FCC TEST REPORT
(WLAN 15.407)

REPORT NO.:	RF130903D17-1
MODEL NO.:	AW-WD089
FCC ID:	ARS-AWWD089
RECEIVED:	Sep. 3, 2013
TESTED:	Sep. 6 ~ 24, 2013
ISSUED:	Oct. 14, 2013

APPLICANT:	TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.
ADDRESS:	10F., No 230, Liancheng Rd., Zhonghe Dist., New Taipei City 23553, Taiwan

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

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
RF130903D17-1	Original release	Oct. 14, 2013

1. CERTIFICATION

PRODUCT: Miracast WiFi Display HDMI module
MODEL: AW-WD089
APPLICANT: TOP VICTORY ELECTRONICS (TAIWAN) CO., LTD.
TESTED: Sep. 6 ~ 24, 2013
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 : Annie Chang , **DATE:** Oct. 14, 2013
(Annie Chang / Supervisor)

APPROVED BY : Rex. Lai , **DATE:** Oct. 14, 2013
(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 -5.01dB at 0.56016MHz.
15.407(b/1/2/3)(b)(6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.4dB at 10400.00MHz.
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	Antenna connector is I-PEX 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	150kHz~30MHz	2.41 dB
Radiated emissions	30MHz ~ 1GHz	4.30 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	Miracast WiFi Display HDMI module
MODEL NO.	AW-WD089
POWER SUPPLY	5.0Vdc from host equipment
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 135Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	27.0mW
ANTENNA TYPE	Refer to note below
ANTENNA CONNECTOR	Refer to note below
DATA CABLE	N/A
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	N/A

NOTE:

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

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11a	1TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

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)	√	√	√

3. The following antennas were applied to the EUT:

Type	Connector	Gain (dBi)		
		2.4G	5.0G (Band 4)	5.0G (Band 1)
PIFA	I-PEX	4.13	4.23	6.45

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	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190MHz	46	5230MHz

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 X, Z 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	7.2
-	802.11n (40MHz)	38 to 46	38, 46	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	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	36 to 48	48	OFDM	BPSK	7.2

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)
-	802.11n (20MHz)	36 to 48	48	OFDM	BPSK	7.2

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	7.2
-	802.11n (40MHz)	38 to 46	38, 46	OFDM	BPSK	13.5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	26deg. C, 73%RH	120Vac, 60Hz	Joey Liu
RE<1G	26deg. C, 73%RH	120Vac, 60Hz	Joey Liu
PLC	26deg. C, 74% RH	120Vac, 60Hz	Charlie Chang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Dalen Dai

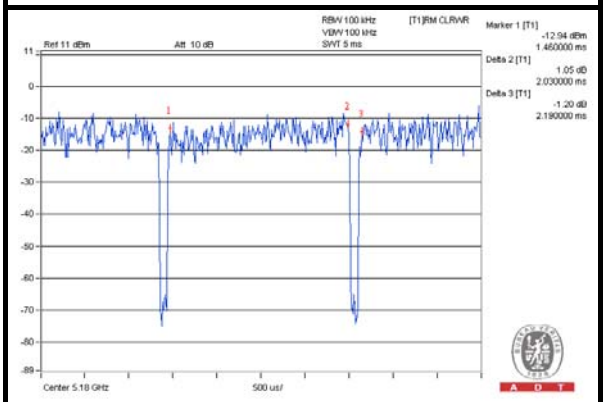
3.3 DUTY CYCLE OF TEST SIGNAL

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

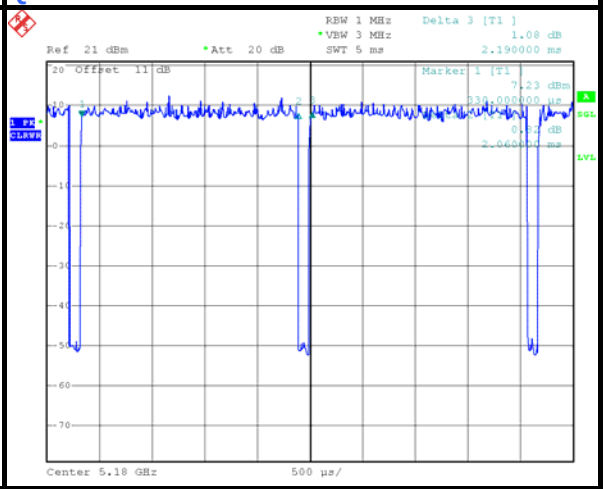
802.11a:

BPSK: Duty cycle = 2.030 / 2.190 = 0.927 , Duty factor = 10 * log(1/ 0.927) = 0.33
QPSK: Duty cycle = 2.060 / 2.190 = 0.941 , Duty factor = 10 * log(1/ 0.941) = 0.26
16QAM: Duty cycle = 1.044 / 1.104 = 0.946 , Duty factor = 10 * log(1/ 0.946) = 0.24
64QAM: Duty cycle = 0.700 / 0.744 = 0.941 , Duty factor = 10 * log(1/ 0.941) = 0.26

