FCC Test Report

Report No.:	RF170425C16A R1
FCC ID:	PY317100368
Test Model:	A7000
Received Date:	Apr. 26, 2017
Test Date:	May 15 ~ Jun. 03, 2017
Issued Date:	Jun. 20, 2017
Applicant:	NETGEAR Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 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 Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF170425C16A	Original release.	Jun. 09, 2017
RF170425C16A R1	Revised cable length of cradle	Jun. 20, 2017

1 Certificate of Conformity

Product:	A1900 USB 3.0 Wireless Adapter
Brand:	NETGEAR
Test Model:	A7000
Sample Status:	Engineering sample
Applicant:	NETGEAR Inc.
Test Date:	May 15 ~ Jun. 03, 2017
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2013

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

Prepared by : _____ , **Date:** Jun. 20, 2017

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Jun. 20, 2017

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -16.21dB at 0.53828MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00, 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is i-pex(MHF) not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.63 dB
	200MHz ~1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	A1900 USB 3.0 Wireless Adapter
Brand	NETGEAR
Test Model	A7000
Status of EUT	Engineering sample
Power Supply Rating	5Vdc (host or cradle)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 600Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	111.901mW
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	Cradle (1.0m USB cable)
Data Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 3 completed transmitter and 3 receivers.

Modulation Mode	TX Function	Beamforming
802.11b	1TX (Fixed Chain 1)	Not Support
802.11g	3TX	Not Support
802.11n (HT20)	3TX	Support
802.11n (HT40)	3TX	Support

* For 802.11n, CDD mode and Beamforming mode are presented in power output test item. For other test items, CDD mode is the worst case for final tests after pretesting.

2. The following antennas were provided to the EUT.

Ant	Antenna Type	Antenna Gain(dBi) Including cable loss	Frequency range (MHz to MHz)	Connecter Type
ant0	PIFA	3.5 (5G) Rx only	2400-2500; 5180-5825	none (like solder)

Antenna Type	Dipole		Antenna Connector	i-pex(MHF)
Antenna Gain (dBi)				
Ant	Frequency (MHz)			
	2.4GHz	U-NII-1	U-NII-2a	U-NII-2c	U-NII-3
ant1	2.63	1.11	2.01	2.44	3.20
ant2	2.87	4.46	4.35	4.88	4.48
ant3	3.06	2.44	2.69	3.48	3.00

3. The 2.4 and 5GHz cannot transmit simultaneously.
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

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

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 & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz

PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

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

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)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	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)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

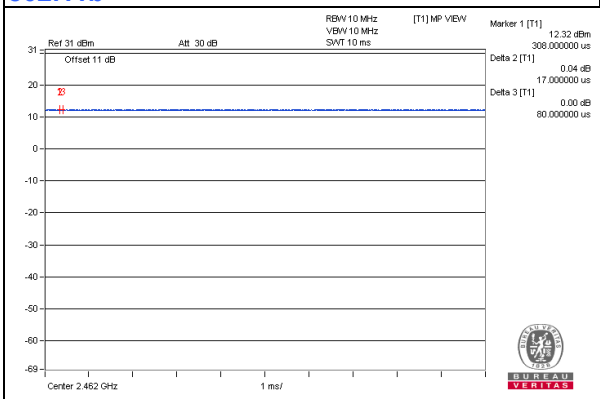
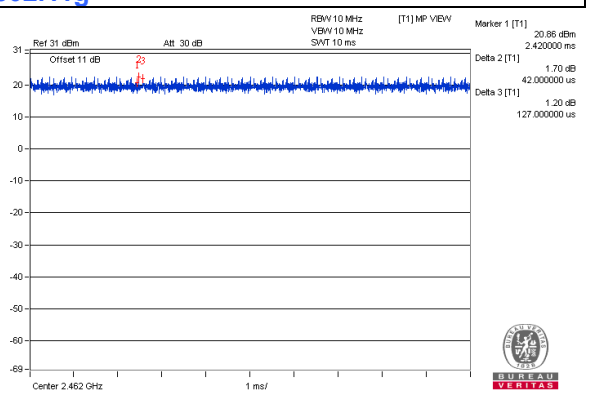
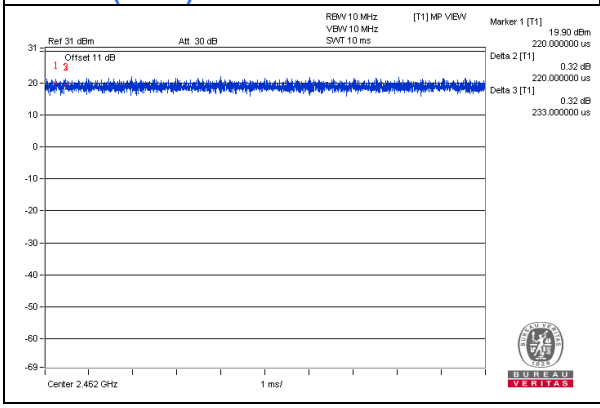
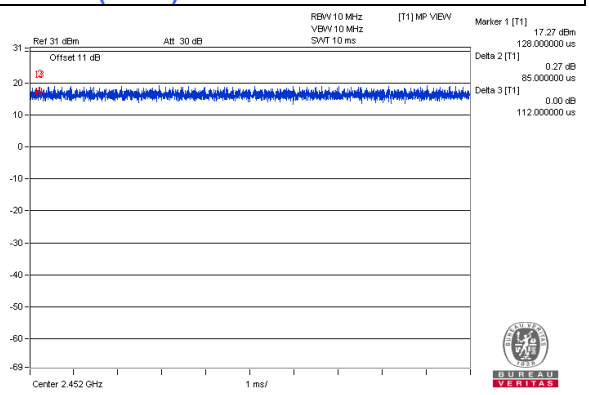
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 70%RH	120Vac, 60Hz	Matthew Yang
RE<1G	25deg. C, 70%RH	120Vac, 60Hz	Matthew Yang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Chris Lin
APCM	24deg. C, 64%RH	120Vac, 60Hz	Ted Chang

3.3 Duty Cycle of Test Signal

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

Duty cycle = 100%

802.11b	802.11g
	
802.11n (HT20)	**802.11n (HT40)**
	

3.4 Description of Support Units

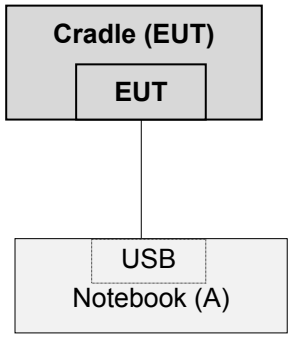
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	SONY	SVS151A12P	275548477000805	FCC DoC Approved	-

Note:

1. 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 C (15.247)
KDB 558074 D01 DTS Meas Guidance v04
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

NOTE: The EUT 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. Other emissions shall be at least 30dB below the highest level of the desired power:

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 30dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 24, 2016	Oct. 23, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 16, 2016	Aug. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Dec. 15, 2016	Dec. 14, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2016	Aug. 08, 2017
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Aug. 09, 2016	Aug. 08, 2017
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 BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017

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 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.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

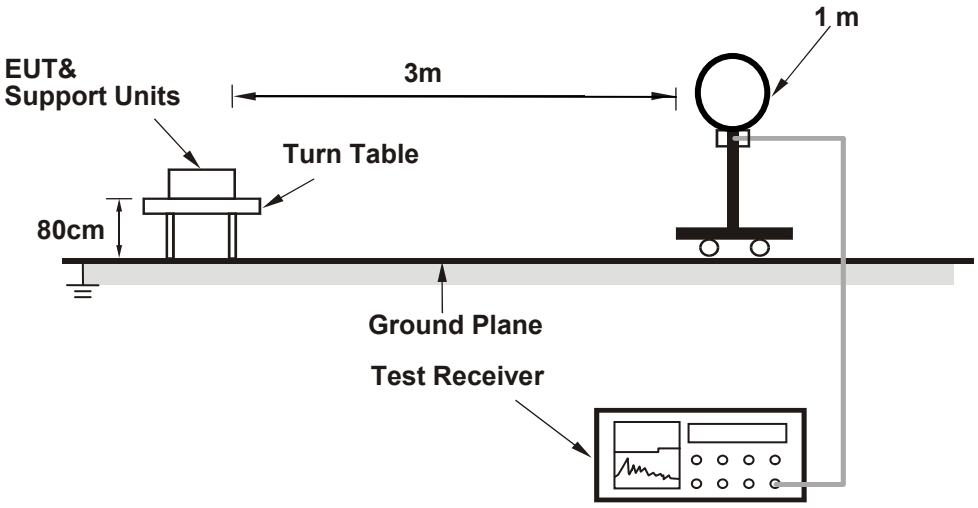
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

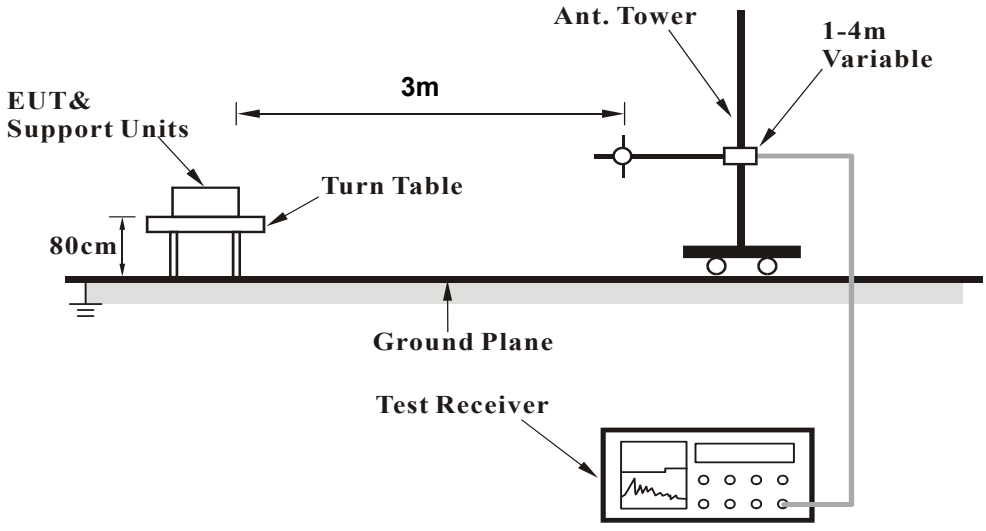
No deviation.

4.1.5 Test Set Up

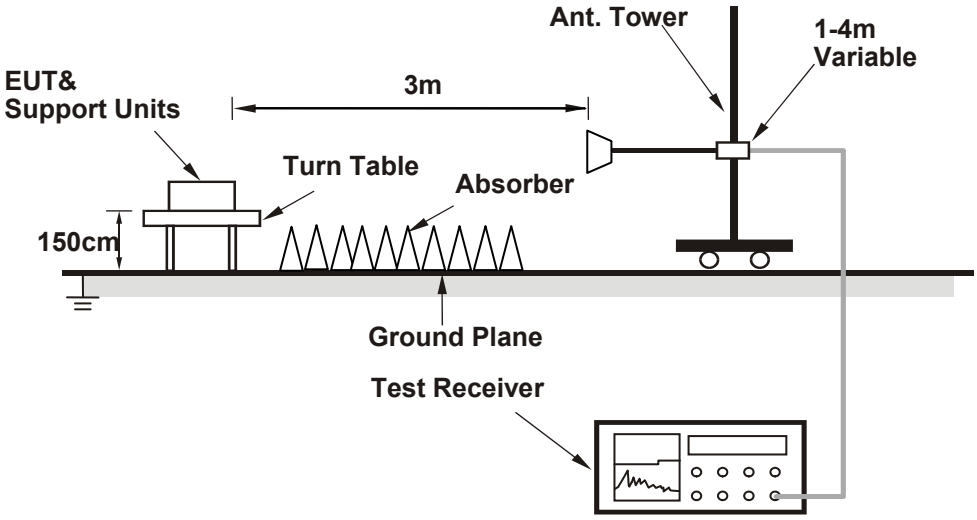
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the notebook via cradle and placed them on the testing table.
b. Set the EUT under transmitting condition.

