FCC Test Report

Report No.:	RF150127C37
FCC ID:	2ACTO-AP55C
Test Model:	AP 55C
Received Date:	Dec. 27, 2014
Test Date:	Jan. 20 ~ Mar. 05, 2015
Issued Date:	Mar. 13, 2015
Applicant:	Sophos Ltd
Address:	The Pentagon, Abingdon, OX14 3YP, United Kingdom
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
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF150127C37	Original release.	Mar. 13, 2015

1 Certificate of Conformity

Product:	Sophos wireless Access Point AP 55C
Brand:	Sophos
Test Model:	AP 55C
Sample Status:	Engineering sample
Applicant:	Sophos Ltd
Test Date:	Jan. 20 ~ Mar. 05, 2015
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.247) ANSI C63.10:2009

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

Prepared by : _____ , **Date:** Mar. 13, 2015

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Mar. 13, 2015

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 -19.66dB at 0.50581MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB 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	No antenna connector is used.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 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	Sophos wireless Access Point AP 55C
Brand	Sophos
Test Model	AP 55C
Status of EUT	Engineering sample
Power Supply Rating	12Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 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 300.0Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	1TX: 802.11b: 237.137mW 802.11g: 229.615mW 2TX: 802.11n (HT20): 351.991mW 802.11n (HT40): 126.967mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function
802.11b	1TX (diversity)
802.11g	1TX (Ant. A)
802.11n (HT20)	2TX
802.11n (HT40)	2TX

*The EUT doesn't support diversity function in 802.11g.

*For 802.11b: Antenna A was for the final test.

*The EUT doesn't support beamforming function.

2. The EUT uses following adapter. (Support unit only)

Brand	Asian Power Devices Inc.
Model	WA-18Q12R
Input Power	100-240Vac ~50-60Hz 0.5A Max.
Output Power	12Vdc / 1.5A
Power Line	1.5m cable without core

3. The following antennas were provided to the EUT.

Antenna Type	PIFA	
Antenna Connector	NA	
	P/N	Gain (dBi)
Ant. A	RFMTA230900NNAB001	4.65
Ant. B	RFMTA230900NNAB002	4.36

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: 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)	TX FUNCTION
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	1TX
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	1TX
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	2TX
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5	2TX

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)	TX FUNCTION
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	2TX

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)	TX FUNCTION
-	802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5	2TX

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)	TX FUNCTION
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	1TX
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	1TX
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5	2TX
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5	2TX

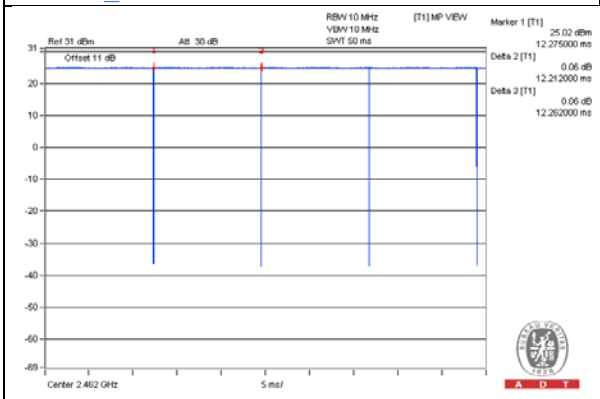
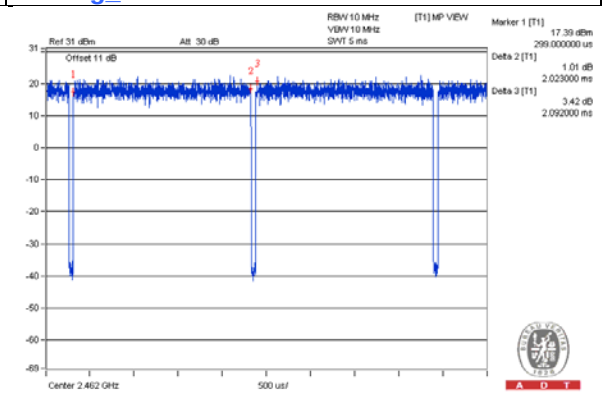
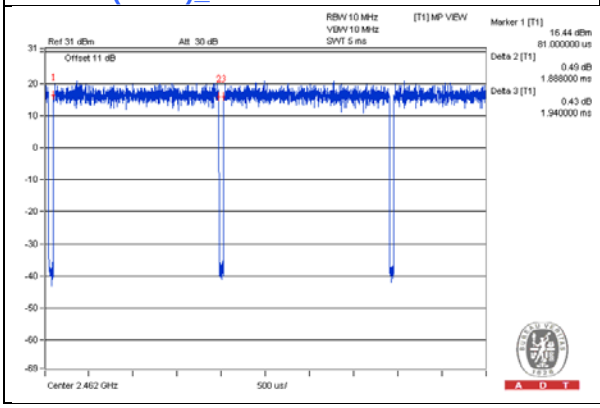
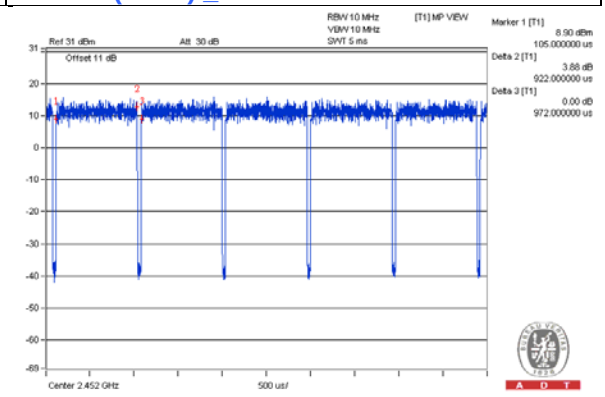
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
RE<1G	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
PLC	25deg. C, 60%RH	120Vac, 60Hz	Tank Wu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b_1TX: Duty cycle = 12.212/12.262 = 0.996
802.11g_1TX: Duty cycle = 2.023/2.092 = 0.967, Duty factor = 10 * log(1/0.967) = 0.15
802.11n (HT20)_2TX: Duty cycle = 1.888/1.94 = 0.973, Duty factor = 10 * log(1/0.973) = 0.12
802.11n (HT40)_2TX: Duty cycle = 0.922/0.972 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23

802.11b_1TX	802.11g_1TX
	
802.11n (HT20)_2TX	**802.11n (HT40) _2TX**
	

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	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Adapter	Asian Power Devices Inc.	WA-18Q12R	NA	NA	Provided by client.

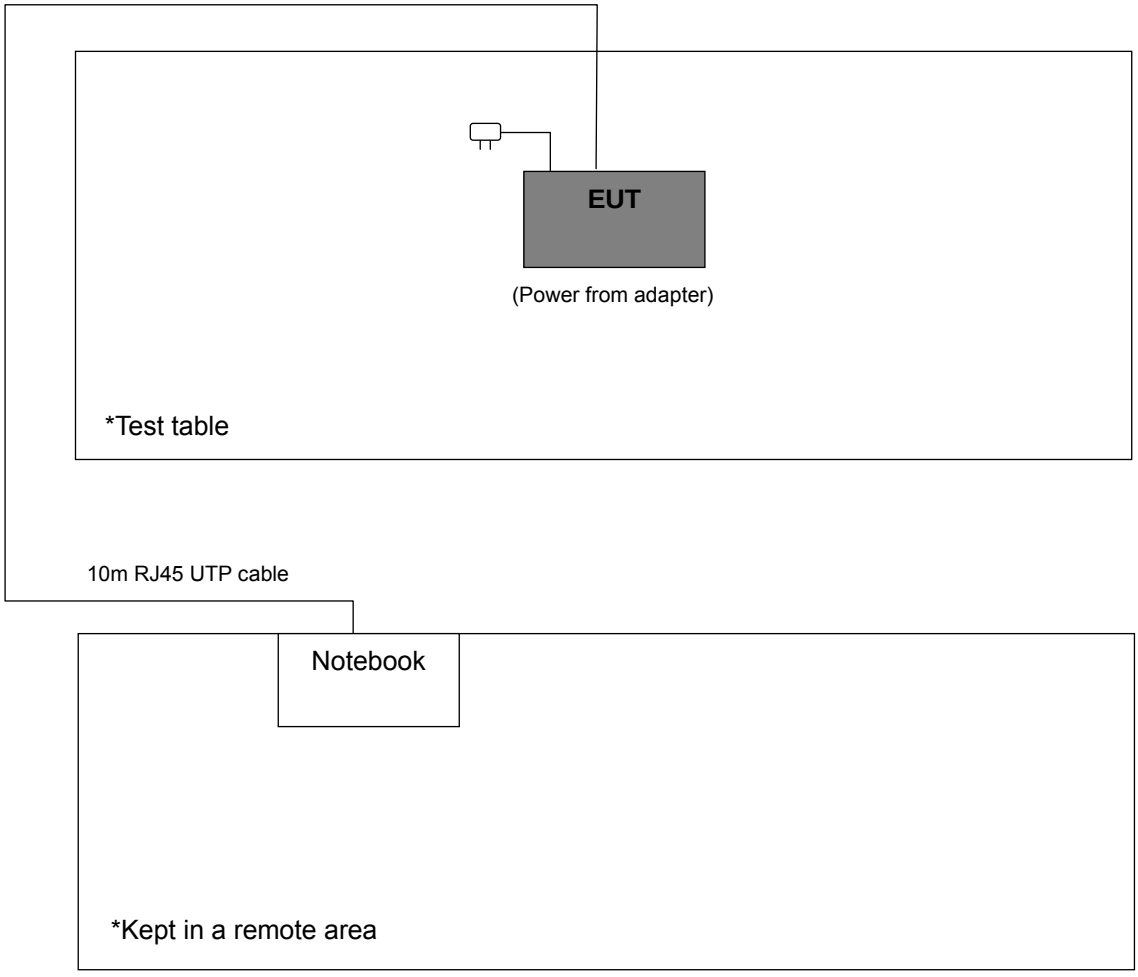
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as communication partners to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ 45 cable	1	10	N	0	-

Note: The core(s) is(are) originally attached to the cable(s).

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)
558074 D01 DTS Meas Guidance v03r02
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

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

NOTE: The EUT 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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 01, 2014	Nov. 30, 2015
Spectrum Analyzer ROHDE & SCHWARZ	E4446A	MY51100039	Aug. 18, 2014	Aug. 17, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Feb. 27, 2014	Feb. 26, 2015
			Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Aug. 26, 2014	Feb. 08, 2016
			Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
			Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01911	Aug. 09, 2014	Aug. 08, 2015
Preamplifier Agilent	8447D	2944A10638	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	248780/4 309222/4 274092/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable Worken	8D-FB	Cable-CH9-01	Aug. 11, 2014	Aug. 10, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn Table Controller EMCO	2090	NA	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

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

2. The test was performed in HwaYa Chamber 9.

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 215374.

5. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

a. The EUT was placed on the top of a rotating table 0.8 meters 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:

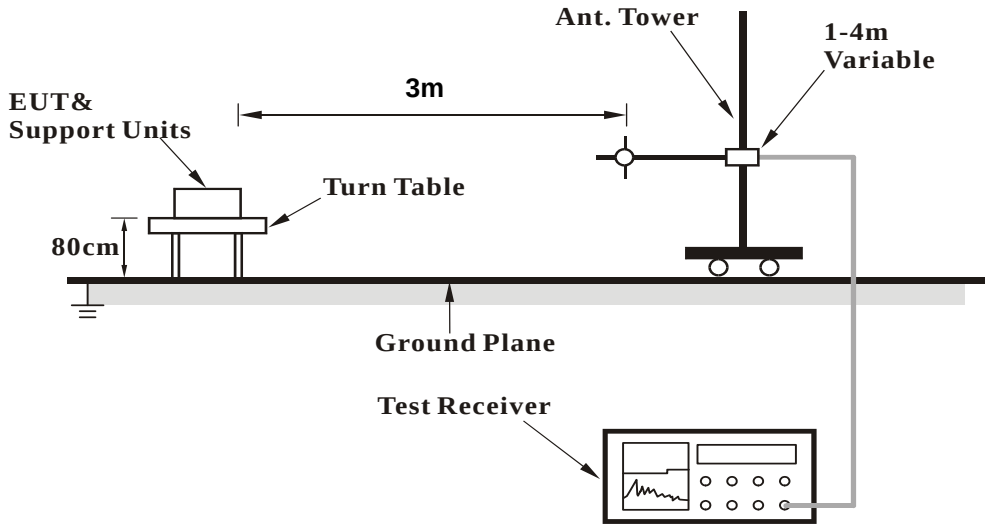
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

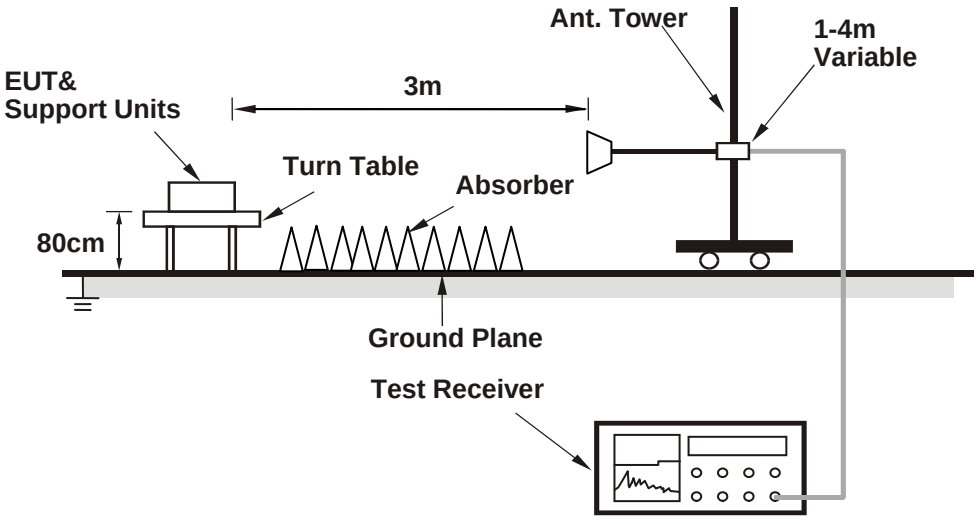
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz Data：

802.11b_1TX

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	68.0 PK	74.0	-6.0	1.00 H	319	35.00	33.00
2	2390.00	52.9 AV	54.0	-1.1	1.00 H	319	19.90	33.00
3	*2412.00	114.9 PK			1.00 H	315	81.80	33.10
4	*2412.00	112.4 AV			1.00 H	315	79.30	33.10
5	4824.00	49.0 PK	74.0	-25.0	1.03 H	320	47.20	1.80
6	4824.00	40.2 AV	54.0	-13.8	1.03 H	320	38.40	1.80
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	61.6 PK	74.0	-12.4	1.14 V	8	28.60	33.00
2	2390.00	47.8 AV	54.0	-6.2	1.14 V	8	14.80	33.00
3	*2412.00	111.1 PK			1.14 V	8	78.00	33.10
4	*2412.00	108.6 AV			1.14 V	8	75.50	33.10
5	4824.00	48.4 PK	74.0	-25.6	1.01 V	33	46.60	1.80
6	4824.00	38.8 AV	54.0	-15.2	1.01 V	33	37.00	1.80

REMARKS:

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

CHANNEL	TX Channel 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	115.8 PK			1.49 H	322	82.50	33.30
2	*2437.00	113.2 AV			1.49 H	322	79.90	33.30
3	4874.00	48.9 PK	74.0	-25.1	1.00 H	303	47.00	1.90
4	4874.00	38.2 AV	54.0	-15.8	1.00 H	303	36.30	1.90
5	7311.00	54.9 PK	74.0	-19.1	1.00 H	293	46.40	8.50
6	7311.00	43.5 AV	54.0	-10.5	1.00 H	293	35.00	8.50
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	*2437.00	113.6 PK			1.09 V	2	80.30	33.30
2	*2437.00	111.1 AV			1.09 V	2	77.80	33.30
3	4874.00	48.6 PK	74.0	-25.4	1.00 V	59	46.70	1.90
4	4874.00	39.0 AV	54.0	-15.0	1.00 V	59	37.10	1.90
5	7311.00	54.5 PK	74.0	-19.5	1.00 V	286	46.00	8.50
6	7311.00	42.9 AV	54.0	-11.1	1.00 V	286	34.40	8.50

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)
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	114.2 PK			1.48 H	321	80.80	33.40
2	*2462.00	111.7 AV			1.48 H	321	78.30	33.40
3	2483.50	63.7 PK	74.0	-10.3	1.46 H	324	30.30	33.40
4	2483.50	52.9 AV	54.0	-1.1	1.46 H	324	19.50	33.40
5	4924.00	49.0 PK	74.0	-25.0	1.33 H	53	47.00	2.00
6	4924.00	38.5 AV	54.0	-15.5	1.33 H	53	36.50	2.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.7 PK			1.06 V	2	78.30	33.40
2	*2462.00	109.5 AV			1.06 V	2	76.10	33.40
3	2483.50	61.6 PK	74.0	-12.4	1.06 V	2	28.20	33.40
4	2483.50	51.6 AV	54.0	-2.4	1.06 V	2	18.20	33.40
5	4924.00	47.8 PK	74.0	-26.2	1.36 V	341	45.80	2.00
6	4924.00	35.8 AV	54.0	-18.2	1.36 V	341	33.80	2.00

REMARKS:

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

802.11g_1TX

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	72.7 PK	74.0	-1.3	1.00 H	321	39.70	33.00
2	2390.00	52.4 AV	54.0	-1.6	1.00 H	321	19.40	33.00
3	*2412.00	111.3 PK			1.00 H	318	78.20	33.10
4	*2412.00	100.8 AV			1.00 H	318	67.70	33.10
5	4824.00	47.5 PK	74.0	-26.5	1.00 H	130	45.70	1.80
6	4824.00	34.0 AV	54.0	-20.0	1.00 H	130	32.20	1.80
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	66.2 PK	74.0	-7.8	1.12 V	7	33.20	33.00
2	2390.00	47.7 AV	54.0	-6.3	1.12 V	7	14.70	33.00
3	*2412.00	108.3 PK			1.12 V	7	75.20	33.10
4	*2412.00	97.0 AV			1.12 V	7	63.90	33.10
5	4824.00	47.2 PK	74.0	-26.8	1.00 V	265	45.40	1.80
6	4824.00	34.1 AV	54.0	-19.9	1.00 V	265	32.30	1.80

REMARKS:

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

CHANNEL	TX Channel 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	71.9 PK	74.0	-2.1	1.25 H	314	38.90	33.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**1.25 H**	**314**	**20.00**	**33.00**
3	*2437.00	117.1 PK			1.25 H	314	83.80	33.30
4	*2437.00	106.6 AV			1.25 H	314	73.30	33.30
5	2483.50	71.6 PK	74.0	-2.4	1.76 H	320	38.20	33.40
6	2483.50	52.6 AV	54.0	-1.4	1.76 H	320	19.20	33.40
7	4874.00	48.2 PK	74.0	-25.8	1.00 H	102	46.30	1.90
8	4874.00	34.6 AV	54.0	-19.4	1.00 H	102	32.70	1.90
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	2390.00	66.0 PK	74.0	-8.0	1.11 V	5	33.00	33.00
2	2390.00	48.2 AV	54.0	-5.8	1.11 V	5	15.20	33.00
3	*2437.00	115.2 PK			1.11 V	5	81.90	33.30
4	*2437.00	104.4 AV			1.11 V	5	71.10	33.30
5	2483.50	68.2 PK	74.0	-5.8	1.07 V	7	34.80	33.40
6	2483.50	51.5 AV	54.0	-2.5	1.07 V	7	18.10	33.40
7	4874.00	47.7 PK	74.0	-26.3	1.00 V	188	45.80	1.90
8	4874.00	34.6 AV	54.0	-19.4	1.00 V	188	32.70	1.90

REMARKS:

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

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	110.5 PK			1.77 H	319	77.10	33.40
2	*2462.00	100.2 AV			1.77 H	319	66.80	33.40
3	2483.50	72.6 PK	74.0	-1.4	1.77 H	319	39.20	33.40
4	2483.50	50.0 AV	54.0	-4.0	1.77 H	319	16.60	33.40
5	4924.00	47.7 PK	74.0	-26.3	1.00 H	32	45.70	2.00
6	4924.00	33.8 AV	54.0	-20.2	1.00 H	32	31.80	2.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	109.3 PK			1.09 V	2	75.90	33.40
2	*2462.00	97.9 AV			1.09 V	2	64.50	33.40
3	2483.50	69.9 PK	74.0	-4.1	1.09 V	2	36.50	33.40
4	2483.50	48.6 AV	54.0	-5.4	1.09 V	2	15.20	33.40
5	4924.00	47.5 PK	74.0	-26.5	1.00 V	321	45.50	2.00
6	4924.00	33.8 AV	54.0	-20.2	1.00 V	321	31.80	2.00

REMARKS:

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

802.11n (HT20)_2TX

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	72.0 PK	74.0	-2.0	1.03 H	334	39.00	33.00
2	2390.00	52.5 AV	54.0	-1.5	1.03 H	334	19.50	33.00
3	*2412.00	110.4 PK			1.00 H	12	77.30	33.10
4	*2412.00	100.1 AV			1.00 H	12	67.00	33.10
5	4824.00	48.7 PK	74.0	-25.3	1.00 H	123	46.90	1.80
6	4824.00	35.5 AV	54.0	-18.5	1.00 H	123	33.70	1.80
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	63.2 PK	74.0	-10.8	1.14 V	18	30.20	33.00
2	2390.00	47.0 AV	54.0	-7.0	1.14 V	18	14.00	33.00
3	*2412.00	104.3 PK			1.19 V	20	71.20	33.10
4	*2412.00	94.0 AV			1.19 V	20	60.90	33.10
5	4824.00	48.3 PK	74.0	-25.7	1.00 V	193	46.50	1.80
6	4824.00	35.0 AV	54.0	-19.0	1.00 V	193	33.20	1.80

REMARKS:

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

CHANNEL	TX Channel 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	65.0 PK	74.0	-9.0	1.00 H	40	32.00	33.00
2	2390.00	50.3 AV	54.0	-3.7	1.00 H	40	17.30	33.00
3	*2437.00	117.2 PK			1.00 H	326	83.90	33.30
4	*2437.00	107.1 AV			1.00 H	326	73.80	33.30
5	2483.50	68.5 PK	74.0	-5.5	1.00 H	326	35.10	33.40
6	**2483.50**	**53.0 AV**	**54.0**	**-1.0**	**1.00 H**	**326**	**19.60**	**33.40**
7	4874.00	47.9 PK	74.0	-26.1	1.00 H	103	46.00	1.90
8	4874.00	35.1 AV	54.0	-18.9	1.00 H	103	33.20	1.90
9	7311.00	56.0 PK	74.0	-18.0	1.00 H	319	47.50	8.50
10	7311.00	43.1 AV	54.0	-10.9	1.00 H	319	34.60	8.50
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	2390.00	60.4 PK	74.0	-13.6	1.14 V	10	27.40	33.00
2	2390.00	47.7 AV	54.0	-6.3	1.14 V	10	14.70	33.00
3	*2437.00	110.8 PK			1.11 V	10	77.50	33.30
4	*2437.00	100.8 AV			1.11 V	10	67.50	33.30
5	2483.50	66.0 PK	74.0	-8.0	1.12 V	22	32.60	33.40
6	2483.50	50.4 AV	54.0	-3.6	1.12 V	22	17.00	33.40
7	4874.00	48.2 PK	74.0	-25.8	1.00 V	63	46.30	1.90
8	4874.00	34.5 AV	54.0	-19.5	1.00 V	63	32.60	1.90
9	7311.00	57.9 PK	74.0	-16.1	1.09 V	355	49.40	8.50
10	7311.00	43.6 AV	54.0	-10.4	1.09 V	355	35.10	8.50

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)
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	109.7 PK			1.00 H	327	76.30	33.40
2	*2462.00	99.8 AV			1.00 H	327	66.40	33.40
3	2483.50	72.7 PK	74.0	-1.3	1.00 H	329	39.30	33.40
4	2483.50	52.0 AV	54.0	-2.0	1.00 H	329	18.60	33.40
5	4924.00	47.7 PK	74.0	-26.3	1.00 H	102	45.70	2.00
6	4924.00	34.0 AV	54.0	-20.0	1.00 H	102	32.00	2.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.2 PK			1.09 V	14	70.80	33.40
2	*2462.00	94.1 AV			1.09 V	14	60.70	33.40
3	2483.50	69.3 PK	74.0	-4.7	1.13 V	10	35.90	33.40
4	2483.50	48.6 AV	54.0	-5.4	1.13 V	10	15.20	33.40
5	4924.00	47.1 PK	74.0	-26.9	1.00 V	62	45.10	2.00
6	4924.00	33.7 AV	54.0	-20.3	1.00 V	62	31.70	2.00

REMARKS:

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

802.11n (40MHz)_2TX

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	70.7 PK	74.0	-3.3	1.01 H	5	37.70	33.00
2	**2390.00**	**53.0 AV**	**54.0**	**-1.0**	**1.01 H**	**5**	**20.00**	**33.00**
3	*2422.00	107.4 PK			1.00 H	330	74.20	33.20
4	*2422.00	96.3 AV			1.00 H	330	63.10	33.20
5	4844.00	47.9 PK	74.0	-26.1	1.00 H	155	46.10	1.80
6	4844.00	33.9 AV	54.0	-20.1	1.00 H	155	32.10	1.80
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	64.4 PK	74.0	-9.6	1.18 V	11	31.40	33.00
2	2390.00	49.2 AV	54.0	-4.8	1.18 V	11	16.20	33.00
3	*2422.00	101.4 PK			1.11 V	20	68.00	33.40
4	*2422.00	93.6 AV			1.11 V	20	60.20	33.40
5	4844.00	47.1 PK	74.0	-26.9	1.00 V	263	45.30	1.80
6	4844.00	33.9 AV	54.0	-20.1	1.00 V	263	32.10	1.80

REMARKS:

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

CHANNEL	TX Channel 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	64.6 PK	74.0	-9.4	1.00 H	335	31.60	33.00
2	2390.00	50.9 AV	54.0	-3.1	1.00 H	335	17.90	33.00
3	*2437.00	108.9 PK			1.00 H	335	75.60	33.30
4	*2437.00	99.9 AV			1.00 H	335	66.60	33.30
5	2483.50	72.8 PK	74.0	-1.2	1.00 H	18	39.40	33.40
6	2483.50	52.0 AV	54.0	-2.0	1.00 H	18	18.60	33.40
7	4874.00	48.4 PK	74.0	-25.6	1.00 H	113	46.50	1.90
8	4874.00	34.4 AV	54.0	-19.6	1.00 H	113	32.50	1.90
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	2390.00	58.5 PK	74.0	-15.5	1.00 V	26	25.50	33.00
2	2390.00	46.1 AV	54.0	-7.9	1.00 V	26	13.10	33.00
3	*2437.00	102.6 PK			1.12 V	20	69.30	33.30
4	*2437.00	92.1 AV			1.12 V	20	58.80	33.30
5	2483.50	64.5 PK	74.0	-9.5	1.16 V	20	31.10	33.40
6	2483.50	49.0 AV	54.0	-5.0	1.16 V	20	15.60	33.40
7	4874.00	47.6 PK	74.0	-26.4	1.00 V	212	45.70	1.90
8	4874.00	34.1 AV	54.0	-19.9	1.00 V	212	32.20	1.90

REMARKS:

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

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	105.5 PK			1.00 H	329	72.20	33.30
2	*2452.00	94.4 AV			1.00 H	329	61.10	33.30
3	2483.50	72.8 PK	74.0	-1.2	1.00 H	328	39.40	33.40
4	2483.50	51.9 AV	54.0	-2.1	1.00 H	328	18.50	33.40
5	4904.00	47.1 PK	74.0	-26.9	1.00 H	196	45.10	2.00
6	4904.00	34.3 AV	54.0	-19.7	1.00 H	196	32.30	2.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	97.3 PK			1.07 V	62	64.00	33.30
2	*2452.00	87.1 AV			1.07 V	62	53.80	33.30
3	2483.50	64.0 PK	74.0	-10.0	1.00 V	302	30.60	33.40
4	2483.50	47.6 AV	54.0	-6.4	1.00 V	302	14.20	33.40
5	4904.00	47.5 PK	74.0	-26.5	1.00 V	201	45.50	2.00
6	4904.00	34.1 AV	54.0	-19.9	1.00 V	201	32.10	2.00

REMARKS:

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

Below 1GHz Data:

802.11n (HT20)_2TX

CHANNEL	TX Channel 6	**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	80.44	23.5 QP	40.0	-16.5	1.50 H	300	42.20	-18.70
2	163.86	32.0 QP	43.5	-11.5	1.50 H	106	46.10	-14.10
3	249.22	33.6 QP	46.0	-12.4	1.24 H	88	48.10	-14.50
4	274.44	30.7 QP	46.0	-15.3	1.00 H	243	44.00	-13.30
5	524.70	33.5 QP	46.0	-12.5	1.50 H	237	41.70	-8.20
6	901.06	35.5 QP	46.0	-10.5	1.50 H	165	36.80	-1.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	33.44	29.8 QP	40.0	-10.2	1.30 V	53	45.60	-15.80
2	49.40	29.2 QP	40.0	-10.8	1.00 V	354	43.70	-14.50
3	128.95	33.0 QP	43.5	-10.5	1.00 V	13	48.50	-15.50
4	249.22	33.0 QP	46.0	-13.0	1.99 V	201	47.50	-14.50
5	524.70	36.7 QP	46.0	-9.3	1.00 V	34	44.90	-8.20
6	899.99	39.9 QP	46.0	-6.1	1.00 V	342	41.20	-1.30

REMARKS:

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

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	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	847265/023	Oct. 21, 2014	Oct. 20, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
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. Tested Date: Feb. 14, 2015

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.

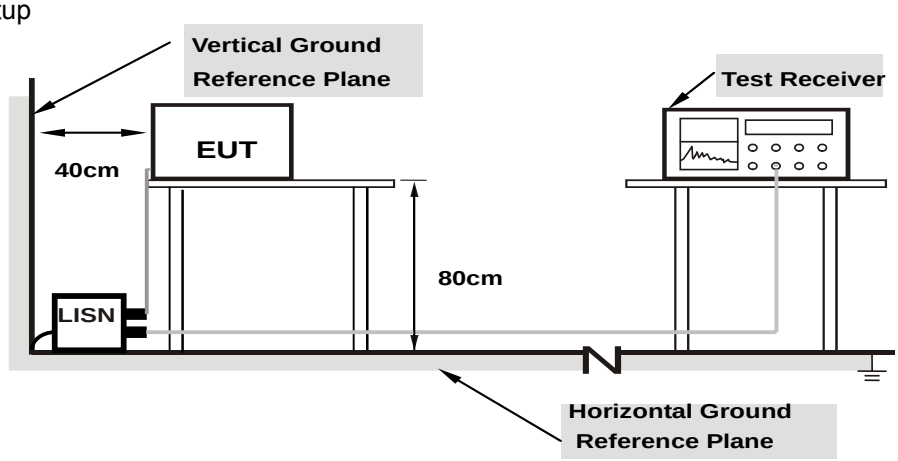
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

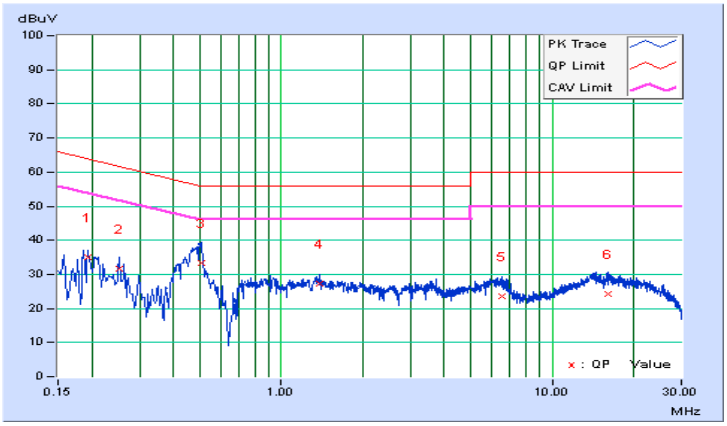
802.11n (HT20)_2TX

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	0.19305	0.07	35.07	20.83	35.14	20.90	63.90	53.90	-28.76	-33.00
2	0.25166	0.07	31.73	21.87	31.80	21.94	61.70	51.70	-29.90	-29.76
3	**0.50581**	**0.09**	**33.37**	**26.25**	**33.46**	**26.34**	**56.00**	**46.00**	**-22.54**	**-19.66**
4	1.38947	0.13	27.19	19.21	27.32	19.34	56.00	46.00	-28.68	-26.66
5	6.50375	0.35	23.13	16.87	23.48	17.22	60.00	50.00	-36.52	-32.78
6	16.09498	0.83	23.57	16.77	24.40	17.60	60.00	50.00	-35.60	-32.40

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.

