FCC TEST REPORT (15.407)

REPORT NO.:	RF130731C06-1
MODEL NO.:	TL-WDN4200
FCC ID:	TE7WDN4200
RECEIVED:	Jul. 31, 2013
TESTED:	Aug. 07 ~ Sep. 06, 2013
ISSUED:	Oct. 01, 2013

APPLICANT:	TP-LINK TECHNOLOGIES CO., LTD.
ADDRESS:	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
LAB ADDRESS:	No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.
TEST LOCATION:	No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130731C06-1	Original release	Oct. 01, 2013

1. CERTIFICATION

PRODUCT: N900 Wireless Dual Band USB Adapter
MODEL: TL-WDN4200
BRAND: TP-LINK
APPLICANT: TP-LINK TECHNOLOGIES CO., LTD.
TESTED: Aug. 07 ~ Sep. 06, 2013
TEST SAMPLE: PRODUCTION SAMPLE
STANDARDS: **FCC Part 15, Subpart E (Section 15.407)**
ANSI C63.10-2009

The above equipment (model: TL-WDN4200) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ **, DATE :** Oct. 01, 2013
Ivy Lin / Specialist

APPROVED BY : _____ **, DATE :** Oct. 01, 2013
Ken Liu / Senior Manager

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -18.78dB at 0.15391MHz.
15.407(b/1/2/3)(b)(6)	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 10600.00MHz, 7066.00MHz, 5350.00MHz
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 murata not a standard connector.
15.215	20dBc Bandwidth	PASS	Meet the requirement of limit.

2.1 MEASUREMENT UNCERTAINTY

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

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	N900 Wireless Dual Band USB Adapter
MODEL NO.	TL-WDN4200
POWER SUPPLY	5Vdc (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 450.0Mbps
OPERATING FREQUENCY	5180 ~ 5240MHz & 5260 ~ 5320MHz
NUMBER OF CHANNEL	5180 ~ 5240MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz) 5260 ~ 5320MHz: 4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	45.070mW for 5180 ~ 5240MHz 153.448mW for 5260 ~ 5320MHz
ANTENNA TYPE	Refer to Note as below
ANTENNA CONNECTOR	Refer to Note as 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 three completed transmitters and three receivers.

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	1TX
802.11a	1TX
802.11n (20MHz) (MCS 0 ~ 7/ nss= 1)	3TX
802.11n (40MHz) (MCS 0 ~ 7/ nss= 1)	3TX

*802.11 abg operate in Ant. 0 only.

2. The EUT uses following antennas.

Frequency (GHz)	Antenna Type	Gain (dBi)			Antenna Connector
		Ant. 0	Ant. 1	Ant. 2	
2.4~2.4835	PIFA	1.68	3.45	0.21	murata
5.15~5.25	PIFA	3.64	2.64	1.67	murata
5.25~5.35	PIFA	3.29	2.73	-0.3	murata
5.725~5.85	PIFA	3.24	1.32	2.53	murata

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 DESCRIPTION OF TEST MODES

FOR 5180 ~ 5240MHz

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

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

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
38	5190 MHz	46	5230 MHz

FOR 5260 ~ 5320MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
54	5270 MHz	62	5310 MHz

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 each 3 axis. The worst case was found when positioned on **Y-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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6.0
-	802.11n (20MHz)		52 to 64	52, 60, 64	OFDM	BPSK	7.2
-	802.11n (40MHz)		54 to 62	54, 62	OFDM	BPSK	15.0

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	5180-5320	36 to 64	60	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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	5180-5320	36 to 64	60	OFDM	BPSK	6.0

ANTENNA PORT CONDUCTED MEASUREMENT:

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	7.2
-	802.11n (40MHz)		38 to 46	38, 46	OFDM	BPSK	15.0
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6.0
-	802.11n (20MHz)		52 to 64	52, 60, 64	OFDM	BPSK	7.2
-	802.11n (40MHz)		54 to 62	54, 62	OFDM	BPSK	15.0

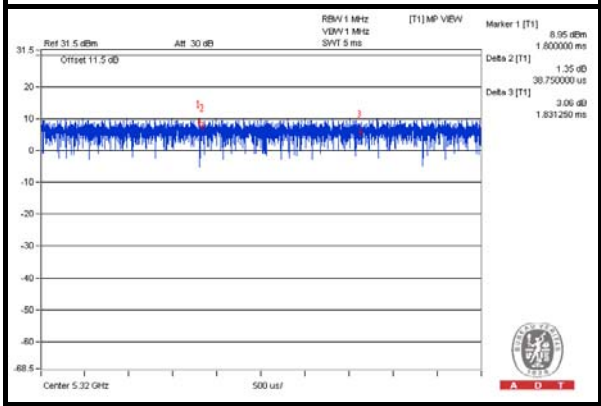
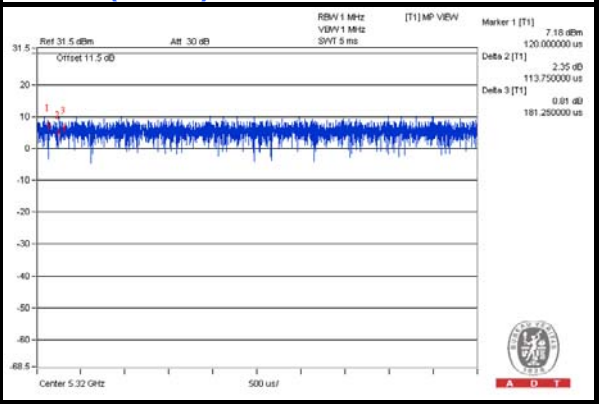
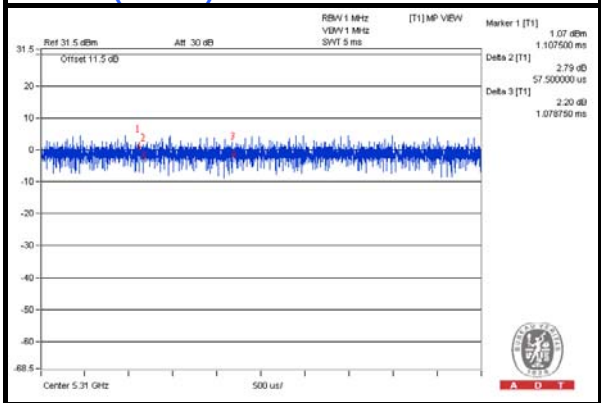
TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	29deg. C, 69%RH	120Vac, 60Hz	Martin Lee
RE<1G	27deg. C, 66%RH	120Vac, 60Hz	Martin Lee
PLC	25deg. C, 65%RH	120Vac, 60Hz	Ted Chang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 DUTY CYCLE OF TEST SIGNAL

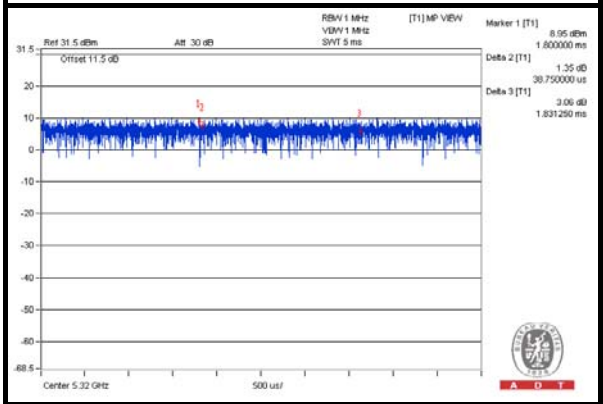
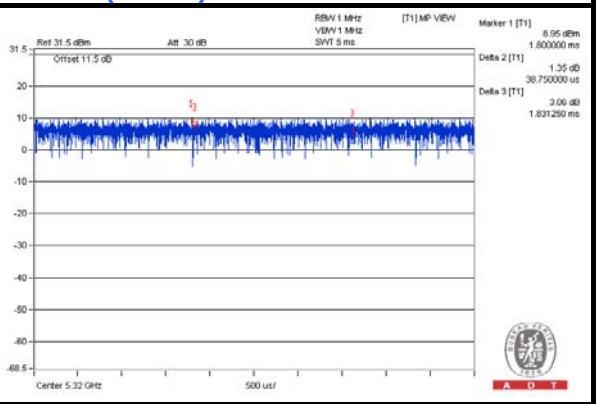
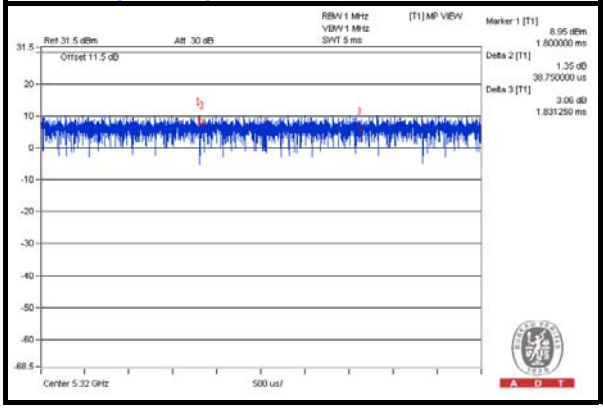
MODULATION TYPE: BPSK

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

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

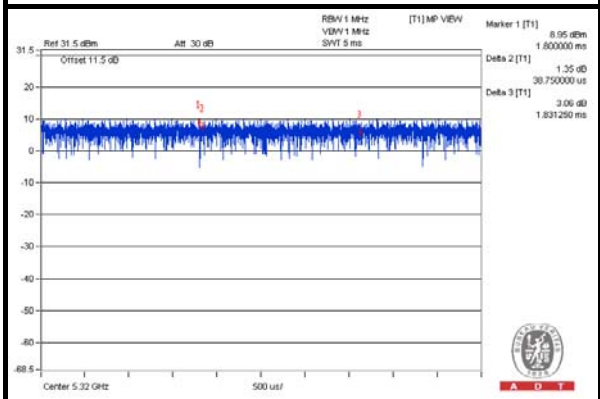
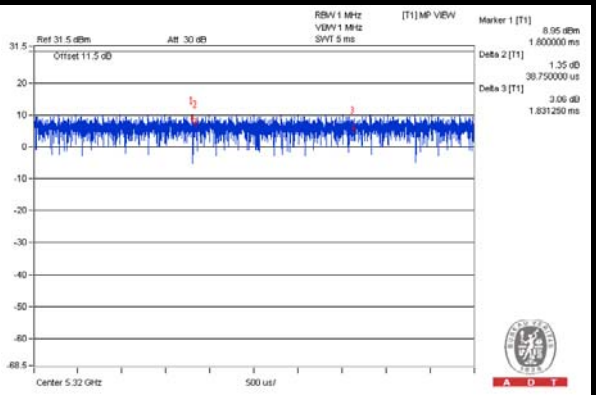
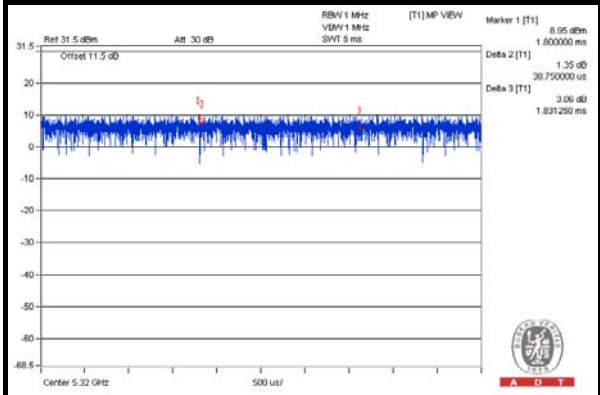
MODULATION TYPE: QPSK