4.1.7 Test Results

Above 1GHz Data：

802.11b

CHANNEL	TX Channel 1	**DETECTOR FUNCTION**	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2387.00	57.6 PK	74.0	-16.4	2.77 H	22	24.70	32.90
2	2387.00	47.0 AV	54.0	-7.0	2.77 H	22	14.10	32.90
3	*2412.00	105.8 PK			2.77 H	22	72.90	32.90
4	*2412.00	102.3 AV			2.77 H	22	69.40	32.90
5	4824.00	49.0 PK	74.0	-25.0	2.83 H	88	42.30	6.70
6	4824.00	41.5 AV	54.0	-12.5	2.83 H	88	34.80	6.70
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	2387.00	60.5 PK	74.0	-13.5	3.10 V	110	27.60	32.90
2	2387.00	50.9 AV	54.0	-3.1	3.10 V	110	18.00	32.90
3	*2412.00	112.9 PK			3.10 V	110	80.00	32.90
4	*2412.00	109.0 AV			3.10 V	110	76.10	32.90
5	4824.00	54.8 PK	74.0	-19.2	2.95 V	169	48.10	6.70
6	4824.00	50.4 AV	54.0	-3.6	2.95 V	169	43.70	6.70

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2437.00	105.7 PK			3.37 H	31	72.60	33.10
2	*2437.00	102.0 AV			3.37 H	31	68.90	33.10
3	4874.00	49.8 PK	74.0	-24.2	2.60 H	95	43.00	6.80
4	4874.00	40.6 AV	54.0	-13.4	2.60 H	95	33.80	6.80
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	*2437.00	110.3 PK			2.91 V	137	77.20	33.10
2	*2437.00	106.6 AV			2.91 V	137	73.50	33.10
3	4874.00	55.4 PK	74.0	-18.6	2.61 V	180	48.60	6.80
4	4874.00	51.6 AV	54.0	-2.4	2.61 V	180	44.80	6.80

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2462.00	105.0 PK			3.29 H	34	71.80	33.20
2	*2462.00	101.3 AV			3.29 H	34	68.10	33.20
3	2483.50	58.3 PK	74.0	-15.7	3.29 H	34	25.00	33.30
4	2483.50	46.6 AV	54.0	-7.4	3.29 H	34	13.30	33.30
5	4924.00	49.4 PK	74.0	-24.6	2.71 H	112	42.50	6.90
6	4924.00	38.1 AV	54.0	-15.9	2.71 H	112	31.20	6.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.3 PK			3.41 V	109	78.10	33.20
2	*2462.00	107.5 AV			3.41 V	109	74.30	33.20
3	2483.50	60.3 PK	74.0	-13.7	3.41 V	109	27.00	33.30
4	2483.50	49.8 AV	54.0	-4.2	3.41 V	109	16.50	33.30
5	4924.00	54.5 PK	74.0	-19.5	3.26 V	188	47.60	6.90
6	4924.00	49.7 AV	54.0	-4.3	3.26 V	188	42.80	6.90

REMARKS:

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

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2390.00	68.9 PK	74.0	-5.1	1.00 H	343	36.00	32.90
2	2390.00	51.5 AV	54.0	-2.5	1.00 H	343	18.60	32.90
3	*2412.00	108.2 PK			1.00 H	343	75.30	32.90
4	*2412.00	99.2 AV			1.00 H	343	66.30	32.90
5	4824.00	48.5 PK	74.0	-25.5	1.22 H	185	41.80	6.70
6	4824.00	35.3 AV	54.0	-18.7	1.22 H	185	28.60	6.70
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	2390.00	69.9 PK	74.0	-4.1	2.01 V	114	37.00	32.90
2	2390.00	53.5 AV	54.0	-0.5	2.01 V	114	20.60	32.90
3	*2412.00	110.8 PK			2.01 V	114	77.90	32.90
4	*2412.00	101.4 AV			2.01 V	114	68.50	32.90
5	4824.00	49.1 PK	74.0	-24.9	1.58 V	71	42.40	6.70
6	4824.00	35.9 AV	54.0	-18.1	1.58 V	71	29.20	6.70

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2437.00	113.9 PK			1.44 H	329	80.80	33.10
2	*2437.00	104.2 AV			1.44 H	329	71.10	33.10
3	4874.00	48.7 PK	74.0	-25.3	1.25 H	171	41.90	6.80
4	4874.00	36.1 AV	54.0	-17.9	1.25 H	171	29.30	6.80
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	*2437.00	116.6 PK			1.50 V	212	83.50	33.10
2	*2437.00	107.1 AV			1.50 V	212	74.00	33.10
3	4874.00	49.1 PK	74.0	-24.9	1.37 V	80	42.30	6.80
4	4874.00	36.6 AV	54.0	-17.4	1.37 V	80	29.80	6.80

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2462.00	109.0 PK			1.61 H	319	75.80	33.20
2	*2462.00	100.9 AV			1.61 H	319	67.70	33.20
3	2483.50	67.9 PK	74.0	-6.1	1.61 H	319	34.60	33.30
4	2483.50	52.6 AV	54.0	-1.4	1.61 H	319	19.30	33.30
5	4924.00	49.6 PK	74.0	-24.4	1.30 H	165	42.70	6.90
6	4924.00	36.0 AV	54.0	-18.0	1.30 H	165	29.10	6.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.3 PK			1.39 V	210	78.10	33.20
2	*2462.00	102.3 AV			1.39 V	210	69.10	33.20
3	2483.50	69.2 PK	74.0	-4.8	1.39 V	210	35.90	33.30
4	2483.50	53.8 AV	54.0	-0.2	1.39 V	210	20.50	33.30
5	4924.00	50.1 PK	74.0	-23.9	1.66 V	74	43.20	6.90
6	4924.00	36.3 AV	54.0	-17.7	1.66 V	74	29.40	6.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)– 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 (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2390.00	70.2 PK	74.0	-3.8	1.32 H	6	37.30	32.90
2	2390.00	52.5 AV	54.0	-1.5	1.32 H	6	19.60	32.90
3	*2412.00	109.7 PK			1.32 H	6	76.80	32.90
4	*2412.00	100.5 AV			1.32 H	6	67.60	32.90
5	4824.00	48.7 PK	74.0	-25.3	1.25 H	224	42.00	6.70
6	4824.00	35.6 AV	54.0	-18.4	1.25 H	224	28.90	6.70
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	2390.00	72.9 PK	74.0	-1.1	1.17 V	198	40.00	32.90
2	2390.00	53.6 AV	54.0	-0.4	1.17 V	198	20.70	32.90
3	*2412.00	111.6 PK			1.17 V	198	78.70	32.90
4	*2412.00	102.0 AV			1.17 V	198	69.10	32.90
5	4824.00	49.2 PK	74.0	-24.8	1.50 V	102	42.50	6.70
6	4824.00	36.1 AV	54.0	-17.9	1.50 V	102	29.40	6.70

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2437.00	114.3 PK			1.50 H	158	81.20	33.10
2	*2437.00	105.1 AV			1.50 H	158	72.00	33.10
3	4874.00	49.0 PK	74.0	-25.0	1.33 H	203	42.20	6.80
4	4874.00	35.9 AV	54.0	-18.1	1.33 H	203	29.10	6.80
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	*2437.00	116.4 PK			3.01 V	108	83.30	33.10
2	*2437.00	107.1 AV			3.01 V	108	74.00	33.10
3	4874.00	49.3 PK	74.0	-24.7	2.27 V	89	42.50	6.80
4	4874.00	36.4 AV	54.0	-17.6	2.27 V	89	29.60	6.80

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.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2462.00	109.3 PK			1.26 H	204	76.10	33.20
2	*2462.00	99.8 AV			1.26 H	204	66.60	33.20
3	2483.50	70.8 PK	74.0	-3.2	1.26 H	204	37.50	33.30
4	2483.50	52.5 AV	54.0	-1.5	1.26 H	204	19.20	33.30
5	4924.00	49.6 PK	74.0	-24.4	1.15 H	312	42.70	6.90
6	4924.00	36.1 AV	54.0	-17.9	1.15 H	312	29.20	6.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.4 PK			3.22 V	175	77.20	33.20
2	*2462.00	101.3 AV			3.22 V	175	68.10	33.20
3	2483.50	72.1 PK	74.0	-1.9	3.22 V	175	38.80	33.30
4	2483.50	53.6 AV	54.0	-0.4	3.22 V	175	20.30	33.30
5	4924.00	50.3 PK	74.0	-23.7	1.78 V	61	43.40	6.90
6	4924.00	36.4 AV	54.0	-17.6	1.78 V	61	29.50	6.90

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)– 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 (HT40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2390.00	65.3 PK	74.0	-8.7	1.24 H	233	32.40	32.90
2	2390.00	52.4 AV	54.0	-1.6	1.24 H	233	19.50	32.90
3	*2422.00	101.5 PK			1.24 H	233	68.40	33.10
4	*2422.00	91.5 AV			1.24 H	233	58.40	33.10
5	4844.00	48.9 PK	74.0	-25.1	1.35 H	305	42.20	6.70
6	4844.00	36.0 AV	54.0	-18.0	1.35 H	305	29.30	6.70
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	2390.00	67.4 PK	74.0	-6.6	1.00 V	177	34.50	32.90
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.00 V**	**177**	**21.00**	**32.90**
3	*2422.00	104.3 PK			1.00 V	177	71.20	33.10
4	*2422.00	94.8 AV			1.00 V	177	61.70	33.10
5	4844.00	49.1 PK	74.0	-24.9	1.28 V	322	42.40	6.70
6	4844.00	36.3 AV	54.0	-17.7	1.28 V	322	29.60	6.70

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
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2390.00	60.9 PK	74.0	-13.1	1.29 H	223	28.00	32.90
2	2390.00	48.1 AV	54.0	-5.9	1.29 H	223	15.20	32.90
3	*2437.00	105.6 PK			1.29 H	223	72.50	33.10
4	*2437.00	96.4 AV			1.29 H	223	63.30	33.10
5	2483.50	66.8 PK	74.0	-7.2	1.29 H	223	33.50	33.30
6	2483.50	52.8 AV	54.0	-1.2	1.29 H	223	19.50	33.30
7	4874.00	49.3 PK	74.0	-24.7	1.17 H	285	42.50	6.80
8	4874.00	36.2 AV	54.0	-17.8	1.17 H	285	29.40	6.80
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	2390.00	62.4 PK	74.0	-11.6	3.46 V	249	29.50	32.90
2	2390.00	49.2 AV	54.0	-4.8	3.46 V	249	16.30	32.90
3	*2437.00	106.5 PK			3.46 V	249	73.40	33.10
4	*2437.00	97.3 AV			3.46 V	249	64.20	33.10
5	2483.50	67.5 PK	74.0	-6.5	3.46 V	249	34.20	33.30
6	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**3.46 V**	**249**	**20.60**	**33.30**
7	4874.00	49.7 PK	74.0	-24.3	2.89 V	301	42.90	6.80
8	4874.00	36.6 AV	54.0	-17.4	2.89 V	301	29.80	6.80

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.

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	*2452.00	99.4 PK			1.45 H	228	66.20	33.20
2	*2452.00	90.1 AV			1.45 H	228	56.90	33.20
3	2483.50	66.5 PK	74.0	-7.5	1.45 H	228	33.20	33.30
4	2483.50	52.5 AV	54.0	-1.5	1.45 H	228	19.20	33.30
5	4904.00	48.7 PK	74.0	-25.3	1.28 H	289	41.80	6.90
6	4904.00	35.9 AV	54.0	-18.1	1.28 H	289	29.00	6.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	101.0 PK			3.03 V	170	67.80	33.20
2	*2452.00	91.9 AV			3.03 V	170	58.70	33.20
3	2483.50	68.2 PK	74.0	-5.8	3.03 V	170	34.90	33.30
4	2483.50	53.6 AV	54.0	-0.4	3.03 V	170	20.30	33.30
5	4904.00	49.0 PK	74.0	-25.0	2.90 V	344	42.10	6.90
6	4904.00	36.2 AV	54.0	-17.8	2.90 V	344	29.30	6.90

REMARKS:

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

802.11b

CHANNEL	TX Channel 1	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	119.16	36.2 QP	43.5	-7.3	1.50 H	267	52.30	-16.10
2	168.03	40.1 QP	43.5	-3.4	1.59 H	275	54.10	-14.00
3	256.93	37.2 QP	46.0	-8.8	1.50 H	99	51.10	-13.90
4	359.78	42.3 QP	46.0	-3.7	1.00 H	259	53.40	-11.10
5	443.21	40.0 QP	46.0	-6.0	2.00 H	130	49.40	-9.40
6	889.50	40.6 QP	46.0	-5.4	1.00 H	144	41.70	-1.10
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	37.66	36.2 QP	40.0	-3.8	1.00 V	45	51.30	-15.10
2	119.16	38.7 QP	43.5	-4.8	1.00 V	216	54.80	-16.10
3	227.02	41.2 QP	46.0	-4.8	1.17 V	184	57.40	-16.20
4	354.77	42.1 QP	46.0	-3.9	1.47 V	83	53.30	-11.20
5	776.95	34.5 QP	46.0	-11.5	1.24 V	200	37.00	-2.50
6	891.44	42.8 QP	46.0	-3.2	1.00 V	279	43.90	-1.10

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
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.