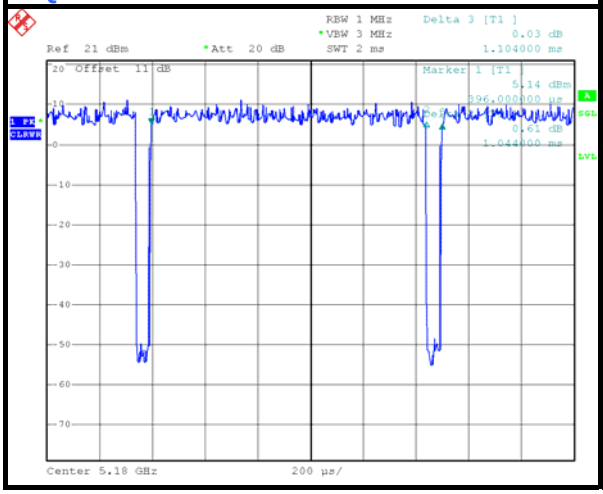
BPSK



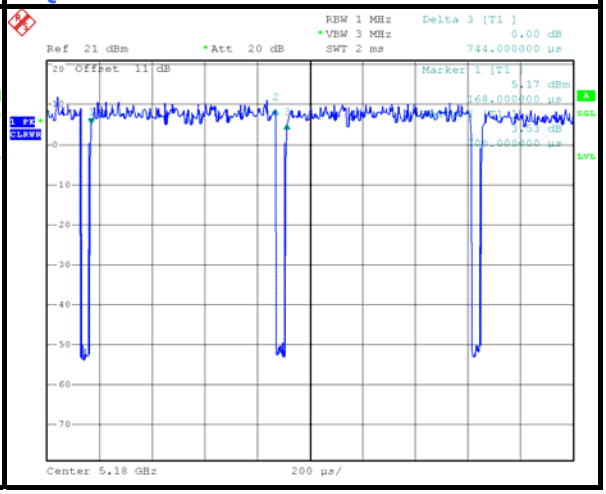
QPSK



16QAM



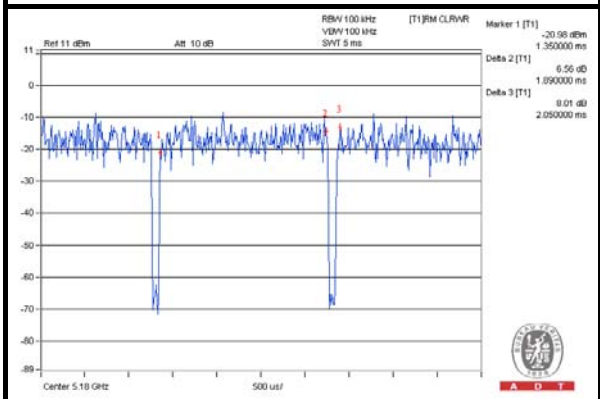
64QAM



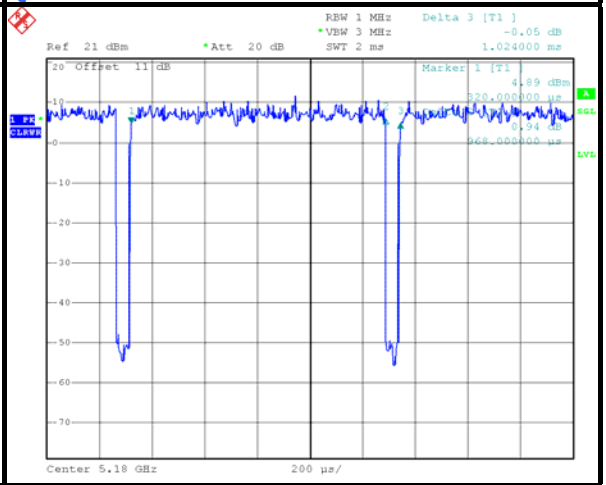
802.11n (20MHz)

BPSK: Duty cycle = 1.890 / 2.050 = 0.922 , Duty factor = 10 * log(1/ 0.922) = 0.35
QPSK: Duty cycle = 0.968 / 1.024 = 0.945 , Duty factor = 10 * log(1/ 0.945) = 0.25
16QAM: Duty cycle = 0.488 / 0.522 = 0.935 , Duty factor = 10 * log(1/ 0.935) = 0.29
64QAM: Duty cycle = 0.252 / 0.284 = 0.887 , Duty factor = 10 * log(1/ 0.887) = 0.52

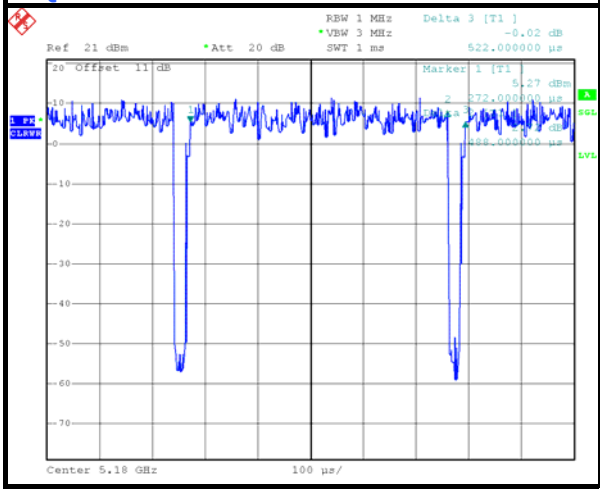
BPSK



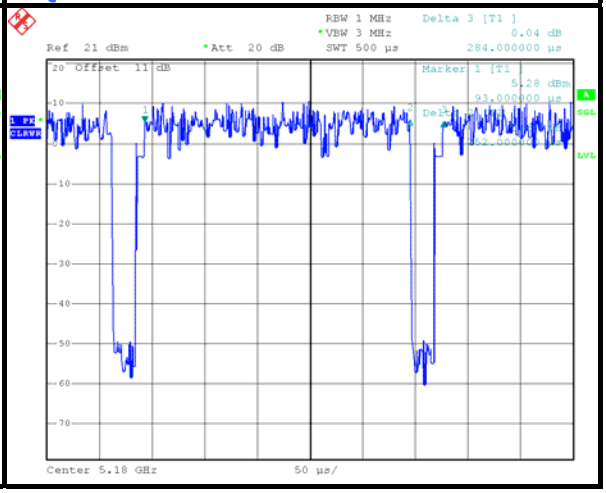
QPSK



16QAM



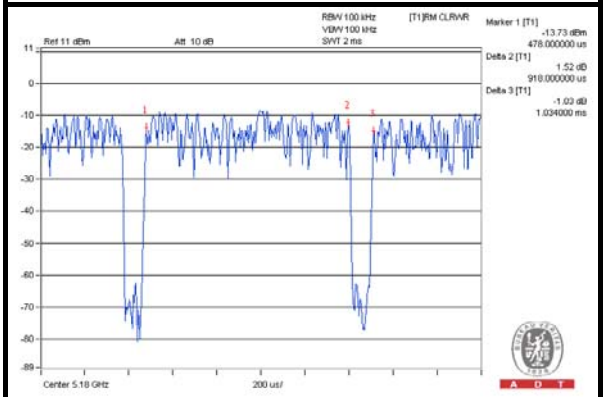
64QAM



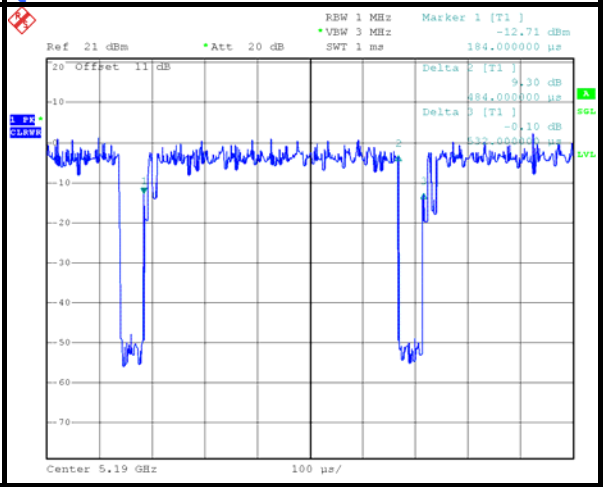
802.11n (40MHz):

