FCC TEST REPORT (15.407)

REPORT NO.:	RF140220D04-1
MODEL NO.:	LAPAC1750
FCC ID:	Q87-LAPAC1750
RECEIVED:	Feb. 20, 2014
TESTED:	Feb. 20 ~ Mar. 15, 2014
ISSUED:	Apr. 14, 2014

APPLICANT:	Linksys LLC
ADDRESS:	131 Theory Drive Irvine California 92617 United States

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.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140220D04-1	Original release	Apr. 14, 2014

1. CERTIFICATION

PRODUCT: AC1750 Dual Band Access Point
MODEL: LAPAC1750
BRAND: Linksys
APPLICANT: Linksys LLC
TESTED: Feb. 20 ~ Mar. 15, 2014
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.10-2009

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , **DATE:** Apr. 14, 2014
(Celia Chen / Senior Specialist)

APPROVED BY : _____ , **DATE:** Apr. 14, 2014
(Rex Lai / Assistant 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 Emission	PASS	Meet the requirement of limit. Minimum passing margin is -6.22dB at 0.15000MHz.
15.407(b/1/2/3)(b)(6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5150.00MHz.
15.407(a/1/2)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(6)	Peak Power Excursion	PASS	Meet the requirement of limit.
15.407(a/1/2)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	150kHz~30MHz	3.43 dB
Radiated emissions	30MHz ~ 1GHz	4.00 dB
	Above 1GHz	3.36 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	AC1750 Dual Band Access Point
MODEL NO.	LAPAC1750
POWER SUPPLY	12Vdc from AC Adapter or 48Vdc from PoE
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK 256QAM for OFDM in 11ac mode only
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 450Mbps 802.11ac: up to 1299.9Mbps
OPERATING FREQUENCY	5180.0 ~ 5240.0MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 1 for 802.11ac (80MHz)
OUTPUT POWER	39.4mW
ANTENNA TYPE	PIFA antenna with 2dBi gain
ANTENNA CONNECTOR	N/A
DATA CABLE	Refer to user's manual
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to Note as below

NOTE:

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

Modulation Mode	Tx Function
802.11b	3TX
802.11g	3TX
802.11a	3TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX
802.11ac (80MHz)	3TX

2. The frequency bands used in this EUT are listed as follows:

Frequency Band (MHz)	2412~2462	5180~5240	5745~5825
802.11b	√		
802.11g	√		
802.11a		√	√
802.11n (20MHz)	√	√	√
802.11n (40MHz)	√	√	√
802.11ac (80MHz)		√	√

3. The EUT was power supplied from the following power adapters or PoE:

Item	Brand	Model No.	Plug Type	Rating
Adapter 1	LEI	IU18-2120150-WP	US, EU, UK Plug	AC I/P: 100-240V, 50/60Hz 0.6A DC O/P: 12V 1.5A Non-shielded DC (1.5m)
Adapter 2	LEI	MU18-R120150-A1	US Plug	AC I/P: 100-240V, 50/60Hz 0.6A DC O/P: 12V 1.5A Non-shielded DC (1.5m)
	LEI	MU18-R120150-C5	EU Plug	
	LEI	MU18-R120150-B2	UK Plug	
	LEI	MU18-R120150-A3	AU Plug	
	Four adapters are identical with each other except for their plug type difference			
Adapter 3	DVE	DSA-20CA-12 120150	US, EU, UK Plug	AC I/P: 100-240V, 50/60Hz 0.8A DC O/P: 12V 1.5A Non-shielded DC (1.5m)
Adapter 4	DVE	DSA-18PFG-12 FUS 12015	US Plug	AC I/P:100-240V, 50/60Hz 0.6A DC O/P:12V 1.5A Non-shielded DC (1.5m)
	DVE	DSA-18PFG-12 FEU 120150	EU Plug	
	DVE	DSA-18PFG-12 FUK 120120	UK Plug	
	DVE	DSA-18PFG-12 FAU 120150	AU Plug	
	Four adapters are identical with each other except for their plug type difference			
PoE	-			48Vdc

After pre-tested above four adapters and PoE mode, the **Adapter 2** was the worst case, therefore, only its test data was recorded in this report.

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

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190MHz	46	5230MHz

1 channel is provided for 802.11ac (80MHz):

CHANNEL	FREQUENCY
42	5210MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE: The EUT had been pre-tested on the positioned of 3 axis. The worst case was found when positioned on **X-plane.**

RADIATED EMISSION TEST (ABOVE 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	19.5
-	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	40.5
-	802.11ac (80MHz)	42	42	OFDM	BPSK	87.9

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	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	36 to 48	36	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	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	36 to 48	36	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	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)	36 to 48	36, 40, 48	OFDM	BPSK	19.5
-	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	40.5
-	802.11ac (80MHz)	42	42	OFDM	BPSK	87.9

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	20deg. C, 72%RH	120Vac, 60Hz	Joey Liu
RE<1G	20deg. C, 72%RH	120Vac, 60Hz	Joey Liu
PLC	20deg. C, 70% RH	120Vac, 60Hz	Justin Liu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Dalen Dai

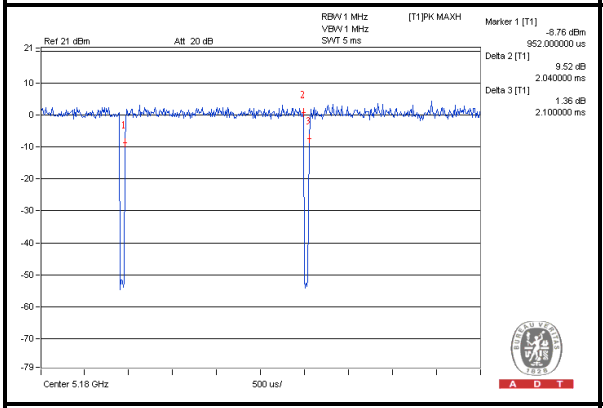
3.3 DUTY CYCLE OF TEST SIGNAL

If duty cycle is < 98%, duty factor shall be considered.

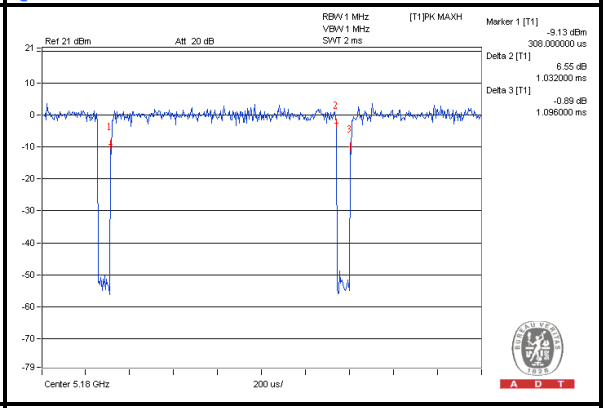
802.11a:

BPSK: Duty cycle = 2.04 / 2.1 = 0.971 , Duty factor = 10 * log(1/ 0.971) = 0.13
QPSK: Duty cycle = 1.032 / 1.096 = 0.942 , Duty factor = 10 * log(1/ 0.942) = 0.26
16QAM: Duty cycle = 0.528 / 0.588 = 0.898 , Duty factor = 10 * log(1/ 0.898) = 0.47
64QAM: Duty cycle = 0.246 / 0.306 = 0.804 , Duty factor = 10 * log(1/ 0.804) = 0.95

