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FCC TEST REPORT (15.247)

REPORT NO.: RF121120C08

MODEL NO.: C41W-100

FCC ID: G95C41W

RECEIVED: Nov. 20, 2012

TESTED: Dec. 14, 2012 ~ Jan. 03, 2013

ISSUED: Jan. 07, 2013

APPLICANT: Technicolor U.S.A. Inc.

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46290, U.S.A.

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

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TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF121120C08	Original release	Jan. 07, 2013



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1. CERTIFICATION

PRODUCT: DirecTV Setop box
MODEL NO.: C41W-100
BRAND: DirecTV
APPLICANT: Technicolor U.S.A. Inc.
TESTED: Dec. 14, 2012 ~ Jan. 03, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: C41W-100) 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 :


Pettie Chen / Senior Specialist

, DATE : Jan. 07, 2013

APPROVED BY :


Ken Liu / Manager

, DATE : Jan. 07, 2013



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -20.14dB at 0.16177MHz.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -3.7dB at 11610.00MHz.
15.247(d)	Band Edge Measurement	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 UFL not a standard connector.

2.1 MEASUREMENT UNCERTAINTY

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

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

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



3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	DirecTV Setop box
MODEL NO.	C41W-100
POWER SUPPLY	12Vdc (Adapter)
MODULATION TYPE	64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	OFDM
TRANSFER RATE	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 600.0Mbps
OPERATING FREQUENCY	5745 ~ 5805MHz
NUMBER OF CHANNEL	4 for 802.11a, 802.11n (20MHz) 2 for 802.11n (40MHz)
OUTPUT POWER	971.910mW
ANTENNA TYPE	Embedded antenna with 1.7dBi gain
ANTENNA CONNECTOR	UFL
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

1. The EUT provides 4 completed transmitters and 4 receivers.

MODULATION MODE	TX FUNCTION
802.11a	4TX
802.11n (20MHz)	4TX
802.11n (40MHz)	4TX

2. The EUT consumes power from the following adapter.

BRAND:	DIRECTV
MODEL:	EPS10R0-16
INPUT:	120Vac~0.5A, 60Hz
OUTPUT:	12Vdc / 1.5A 18W
POWER LINE:	DC 1.8m non-shielded cable with one core AC 0.8m non-shielded cable without core

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



3.2 DESCRIPTION OF TEST MODES

FOR 5.0GHz (5745 ~ 5805MHz):

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
149	5745MHz	157	5785MHz
153	5765MHz	161	5805MHz

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

CHANNEL	FREQUENCY	CHANNEL	FREQUENCY
151	5755MHz	159	5795MHz



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

FOR 5.0GHz (5745 ~ 5805MHz):

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE:
The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **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)
-	802.11a	149 to 161	149, 157, 161	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 161	149, 157, 161	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

RADIATED EMISSION TEST (BELOW 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	149 to 161	149	OFDM	BPSK	7.2

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	149 to 161	149	OFDM	BPSK	7.2



BANDEDGE MEASUREMENT:

- 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)
-	802.11a	149 to 161	149, 161	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 161	149, 161	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

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)
-	802.11a	149 to 161	149, 157, 161	OFDM	BPSK	6.0
-	802.11n (20MHz)	149 to 161	149, 157, 161	OFDM	BPSK	7.2
-	802.11n (40MHz)	151 to 159	151, 159	OFDM	BPSK	15.0

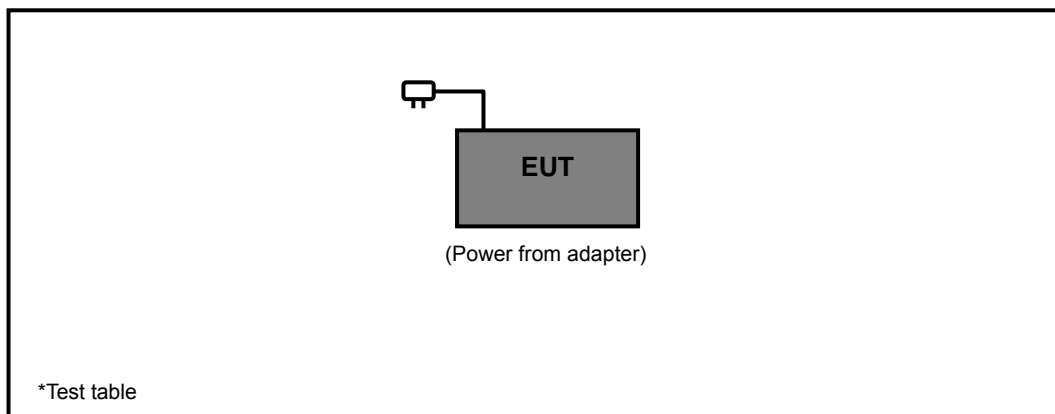
TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 67%RH	120Vac, 60Hz	Antony Lee
RE<1G	21deg. C, 66%RH	120Vac, 60Hz	Brad Tung
PLC	25deg. C, 61%RH	120Vac, 60Hz	Antony Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Antony Lee

3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit.

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



3.4 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 v02

662911 D01 Multiple Transmitter Output v01 r02

ANSI C63.10-2009

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



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4. TEST TYPES AND RESULTS (FOR 5.0GHz BAND)

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION 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.



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4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100744	Apr. 19, 2012	Apr. 18, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	Jan. 30, 2012	Jan. 29, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-156	Apr. 03, 2012	Apr. 02, 2013
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-563	Sep. 12, 2012	Sep. 11, 2013
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 11, 2012	Jul. 10, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier Agilent	8449B	3008A01911	Oct. 25, 2012	Oct. 24, 2013
Preamplifier Agilent	8447D	2944A10638	Oct. 25, 2012	Oct. 24, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295013/4 283403/4	Aug. 28, 2012	Aug. 27, 2013
RF signal cable Worken	8D-FB	Cable-HYCH9-01	Aug. 11, 2012	Aug. 10, 2013
Software	ADT_Radiated_ V7.6.15.9.2	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower & Turn Table Controller EMCO	2090	NA	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 25, 2012	Oct. 24, 2013
High Speed Peak Power Meter	ML2495A	0842014	Apr. 28, 2012	Apr. 27, 2013
Power Sensor	MA2411B	0738404	Apr. 28, 2012	Apr. 27, 2013

- 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. The test was performed in HwaYa Chamber 9.
 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 5. The FCC Site Registration No. is 460141.
 6. The IC Site Registration No. is IC 7450F-4.



