FCC Test Report (15.247)

Report No.: RF150305E02

FCC ID: KA2WA192A1

Test Model: DWA-192

Received Date: Mar. 05, 2015

Test Date: Mar. 31 to May 07, 2015

Issued Date: May 27, 2015

Applicant: D-Link corporation

Address: No.289, Sinhu 3rd Rd., Neihu District, Taipei City 114, Taipei, R.O.C.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

Lab Address: No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Test Location (1): No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF150305E02	Original release.	May 27, 2015

1 Certificate of Conformity

Product: AC1900 Wi-Fi USB 3.0 Adapter

Brand: D-Link

Test Model: DWA-192

Sample Status: ENGINEERING SAMPLE

Applicant: D-Link corporation

Test Date: Mar. 31 to May 07, 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:** May 27, 2015
Midoli Peng / Specialist

Approved by : _____ , **Date:** May 27, 2015
May Chen / 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 -10.60dB at 0.20469MHz.
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 7356.00MHz.
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 not a standard connector.

NOTE: 1. For WLAN: The EUT was operating in 2400 ~ 2483.5MHz, 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 2400 ~ 2483.5MHz. For the 5.15~5.35GHz, 5.47~5.725GHz and 5.725~5.850GHz RF parameters was recorded in another test report.

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	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1900 Wi-Fi USB 3.0 Adapter
Brand	D-Link
Test Model	DWA-192
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 5V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n : up to 450Mbps 802.11ac: up to 1300Mbps
Operating Frequency	For 15.407 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.70GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	For 15.407 24 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 11 for 802.11n (HT40), 802.11ac (VHT40) 5 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b/g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	For 15.407 802.11a: 97.275mW 802.11ac (VHT20): 139.785mW 802.11ac (VHT40): 120.528mW 802.11ac (VHT80): 32.242mW
	For 15.247 802.11b: 102.802mW 802.11g: 100.693mW 802.11n (HT20): 38.208mW 802.11n (HT40): 35.276mW
Antenna Type	Please see Note
Antenna Connector	Please see Note
Accessory Device	NA
Data Cable Supplied	USB data cable(1.35m, unshielded)

Note:

1. 2.4GHz and 5GHz technology can't transmit at same time.
2. The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Gain (dBi)	Frequency range (MHz to MHz)	Cable Length (mm)	Antenna Type	Connecter Type
Ant. 1 Chain (0)	HL TECHNOLOGY GROUP LIMITED	290-20179	4.03	2400~2500	150	PCB	i-PEX
			2.18	5150~5350			
			2.11	5470~5850			
Ant. 2 Chain (1)	HL TECHNOLOGY GROUP LIMITED	290-20178	2.13	2400~2500	150	PCB	i-PEX
			2.05	5150~5350			
			2.65	5470~5850			
Ant. 3 Chain (2)	HL TECHNOLOGY GROUP LIMITED	ANT_UM814A01	2.45	2400~2500	NA	PCB	NA
			4.03	5150~5350			
			4.45	5470~5850			
Ant. 4 Chain (3)	HL TECHNOLOGY GROUP LIMITED	ANT_UM814A02	2.26	2400~2500	NA	PCB	NA
			2.53	5150~5350			
			4.19	5470~5850			

NOTE: 1. Ant. 1(Chain 0), Ant. 2(Chain 1) & Ant. 4(Chain 3) – With TX & RX function
2. Ant. 3(Chain 2) – With RX function
3. From the above antennas, Ant. 1(Chain 0) was selected as representative antenna for the 802.11b/g test and its data was recorded in this report.
4. From the above antennas, Ant. 4(Chain 3) was selected as representative antenna for the 802.11a test and its data was recorded in this report.

3. The EUT incorporates a MIMO function, with beamforming for 5GHz.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	1TX (diversity)	4RX
802.11g	6 ~ 54Mbps	1TX (diversity)	4RX
802.11n (HT20)	MCS 0~7	1TX (diversity)	4RX
	MCS 8~15	2TX (diversity)	4RX
	MCS 16~23	3TX	4RX
802.11n (HT40)	MCS 0~7	1TX (diversity)	4RX
	MCS 8~15	2TX (diversity)	4RX
	MCS 16~23	3TX	4RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	1TX (diversity)	4RX
802.11n (HT20)	MCS 0~7	1TX (diversity)	4RX
	MCS 8~15	2TX (diversity)	4RX
	MCS 16~23	3TX	4RX
802.11n (HT40)	MCS 0~7	1TX (diversity)	4RX
	MCS 8~15	2TX (diversity)	4RX
	MCS 16~23	3TX	4RX
802.11ac (VHT20)	MCS 0~8, Nss=1	1TX (diversity)	4RX
	MCS 0~8, Nss=2	2TX (diversity)	4RX
	MCS 0~9, Nss=3	3TX	4RX
802.11ac (VHT40)	MCS 0~9, Nss=1	1TX (diversity)	4RX
	MCS 0~9, Nss=2	2TX (diversity)	4RX
	MCS 0~9, Nss=3	3TX	4RX
802.11ac (VHT80)	MCS 0~9, Nss=1	1TX (diversity)	4RX
	MCS 0~9, Nss=2	2TX (diversity)	4RX
	MCS 0~9, Nss=3	3TX	4RX

Note: 1. For 2.4GHz: The device operate with three spatial stream (Nss = 3) with different data, and three signals are not correlated.
2. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

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

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	19.5 MCS16 / Nss 3
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	40.5 MCS16 / Nss 3

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	19.5 MCS16 / Nss 3

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	19.5 MCS16 / Nss 3

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	19.5 MCS16 / Nss 3
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	40.5 MCS16 / Nss 3

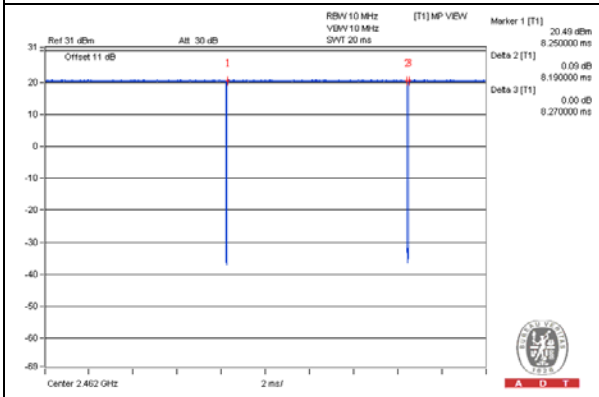
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	24deg. C, 69%RH	120Vac, 60Hz	Weiwei Lo
RE<1G	23deg. C, 66%RH	120Vac, 60Hz	Robert Cheng
PLC	25deg. C, 63%RH	120Vac, 60Hz	Timmy Hu
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

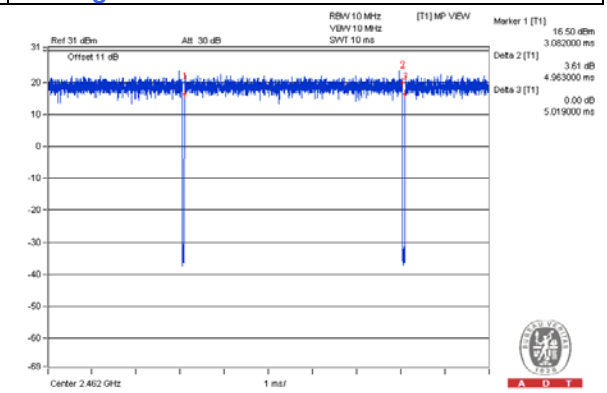
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11b: Duty cycle = 8.19 ms/8.27 ms = 0.99
802.11g: Duty cycle = 4.963 ms/5.019 ms = 0.989
802.11n (HT20): Duty cycle = 4.962 ms/5.026 ms = 0.987
802.11n (HT40): Duty cycle = 2.417 ms/2.463 ms = 0.981

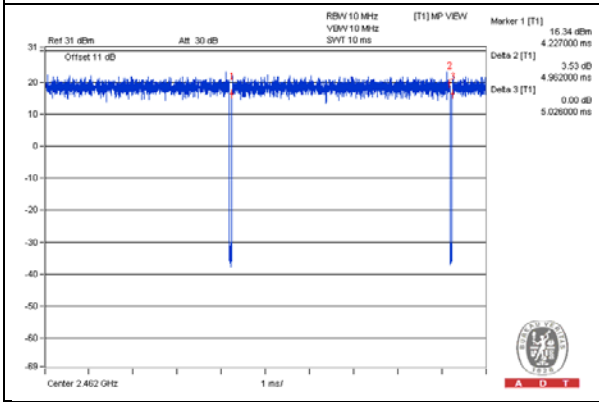
802.11b



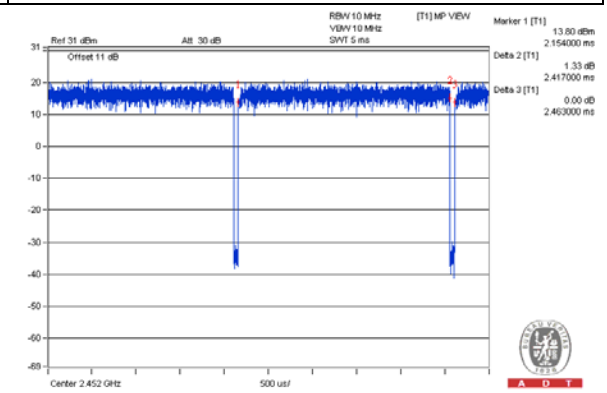
802.11g



VHT20



VHT40



3.4 Description of Support Units

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

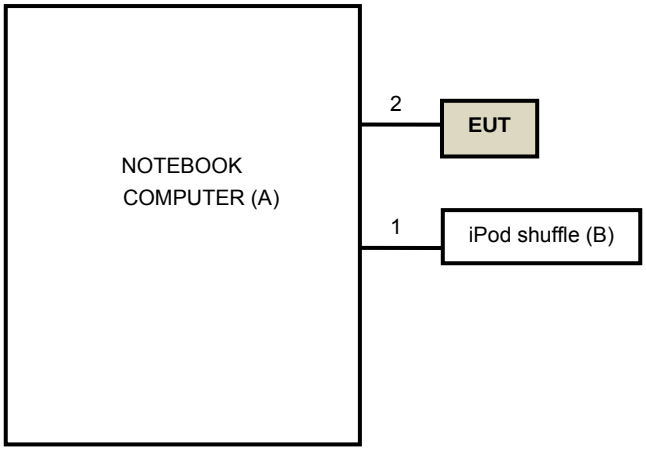
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
B	iPod shuffle	Apple	MC749TA/A	CC4DN25WDFDM	NA	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	USB	1	0.1	Yes	0	Provided by Lab
2	USB	1	1.35	Yes	0	Supplied by Client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart 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 20dB under any condition of modulation.