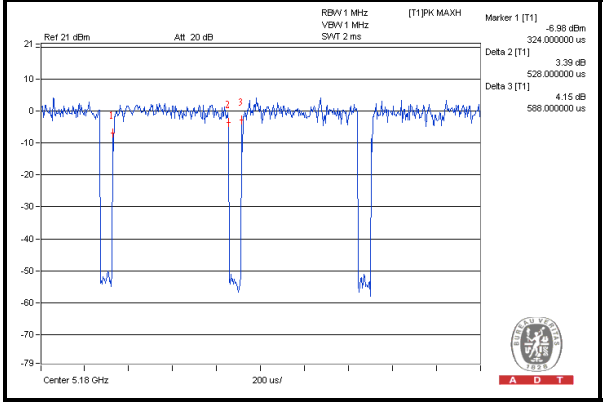
BPSK



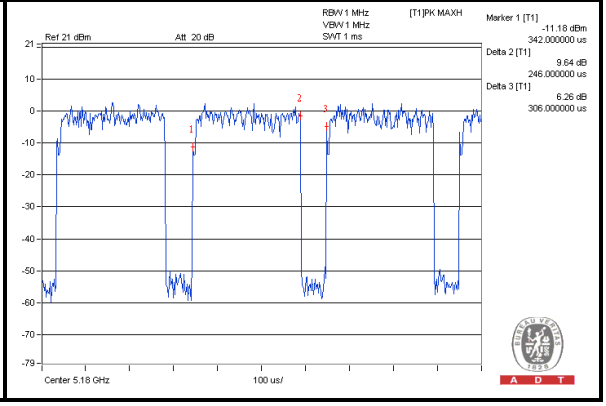
QPSK



16QAM



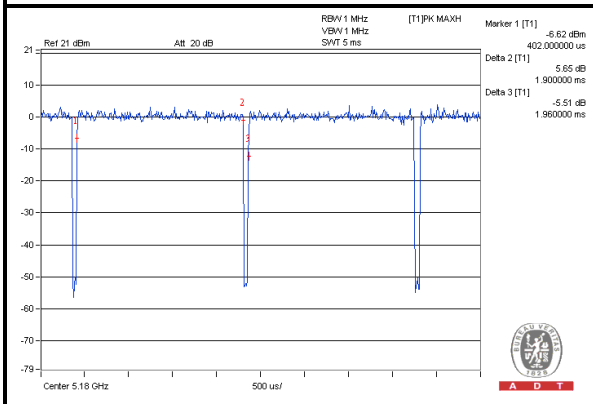
64QAM



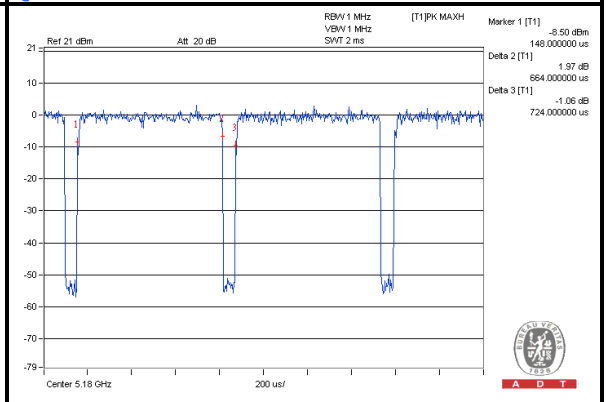
802.11n (20MHz)

BPSK: Duty cycle = 1.9 / 1.96 = 0.969 , Duty factor = 10 * log(1/ 0.969) = 0.14
QPSK: Duty cycle = 0.664 / 0.724 = 0.917 , Duty factor = 10 * log(1/ 0.917) = 0.38
16QAM: Duty cycle = 0.350 / 0.410 = 0.854 , Duty factor = 10 * log(1/ 0.854) = 0.69
64QAM: Duty cycle = 0.226 / 0.286 = 0.790 , Duty factor = 10 * log(1/ 0.790) = 1.02

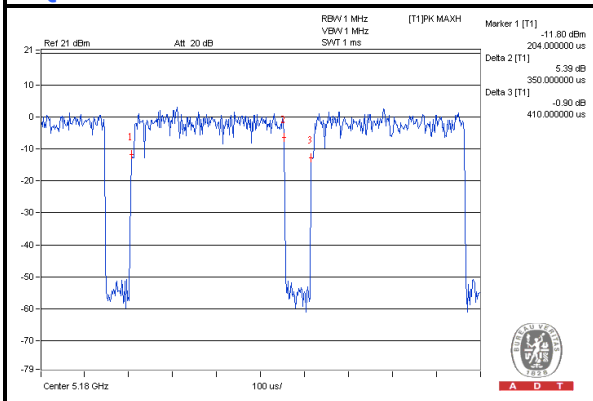
BPSK



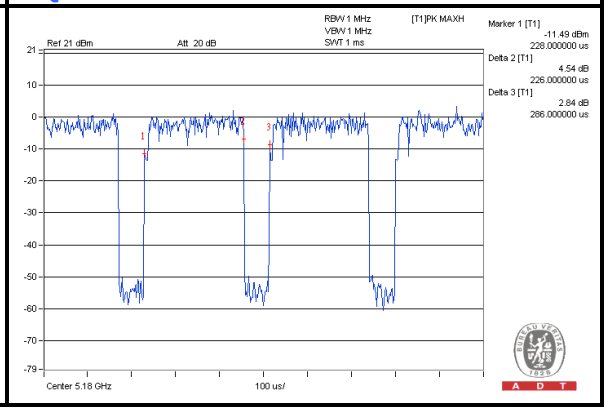
QPSK



16QAM



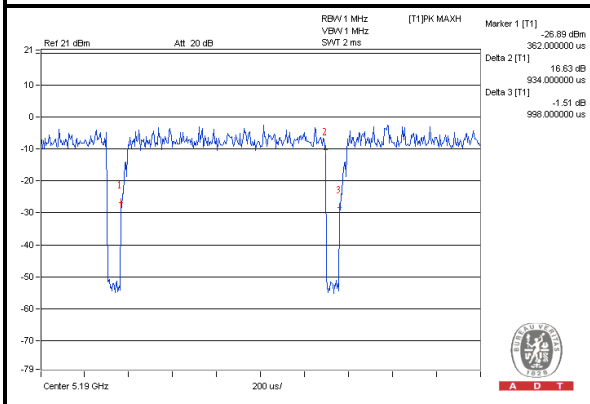
64QAM



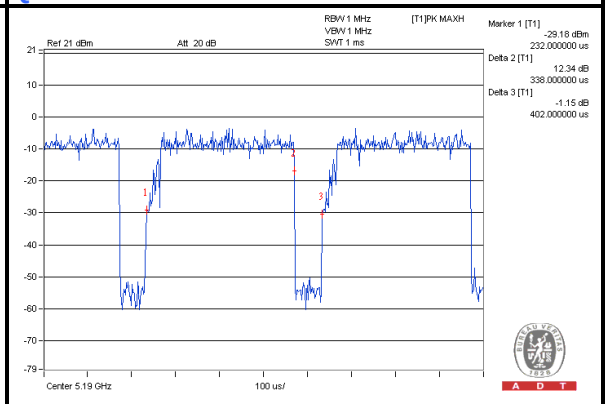
802.11n (40MHz):

BPSK: Duty cycle = 0.934 / 0.998 = 0.936 , Duty factor = 10 * log(1/ 0.936) = 0.29
QPSK: Duty cycle = 0.338 / 0.402 = 0.841 , Duty factor = 10 * log(1/ 0.841) = 0.75
16QAM: Duty cycle = 0.188 / 0.248 = 0.758 , Duty factor = 10 * log(1/ 0.758) = 1.20
64QAM: Duty cycle = 0.128 / 0.189 = 0.677 , Duty factor = 10 * log(1/ 0.677) = 1.69

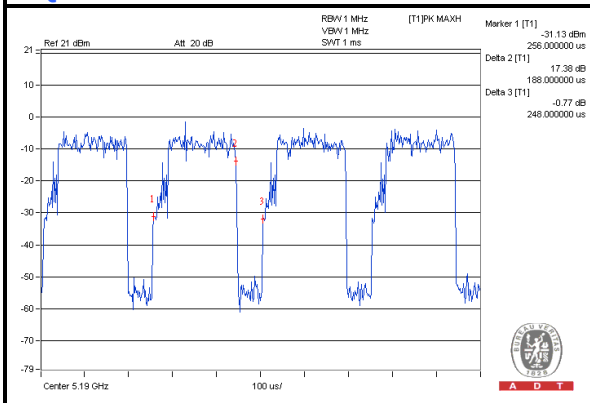
BPSK



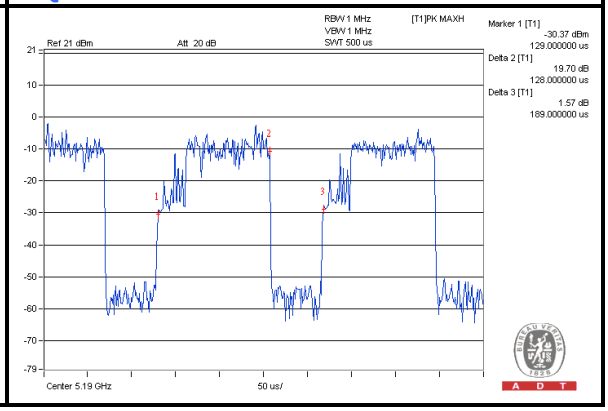
QPSK



16QAM



64QAM



802.11ac (80MHz):

BPSK: Duty cycle = 0.458 / 0.518 = 0.884 , Duty factor = 10 * log(1/ 0.884) = 0.53

