

FCC Test Report

Report No.: RF150519C22

FCC ID: KA2CS960LA1

Test Model: DCS-960L

Series Model: DCS-960LH, DCS-96xLxx (x = any alphanumeric character or blank)

Received Date: May 19, 2015

Test Date: Jul. 07 ~ Aug. 27, 2015

Issued Date: Aug. 27, 2015

Applicant: D-LINK CORPORATION

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Release Control Record

Issue No.	Description	Date Issued
RF150519C22	Original release	Aug. 27, 2015

1 Certificate of Conformity

Product: HD Ultra-Wide View Wi-Fi Camera

Brand: D-Link

Test Model: DCS-960L

Series Model: DCS-960LH, DCS-96xLxx (x = any alphanumeric character or blank)

Sample Status: Engineering Sample

Applicant: D-LINK CORPORATION

Test Date: Jul. 07 ~ Aug. 27, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

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

Prepared by : Celine Chou , **Date:** Aug. 27, 2015
Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Aug. 27, 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 -20.66dB at 4.10288MHz
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.2dB at 2483.50 and 7311.00MHz.
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	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	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~ 1000MHz	3.60 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	HD Ultra-Wide View Wi-Fi Camera
Brand	D-Link
Test Model	DCS-960L
Series Model	DCS-960LH, DCS-96xLxx (x = any alphanumeric character or blank)
Model Difference	Refer to note
Sample Status	Engineering Sample
Power Supply Rating	5Vdc (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 135Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	199.986mW
Antenna Type	PCB antenna with 0dBi gain
Antenna Connector	N/A
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

- The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX

- All models are listed as below.

Brand	Model	Difference
D-Link	DCS-960L	All models are electrically identical, different model names are for marketing purpose.
	DCS-960LH	
	DCS-96xLxx (x = any alphanumeric character or blank)	

* The model of the DCS-960L was chosen for final test.

- The EUT has two exterior colors for sale (white and black). The white device is identical to the black device including all the electrical design and RF parameters.

4. The EUT uses following adapters.

Adapter 1	
Brand	D-Link
Model	KSAS0050500120D5D (With Energy star V)
Input Power	100-240Vac, 50/60Hz, 0.18A
Output Power	5Vdc, 1.2A
Power Line	1.5m cable without core attached on adapter

Adapter 2	
Brand	D-Link
Model	KSAS0050500120D5D (With Energy star VI)
Input Power	100-240Vac, 50/60Hz, 0.18A
Output Power	5Vdc, 1.2A
Power Line	1.55m cable without core attached on adapter

* After pre-tested two adapters found adapter 1 was the worse, therefore chosen for final test and presented in the test report.

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 **X-plane**.

Radiated Emission Test (Above 1GHz):

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

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

Radiated Emission Test (Below 1GHz):

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

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

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

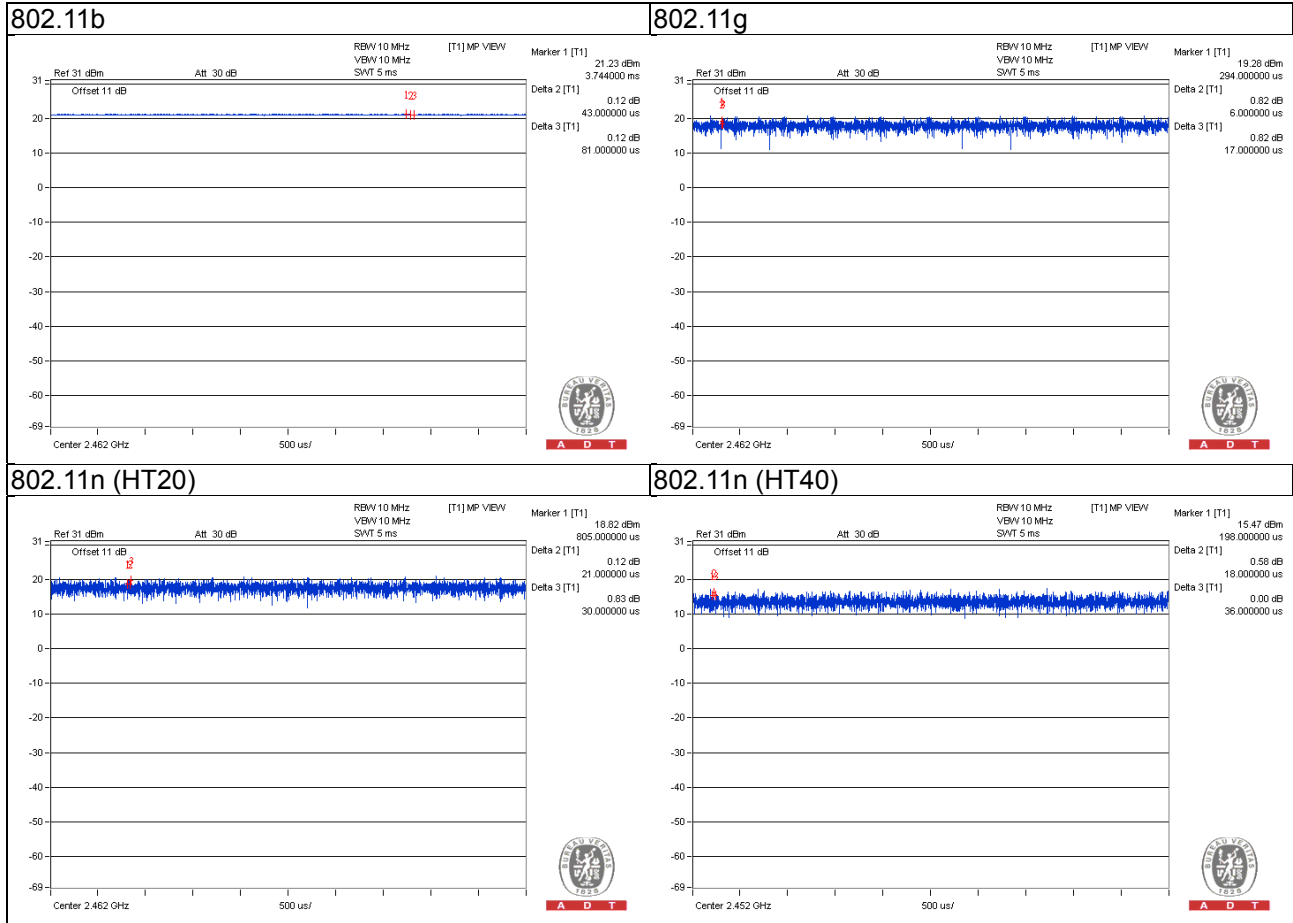
EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE\geq1G	27deg. C, 64%RH	120Vac, 60Hz	Alan Wu
RE$<$1G	29deg. C, 63%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

3.3 Duty Cycle of Test Signal

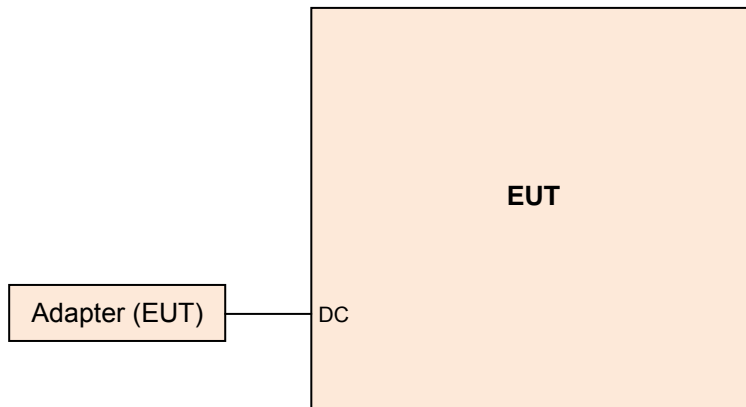
Duty cycle of test signal is > 98%



3.4 Description of Support Units

The EUT has been tested as an independent unit.