BPSK: Duty cycle = 0.918 / 1.034 = 0.888 , Duty factor = 10 * log(1/ 0.888) = 0.52
QPSK: Duty cycle = 0.484 / 0.532 = 0.910 , Duty factor = 10 * log(1/ 0.910) = 0.41
16QAM: Duty cycle = 0.251 / 0.276 = 0.910 , Duty factor = 10 * log(1/ 0.910) = 0.41
64QAM: Duty cycle = 0.140 / 0.163 = 0.859 , Duty factor = 10 * log(1/ 0.859) = 0.66

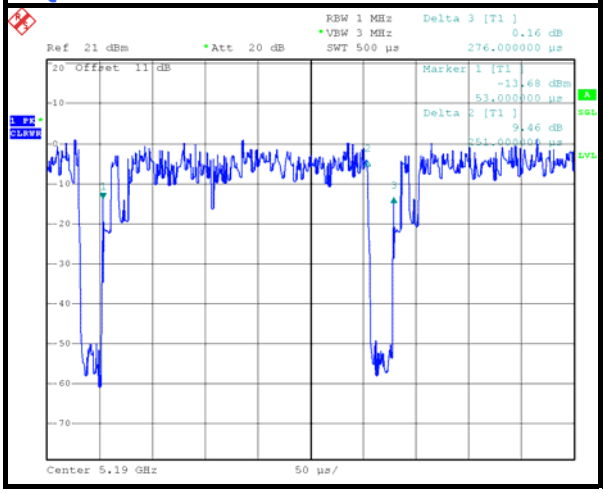
BPSK



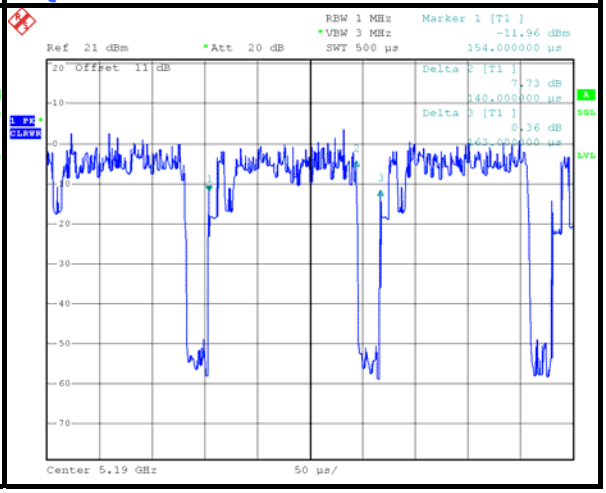
QPSK



16QAM



64QAM



3.4 DESCRIPTION OF SUPPORT UNITS

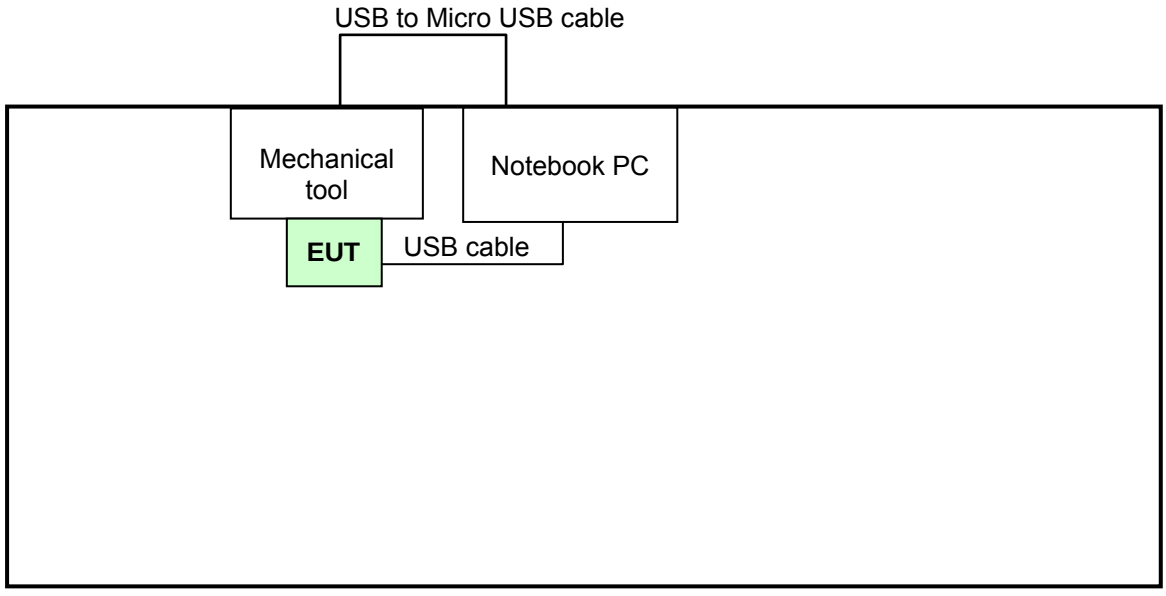
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	BW33YM1	FCC DoC Approved
2	Mechanical tool	N/A	N/A	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	1.0m USB to Micro USB cable 0.1m USB cable (Provided by client)
3	N/A

NOTE: 1. All power cords of the above support units are non shielded (1.8m).
2. The support unit 2 was provided by client.

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 v01 r03
662911 D01 Multiple Transmitter Output v01 r02
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, 2013	Feb. 25, 2014
HP Preamplifier	8449B	3008A01201	Feb. 26, 2013	Feb. 25, 2014
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 03, 2013	Jan. 02, 2014
Schwarzbeck Antenna	VULB 9168	137	Mar. 20, 2013	Mar. 19, 2014
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2013	May 28, 2014
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	ADT_Radiated_V 7.6.15.9.2	NA	NA	NA
SUHNER RF cable	SF102	CABLE-CH6	Aug. 19, 2013	Aug. 18, 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:

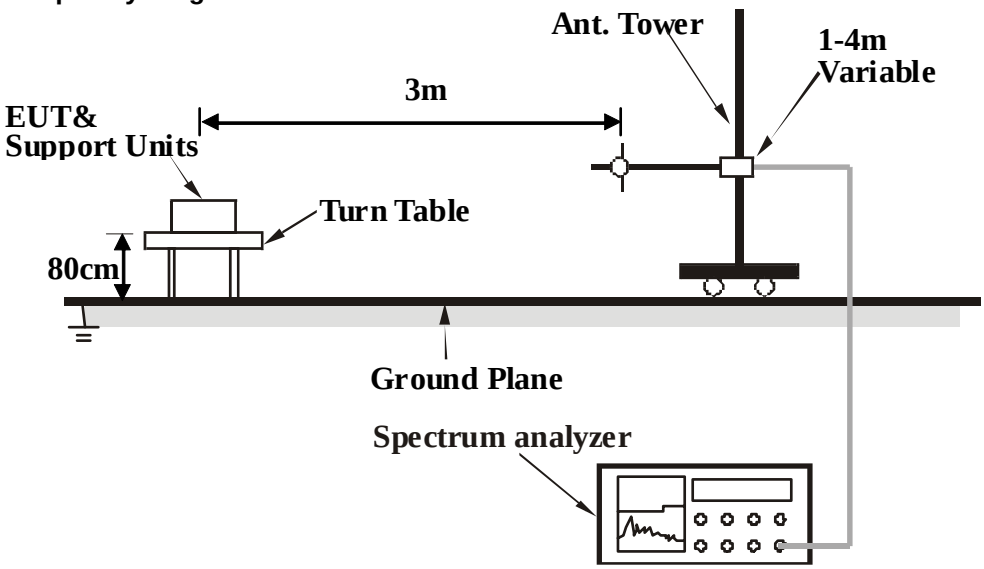
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency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