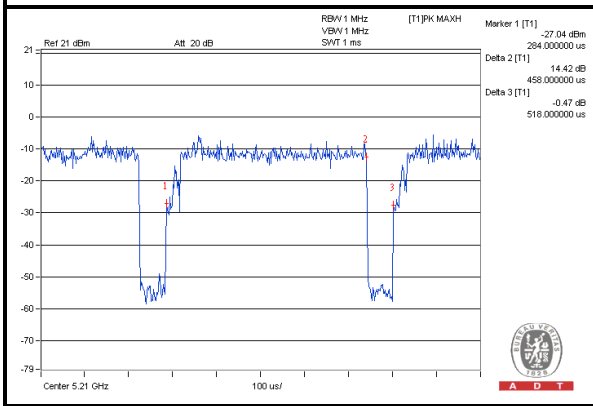
QPSK: Duty cycle = 0.179 / 0.244 = 0.734 , Duty factor = 10 * log(1/ 0.734) = 1.35

16QAM: Duty cycle = 0.113 / 0.178 = 0.635 , Duty factor = 10 * log(1/ 0.635) = 1.97

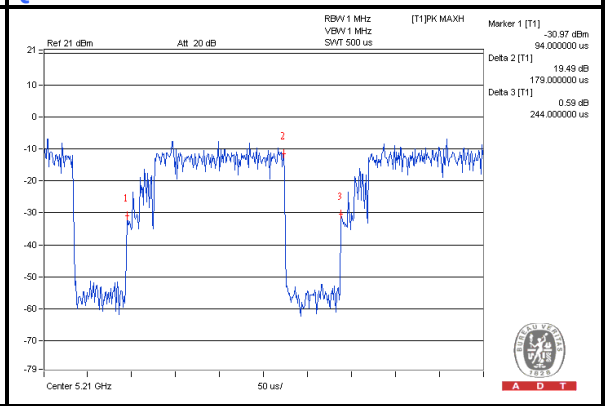
64QAM: Duty cycle = 0.084 / 0.149 = 0.564 , Duty factor = 10 * log(1/ 0.564) = 2.49

256QAM: Duty cycle = 0.059 / 0.111 = 0.532 , Duty factor = 10 * log(1/ 0.532) = 2.74

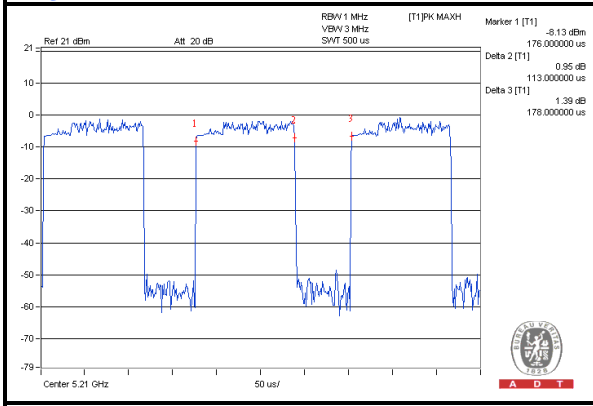
BPSK



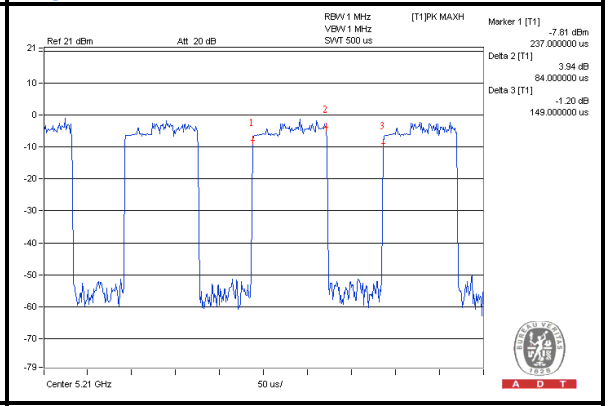
QPSK



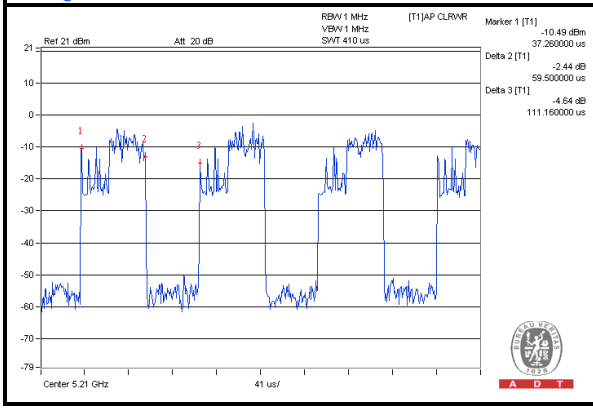
16QAM



64QAM



256QAM



3.4 DESCRIPTION OF SUPPORT UNITS

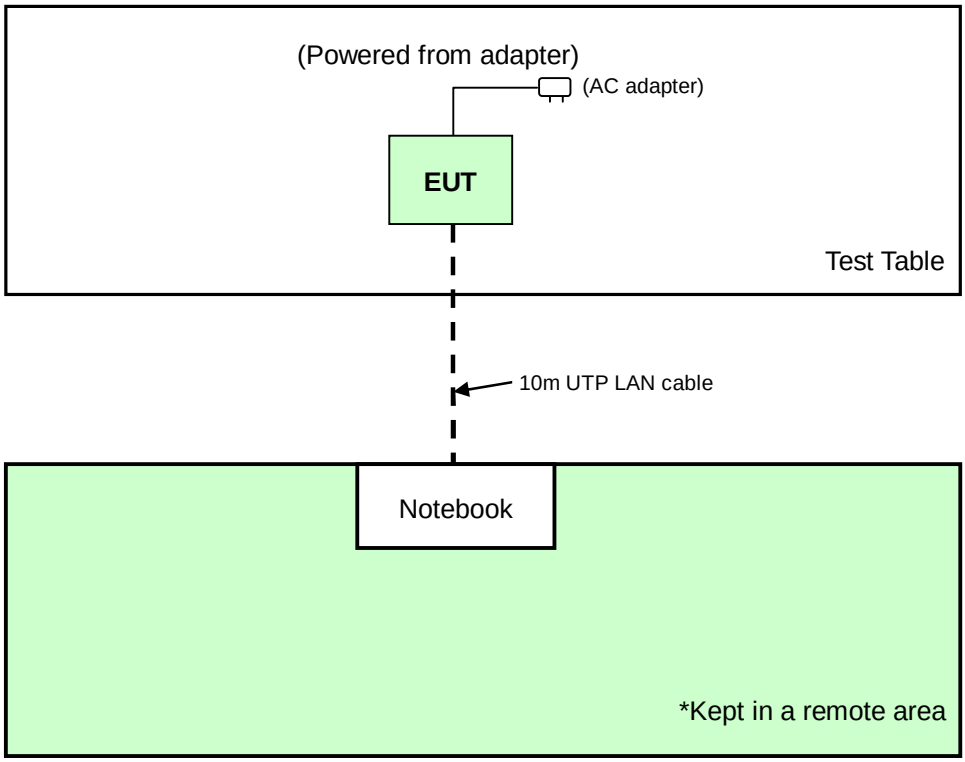
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	BW33YM1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m UTP LAN Cable

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

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 D01 General UNII Test Procedures v01r03
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 product 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	
√	FIELD STRENGTH AT 3m (dBμV/m)	
	PK	AV
	74	54
	EIRP LIMIT (dBm)	EQUIVALENT FIELD STRENGTH AT 3m (dBμV/m)
	PK	PK
	-27	68.3

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

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

4.1.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 26, 2014	Feb. 25, 2015
HP Preamplifier	8449B	3008A01201	Feb. 26, 2014	Feb. 25, 2015
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 18, 2014	Jan. 17, 2015
Schwarzbeck Antenna	VULB 9168	139	Feb. 24, 2014	Feb. 23, 2015
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2013	May 28, 2015
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.4	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 16, 2013	Aug. 15, 2014
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	May 13, 2013	May 12, 2014
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	May 17, 2013	May 16, 2014
Anritsu Power Sensor	MA2411B	0738404	Apr. 24, 2013	Apr. 23, 2014
Anritsu Power Meter	ML2495A	0842014	Apr. 25, 2013	Apr. 24, 2014

NOTE: 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.