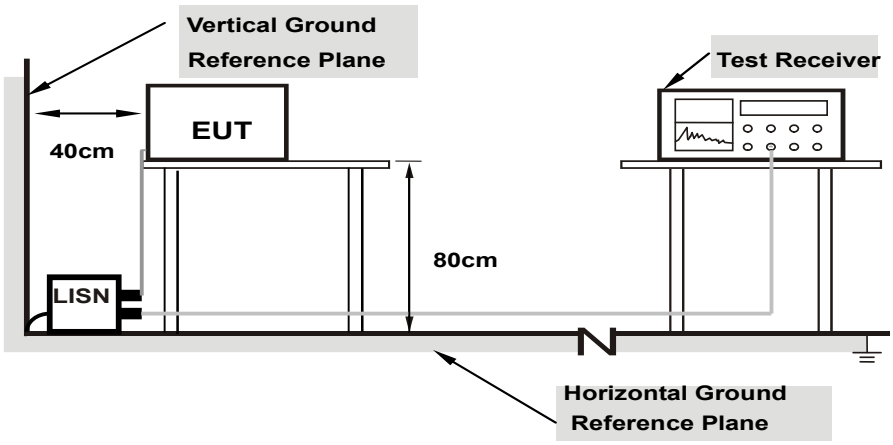
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

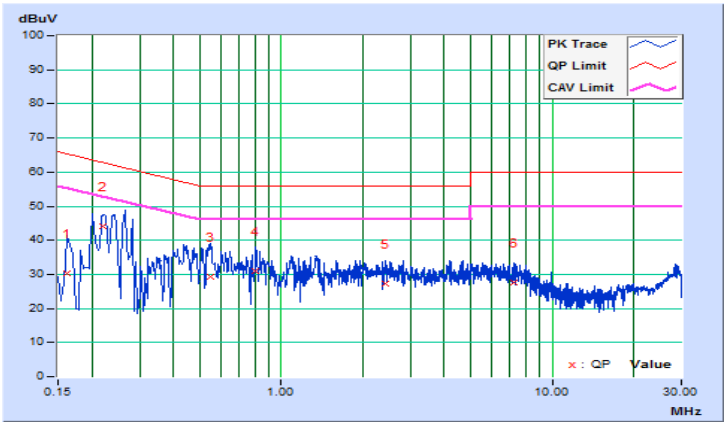
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.16200	10.35	19.82	1.80	30.17	12.15	65.36	55.36	-35.19	-43.21
2	0.21978	10.37	33.80	14.62	44.17	24.99	62.83	52.83	-18.66	-27.84
3	0.54600	10.40	18.76	5.34	29.16	15.74	56.00	46.00	-26.84	-30.26
4	0.80339	10.40	20.70	14.10	31.10	24.50	56.00	46.00	-24.90	-21.50
5	2.41800	10.48	16.85	9.75	27.33	20.23	56.00	46.00	-28.67	-25.77
6	7.25400	10.71	16.82	11.06	27.53	21.77	60.00	50.00	-32.47	-28.23

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.

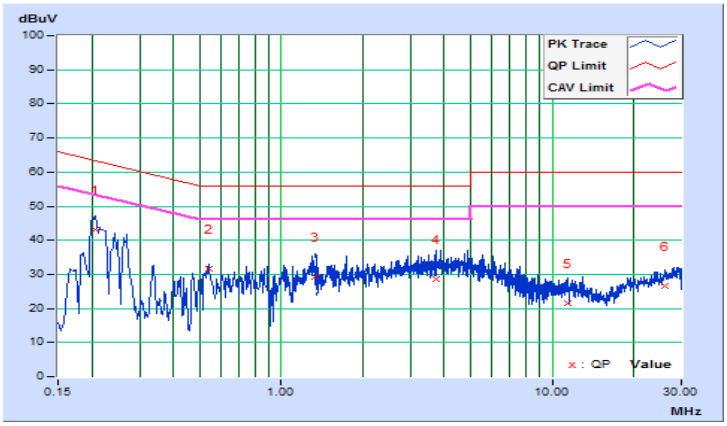


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.20600	10.14	33.07	25.64	43.21	35.78	63.37	53.37	-20.16	-17.59
2	**0.53828**	**10.16**	**21.64**	**19.63**	**31.80**	**29.79**	**56.00**	**46.00**	**-24.20**	**-16.21**
3	1.34200	10.19	19.10	11.89	29.29	22.08	56.00	46.00	-26.71	-23.92
4	3.73400	10.33	18.44	5.15	28.77	15.48	56.00	46.00	-27.23	-30.52
5	11.36200	10.60	11.09	6.15	21.69	16.75	60.00	50.00	-38.31	-33.25
6	26.01800	11.09	15.41	10.64	26.50	21.73	60.00	50.00	-33.50	-28.27

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.

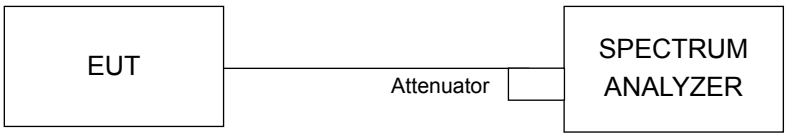


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.15	0.5	Pass
6	2437	10.16	0.5	Pass
11	2462	10.16	0.5	Pass

802.11g

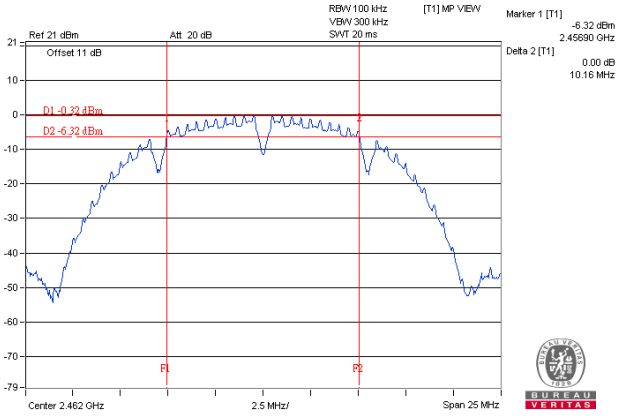
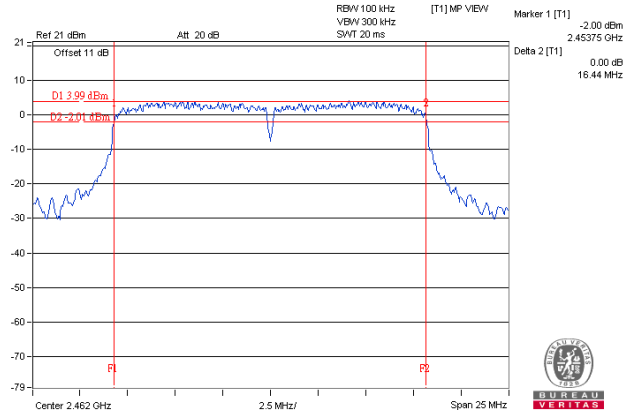
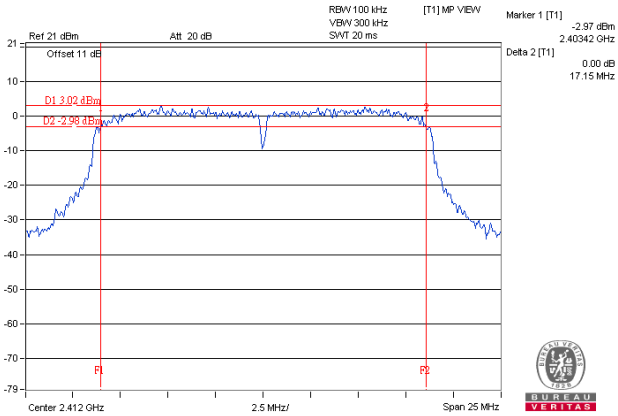
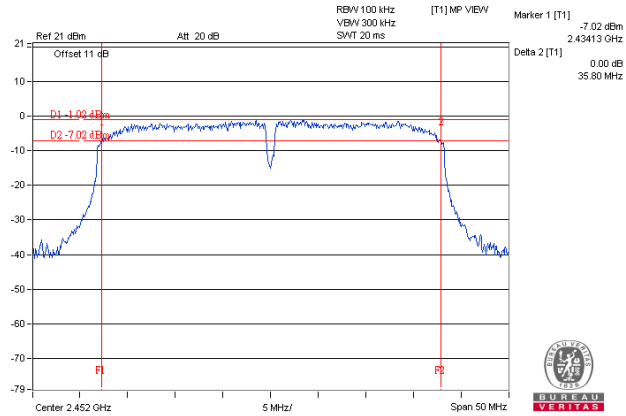
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 1	Chain 2	Chain 3		
1	2412	16.39	16.39	16.40	0.5	Pass
6	2437	16.41	16.41	16.43	0.5	Pass
11	2462	16.41	16.39	16.44	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 1	Chain 2	Chain 3		
1	2412	17.13	16.92	17.15	0.5	Pass
6	2437	17.09	16.91	17.13	0.5	Pass
11	2462	16.99	16.89	17.11	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 1	Chain 2	Chain 3		
3	2422	35.37	33.98	35.76	0.5	Pass
6	2437	35.40	33.87	35.43	0.5	Pass
9	2452	35.33	34.27	35.80	0.5	Pass

Spectrum Plot of Worst Value	
802.11b	**802.11g**
	
802.11n (HT20)	**802.11n (HT40)**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.4.2 Test Setup

4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor. Record the power level.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Channel	Frequency (MHz)	Avg. Power (mW)	Avg. Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	32.584	15.13	30	Pass
6	2437	35.318	15.48	30	Pass
11	2462	32.734	15.15	30	Pass

802.11g

Chan.	Freq. (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 1	Chain 2	Chain 3				
1	2412	15.16	15.52	15.46	103.611	20.15	30	Pass
6	2437	15.03	15.72	15.50	104.648	20.20	30	Pass
11	2462	15.16	15.45	15.28	101.614	20.07	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 1	Chain 2	Chain 3				
1	2412	15.15	15.62	15.38	103.723	20.16	30	Pass
6	2437	15.10	15.85	15.31	104.781	20.20	30	Pass
11	2462	15.18	15.44	15.43	102.870	20.12	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 1	Chain 2	Chain 3				
3	2422	15.07	15.83	15.44	105.414	20.23	30	Pass
6	2437	15.28	15.96	15.88	**111.901**	20.49	30	Pass
9	2452	15.01	15.82	15.45	104.965	20.21	30	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 1	Chain 2	Chain 3				
1	2412	15.15	15.62	15.38	103.723	20.16	28.37	Pass
6	2437	15.10	15.85	15.31	104.781	20.20	28.37	Pass
11	2462	15.18	15.44	15.43	102.870	20.12	28.37	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/3$]= 7.63dBi > 6dBi, so the limit shall be reduced to 30-(7.63-6) = 28.37dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 1	Chain 2	Chain 3				
3	2422	15.07	15.83	15.44	105.414	20.23	28.37	Pass
6	2437	15.28	15.96	15.88	**111.901**	20.49	28.37	Pass
9	2452	15.01	15.82	15.45	104.965	20.21	28.37	Pass

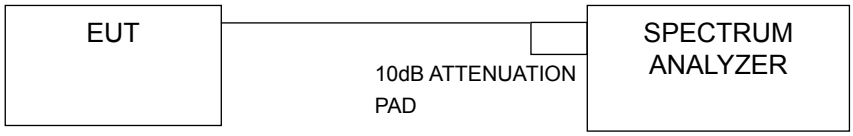
Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/3$]= 7.63dBi > 6dBi, so the limit shall be reduced to 30-(7.63-6) = 28.37dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For duty cycle ≥ 98%

a. Set instrument center frequency to DTS channel center frequency.
b. Set span to at least 1.5 times the OBW.
c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set VBW ≥3 x RBW.
e. Detector = power averaging (RMS) or sample detector (when RMS not available).
f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g. Sweep time = auto couple.
h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
i. Use the peak marker function to determine the maximum amplitude level.