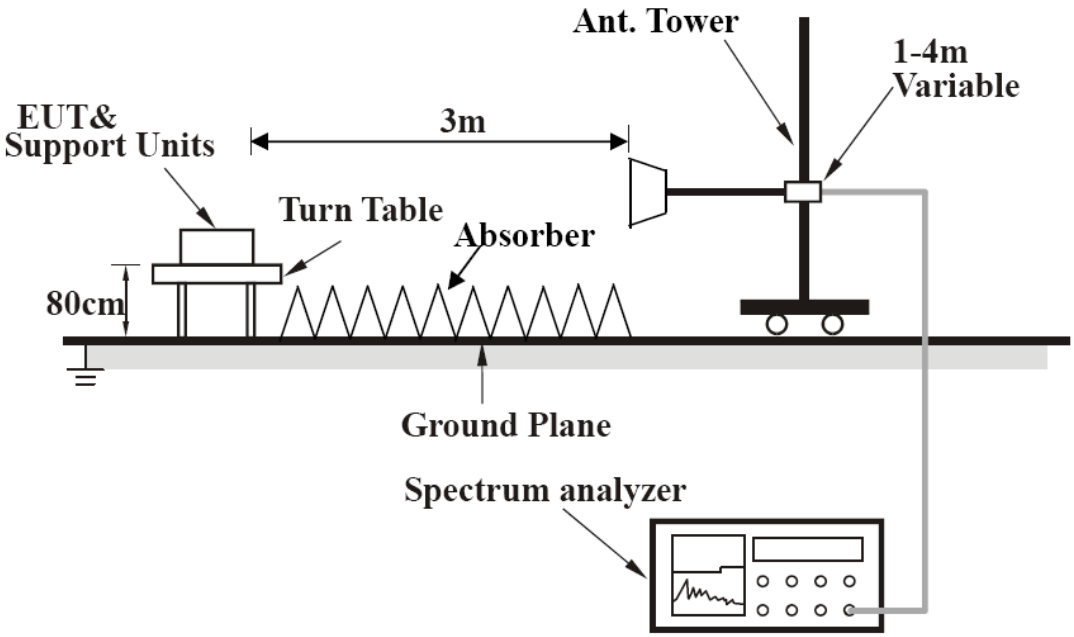
No deviation.

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

a. Connected EUT with a notebook system via the Mechanical tool and placed on a testing table.

b. The notebook ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the system in full functions.

4.1.8 TEST RESULTS

ABOVE 1GHz DATA

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.2 PK	74.0	-15.8	1.38 H	108	54.19	4.05
2	5150.00	35.7 AV	54.0	-18.3	1.38 H	108	31.64	4.05
3	*5180.00	102.0 PK			1.38 H	108	97.88	4.14
4	*5180.00	91.5 AV			1.38 H	108	87.36	4.14
5	10360.00	56.0 PK	74.0	-18.0	1.38 H	113	41.28	14.73
6	10360.00	42.0 AV	54.0	-12.0	1.38 H	113	27.30	14.73
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	60.6 PK	74.0	-13.4	1.03 V	143	56.54	4.05
2	5150.00	37.7 AV	54.0	-16.3	1.03 V	143	33.63	4.05
3	*5180.00	109.6 PK			1.03 V	143	105.42	4.14
4	*5180.00	98.6 AV			1.03 V	143	94.41	4.14
5	10360.00	58.3 PK	74.0	-15.7	1.03 V	242	43.59	14.73
6	10360.00	44.2 AV	54.0	-9.8	1.03 V	242	29.44	14.73

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.

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	104.8 PK			1.37 H	111	100.58	4.19
2	*5200.00	93.6 AV			1.37 H	111	89.43	4.19
3	10400.00	56.8 PK	74.0	-17.2	1.37 H	143	41.70	15.12
4	10400.00	42.2 AV	54.0	-11.8	1.37 H	143	27.09	15.12
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			1.03 V	143	105.99	4.19
2	*5200.00	99.1 AV			1.03 V	143	94.93	4.19
3	10400.00	58.7 PK	74.0	-15.3	1.03 V	252	43.60	15.12
4	10400.00	43.8 AV	54.0	-10.2	1.03 V	252	28.71	15.12

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.

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	104.1 PK			1.34 H	114	99.79	4.35
2	*5240.00	93.4 AV			1.34 H	114	89.06	4.35
3	5350.00	44.9 PK	74.0	-29.1	1.34 H	114	40.18	4.71
4	5350.00	30.6 AV	54.0	-23.4	1.34 H	114	25.86	4.71
5	10480.00	52.2 PK	74.0	-21.8	1.34 H	139	37.30	14.92
6	10480.00	38.7 AV	54.0	-15.3	1.34 H	139	23.74	14.92
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			1.03 V	143	104.90	4.35
2	*5240.00	98.7 AV			1.03 V	143	94.32	4.35
3	5350.00	44.7 PK	74.0	-29.3	1.03 V	143	40.01	4.71
4	5350.00	31.3 AV	54.0	-22.7	1.03 V	143	26.61	4.71
5	10480.00	52.4 PK	74.0	-21.6	1.03 V	124	37.51	14.92
6	10480.00	39.2 AV	54.0	-14.8	1.03 V	124	24.31	14.92

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.

802.11n (20MHz)

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	57.9 PK	74.0	-16.1	1.10 H	137	53.88	4.05
2	5150.00	37.9 AV	54.0	-16.1	1.00 H	139	33.89	4.05
3	*5180.00	105.0 PK			1.10 H	137	100.82	4.14
4	*5180.00	93.7 AV			1.10 H	137	89.58	4.14
5	10360.00	56.1 PK	74.0	-17.9	1.10 H	136	41.40	14.73
6	10360.00	42.1 AV	54.0	-11.9	1.10 H	136	27.39	14.73
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	58.0 PK	74.0	-16.1	1.04 V	134	53.90	4.05
2	5150.00	36.5 AV	54.0	-17.5	1.04 V	134	32.49	4.05
3	*5180.00	111.4 PK			1.04 V	135	107.21	4.14
4	*5180.00	99.6 AV			1.04 V	135	95.50	4.14
5	10360.00	52.7 PK	74.0	-21.3	1.04 V	143	37.94	14.73
6	10360.00	42.4 AV	54.0	-11.6	1.04 V	143	27.65	14.73

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.