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4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

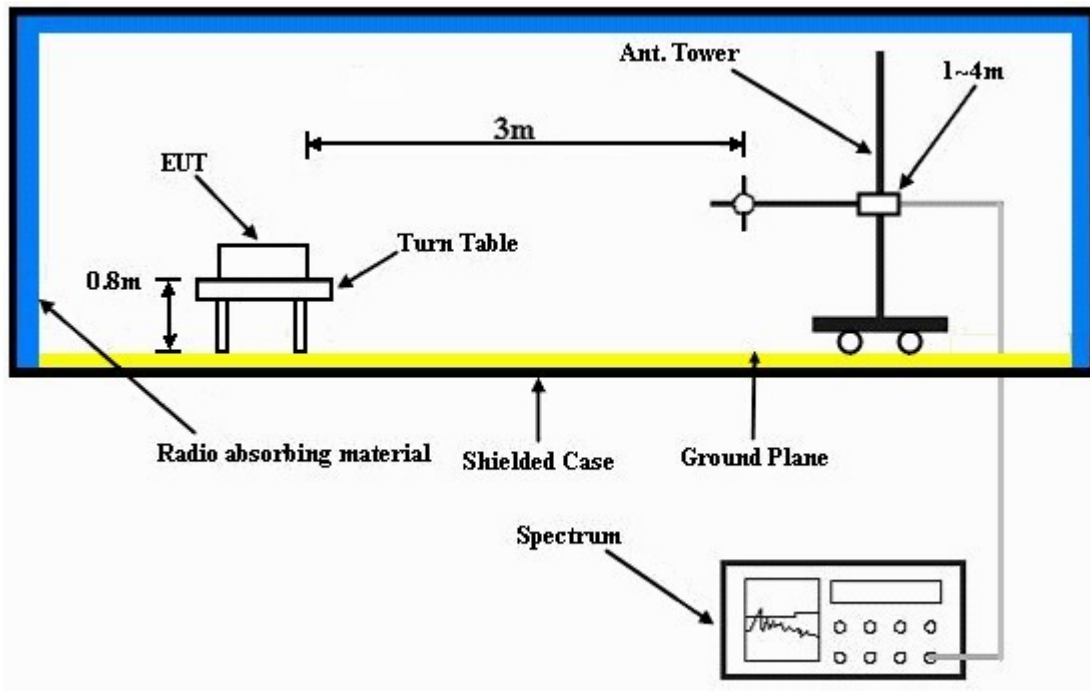
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 100kHz and video bandwidth is 300kHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 1kHz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. Set the EUT under transmitting condition.



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4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA :

802.11a

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	80.9 PK	91.2	-10.3	1.00 H	106	42.20	38.70
2	#5725.00	64.2 AV	80.9	-16.7	1.00 H	106	25.50	38.70
3	*5745.00	111.2 PK			1.00 H	106	72.40	38.80
4	*5745.00	100.9 AV			1.00 H	106	62.10	38.80
5	11490.00	57.3 PK	74.0	-16.7	1.00 H	352	7.90	49.40
6	11490.00	45.2 AV	54.0	-8.8	1.00 H	352	-4.20	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	86.3 PK	96.4	-10.1	1.00 V	3	47.60	38.70
2	#5725.00	71.4 AV	86.9	-15.5	1.00 V	3	32.70	38.70
3	*5745.00	116.4 PK			1.00 V	3	77.60	38.80
4	*5745.00	106.9 AV			1.00 V	3	68.10	38.80
5	7660.00	56.1 PK	74.0	-17.9	1.00 V	162	11.80	44.30
6	7660.00	48.6 AV	54.0	-5.4	1.00 V	162	4.30	44.30
7	11490.00	59.3 PK	74.0	-14.7	1.02 V	18	9.90	49.40
8	11490.00	47.9 AV	54.0	-6.1	1.02 V	18	-1.50	49.40

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	113.3 PK			1.00 H	109	74.40	38.90
2	*5785.00	102.6 AV			1.00 H	109	63.70	38.90
3	7713.00	54.2 PK	74.0	-19.8	1.00 H	33	9.90	44.30
4	7713.00	44.9 AV	54.0	-9.1	1.00 H	33	0.60	44.30
5	11570.00	57.7 PK	74.0	-16.3	1.00 H	104	8.50	49.20
6	11570.00	45.1 AV	54.0	-8.9	1.00 H	104	-4.10	49.20
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	*5785.00	118.1 PK			1.01 V	359	79.20	38.90
2	*5785.00	107.8 AV			1.01 V	359	68.90	38.90
3	7713.00	54.9 PK	74.0	-19.1	1.00 V	164	10.60	44.30
4	7713.00	47.0 AV	54.0	-7.0	1.00 V	164	2.70	44.30
5	11570.00	61.5 PK	74.0	-12.5	1.00 V	158	12.30	49.20
6	11570.00	48.6 AV	54.0	-5.4	1.00 V	158	-0.60	49.20

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.
6. The limit value is defined as per 15.247.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 161	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5805.00	114.0 PK			1.00 H	68	75.10	38.90
2	*5805.00	103.6 AV			1.00 H	68	64.70	38.90
3	#5850.00	59.6 PK	94.0	-34.4	1.00 H	68	20.60	39.00
4	#5850.00	46.9 AV	83.6	-36.7	1.00 H	68	7.90	39.00
5	11610.00	57.9 PK	74.0	-16.1	1.00 H	253	8.80	49.10
6	11610.00	45.4 AV	54.0	-8.6	1.00 H	253	-3.70	49.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5805.00	120.2 PK			1.00 V	104	81.30	38.90
2	*5805.00	109.7 AV			1.00 V	104	70.80	38.90
3	#5850.00	71.6 PK	100.2	-28.6	1.00 V	104	32.60	39.00
4	#5850.00	54.6 AV	89.7	-35.1	1.00 V	104	15.60	39.00
5	11610.00	60.5 PK	74.0	-13.5	1.00 V	125	11.40	49.10
6	11610.00	50.1 AV	54.0	-3.9	1.00 V	125	1.00	49.10

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. “#”:The radiated frequency is out the restricted band.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	79.0 PK	90.3	-11.3	1.00 H	110	40.30	38.70
2	#5725.00	63.5 AV	80.2	-16.7	1.00 H	110	24.80	38.70
3	*5745.00	110.3 PK			1.00 H	110	71.50	38.80
4	*5745.00	100.2 AV			1.00 H	110	61.40	38.80
5	11490.00	58.2 PK	74.0	-15.8	1.00 H	355	8.80	49.40
6	11490.00	45.6 AV	54.0	-8.4	1.00 H	355	-3.80	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	84.1 PK	95.5	-11.4	1.00 V	192	45.40	38.70
2	#5725.00	67.2 AV	85.0	-17.8	1.00 V	192	28.50	38.70
3	*5745.00	115.5 PK			1.00 V	192	76.70	38.80
4	*5745.00	105.0 AV			1.00 V	192	66.20	38.80
5	11490.00	60.2 PK	74.0	-13.8	1.01 V	20	10.80	49.40
6	11490.00	48.3 AV	54.0	-5.7	1.01 V	20	-1.10	49.40

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 157	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	114.2 PK			1.00 H	110	75.30	38.90
2	*5785.00	103.2 AV			1.00 H	110	64.30	38.90
3	7713.00	53.6 PK	74.0	-20.4	1.00 H	258	9.30	44.30
4	7713.00	44.8 AV	54.0	-9.2	1.00 H	258	0.50	44.30
5	11570.00	57.6 PK	74.0	-16.4	1.00 H	107	8.40	49.20
6	11570.00	45.3 AV	54.0	-8.7	1.00 H	107	-3.90	49.20
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	*5785.00	117.6 PK			1.02 V	360	78.70	38.90
2	*5785.00	106.5 AV			1.02 V	360	67.60	38.90
3	7713.00	55.2 PK	74.0	-18.8	1.00 V	144	10.90	44.30
4	7713.00	46.9 AV	54.0	-7.1	1.00 V	144	2.60	44.30
5	11570.00	61.0 PK	74.0	-13.0	1.00 V	205	11.80	49.20
6	11570.00	48.5 AV	54.0	-5.5	1.00 V	205	-0.70	49.20