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 camber. 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:

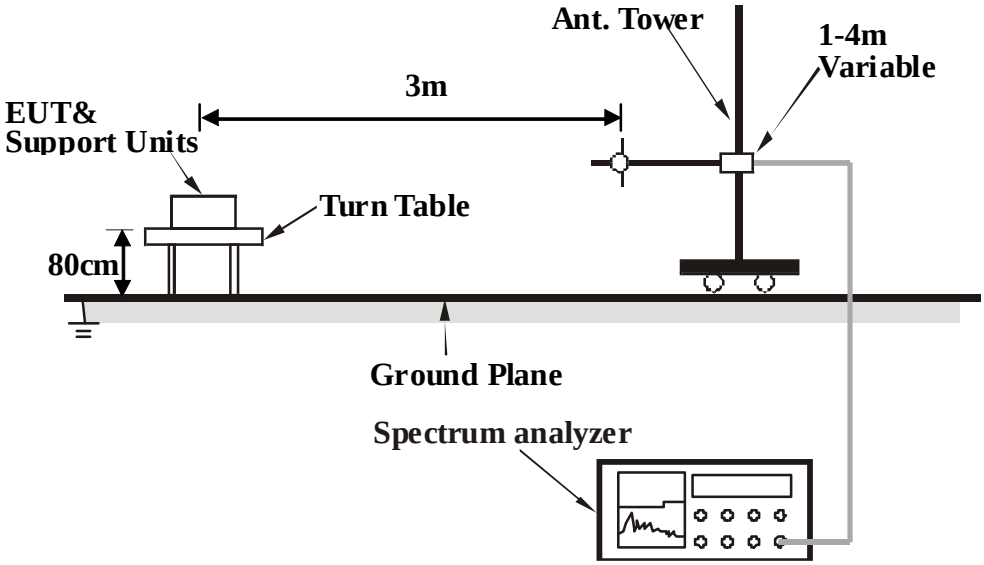
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

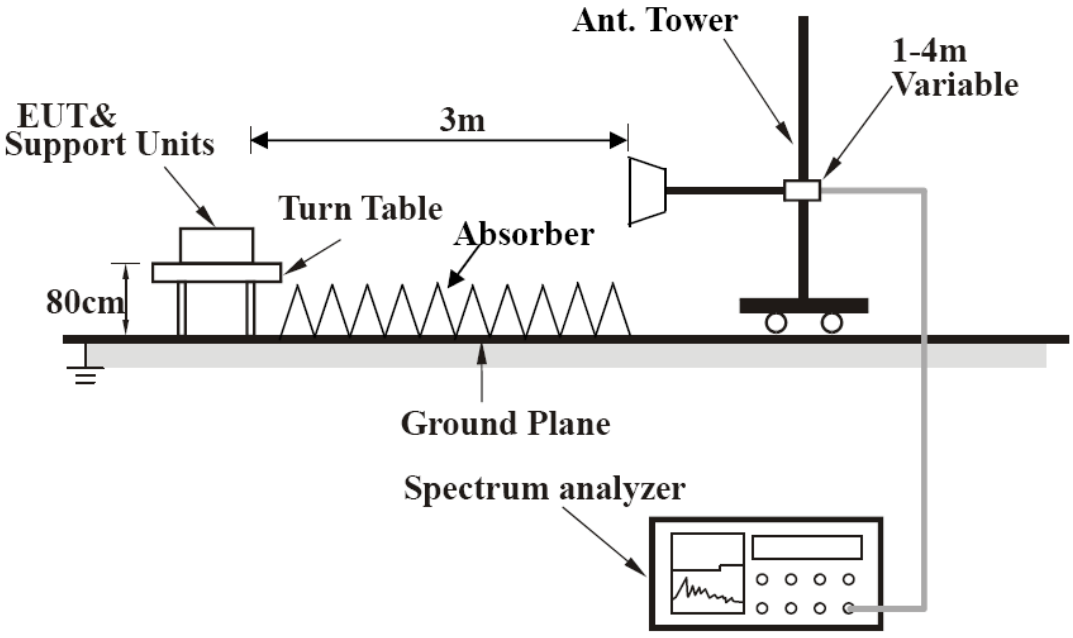
No deviation.

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

The Notebook connected with EUT via a LAN cable and run a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

4.1.8 TEST RESULTS

ABOVE 1GHz DATA

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	70.8 PK	74.0	-3.2	1.46 H	20	67.65	3.17
2	5150.00	51.3 AV	54.0	-2.8	1.46 H	20	48.08	3.17
3	*5180.00	112.8 PK			1.46 H	20	109.51	3.26
4	*5180.00	96.6 AV			1.46 H	20	93.33	3.26
5	#10360.00	59.9 PK	74.0	-14.1	1.46 H	22	45.13	14.79
6	#10360.00	46.2 AV	54.0	-7.8	1.46 H	22	31.42	14.79
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	72.7 PK	74.0	-1.3	1.00 V	331	69.55	3.17
2	**5150.00**	**52.9 AV**	**54.0**	**-1.1**	**1.00 V**	**331**	**49.71**	**3.17**
3	*5180.00	115.9 PK			1.00 V	330	112.64	3.26
4	*5180.00	100.3 AV			1.00 V	330	97.03	3.26
5	#10360.00	59.9 PK	74.0	-14.1	1.00 V	330	45.12	14.79
6	#10360.00	46.2 AV	54.0	-7.8	1.00 V	330	31.45	14.79

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	113.3 PK			1.00 H	16	109.99	3.31
2	*5200.00	98.0 AV			1.00 H	16	94.72	3.31
3	#10400.00	59.7 PK	74.0	-14.3	1.45 H	16	44.55	15.17
4	#10400.00	46.3 AV	54.0	-7.7	1.45 H	16	31.12	15.17
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	114.7 PK			1.00 V	322	111.37	3.31
2	*5200.00	100.0 AV			1.00 V	322	96.71	3.31
3	#10400.00	60.3 PK	74.0	-13.7	1.00 V	322	45.12	15.17
4	#10400.00	47.0 AV	54.0	-7.0	1.00 V	322	31.87	15.17

REMARKS:

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

CHANNEL	TX Channel 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	112.4 PK			1.45 H	3	109.02	3.40
2	*5240.00	96.8 AV			1.45 H	3	93.42	3.40
3	5350.00	57.6 PK	74.0	-16.4	1.45 H	4	53.80	3.79
4	5350.00	44.3 AV	54.0	-9.8	1.45 H	4	40.46	3.79
5	#10480.00	61.0 PK	74.0	-13.0	1.45 H	3	45.91	15.06
6	#10480.00	46.8 AV	54.0	-7.2	1.45 H	3	31.71	15.06
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	115.1 PK			1.00 V	322	111.65	3.40
2	*5240.00	100.1 AV			1.00 V	322	96.72	3.40
3	5350.00	57.4 PK	74.0	-16.6	1.00 V	322	53.62	3.79
4	5350.00	44.2 AV	54.0	-9.8	1.00 V	322	40.39	3.79
5	#10480.00	60.0 PK	74.0	-14.0	1.00 V	330	44.94	15.06
6	#10480.00	47.2 AV	54.0	-6.8	1.00 V	330	32.13	15.06

REMARKS:

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

802.11n (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	58.5 PK	74.0	-15.5	1.40 H	27	55.36	3.17
2	5150.00	44.6 AV	54.0	-9.4	1.40 H	27	41.46	3.17
3	*5180.00	109.6 PK			1.40 H	27	106.34	3.26
4	*5180.00	97.4 AV			1.40 H	27	94.12	3.26
5	#10360.00	59.4 PK	74.0	-14.6	1.40 H	27	44.58	14.79
6	#10360.00	45.8 AV	54.0	-8.2	1.40 H	27	30.98	14.79
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	61.7 PK	74.0	-12.3	1.02 V	323	58.52	3.17
2	5150.00	45.5 AV	54.0	-8.5	1.02 V	323	42.35	3.17
3	*5180.00	114.7 PK			1.02 V	323	111.41	3.26
4	*5180.00	102.5 AV			1.02 V	323	99.26	3.26
5	#10360.00	60.2 PK	74.0	-13.8	1.02 V	323	45.42	14.79
6	#10360.00	46.1 AV	54.0	-7.9	1.02 V	323	31.34	14.79

REMARKS:

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

CHANNEL	TX Channel 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	111.6 PK			1.40 H	17	108.27	3.31
2	*5200.00	99.5 AV			1.40 H	17	96.16	3.31
3	#10400.00	59.7 PK	74.0	-14.3	1.40 H	17	44.57	15.17
4	#10400.00	45.3 AV	54.0	-8.7	1.40 H	17	30.13	15.17
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	114.4 PK			1.00 V	323	111.06	3.31
2	*5200.00	102.2 AV			1.00 V	323	98.92	3.31
3	#10400.00	59.3 PK	74.0	-14.7	1.02 V	323	44.12	15.17
4	#10400.00	45.3 AV	54.0	-8.7	1.02 V	323	30.15	15.17