For duty cycle < 98%

a. Measure the duty cycle (x).
b. Set instrument center frequency to DTS channel center frequency.
c. Set span to at least 1.5 times the OBW.
d. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e. Set VBW ≥3 x RBW.
f. Detector = power averaging (RMS) or sample detector (when RMS not available).
g. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h. Sweep time = auto couple.
i. Don’t use sweep triggering. Allow sweep to “free run”.
j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
k. Use the peak marker function to determine the maximum amplitude level.
l. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-10.96	8.00	Pass
6	2437	-11.35	8.00	Pass
11	2462	-17.76	8.00	Pass

802.11g

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=3) dB	Total PSD (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
1	1	2412	-16.41	4.77	-11.64	6.37	Pass
	6	2437	-13.18	4.77	-8.41	6.37	Pass
	11	2462	-13.02	4.77	-8.25	6.37	Pass
2	1	2412	-13.71	4.77	-8.94	6.37	Pass
	6	2437	-14.13	4.77	-9.36	6.37	Pass
	11	2462	-13.60	4.77	-8.83	6.37	Pass
3	1	2412	-12.09	4.77	-7.32	6.37	Pass
	6	2437	-12.62	4.77	-7.85	6.37	Pass
	11	2462	-11.06	4.77	-6.29	6.37	Pass

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/3$]= 7.63dBi > 6dBi, so the power density limit shall be reduced to 8-(7.63-6) = 6.37dBm.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=3) dB	Total PSD (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
1	1	2412	-13.40	4.77	-8.63	6.37	Pass
	6	2437	-12.98	4.77	-8.21	6.37	Pass
	11	2462	-14.17	4.77	-9.40	6.37	Pass
2	1	2412	-14.46	4.77	-9.69	6.37	Pass
	6	2437	-13.21	4.77	-8.44	6.37	Pass
	11	2462	-14.27	4.77	-9.50	6.37	Pass
3	1	2412	-12.68	4.77	-7.91	6.37	Pass
	6	2437	-11.88	4.77	-7.11	6.37	Pass
	11	2462	-11.24	4.77	-6.47	6.37	Pass

NOTE:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/3$]= 7.63dBi > 6dBi, so the power density limit shall be reduced to 8-(7.63-6) = 6.37dBm.

802.11n (HT40)

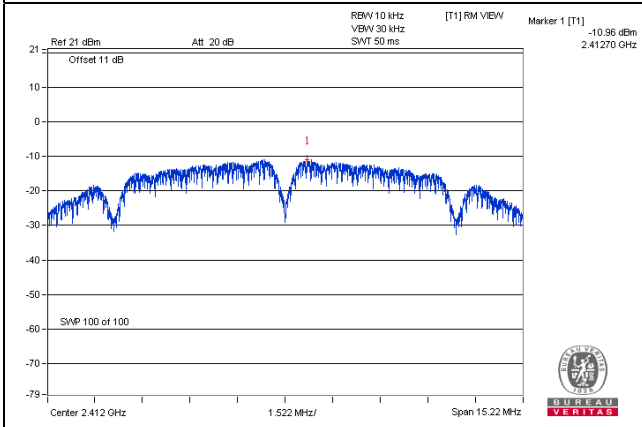
TX chain	Chan.	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=3) dB	Total PSD (dBm/10kHz)	Limit (dBm/10kHz)	Pass / Fail
1	3	2422	-17.27	4.77	-12.50	6.37	Pass
	6	2437	-17.03	4.77	-12.26	6.37	Pass
	9	2452	-16.87	4.77	-12.10	6.37	Pass
2	3	2422	-19.67	4.77	-14.90	6.37	Pass
	6	2437	-19.30	4.77	-14.53	6.37	Pass
	9	2452	-19.44	4.77	-14.67	6.37	Pass
3	3	2422	-16.80	4.77	-12.03	6.37	Pass
	6	2437	-15.99	4.77	-11.22	6.37	Pass
	9	2452	-16.13	4.77	-11.36	6.37	Pass

NOTE:

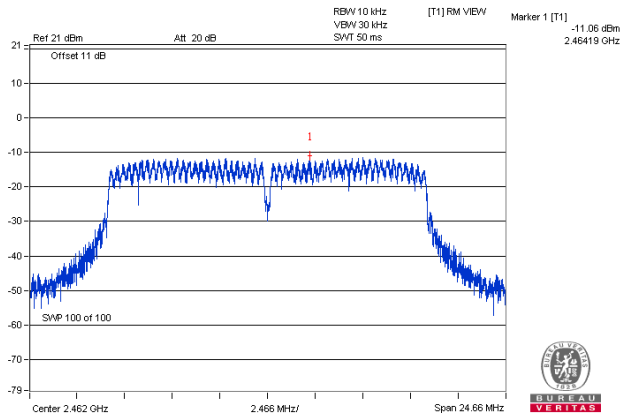
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/3$]= 7.63dBi > 6dBi, so the power density limit shall be reduced to 8-(7.63-6) = 6.37dBm.

Spectrum Plot of Worst Value

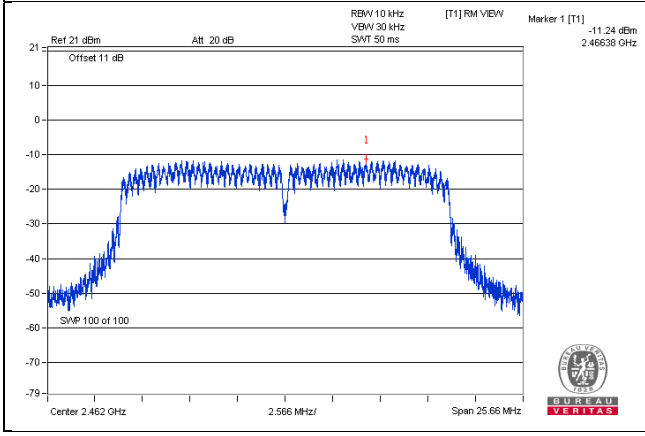
802.11b



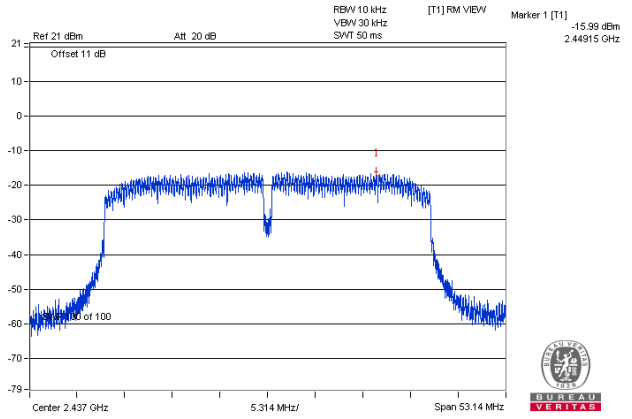
802.11g



802.11n (HT20)



802.11n (HT40)

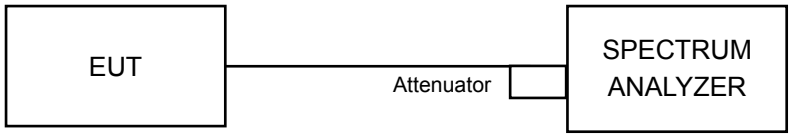


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Ensure that the number of measurement points ≥ span/RBW
d. According to measurement points to set differ measurement span.
e. Detector = average.
f. Trace Mode = max hold.
g. Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

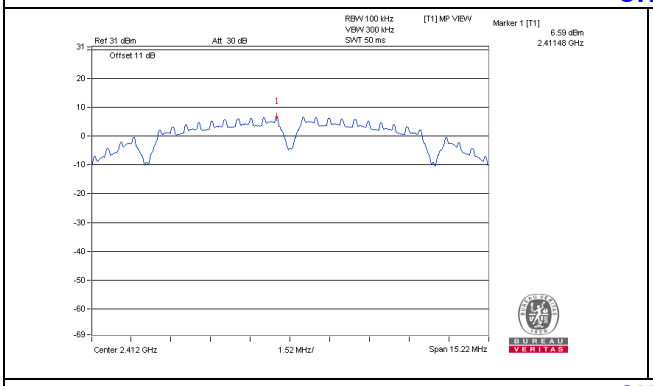
Same as Item 4.3.6

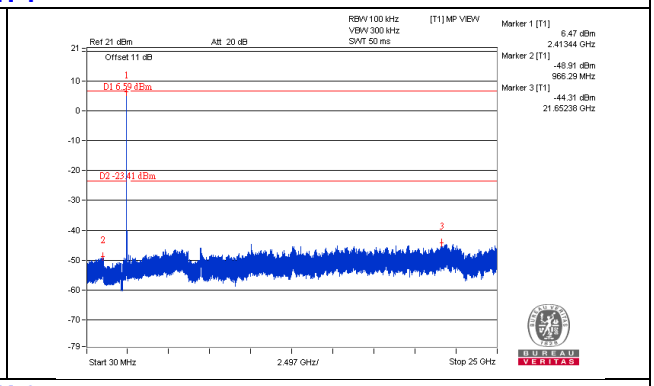
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