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.
6. The limit value is defined as per 15.247.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 161	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5805.00	113.8 PK			1.00 H	58	74.90	38.90
2	*5805.00	102.6 AV			1.00 H	58	63.70	38.90
3	#5850.00	58.0 PK	93.8	-35.8	1.00 H	58	19.00	39.00
4	#5850.00	46.2 AV	82.6	-36.4	1.00 H	58	7.20	39.00
5	11610.00	58.2 PK	74.0	-15.8	1.00 H	264	9.10	49.10
6	11610.00	45.6 AV	54.0	-8.4	1.00 H	264	-3.50	49.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5805.00	119.6 PK			1.00 V	125	80.70	38.90
2	*5805.00	109.8 AV			1.00 V	125	70.90	38.90
3	#5850.00	70.8 PK	99.6	-28.8	1.00 V	125	31.80	39.00
4	#5850.00	53.6 AV	89.8	-36.2	1.00 V	125	14.60	39.00
5	11610.00	60.8 PK	74.0	-13.2	1.00 V	147	11.70	49.10
6	11610.00	50.3 AV	54.0	-3.7	1.00 V	147	1.20	49.10

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 151	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	71.4 PK	82.5	-11.1	1.00 H	135	32.70	38.70
2	#5725.00	55.2 AV	72.9	-17.7	1.00 H	135	16.50	38.70
3	*5755.00	102.5 PK			1.00 H	135	63.70	38.80
4	*5755.00	92.9 AV			1.00 H	135	54.10	38.80
5	11510.00	57.8 PK	74.0	-16.2	1.02 H	158	8.40	49.40
6	11510.00	44.3 AV	54.0	-9.7	1.02 H	158	-5.10	49.40
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5725.00	82.5 PK	93.0	-10.5	1.03 V	91	43.80	38.70
2	#5725.00	70.9 AV	81.4	-10.5	1.03 V	91	32.20	38.70
3	*5755.00	113.0 PK			1.03 V	91	74.20	38.80
4	*5755.00	101.4 AV			1.03 V	91	62.60	38.80
5	11510.00	57.1 PK	74.0	-16.9	1.00 V	302	7.70	49.40
6	11510.00	44.7 AV	54.0	-9.3	1.00 V	302	-4.70	49.40

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 159	FREQUENCY RANGE	1 ~ 40GHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	21deg. C, 66%RH	TESTED BY	Antony Lee

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.4 PK			1.01 H	101	68.50	38.90
2	*5795.00	97.0 AV			1.01 H	101	58.10	38.90
3	#5850.00	76.7 PK	87.4	-10.7	1.00 H	101	37.70	39.00
4	#5850.00	59.6 AV	77.0	-17.4	1.00 H	101	20.60	39.00
5	11590.00	58.3 PK	74.0	-15.7	1.00 H	305	9.20	49.10
6	11590.00	46.2 AV	54.0	-7.8	1.00 H	305	-2.90	49.10
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	115.4 PK			1.01 V	13	76.50	38.90
2	*5795.00	104.4 AV			1.01 V	13	65.50	38.90
3	#5850.00	80.2 PK	95.4	-15.2	1.00 V	13	41.20	39.00
4	#5850.00	67.4 AV	84.4	-17.0	1.00 V	13	28.40	39.00
5	11590.00	57.9 PK	74.0	-16.1	1.00 V	325	8.80	49.10
6	11590.00	45.6 AV	54.0	-8.4	1.00 V	325	-3.50	49.10

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The limit value is defined as per 15.247.
7. "#":The radiated frequency is out the restricted band.



A D T

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

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 149	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (SYSTEM)	120Vac, 60 Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	22deg. C, 67%RH	TESTED BY	Brad Tung

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	156.10	31.2 QP	43.5	-12.3	1.99 H	79	17.50	13.70
2	202.66	28.3 QP	43.5	-15.2	1.24 H	295	17.40	10.90
3	282.20	29.2 QP	46.0	-16.8	1.00 H	287	15.00	14.20
4	530.52	36.8 QP	46.0	-9.2	1.49 H	314	16.10	20.70
5	641.10	36.3 QP	46.0	-9.7	1.24 H	13	13.50	22.80
6	875.84	39.4 QP	46.0	-6.6	1.49 H	294	13.30	26.10

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	70.74	27.7 QP	40.0	-12.3	1.00 V	6	15.70	12.00
2	156.10	25.9 QP	43.5	-17.6	1.00 V	47	12.20	13.70
3	315.18	28.2 QP	46.0	-17.8	1.49 V	335	12.90	15.30
4	344.28	29.3 QP	46.0	-16.7	1.49 V	15	13.30	16.00
5	530.52	34.9 QP	46.0	-11.1	1.49 V	195	14.20	20.70
6	664.38	32.2 QP	46.0	-13.8	1.00 V	267	9.20	23.00

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 OF EMISSION (MHz)	CONDUCTED LIMIT (dBµV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

- NOTE:** 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCS30	100288	Nov. 09, 2012	Nov. 08, 2013
RF signal cable Woken	5D-FB	Cable-HYCO2-01	Dec. 28, 2012	Dec. 27, 2013
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Dec. 21, 2012	Dec. 20, 2013
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 06, 2012	Jul. 05, 2013
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 TEST PROCEDURES

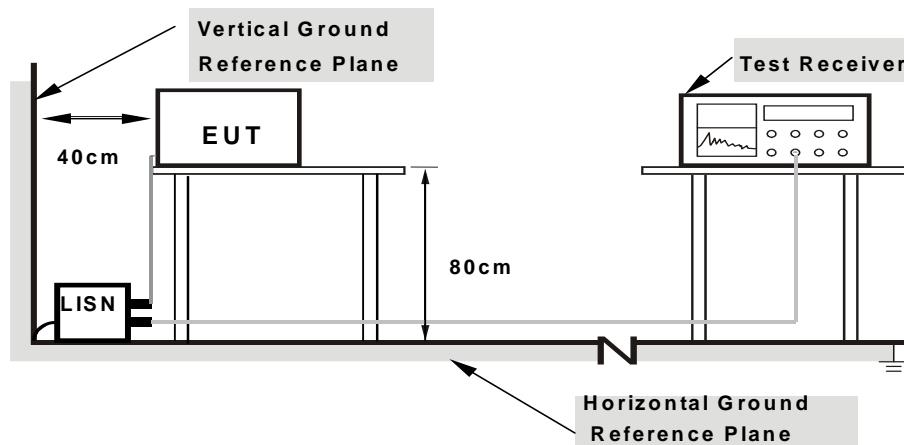
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

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

4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.