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	106.6 PK			1.07 H	138	102.41	4.19
2	*5200.00	93.3 AV			1.07 H	138	89.14	4.19
3	10400.00	56.6 PK	74.0	-17.5	1.07 H	135	41.43	15.12
4	10400.00	42.2 AV	54.0	-11.8	1.07 H	135	27.08	15.12
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	111.4 PK			1.00 V	134	107.16	4.19
2	*5200.00	99.9 AV			1.00 V	134	95.68	4.19
3	10400.00	65.4 PK	74.0	-8.6	1.07 V	131	50.30	15.12
4	**10400.00**	**49.6 AV**	**54.0**	**-4.4**	**1.07 V**	**131**	**34.47**	**15.12**

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.

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	104.4 PK			1.32 H	111	100.01	4.35
2	*5240.00	92.9 AV			1.32 H	111	88.53	4.35
3	5350.00	43.9 PK	74.0	-30.1	1.32 H	111	39.17	4.71
4	5350.00	30.7 AV	54.0	-23.3	1.32 H	111	25.96	4.71
5	10480.00	53.3 PK	74.0	-20.7	1.30 H	245	38.40	14.92
6	10480.00	39.5 AV	54.0	-14.5	1.30 H	245	24.55	14.92
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			1.01 V	135	104.99	4.35
2	*5240.00	98.6 AV			1.01 V	135	94.27	4.35
3	5350.00	45.8 PK	74.0	-28.2	1.01 V	135	41.07	4.71
4	5350.00	31.6 AV	54.0	-22.4	1.01 V	135	26.90	4.71
5	10480.00	52.7 PK	74.0	-21.3	1.00 V	334	37.76	14.92
6	10480.00	39.4 AV	54.0	-14.6	1.00 V	334	24.50	14.92

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.

802.11n (40MHz)

CHANNEL	TX Channel 38	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	60.6 PK	74.0	-13.4	1.04 H	139	56.53	4.05
2	5150.00	42.7 AV	54.0	-11.4	1.04 H	139	38.60	4.05
3	*5190.00	100.4 PK			1.04 H	136	96.19	4.16
4	*5190.00	87.6 AV			1.04 H	136	83.39	4.16
5	10380.00	53.5 PK	74.0	-20.5	1.06 H	139	38.60	14.92
6	10380.00	39.7 AV	54.0	-14.3	1.06 H	139	24.80	14.92
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.9 PK	74.0	-8.1	1.00 V	133	61.89	4.05
2	5150.00	47.6 AV	54.0	-6.4	1.00 V	133	43.54	4.05
3	*5190.00	105.2 PK			1.00 V	133	101.01	4.16
4	*5190.00	92.3 AV			1.00 V	133	88.14	4.16
5	10380.00	59.6 PK	74.0	-14.4	1.00 V	136	44.72	14.92
6	10380.00	45.3 AV	54.0	-8.7	1.00 V	136	30.37	14.92

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.

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	99.1 PK			1.05 H	140	94.74	4.31
2	*5230.00	87.2 AV			1.05 H	140	82.85	4.31
3	5350.00	44.1 PK	74.0	-30.0	1.05 H	140	39.34	4.71
4	5350.00	30.0 AV	54.0	-24.0	1.05 H	140	25.27	4.71
5	10460.00	52.9 PK	74.0	-21.1	1.05 H	141	37.93	14.97
6	10460.00	39.7 AV	54.0	-14.3	1.05 H	141	24.70	14.97
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	103.5 PK			1.00 V	135	99.18	4.31
2	*5230.00	91.0 AV			1.00 V	135	86.65	4.31
3	5350.00	44.3 PK	74.0	-29.7	1.00 V	135	39.63	4.71
4	5350.00	30.7 AV	54.0	-23.3	1.00 V	135	25.98	4.71
5	10460.00	57.0 PK	74.0	-17.0	1.00 V	135	41.99	14.97
6	10460.00	42.6 AV	54.0	-11.4	1.00 V	135	27.59	14.97

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.

BELOW 1GHz WORST-CASE DATA

802.11n (20MHz)

CHANNEL	TX Channel 48	**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	165.81	31.3 PK	43.5	-12.2	1.22 H	291	44.89	-13.57
2	232.73	33.7 PK	46.0	-12.3	1.37 H	262	48.71	-15.04
3	299.66	37.4 PK	46.0	-8.6	1.43 H	348	48.83	-11.46
4	398.60	30.5 PK	46.0	-15.5	1.59 H	62	40.10	-9.61
5	761.38	30.0 PK	46.0	-16.1	1.15 H	156	32.27	-2.32
6	898.16	35.2 PK	46.0	-10.8	1.32 H	214	35.78	-0.57
7	960.23	41.0 PK	54.0	-13.0	1.18 H	64	40.55	0.48
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	165.73	30.2 PK	43.5	-13.3	1.27 V	320	43.73	-13.56
2	232.73	35.0 PK	46.0	-11.0	1.39 V	165	50.00	-15.04
3	398.65	34.5 PK	46.0	-11.5	1.17 V	181	44.11	-9.61
4	498.51	29.7 PK	46.0	-16.3	1.79 V	276	37.08	-7.38
5	761.38	31.1 PK	46.0	-15.0	1.36 V	216	33.37	-2.32
6	897.18	33.9 PK	46.0	-12.1	1.18 V	239	34.53	-0.63

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.	CALIBRATED DATE	CALIBRATED UNTIL
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Jan. 07, 2013	Jan. 06, 2014
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ESH3-Z5	100219	Nov. 28, 2012	Nov. 27, 2013
LISN With Adapter (for EUT)	AD10	C10Ada-001	Nov. 28, 2012	Nov. 27, 2013
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Dec. 05, 2012	Dec. 04, 2013
Software	ADT_Cond_V7.3.7	NA	NA	NA
Software	ADT_ISN_V7.3.7	NA	NA	NA
RF cable (JYEBAO)	5D-FB	Cable-C10.01	Feb. 19, 2013	Feb. 18, 2014
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-010773	Feb. 06, 2013	Feb. 05, 2014

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 Shielded Room No. 10.

3. The VCCI Site Registration No. C-1852.

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.