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 v03r03

ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB 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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 08, 2014	Jul. 07, 2015
			Jul. 08, 2015	Jul. 07, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 06, 2015	Feb. 05, 2016
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2014	Aug. 08, 2015
			Aug. 09, 2015	Aug. 08, 2016
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2014	Aug. 08, 2015
			Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
			Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
			Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 2015
			Aug. 09, 2015	Aug. 08, 2016
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2014	Jul. 08, 2015
			Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2014	Jul. 08, 2015
			Jul. 09, 2015	Jul. 08, 2016

- Note:
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Chamber 4.
 3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 4. The FCC Site Registration No. is 460141.
 5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

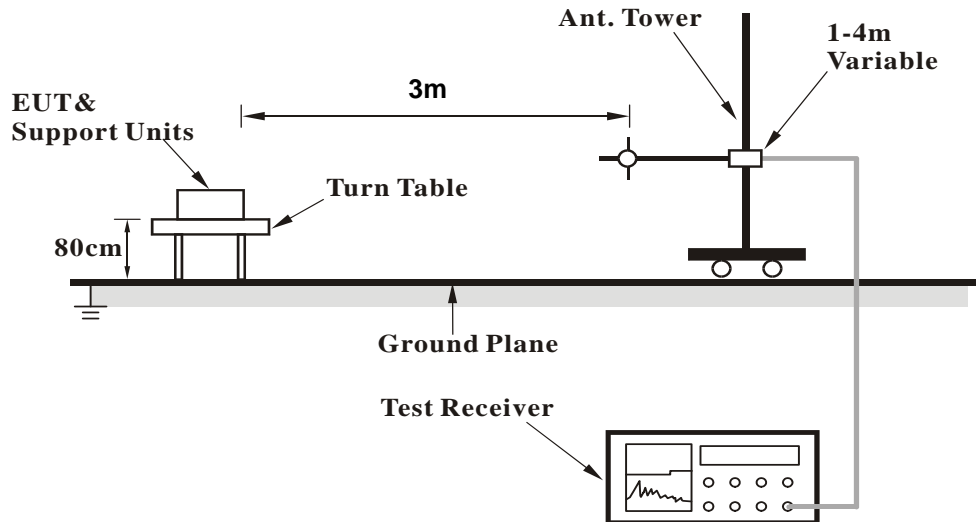
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 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 ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) 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

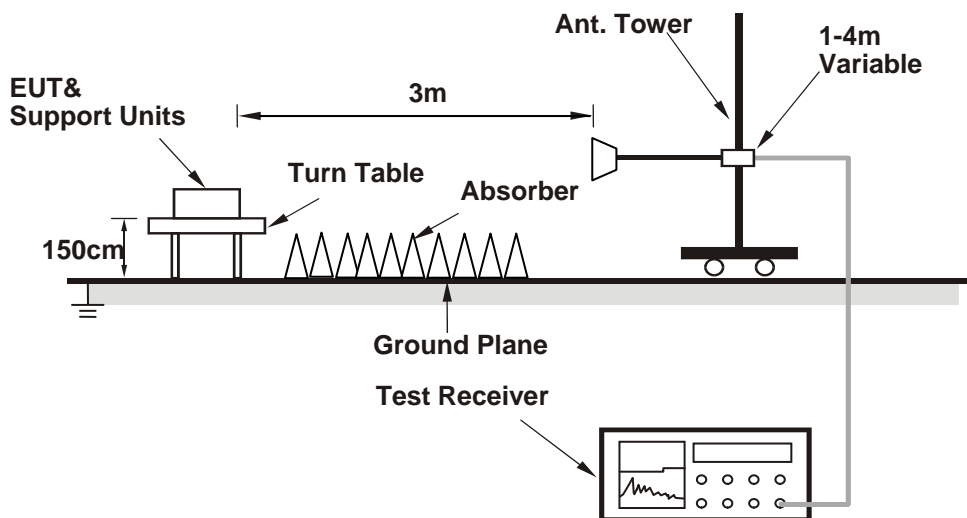
No deviation.

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

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.4 PK	74.0	-14.6	1.90 H	199	27.30	32.10
2	2390.00	52.7 AV	54.0	-1.3	1.90 H	199	20.60	32.10
3	*2412.00	108.6 PK			1.87 H	205	76.40	32.20
4	*2412.00	104.6 AV			1.87 H	205	72.40	32.20
5	4824.00	54.0 PK	74.0	-20.0	1.86 H	39	48.80	5.20
6	4824.00	50.3 AV	54.0	-3.7	1.86 H	39	45.10	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.1 PK	74.0	-17.9	1.00 V	268	24.00	32.10
2	2390.00	45.8 AV	54.0	-8.2	1.00 V	268	13.70	32.10
3	*2412.00	101.2 PK			1.00 V	266	69.00	32.20
4	*2412.00	97.7 AV			1.00 V	266	65.50	32.20
5	4824.00	52.6 PK	74.0	-21.4	1.64 V	219	47.40	5.20
6	4824.00	47.4 AV	54.0	-6.6	1.64 V	219	42.20	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	108.7 PK			1.84 H	201	76.50	32.20
2	*2437.00	104.7 AV			1.84 H	201	72.50	32.20
3	4874.00	54.3 PK	74.0	-19.7	2.28 H	65	49.10	5.20
4	4874.00	50.0 AV	54.0	-4.0	2.28 H	65	44.80	5.20
5	7311.00	56.7 PK	74.0	-17.3	2.25 H	31	45.00	11.70
6	7311.00	47.9 AV	54.0	-6.1	2.25 H	31	36.20	11.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.4 PK			1.00 V	299	69.20	32.20
2	*2437.00	97.4 AV			1.00 V	299	65.20	32.20
3	4874.00	53.5 PK	74.0	-20.5	1.52 V	217	48.30	5.20
4	4874.00	49.5 AV	54.0	-4.5	1.52 V	217	44.30	5.20
5	7311.00	60.3 PK	74.0	-13.7	2.21 V	142	48.60	11.70
6	7311.00	52.8 AV	54.0	-1.2	2.21 V	142	41.10	11.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	107.3 PK			1.83 H	204	75.00	32.30
2	*2462.00	103.4 AV			1.83 H	204	71.10	32.30
3	2483.50	60.6 PK	74.0	-13.4	1.82 H	200	28.30	32.30
4	2483.50	52.3 AV	54.0	-1.7	1.82 H	200	20.00	32.30
5	4924.00	53.0 PK	74.0	-21.0	1.86 H	61	47.70	5.30
6	4924.00	46.6 AV	54.0	-7.4	1.86 H	61	41.30	5.30
7	7386.00	56.2 PK	74.0	-17.8	2.38 H	31	44.60	11.60
8	7386.00	47.0 AV	54.0	-7.0	2.38 H	31	35.40	11.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	101.1 PK			1.00 V	295	68.80	32.30
2	*2462.00	97.0 AV			1.00 V	295	64.70	32.30
3	2483.50	57.3 PK	74.0	-16.7	1.00 V	293	25.00	32.30
4	2483.50	45.2 AV	54.0	-8.8	1.00 V	293	12.90	32.30
5	4924.00	52.6 PK	74.0	-21.4	1.66 V	283	47.30	5.30
6	4924.00	46.9 AV	54.0	-7.1	1.66 V	283	41.60	5.30
7	7386.00	59.0 PK	74.0	-15.0	2.25 V	145	47.40	11.60
8	7386.00	50.5 AV	54.0	-3.5	2.25 V	145	38.90	11.60

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.4 PK	74.0	-2.6	2.10 H	198	39.30	32.10
2	2390.00	52.6 AV	54.0	-1.4	2.10 H	198	20.50	32.10
3	*2412.00	107.3 PK			2.06 H	198	75.10	32.20
4	*2412.00	97.6 AV			2.06 H	198	65.40	32.20
5	4824.00	52.0 PK	74.0	-22.0	1.82 H	66	46.80	5.20
6	4824.00	38.3 AV	54.0	-15.7	1.82 H	66	33.10	5.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.0 PK	74.0	-11.0	1.00 V	268	30.90	32.10
2	2390.00	46.8 AV	54.0	-7.2	1.00 V	268	14.70	32.10
3	*2412.00	99.8 PK			1.00 V	267	67.60	32.20
4	*2412.00	90.2 AV			1.00 V	267	58.00	32.20
5	4824.00	48.7 PK	74.0	-25.3	1.81 V	207	43.50	5.20
6	4824.00	35.8 AV	54.0	-18.2	1.81 V	207	30.60	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	110.2 PK			1.85 H	198	78.00	32.20
2	*2437.00	100.7 AV			1.85 H	198	68.50	32.20
3	4874.00	52.3 PK	74.0	-21.7	1.81 H	65	47.10	5.20
4	4874.00	39.0 AV	54.0	-15.0	1.81 H	65	33.80	5.20
5	7311.00	56.5 PK	74.0	-17.5	2.03 H	34	44.80	11.70
6	7311.00	43.4 AV	54.0	-10.6	2.03 H	34	31.70	11.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	101.5 PK			1.00 V	299	69.30	32.20
2	*2437.00	93.0 AV			1.00 V	299	60.80	32.20
3	4874.00	49.1 PK	74.0	-24.9	1.88 V	205	43.90	5.20
4	4874.00	36.0 AV	54.0	-18.0	1.88 V	205	30.80	5.20
5	7311.00	60.9 PK	74.0	-13.1	2.20 V	136	49.20	11.70
6	7311.00	47.7 AV	54.0	-6.3	2.20 V	136	36.00	11.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.9 PK			1.80 H	201	73.60	32.30
2	*2462.00	96.2 AV			1.80 H	201	63.90	32.30
3	2483.50	67.3 PK	74.0	-6.7	1.80 H	198	35.00	32.30
4	2483.50	52.8 AV	54.0	-1.2	1.80 H	198	20.50	32.30
5	4924.00	51.5 PK	74.0	-22.5	1.81 H	61	46.20	5.30
6	4924.00	38.1 AV	54.0	-15.9	1.81 H	61	32.80	5.30
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	*2462.00	100.1 PK			1.00 V	298	67.80	32.30
2	*2462.00	90.5 AV			1.00 V	298	58.20	32.30
3	2483.50	59.7 PK	74.0	-14.3	1.00 V	296	27.40	32.30
4	2483.50	46.4 AV	54.0	-7.6	1.00 V	296	14.10	32.30
5	4924.00	48.5 PK	74.0	-25.5	1.60 V	266	43.20	5.30
6	4924.00	35.5 AV	54.0	-18.5	1.60 V	266	30.20	5.30