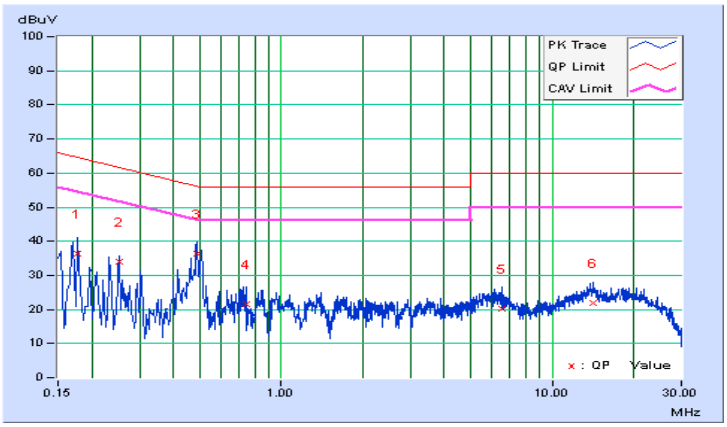


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.17737	0.05	36.39	18.00	36.44	18.05	64.61	54.61	-28.17	-36.56
2	0.25166	0.06	34.03	18.32	34.09	18.38	61.70	51.70	-27.62	-33.33
3	0.48678	0.07	36.21	25.16	36.28	25.23	56.22	46.22	-19.94	-20.99
4	0.74041	0.08	21.37	11.85	21.45	11.93	56.00	46.00	-34.55	-34.07
5	6.53112	0.31	19.98	12.54	20.29	12.85	60.00	50.00	-39.71	-37.15
6	14.21036	0.64	21.11	11.76	21.75	12.40	60.00	50.00	-38.25	-37.60

REMARKS:

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

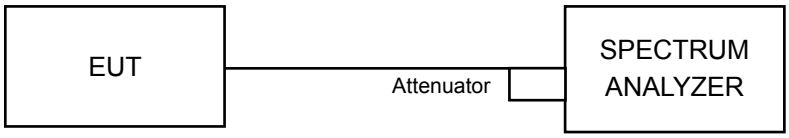


4.3 6dB Bandwidth Measurement

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_1TX

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	7.11	0.5	PASS
6	2437	7.10	0.5	PASS
11	2462	7.11	0.5	PASS

802.11g_1TX

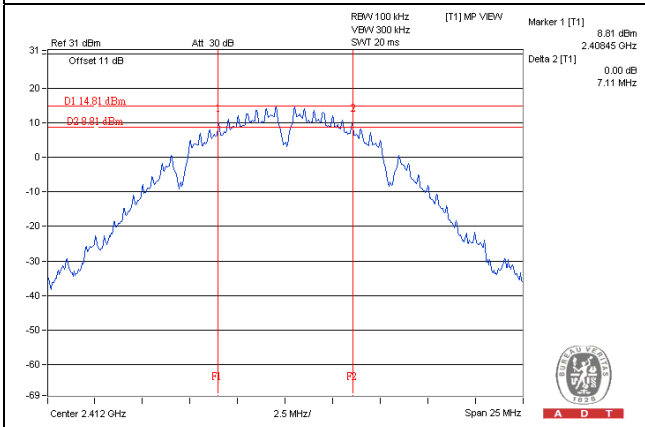
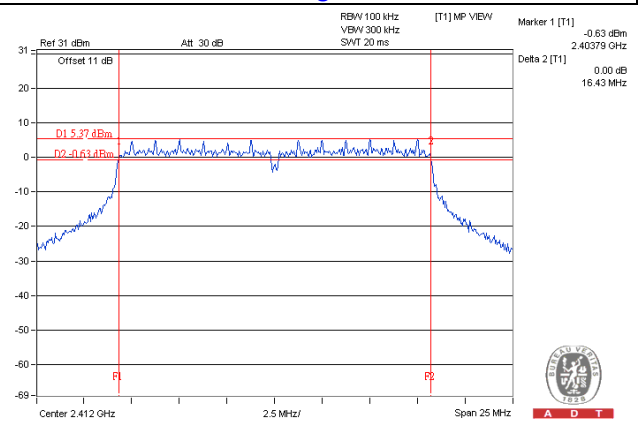
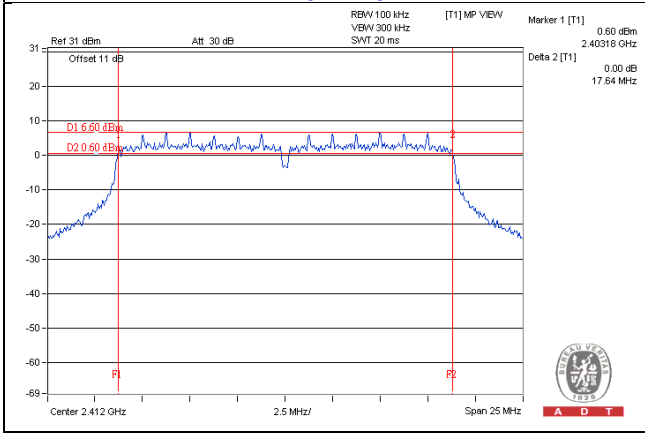
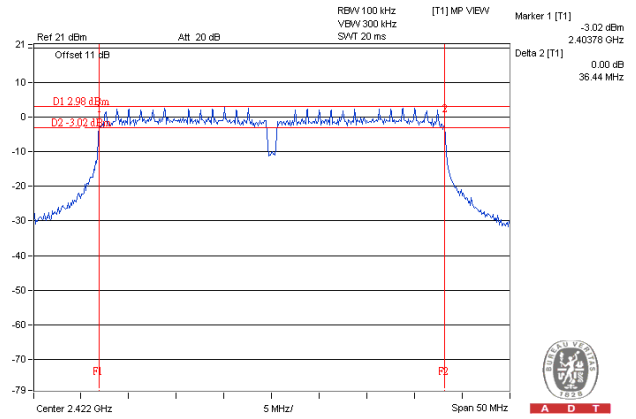
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.43	0.5	PASS
6	2437	16.37	0.5	PASS
11	2462	16.40	0.5	PASS

802.11n (HT20)_2TX

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
1	2412	17.64	17.63	0.5	PASS
6	2437	17.60	17.57	0.5	PASS
11	2462	17.64	17.64	0.5	PASS

802.11n (HT40)_2TX

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		CHAIN 0	CHAIN 1		
3	2422	36.42	36.44	0.5	PASS
6	2437	36.14	36.36	0.5	PASS
9	2452	36.36	36.36	0.5	PASS

Spectrum Plot of Worst Value	
802.11b_1TX	**802.11g_1TX**
	
802.11n (HT20)_2TX	**802.11n (HT40)_2TX**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

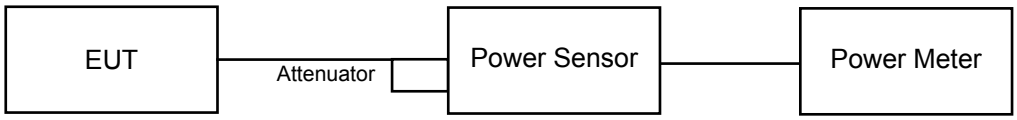
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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 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.

4.4.2 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

FOR AVERAGE POWER

802.11b_1TX

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	197.697	22.96	30	Pass
6	2437	237.137	23.75	30	Pass
11	2462	189.234	22.77	30	Pass

802.11g_1TX

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	53.456	17.28	30	Pass
6	2437	229.615	23.61	30	Pass
11	2462	43.451	16.38	30	Pass

802.11n (HT20)_2TX

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.35	18.58	126.436	21.02	30	Pass
6	2437	22.15	22.74	351.991	25.47	30	Pass
11	2462	14.91	15.17	63.859	18.05	30	Pass

802.11n (HT40)_2TX

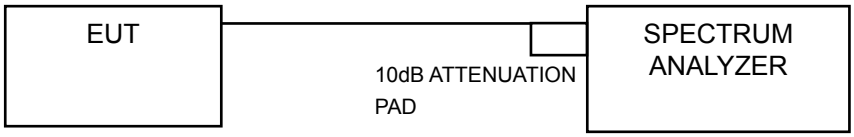
Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	16.25	17.14	93.931	19.73	30	Pass
6	2437	17.78	18.26	126.967	21.04	30	Pass
9	2452	14.84	15.19	63.516	18.03	30	Pass

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 AVG. power (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 AVG. power (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) Do not 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_1TX

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-4.79	8	Pass
6	2437	-3.83	8	Pass
11	2462	-5.27	8	Pass

802.11g_1TX

Channel	Freq. (MHz)	PSD (dBm)	Duty Factor	PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
1	2412	-9.61	0.15	-9.46	8	Pass
6	2437	-7.20	0.15	-7.05	8	Pass
11	2462	-12.20	0.15	-12.05	8	Pass

802.11n (HT20)_2TX

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-12.58	3.01	0.12	-9.45	6.48	Pass
	6	2437	-7.48	3.01	0.12	-4.35	6.48	Pass
	11	2462	-15.53	3.01	0.12	-12.40	6.48	Pass
1	1	2412	-11.78	3.01	0.12	-8.65	6.48	Pass
	6	2437	-6.42	3.01	0.12	-3.29	6.48	Pass
	11	2462	-14.06	3.01	0.12	-10.93	6.48	Pass

NOTE:

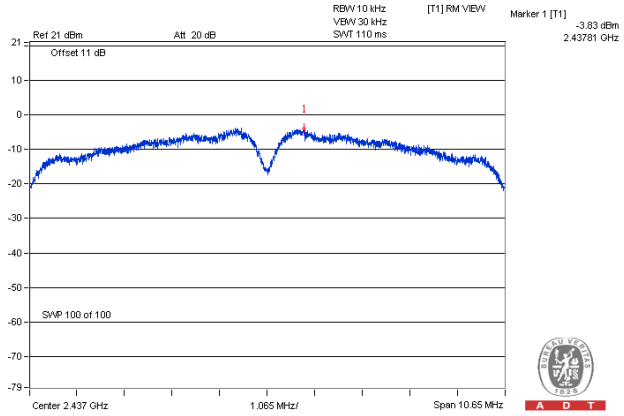
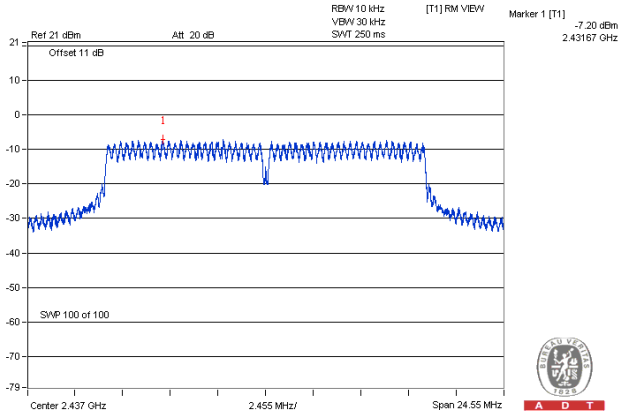
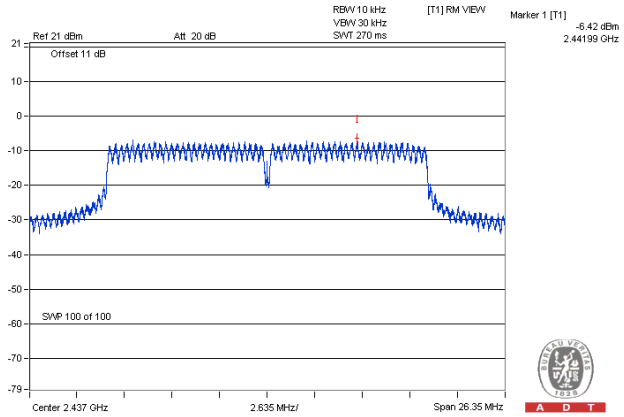
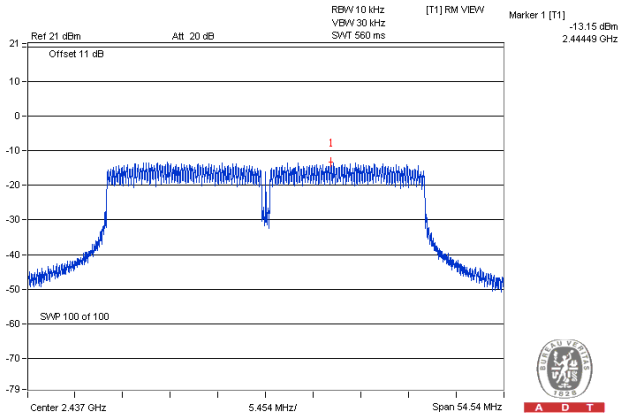
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/2$]= 7.52 dBi > 6dBi , so the power density limit shall be reduced to 8-(7.52-6) = 6.48dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)_2TX