4.2.7 TEST RESULTS

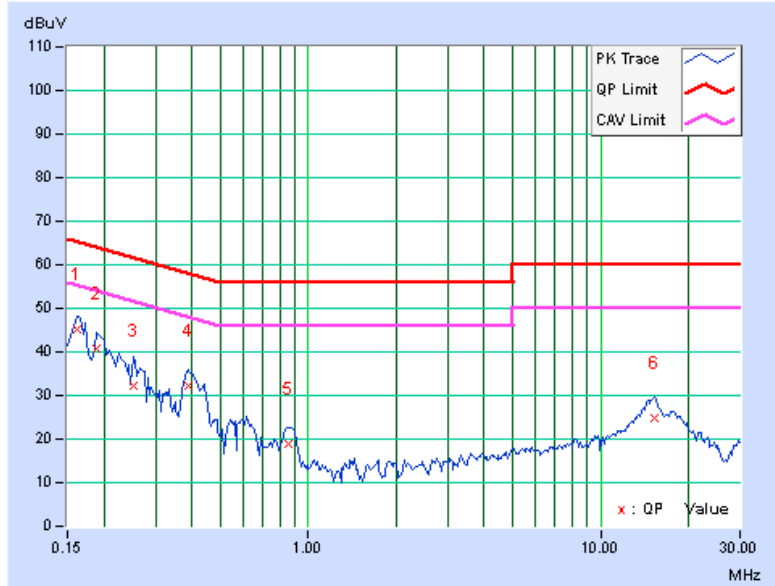
CONDUCTED WORST-CASE DATA : 802.11n(20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
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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	0.16172	0.10	45.03	32.90	45.13	33.00	65.38	55.38	-20.24	-22.37
2	0.18906	0.12	40.74	28.09	40.86	28.21	64.08	54.08	-23.22	-25.87
3	0.25156	0.13	31.98	22.01	32.11	22.14	61.71	51.71	-29.60	-29.57
4	0.38828	0.14	32.09	26.53	32.23	26.67	58.10	48.10	-25.87	-21.43
5	0.85313	0.15	18.80	9.53	18.95	9.68	56.00	46.00	-37.05	-36.32
6	15.37891	0.88	24.07	18.47	24.95	19.35	60.00	50.00	-35.05	-30.65

REMARKS:

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

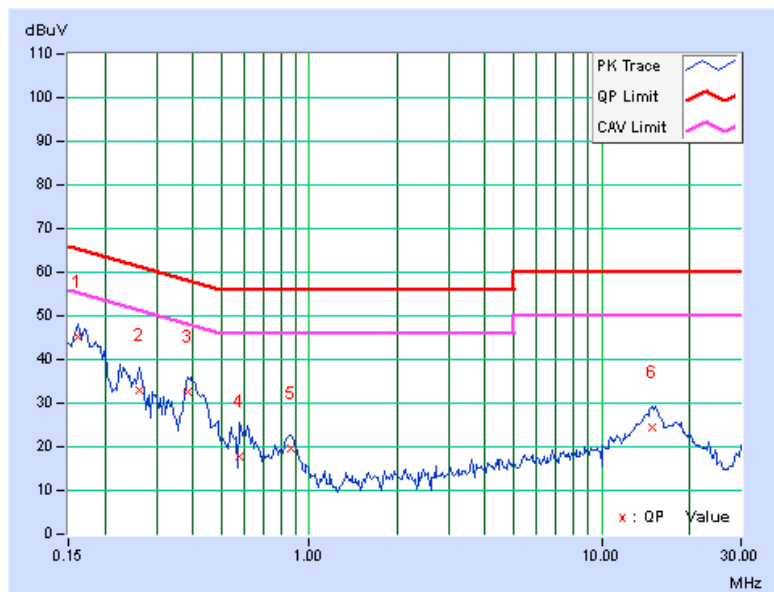


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16177	0.12	45.11	33.06	45.23	33.18	65.37	55.37	-20.14	-22.19
2	0.26328	0.14	32.73	24.30	32.87	24.44	61.33	51.33	-28.46	-26.89
3	0.38438	0.15	32.26	26.59	32.41	26.74	58.18	48.18	-25.78	-21.45
4	0.57578	0.15	17.79	3.77	17.94	3.92	56.00	46.00	-38.06	-42.08
5	0.86484	0.16	19.65	11.31	19.81	11.47	56.00	46.00	-36.19	-34.53
6	15.00781	0.69	23.87	18.64	24.56	19.33	60.00	50.00	-35.44	-30.67

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.

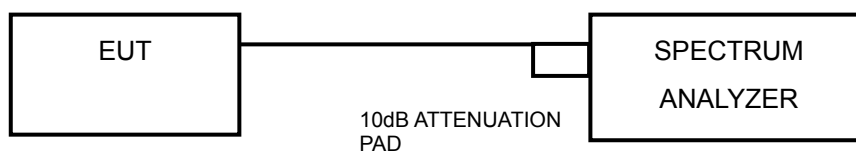


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

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

- Set resolution bandwidth (RBW) = approximately 1% of the emission bandwidth
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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 RESULTS

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
149	5745	16.57	16.57	16.54	16.53	0.5	PASS
157	5785	16.58	16.56	16.52	16.50	0.5	PASS
161	5805	17.67	17.65	17.64	17.66	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
149	5745	17.68	17.66	17.67	17.65	0.5	PASS
157	5785	17.67	17.67	17.64	17.64	0.5	PASS
161	5805	17.65	17.66	17.64	17.63	0.5	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)				MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3		
151	5755	36.42	35.56	36.43	36.13	0.5	PASS
159	5795	36.42	36.11	36.42	36.10	0.5	PASS



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4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 5725 –5850 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v01r02 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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 $NANT \geq 5$.

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

4.4.2 TEST SETUP

Same as Item 4.4.2.

4.4.3 INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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

802.11a

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
149	5745	23.78	23.65	23.03	23.47	893.760	29.51	30	PASS
157	5785	23.92	23.51	23.08	23.51	898.616	29.54	30	PASS
161	5805	23.95	23.62	23.12	23.38	901.344	29.55	30	PASS

802.11n (20MHz)

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
149	5745	23.89	23.51	23.28	23.44	902.908	29.56	30	PASS
157	5785	23.85	23.22	23.41	23.21	881.246	29.45	30	PASS
161	5805	23.82	23.61	23.28	23.27	895.744	29.52	30	PASS

802.11n (40MHz)

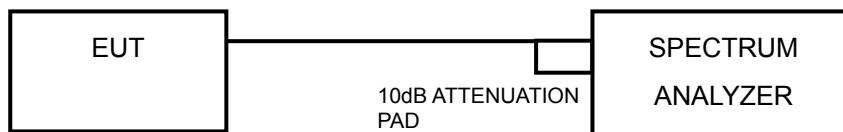
CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)				TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
151	5755	23.94	23.82	23.75	23.85	968.531	29.86	30	PASS
159	5795	23.98	23.84	23.82	23.78	971.910	29.88	30	PASS

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 the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
- b. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
- c. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

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

802.11a

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-8.09	6.02	-2.07	8	PASS
	157	5785	-8.82	6.02	-2.80	8	PASS
	161	5805	-10.52	6.02	-4.50	8	PASS
1	149	5745	-10.57	6.02	-4.55	8	PASS
	157	5785	-10.57	6.02	-4.55	8	PASS
	161	5805	-10.99	6.02	-4.97	8	PASS
2	149	5745	-10.79	6.02	-4.77	8	PASS
	157	5785	-10.78	6.02	-4.76	8	PASS
	161	5805	-11.61	6.02	-5.59	8	PASS

802.11n (20MHz)

TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	149	5745	-25.78	6.02	-19.76	8	PASS
	157	5785	-25.46	6.02	-19.44	8	PASS
	161	5805	-25.20	6.02	-19.18	8	PASS
1	149	5745	-25.99	6.02	-19.97	8	PASS
	157	5785	-25.53	6.02	-19.51	8	PASS
	161	5805	-25.69	6.02	-19.67	8	PASS
2	149	5745	-26.91	6.02	-20.89	8	PASS
	157	5785	-26.27	6.02	-20.25	8	PASS
	161	5805	-25.40	6.02	-19.38	8	PASS

802.11n (40MHz)

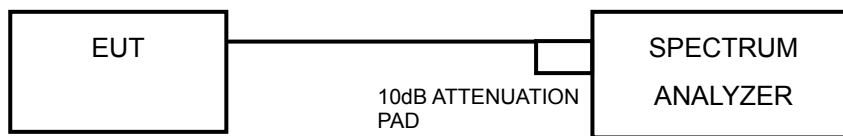
TX chain	Channel	FREQ. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	151	5755	-14.13	6.02	-8.11	8	PASS
	159	5795	-13.46	6.02	-7.44	8	PASS
1	151	5755	-13.69	6.02	-7.67	8	PASS
	159	5795	-14.67	6.02	-8.65	8	PASS
2	151	5755	-11.48	6.02	-5.46	8	PASS
	159	5795	-12.22	6.02	-6.20	8	PASS

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

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 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.