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
5. " * ": Fundamental frequency.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.3 PK	74.0	-2.7	2.04 H	199	39.20	32.10
2	2390.00	52.7 AV	54.0	-1.3	2.04 H	199	20.60	32.10
3	*2412.00	106.7 PK			2.06 H	197	74.50	32.20
4	*2412.00	96.8 AV			2.06 H	197	64.60	32.20
5	4824.00	51.3 PK	74.0	-22.7	1.83 H	65	46.10	5.20
6	4824.00	38.0 AV	54.0	-16.0	1.83 H	65	32.80	5.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.9 PK	74.0	-10.1	1.00 V	266	31.80	32.10
2	2390.00	47.5 AV	54.0	-6.5	1.00 V	266	15.40	32.10
3	*2412.00	99.3 PK			1.00 V	269	67.10	32.20
4	*2412.00	89.8 AV			1.00 V	269	57.60	32.20
5	4824.00	48.4 PK	74.0	-25.6	1.86 V	200	43.20	5.20
6	4824.00	35.4 AV	54.0	-18.6	1.86 V	200	30.20	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	109.7 PK			2.25 H	194	77.50	32.20
2	*2437.00	100.2 AV			2.25 H	194	68.00	32.20
3	4874.00	51.6 PK	74.0	-22.4	1.85 H	67	46.40	5.20
4	4874.00	38.8 AV	54.0	-15.2	1.85 H	67	33.60	5.20
5	7311.00	56.0 PK	74.0	-18.0	2.01 H	36	44.30	11.70
6	7311.00	42.9 AV	54.0	-11.1	2.01 H	36	31.20	11.70

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.1 PK			1.00 V	268	69.90	32.20
2	*2437.00	93.0 AV			1.00 V	268	60.80	32.20
3	4874.00	48.8 PK	74.0	-25.2	1.87 V	207	43.60	5.20
4	4874.00	35.8 AV	54.0	-18.2	1.87 V	207	30.60	5.20
5	7311.00	60.6 PK	74.0	-13.4	2.20 V	137	48.90	11.70
6	7311.00	47.3 AV	54.0	-6.7	2.20 V	137	35.60	11.70

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	106.0 PK			2.02 H	200	73.70	32.30
2	*2462.00	96.3 AV			2.02 H	200	64.00	32.30
3	2483.50	71.3 PK	74.0	-2.7	2.09 H	199	39.00	32.30
4	2483.50	52.5 AV	54.0	-1.5	2.09 H	199	20.20	32.30
5	4924.00	51.0 PK	74.0	-23.0	1.80 H	68	45.70	5.30
6	4924.00	37.9 AV	54.0	-16.1	1.80 H	68	32.60	5.30
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	*2462.00	99.8 PK			1.00 V	296	67.50	32.30
2	*2462.00	90.3 AV			1.00 V	296	58.00	32.30
3	2483.50	63.0 PK	74.0	-11.0	1.00 V	291	30.70	32.30
4	2483.50	46.6 AV	54.0	-7.4	1.00 V	291	14.30	32.30
5	4924.00	48.3 PK	74.0	-25.7	1.61 V	260	43.00	5.30
6	4924.00	35.3 AV	54.0	-18.7	1.61 V	260	30.00	5.30

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
5. " * " : Fundamental frequency.

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.1 PK	74.0	-5.9	2.36 H	192	36.00	32.10
2	2390.00	52.5 AV	54.0	-1.5	2.36 H	192	20.40	32.10
3	*2422.00	102.9 PK			2.29 H	202	70.70	32.20
4	*2422.00	92.2 AV			2.29 H	202	60.00	32.20
5	4844.00	50.6 PK	74.0	-23.4	1.87 H	63	45.40	5.20
6	4844.00	37.4 AV	54.0	-16.6	1.87 H	63	32.20	5.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	1.00 V	296	28.90	32.10
2	2390.00	46.2 AV	54.0	-7.8	1.00 V	296	14.10	32.10
3	*2422.00	95.4 PK			1.00 V	299	63.20	32.20
4	*2422.00	85.5 AV			1.00 V	299	53.30	32.20
5	4844.00	47.9 PK	74.0	-26.1	1.63 V	205	42.70	5.20
6	4844.00	34.8 AV	54.0	-19.2	1.63 V	205	29.60	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.5 PK	74.0	-6.5	2.02 H	197	35.40	32.10
2	2390.00	52.7 AV	54.0	-1.3	2.02 H	197	20.60	32.10
3	*2437.00	104.8 PK			2.03 H	198	72.60	32.20
4	*2437.00	94.0 AV			2.03 H	198	61.80	32.20
5	2483.50	64.9 PK	74.0	-9.1	2.05 H	198	32.60	32.30
6	2483.50	51.7 AV	54.0	-2.3	2.05 H	198	19.40	32.30
7	4874.00	51.2 PK	74.0	-22.8	1.81 H	65	46.00	5.20
8	4874.00	38.4 AV	54.0	-15.6	1.81 H	65	33.20	5.20

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	1.00 V	291	27.70	32.10
2	2390.00	47.6 AV	54.0	-6.4	1.00 V	291	15.50	32.10
3	*2437.00	98.2 PK			1.00 V	299	66.00	32.20
4	*2437.00	87.4 AV			1.00 V	299	55.20	32.20
5	2483.50	59.2 PK	74.0	-14.8	1.00 V	299	26.90	32.30
6	2483.50	46.7 AV	54.0	-7.3	1.00 V	299	14.40	32.30
7	4874.00	48.2 PK	74.0	-25.8	1.81 V	201	43.00	5.20
8	4874.00	35.1 AV	54.0	-18.9	1.81 V	201	29.90	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	101.9 PK			1.86 H	201	69.70	32.20
2	*2452.00	91.9 AV			1.86 H	201	59.70	32.20
3	2483.50	67.7 PK	74.0	-6.3	1.98 H	198	35.40	32.30
4	2483.50	52.3 AV	54.0	-1.7	1.98 H	198	20.00	32.30
5	4904.00	50.6 PK	74.0	-23.4	1.83 H	63	45.40	5.20
6	4904.00	37.6 AV	54.0	-16.4	1.83 H	63	32.40	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	94.4 PK			1.00 V	296	62.20	32.20
2	*2452.00	84.7 AV			1.00 V	296	52.50	32.20
3	2483.50	59.1 PK	74.0	-14.9	1.00 V	292	26.80	32.30
4	2483.50	44.9 AV	54.0	-9.1	1.00 V	292	12.60	32.30
5	4904.00	47.8 PK	74.0	-26.2	1.62 V	202	42.60	5.20
6	4904.00	34.8 AV	54.0	-19.2	1.62 V	202	29.60	5.20

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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: 802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	51.24	22.4 QP	40.0	-17.6	2.00 H	323	36.50	-14.10
2	177.37	23.7 QP	43.5	-19.8	1.51 H	234	38.60	-14.90
3	249.17	34.8 QP	46.0	-11.2	1.01 H	79	49.20	-14.40
4	375.29	29.9 QP	46.0	-16.1	1.01 H	48	41.10	-11.20
5	499.48	29.2 QP	46.0	-16.8	1.51 H	142	38.10	-8.90
6	656.65	30.0 QP	46.0	-16.0	1.51 H	12	35.90	-5.90
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	51.24	27.8 QP	40.0	-12.2	1.00 V	35	41.90	-14.10
2	249.17	25.2 QP	46.0	-20.8	1.24 V	157	39.60	-14.40
3	375.29	27.4 QP	46.0	-18.6	1.49 V	47	38.60	-11.20
4	534.40	27.1 QP	46.0	-18.9	1.00 V	5	35.60	-8.50
5	784.72	32.4 QP	46.0	-13.6	1.99 V	313	35.60	-3.20
6	938.01	35.1 QP	46.0	-10.9	1.99 V	336	36.10	-1.00

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

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2014	Jul. 23, 2015
			Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- Notes: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

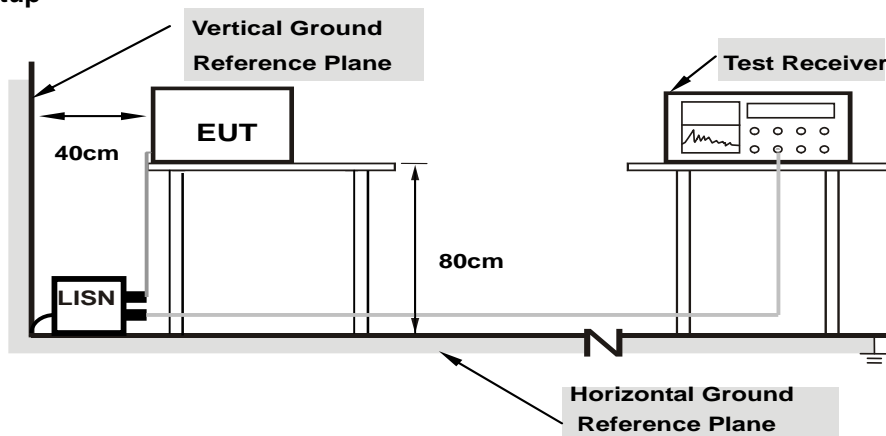
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- 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.