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-17.33	3.01	0.23	-14.09	6.48	Pass
	6	2437	-14.11	3.01	0.23	-10.87	6.48	Pass
	9	2452	-19.25	3.01	0.23	-16.01	6.48	Pass
1	3	2422	-14.77	3.01	0.23	-11.53	6.48	Pass
	6	2437	-13.15	3.01	0.23	-9.91	6.48	Pass
	9	2452	-17.74	3.01	0.23	-14.50	6.48	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[$(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/2$]= 7.52 dBi > 6dBi , so the power density limit shall be reduced to 8-(7.52-6) = 6.48dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

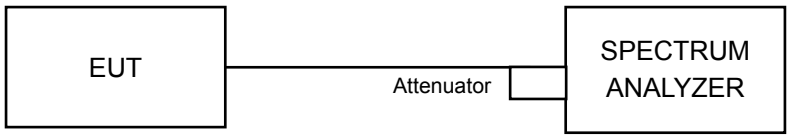
Spectrum Plot of Worst Value	
802.11b_1TX	**802.11g_1TX**
	
802.11n (HT20)_2TX	**802.11n (HT40)_2TX**
	

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

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

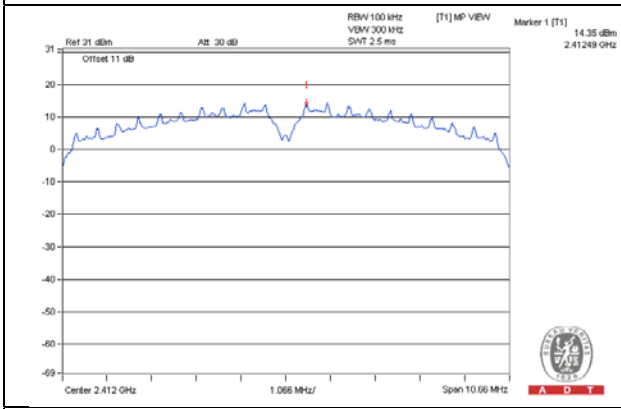
Same as Item 4.3.6

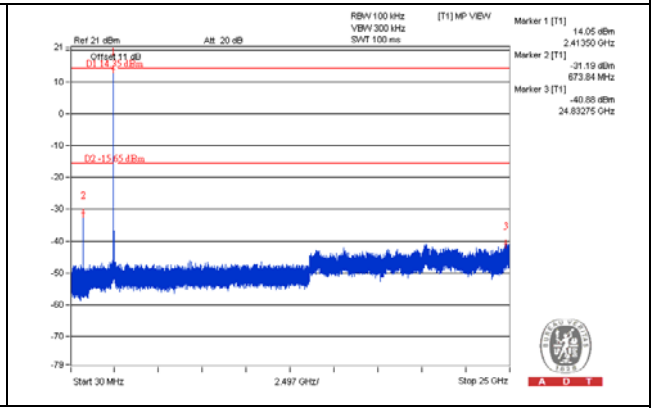
4.6.7 Test Results

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.

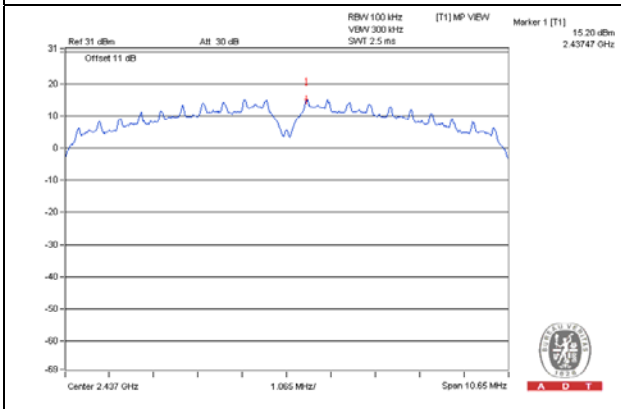
802.11b_1TX

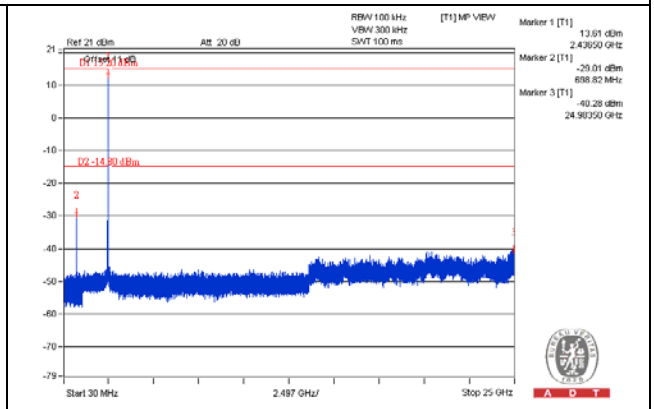
CH 1



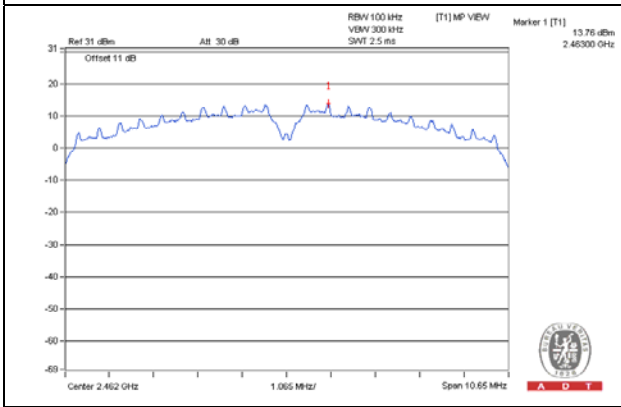


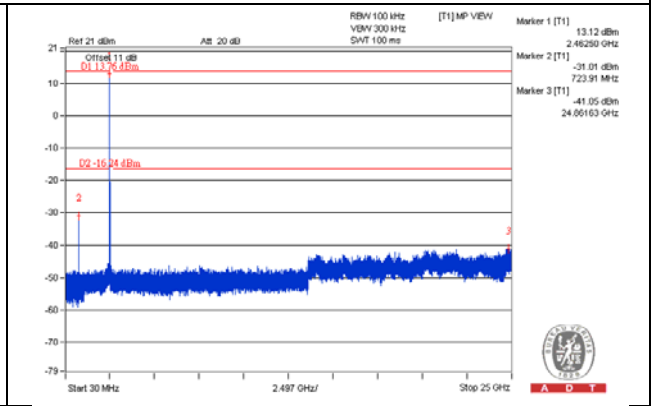
CH 6



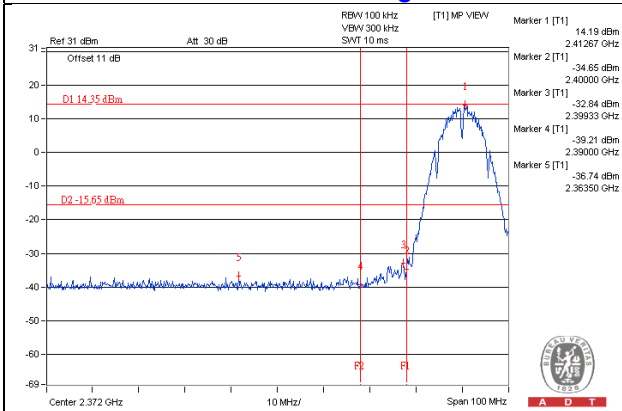


CH 11





CH 1 Band edge



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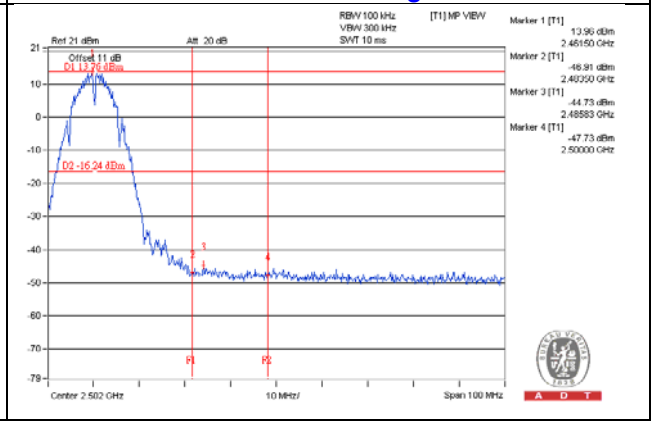
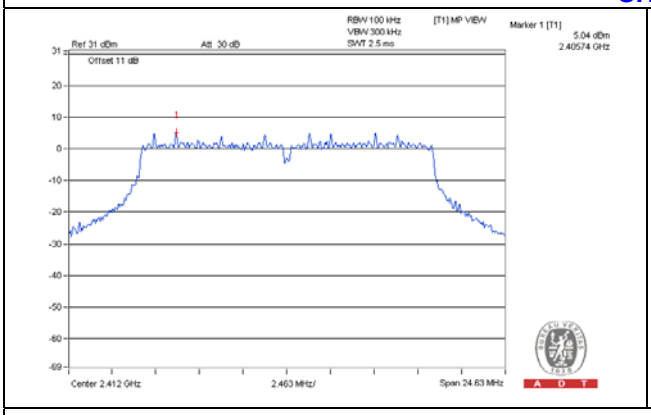
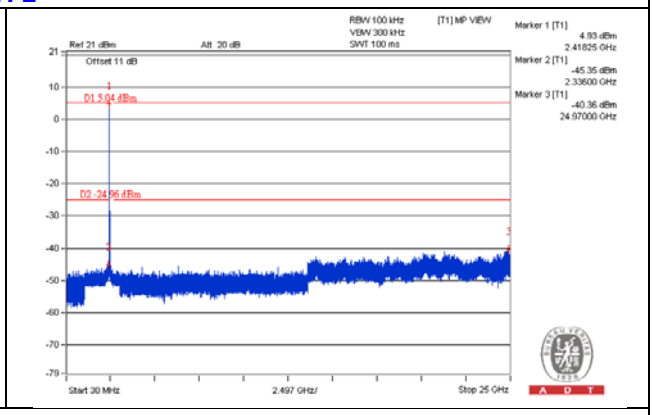


802.11g_1TX

CH 1





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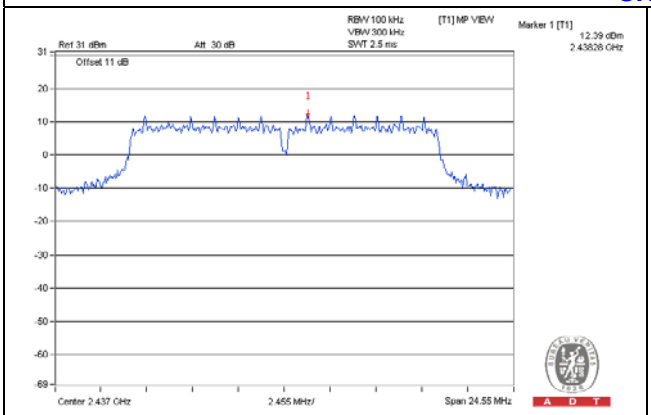