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 06, 2015	Feb. 05, 2016
RF Cable	NA	CHHCAB_001	Oct. 05, 2014	Oct. 04, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	300801923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA
Power Meter Anritsu	ML2495A	0824006	May 22, 2014	May 21, 2015
Power Sensor Anritsu	MA2411B	0738172	May 22, 2014	May 21, 2015
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5 The CANADA Site Registration No. is IC 7450H-3.
6 Tested Date: Apr. 30 to May 07, 2015

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:

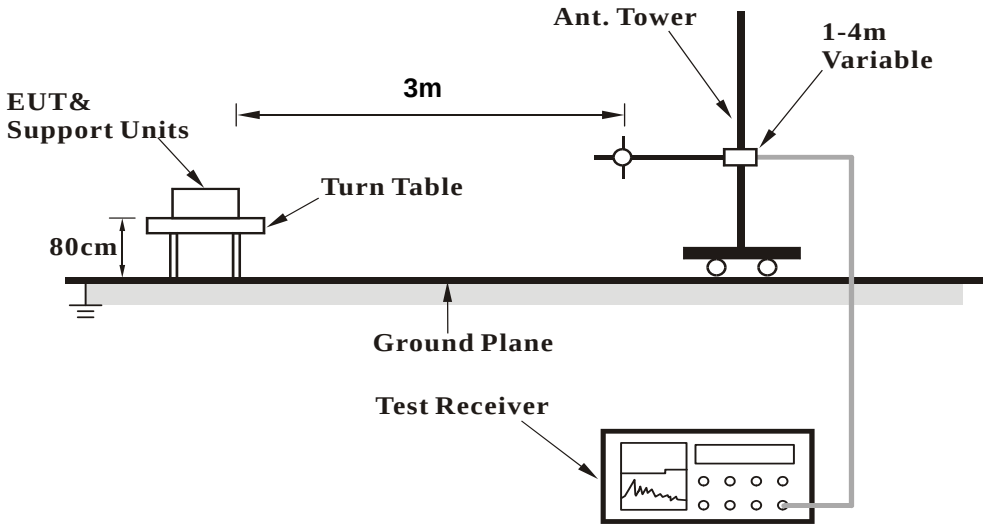
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. 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)).
5. 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.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

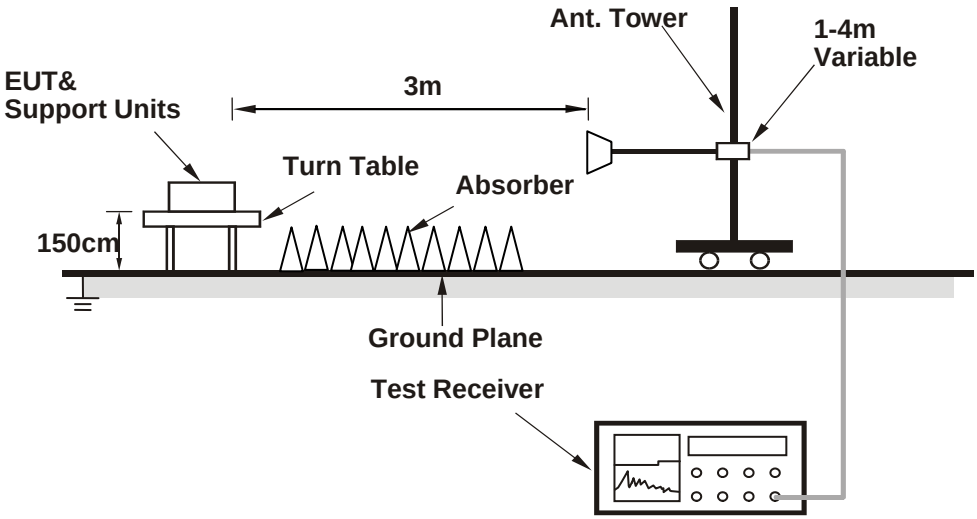
No deviation.

4.1.5 Test Setup

<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

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “REALTEK 11ac 8814AU USB WLAN NIC Massproduction Kit” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

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	2390.00	60.2 PK	74.0	-13.8	1.27 H	252	66.07	-5.87
2	2390.00	53.6 AV	54.0	-0.4	1.27 H	252	59.47	-5.87
3	*2412.00	111.2 PK			1.24 H	218	117.00	-5.80
4	*2412.00	108.6 AV			1.24 H	218	114.40	-5.80
5	4824.00	49.0 PK	74.0	-25.0	1.87 H	249	45.58	3.42
6	4824.00	39.8 AV	54.0	-14.2	1.87 H	249	36.38	3.42
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	56.0 PK	74.0	-18.0	1.29 V	232	61.87	-5.87
2	2390.00	49.2 AV	54.0	-4.8	1.29 V	232	55.07	-5.87
3	*2412.00	107.5 PK			1.25 V	231	113.30	-5.80
4	*2412.00	104.9 AV			1.25 V	231	110.70	-5.80
5	4824.00	53.0 PK	74.0	-21.0	1.10 V	249	49.58	3.42
6	4824.00	49.3 AV	54.0	-4.7	1.10 V	249	45.88	3.42

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	58.0 PK	74.0	-16.0	1.27 H	254	63.87	-5.87
2	2390.00	52.5 AV	54.0	-1.5	1.27 H	254	58.37	-5.87
3	*2437.00	111.9 PK			1.23 H	219	117.60	-5.70
4	*2437.00	109.2 AV			1.23 H	219	114.90	-5.70
5	4874.00	53.9 PK	74.0	-20.1	1.12 H	249	50.50	3.40
6	4874.00	48.3 AV	54.0	-5.7	1.12 H	249	44.90	3.40
7	7311.00	57.3 PK	74.0	-16.7	1.09 H	289	49.54	7.76
8	7311.00	46.2 AV	54.0	-7.8	1.09 H	289	38.44	7.76
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	55.2 PK	74.0	-18.8	1.25 V	221	61.07	-5.87
2	2390.00	48.1 AV	54.0	-5.9	1.25 V	221	53.97	-5.87
3	*2437.00	108.1 PK			1.26 V	223	113.80	-5.70
4	*2437.00	105.7 AV			1.26 V	223	111.40	-5.70
5	4874.00	56.4 PK	74.0	-17.6	1.10 V	186	53.00	3.40
6	4874.00	53.7 AV	54.0	-0.3	1.10 V	186	50.30	3.40
7	7311.00	63.0 PK	74.0	-11.0	1.14 V	288	55.24	7.76
8	7311.00	51.6 AV	54.0	-2.4	1.14 V	288	43.84	7.76

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	110.9 PK			1.22 H	219	116.49	-5.59
2	*2462.00	108.3 AV			1.22 H	219	113.89	-5.59
3	2483.50	60.8 PK	74.0	-13.2	1.21 H	220	66.29	-5.49
4	2483.50	50.2 AV	54.0	-3.8	1.21 H	220	55.69	-5.49
5	4924.00	53.4 PK	74.0	-20.6	1.68 H	283	50.01	3.39
6	4924.00	47.2 AV	54.0	-6.8	1.68 H	283	43.81	3.39
7	7386.00	57.9 PK	74.0	-16.1	1.10 H	292	49.85	8.05
8	7386.00	46.5 AV	54.0	-7.5	1.10 H	292	38.45	8.05
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	110.6 PK			1.20 V	243	116.19	-5.59
2	*2462.00	104.6 AV			1.20 V	243	110.19	-5.59
3	2483.50	57.2 PK	74.0	-16.8	1.19 V	216	62.69	-5.49
4	2483.50	46.8 AV	54.0	-7.2	1.19 V	216	52.29	-5.49
5	4924.00	56.0 PK	74.0	-18.0	1.00 V	274	52.61	3.39
6	4924.00	53.6 AV	54.0	-0.4	1.00 V	274	50.21	3.39
7	7386.00	58.5 PK	74.0	-15.5	1.04 V	285	50.45	8.05
8	7386.00	49.9 AV	54.0	-4.1	1.04 V	285	41.85	8.05

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	72.5 PK	74.0	-1.5	1.27 H	255	78.37	-5.87
2	2390.00	53.5 AV	54.0	-0.5	1.27 H	255	59.37	-5.87
3	*2412.00	110.5 PK			1.24 H	255	116.30	-5.80
4	*2412.00	100.6 AV			1.24 H	255	106.40	-5.80
5	4824.00	51.3 PK	74.0	-22.7	1.11 H	259	47.88	3.42
6	4824.00	41.3 AV	54.0	-12.7	1.11 H	259	37.88	3.42
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	55.4 PK	74.0	-18.6	1.20 V	244	61.27	-5.87
2	2390.00	48.7 AV	54.0	-5.3	1.20 V	244	54.57	-5.87
3	*2412.00	106.9 PK			1.25 V	232	112.70	-5.80
4	*2412.00	96.2 AV			1.25 V	232	102.00	-5.80
5	4824.00	52.2 PK	74.0	-21.8	1.29 V	291	48.78	3.42
6	4824.00	42.3 AV	54.0	-11.7	1.29 V	291	38.88	3.42

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	69.2 PK	74.0	-4.8	1.25 H	255	75.07	-5.87
2	2390.00	50.1 AV	54.0	-3.9	1.25 H	255	55.97	-5.87
3	*2437.00	115.2 PK			1.22 H	219	120.90	-5.70
4	*2437.00	104.5 AV			1.22 H	219	110.20	-5.70
5	4874.00	51.5 PK	74.0	-22.5	1.17 H	251	48.10	3.40
6	4874.00	41.4 AV	54.0	-12.6	1.17 H	251	38.00	3.40
7	7311.00	58.5 PK	74.0	-15.5	1.17 H	259	50.74	7.76
8	7311.00	47.2 AV	54.0	-6.8	1.17 H	259	39.44	7.76
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	56.4 PK	74.0	-17.6	1.30 V	240	62.27	-5.87
2	2390.00	49.7 AV	54.0	-4.3	1.30 V	240	55.57	-5.87
3	*2437.00	110.2 PK			1.22 V	235	115.90	-5.70
4	*2437.00	100.1 AV			1.22 V	235	105.80	-5.70
5	4874.00	54.8 PK	74.0	-19.2	1.24 V	287	51.40	3.40
6	4874.00	43.3 AV	54.0	-10.7	1.24 V	287	39.90	3.40
7	7311.00	63.2 PK	74.0	-10.8	1.17 V	283	55.44	7.76
8	7311.00	51.3 AV	54.0	-2.7	1.17 V	283	43.54	7.76