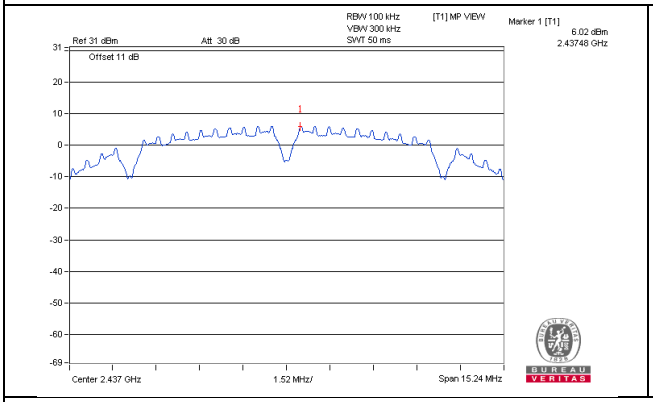
802.11b

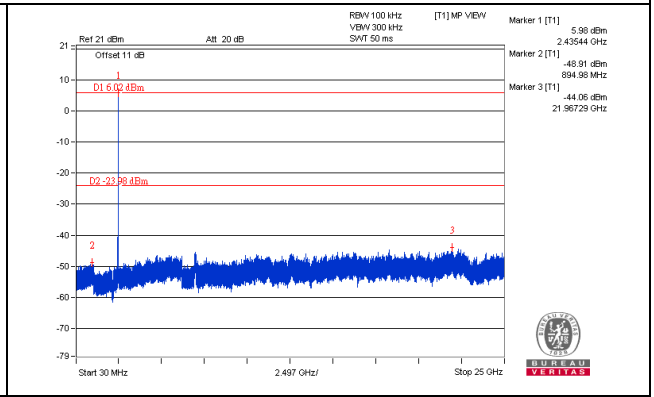
CH 1



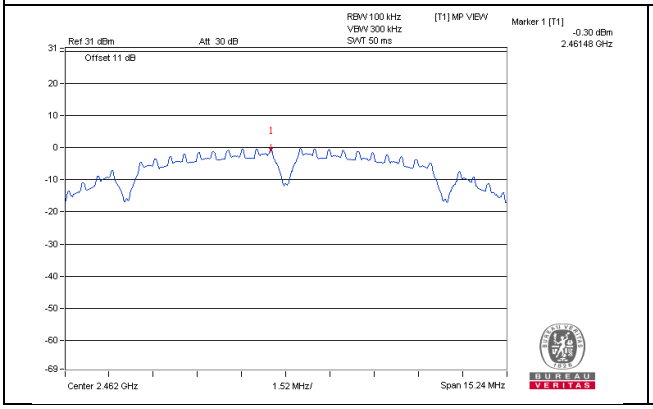


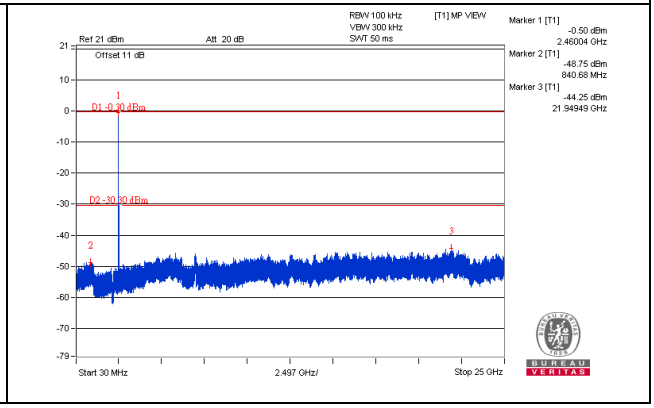
CH 6





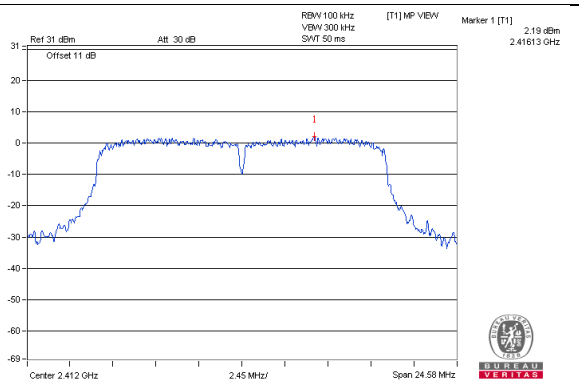
CH 11

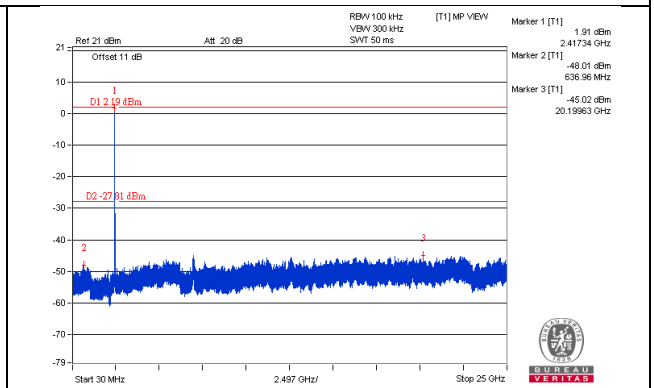




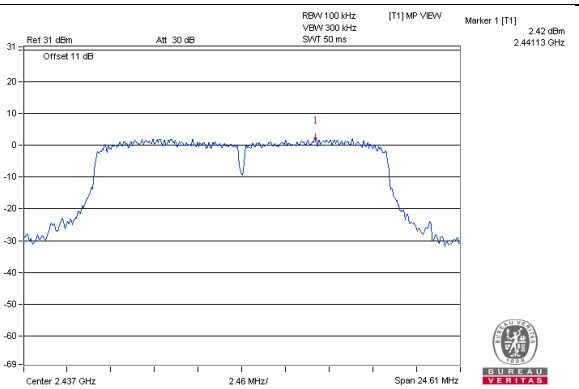
802.11g
CHAIN 1

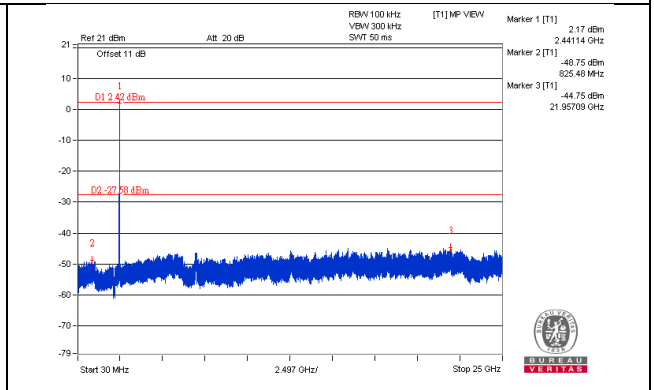
CH 1



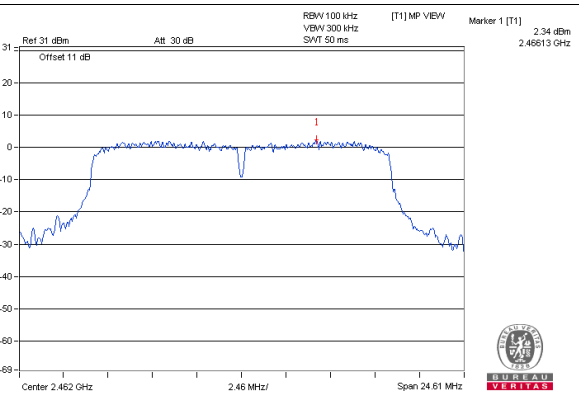


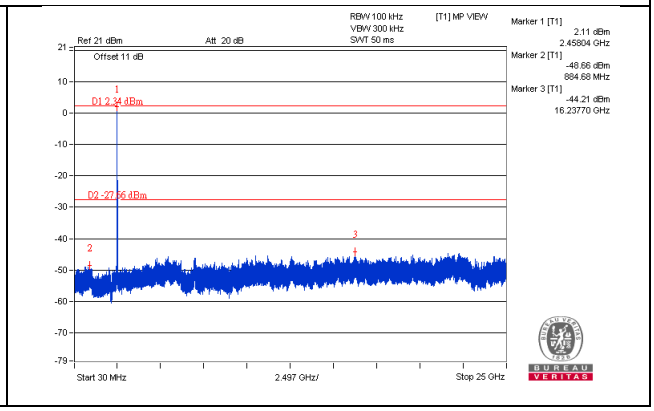
CH 6





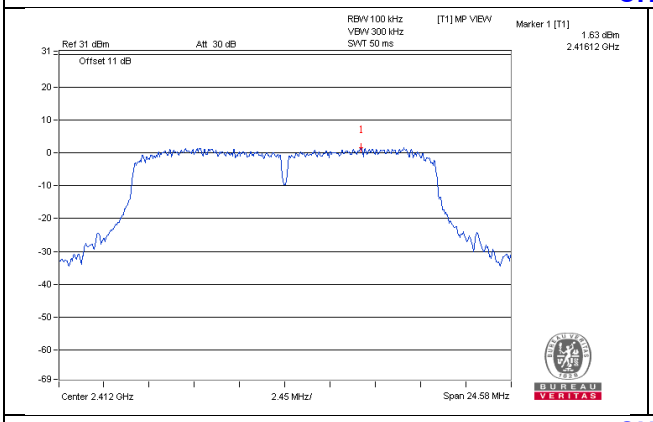
CH 11

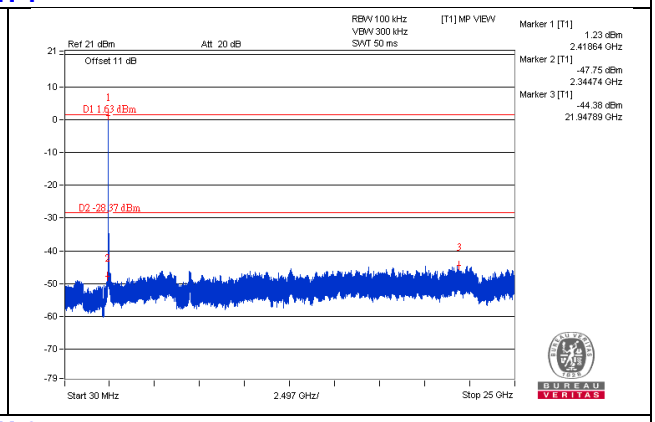




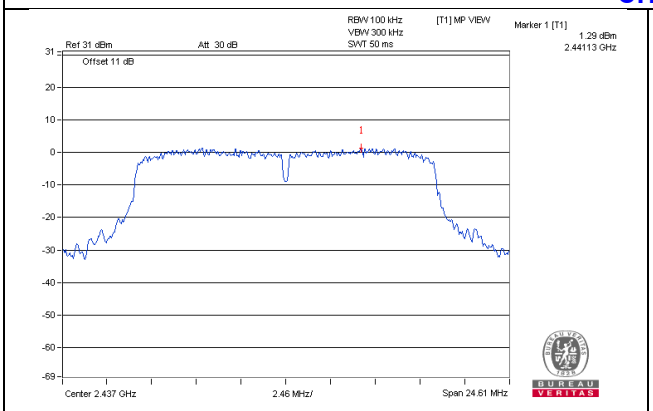
CHAIN 2

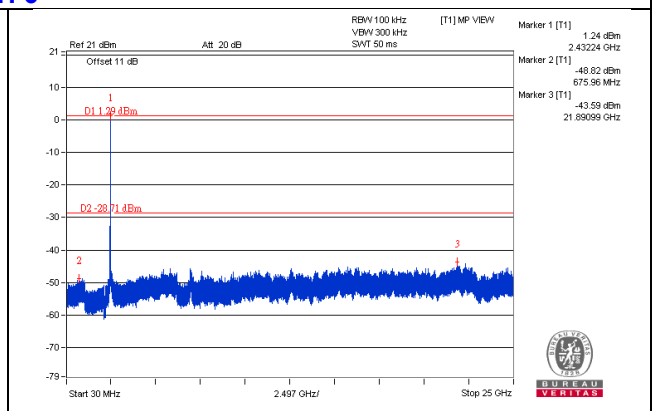
CH 1



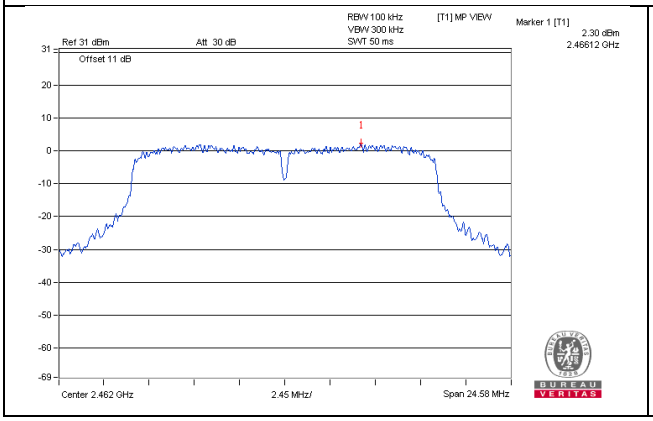


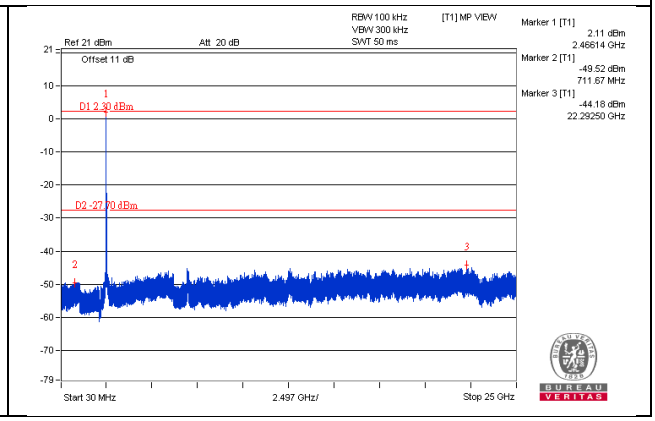