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MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Set span to encompass the spectrum to be examined.
4. Detector = peak.
5. Trace Mode = max hold.
6. 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 conducted emission test is performed on each TX port of operating mode without summing or adding $10\log(N)$ since the limit is relative emission limit.

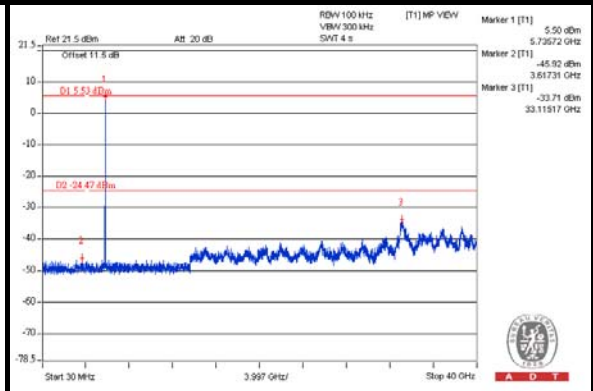
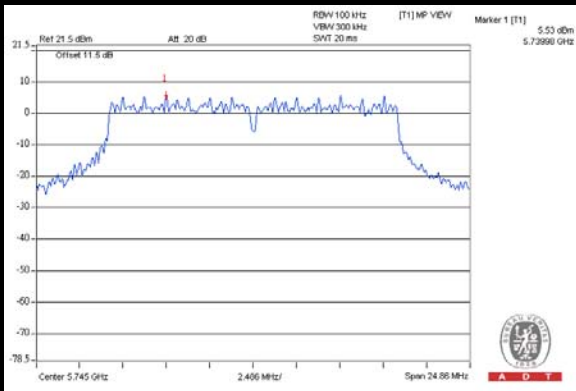
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



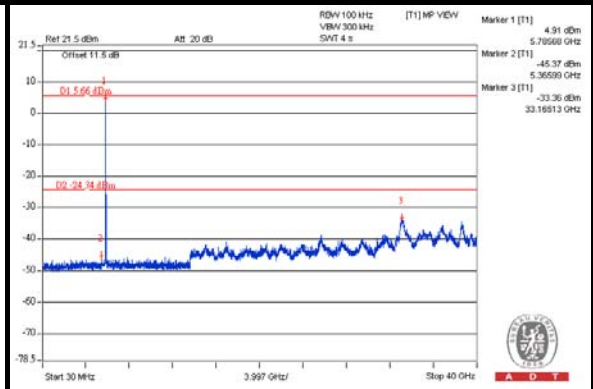
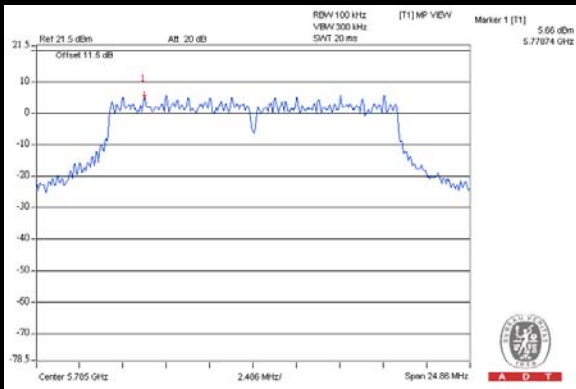
A D T

802.11a
CHAIN 0

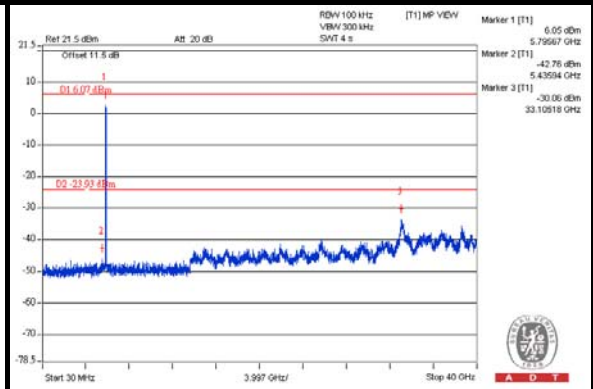
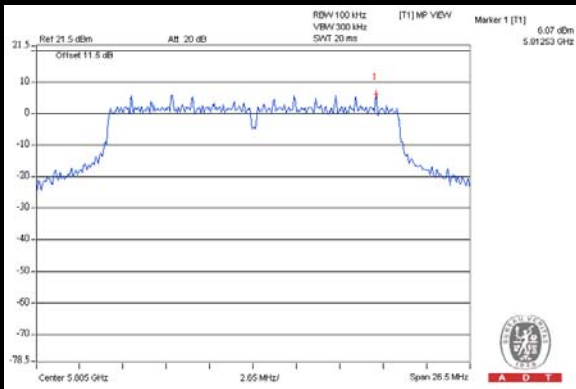
CH 149