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	109.7 PK			1.22 H	217	115.29	-5.59
2	*2462.00	100.4 AV			1.22 H	217	105.99	-5.59
3	2483.50	72.5 PK	74.0	-1.5	1.18 H	220	77.99	-5.49
4	2483.50	53.5 AV	54.0	-0.5	1.18 H	220	58.99	-5.49
5	4924.00	51.6 PK	74.0	-22.4	1.11 H	251	48.21	3.39
6	4924.00	41.5 AV	54.0	-12.5	1.11 H	251	38.11	3.39
7	7386.00	58.3 PK	74.0	-15.7	1.13 H	264	50.25	8.05
8	7386.00	47.0 AV	54.0	-7.0	1.13 H	264	38.95	8.05
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	106.8 PK			1.25 V	237	112.39	-5.59
2	*2462.00	96.1 AV			1.25 V	237	101.69	-5.59
3	2483.50	56.2 PK	74.0	-17.8	1.24 V	234	61.69	-5.49
4	2483.50	49.2 AV	54.0	-4.8	1.24 V	234	54.69	-5.49
5	4924.00	51.9 PK	74.0	-22.1	1.27 V	280	48.51	3.39
6	4924.00	42.5 AV	54.0	-11.5	1.27 V	280	39.11	3.39
7	7386.00	58.5 PK	74.0	-15.5	1.23 V	227	50.45	8.05
8	7386.00	47.0 AV	54.0	-7.0	1.23 V	227	38.95	8.05

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	71.2 PK	74.0	-2.8	1.21 H	301	77.07	-5.87
2	2390.00	53.5 AV	54.0	-0.5	1.21 H	301	59.37	-5.87
3	*2412.00	110.1 PK			1.25 H	219	115.90	-5.80
4	*2412.00	97.3 AV			1.25 H	219	103.10	-5.80
5	4824.00	51.4 PK	74.0	-22.6	1.07 H	253	47.98	3.42
6	4824.00	41.5 AV	54.0	-12.5	1.07 H	253	38.08	3.42
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	55.4 PK	74.0	-18.6	1.26 V	216	61.27	-5.87
2	2390.00	48.8 AV	54.0	-5.2	1.26 V	216	54.67	-5.87
3	*2412.00	105.8 PK			1.21 V	230	111.60	-5.80
4	*2412.00	93.1 AV			1.21 V	230	98.90	-5.80
5	4824.00	52.3 PK	74.0	-21.7	1.31 V	292	48.88	3.42
6	4824.00	42.3 AV	54.0	-11.7	1.31 V	292	38.88	3.42

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	112.2 PK			1.27 H	248	117.90	-5.70
2	*2437.00	102.3 AV			1.27 H	248	108.00	-5.70
3	4874.00	51.6 PK	74.0	-22.4	1.15 H	245	48.20	3.40
4	4874.00	41.5 AV	54.0	-12.5	1.15 H	245	38.10	3.40
5	7311.00	57.8 PK	74.0	-16.2	1.15 H	261	50.04	7.76
6	7311.00	46.8 AV	54.0	-7.2	1.15 H	261	39.04	7.76
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	107.8 PK			1.26 V	239	113.50	-5.70
2	*2437.00	98.2 AV			1.26 V	239	103.90	-5.70
3	4874.00	52.1 PK	74.0	-21.9	1.26 V	281	48.70	3.40
4	4874.00	42.0 AV	54.0	-12.0	1.26 V	281	38.60	3.40
5	7311.00	57.9 PK	74.0	-16.1	1.26 V	230	50.14	7.76
6	7311.00	45.3 AV	54.0	-8.7	1.26 V	230	37.54	7.76

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	109.8 PK			1.21 H	220	115.39	-5.59
2	*2462.00	96.5 AV			1.21 H	220	102.09	-5.59
3	2483.50	72.3 PK	74.0	-1.7	1.38 H	342	77.79	-5.49
4	2483.50	53.5 AV	54.0	-0.5	1.38 H	342	58.99	-5.49
5	4924.00	51.9 PK	74.0	-22.1	1.10 H	250	48.51	3.39
6	4924.00	41.7 AV	54.0	-12.3	1.10 H	250	38.31	3.39
7	7386.00	58.9 PK	74.0	-15.1	1.13 H	253	50.85	8.05
8	7386.00	47.5 AV	54.0	-6.5	1.13 H	253	39.45	8.05
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	106.2 PK			1.26 V	226	111.79	-5.59
2	*2462.00	93.1 AV			1.26 V	226	98.69	-5.59
3	2483.50	56.5 PK	74.0	-17.5	1.24 V	244	61.99	-5.49
4	2483.50	49.6 AV	54.0	-4.4	1.24 V	244	55.09	-5.49
5	4924.00	52.5 PK	74.0	-21.5	1.28 V	287	49.11	3.39
6	4924.00	42.6 AV	54.0	-11.4	1.28 V	287	39.21	3.39
7	7386.00	57.9 PK	74.0	-16.1	1.24 V	226	49.85	8.05
8	7386.00	45.6 AV	54.0	-8.4	1.24 V	226	37.55	8.05

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	73.0 PK	74.0	-1.0	1.27 H	219	78.87	-5.87
2	2390.00	53.7 AV	54.0	-0.3	1.27 H	219	59.57	-5.87
3	*2422.00	104.8 PK			1.26 H	250	110.56	-5.76
4	*2422.00	91.7 AV			1.26 H	250	97.46	-5.76
5	4844.00	50.9 PK	74.0	-23.1	1.14 H	238	47.49	3.41
6	4844.00	41.0 AV	54.0	-13.0	1.14 H	238	37.59	3.41
7	7266.00	58.2 PK	74.0	-15.8	1.23 H	267	50.62	7.58
8	7266.00	47.2 AV	54.0	-6.8	1.23 H	267	39.62	7.58
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	55.5 PK	74.0	-18.5	1.26 V	228	61.37	-5.87
2	2390.00	48.8 AV	54.0	-5.2	1.26 V	228	54.67	-5.87
3	*2422.00	101.6 PK			1.11 V	286	107.36	-5.76
4	*2422.00	88.5 AV			1.11 V	286	94.26	-5.76
5	4844.00	51.2 PK	74.0	-22.8	1.24 V	279	47.79	3.41
6	4844.00	41.5 AV	54.0	-12.5	1.24 V	279	38.09	3.41
7	7266.00	58.4 PK	74.0	-15.6	1.29 V	230	50.82	7.58
8	7266.00	45.7 AV	54.0	-8.3	1.29 V	230	38.12	7.58

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	56.1 PK	74.0	-17.9	1.21 H	223	61.97	-5.87
2	2390.00	49.5 AV	54.0	-4.5	1.21 H	223	55.37	-5.87
3	*2437.00	104.1 PK			1.20 H	227	109.80	-5.70
4	*2437.00	91.4 AV			1.20 H	227	97.10	-5.70
5	2483.50	55.8 PK	74.0	-18.2	1.22 H	225	61.29	-5.49
6	2483.50	49.1 AV	54.0	-4.9	1.22 H	225	54.59	-5.49
7	4874.00	51.0 PK	74.0	-23.0	1.25 H	289	47.60	3.40
8	4874.00	41.3 AV	54.0	-12.7	1.25 H	289	37.90	3.40
9	7311.00	58.1 PK	74.0	-15.9	1.31 H	229	50.34	7.76
10	7311.00	45.2 AV	54.0	-8.8	1.31 H	229	37.44	7.76
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	56.1 PK	74.0	-17.9	1.21 V	223	61.97	-5.87
2	2390.00	49.5 AV	54.0	-4.5	1.21 V	223	55.37	-5.87
3	*2437.00	104.1 PK			1.20 V	227	109.80	-5.70
4	*2437.00	91.4 AV			1.20 V	227	97.10	-5.70
5	2483.50	55.8 PK	74.0	-18.2	1.22 V	225	61.29	-5.49
6	2483.50	49.1 AV	54.0	-4.9	1.22 V	225	54.59	-5.49
7	4874.00	51.0 PK	74.0	-23.0	1.25 V	289	47.60	3.40
8	4874.00	41.3 AV	54.0	-12.7	1.25 V	289	37.90	3.40
9	7311.00	58.1 PK	74.0	-15.9	1.31 V	229	50.34	7.76
10	7311.00	45.2 AV	54.0	-8.8	1.31 V	229	37.44	7.76

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	105.2 PK			1.24 H	249	110.84	-5.64
2	*2452.00	92.1 AV			1.24 H	249	97.74	-5.64
3	2483.50	73.1 PK	74.0	-0.9	1.28 H	289	78.59	-5.49
4	2483.50	53.6 AV	54.0	-0.4	1.28 H	289	59.09	-5.49
5	4904.00	52.1 PK	74.0	-21.9	1.16 H	246	48.71	3.39
6	4904.00	41.8 AV	54.0	-12.2	1.16 H	246	38.41	3.39
7	7356.00	58.3 PK	74.0	-15.7	1.15 H	269	50.36	7.94
8	**7356.00**	**53.9 AV**	**54.0**	**-0.1**	**1.15 H**	**269**	**45.96**	**7.94**

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	101.5 PK			1.24 V	240	107.14	-5.64
2	*2452.00	88.6 AV			1.24 V	240	94.24	-5.64
3	2483.50	55.5 PK	74.0	-18.5	1.19 V	246	60.99	-5.49
4	2483.50	48.9 AV	54.0	-5.1	1.19 V	246	54.39	-5.49
5	4904.00	51.3 PK	74.0	-22.7	1.32 V	280	47.91	3.39
6	4904.00	41.8 AV	54.0	-12.2	1.32 V	280	38.41	3.39
7	7356.00	57.3 PK	74.0	-16.7	1.22 V	242	49.36	7.94
8	7356.00	44.8 AV	54.0	-9.2	1.22 V	242	36.86	7.94

REMARKS:

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

BELOW 1GHz WORST-CASE DATA

802.11n (HT20)

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	Below 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	212.65	35.1 QP	43.5	-8.5	1.00 H	304	51.14	-16.09
2	240.01	41.8 QP	46.0	-4.2	1.00 H	288	55.90	-14.06
3	264.84	42.8 QP	46.0	-3.2	1.00 H	90	56.16	-13.40
4	300.29	37.3 QP	46.0	-8.8	1.00 H	69	49.14	-11.89
5	356.02	33.3 QP	46.0	-12.7	1.00 H	360	43.88	-10.55
6	796.59	40.0 QP	46.0	-6.0	1.00 H	99	41.52	-1.51
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	68.17	35.9 QP	40.0	-4.1	1.00 V	84	51.14	-15.24
2	166.29	37.1 QP	43.5	-6.5	1.00 V	102	50.28	-13.23
3	249.61	40.1 QP	46.0	-5.9	1.50 V	124	54.00	-13.87
4	265.90	40.6 QP	46.0	-5.4	1.50 V	94	53.94	-13.32
5	286.76	40.0 QP	46.0	-6.0	1.50 V	35	52.39	-12.41
6	798.24	38.4 QP	46.0	-7.6	1.50 V	104	39.91	-1.54

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	847124/029	Oct. 22, 2014	Oct. 21, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 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 Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Mar. 31, 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.