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

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

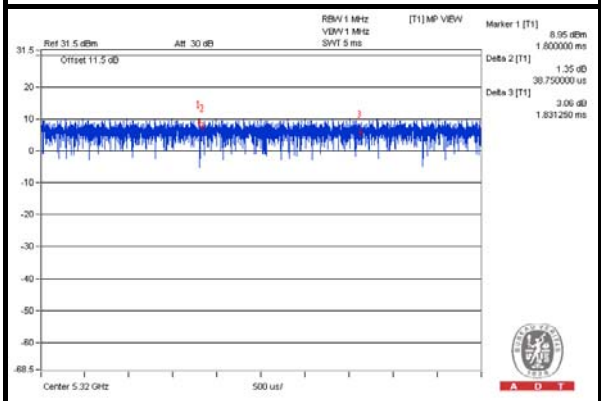
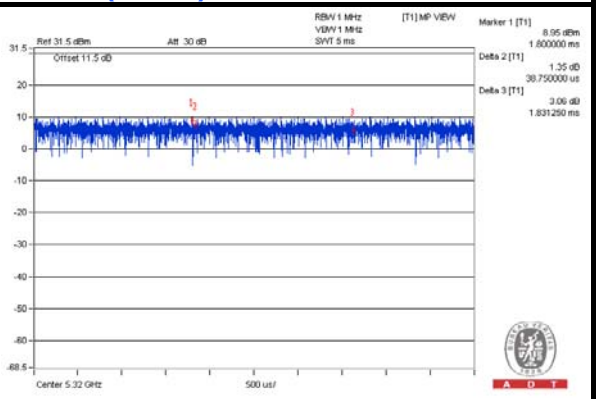
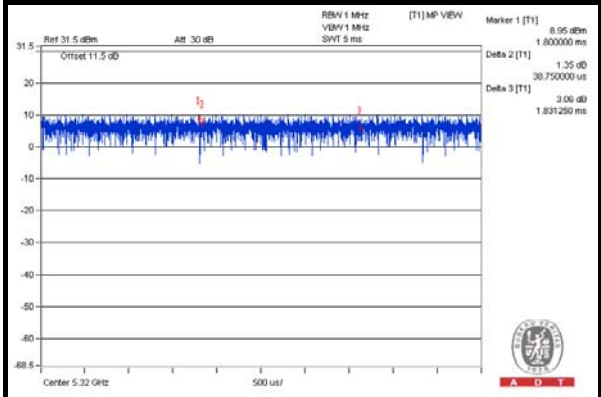
MODULATION TYPE: 16QAM

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

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

MODULATION TYPE: 64QAM

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

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

3.4 DESCRIPTION OF SUPPORT UNITS

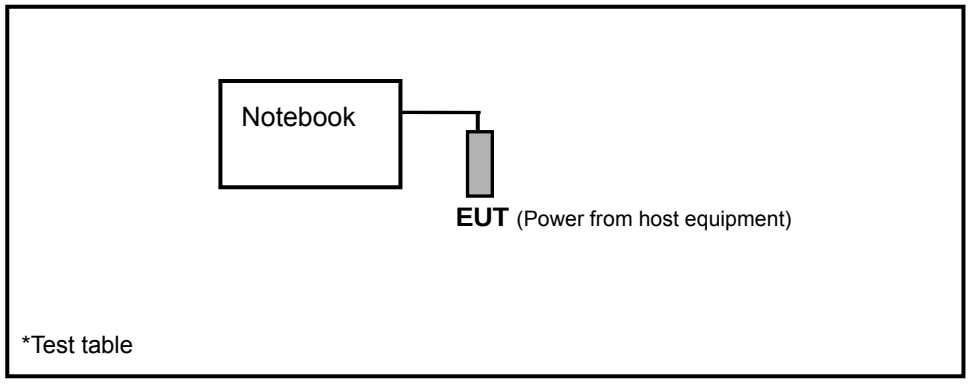
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5420	BPQ7MQ1	FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	0.5m USB 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 v01 r03
662911 D01 Multiple Transmitter Output v02
ANSI C63.10-2009

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

4. TEST TYPES AND RESULTS

4.1 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE MEASUREMENT

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.1.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
	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.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 16, 2012	Nov. 15, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Oct. 25, 2012	Oct. 24, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Dec. 22, 2012	Dec. 21, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8447D	2944A10738	Oct. 23, 2012	Oct. 22, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 19, 2012	Oct. 18, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 19, 2012	Oct. 18, 2013
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0842014	Apr. 25, 2013	Apr. 24, 2014
Power Sensor	MA2411B	1026085	Oct. 12, 2012	Oct. 11, 2014
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 10, 2013	Jun. 09, 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 HwaYa Chamber 4.

3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

4. The FCC Site Registration No. is 460141.

5. The IC Site Registration No. is IC7450F-4.

4.1.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic 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:

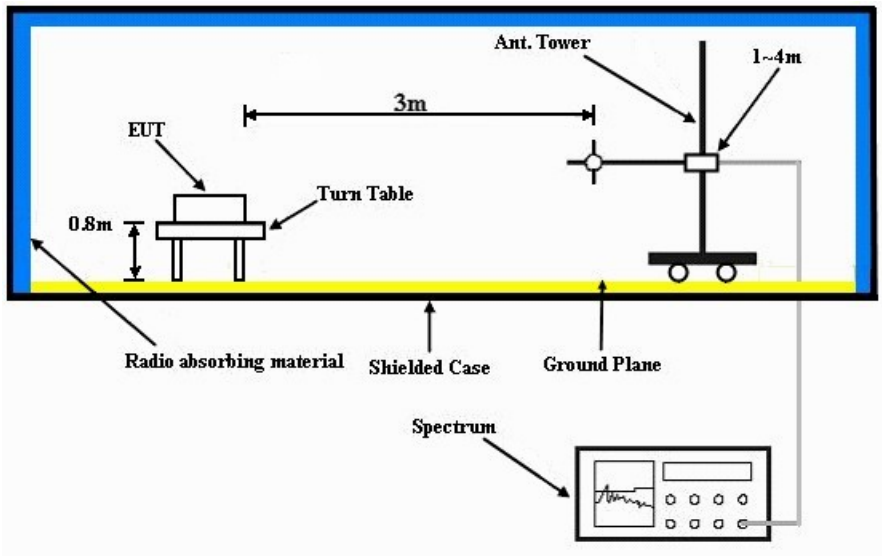
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

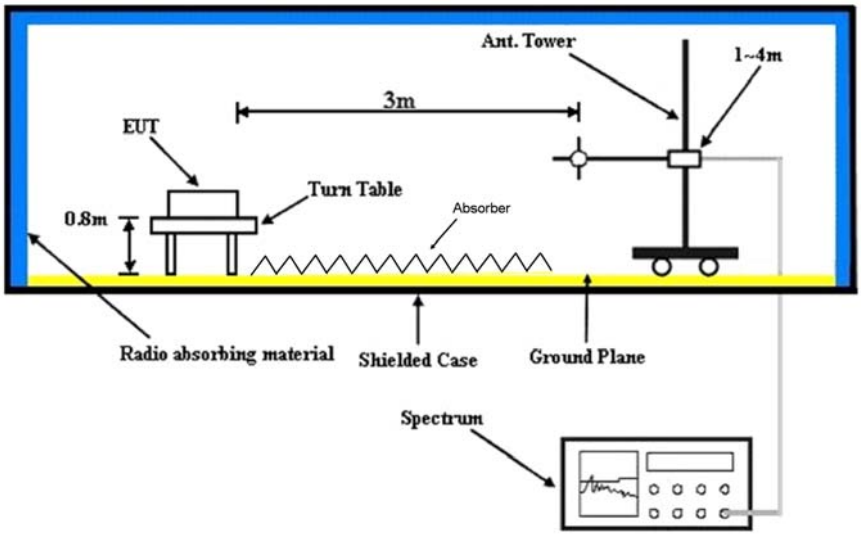
No deviation.

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

a. The EUT was connected to the notebook with USB cable
b. The notebook ran 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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	50.9 PK	74.0	-23.1	1.00 H	208	45.60	5.30
2	5150.00	41.2 AV	54.0	-12.8	1.00 H	208	35.90	5.30
3	*5180.00	103.1 PK			1.00 H	208	63.80	39.30
4	*5180.00	93.9 AV			1.00 H	208	54.60	39.30
5	#6906.00	59.0 PK	68.3	-9.3	1.48 H	301	48.50	10.50
6	#10360.00	58.4 PK	68.3	-9.9	1.25 H	25	41.30	17.10
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	49.3 PK	74.0	-24.7	1.41 V	284	44.00	5.30
2	5150.00	40.2 AV	54.0	-13.8	1.41 V	284	34.90	5.30
3	*5180.00	102.1 PK			1.41 V	284	62.80	39.30
4	*5180.00	92.8 AV			1.41 V	284	53.50	39.30
5	#6906.00	56.3 PK	68.3	-12.0	1.39 V	147	45.80	10.50
6	#10360.00	58.1 PK	68.3	-10.2	1.25 V	44	41.00	17.10

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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	102.2 PK			1.00 H	200	62.90	39.30
2	*5200.00	92.8 AV			1.00 H	200	53.50	39.30
3	#6933.00	57.6 PK	68.3	-10.7	1.00 H	310	47.00	10.60
4	#10400.00	58.0 PK	68.3	-10.3	1.32 H	125	40.80	17.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	101.6 PK			1.42 V	285	62.30	39.30
2	*5200.00	92.0 AV			1.42 V	285	52.70	39.30
3	#6933.00	56.5 PK	68.3	-11.8	1.40 V	111	45.90	10.60
4	#10400.00	58.4 PK	68.3	-9.9	1.20 V	2	41.20	17.20