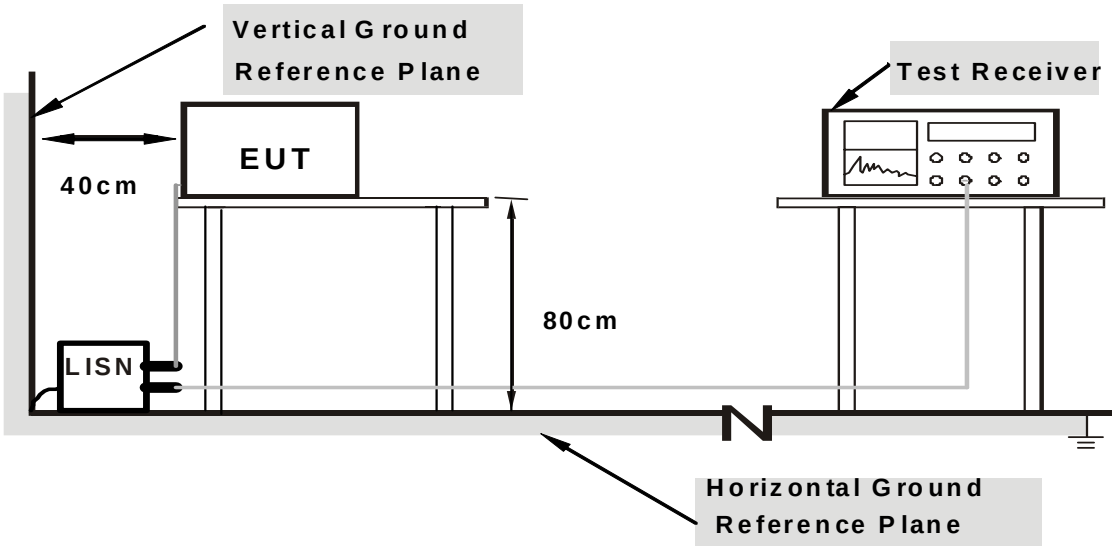
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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 4.1.6.

4.2.7 TEST RESULTS

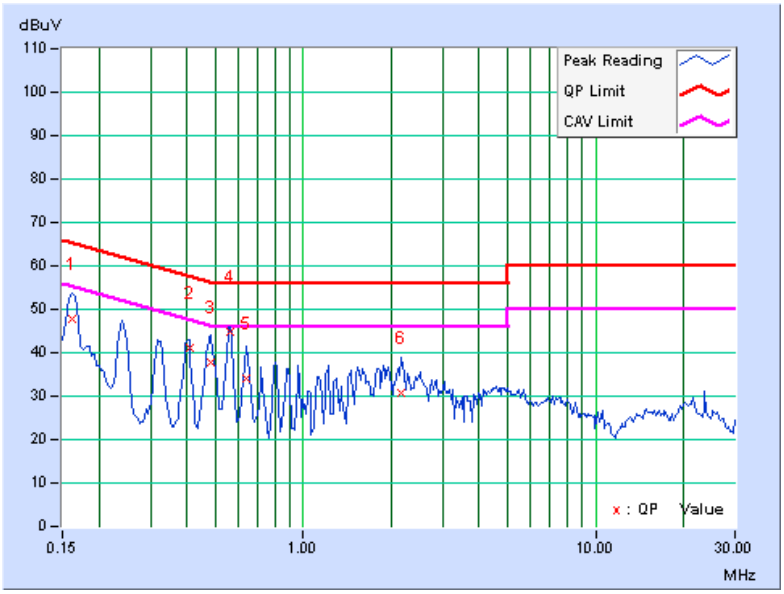
CONDUCTED WORST-CASE DATA：802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.14	47.70	45.53	47.84	45.67	65.38	55.38	-17.54	-9.71
2	0.40781	0.17	40.94	32.17	41.11	32.34	57.69	47.69	-16.58	-15.35
3	0.48203	0.17	37.62	31.14	37.79	31.31	56.30	46.30	-18.51	-14.99
4	**0.56016**	**0.18**	**44.67**	**40.81**	**44.85**	**40.99**	**56.00**	**46.00**	**-11.15**	**-5.01**
5	0.63828	0.18	33.81	24.12	33.99	24.30	56.00	46.00	-22.01	-21.70
6	2.15625	0.24	30.45	20.42	30.69	20.66	56.00	46.00	-25.31	-25.34

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

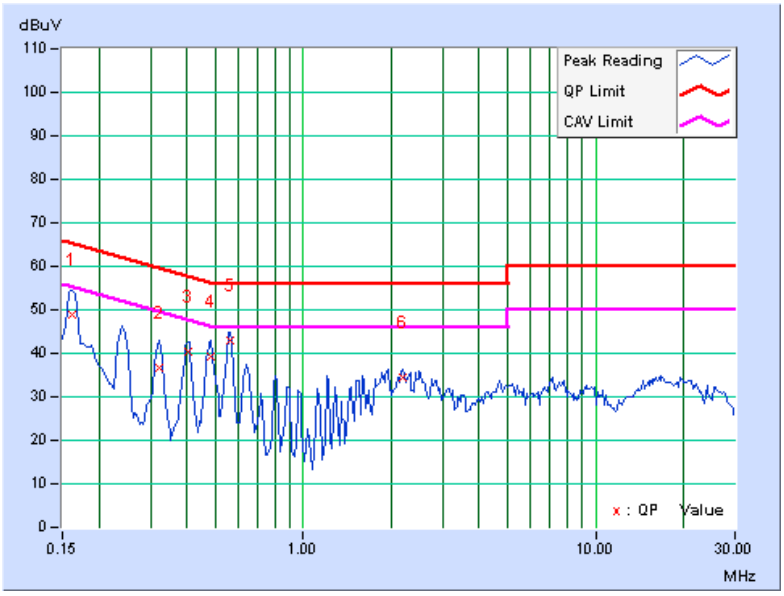


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.11	48.61	45.97	48.72	46.08	65.38	55.38	-16.66	-9.30
2	0.32188	0.13	36.69	33.21	36.82	33.34	59.66	49.66	-22.84	-16.32
3	0.40391	0.14	40.10	36.66	40.24	36.80	57.77	47.77	-17.53	-10.97
4	0.48203	0.14	39.16	36.06	39.30	36.20	56.30	46.30	-17.00	-10.10
5	0.56016	0.14	42.90	37.15	43.04	37.29	56.00	46.00	-12.96	-8.71
6	2.19531	0.20	34.34	26.20	34.54	26.40	56.00	46.00	-21.46	-19.60

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
5.150 ~ 5.250GHz	The lesser of 50mW (17dBm) or 4dBm + 10logB

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

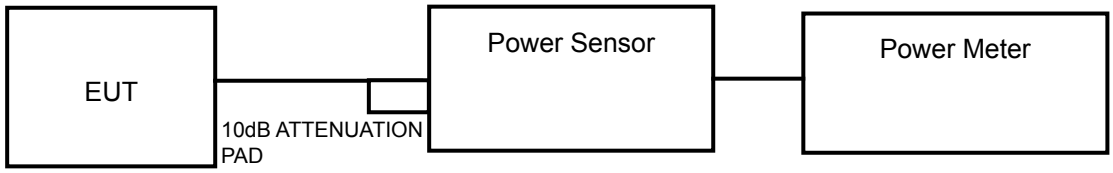
Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

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.