CH 157

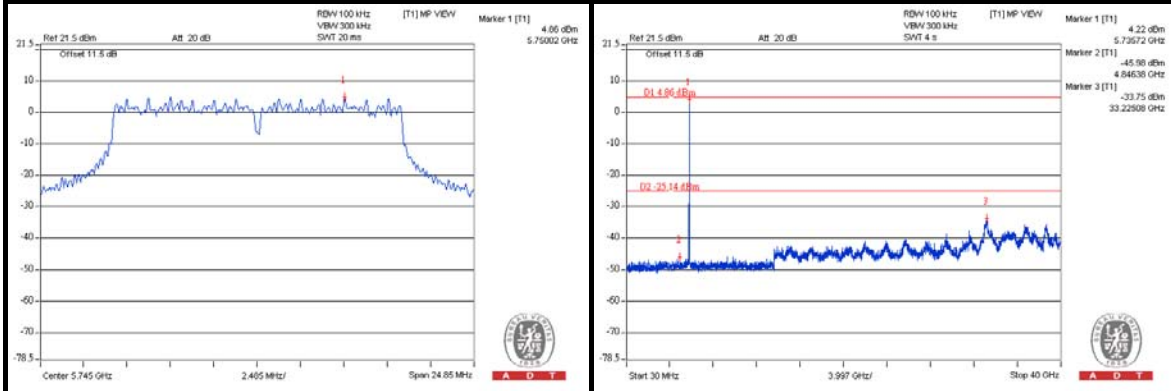


CH 161

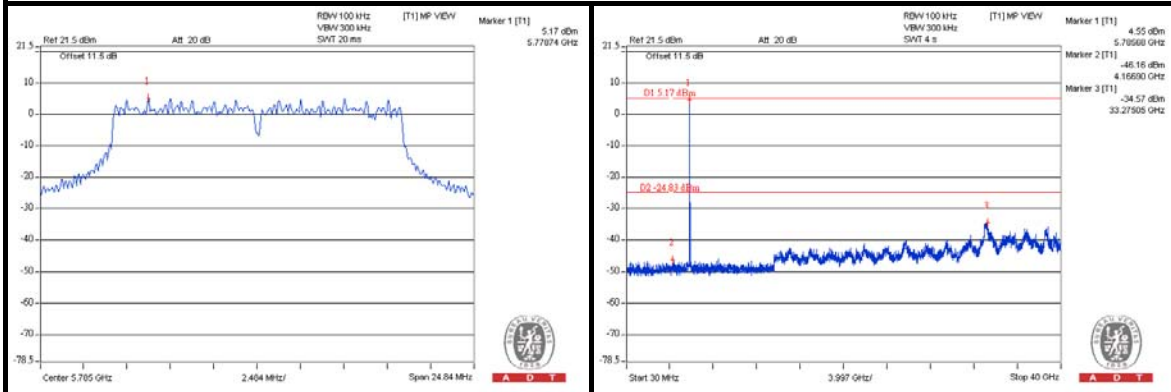


CHAIN 1

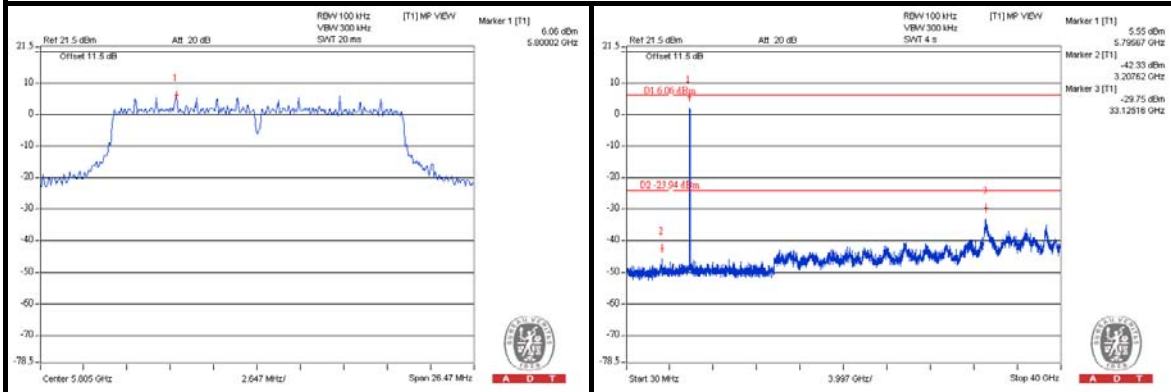
CH 149



CH 157



CH 161

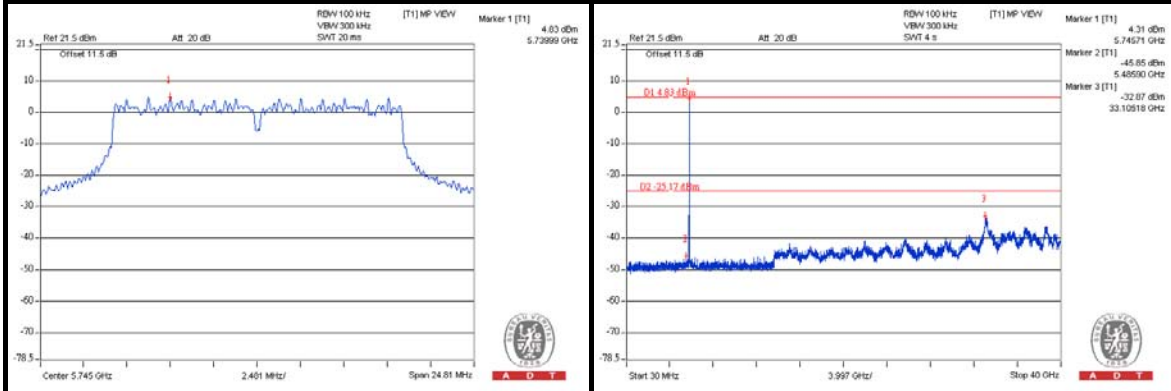




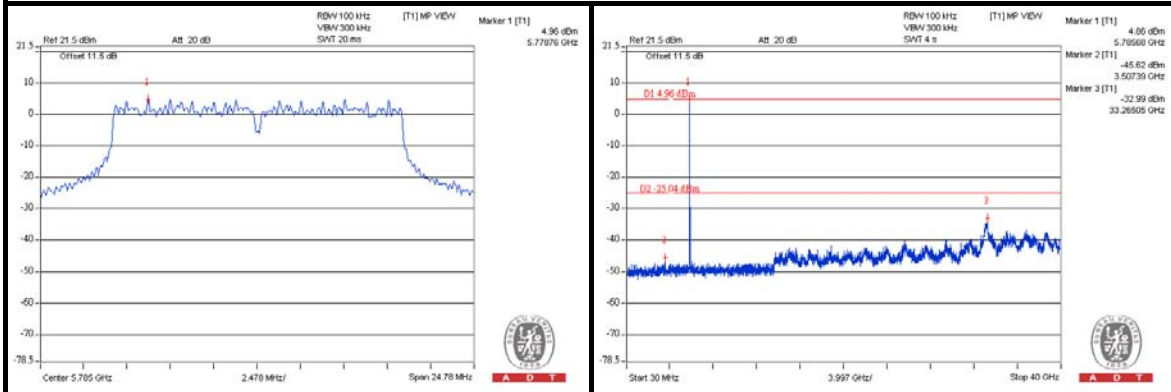
A D T

CHAIN 2

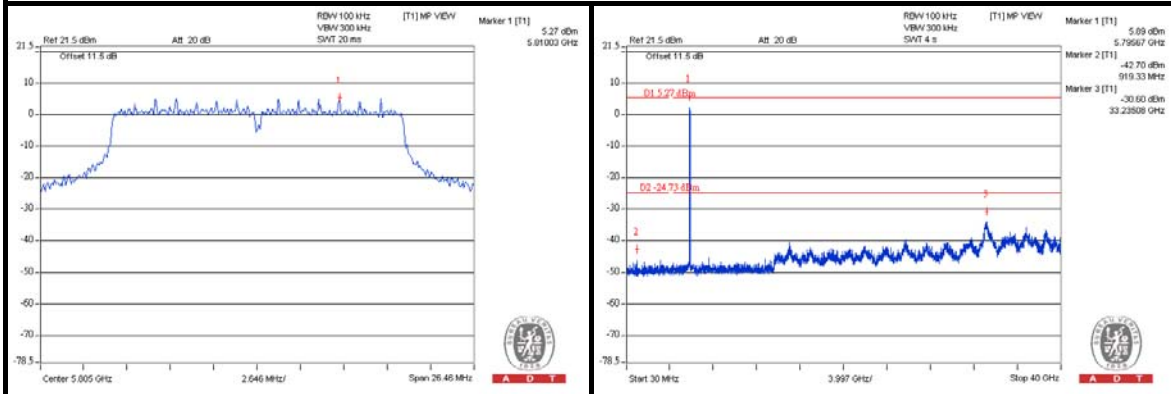