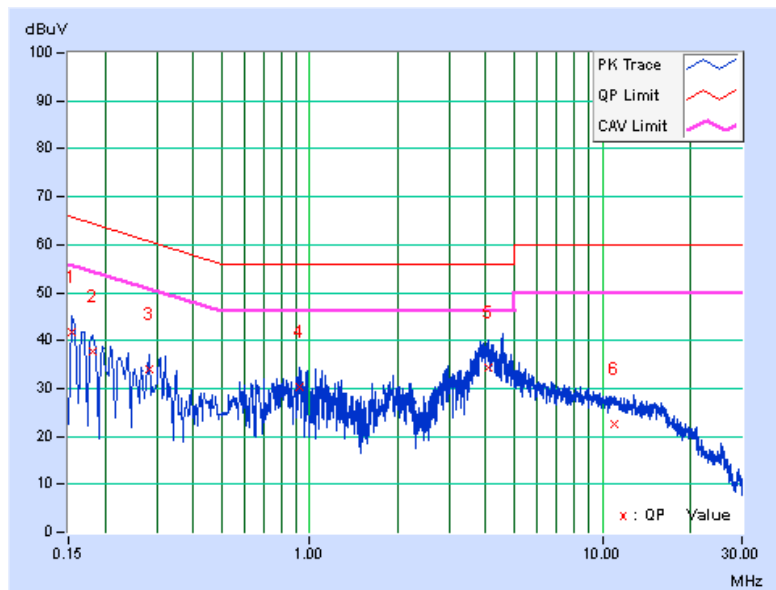
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15391	0.08	41.64	30.09	41.72	30.17	65.79
2	0.18122	0.12	37.74	25.03	37.86	25.15	64.43	54.43	-26.57	-29.28
3	0.28294	0.12	33.83	26.82	33.95	26.94	60.73	50.73	-26.78	-23.79
4	0.92418	0.17	30.19	15.37	30.36	15.54	56.00	46.00	-25.64	-30.46
5	4.10288	0.25	33.97	25.09	34.22	25.34	56.00	46.00	-21.78	-20.66
6	11.01198	0.53	21.90	13.41	22.43	13.94	60.00	50.00	-37.57	-36.06

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.

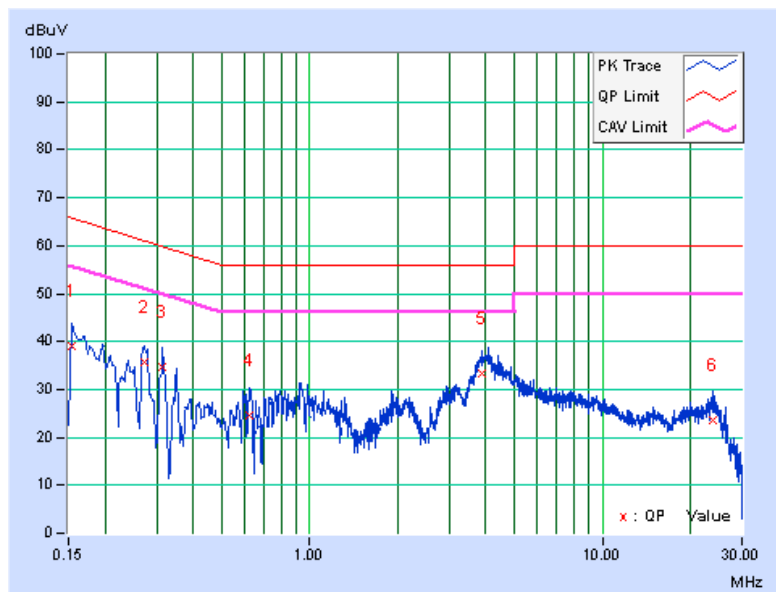


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.13	38.87	28.05	39.00	28.18	65.79	55.79	-26.79	-27.61
2	0.27120	0.22	35.37	24.17	35.59	24.39	61.08	51.08	-25.49	-26.69
3	0.31432	0.20	34.35	28.77	34.55	28.97	59.86	49.86	-25.30	-20.88
4	0.61920	0.17	24.32	11.89	24.49	12.06	56.00	46.00	-31.51	-33.94
5	3.90360	0.38	33.03	24.17	33.41	24.55	56.00	46.00	-22.59	-21.45
6	24.00100	0.91	22.68	7.58	23.59	8.49	60.00	50.00	-36.41	-41.51

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.

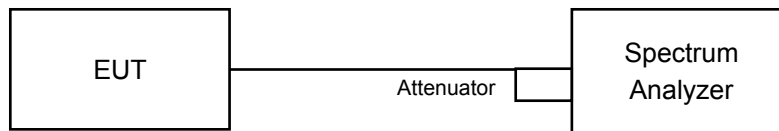


4.3 6dB Bandwidth Measurement

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) $\geq 3 \times$ 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 from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at 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	10.19	0.5	Pass
6	2437	10.17	0.5	Pass
11	2462	10.16	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.59	0.5	Pass
6	2437	16.56	0.5	Pass
11	2462	16.59	0.5	Pass

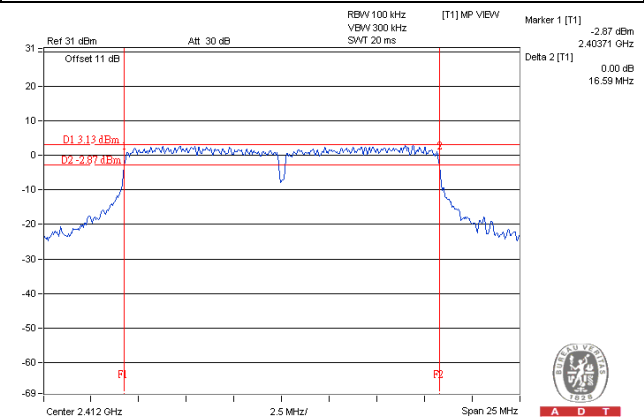
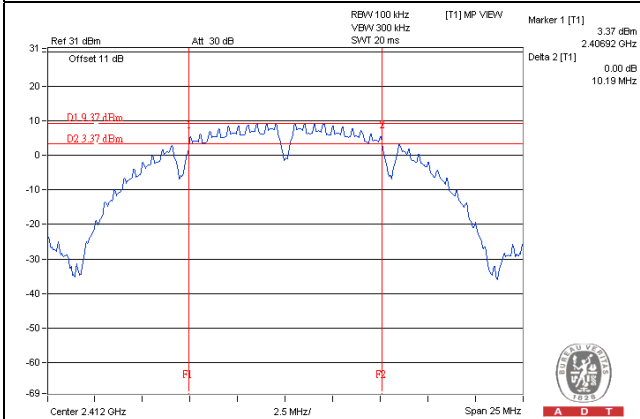
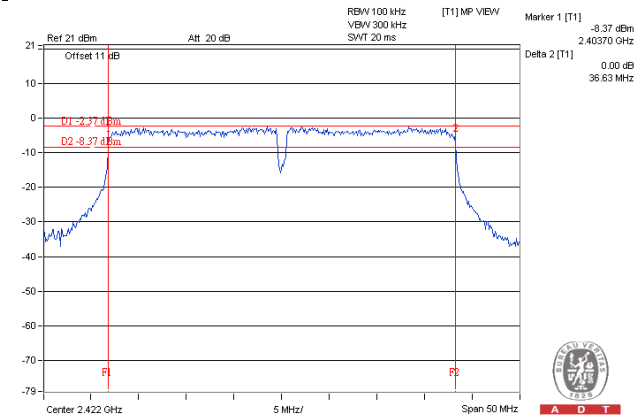
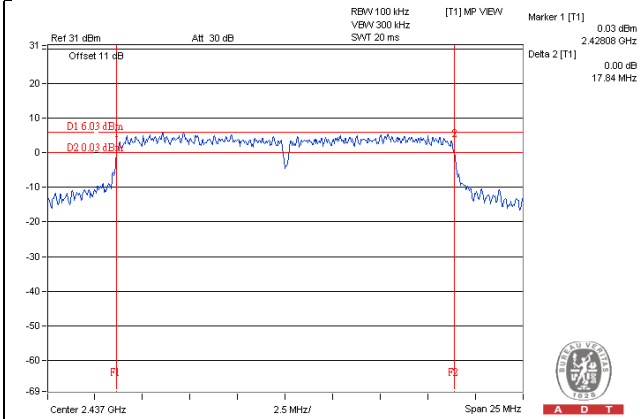
802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.80	0.5	Pass
6	2437	17.84	0.5	Pass
11	2462	17.78	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.63	0.5	Pass
6	2437	36.59	0.5	Pass
9	2452	36.62	0.5	Pass