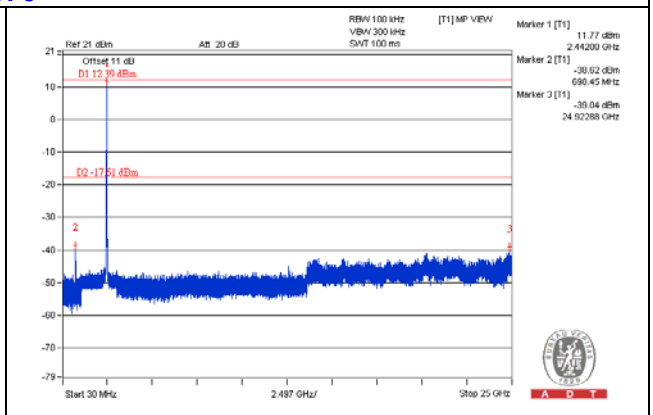

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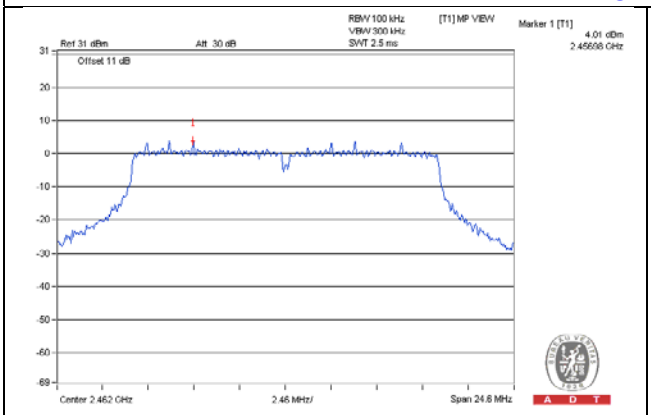
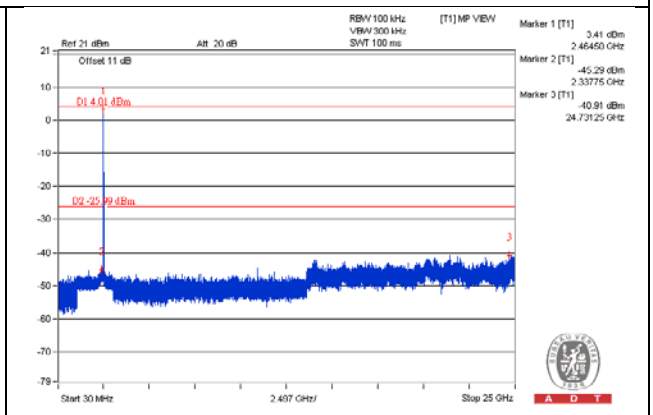
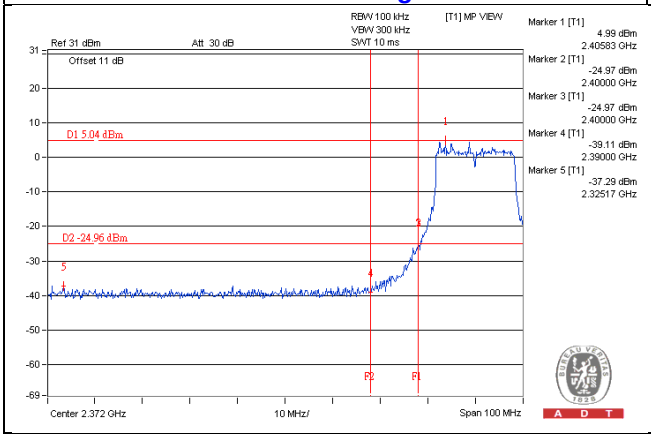
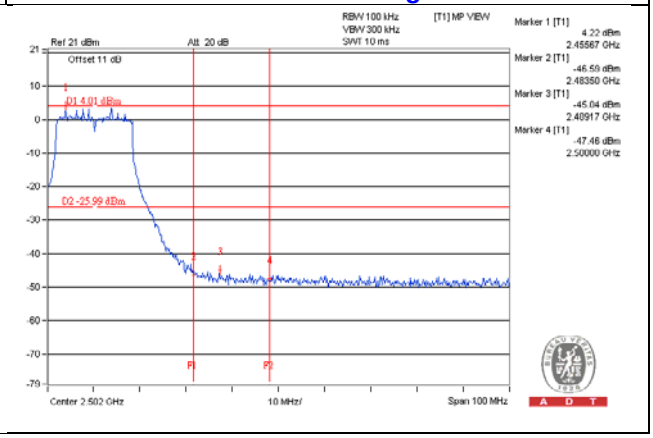