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.0 PK			1.60 H	4	109.61	3.40
2	*5240.00	101.3 AV			1.60 H	4	97.93	3.40
3	5350.00	58.6 PK	74.0	-15.4	1.60 H	4	54.82	3.79
4	5350.00	44.3 AV	54.0	-9.8	1.60 H	4	40.46	3.79
5	#10480.00	59.5 PK	74.0	-14.5	1.60 H	4	44.41	15.06
6	#10480.00	45.5 AV	54.0	-8.6	1.60 H	4	30.39	15.06
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	114.7 PK			1.00 V	322	111.30	3.40
2	*5240.00	102.6 AV			1.00 V	322	99.24	3.40
3	5350.00	57.7 PK	74.0	-16.3	1.00 V	322	53.92	3.79
4	5350.00	44.2 AV	54.0	-9.9	1.00 V	322	40.36	3.79
5	#10480.00	59.8 PK	74.0	-14.2	1.00 V	322	44.78	15.06
6	#10480.00	47.0 AV	54.0	-7.0	1.00 V	322	31.98	15.06

REMARKS:

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

802.11n (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	67.0 PK	74.0	-7.0	1.53 H	3	63.85	3.17
2	5150.00	51.3 AV	54.0	-2.7	1.53 H	3	48.10	3.17
3	*5190.00	107.7 PK			1.53 H	3	104.45	3.28
4	*5190.00	94.1 AV			1.53 H	3	90.82	3.28
5	#10380.00	59.1 PK	74.0	-14.9	1.53 H	3	44.15	14.98
6	#10380.00	44.2 AV	54.0	-9.8	1.53 H	3	29.24	14.98
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	67.9 PK	74.0	-6.1	1.00 V	330	64.77	3.17
2	5150.00	51.1 AV	54.0	-2.9	1.00 V	330	47.89	3.17
3	*5190.00	109.9 PK			1.00 V	330	106.65	3.28
4	*5190.00	96.2 AV			1.00 V	330	92.88	3.28
5	11380.00	62.3 PK	74.0	-11.7	1.00 V	330	44.54	17.80
6	11380.00	48.3 AV	54.0	-5.8	1.00 V	330	30.45	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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 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	109.2 PK			1.53 H	6	105.81	3.37
2	*5230.00	95.8 AV			1.53 H	6	92.45	3.37
3	5350.00	59.4 PK	74.0	-14.6	1.53 H	6	55.57	3.79
4	5350.00	45.4 AV	54.0	-8.6	1.53 H	6	41.62	3.79
5	#10460.00	59.6 PK	74.0	-14.4	1.53 H	6	44.53	15.09
6	#10460.00	45.2 AV	54.0	-8.8	1.53 H	6	30.11	15.09
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	110.6 PK			1.00 V	322	107.23	3.37
2	*5230.00	96.4 AV			1.00 V	322	93.04	3.37
3	5350.00	59.4 PK	74.0	-14.6	1.00 V	322	55.61	3.79
4	5350.00	45.6 AV	54.0	-8.4	1.00 V	322	41.81	3.79
5	#10460.00	59.7 PK	74.0	-14.3	1.00 V	322	44.65	15.09
6	#10460.00	45.3 AV	54.0	-8.7	1.00 V	322	30.17	15.09

REMARKS:

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

802.11ac (80MHz)

CHANNEL	TX Channel 42	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	67.5 PK	74.0	-6.5	1.54 H	24	64.32	3.17
2	5150.00	46.8 AV	54.0	-7.2	1.54 H	24	43.63	3.17
3	*5210.00	100.2 PK			1.54 H	24	96.86	3.33
4	*5210.00	72.1 AV			1.54 H	24	68.78	3.33
5	5350.00	49.8 PK	74.0	-24.2	1.54 H	24	45.97	3.79
6	5350.00	36.0 AV	54.0	-18.0	1.54 H	24	32.17	3.79
7	#10420.00	59.6 PK	74.0	-14.4	1.54 H	21	44.46	15.14
8	#10420.00	46.1 AV	54.0	-7.9	1.54 H	21	30.97	15.14
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	72.8 PK	74.0	-1.2	1.00 V	322	69.64	3.17
2	5150.00	49.5 AV	54.0	-4.5	1.00 V	322	46.30	3.17
3	*5210.00	106.0 PK			1.00 V	322	102.63	3.33
4	*5210.00	75.8 AV			1.00 V	322	72.50	3.33
5	5350.00	50.9 PK	74.0	-23.1	1.00 V	322	47.12	3.79
6	5350.00	37.3 AV	54.0	-16.7	1.00 V	322	33.55	3.79
7	#10420.00	63.1 PK	74.0	-10.9	1.00 V	322	47.97	15.14
8	#10420.00	47.9 AV	54.0	-6.1	1.00 V	322	32.74	15.14

REMARKS:

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

BELOW 1GHz WORST-CASE DATA

802.11a

CHANNEL	TX Channel 36	**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	38.73	24.3 QP	40.0	-15.7	1.17 H	205	39.03	-14.72
2	182.53	23.9 QP	43.5	-19.6	1.25 H	123	39.41	-15.55
3	375.03	39.2 QP	46.0	-6.8	1.33 H	194	50.43	-11.20
4	500.01	28.6 QP	46.0	-17.4	1.16 H	20	37.59	-9.02
5	875.02	35.0 QP	46.0	-11.1	1.28 H	184	38.05	-3.10
6	900.04	37.7 QP	46.0	-8.3	1.35 H	252	40.29	-2.57
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	38.73	24.3 QP	40.0	-15.7	1.17 V	205	39.03	-14.72
2	182.53	23.9 QP	43.5	-19.6	1.25 V	123	39.41	-15.55
3	375.03	39.2 QP	46.0	-6.8	1.33 V	194	50.43	-11.20
4	500.01	28.6 QP	46.0	-17.4	1.16 V	20	37.59	-9.02
5	875.02	35.0 QP	46.0	-11.1	1.28 V	184	38.05	-3.10
6	900.04	37.7 QP	46.0	-8.3	1.35 V	252	40.29	-2.57

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

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

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

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

4.2.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCI	100412	Sep. 13, 2013	Sep. 12, 2014
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH2-Z5	100104	Dec. 06, 2013	Dec. 05, 2014
LISN With Adapter (for EUT)	AD10	C09Ada-001	Dec. 06, 2013	Dec. 05, 2014
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100220	Nov. 17, 2013	Nov. 16, 2014
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	835239/002	Mar. 08, 2013	Mar. 07, 2014
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 15, 2013	May 14, 2014
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C09.01	Feb. 20, 2014	Feb. 19, 2015
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010789	May 23, 2013	May 22, 2014
Isolation Transformer (Erika Fiedler)	D-65396	017	Jul. 29, 2013	Jul. 28, 2014

Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 9.
3. The VCCI Site Registration No. C-1312.
4. Tested Date: Feb. 20, 2014.

4.2.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

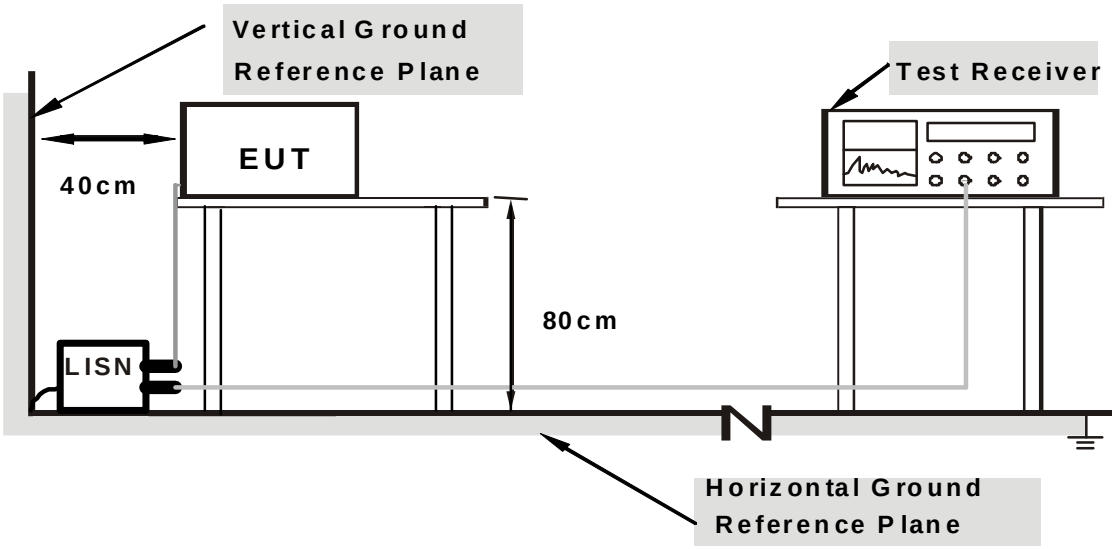
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