Spectrum Plot of Worst Value

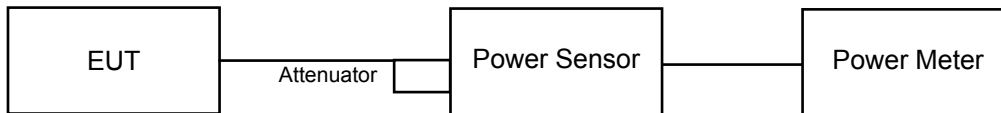
802.11b**802.11g****802.11n (HT20)****802.11n (HT40)**

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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 peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / 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 Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	147.231	21.68	30	Pass
6	2437	139.959	21.46	30	Pass
11	2462	112.460	20.51	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	166.725	22.22	30	Pass
6	2437	191.426	22.82	30	Pass
11	2462	127.644	21.06	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	164.059	22.15	30	Pass
6	2437	199.986	23.01	30	Pass
11	2462	146.218	21.65	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	159.956	22.04	30	Pass
6	2437	171.002	22.33	30	Pass
9	2452	129.420	21.12	30	Pass

For Average Power

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	91.622	19.62
6	2437	99.312	19.97
11	2462	67.764	18.31

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	53.456	17.28
6	2437	81.658	19.12
11	2462	40.179	16.04

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	44.771	16.51
6	2437	93.972	19.73
11	2462	40.832	16.11

802.11n (HT40)

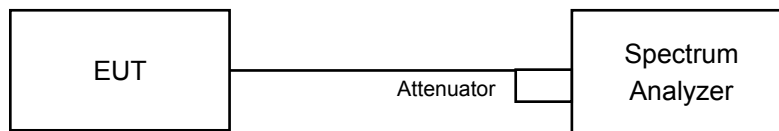
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	35.237	15.47
6	2437	56.754	17.54
9	2452	30.903	14.90

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 analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d. Set the VBW $\geq 3 \times \text{RBW}$.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-10.80	8.00	Pass
6	2437	-10.98	8.00	Pass
11	2462	-12.04	8.00	Pass

802.11g

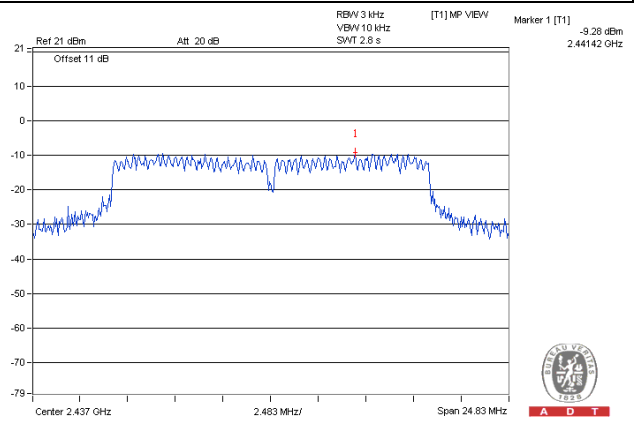
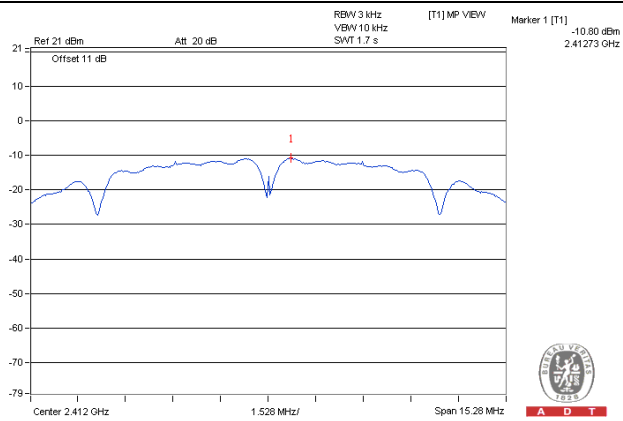
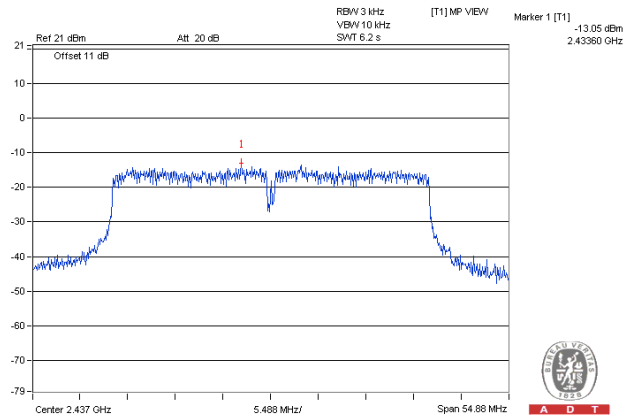
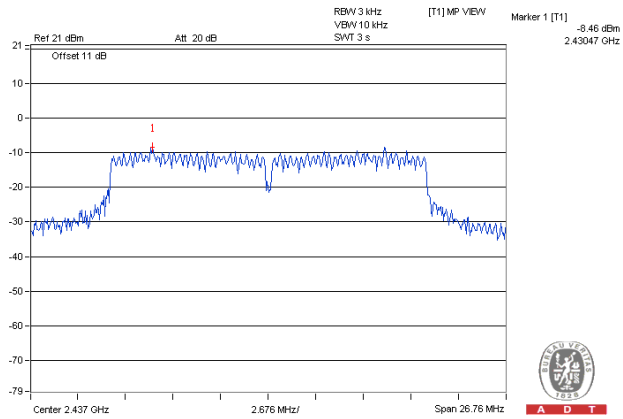
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-11.65	8.00	Pass
6	2437	-9.28	8.00	Pass
11	2462	-12.36	8.00	Pass

802.11n (HT20)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-11.79	8.00	Pass
6	2437	-8.46	8.00	Pass
11	2462	-11.99	8.00	Pass

802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
3	2422	-15.96	8.00	Pass
6	2437	-13.05	8.00	Pass
9	2452	-14.83	8.00	Pass

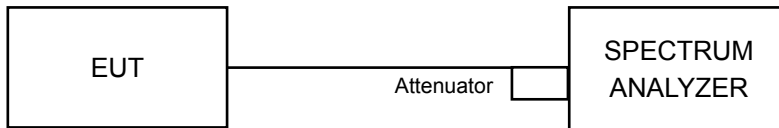
Spectrum Plot of Worst Value**802.11b****802.11g****802.11n (HT20)****802.11n (HT40)**

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB 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

- Set the RBW = 100 kHz.
- Set the VBW \geq 300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW \geq 300 kHz.
- Ensure that the number of measurement points \geq span/RBW
- According to measurement points to set differ measurement span.
- Detector = peak.
- Trace Mode = max hold.
- Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

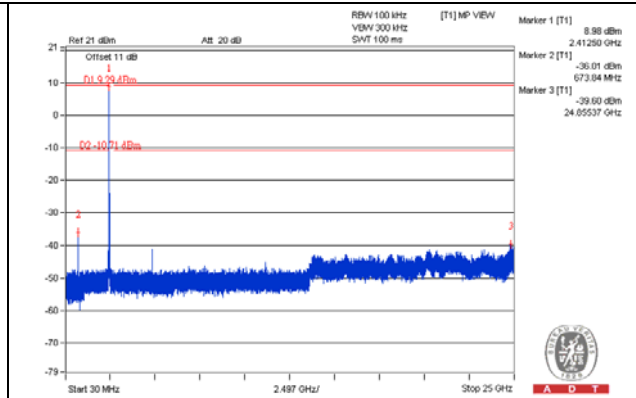
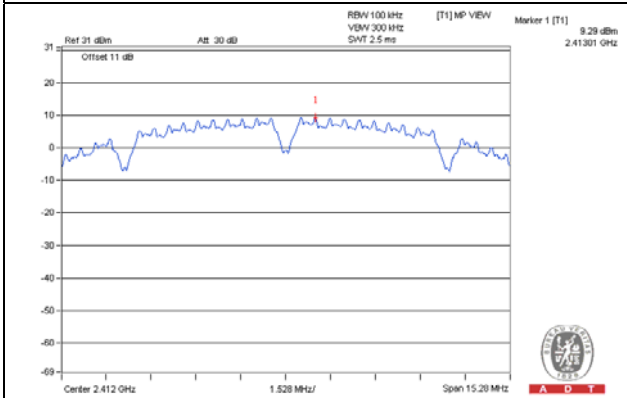
Same as Item 4.3.6