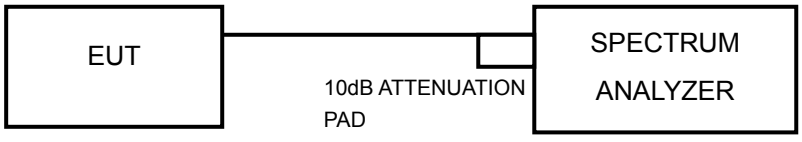
For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



FOR 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

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 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:

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)	POWER LIMIT (dBm)	PASS/FAIL
802.11a					
36	5180	14.32	**27.0**	17.00	PASS
40	5200	14.12	25.8	17.00	PASS
48	5240	14.02	25.2	17.00	PASS

1. 4dBm + 10log(24.66) = 17.92dBm > 17dBm.
2. 4dBm + 10log(21.47) = 17.32dBm > 17dBm.
3. 4dBm + 10log(26.01) = 18.15dBm > 17dBm.

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
802.11n (20MHz)							
36	5180	10.67	11.09	24.5	13.90	16.97	PASS
40	5200	10.35	10.79	22.8	13.59	16.97	PASS
48	5240	10.67	10.91	24.0	13.80	16.97	PASS

CHAIN 0
1. 4dBm + 10log(19.98) = 17.01dBm > 17dBm.
2. 4dBm + 10log(19.91) = 16.99dBm < 17dBm.
3. 4dBm + 10log(19.94) = 17.00dBm > 17dBm.

CHAIN 1
1. 4dBm + 10log(19.84) = 16.98dBm < 17dBm.
2. 4dBm + 10log(20.61) = 17.14dBm > 17dBm.
3. 4dBm + 10log(19.81) = 16.97dBm < 17dBm.

CHAN.	CHAN. FREQ. (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
802.11n (40MHz)							
38	5190	10.16	10.92	22.7	13.57	17.00	PASS
46	5230	10.39	10.86	23.1	13.64	17.00	PASS

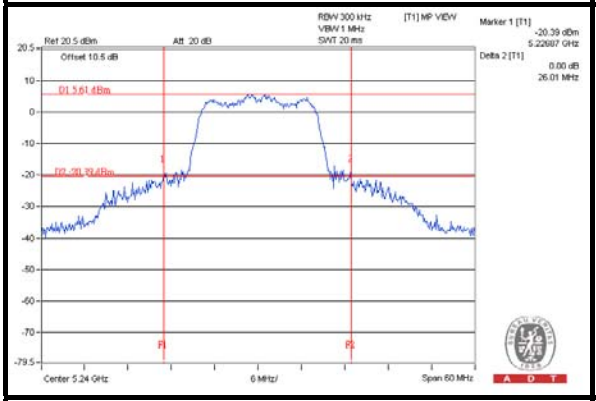
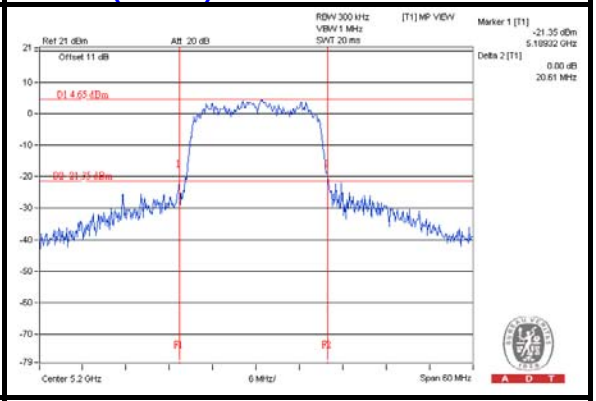
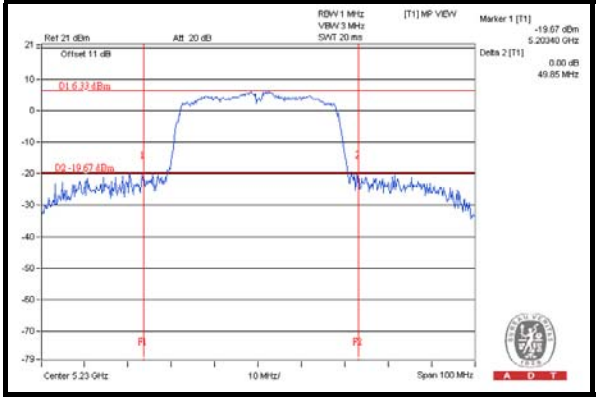
CHAIN 0
1. 4dBm + 10log(39.33) = 19.95dBm > 17dBm.
2. 4dBm + 10log(39.55) = 19.97dBm > 17dBm.

CHAIN 1
1. 4dBm + 10log(46.41) = 20.67dBm > 17dBm.
2. 4dBm + 10log(49.85) = 20.98dBm > 17dBm.

26dB BANDWIDTH:

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
802.11a			
36	5180	24.66	PASS
40	5200	21.47	PASS
48	5240	26.01	PASS

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
802.11n (20MHz)				
36	5180	19.98	19.84	PASS
40	5200	19.91	20.61	PASS
48	5240	19.94	19.81	PASS
802.11n (40MHz)				
38	5190	39.33	46.41	PASS
46	5230	39.55	49.85	PASS

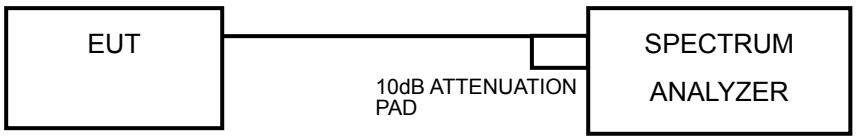
SPECTRUM PLOT OF WORST VALUE	
802.11a	802.11n (20MHz)
	
802.11n (40MHz)	
	

4.4 PEAK POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF PEAK POWER SPECTRAL DENSITY MEASUREMENT

FREQUENCY BAND	LIMIT
5.150 ~ 5.250GHz	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

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 30 KHz, Set VBW ≥ 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)

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

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
802.11a						
36	5180	0.99	0.33	1.32	4	PASS
40	5200	0.95	0.33	1.28	4	PASS
48	5240	0.99	0.33	1.32	4	PASS

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					
802.11n (20MHz)								
36	5180	-3.11	-2.93	-0.01	0.35	0.34	0.54	PASS
40	5200	-3.08	-2.86	0.04	0.35	0.39	0.54	PASS
48	5240	-3.05	-2.84	0.07	0.35	0.42	0.54	PASS
802.11n (40MHz)								
38	5190	-5.73	-6.43	-3.06	0.52	-2.54	0.54	PASS
46	5230	-5.85	-6.55	-3.18	0.52	-2.66	0.54	PASS