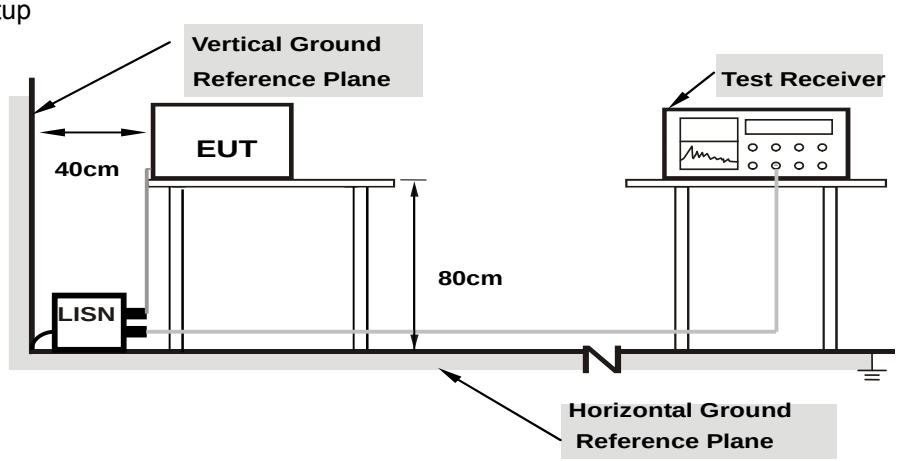
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

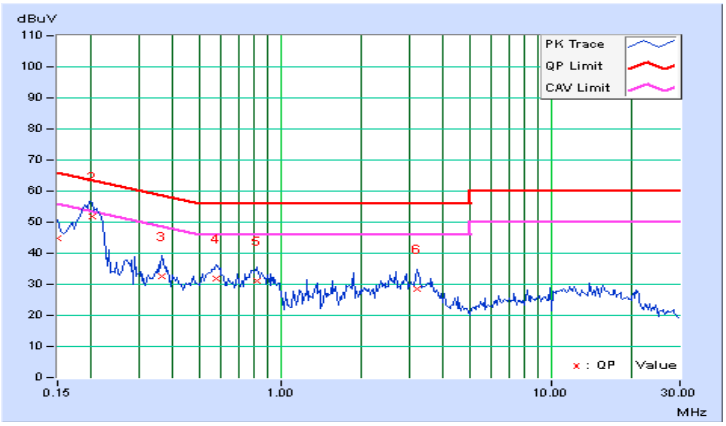
4.2.7 Test Results

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	0.08	44.78	29.42	44.86	29.50	66.00	56.00	-21.14	-26.50
2	0.20078	0.09	51.58	34.26	51.67	34.35	63.58	53.58	-11.91	-19.23
3	0.36484	0.10	32.50	17.84	32.60	17.94	58.62	48.62	-26.02	-30.68
4	0.57578	0.11	31.58	23.18	31.69	23.29	56.00	46.00	-24.31	-22.71
5	0.81406	0.12	31.02	22.10	31.14	22.22	56.00	46.00	-24.86	-23.78
6	3.21875	0.20	28.38	22.86	28.58	23.06	56.00	46.00	-27.42	-22.94

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

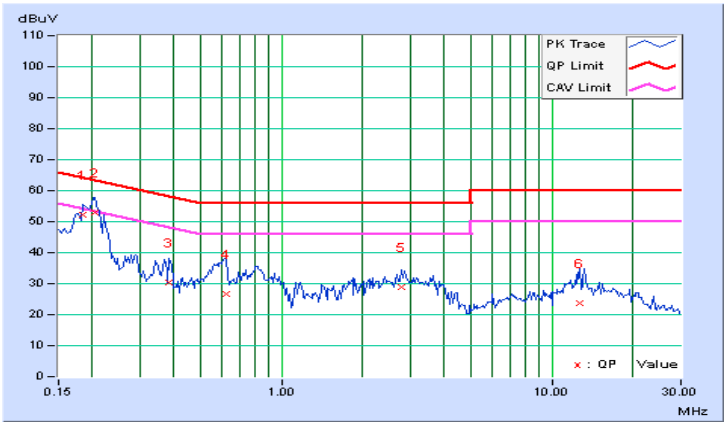


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18516	0.08	52.02	34.96	52.10	35.04	64.25	54.25	-12.15	-19.21
2	**0.20469**	**0.08**	**52.74**	**35.52**	**52.82**	**35.60**	**63.42**	**53.42**	**-10.60**	**-17.82**
3	0.38438	0.10	30.22	16.58	30.32	16.68	58.18	48.18	-27.87	-31.51
4	0.62266	0.11	26.74	18.36	26.85	18.47	56.00	46.00	-29.15	-27.53
5	2.76953	0.19	28.60	22.70	28.79	22.89	56.00	46.00	-27.21	-23.11
6	12.63672	0.53	23.24	17.54	23.77	18.07	60.00	50.00	-36.23	-31.93

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

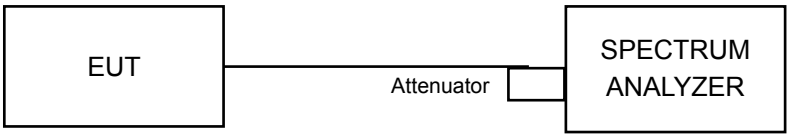


4.3 6dB Bandwidth Measurement

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	10.11	0.5	PASS
6	2437	10.13	0.5	PASS
11	2462	10.13	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.42	0.5	PASS
6	2437	16.39	0.5	PASS
11	2462	16.42	0.5	PASS

802.11n (HT20)

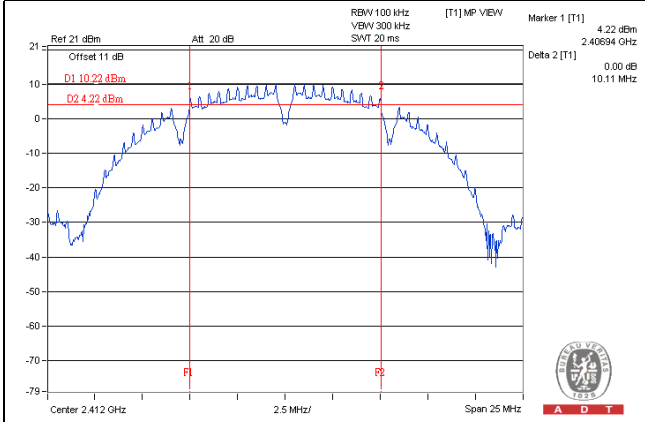
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 3		
1	2412	17.85	17.83	17.86	0.5	Pass
6	2437	17.83	17.83	17.84	0.5	Pass
11	2462	17.84	17.83	17.83	0.5	Pass

802.11n (HT40)

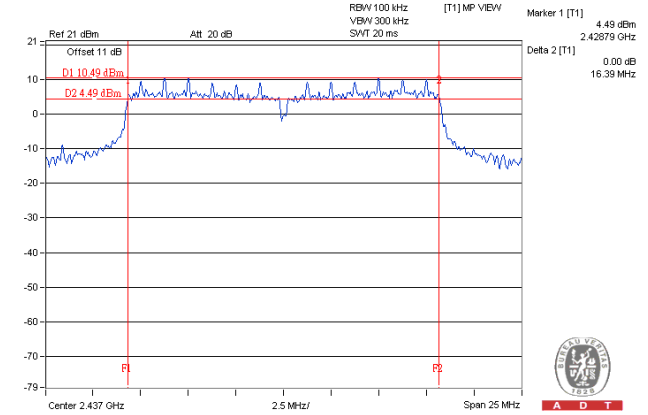
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 3		
3	2422	36.64	36.63	36.62	0.5	Pass
6	2437	36.65	36.65	36.64	0.5	Pass
9	2452	36.64	36.63	36.63	0.5	Pass

Spectrum Plot of Worst Value

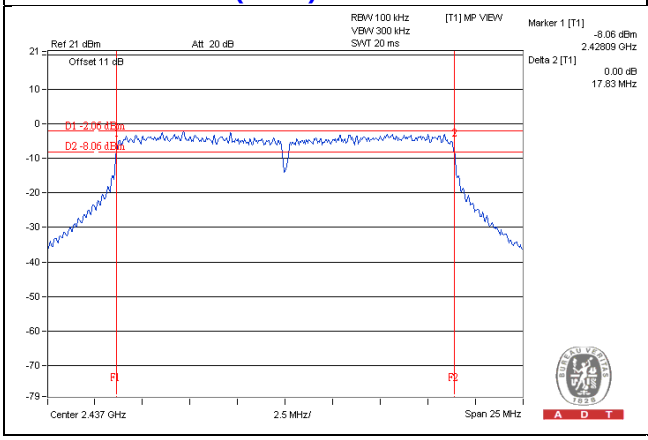
802.11b / CH 1



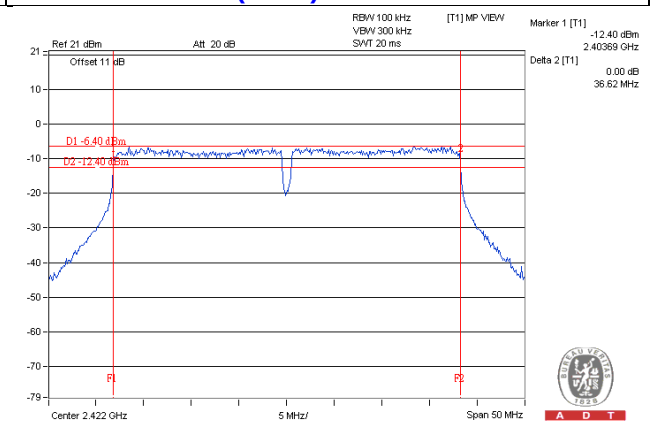
802.11g / CH 6



802.11n(HT20): Chain 0 / CH 6



802.11n(HT40): Chain 3 / CH 3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

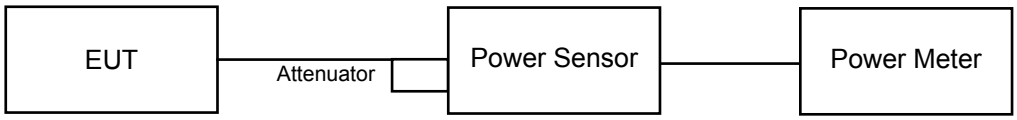
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