CH 149



CH 157



CH 161

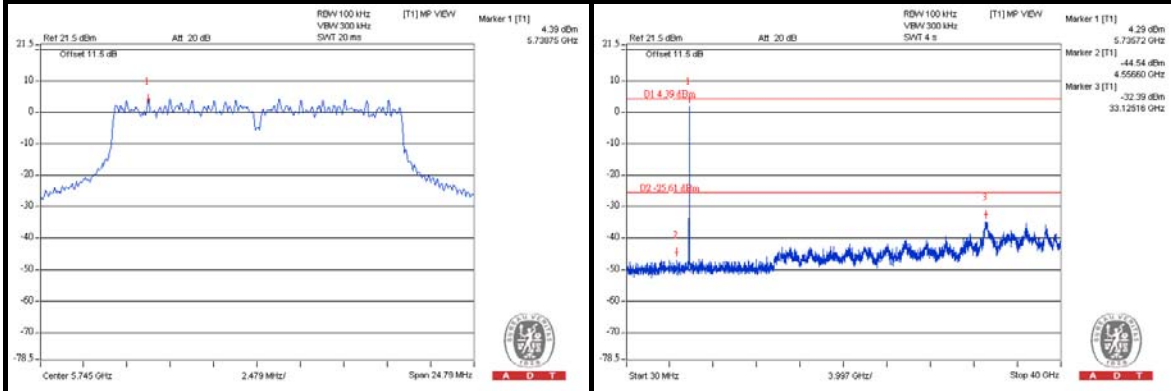




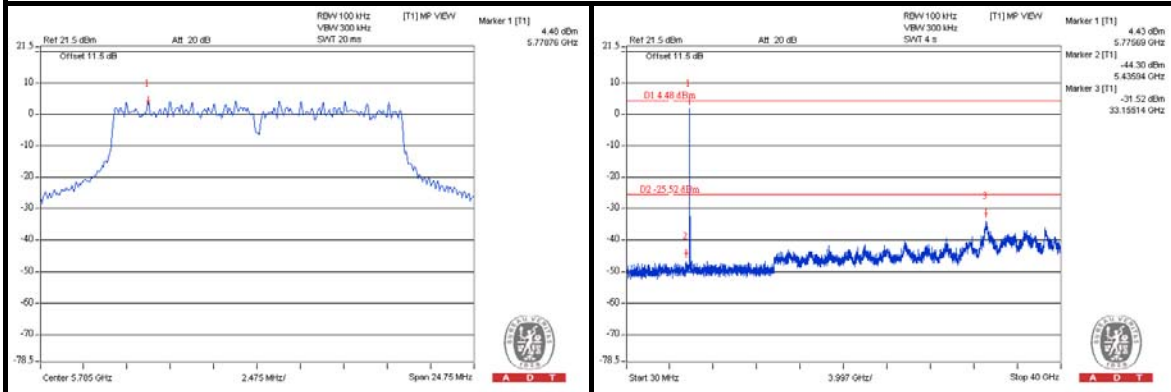
A D T

CHAIN 3

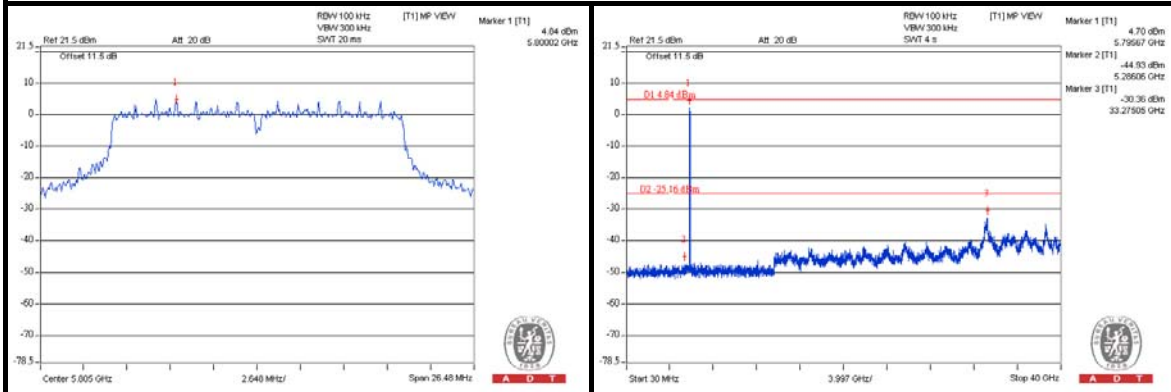
CH 149



CH 157



CH 161



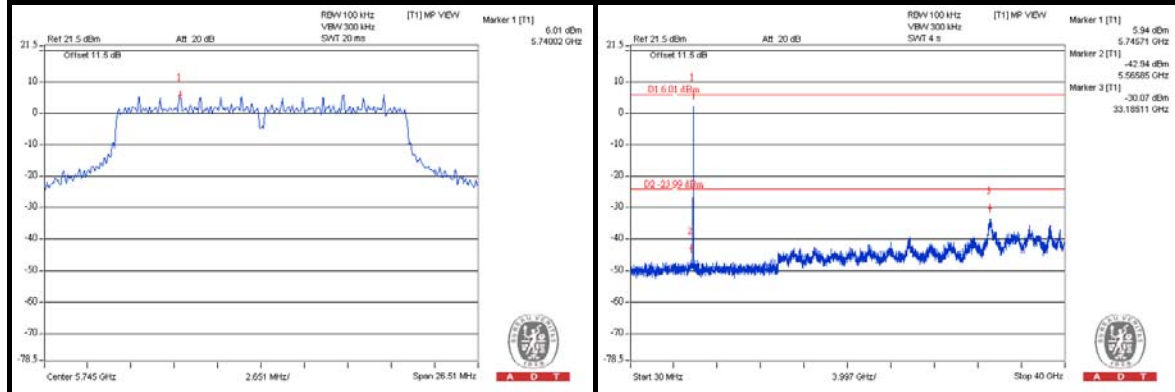


A D T

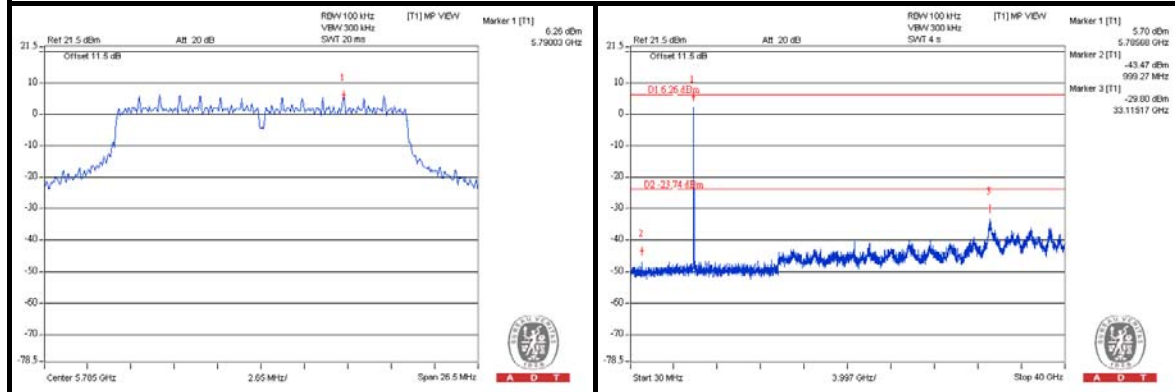
802.11n (20MHz)