CH 6





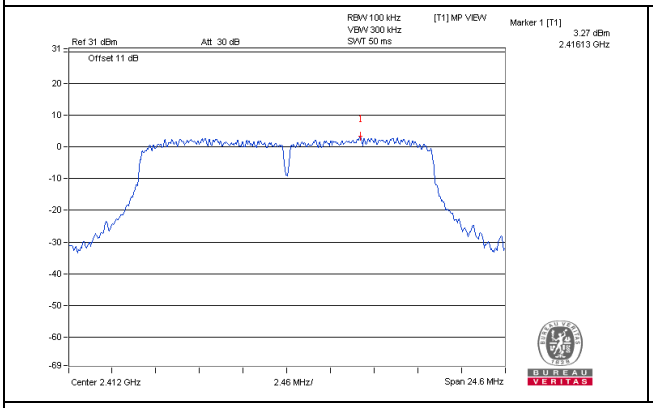
CH 11

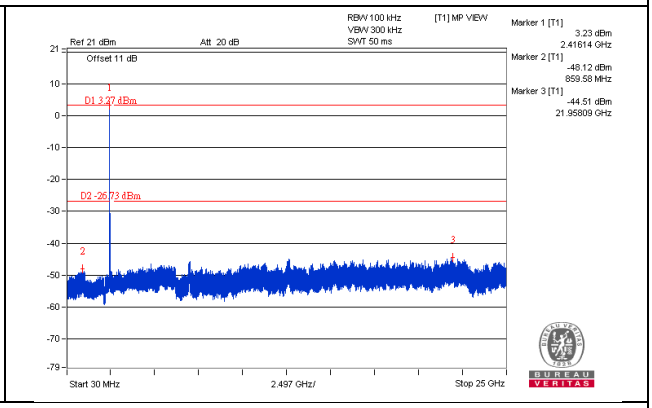




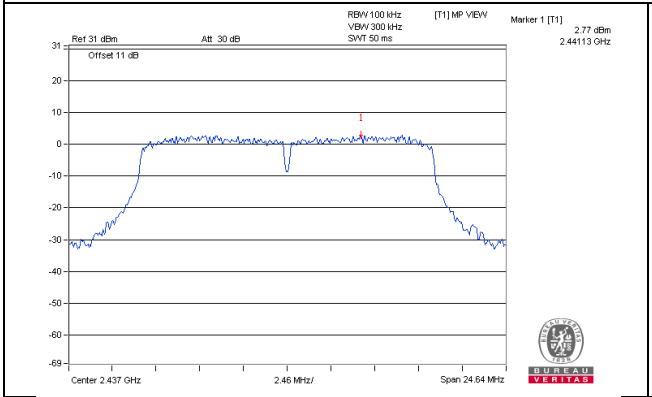
CHAIN 3

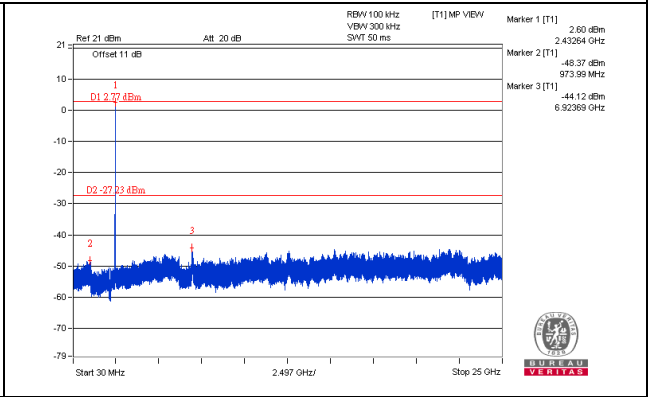
CH 1



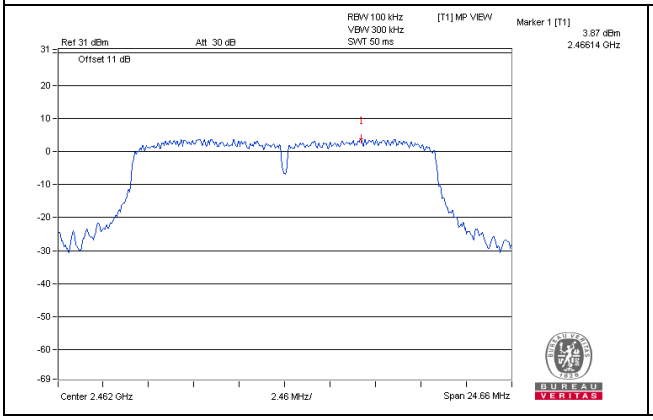


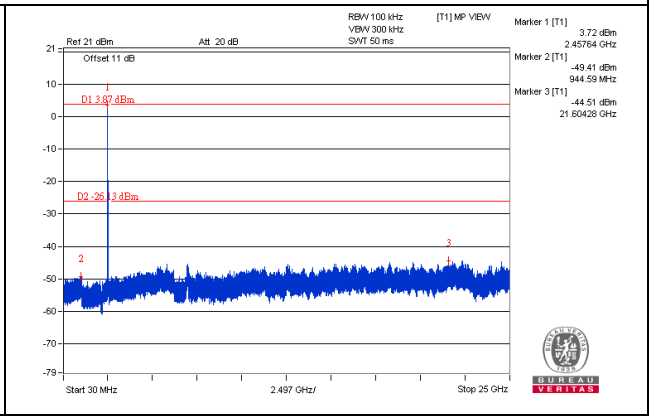
CH 6





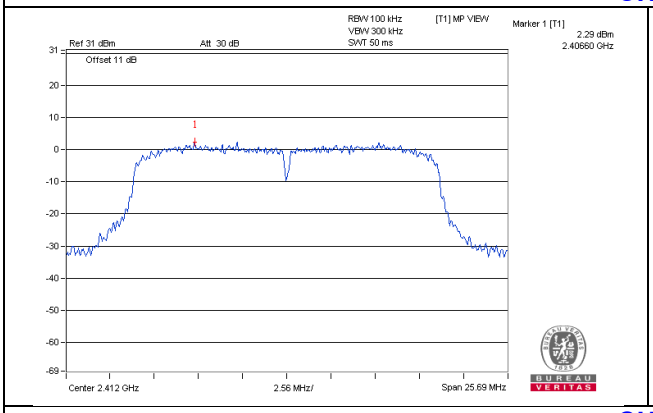
CH 11

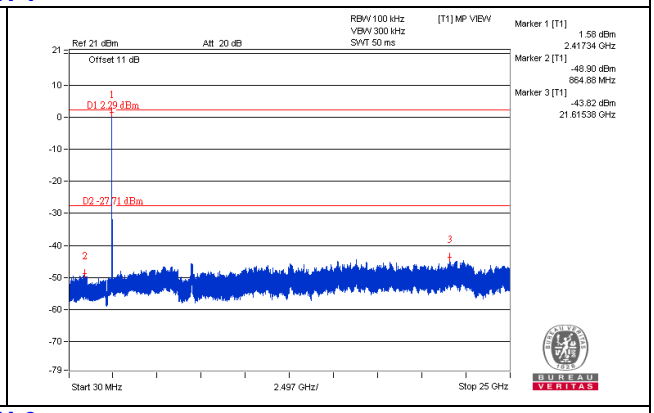




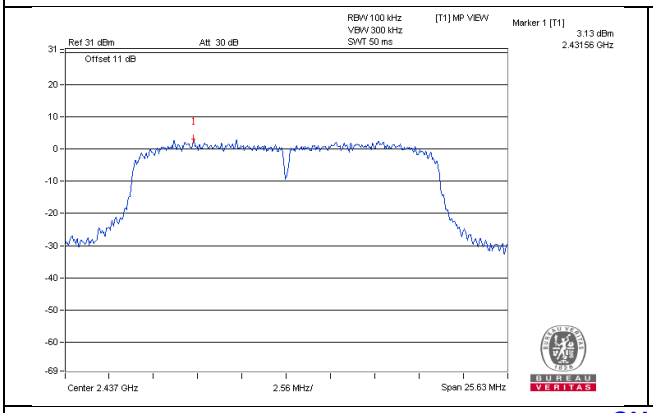
802.11n (HT20)
CHAIN 1

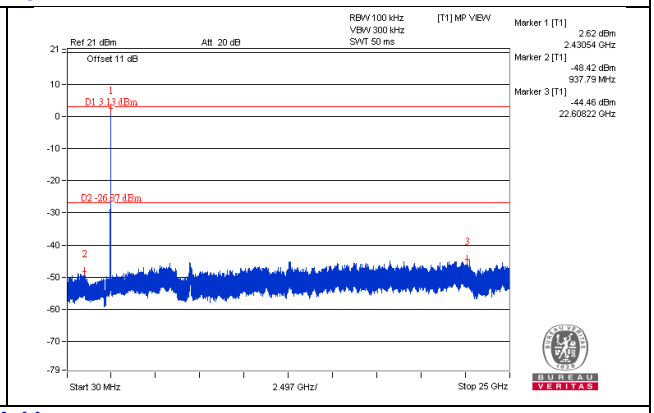
CH 1



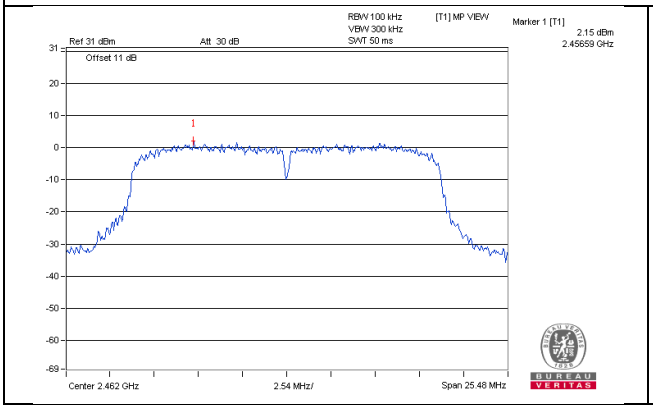


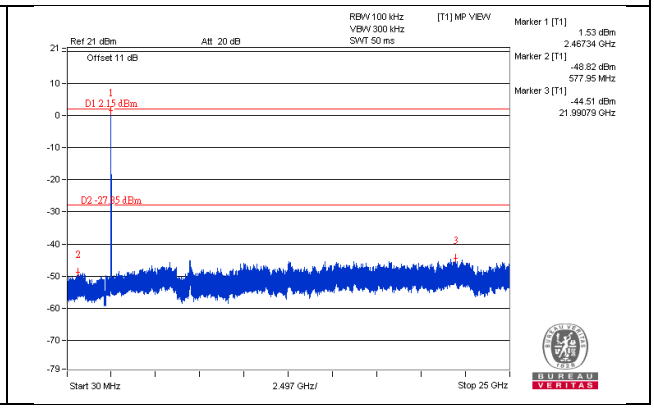
CH 6





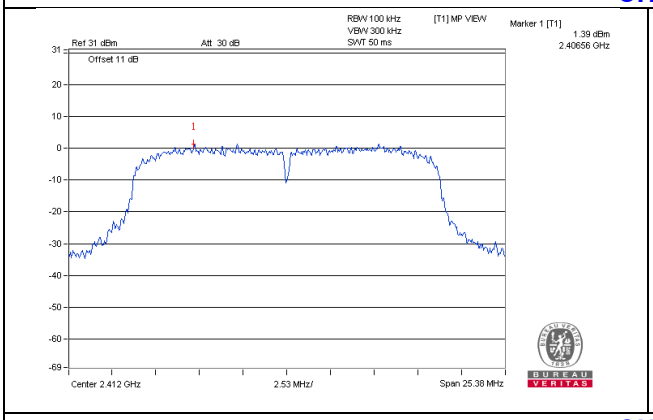
CH 11

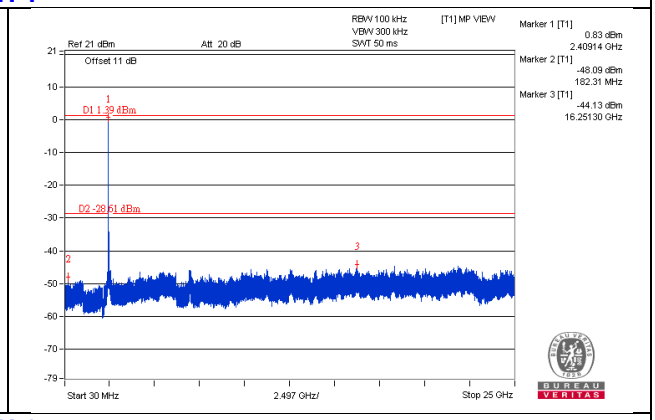




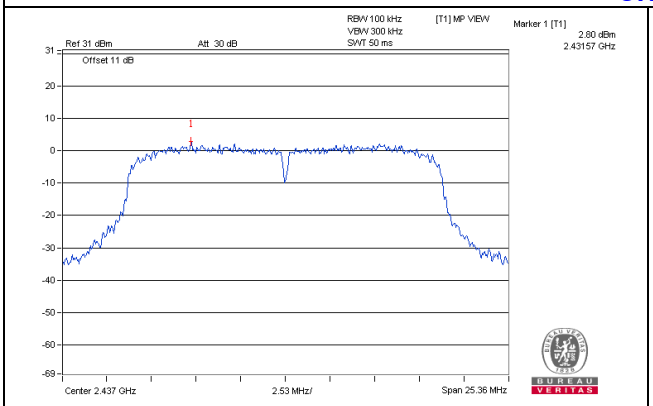
CHAIN 2