A 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

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
Chain 0					
1	2412	45.814	16.61	30	Pass
6	2437	46.026	16.63	30	Pass
11	2462	43.053	16.34	30	Pass
Chain 1					
1	2412	83.368	19.21	30	Pass
6	2437	98.855	19.95	30	Pass
11	2462	84.918	19.29	30	Pass
Chain 3					
1	2412	96.161	19.83	30	Pass
6	2437	102.802	20.12	30	Pass
11	2462	88.92	19.49	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
Chain 0					
1	2412	26.182	14.18	30	Pass
6	2437	44.157	16.45	30	Pass
11	2462	26.363	14.21	30	Pass
Chain 1					
1	2412	39.902	16.01	30	Pass
6	2437	89.125	19.50	30	Pass
11	2462	40.365	16.06	30	Pass
Chain 3					
1	2412	40.365	16.06	30	Pass
6	2437	100.693	20.03	30	Pass
11	2462	40.458	16.07	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 3				
1	2412	11.07	11.01	10.81	37.462	15.74	30	Pass
6	2437	11.20	11.14	10.80	38.208	15.82	30	Pass
11	2462	11.18	11.12	10.72	37.867	15.78	30	Pass

802.11n (HT40)

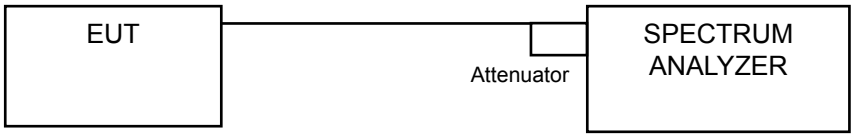
Chan.	Chan. Freq. (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 3				
3	2422	10.74	10.73	10.64	35.276	15.47	30	Pass
6	2437	10.40	10.66	10.30	33.321	15.23	30	Pass
9	2452	10.60	10.63	10.56	34.419	15.37	30	Pass

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

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.

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	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-9.58	8	Pass
6	2437	-9.05	8	Pass
11	2462	-9.65	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-13.10	8	Pass
6	2437	-8.36	8	Pass
11	2462	-12.33	8	Pass

802.11n (HT20)

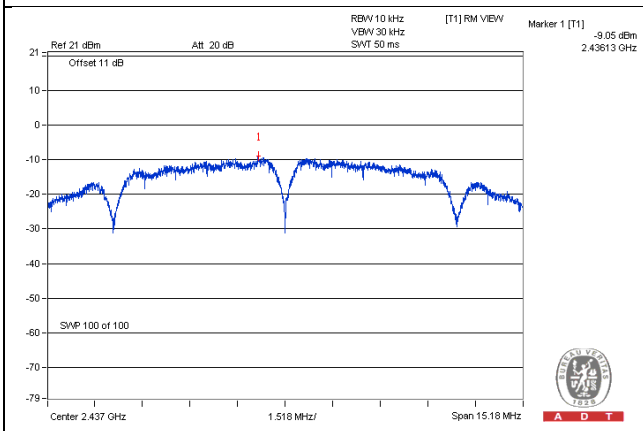
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	1	2412	-18.22	4.77	-13.45	8	Pass
	6	2437	-17.34	4.77	-12.57	8	Pass
	11	2462	-17.75	4.77	-12.98	8	Pass
1	1	2412	-17.71	4.77	-12.94	8	Pass
	6	2437	-17.94	4.77	-13.17	8	Pass
	11	2462	-17.34	4.77	-12.57	8	Pass
3	1	2412	-17.90	4.77	-13.13	8	Pass
	6	2437	-17.26	4.77	-12.49	8	Pass
	11	2462	-17.25	4.77	-12.48	8	Pass

802.11n (HT40)

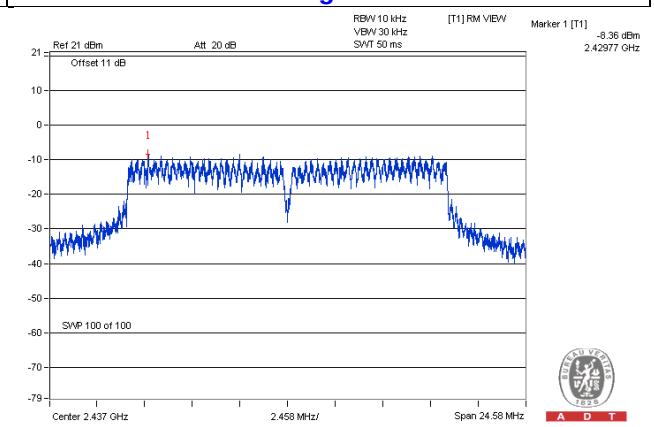
TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	Pass /Fail
0	3	2422	-20.92	4.77	-16.15	8	Pass
	6	2437	-21.21	4.77	-16.44	8	Pass
	9	2452	-21.93	4.77	-17.16	8	Pass
1	3	2422	-20.93	4.77	-16.16	8	Pass
	6	2437	-20.68	4.77	-15.91	8	Pass
	9	2452	-21.04	4.77	-16.27	8	Pass
3	3	2422	-21.32	4.77	-16.55	8	Pass
	6	2437	-21.12	4.77	-16.35	8	Pass
	9	2452	-21.37	4.77	-16.60	8	Pass

Spectrum Plot of Worst Value

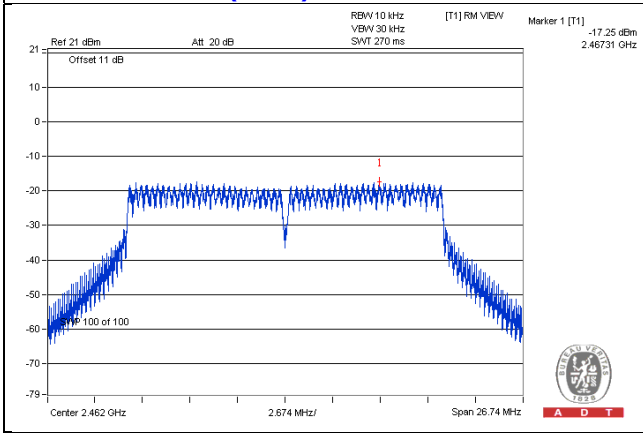
802.11b / CH 6



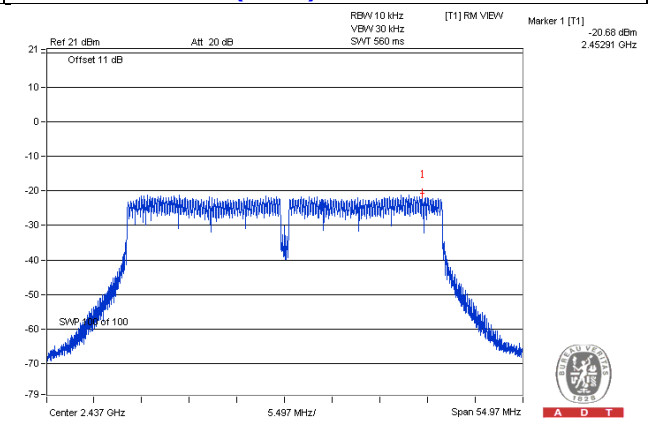
802.11g / CH 6



802.11n(HT20): Chain 3 / CH 11



802.11n(HT40): Chain 1 / CH 6

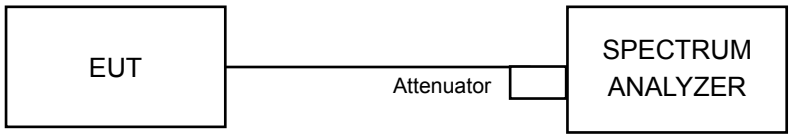


4.6 Conducted Out of Band Emission Measurement

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

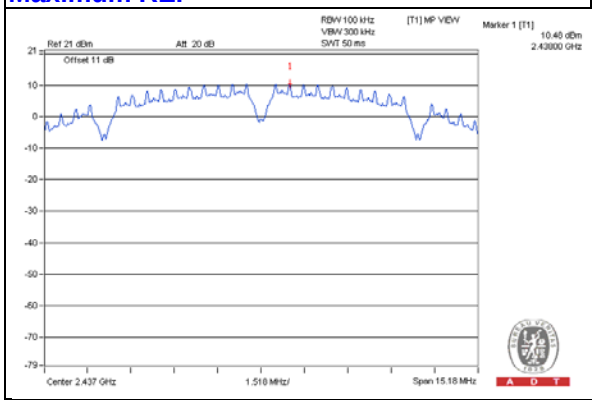
Same as Item 4.3.6

4.6.7 Test Results

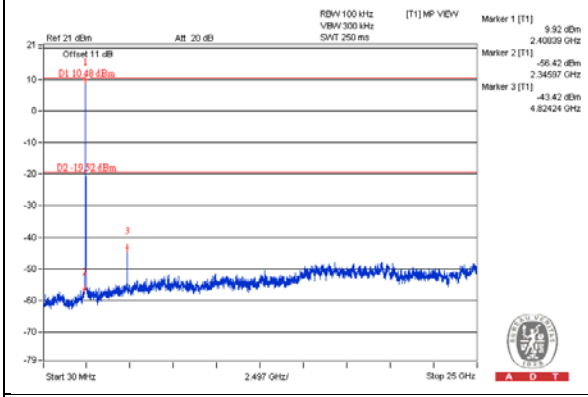
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