CH 1 Band edge

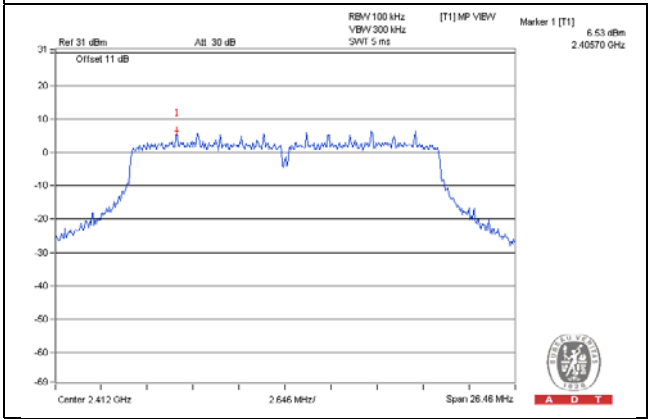


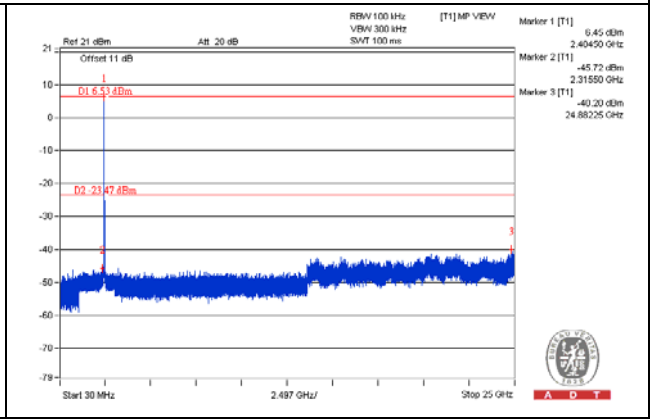
CH 11 Band edge



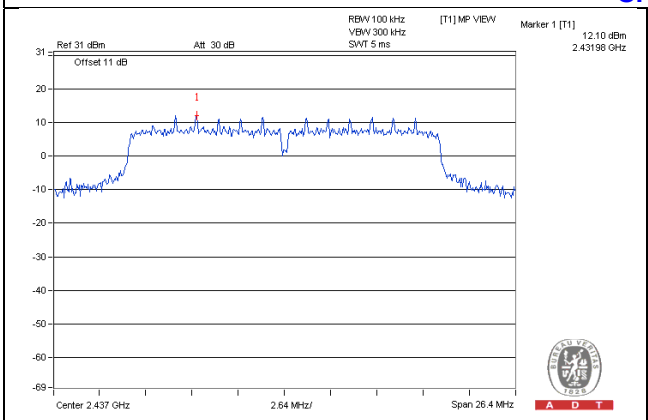
802.11n (HT20)_2TX
CHAIN 0

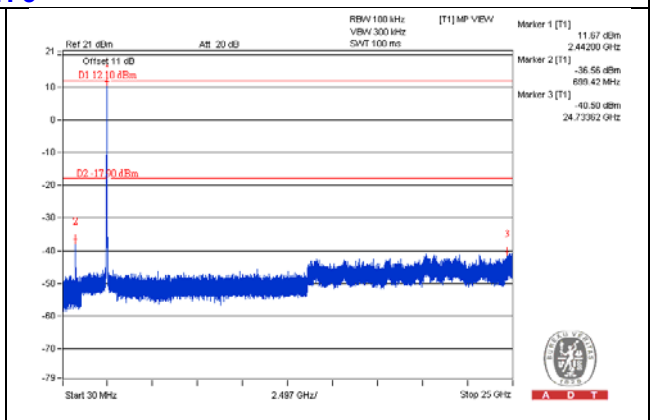
CH 1



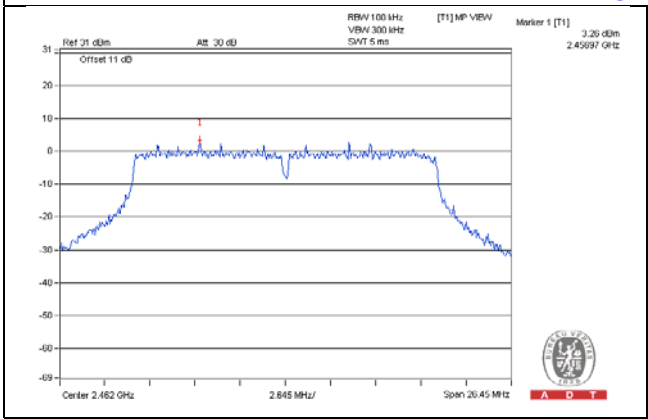


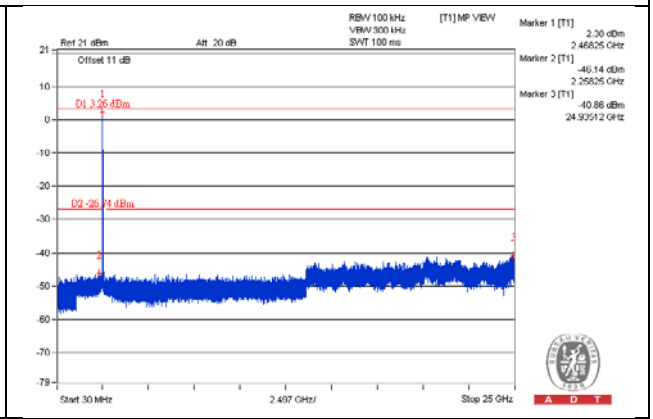
CH 6



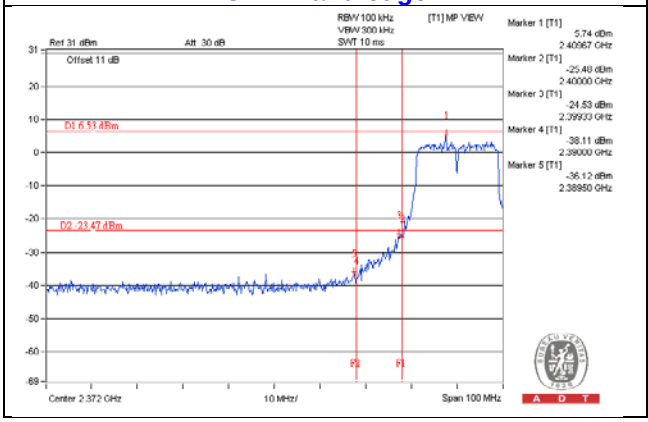


CH 11

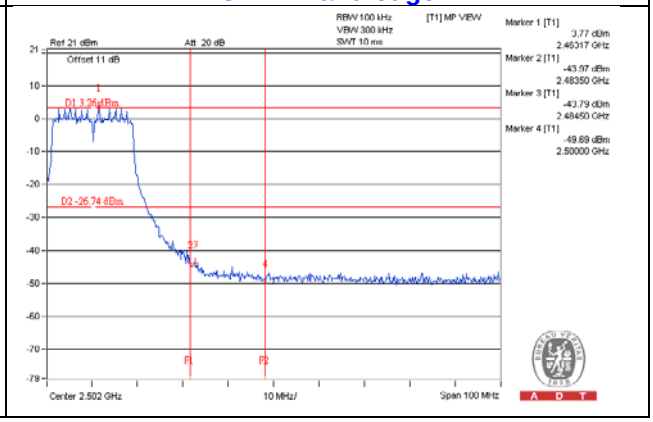




CH 1 Band edge

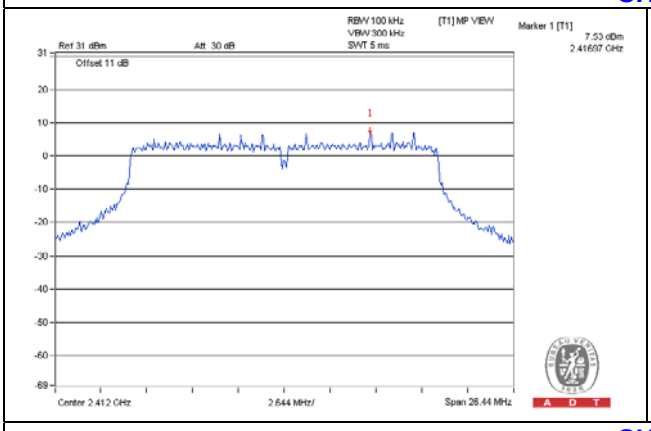


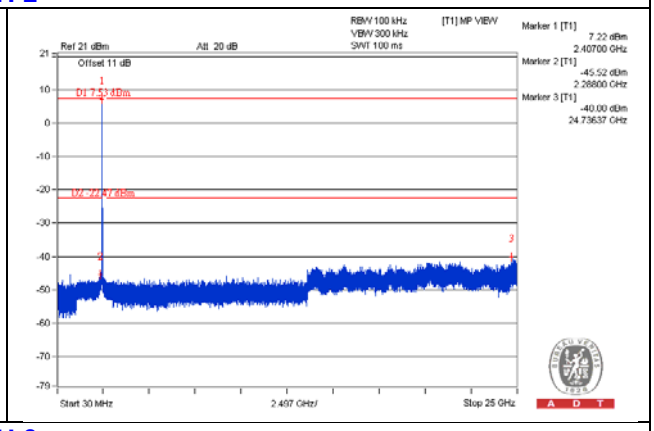
CH 11 Band edge



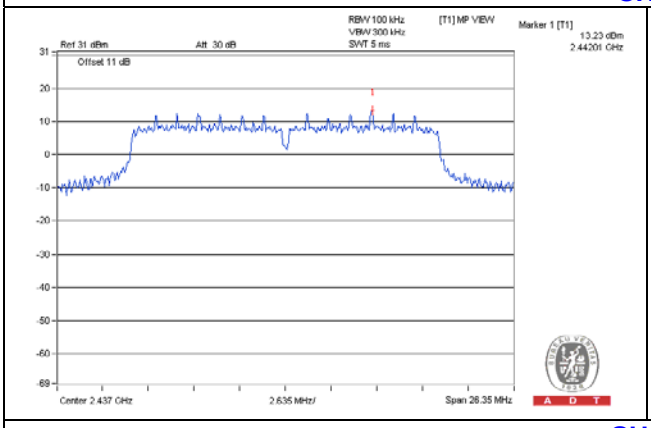
CHAIN 1

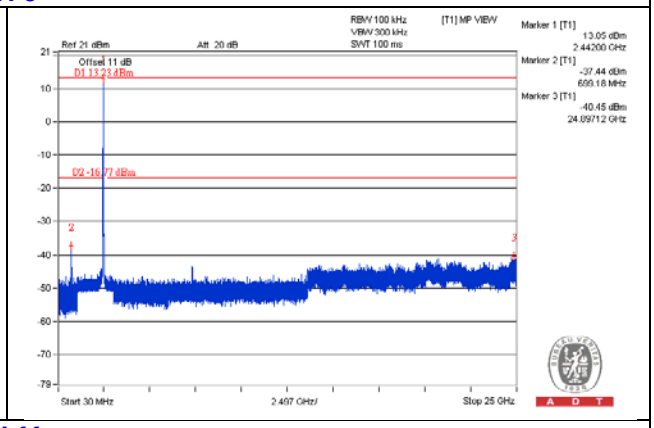
CH 1



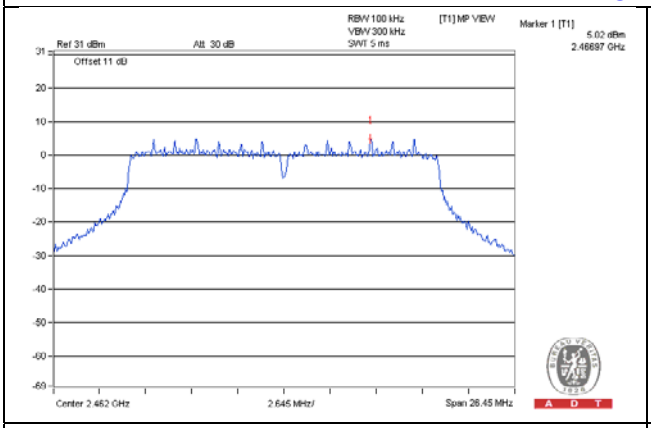


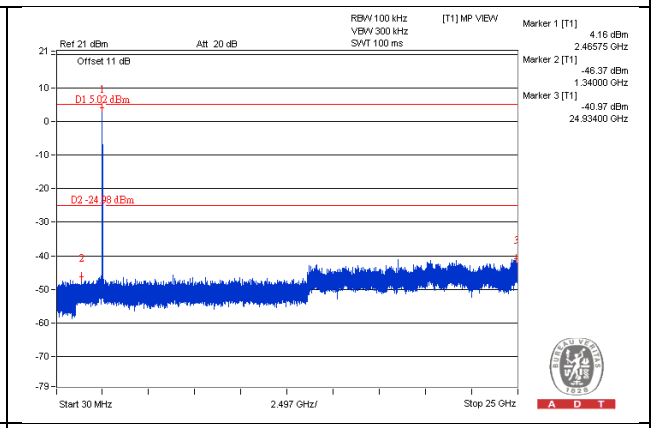
CH 6



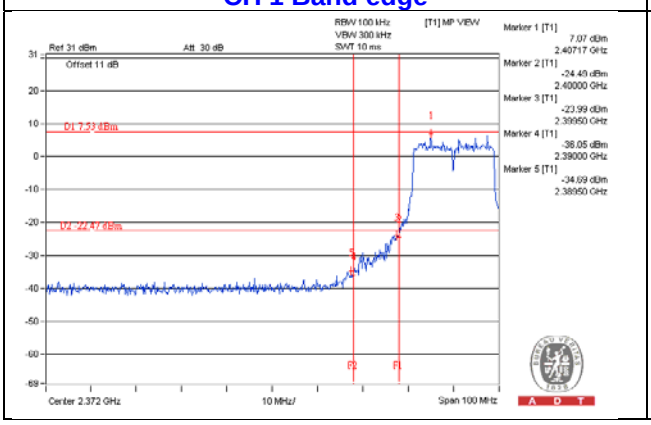


CH 11

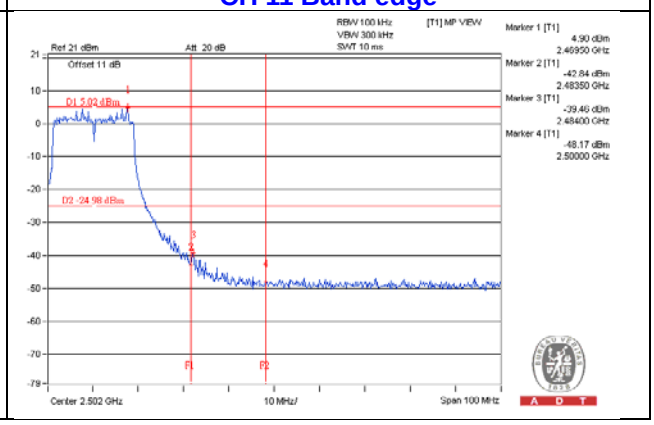




CH 1 Band edge



CH 11 Band edge



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CHAIN 0

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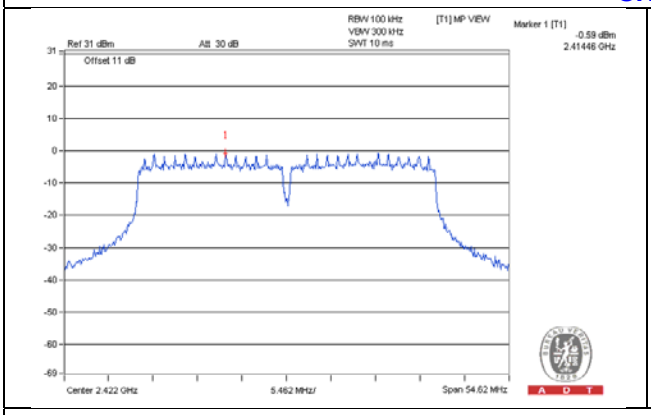
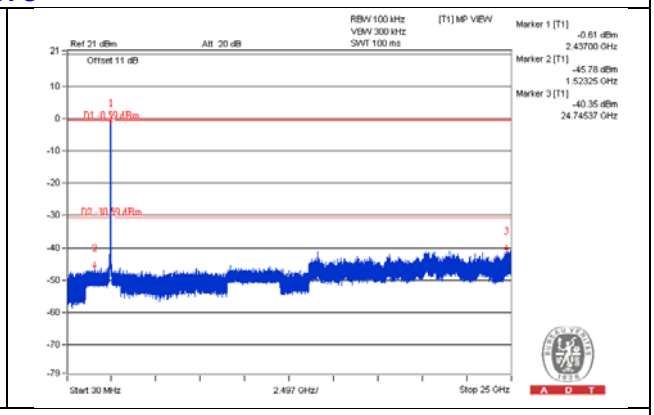
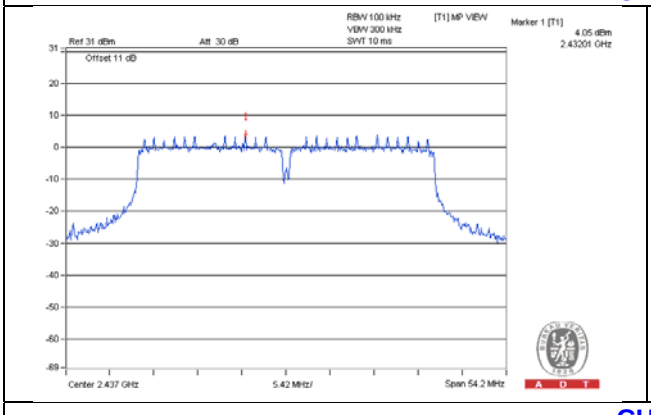
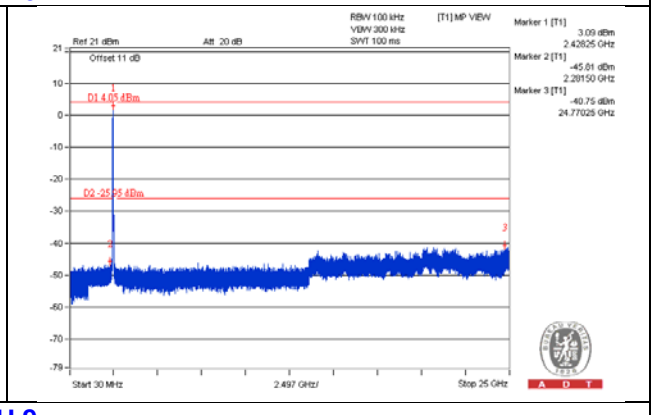