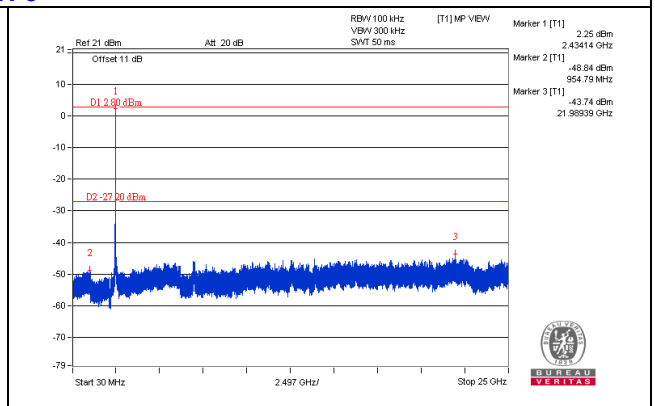
CH 1



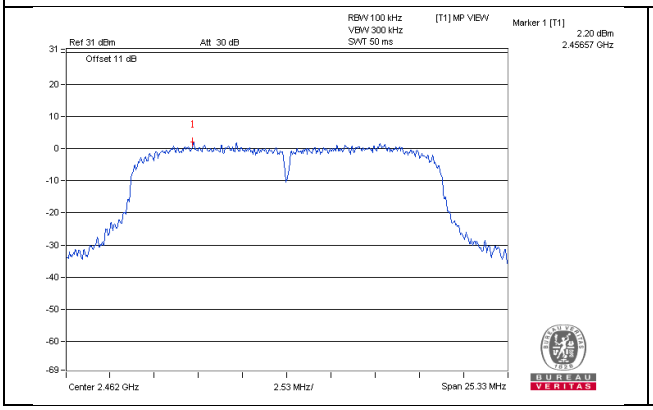


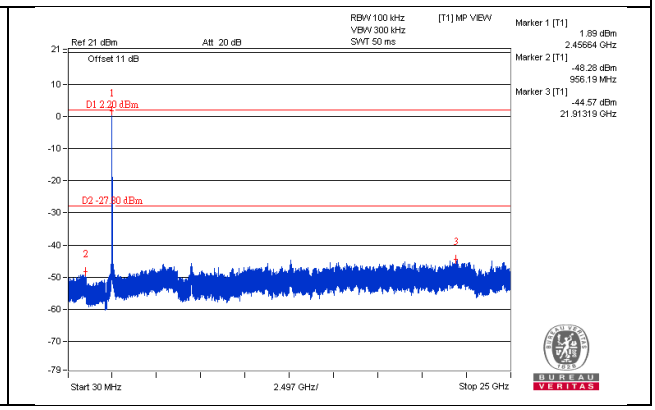
CH 6





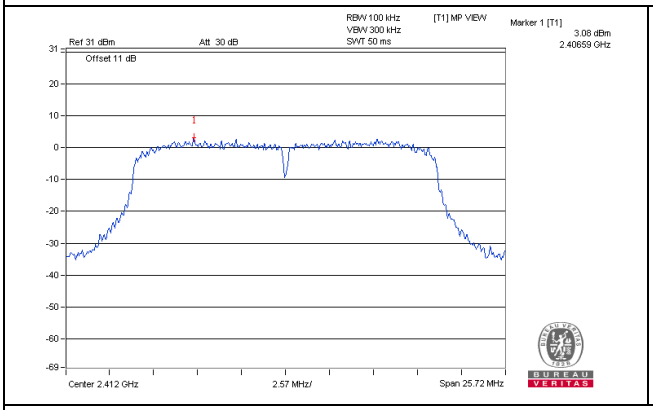
CH 11

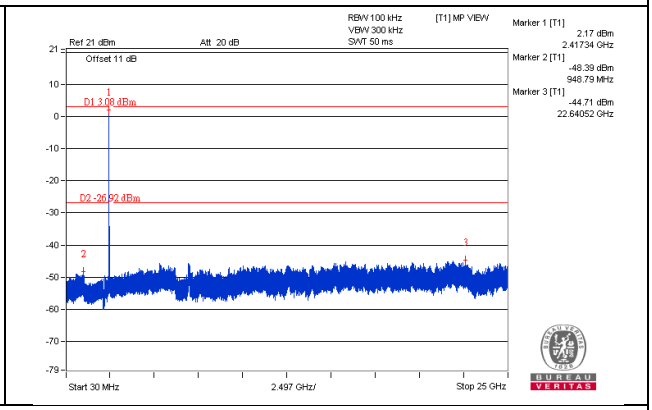




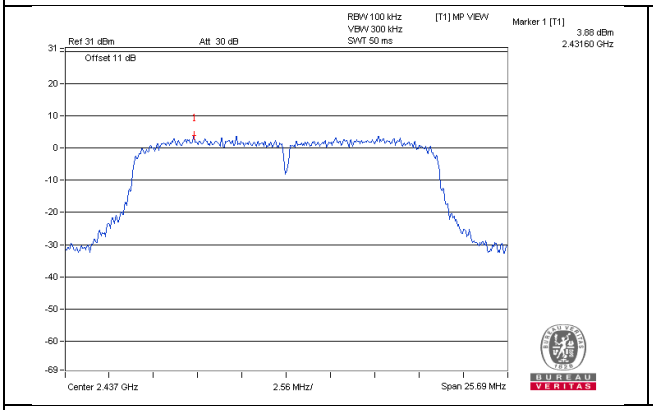
CHAIN 3

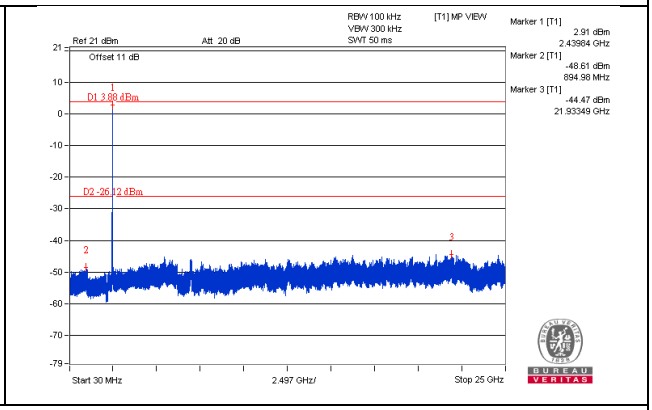
CH 1



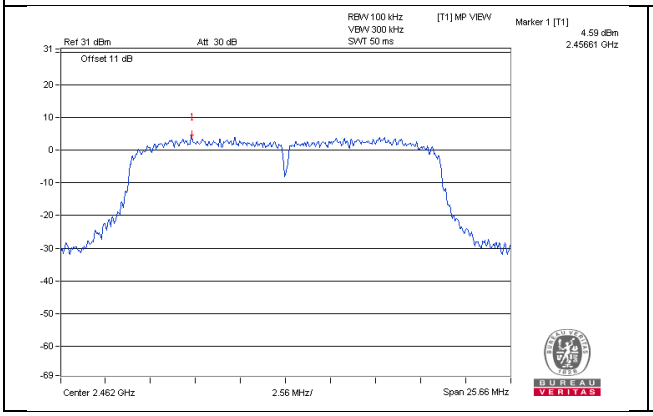


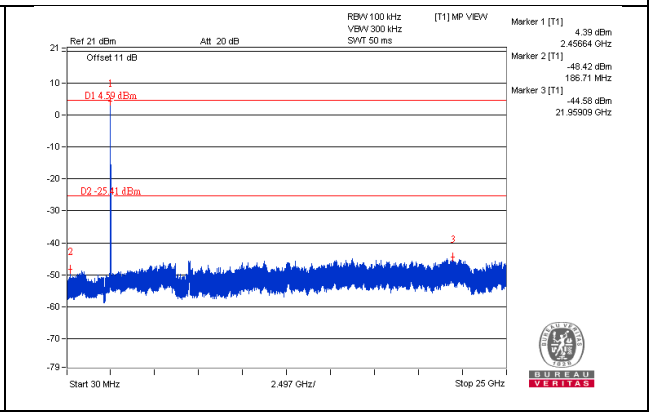
CH 6





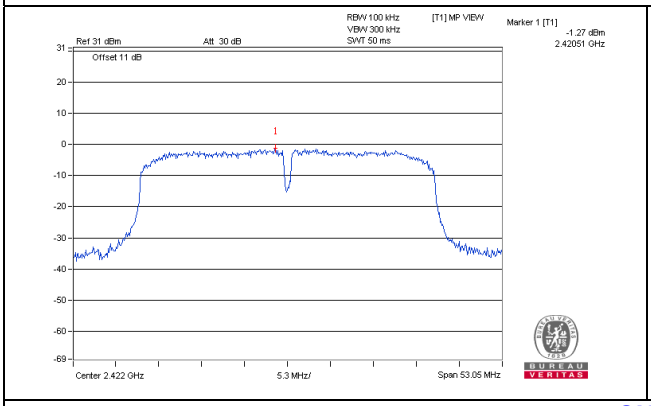
CH 11

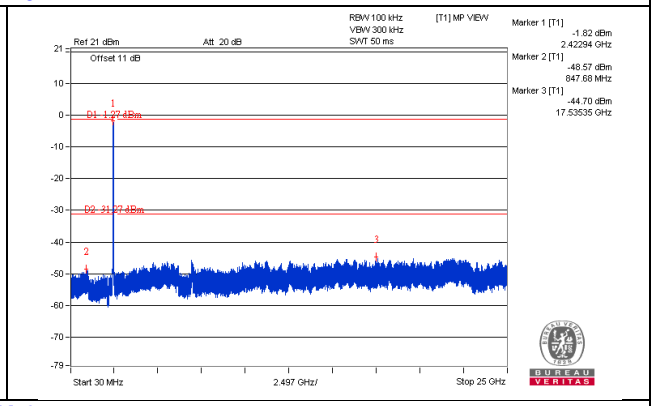




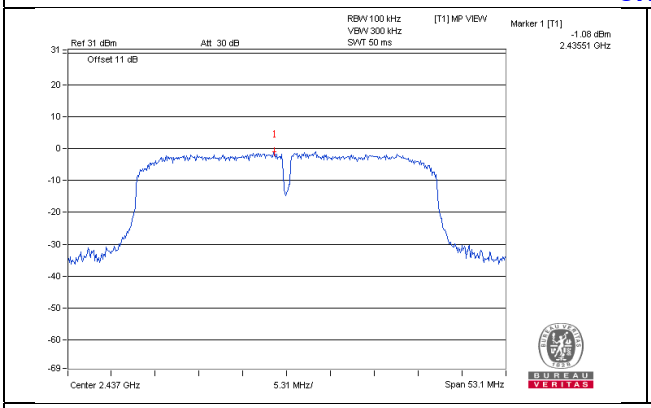
802.11n (HT40)
CHAIN 1

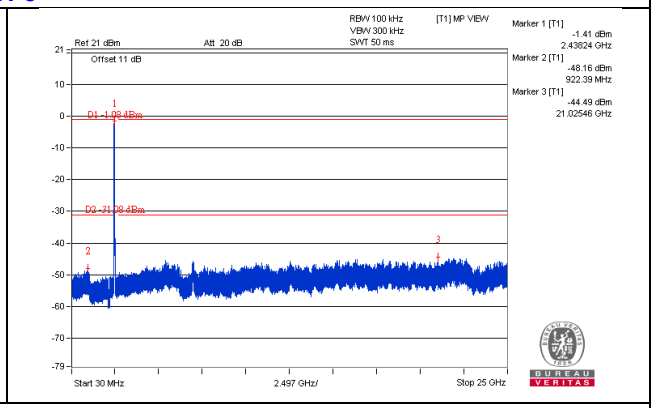
CH 3



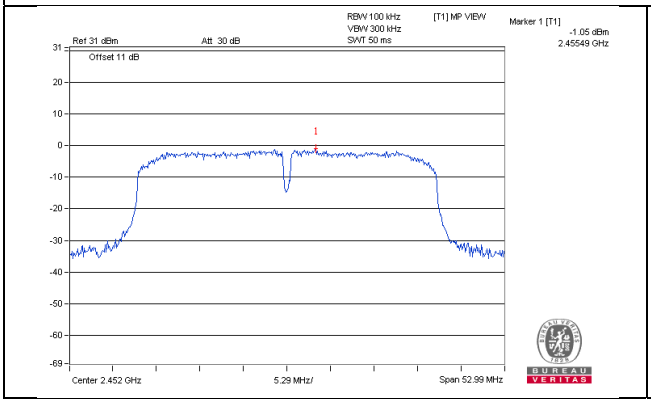


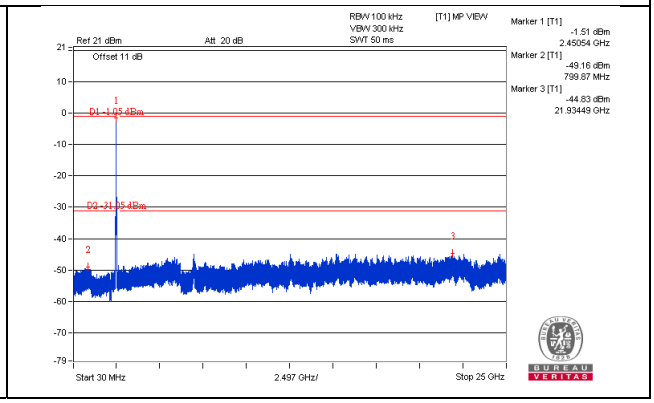
CH 6