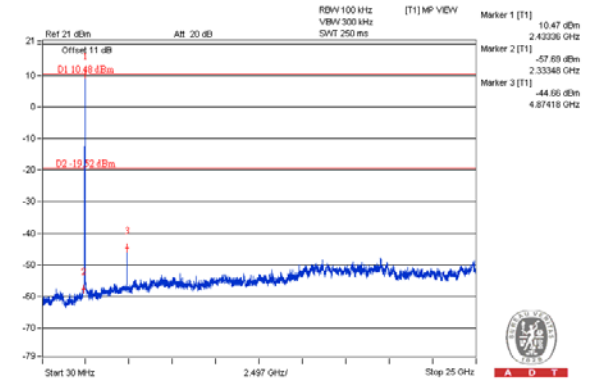
Maximum REF



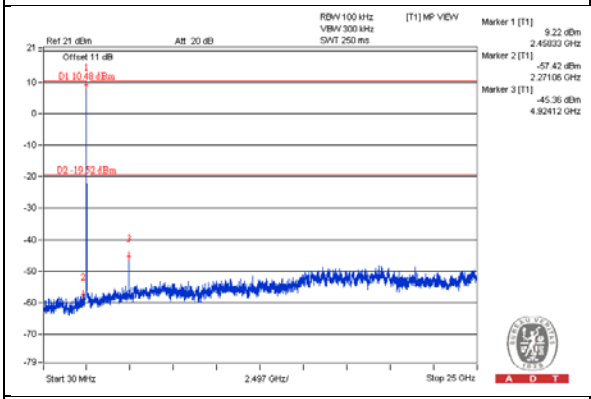
CH 1



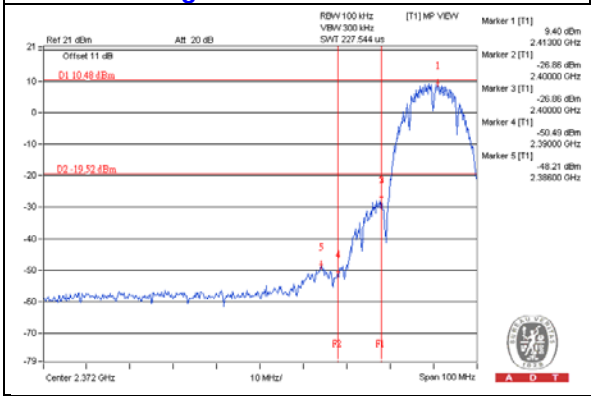
CH 6



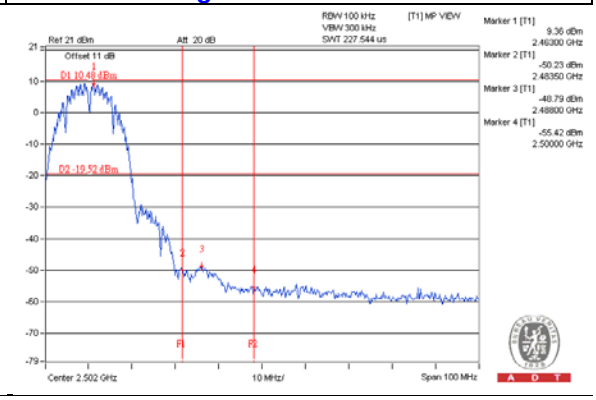
CH 11



CH 1 Band edge

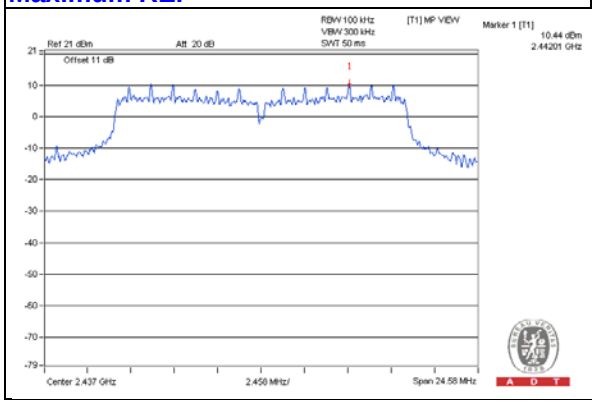


CH 11 Band edge

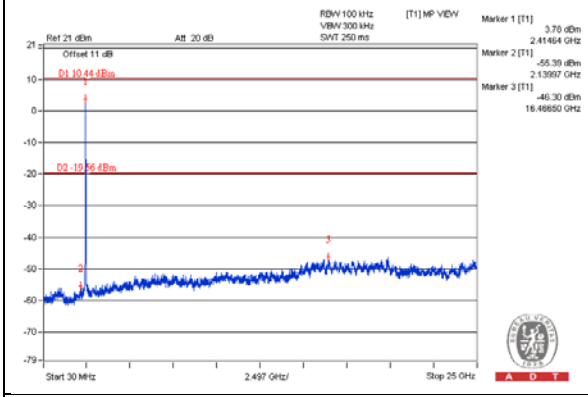


802.11g

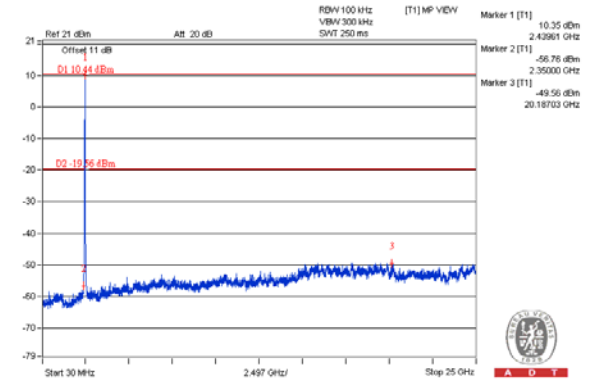
Maximum REF



CH 1



CH 6



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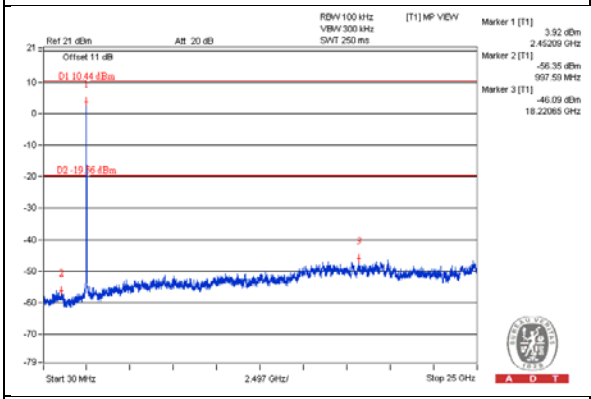
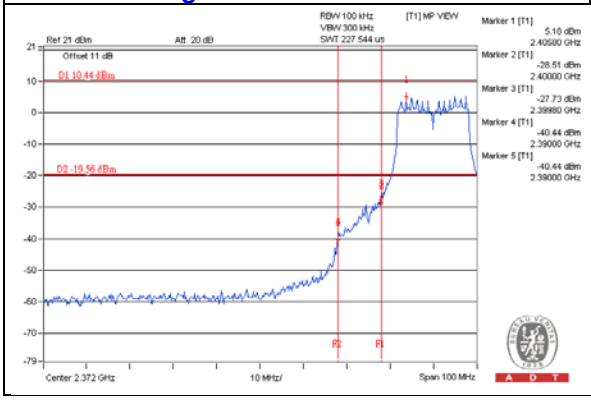
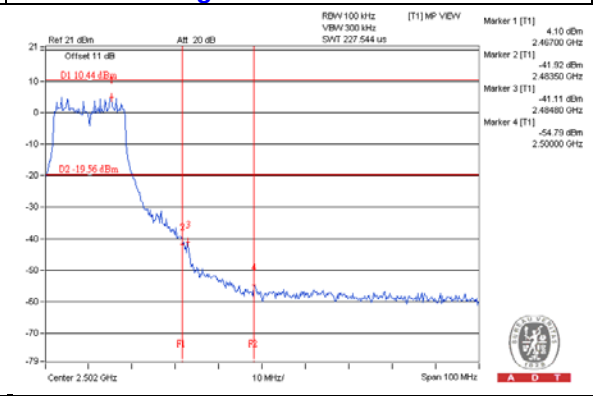


CH 1 Band edge

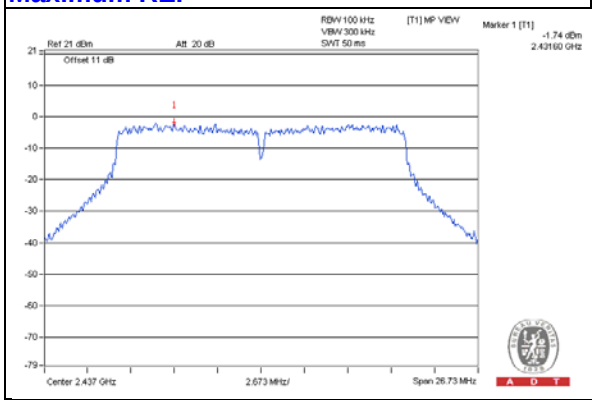


CH 11 Band edge



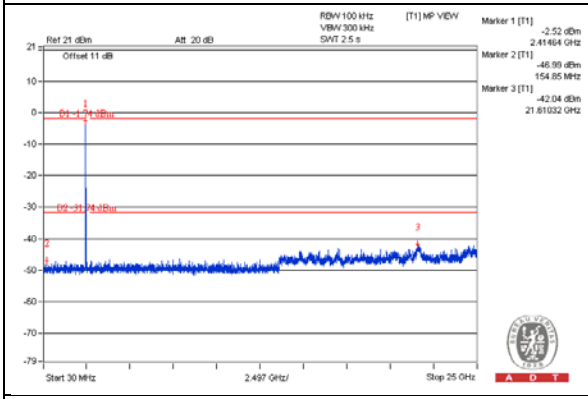
802.11n (HT20)