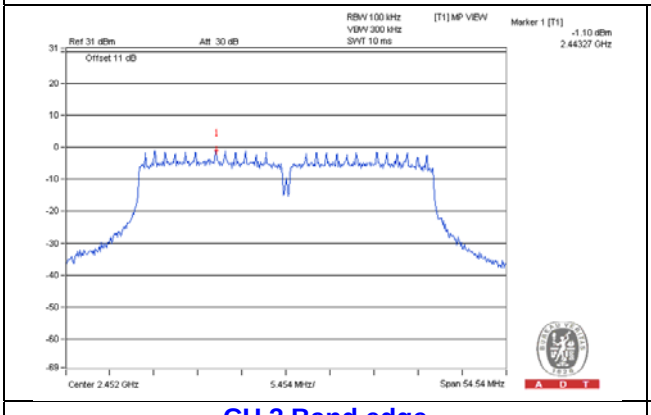


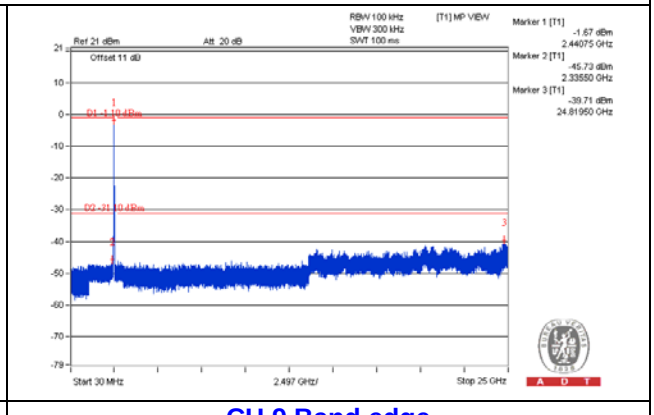
CH 6



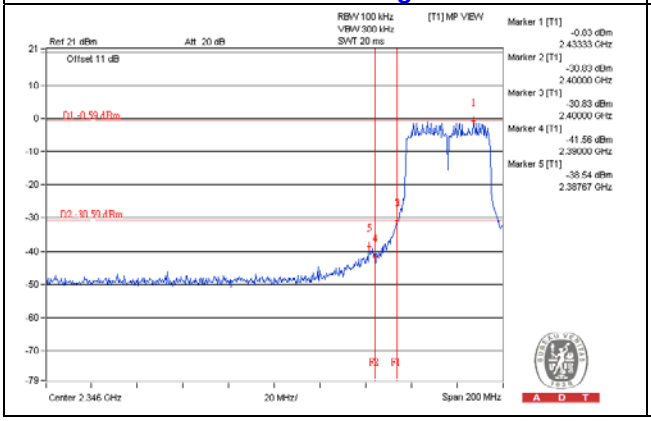


CH 9

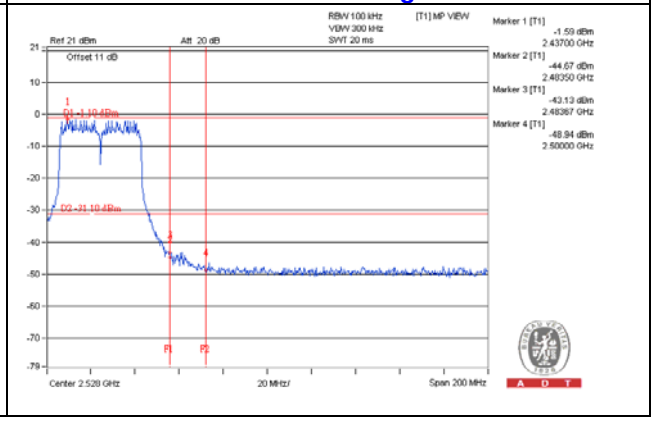




CH 3 Band edge

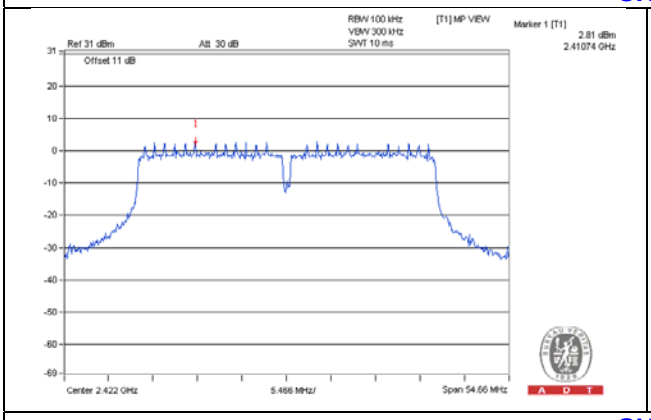


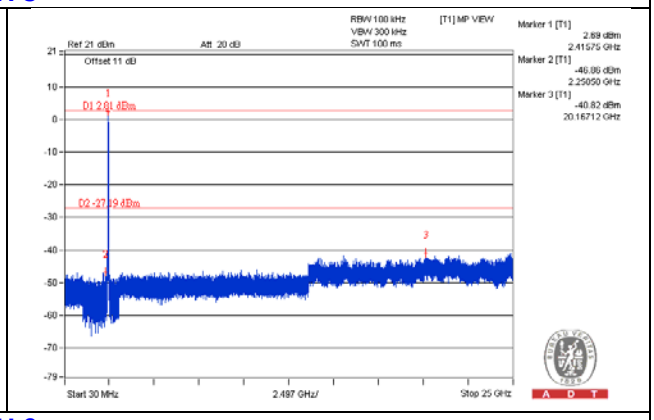
CH 9 Band edge



CHAIN 1

CH 3





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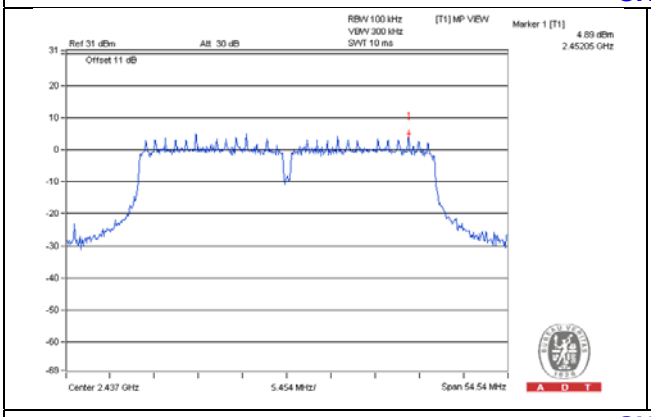
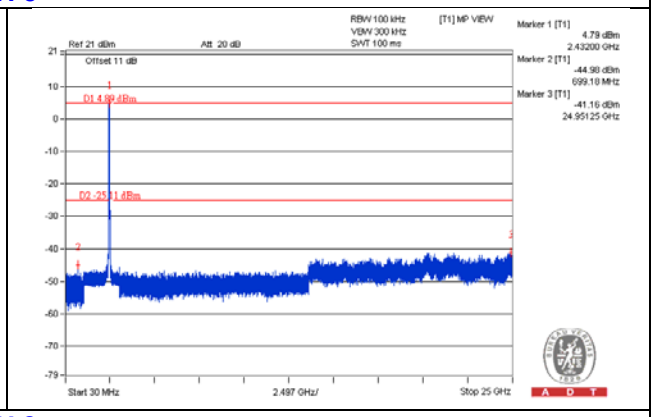
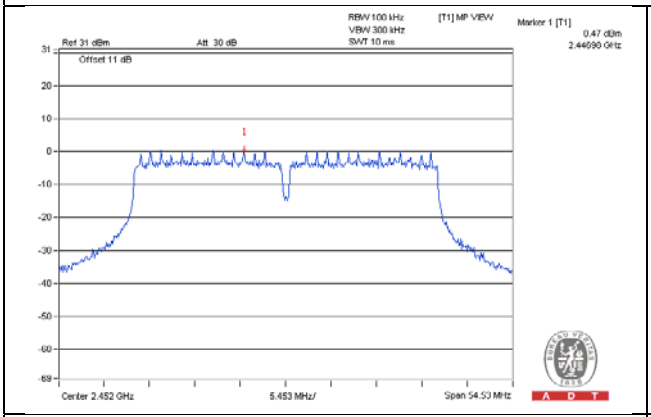
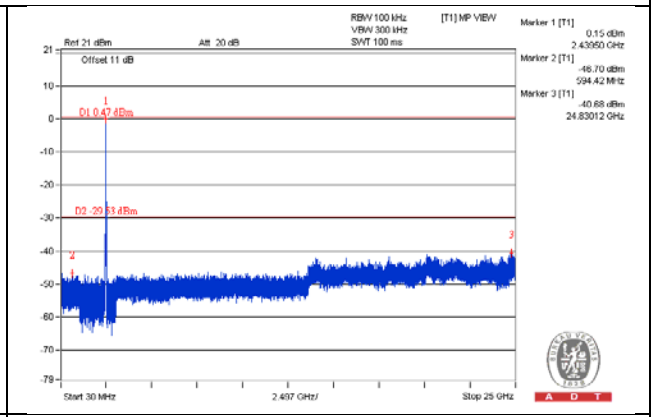


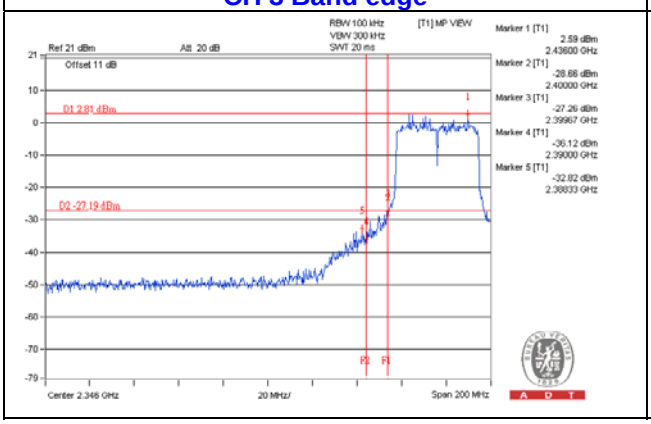


CH 9

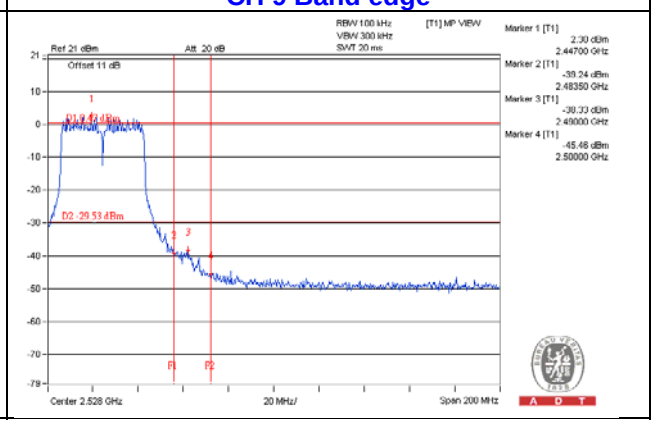




CH 3 Band edge



CH 9 Band edge



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:

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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.

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