4.6.7 Test Results

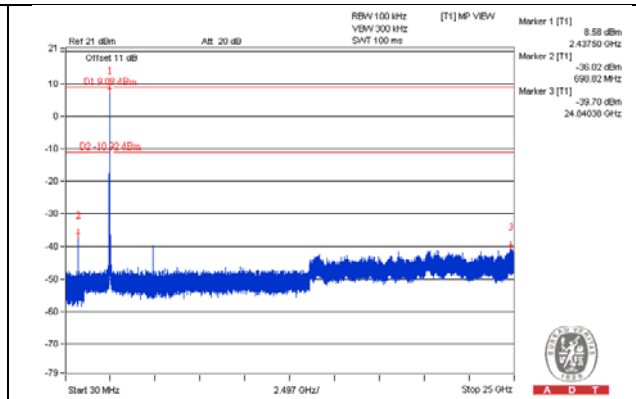
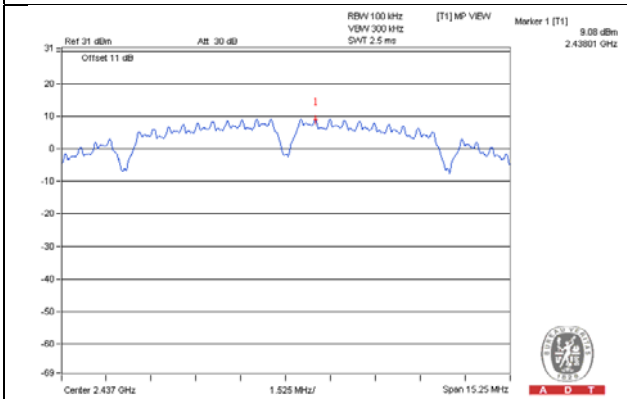
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

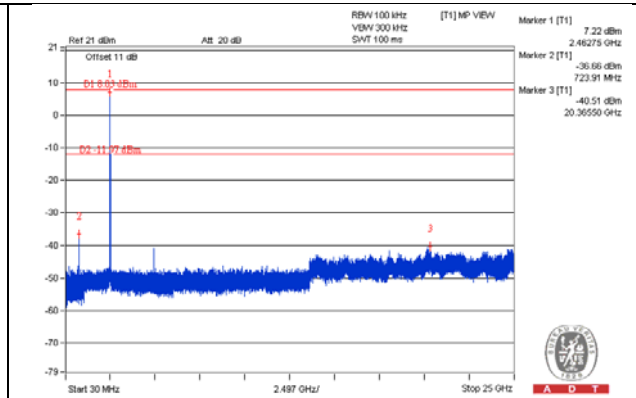
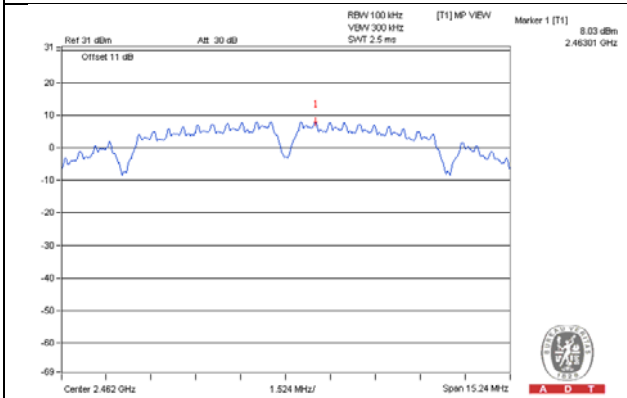
CH 1



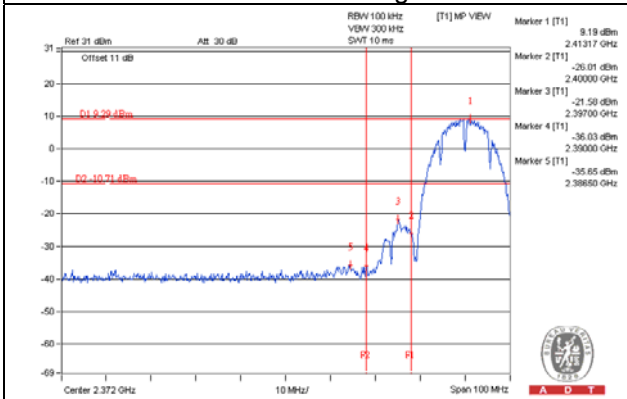
CH 6



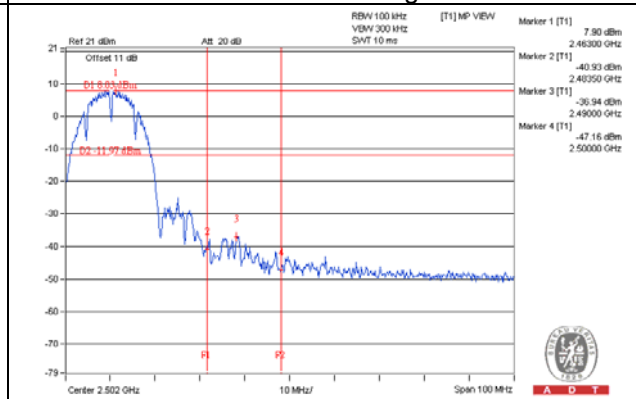
CH 11



CH 1 Band edge

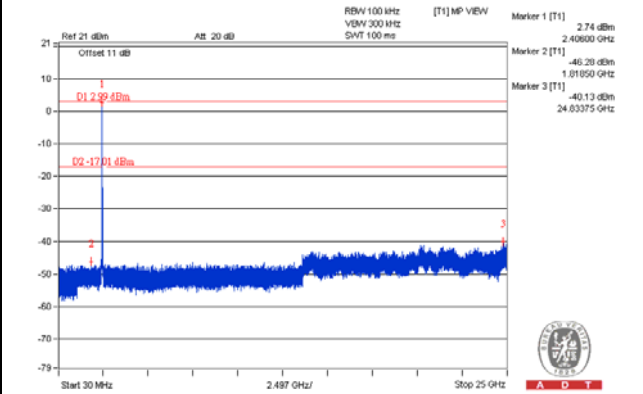
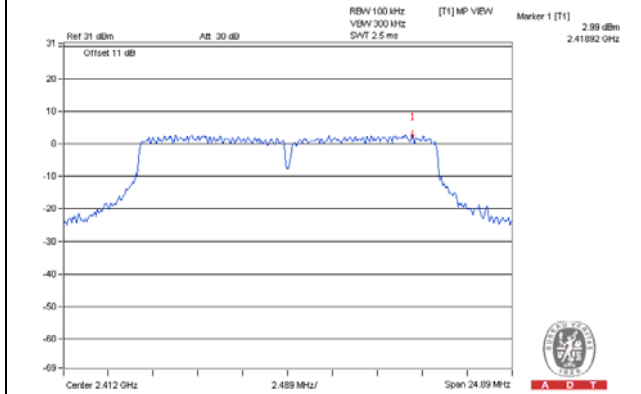


CH 11 Band edge

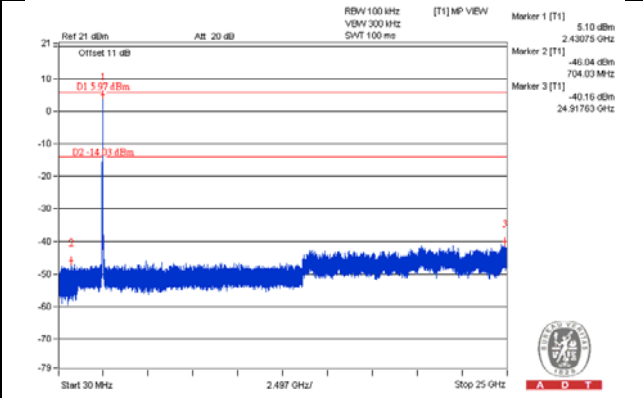
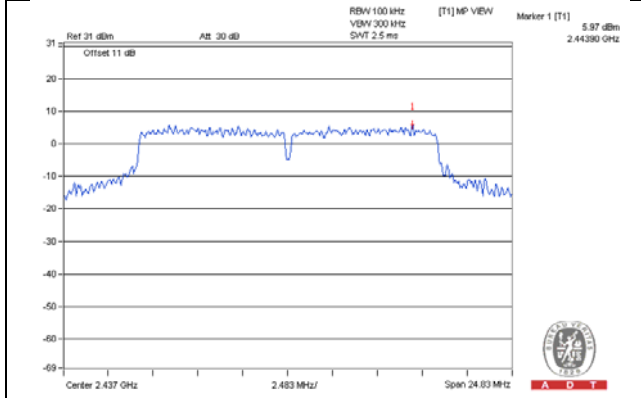