Maximum REF

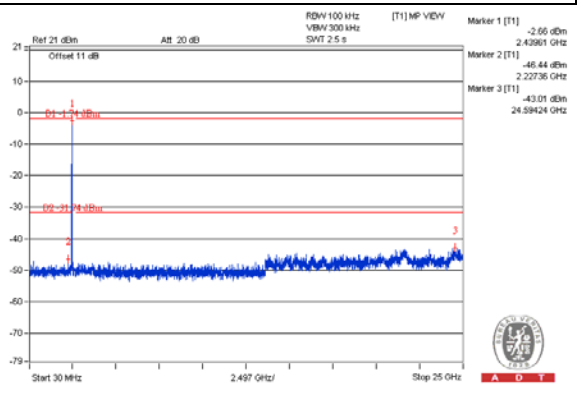


Chain 0

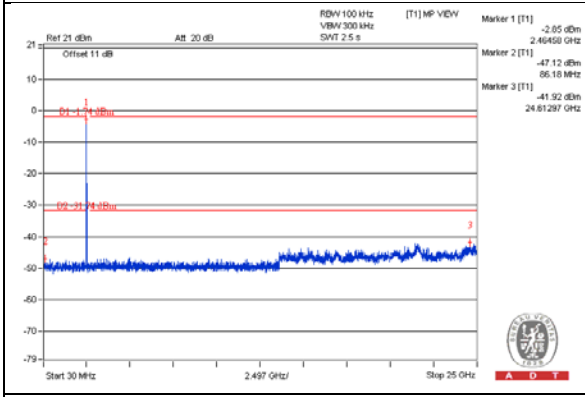
CH 1



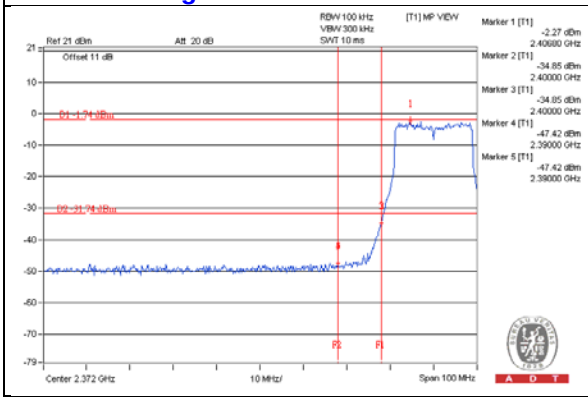
CH 6



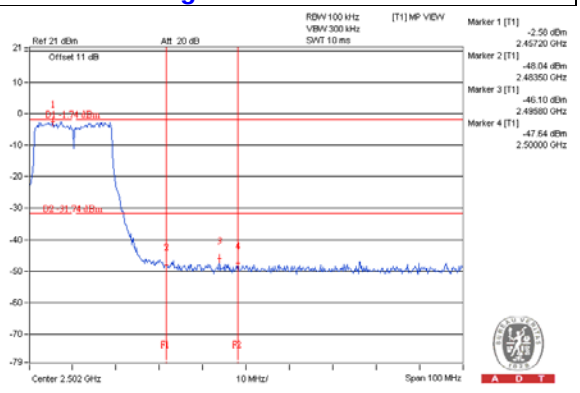
CH 11



CH 1 Band edge

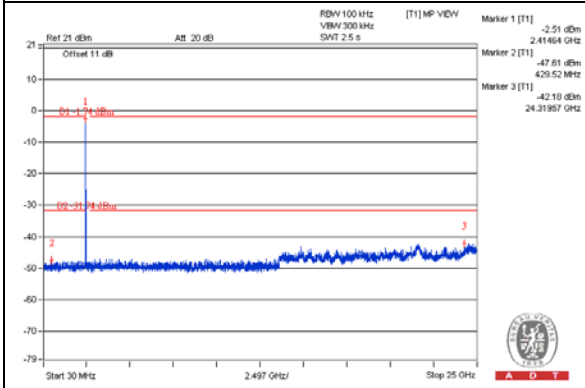


CH 11 Band edge

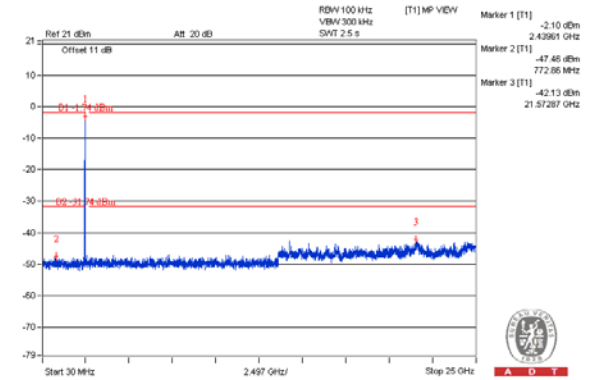


Chain 1

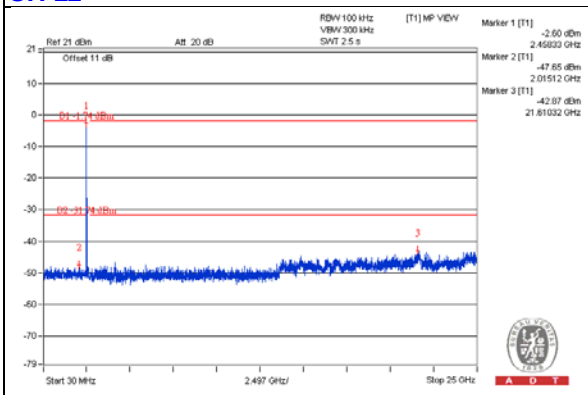
CH 1



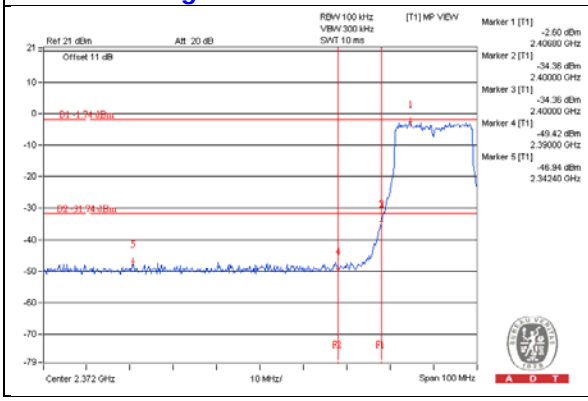
CH 6



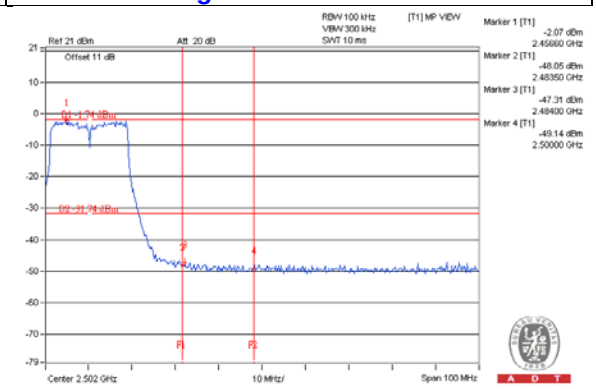
CH 11



CH 1 Band edge

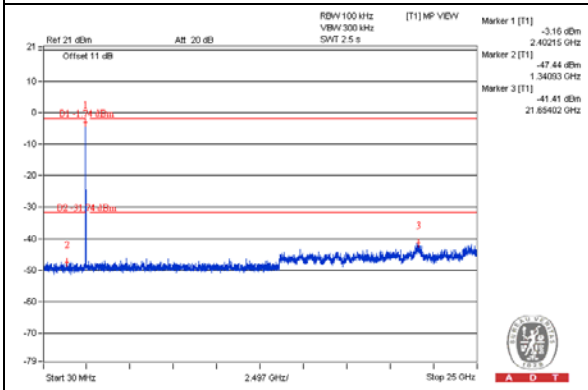


CH 11 Band edge

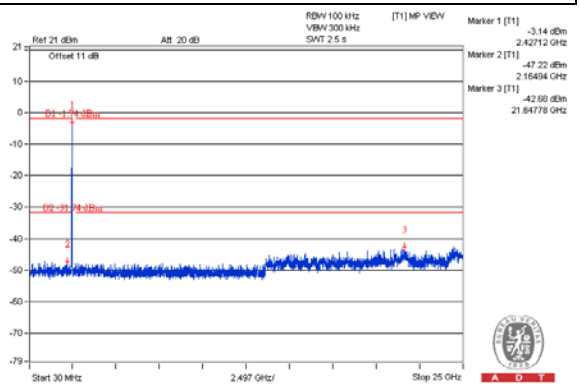


Chain 3

CH 1



CH 6



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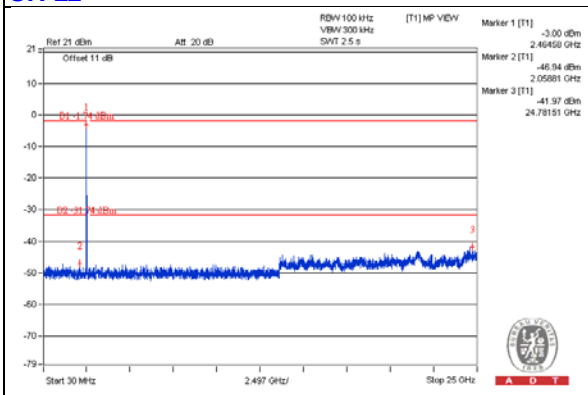
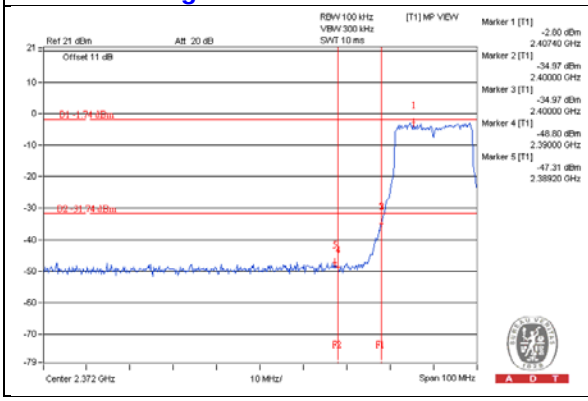
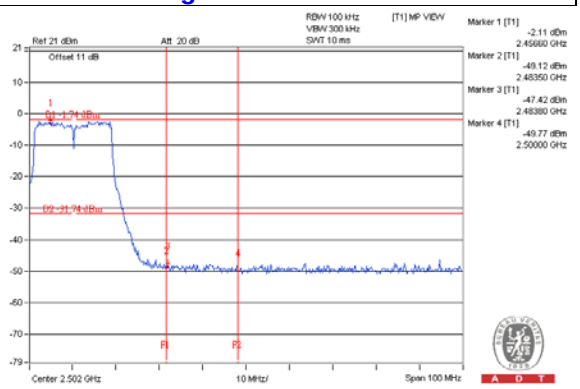


CH 1 Band edge

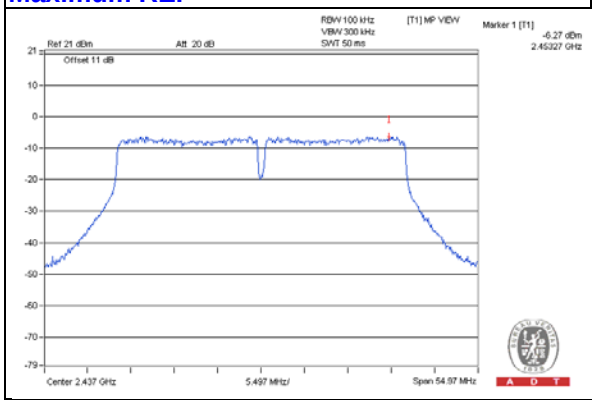


CH 11 Band edge



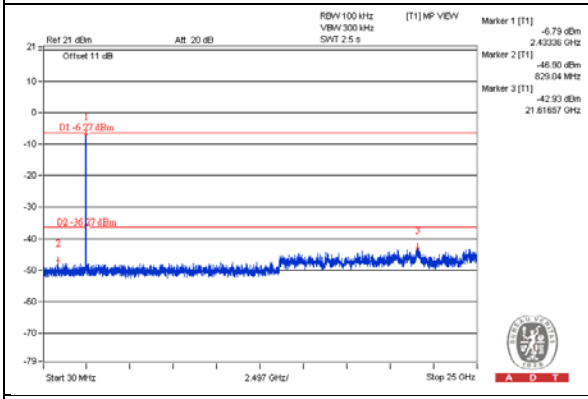
802.11n (HT40)