NOTE:

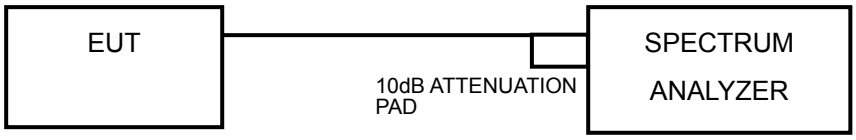
1. Method a of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 6.45dBi + 10log(2) = 9.46dBi > 6dBi , so the power density limit shall be reduced to 4-(9.46-6) = 0.54dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

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

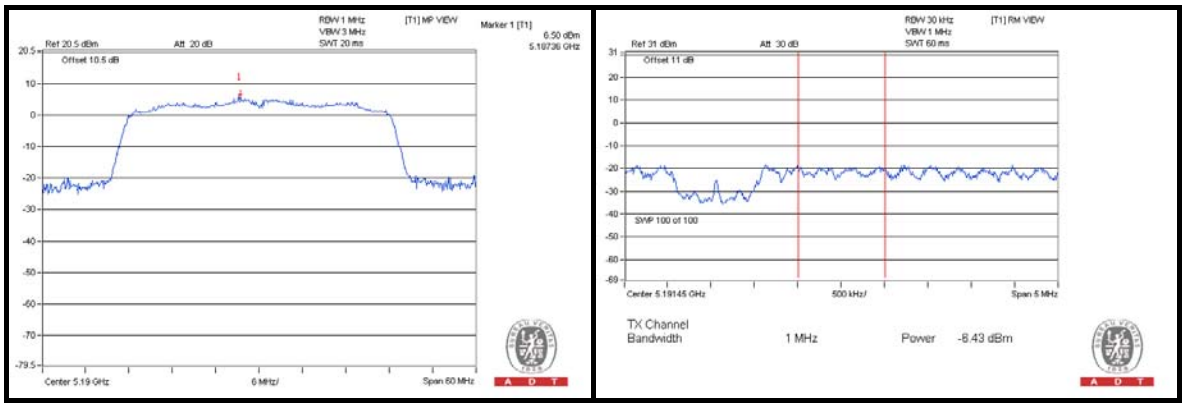
No deviation.

4.5.6 EUT OPERATING CONDITIONS

Same as 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	12.47	0.99	1.32	11.15	13	PASS
	QPSK		13.14	1.33	1.59	11.55	13	PASS
	16QAM		12.90	1.48	1.72	11.18	13	PASS
	64QAM		13.17	1.64	1.90	11.27	13	PASS
802.11n (20MHz)	BPSK	5180	9.56	-2.93	-2.58	12.14	13	PASS
	QPSK		9.90	-1.74	-1.49	11.39	13	PASS
	16QAM		10.56	-1.42	-1.13	11.69	13	PASS
	64QAM		11.23	-1.55	-1.03	12.26	13	PASS
802.11n (40MHz)	BPSK	5190	6.50	-6.43	-5.91	12.41	13	PASS
	QPSK		6.77	-5.67	-5.26	12.03	13	PASS
	16QAM		6.96	-5.52	-5.11	12.07	13	PASS
	64QAM		7.09	-5.89	-5.23	12.32	13	PASS

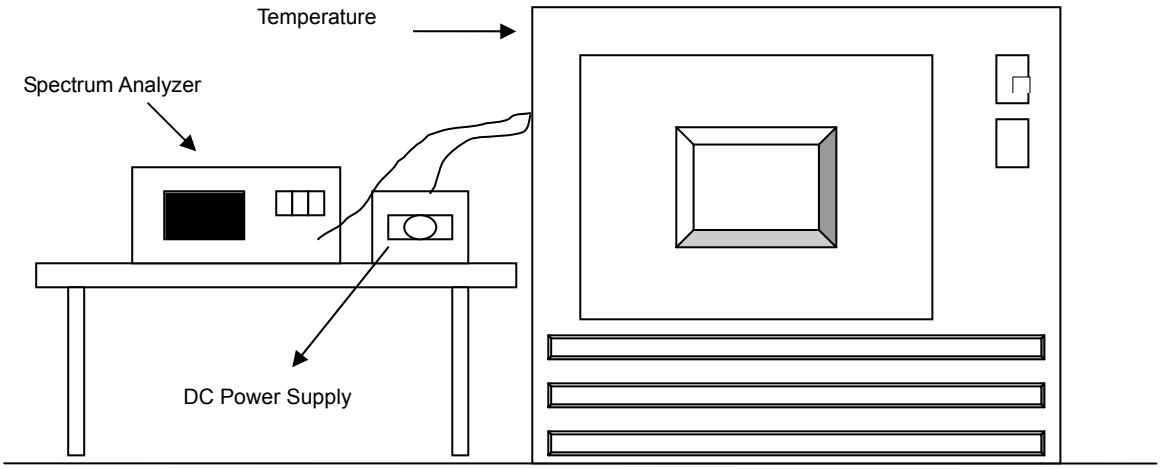


4.6 FREQUENCY STABILITY

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 DC 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: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vdc)	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)
50	5.0	5200.061312	11.7907692	5200.061549	11.8363462	5200.061217	11.7725000	5200.061233	11.7755769
40	5.0	5200.061228	11.7746154	5200.061078	11.7457692	5200.061120	11.7538462	5200.061367	11.8013462
30	5.0	5200.061646	11.8550000	5200.06142	11.8115385	5200.061478	11.8226923	5200.061265	11.7817308
20	5.0	5200.061296	11.7876923	5200.061207	11.7705769	5200.061636	11.8530769	5200.061534	11.8334615
10	5.0	5200.06155	11.8365385	5200.061251	11.7790385	5200.061305	11.7894231	5200.061111	11.7521154
0	5.0	5200.061423	11.8121154	5200.061367	11.8013462	5200.061362	11.8003846	5200.061321	11.7925000
-10	5.0	5200.061134	11.7565385	5200.061222	11.7734615	5200.061619	11.8498077	5200.061386	11.8050000
-20	5.0	5200.057875	11.1298077	5200.061673	11.8601923	5200.061550	11.8365385	5200.06150	11.8269231

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5200MHz									
TEMP. (℃)	POWER SUPPLY (Vdc)	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	5.8	5200.059959	11.5305769	5200.060294	11.5950000	5200.059959	11.5305769	5200.059923	11.5236538
	5.0	5200.061296	11.7876923	5200.061207	11.7705769	5200.061636	11.8530769	5200.061534	11.8334615
	4.3	5200.058089	11.1709615	5200.057805	11.1163462	5200.057890	11.1326923	5200.057826	11.1203846

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:
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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---