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

4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

4.2.7 TEST RESULTS

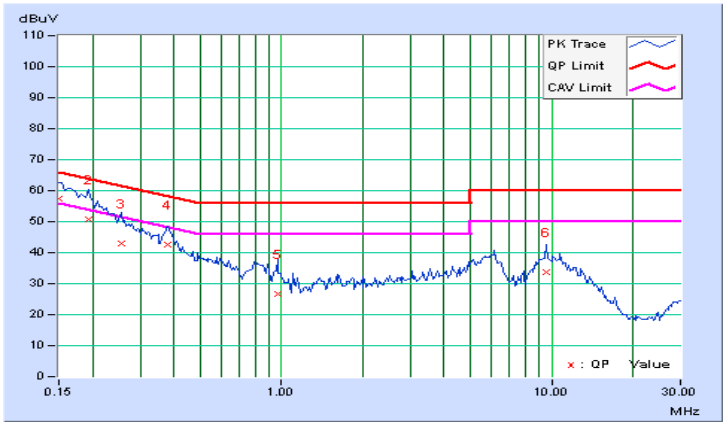
CONDUCTED WORST-CASE DATA： 802.11a

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Channel	TX Channel 36		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.16	57.31	36.45	57.47	36.61	66.00	56.00	-8.53	-19.39
2	0.19297	0.16	50.50	29.32	50.66	29.48	63.91	53.91	-13.25	-24.43
3	0.25547	0.18	42.66	25.02	42.84	25.20	61.58	51.58	-18.74	-26.38
4	0.38047	0.21	42.32	36.25	42.53	36.46	58.27	48.27	-15.74	-11.81
5	0.97031	0.26	26.46	17.22	26.72	17.48	56.00	46.00	-29.28	-28.52
6	9.55078	0.73	33.02	27.66	33.75	28.39	60.00	50.00	-26.25	-21.61

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

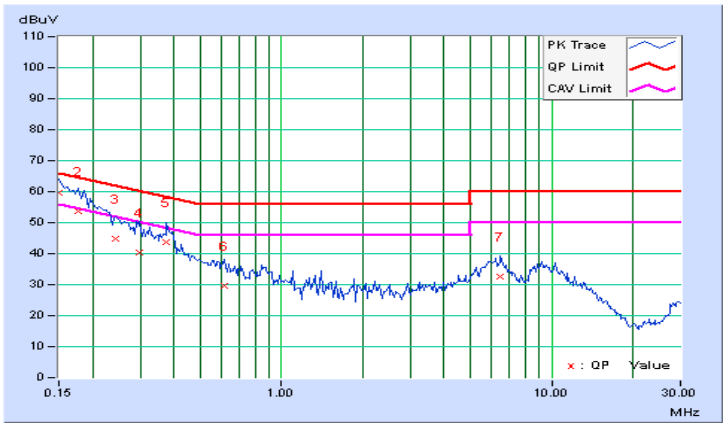


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Channel	TX Channel 36		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15000**	**0.30**	**59.48**	**39.40**	**59.78**	**39.70**	**66.00**	**56.00**	**-6.22**	**-16.30**
2	0.17734	0.31	53.53	34.93	53.84	35.24	64.61	54.61	-10.77	-19.37
3	0.24375	0.33	44.41	26.24	44.74	26.57	61.97	51.97	-17.22	-25.39
4	0.29844	0.35	39.98	29.10	40.33	29.45	60.29	50.29	-19.96	-20.84
5	0.37656	0.37	43.42	39.61	43.79	39.98	58.35	48.35	-14.56	-8.37
6	0.61484	0.40	29.16	23.37	29.56	23.77	56.00	46.00	-26.44	-22.23
7	6.47656	0.63	31.78	26.30	32.41	26.93	60.00	50.00	-27.59	-23.07

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 PEAK TRANSMIT POWER MEASUREMENT

4.3.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB

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

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

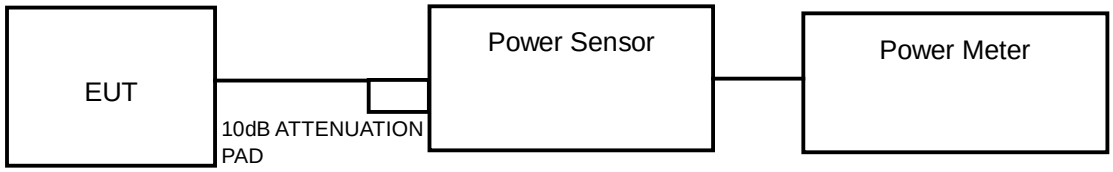
Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

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

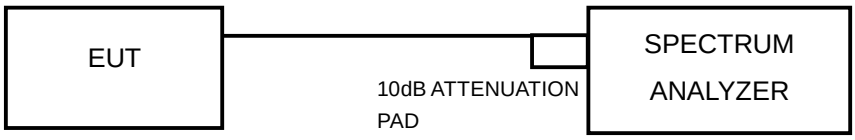
4.3.2 TEST SETUP

FOR POWER OUTPUT MEASUREMENT

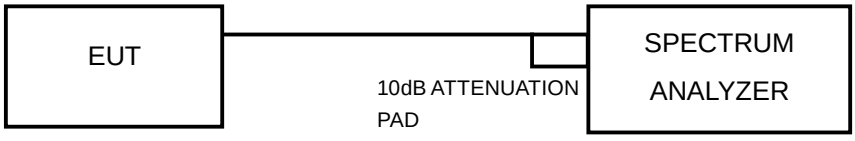
For 802.11a, 802.11n (20MHz), 802.11n (40MHz)



For 802.11ac (80MHz),



FOR 26dB BANDWIDTH



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.

For 802.11ac (80MHz)

Method SA-1

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1 MHz.
3) Set VBW ≥ 3 MHz.
4) Number of points in sweep ≥ 2 Span / RBW.
5) Sweep time = auto.
6) Set trigger to free run (duty cycle≥98 percent); Set video trigger (duty cycle<98 percent)
7) Detector = RMS.
8) Trace average at least 100 traces in power averaging mode
9) Compute power by integrating the spectrum across the 26 dB EBW of the signal.

FOR 26dB BANDWIDTH

1) Set RBW = approximately 1% of the emission bandwidth.
2) Set the VBW > RBW.
3) Detector = Peak.
4) Trace mode = max hold.
5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

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.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	10.97	11.21	11.09	38.6	15.86	17	PASS
40	5200	10.74	10.86	10.39	35.0	15.44	17	PASS
48	5240	11.13	11.07	10.53	37.1	15.69	17	PASS

CHAIN 0
1. 4dBm + 10log(22.55) = 17.53dBm > 17dBm.
2. 4dBm + 10log(22.33) = 17.49dBm > 17dBm.
3. 4dBm + 10log(22.03) = 17.43dBm > 17dBm.

CHAIN 1
1. 4dBm + 10log(21.93) = 17.41dBm > 17dBm.
2. 4dBm + 10log(22.05) = 17.43dBm > 17dBm.
3. 4dBm + 10log(22.25) = 17.47dBm > 17dBm.

CHAIN 2
1. 4dBm + 10log(22.17) = 17.46dBm > 17dBm.
2. 4dBm + 10log(21.95) = 17.41dBm > 17dBm.
3. 4dBm + 10log(21.39) = 17.30dBm > 17dBm.

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
36	5180	10.86	11.52	10.14	36.7	15.65	17	PASS
40	5200	10.89	11.49	10.08	36.6	15.63	17	PASS
48	5240	11.25	11.57	10.70	**39.4**	15.96	17	PASS

CHAIN 0
1. 4dBm + 10log(23.60) = 17.73dBm > 17dBm.
2. 4dBm + 10log(23.22) = 17.66dBm > 17dBm.
3. 4dBm + 10log(23.28) = 17.67dBm > 17dBm.

CHAIN 1
1. 4dBm + 10log(23.54) = 17.72dBm > 17dBm.
2. 4dBm + 10log(23.03) = 17.62dBm > 17dBm.
3. 4dBm + 10log(23.40) = 17.69dBm > 17dBm.

CHAIN 2
1. 4dBm + 10log(23.00) = 17.62dBm > 17dBm.
2. 4dBm + 10log(22.46) = 17.51dBm > 17dBm.
3. 4dBm + 10log(23.15) = 17.65dBm > 17dBm.

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
38	5190	11.09	11.59	10.49	38.5	15.85	17	PASS
46	5230	10.49	11.23	10.42	35.5	15.50	17	PASS

CHAIN 0
1. 4dBm + 10log(45.56) = 20.59dBm > 17dBm.
2. 4dBm + 10log(46.39) = 20.66dBm > 17dBm.

CHAIN 1
1. 4dBm + 10log(45.19) = 20.55dBm > 17dBm.
2. 4dBm + 10log(45.70) = 20.60dBm > 17dBm.

CHAIN 2
1. 4dBm + 10log(44.74) = 20.51dBm > 17dBm.
2. 4dBm + 10log(45.38) = 20.57dBm > 17dBm.