Maximum REF

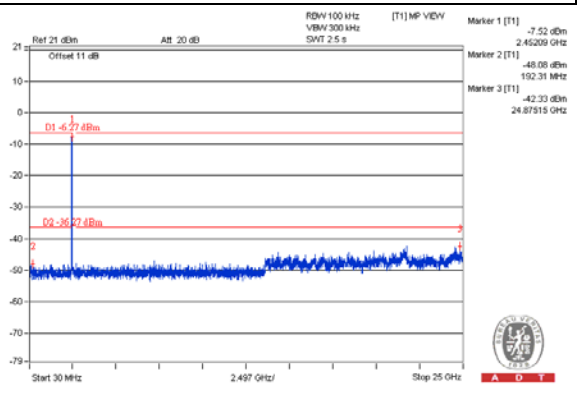


Chain 0

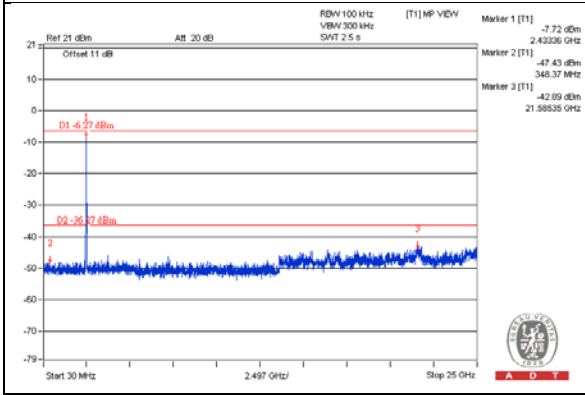
CH 3



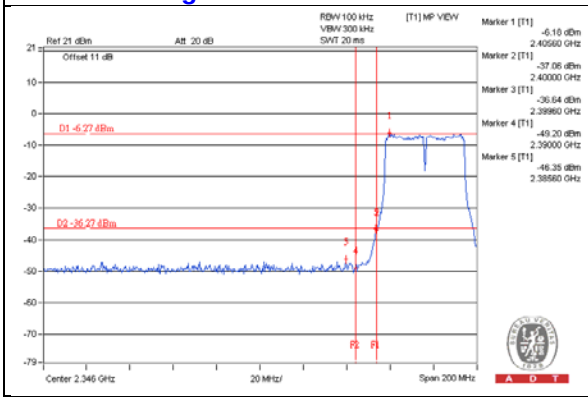
CH 6



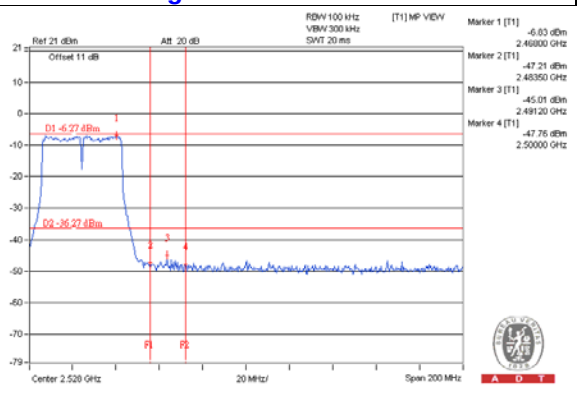
CH 9



CH 3 Band edge

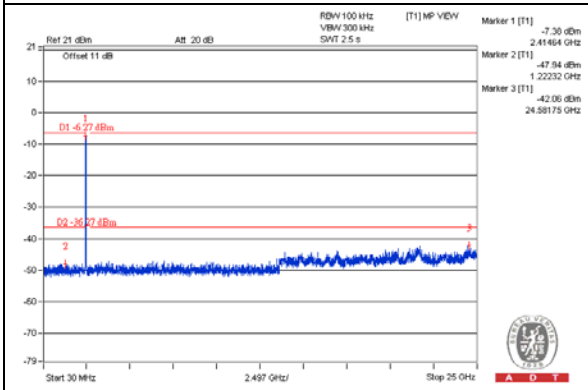


CH 9 Band edge

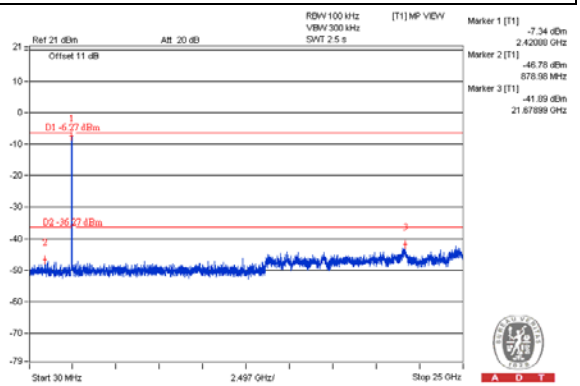


Chain 1

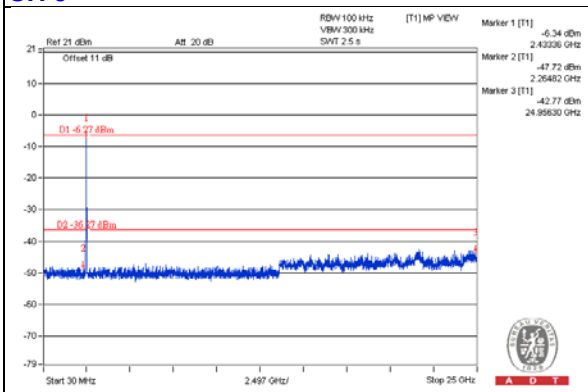
CH 3



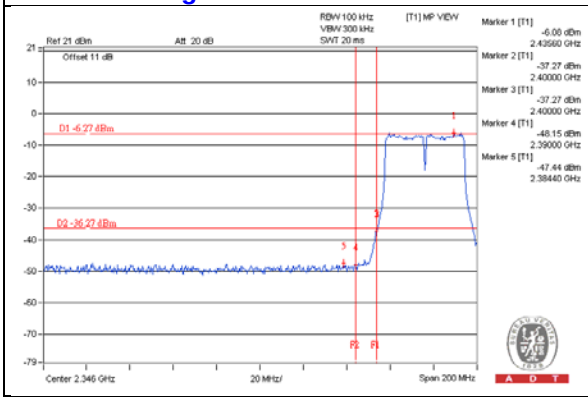
CH 6



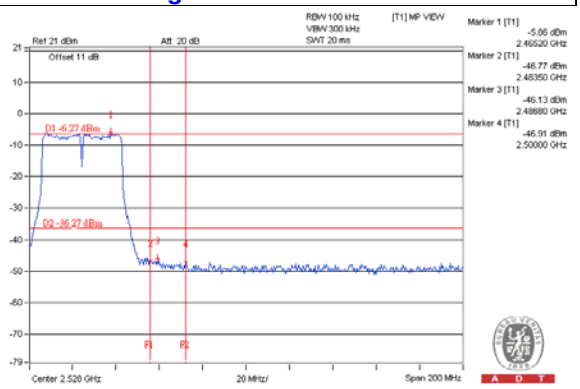
CH 9



CH 3 Band edge

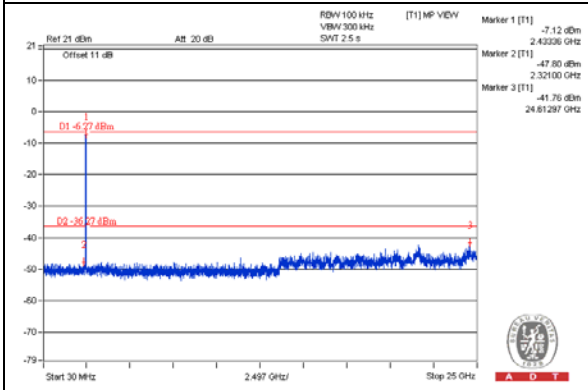


CH 9 Band edge

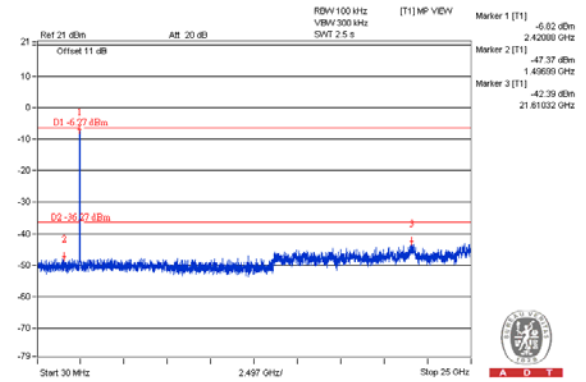


Chain 3

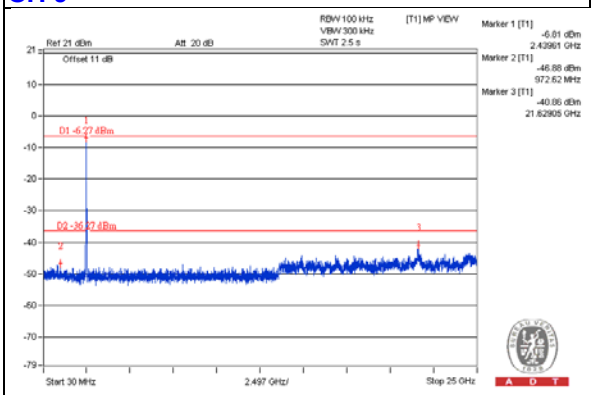
CH 3



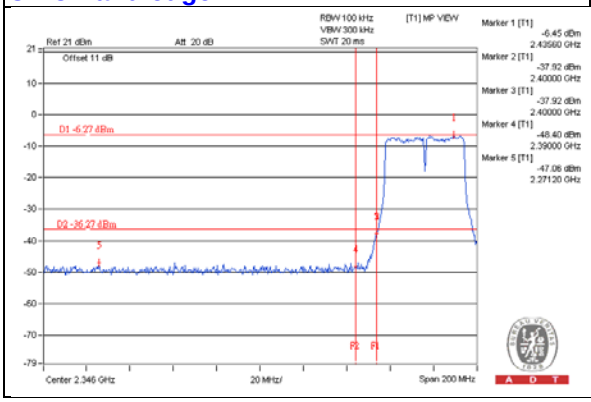
CH 6



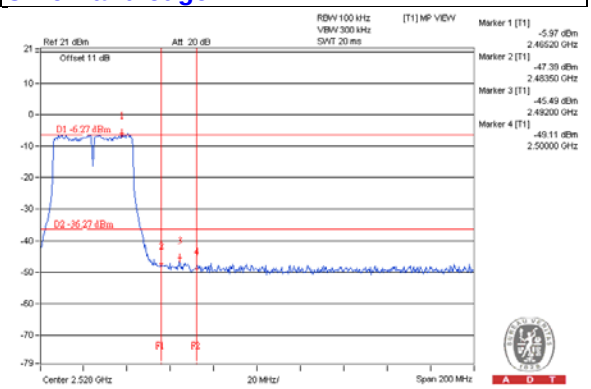
CH 9



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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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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