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	102.3 PK			1.00 H	199	63.00	39.30
2	*5240.00	92.1 AV			1.00 H	199	52.80	39.30
3	5350.00	52.4 PK	74.0	-21.6	1.00 H	199	46.80	5.60
4	5350.00	42.1 AV	54.0	-11.9	1.00 H	199	36.50	5.60
5	#6986.00	59.2 PK	68.3	-9.1	1.48 H	300	48.50	10.70
6	#10480.00	59.8 PK	68.3	-8.5	1.35 H	25	42.30	17.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	102.2 PK			1.40 V	284	62.90	39.30
2	*5240.00	92.8 AV			1.40 V	284	53.50	39.30
3	5350.00	50.1 PK	74.0	-23.9	1.40 V	284	44.50	5.60
4	5350.00	41.2 AV	54.0	-12.8	1.40 V	284	35.60	5.60
5	#6986.00	56.9 PK	68.3	-11.4	1.38 V	147	46.20	10.70
6	#10480.00	58.1 PK	68.3	-10.2	1.35 V	5	40.60	17.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 52	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	56.0 PK	74.0	-18.0	1.00 H	185	50.70	5.30
2	5150.00	42.2 AV	54.0	-11.8	1.00 H	185	36.90	5.30
3	*5260.00	108.2 PK			1.00 H	185	68.90	39.30
4	*5260.00	98.2 AV			1.00 H	185	58.90	39.30
5	#7013.00	57.7 PK	68.3	-10.6	1.72 H	300	47.00	10.70
6	#10520.00	63.8 PK	68.3	-4.5	1.55 H	250	46.20	17.60
7	15780.00	59.5 PK	74.0	-14.5	1.50 H	21	41.90	17.60
8	15780.00	46.7 AV	54.0	-7.3	1.50 H	21	29.10	17.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	56.8 PK	74.0	-17.2	1.39 V	285	51.50	5.30
2	5150.00	45.0 AV	54.0	-9.0	1.39 V	285	39.70	5.30
3	*5260.00	109.9 PK			1.39 V	285	70.60	39.30
4	*5260.00	100.2 AV			1.39 V	285	60.90	39.30
5	#7013.00	55.6 PK	68.3	-12.7	1.29 V	254	44.90	10.70
6	#10520.00	65.8 PK	68.3	-2.5	1.57 V	275	48.20	17.60
7	15780.00	58.9 PK	74.0	-15.1	1.39 V	202	41.30	17.60
8	15780.00	46.5 AV	54.0	-7.5	1.39 V	202	28.90	17.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 60	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5300.00	108.9 PK			1.00 H	188	69.50	39.40
2	*5300.00	98.6 AV			1.00 H	188	59.20	39.40
3	#7066.00	58.3 PK	68.3	-10.0	1.75 H	300	47.50	10.80
4	10600.00	62.7 PK	74.0	-11.3	1.53 H	249	44.70	18.00
5	10600.00	49.9 AV	54.0	-4.1	1.53 H	249	31.90	18.00
6	15900.00	59.7 PK	74.0	-14.3	1.52 H	22	42.20	17.50
7	15900.00	46.8 AV	54.0	-7.2	1.52 H	22	29.30	17.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	110.3 PK			1.37 V	281	70.90	39.40
2	*5300.00	100.4 AV			1.37 V	281	61.00	39.40
3	#7066.00	55.4 PK	68.3	-12.9	1.49 V	258	44.60	10.80
4	10600.00	65.2 PK	74.0	-8.8	1.58 V	290	47.20	18.00
5	**10600.00**	**52.9 AV**	**54.0**	**-1.1**	**1.58 V**	**290**	**34.90**	**18.00**
6	15900.00	60.8 PK	74.0	-13.2	1.37 V	36	43.30	17.50
7	15900.00	47.7 AV	54.0	-6.3	1.37 V	36	30.20	17.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 64	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5320.00	109.4 PK			1.00 H	200	70.00	39.40
2	*5320.00	99.4 AV			1.00 H	200	60.00	39.40
3	5350.00	70.2 PK	74.0	-3.8	1.00 H	200	64.60	5.60
4	5350.00	50.5 AV	54.0	-3.5	1.00 H	200	44.90	5.60
5	#7093.00	58.7 PK	68.3	-9.6	1.77 H	322	47.90	10.80
6	10640.00	63.1 PK	74.0	-10.9	1.55 H	247	44.90	18.20
7	10640.00	50.4 AV	54.0	-3.6	1.55 H	247	32.20	18.20
8	15960.00	59.8 PK	74.0	-14.2	1.11 H	256	42.60	17.20
9	15960.00	46.8 AV	54.0	-7.2	1.11 H	256	29.60	17.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	110.0 PK			1.37 V	283	70.60	39.40
2	*5320.00	100.2 AV			1.37 V	283	60.80	39.40
3	5350.00	71.2 PK	74.0	-2.8	1.37 V	283	65.60	5.60
4	5350.00	52.2 AV	54.0	-1.8	1.37 V	283	46.60	5.60
5	#7093.00	54.9 PK	68.3	-13.4	1.31 V	268	44.10	10.80
6	10640.00	64.8 PK	74.0	-9.2	1.40 V	276	46.60	18.20
7	10640.00	51.9 AV	54.0	-2.1	1.40 V	276	33.70	18.20
8	15960.00	60.2 PK	74.0	-13.8	1.32 V	31	43.00	17.20
9	15960.00	47.2 AV	54.0	-6.8	1.32 V	31	30.00	17.20

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 36	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	50.4 PK	74.0	-23.6	1.00 H	198	45.10	5.30
2	5150.00	40.5 AV	54.0	-13.5	1.00 H	198	35.20	5.30
3	*5180.00	102.7 PK			1.00 H	198	63.40	39.30
4	*5180.00	92.2 AV			1.00 H	198	52.90	39.30
5	#6906.00	56.2 PK	68.3	-12.1	1.66 H	1	45.70	10.50
6	#10360.00	57.6 PK	68.3	-10.7	1.12 H	25	40.50	17.10
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	51.6 PK	74.0	-22.4	1.36 V	185	46.30	5.30
2	5150.00	41.8 AV	54.0	-12.2	1.36 V	185	36.50	5.30
3	*5180.00	104.3 PK			1.36 V	185	65.00	39.30
4	*5180.00	93.5 AV			1.36 V	185	54.20	39.30
5	#6906.00	54.5 PK	68.3	-13.8	1.34 V	266	44.00	10.50
6	#10360.00	57.4 PK	68.3	-10.9	1.47 V	7	40.30	17.10

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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 40	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	102.9 PK			1.00 H	196	63.60	39.30
2	*5200.00	92.4 AV			1.00 H	196	53.10	39.30
3	#6933.00	56.5 PK	68.3	-11.8	1.65 H	2	45.90	10.60
4	#10400.00	58.0 PK	68.3	-10.3	1.12 H	26	40.80	17.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	104.8 PK			1.35 V	188	65.50	39.30
2	*5200.00	93.9 AV			1.35 V	188	54.60	39.30
3	#6933.00	54.9 PK	68.3	-13.4	1.35 V	265	44.30	10.60
4	#10400.00	58.8 PK	68.3	-9.5	1.47 V	258	41.60	17.20

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 48	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	102.5 PK			1.00 H	195	63.20	39.30
2	*5240.00	91.9 AV			1.00 H	195	52.60	39.30
3	5350.00	52.1 PK	74.0	-21.9	1.00 H	195	46.50	5.60
4	5350.00	42.1 AV	54.0	-11.9	1.00 H	195	36.50	5.60
5	#6986.00	56.0 PK	68.3	-12.3	1.65 H	2	45.30	10.70
6	#10480.00	58.3 PK	68.3	-10.0	1.00 H	2	40.80	17.50
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	104.0 PK			1.47 V	184	64.70	39.30
2	*5240.00	92.9 AV			1.47 V	184	53.60	39.30
3	5350.00	46.3 PK	74.0	-27.7	1.47 V	184	40.70	5.60
4	5350.00	36.4 AV	54.0	-17.6	1.47 V	184	30.80	5.60
5	#6986.00	55.4 PK	68.3	-12.9	1.35 V	265	44.70	10.70
6	#10480.00	57.6 PK	68.3	-10.7	1.32 V	52	40.10	17.50

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 52	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	50.9 PK	74.0	-23.1	1.00 H	200	45.60	5.30
2	5150.00	41.2 AV	54.0	-12.8	1.00 H	200	35.90	5.30
3	*5260.00	108.0 PK			1.00 H	200	68.70	39.30
4	*5260.00	96.1 AV			1.00 H	200	56.80	39.30
5	#7013.00	57.3 PK	68.3	-11.0	1.75 H	329	46.60	10.70
6	#10520.00	58.3 PK	68.3	-10.0	1.45 H	25	40.70	17.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	51.3 PK	74.0	-22.7	1.32 V	184	46.00	5.30
2	5150.00	41.2 AV	54.0	-12.8	1.32 V	184	35.90	5.30
3	*5260.00	109.9 PK			1.32 V	184	70.60	39.30
4	*5260.00	99.0 AV			1.32 V	184	59.70	39.30
5	#7013.00	57.0 PK	68.3	-11.3	1.73 V	24	46.30	10.70
6	#10520.00	58.4 PK	68.3	-9.9	1.36 V	254	40.80	17.60

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 60	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5300.00	108.2 PK			1.00 H	202	68.80	39.40
2	*5300.00	96.1 AV			1.00 H	202	56.70	39.40
3	**#7066.00**	**67.2 PK**	**68.3**	**-1.1**	**1.25 H**	**25**	**56.40**	**10.80**
4	10600.00	59.2 PK	74.0	-14.8	1.36 H	45	41.20	18.00
5	10600.00	44.9 AV	54.0	-9.1	1.36 H	45	26.90	18.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	110.0 PK			1.33 V	185	70.60	39.40
2	*5300.00	99.5 AV			1.33 V	185	60.10	39.40
3	#7066.00	46.9 PK	68.3	-21.4	1.00 V	2	36.10	10.80
4	10600.00	59.0 PK	74.0	-15.0	1.85 V	58	41.00	18.00
5	10600.00	45.1 AV	54.0	-8.9	1.85 V	58	27.10	18.00

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 64	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5320.00	108.2 PK			1.08 H	196	68.80	39.40
2	*5320.00	96.2 AV			1.08 H	196	56.80	39.40
3	5350.00	59.1 PK	74.0	-14.9	1.08 H	196	53.50	5.60
4	5350.00	46.6 AV	54.0	-7.4	1.08 H	196	41.00	5.60
5	#7093.00	55.6 PK	68.3	-12.7	1.76 H	36	44.80	10.80
6	10640.00	58.3 PK	74.0	-15.7	1.33 H	333	40.10	18.20
7	10640.00	45.6 AV	54.0	-8.4	1.33 H	333	27.40	18.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	109.5 PK			1.45 V	168	70.10	39.40
2	*5320.00	98.4 AV			1.45 V	168	59.00	39.40
3	5350.00	59.3 PK	74.0	-14.7	1.45 V	168	53.70	5.60
4	5350.00	46.8 AV	54.0	-7.2	1.45 V	168	41.20	5.60
5	#7093.00	54.1 PK	68.3	-14.2	1.35 V	274	43.30	10.80
6	10640.00	59.6 PK	74.0	-14.4	1.65 V	55	41.40	18.20
7	10640.00	46.4 AV	54.0	-7.6	1.65 V	55	28.20	18.20

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 38	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	56.8 PK	74.0	-17.2	1.00 H	214	51.50	5.30
2	5150.00	44.4 AV	54.0	-9.6	1.00 H	214	39.10	5.30
3	*5190.00	99.6 PK			1.00 H	200	60.30	39.30
4	*5190.00	88.0 AV			1.00 H	200	48.70	39.30
5	#6920.00	62.3 PK	68.3	-6.0	1.75 H	317	51.70	10.60
6	#10380.00	59.7 PK	68.3	-8.6	1.32 H	266	42.60	17.10
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	60.0 PK	74.0	-14.0	1.36 V	178	54.70	5.30
2	5150.00	45.2 AV	54.0	-8.8	1.36 V	178	39.90	5.30
3	*5190.00	100.6 PK			1.64 V	182	61.30	39.30
4	*5190.00	89.3 AV			1.64 V	182	50.00	39.30
5	#6920.00	60.7 PK	68.3	-7.6	1.38 V	271	50.10	10.60
6	#10380.00	59.6 PK	68.3	-8.7	1.02 V	325	42.50	17.10

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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 46	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	98.7 PK			1.00 H	202	59.40	39.30
2	*5230.00	87.2 AV			1.00 H	202	47.90	39.30
3	5350.00	55.8 PK	74.0	-18.2	1.00 H	201	50.20	5.60
4	5350.00	43.5 AV	54.0	-10.5	1.00 H	201	37.90	5.60
5	#6973.00	61.4 PK	68.3	-6.9	1.50 H	315	50.70	10.70
6	#10460.00	60.2 PK	68.3	-8.1	1.32 H	201	42.80	17.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	100.2 PK			1.59 V	163	60.90	39.30
2	*5230.00	89.0 AV			1.59 V	163	49.70	39.30
3	5350.00	56.1 PK	74.0	-17.9	1.59 V	160	50.50	5.60
4	5350.00	43.3 AV	54.0	-10.7	1.59 V	160	37.70	5.60
5	#6973.00	60.4 PK	68.3	-7.9	1.00 V	238	49.70	10.70
6	#10460.00	59.0 PK	68.3	-9.3	1.00 V	251	41.60	17.40