802.11ac (80MHz)

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
42	5210	11.12	11.42	10.32	37.6	15.75	17	PASS

CHAIN 0
4dBm + 10log(86.81) = 23.39dBm > 17dBm.

CHAIN 1
4dBm + 10log(86.14) = 23.35dBm > 17dBm.

CHAIN 2
4dBm + 10log(86.70) = 23.38dBm > 17dBm.

26dB BANDWIDTH:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	22.55	21.93	22.17	PASS
40	5200	22.33	22.05	21.95	PASS
48	5240	22.03	22.25	21.39	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	23.60	23.54	23.00	PASS
40	5200	23.22	23.03	22.46	PASS
48	5240	23.28	23.40	23.15	PASS

802.11n (40MHz)

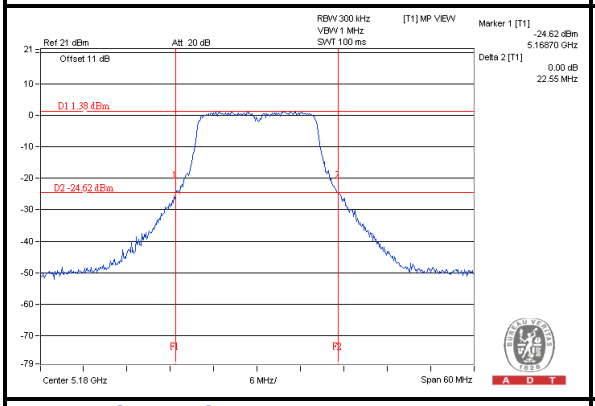
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
38	5190	46.56	45.19	44.74	PASS
46	5230	46.39	45.70	45.38	PASS

802.11ac (80MHz)

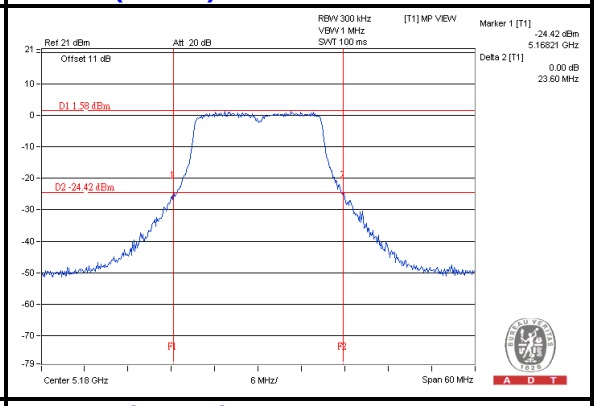
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
42	5210	86.81	86.14	86.70	PASS

SPECTRUM PLOT OF WORST VALUE

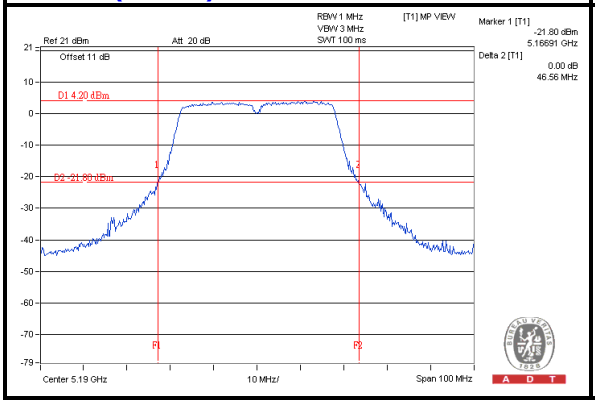
802.11a



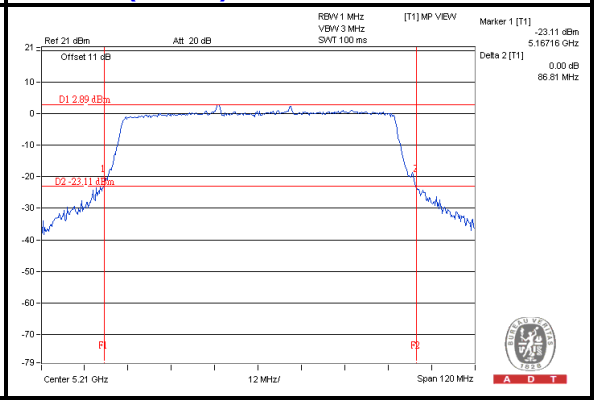
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)

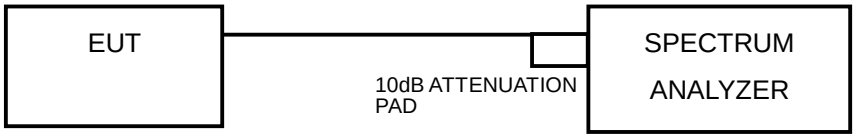


4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

FREQUENCY BAND	LIMIT
5.15 ~ 5.25GHz	4dBm

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

a. The transmitter output was connected to the spectrum analyzer.

b. Set RBW = 1MHz, VBW = 3MHz. The PPSD is the highest level found across the emission in any 1MHz band.

Follow method 2 of KDB 662911 D01 Multiple Transmitter Output v01 to calculate total power density of 3 TX port.

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 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	-1.80	-1.60	-2.89	2.71	0.13	2.84	3.23	PASS
40	5200	-1.37	-1.65	-2.53	2.95	0.13	3.08	3.23	PASS
48	5240	-1.57	-1.75	-2.34	2.90	0.13	3.03	3.23	PASS

NOTE:

1. Method a) 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 = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 4-(6.77-6) =3.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

CHAN.	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	-2.12	-1.86	-2.60	2.59	0.14	2.73	3.23	PASS
40	5200	-1.68	-1.84	-2.46	2.79	0.14	2.93	3.23	PASS
48	5240	-1.51	-1.79	-2.70	2.80	0.14	2.94	3.23	PASS

NOTE:

1. Method a) 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 = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 4-(6.77-6) =3.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (40MHz)

CHAN.	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	-5.15	-5.04	-6.07	-0.62	0.29	-0.33	3.23	PASS
46	5230	-4.67	-5.26	-5.90	-0.48	0.29	-0.19	3.23	PASS

NOTE:

1. Method a) 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 = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 4-(6.77-6) =3.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (80MHz)

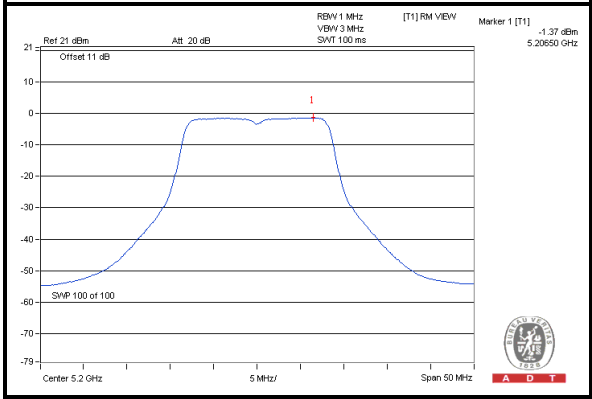
CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2					
42	5210	-6.80	-8.44	-9.53	-3.34	0.54	-2.80	3.23	PASS

NOTE:

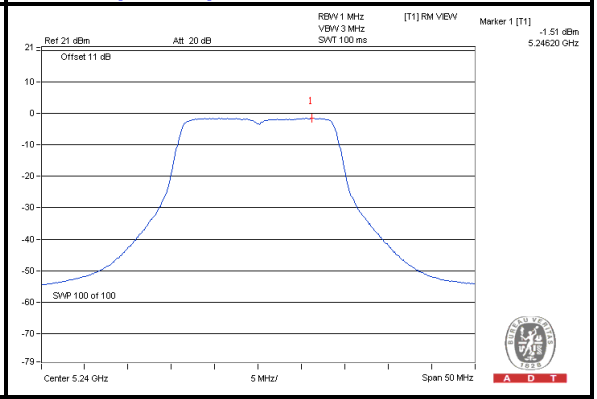
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 2dBi + 10log(3) = 6.77dBi > 6dBi , so the power density limit shall be reduced to 4-(6.77-6) =3.23dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