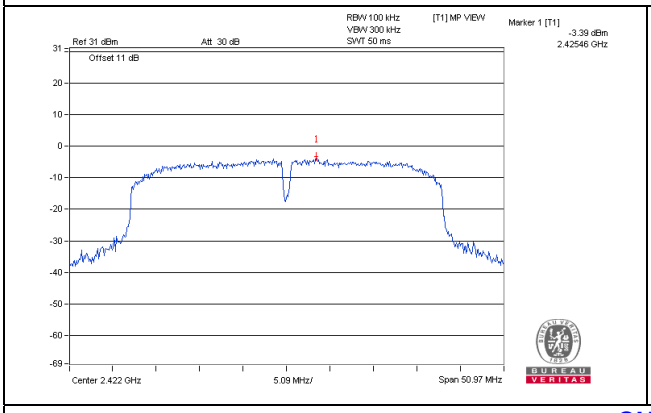
CH 9

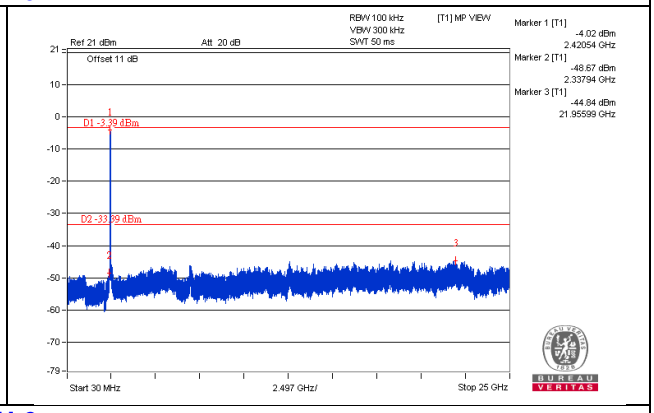




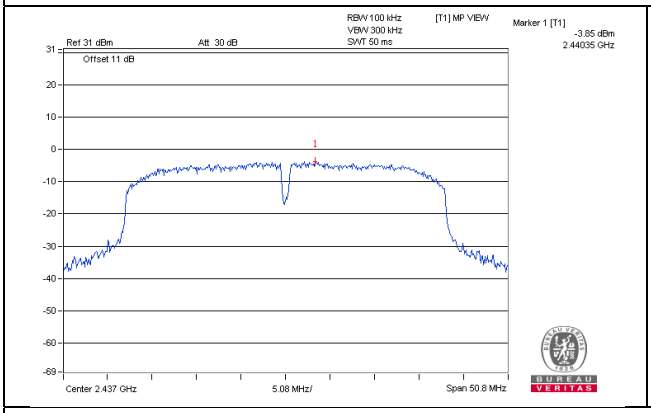
CHAIN 2

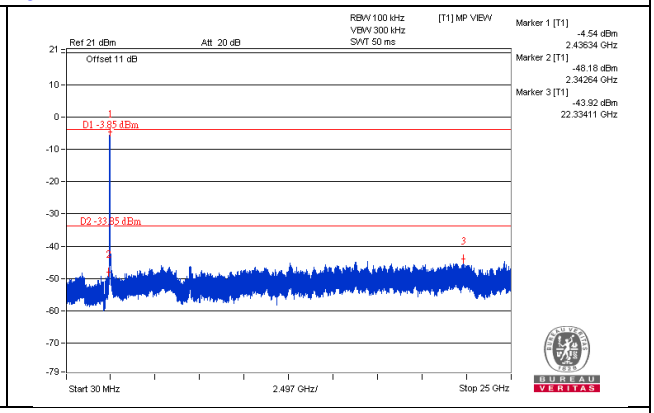
CH 3



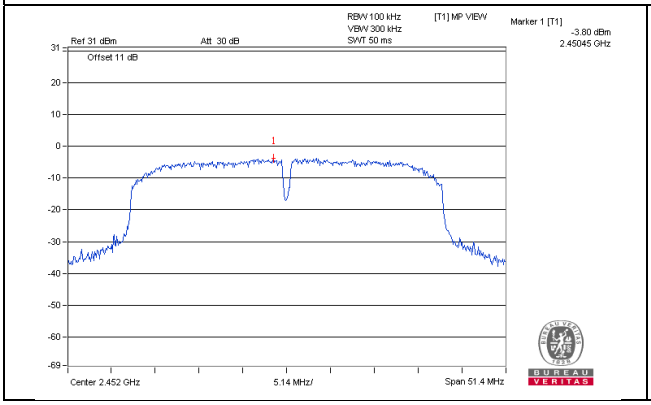


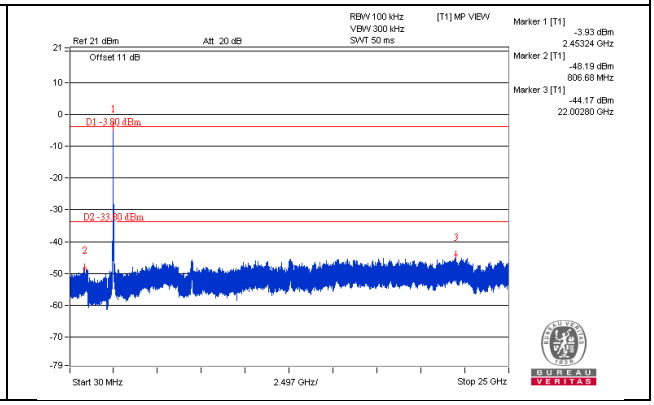
CH 6





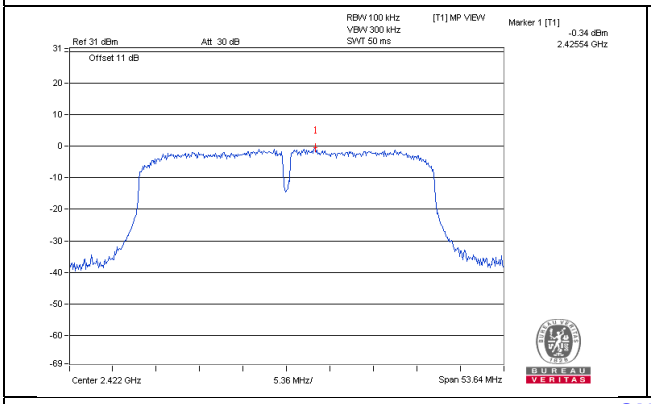
CH 9

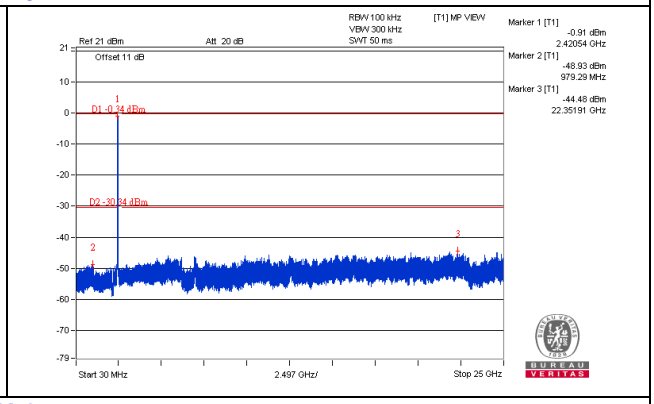




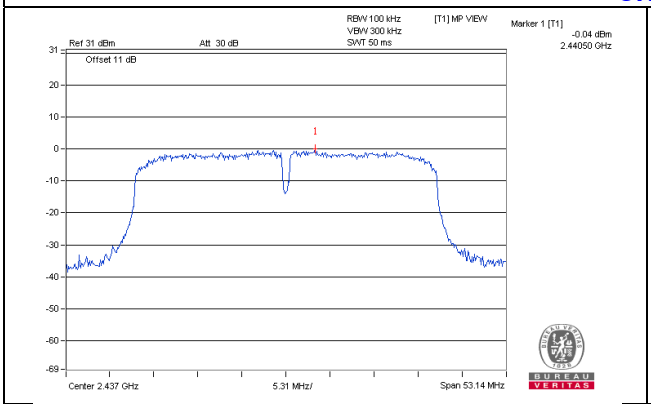
CHAIN 3

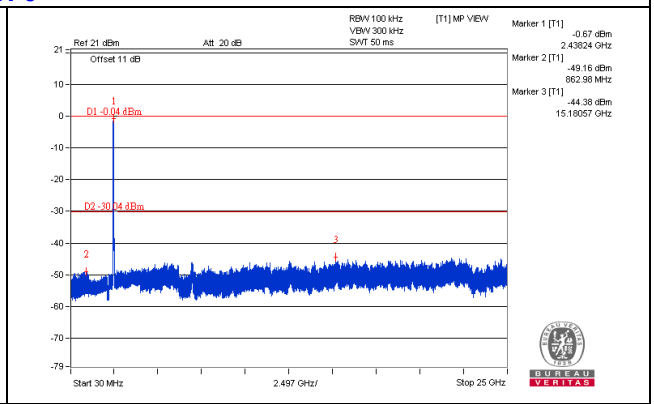
CH 3



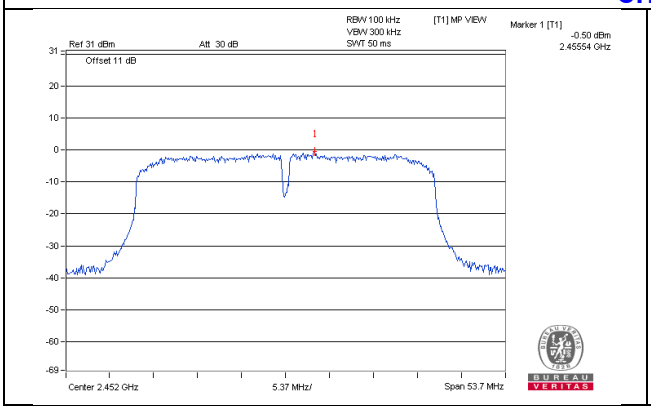


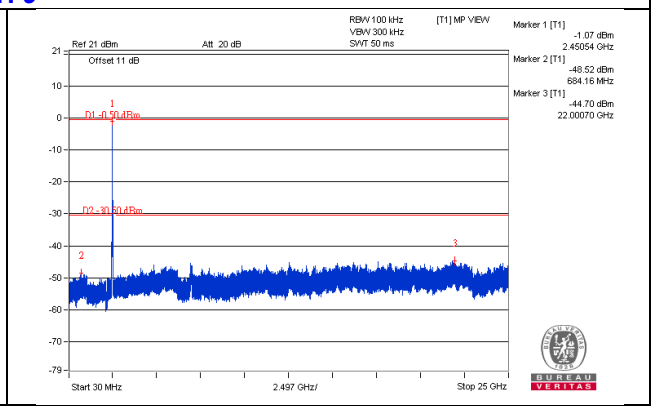
CH 6





CH 9





5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

Linko EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety 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.

--- END ---