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 54	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.4 PK	74.0	-18.6	1.35 H	156	50.10	5.30
2	5150.00	42.5 AV	54.0	-11.5	1.35 H	156	37.20	5.30
3	*5270.00	105.4 PK			1.00 H	203	66.10	39.30
4	*5270.00	93.7 AV			1.00 H	203	54.40	39.30
5	#7026.00	62.0 PK	68.3	-6.3	1.51 H	314	51.30	10.70
6	#10540.00	61.7 PK	68.3	-6.6	1.26 H	54	43.90	17.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.9 PK	74.0	-18.1	1.41 V	184	50.60	5.30
2	5150.00	43.8 AV	54.0	-10.2	1.41 V	184	38.50	5.30
3	*5270.00	107.6 PK			1.45 V	188	68.30	39.30
4	*5270.00	95.8 AV			1.45 V	188	56.50	39.30
5	#7026.00	61.1 PK	68.3	-7.2	1.90 V	190	50.40	10.70
6	#10540.00	59.4 PK	68.3	-8.9	1.12 V	128	41.60	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 the restricted band.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 62	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	*5310.00	103.4 PK			1.00 H	202	64.00	39.40
2	*5310.00	91.9 AV			1.00 H	202	52.50	39.40
3	5350.00	61.9 PK	74.0	-12.1	1.00 H	197	56.30	5.60
4	5350.00	49.1 AV	54.0	-4.9	1.00 H	197	43.50	5.60
5	#7080.00	61.8 PK	68.3	-6.5	1.76 H	309	51.00	10.80
6	10620.00	61.3 PK	74.0	-12.7	1.03 H	219	43.20	18.10
7	10620.00	47.4 AV	54.0	-6.6	1.03 H	219	29.30	18.10
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	*5310.00	106.0 PK			1.73 V	184	66.60	39.40
2	*5310.00	94.2 AV			1.73 V	184	54.80	39.40
3	5350.00	67.6 PK	74.0	-6.4	1.23 V	166	62.00	5.60
4	**5350.00**	**52.9 AV**	**54.0**	**-1.1**	**1.23 V**	**166**	**47.30**	**5.60**
5	#7080.00	61.0 PK	68.3	-7.3	1.00 V	196	50.20	10.80
6	10620.00	60.6 PK	74.0	-13.4	1.02 V	159	42.50	18.10
7	10620.00	47.6 AV	54.0	-6.4	1.02 V	159	29.50	18.10

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 the restricted band.

BELOW 1GHz WORST-CASE DATA：802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 60	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	27deg. C, 66%RH	TESTED BY	Martin Lee

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	142.44	25.7 QP	43.5	-17.8	1.47 H	289	40.10	-14.40
2	223.94	38.6 QP	46.0	-7.4	1.52 H	318	55.30	-16.70
3	239.46	40.7 QP	46.0	-5.3	1.00 H	285	55.80	-15.10
4	264.69	40.5 QP	46.0	-5.5	2.25 H	213	54.50	-14.00
5	371.41	36.6 QP	46.0	-9.4	1.00 H	328	47.90	-11.30
6	961.29	35.8 QP	54.0	-18.2	2.00 H	81	36.50	-0.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	47.36	33.1 QP	40.0	-6.9	1.63 V	244	47.80	-14.70
2	198.71	34.5 QP	43.5	-9.0	1.25 V	39	51.40	-16.90
3	229.76	35.3 QP	46.0	-10.7	1.00 V	316	51.60	-16.30
4	266.63	38.6 QP	46.0	-7.4	1.44 V	6	52.50	-13.90
5	332.60	32.5 QP	46.0	-13.5	1.49 V	184	44.50	-12.00
6	961.29	36.9 QP	54.0	-17.1	2.25 V	6	37.60	-0.70

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Nov. 16, 2012	Nov. 15, 2013
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 04, 2013	Feb. 03, 2014
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 08, 2013	Jul. 07, 2014
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

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

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

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.

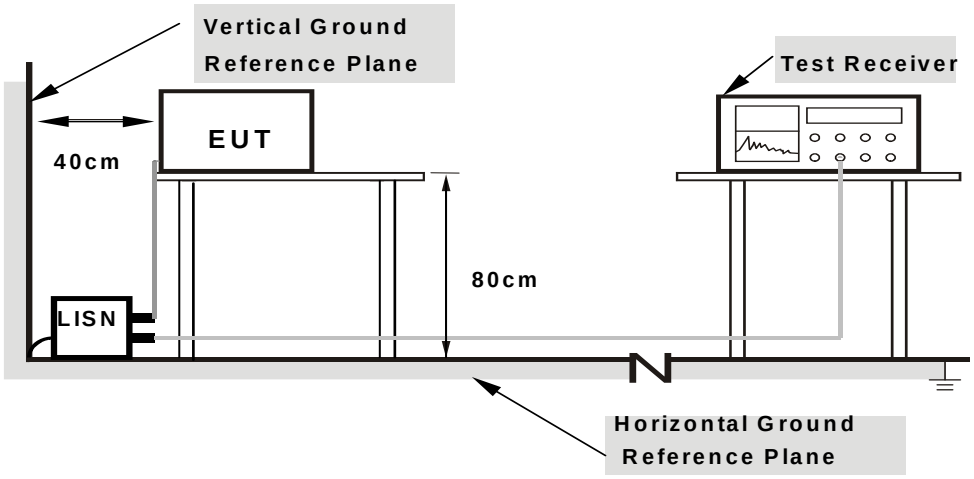
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

4.2.7 TEST RESULTS

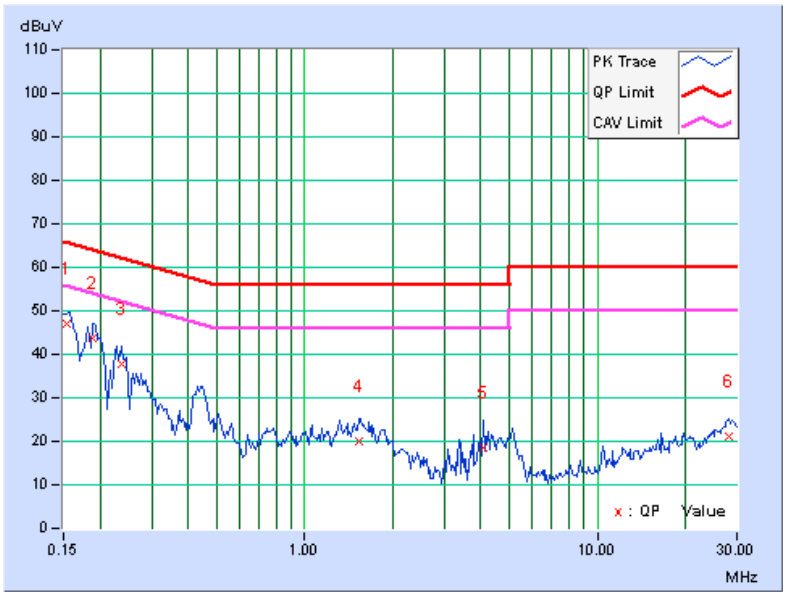
CONDUCTED WORST-CASE DATA：802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
CHANNEL	Channel 60		

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	**0.15391**	**0.16**	**46.85**	**34.85**	**47.01**	**35.01**	**65.79**	**55.79**	**-18.78**	**-20.78**
2	0.18906	0.16	43.68	31.39	43.84	31.55	64.08	54.08	-20.24	-22.53
3	0.23594	0.17	37.73	28.70	37.90	28.87	62.24	52.24	-24.34	-23.37
4	1.53516	0.27	19.91	15.67	20.18	15.94	56.00	46.00	-35.82	-30.06
5	4.08203	0.40	18.08	5.43	18.48	5.83	56.00	46.00	-37.52	-40.17
6	28.01563	1.59	19.45	13.09	21.04	14.68	60.00	50.00	-38.96	-35.32

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

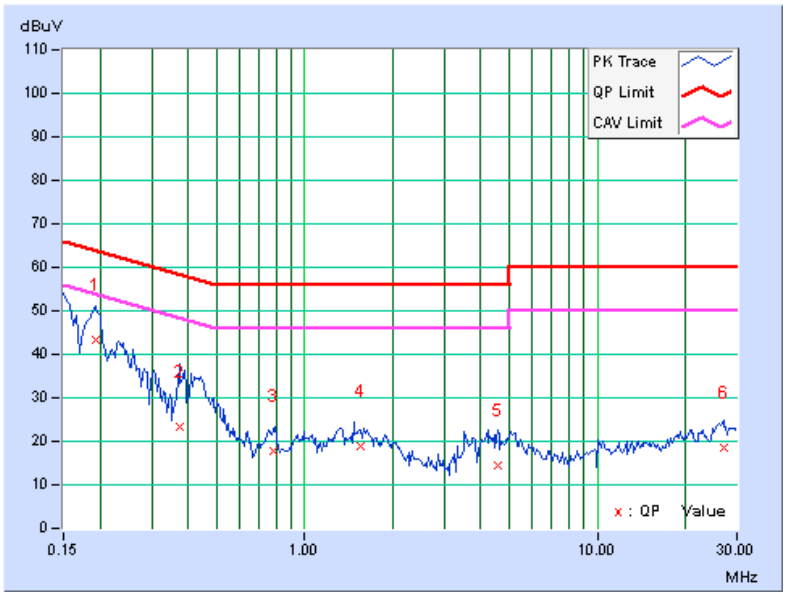


PHASE	Line 2	6dB BANDWIDTH	9kHz
CHANNEL	Channel 60		

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	0.19297	0.17	43.25	31.39	43.42	31.56	63.91	53.91	-20.49	-22.35
2	0.37266	0.23	23.25	11.97	23.48	12.20	58.44	48.44	-34.96	-36.24
3	0.78281	0.25	17.43	11.14	17.68	11.39	56.00	46.00	-38.32	-34.61
4	1.56250	0.27	18.68	12.73	18.95	13.00	56.00	46.00	-37.05	-33.00
5	4.56250	0.40	14.12	3.19	14.52	3.59	56.00	46.00	-41.48	-42.41
6	26.94531	1.16	17.32	8.61	18.48	9.77	60.00	50.00	-41.52	-40.23

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
5.250 ~ 5.350GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB
5.470 ~ 5.725GHz	The lesser of 250mW (24dBm) or 11dBm + 10logB

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

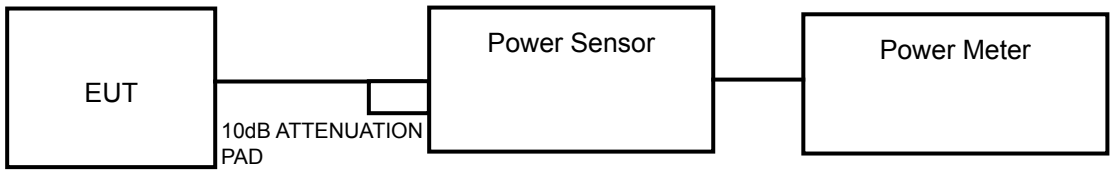
Per 662911 D01 Multiple Transmitter Output v02 Method of conducted output power measurement on IEEE 802.11 devices,

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.