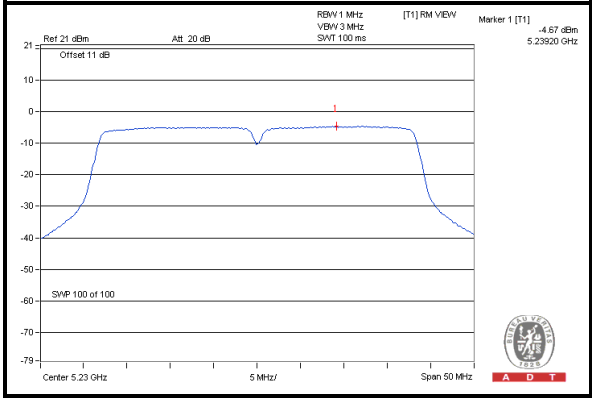
802.11a



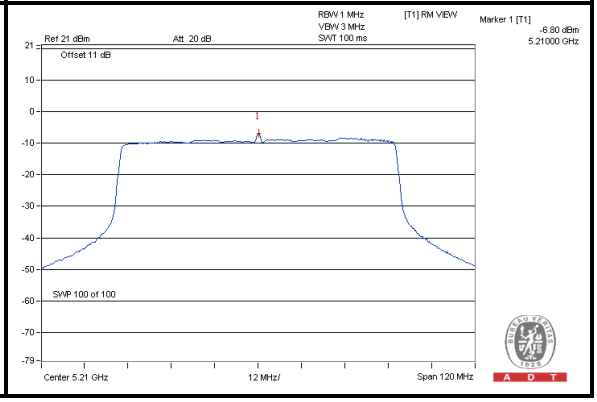
802.11n (20MHz)



802.11n (40MHz)



802.11ac (80MHz)

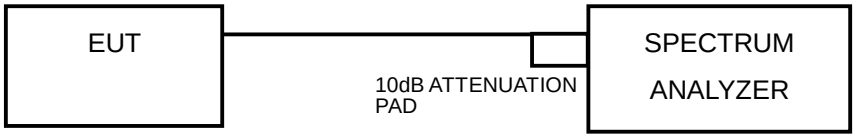


4.5 PEAK POWER EXCURSION MEASUREMENT

4.5.1 LIMITS OF PEAK POWER EXCURSION MEASUREMENT

Shall not exceed 13 dB

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

1) Set RBW = 1 MHz, VBW ≥ 3 MHz, Detector = peak.
2) Trace mode = max-hold. Allow the sweeps to continue until the trace stabilizes.
3) Use the peak search function to find the peak of the spectrum.
4) Measure the PPSD.
5) Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.
   Find the worst channel and modulation mode as above test procedure, and follow KDB 789033 D01 General UNII Test Procedures v01r03 and repeat step 1 to 5 for final testing of each modulation mode on a single channel (all modulation types) in a single operating band to compliance with the peak excursion requirement.

4.5.5 DEVIATION FROM TEST STANDARD

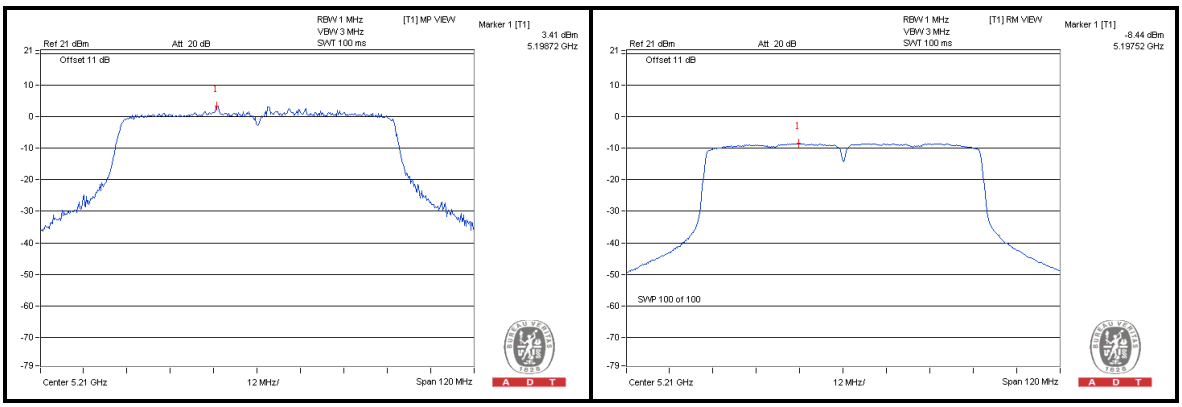
No deviation.

4.5.6 EUT OPERATING CONDITIONS

Same as item 4.2.6

4.5.7 TEST RESULTS

MODULATION MODE	MODULATION TYPE	CHAN. FREQ. (MHz)	PEAK VALUE (dBm)	PPSD WITHOUT DUTY FACTOR (dBm)	PPSD WITH DUTY FACTOR (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS /FAIL
802.11a	BPSK	5180	9.56	-1.60	-1.47	11.03	13	PASS
	QPSK		8.15	-2.05	-1.79	9.94	13	PASS
	16QAM		8.04	-2.16	-1.69	9.73	13	PASS
	64QAM		7.19	-4.27	-3.32	10.51	13	PASS
802.11n (20MHz)	BPSK	5180	8.38	-1.86	-1.72	10.10	13	PASS
	QPSK		7.96	-2.29	-1.91	9.87	13	PASS
	16QAM		8.78	-1.83	-1.14	9.92	13	PASS
	64QAM		6.54	-4.58	-3.56	10.10	13	PASS
802.11n (40MHz)	BPSK	5190	5.40	-5.04	-4.75	10.15	13	PASS
	QPSK		4.24	-5.99	-5.24	9.48	13	PASS
	16QAM		4.71	-6.27	-5.07	9.78	13	PASS
	64QAM		5.48	-6.58	-4.89	10.37	13	PASS
802.11ac (80MHz)	BPSK	5210	3.41	-8.44	-7.91	11.32	13	PASS
	QPSK		2.54	-9.68	-8.33	10.87	13	PASS
	16QAM		2.87	-9.98	-8.01	10.88	13	PASS
	64QAM		2.02	-10.14	-7.65	9.67	13	PASS
	256QAM		1.96	-10.44	-7.70	9.66	13	PASS

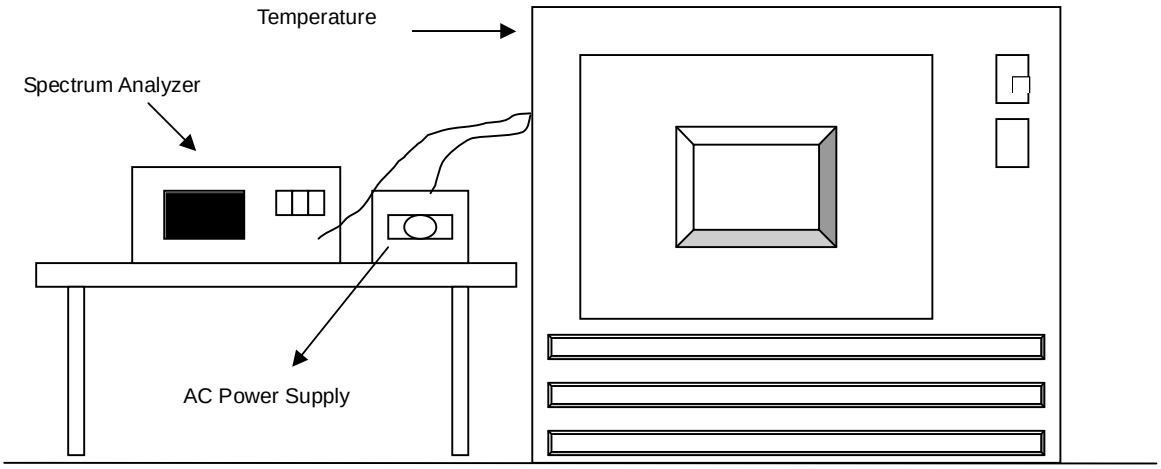


4.6 FREQUENCY STABILITY

4.6.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

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

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.6.4 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.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

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

4.6.7 TEST RESULTS

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
40	120	5180.042874	8.2768248	5180.042954	8.2922145	5180.043043	8.3093925	5180.042795	8.2615977
30	120	5180.043201	8.3399060	5180.042881	8.2781242	5180.042887	8.2794203	5180.042686	8.2405120
20	120	5180.043498	8.3972985	5180.043382	8.3748391	5180.043338	8.3664097	5180.043565	8.4103155
10	120	5180.042586	8.2211454	5180.042763	8.2553693	5180.042688	8.2408694	5180.043085	8.3175592
0	120	5180.042749	8.2527124	5180.042317	8.1693969	5180.042638	8.2312784	5180.042585	8.2210104

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)	Measured Frequency (MHz)	Frequency Drift (ppm)
20	138	5180.042812	8.2648911	5180.042857	8.2734716	5180.043037	8.3082494	5180.043106	8.3216243
	120	5180.043498	8.3972985	5180.043382	8.3748391	5180.043338	8.3664097	5180.043565	8.4103155
	102	5180.042421	8.1893361	5180.04264	8.2316932	5180.042458	8.1965587	5180.042702	8.2435516

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:

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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.

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---