802.11g

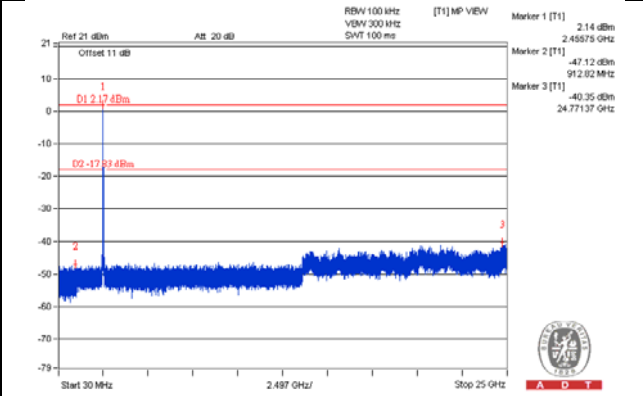
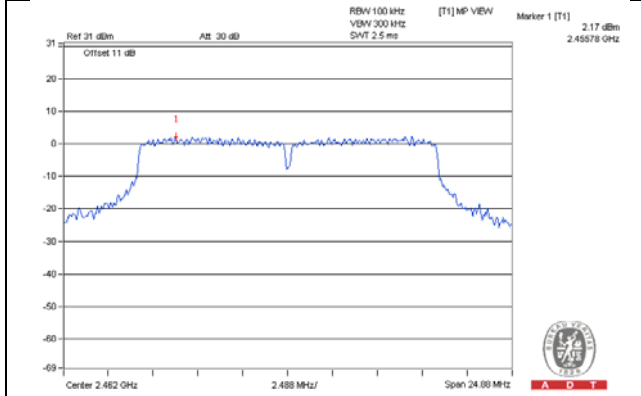
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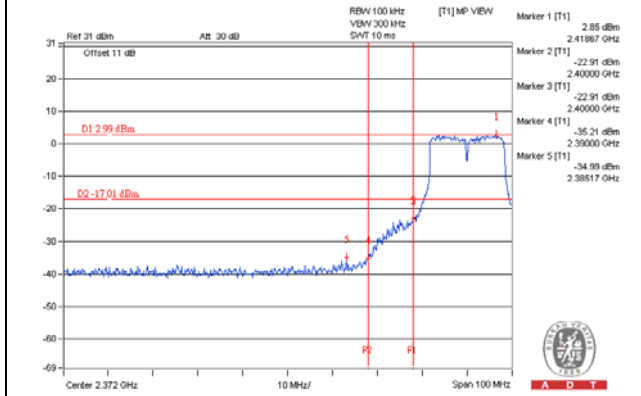
CH 6



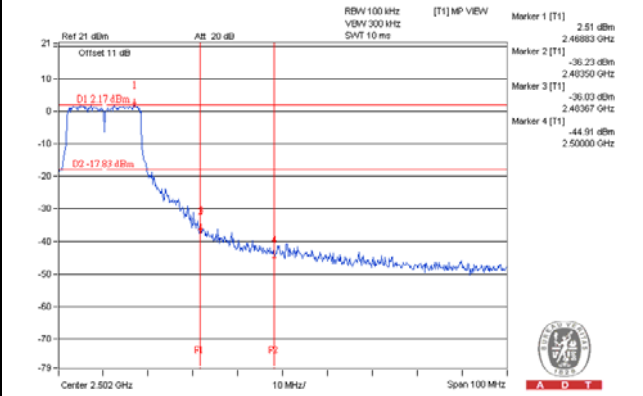
CH 11



CH 1 Band edge

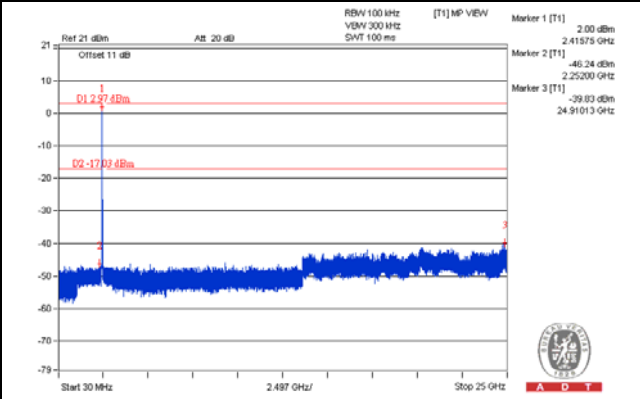
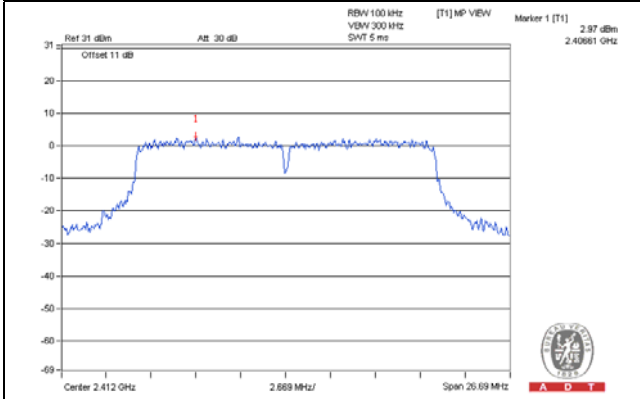


CH 11 Band edge

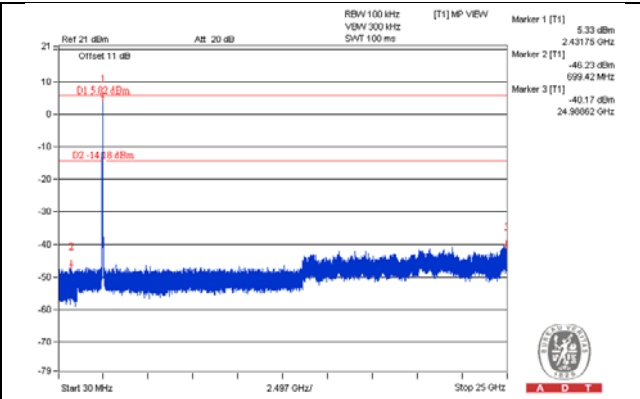
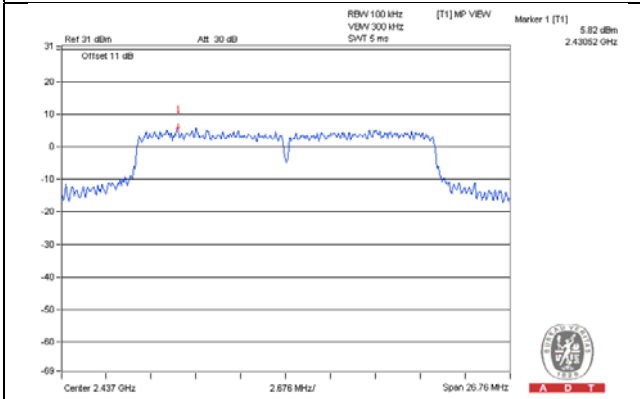


802.11n (HT20)

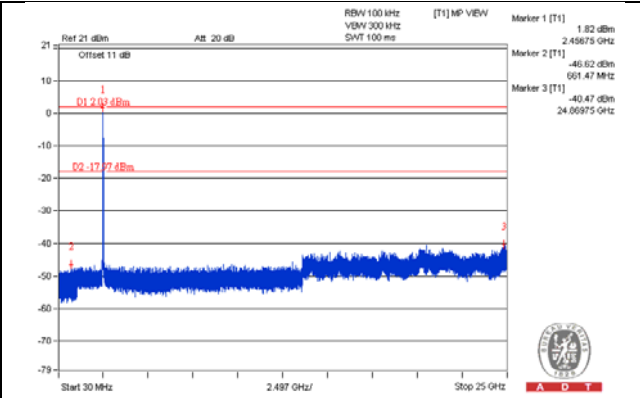
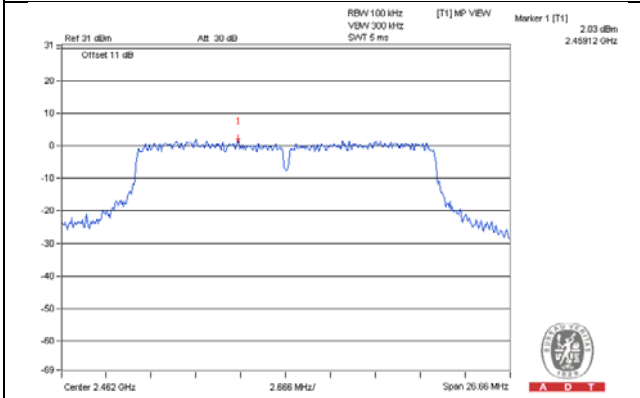
CH 1