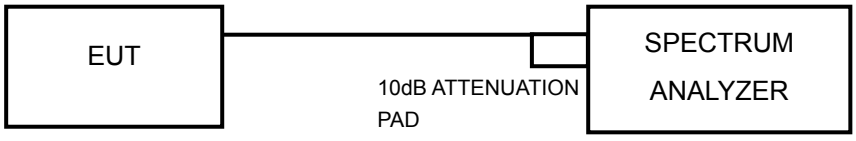
For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

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:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)	POWER LIMIT (dBm)	PASS/FAIL
36	5180	41.115	16.14	17	PASS
40	5200	41.976	16.23	17	PASS
48	5240	40.926	16.12	17	PASS
52	5260	45.709	16.60	24	PASS
60	5300	47.098	16.73	24	PASS
64	5320	45.920	16.62	24	PASS

NOTE:

For 5180~5240MHz:

1. 4dBm + 10log(24.30) = 17.86 dBm > 17dBm
2. 4dBm + 10log(25.41) = 18.05 dBm > 17dBm
3. 4dBm + 10log(25.16) = 18.01 dBm > 17dBm

For 5260~320MHz:

1. 11dBm + 10log(25.30) = 25.03 dBm > 24dBm
2. 11dBm + 10log(25.27) = 25.03 dBm > 24dBm
3. 11dBm + 10log(24.95) = 24.97 dBm > 24dBm

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	9.17	9.38	10.13	27.234	14.35	16.96	PASS
40	5200	8.60	9.32	9.90	25.567	14.08	17	PASS
48	5240	8.63	8.97	9.81	24.756	13.94	17	PASS
52	5260	16.21	16.11	16.15	123.825	20.93	24	PASS
60	5300	16.18	16.25	16.08	124.216	20.94	24	PASS
64	5320	16.09	16.31	16.07	123.858	20.93	24	PASS

NOTE:

Chain 0

For 5180~5240MHz:

1. 4dBm + 10log(20.61) = 17.14 dBm > 17dBm
2. 4dBm + 10log(20.22) = 17.06 dBm > 17dBm
3. 4dBm + 10log(20.95) = 17.21 dBm > 17dBm

For 5260~320MHz:

1. 11dBm + 10log(23.61) = 24.73 dBm > 24dBm
2. 11dBm + 10log(24.77) = 24.94 dBm > 24dBm
3. 11dBm + 10log(22.32) = 24.49 dBm > 24dBm

Chain 1

For 5180~5240MHz:

1. 4dBm + 10log(19.78) = 16.96 dBm < 17dBm
2. 4dBm + 10log(20.21) = 17.06 dBm > 17dBm
3. 4dBm + 10log(23.40) = 17.69 dBm > 17dBm

For 5260~320MHz:

1. 11dBm + 10log(25.30) = 25.03 dBm > 24dBm
2. 11dBm + 10log(24.39) = 24.87 dBm > 24dBm
3. 11dBm + 10log(24.07) = 24.81 dBm > 24dBm

Chain 2

For 5180~5240MHz:

1. 4dBm + 10log(20.08) = 17.03 dBm > 17dBm
2. 4dBm + 10log(20.51) = 17.12 dBm > 17dBm
3. 4dBm + 10log(20.07) = 17.03 dBm > 17dBm

For 5260~320MHz:

1. 11dBm + 10log(35.07) = 26.45 dBm > 24dBm
2. 11dBm + 10log(31.73) = 26.01 dBm > 24dBm
3. 11dBm + 10log(33.20) = 26.21 dBm > 24dBm

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	11.90	11.70	11.70	**45.070**	16.54	17	PASS
46	5230	11.80	11.70	11.60	44.381	16.47	17	PASS
54	5270	17.26	16.99	17.01	**153.448**	21.86	24	PASS
62	5310	17.49	16.89	16.77	152.504	21.83	24	PASS

NOTE:

Chain 0

For 5180~5230MHz:

1. 4dBm + 10log(44.70) = 20.50 dBm > 17dBm
2. 4dBm + 10log(44.92) = 20.52 dBm > 17dBm

For 5260~310MHz:

1. 11dBm + 10log(47.80) = 27.79 dBm > 24dBm
2. 11dBm + 10log(53.33) = 28.27 dBm > 24dBm

Chain 1

For 5180~5230MHz:

1. 4dBm + 10log(41.82) = 20.21 dBm > 17dBm
2. 4dBm + 10log(41.09) = 20.14 dBm > 17dBm

For 5260~310MHz::

1. 11dBm + 10log(48.43) = 27.85 dBm > 24dBm
2. 11dBm + 10log(48.20) = 27.83 dBm > 24dBm

Chain 2

For 5180~5230MHz:

1. 4dBm + 10log(44.15) = 20.45 dBm > 17dBm
2. 4dBm + 10log(43.87) = 20.42 dBm > 17dBm

For 5260~310MHz:

1. 11dBm + 10log(56.51) = 28.52 dBm > 24dBm
2. 11dBm + 10log(58.15) = 28.65 dBm > 24dBm

26dB BANDWIDTH:

802.11a

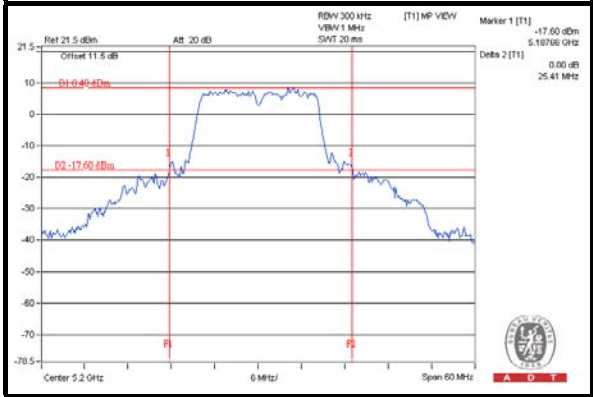
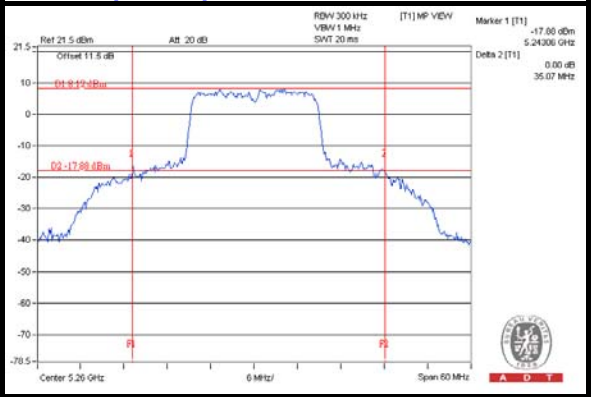
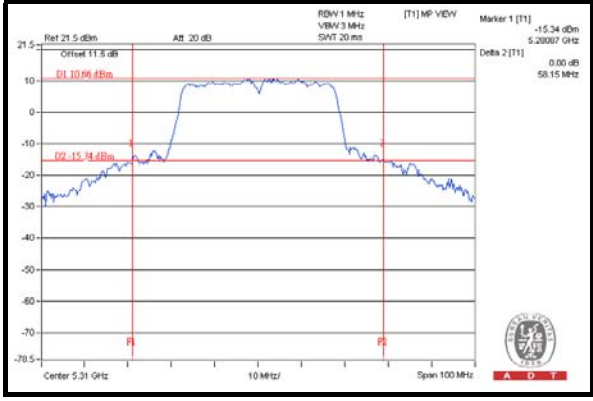
CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)	PASS / FAIL
36	5180	24.30	PASS
40	5200	25.41	PASS
48	5240	25.16	PASS
52	5260	25.30	PASS
60	5300	25.27	PASS
64	5320	24.95	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
36	5180	20.61	19.78	20.08	PASS
40	5200	20.22	20.21	20.51	PASS
48	5240	20.95	23.40	20.07	PASS
52	5260	23.61	25.30	35.07	PASS
60	5300	24.77	24.39	31.73	PASS
64	5320	22.32	24.07	33.20	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	26dBc BANDWIDTH (MHz)			PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	
38	5190	44.70	41.82	44.15	PASS
46	5230	44.92	41.09	43.87	PASS
54	5270	47.80	48.43	56.51	PASS
62	5310	53.33	48.20	58.15	PASS

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

EUT MAXIMUM CONDUCTED POWER

802.11a

FREQUENCY BAND (MHz)	MAX. POWER	
	OUTPUT POWER (mW)	OUTPUT POWER (dBm)
5250~5350	47.098	16.73

NOTE: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11n (20MHz)

FREQUENCY BAND (MHz)	MAX. POWER	
	OUTPUT POWER (mW)	OUTPUT POWER (dBm)
5250~5350	124.216	20.94

NOTE: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11n (40MHz)

FREQUENCY BAND (MHz)	MAX. POWER	
	OUTPUT POWER (mW)	OUTPUT POWER (dBm)
5250~5350	153.448	21.86

NOTE: Manufacturer provides Transmit Power Control description to meet this requirement.

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
5.250 ~ 5.350GHz	11dBm
5.470 ~ 5.725GHz	11dBm

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-1 alternative
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 = 0.3 second.
5) Perform a single sweep.
6) Record the max value

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

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
36	5180	3.81	4	PASS
40	5200	3.96	4	PASS
48	5240	3.85	4	PASS
52	5260	4.07	11	PASS
60	5300	4.70	11	PASS
64	5320	5.08	11	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
36	5180	-3.80	-3.44	-3.34	1.25	2.54	PASS
40	5200	-4.19	-3.19	-3.62	1.12	2.54	PASS
48	5240	-4.57	-3.20	-3.73	0.97	2.54	PASS
52	5260	3.61	3.85	3.66	8.48	10.19	PASS
60	5300	3.78	3.14	3.91	8.39	10.19	PASS
64	5320	3.29	3.38	3.85	8.28	10.19	PASS

NOTE: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. **For 5180~5240MHz:**

Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 7.46 > 6dBi, so the power density limit shall be reduced to 4-(7.46-6) =2.54dBm.

3. **For 5260~5320MHz:**

Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}$]= 6.81 > 6dBi, so the power density limit shall be reduced to 11-(6.81-6) =10.19dBm.

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

802.11n (40MHz)

CHAN.	CHAN. FREQ. (MHz)	PSD (dBm)			TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2			
38	5190	-5.06	-4.76	-4.07	0.16	2.54	PASS
46	5230	-3.91	-5.47	-3.85	0.42	2.54	PASS
54	5270	0.60	1.15	0.47	5.52	10.19	PASS
62	5310	1.32	0.96	0.74	5.78	10.19	PASS

NOTE: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. **For 5190~5230MHz:**

   Directional gain = 10 log[(10$^{G1/20}$ + 10$^{G2/20}$ + ... + 10$^{GN/20}$)^2 /N_{ANT}]= 7.46 > 6dBi, so the power density limit shall be reduced to 4-(7.46-6) =2.54dBm.

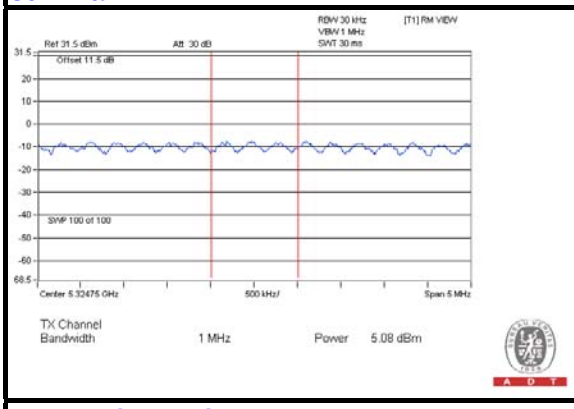
3. **For 5270~5310MHz:**

   Directional gain = 10 log[(10$^{G1/20}$ + 10$^{G2/20}$ + ... + 10$^{GN/20}$)^2 /N_{ANT}]= 6.81 > 6dBi, so the power density limit shall be reduced to 11-(6.81-6) =10.19dBm.

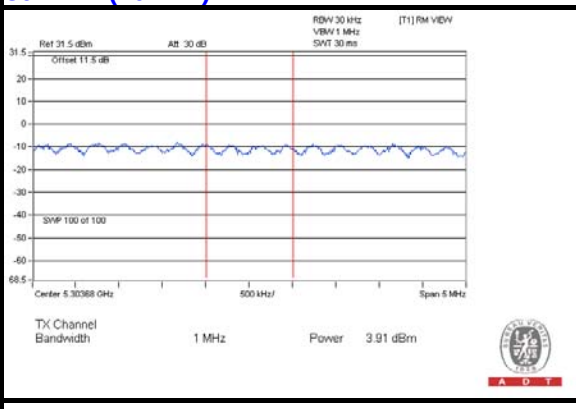
4. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

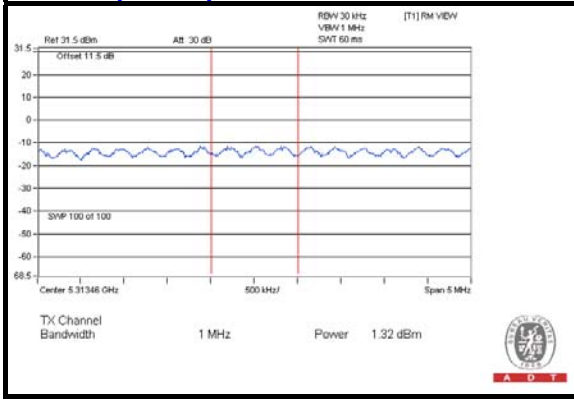
802.11a



802.11n (20MHz)



802.11n (40MHz)

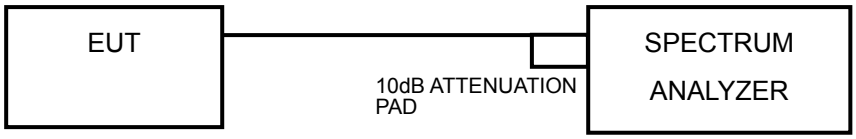


4.5 PEAK POWER EXCURSION MEASUREMENT

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

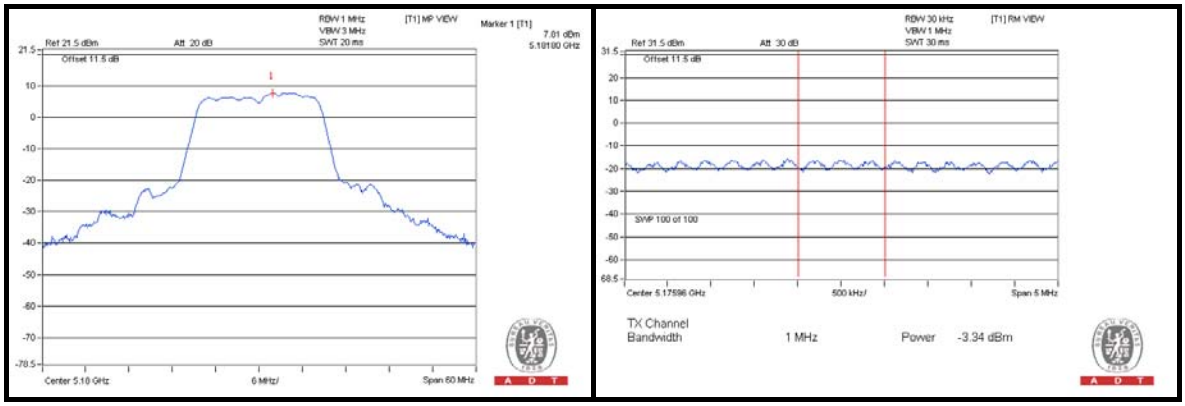
No deviation.

4.5.6 EUT OPERATING CONDITIONS

Same as 4.2.6

4.5.7 TEST RESULTS

MODULATION MODE	MODULATION TYPE	CHANNEL FREQUENCY (MHz)	PEAK VALUE (dBm)	PPSD (dBm)	PEAK EXCURSION (dB)	LIMIT (dB)	PASS/ FAIL
802.11a	BPSK	5260	13.63	4.07	9.56	13	PASS
	QPSK		13.37	2.96	10.41	13	PASS
	16QAM		11.84	0.78	11.06	13	PASS
	64QAM		10.08	-0.18	10.26	13	PASS
802.11n (20MHz)	BPSK	5180	7.81	-3.34	11.15	13	PASS
	QPSK		7.03	-3.25	10.28	13	PASS
	16QAM		5.82	-4.84	10.66	13	PASS
	64QAM		3.64	-7.08	10.72	13	PASS
802.11n (40MHz)	BPSK	5230	5.93	-4.07	10.00	13	PASS
	QPSK		7.08	-3.28	10.36	13	PASS
	16QAM		4.93	-5.44	10.37	13	PASS
	64QAM		3.28	-7.84	11.12	13	PASS

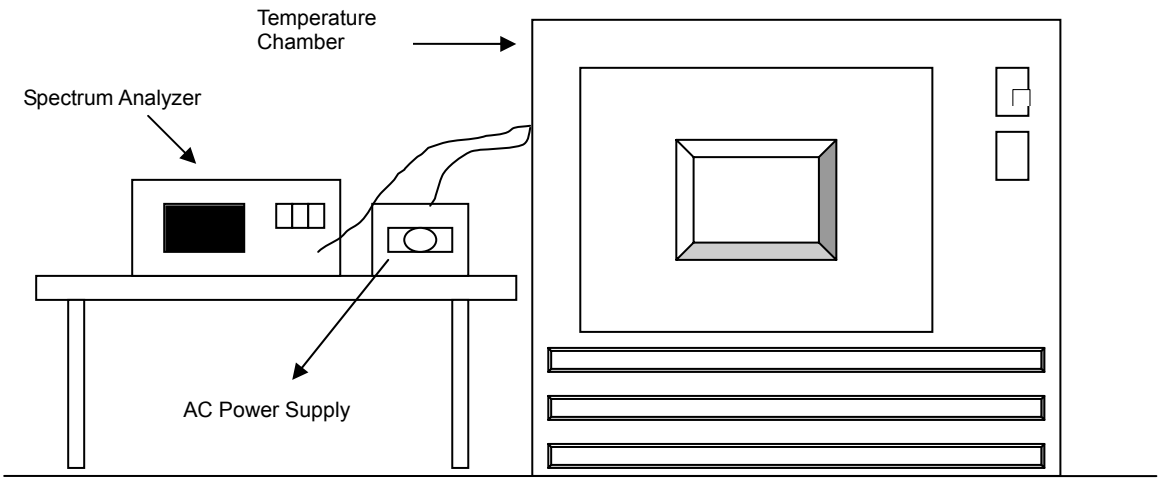


4.6 FREQUENCY STABILITY

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: 5320MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5320.0033	0.00006	5319.9992	-0.00002	5319.9942	-0.00011	5320.0029	0.00005
40	120	5320.0144	0.00027	5320.0141	0.00027	5320.0143	0.00027	5320.0159	0.00030
30	120	5320.0029	0.00005	5320.0077	0.00014	5320.0101	0.00019	5320.0031	0.00006
20	120	5319.9739	-0.00049	5319.9755	-0.00046	5319.971	-0.00055	5319.9782	-0.00041
10	120	5320.0025	0.00005	5320.0036	0.00007	5320.0063	0.00012	5320.0083	0.00016
0	120	5320.0187	0.00035	5320.0183	0.00034	5320.0167	0.00031	5320.0189	0.00036
-10	120	5319.9735	-0.00050	5319.9765	-0.00044	5319.9768	-0.00044	5319.9749	-0.00047
-20	120	5320.0036	0.00007	5320.0108	0.00020	5320.0059	0.00011	5320.012	0.00023
-30	120	5319.9937	-0.00012	5319.9916	-0.00016	5319.9872	-0.00024	5319.9912	-0.00017

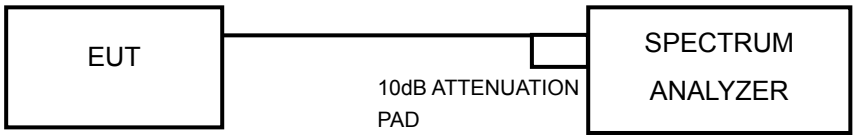
FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5320MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5319.9742	-0.00048	5319.9761	-0.00045	5319.9716	-0.00053	5319.9786	-0.00040
	120	5319.9739	-0.00049	5319.9755	-0.00046	5319.971	-0.00055	5319.9782	-0.00041
	102	5319.9732	-0.00050	5319.9764	-0.00044	5319.971	-0.00055	5319.9789	-0.00040

4.7 20dBc BANDWIDTH MEASUREMENT

4.7.1 LIMITS OF PEAK TRANSMIT POWER MEASUREMENT

20dBc point shall not overlap in 5150~5350MHz.

4.7.2 TEST SETUP



4.7.3 TEST INSTRUMENTS

Refer to section 4.1.3 to get information of above instrument.

4.7.4 TEST PROCEDURE

789033 D01 General UNII Test Procedures v01r03

Emission bandwidth

1) Set RBW = approximately 1% of the emission bandwidth.

2) Set the VBW > RBW.

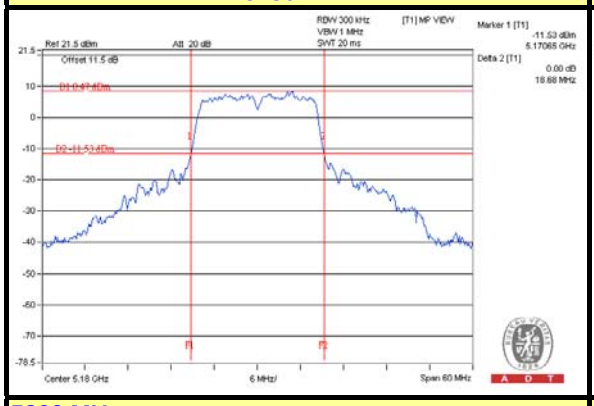
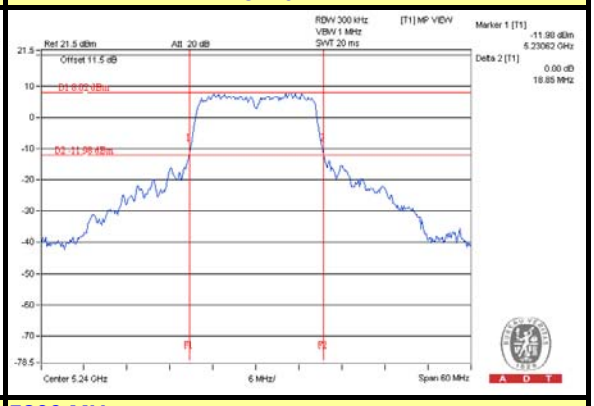
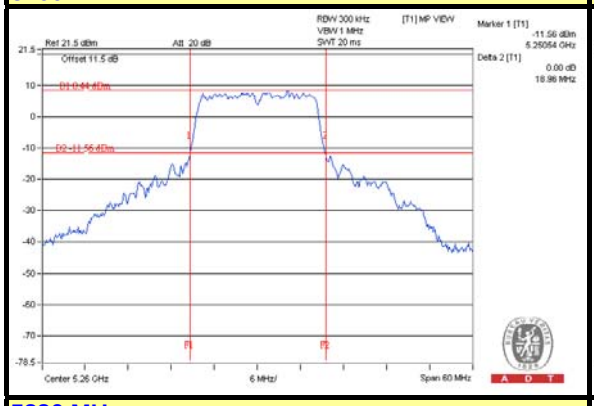
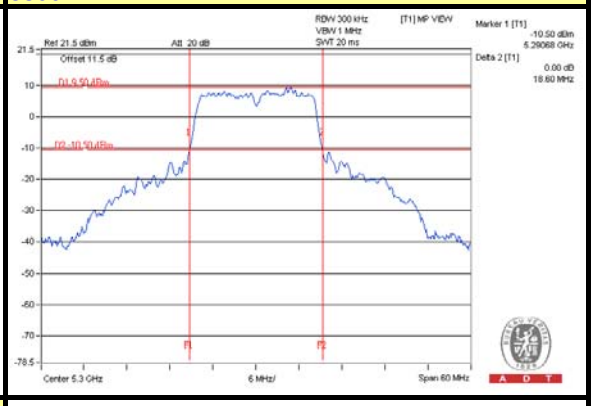
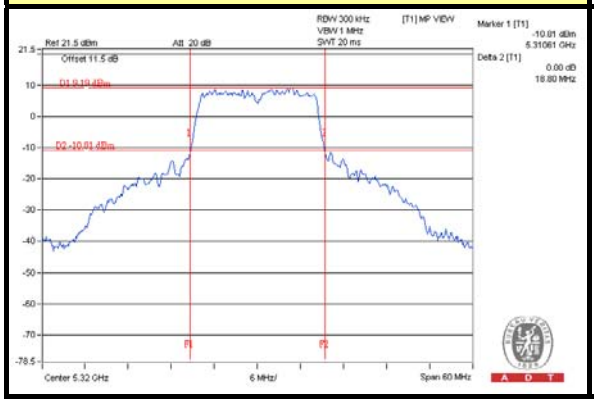
3) Detector = Peak.