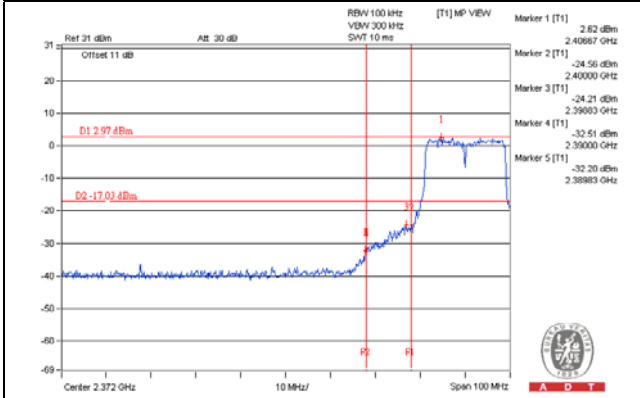
CH 6



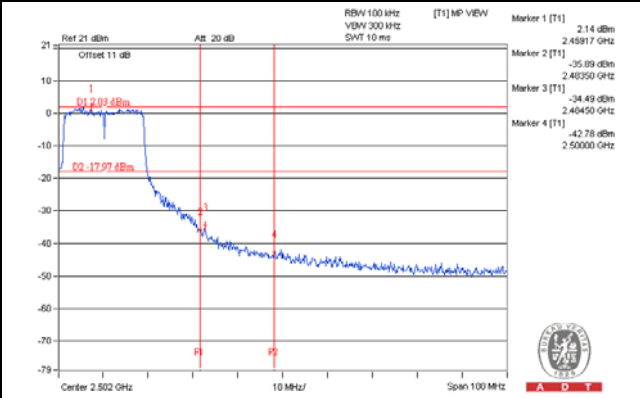
CH 11



CH 1 Band edge

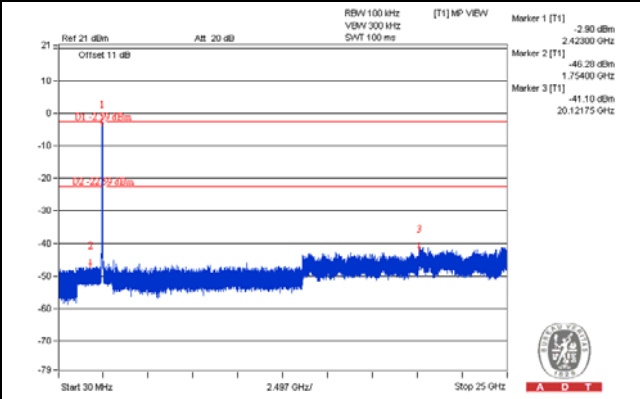
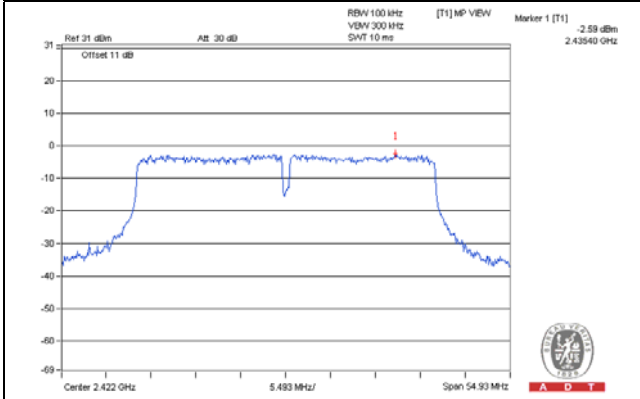


CH 11 Band edge

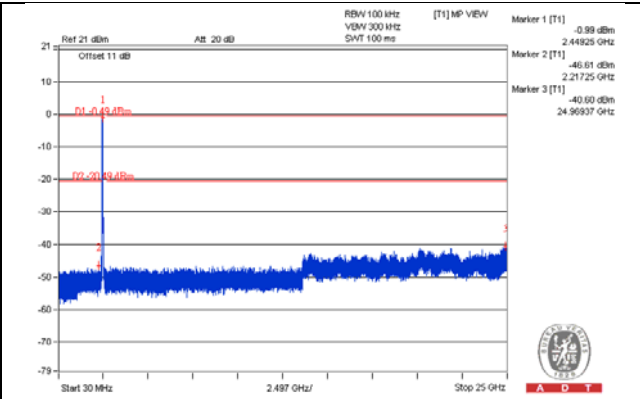
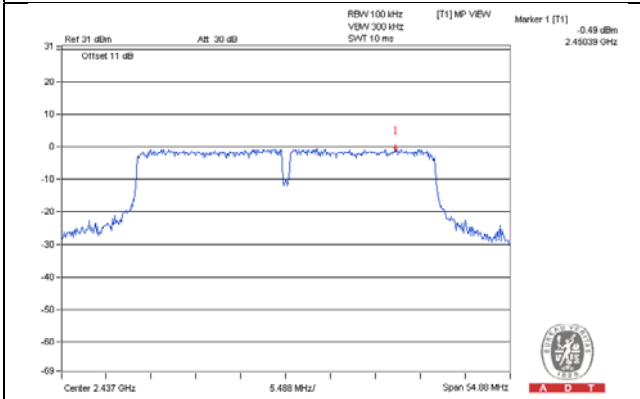


802.11n (HT40)

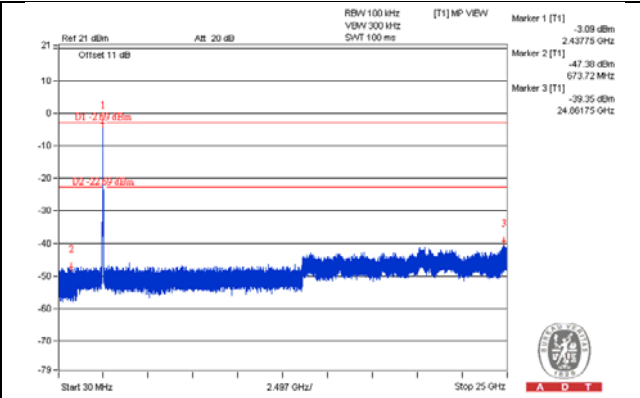
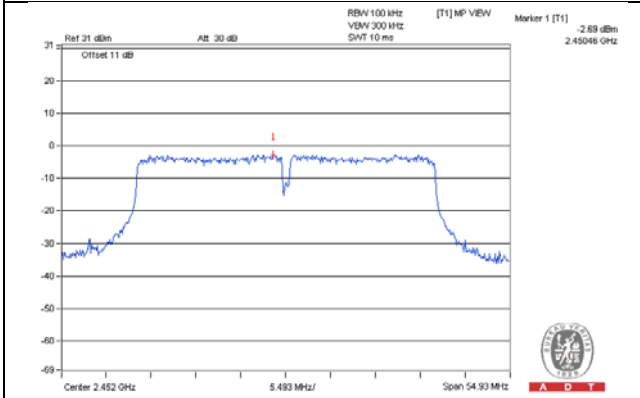
CH 3



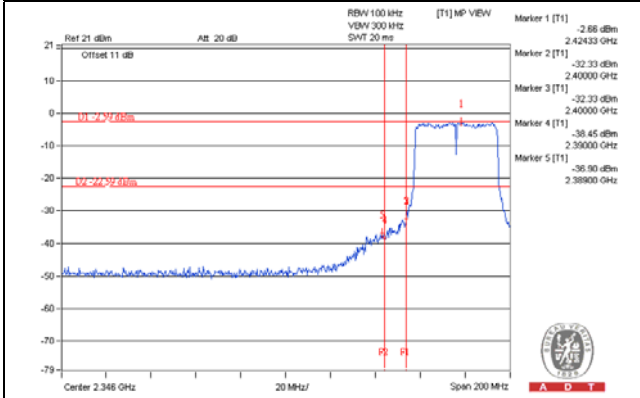
CH 6



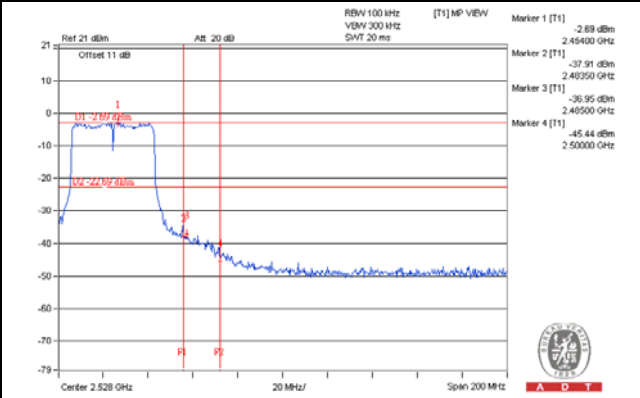
CH 9



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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