4) Trace mode = max hold.

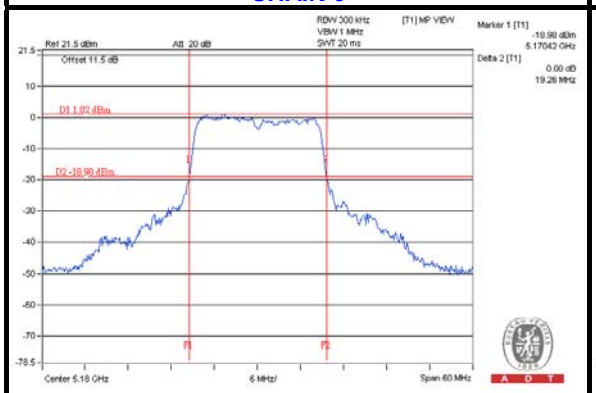
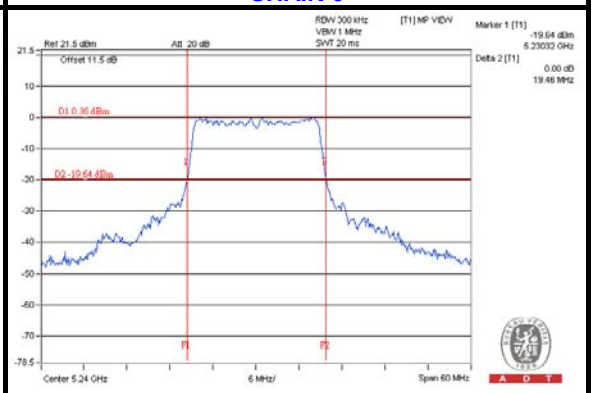
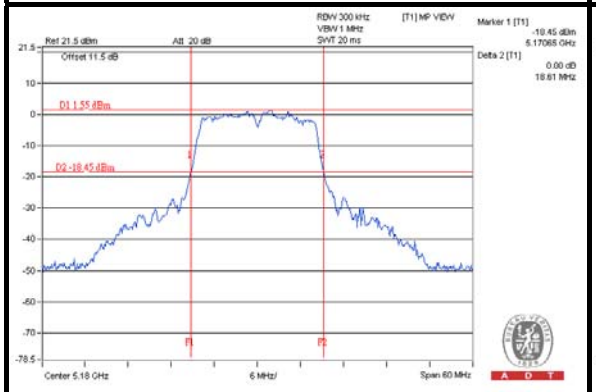
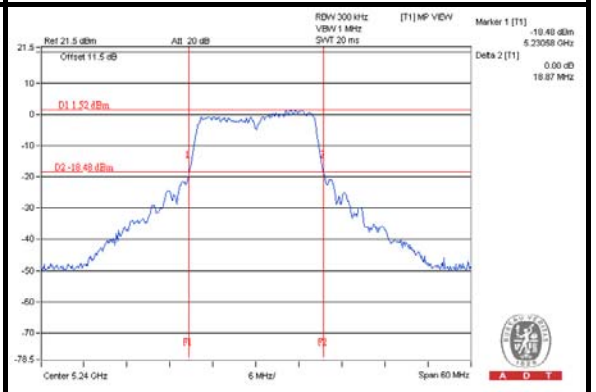
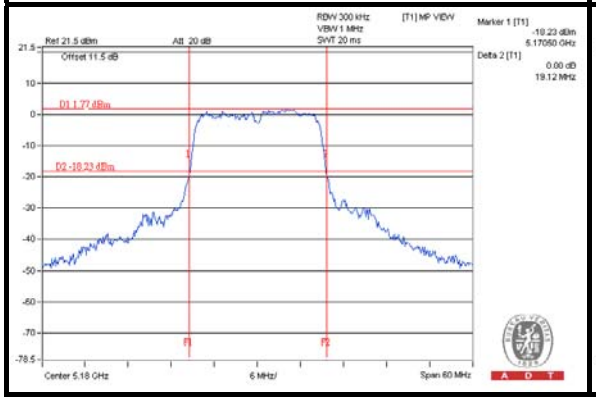
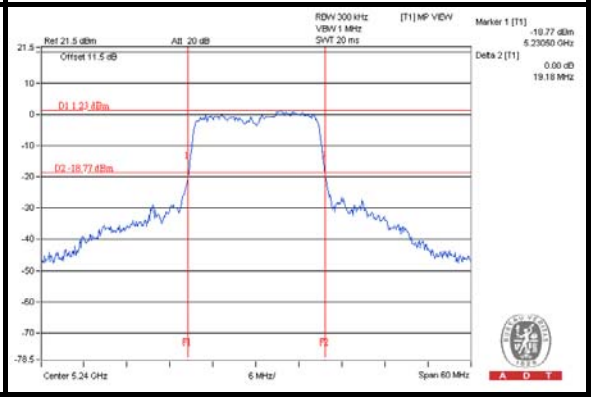
5) Measure the maximum width of the emission that is 20 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

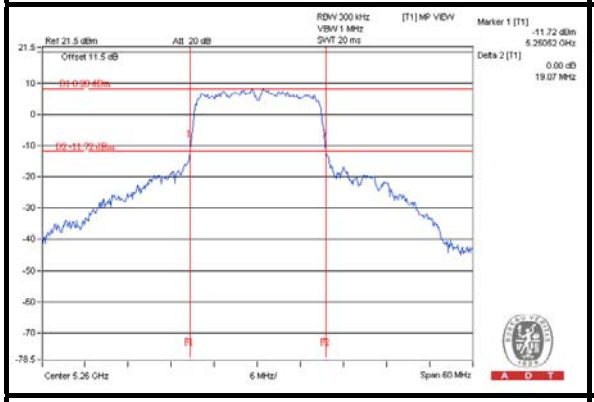
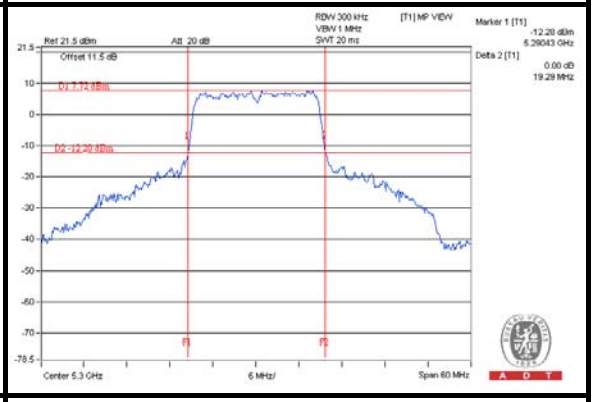
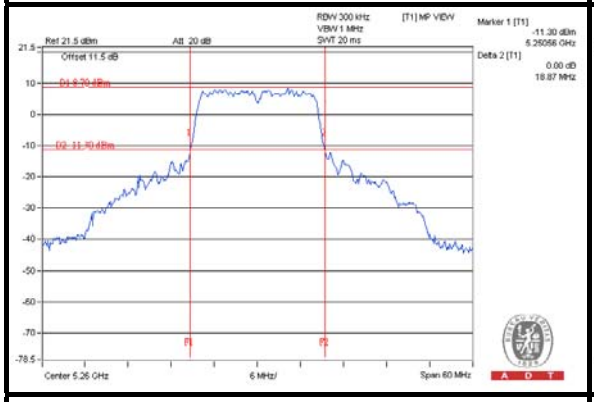
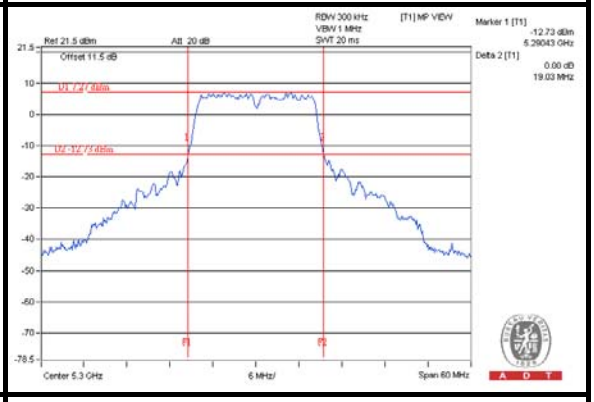
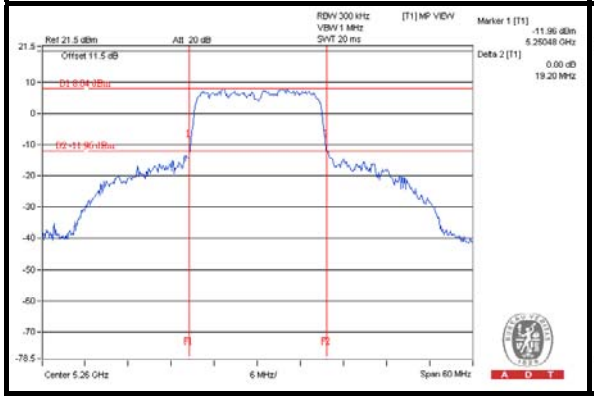
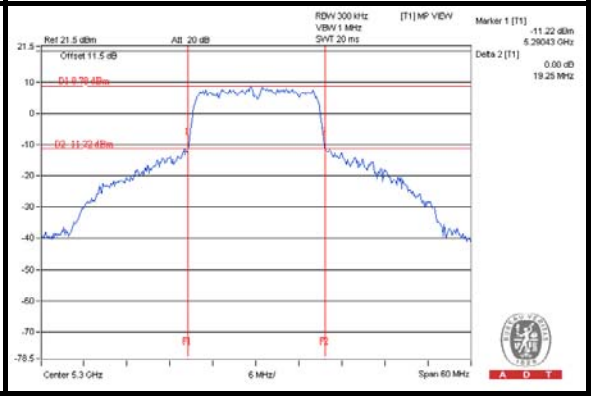
4.7.5 TEST RESULTS

802.11a

5180 MHz	5240 MHz
	
5260 MHz	**5300 MHz**
	
5320 MHz	
	

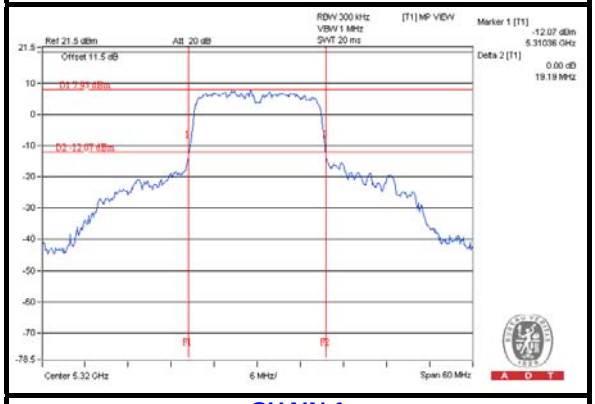
802.11n (20MHz)

5180 MHz	5240 MHz
CHAIN 0	CHAIN 0
	
CHAIN 1	CHAIN 1
	
CHAIN 2	CHAIN 2
	

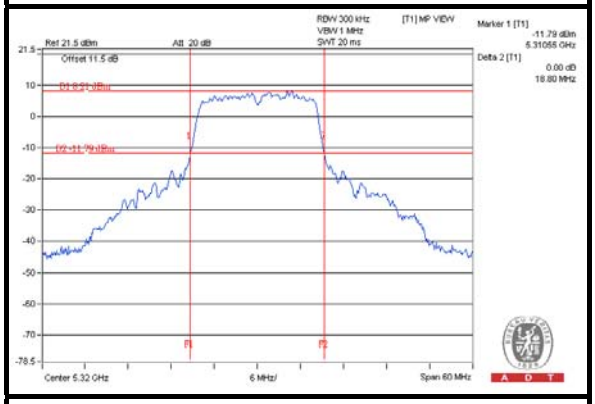
5260 MHz	5300 MHz
CHAIN 0	CHAIN 0
	
CHAIN 1	CHAIN 1
	
CHAIN 2	CHAIN 2
	

5320 MHz

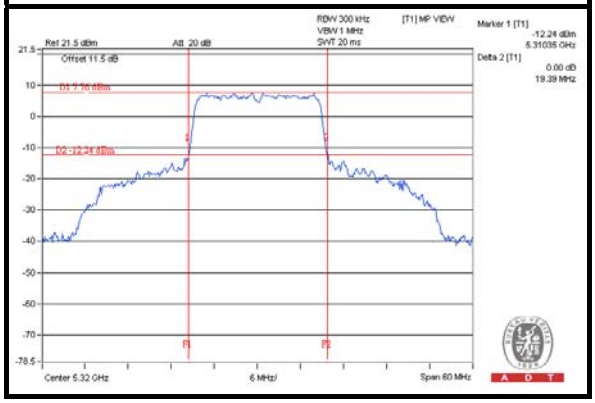
CHAIN 0



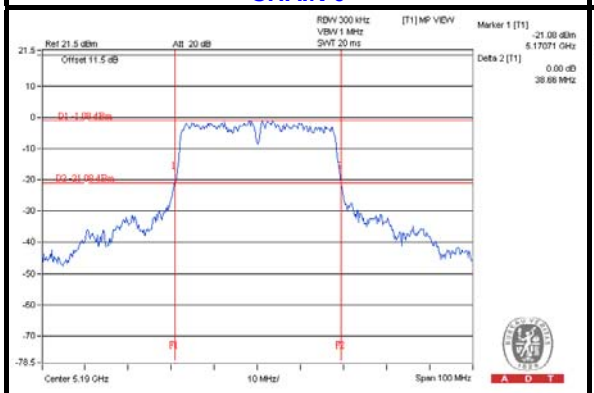
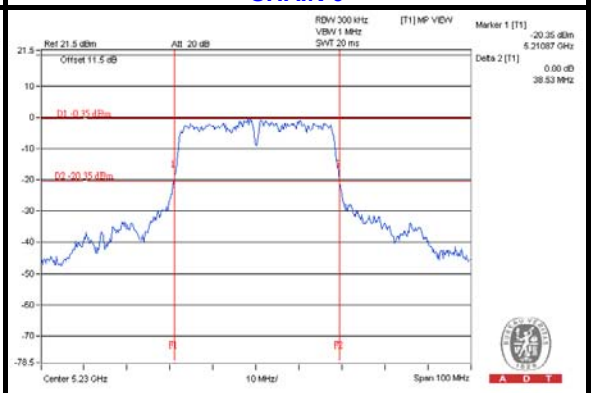
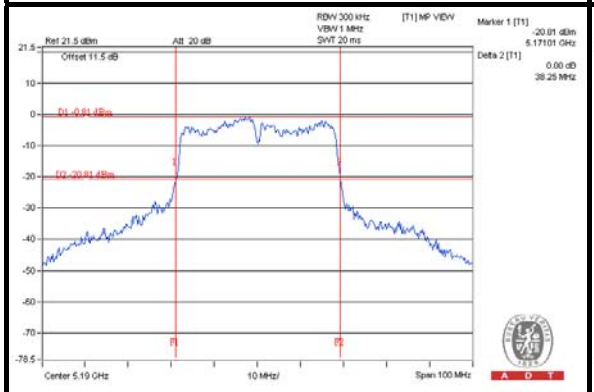
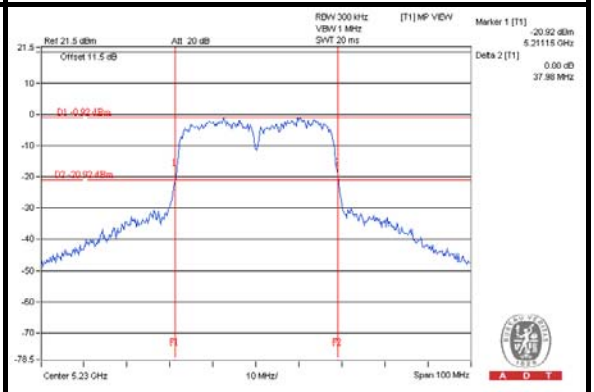
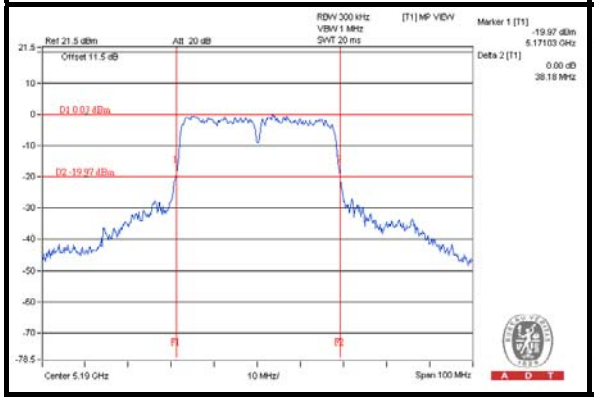
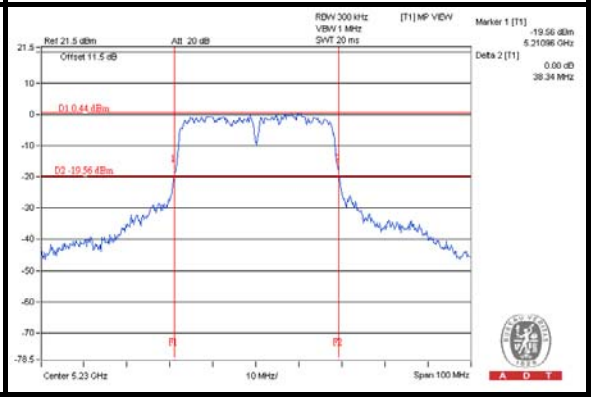
CHAIN 1



CHAIN 2



802.11n (40MHz)

5190 MHz	5230 MHz
CHAIN 0	CHAIN 0
	
CHAIN 1	CHAIN 1
	
CHAIN 2	CHAIN 2
	

5270 MHz	5310 MHz
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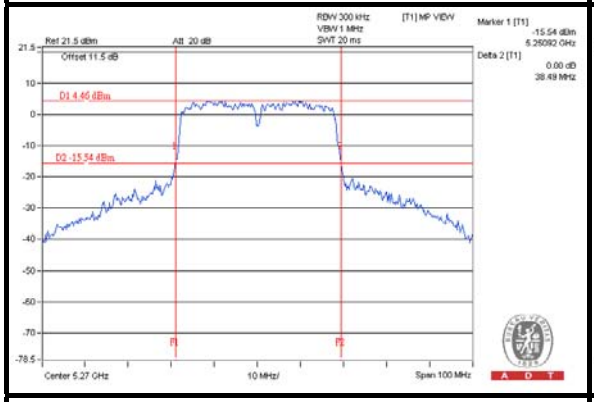
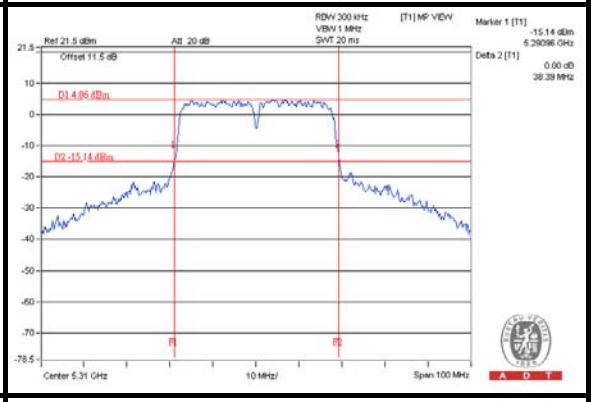
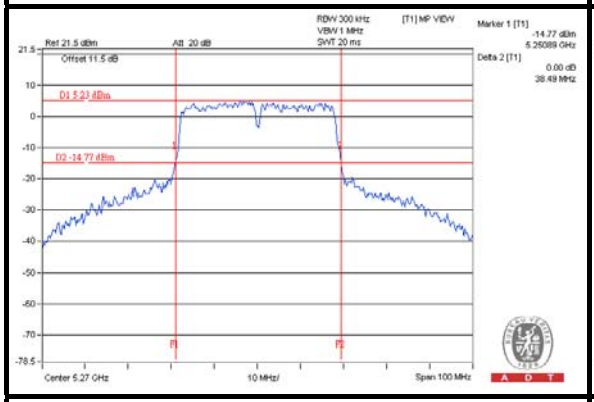
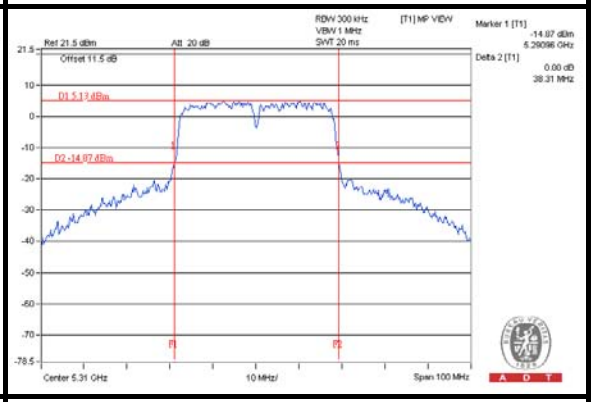
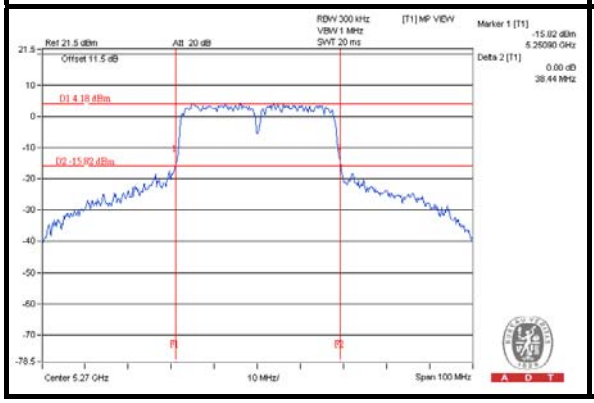
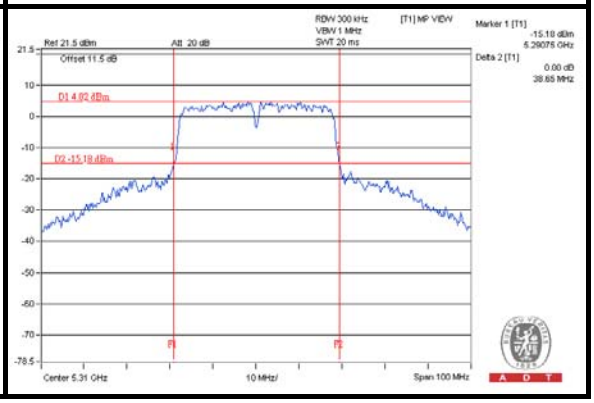
	
CHAIN 1	CHAIN 1
	
CHAIN 2	CHAIN 2
	

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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Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:
Tel: 886-3-5935343
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Hwa Ya EMC/RF/Safety Telecom Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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

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

---END---