CHAIN 0

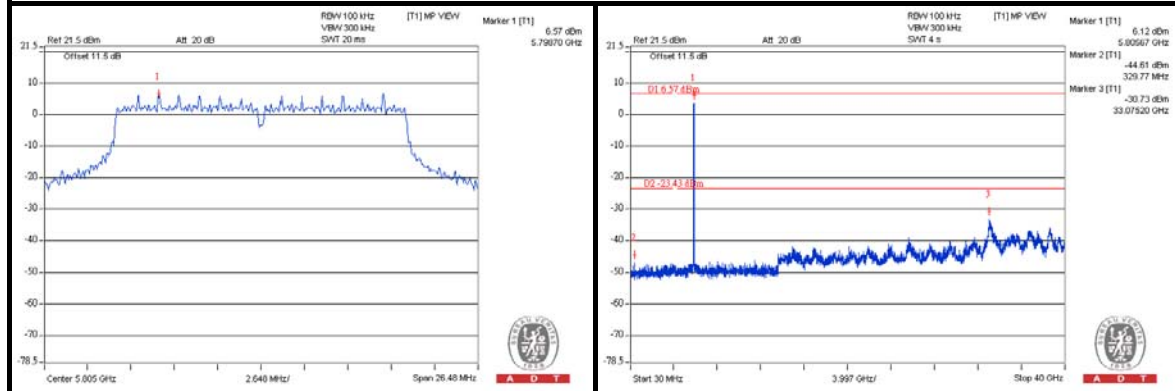
CH 149



CH 157

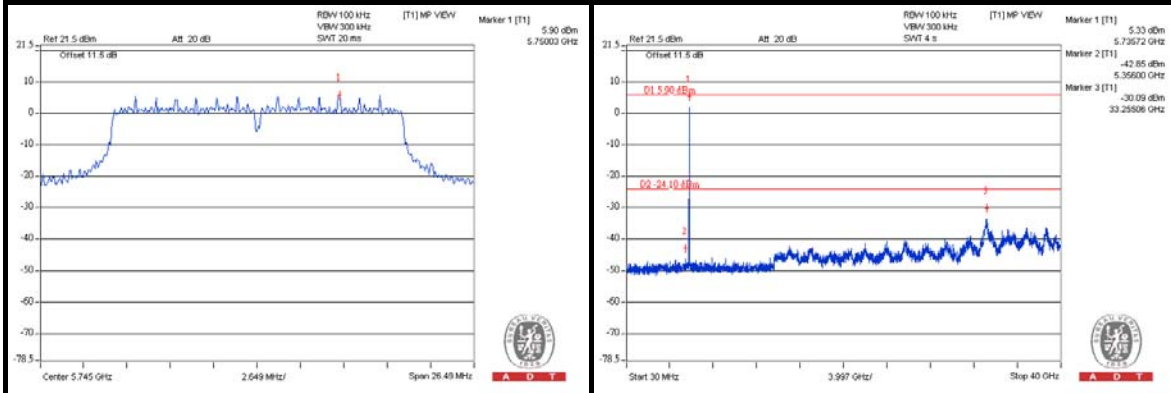


CH 161

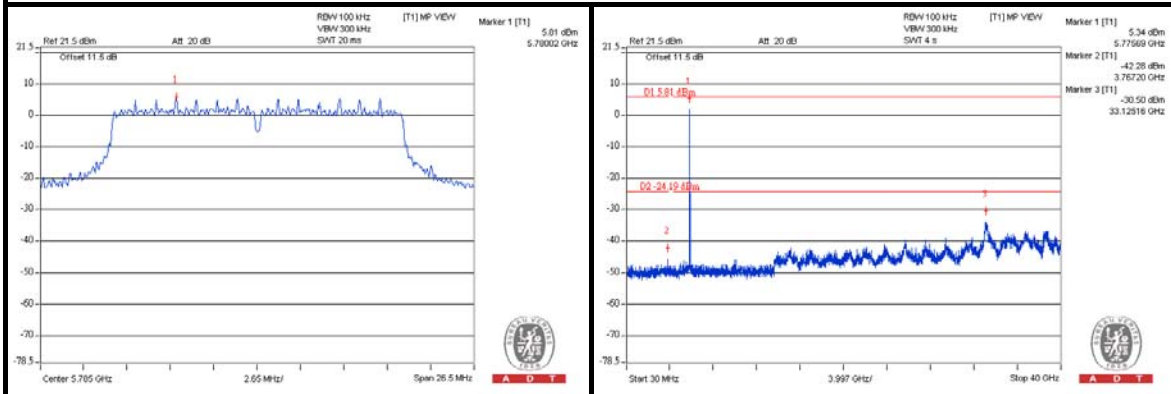


CHAIN 1

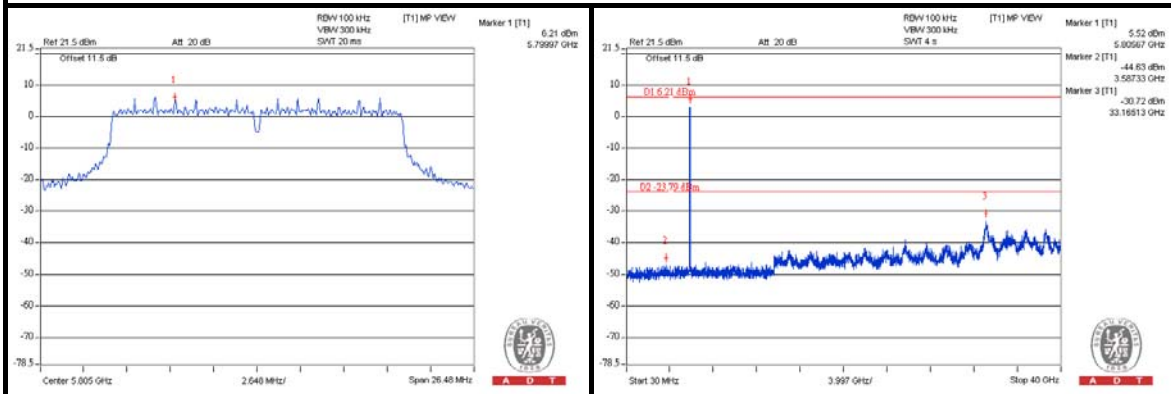
CH 149



CH 157

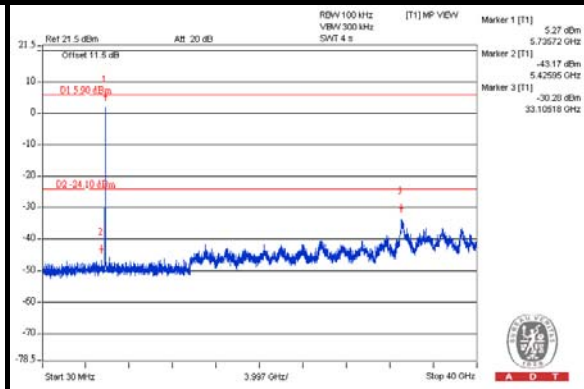
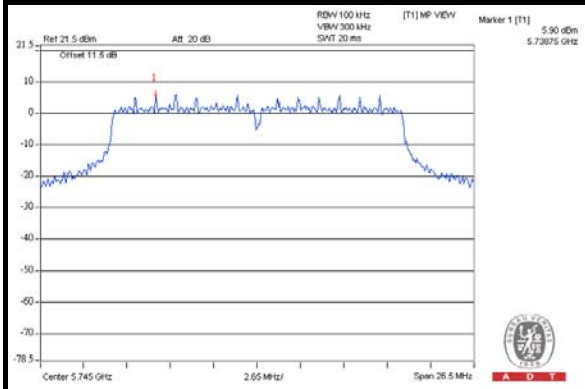


CH 161

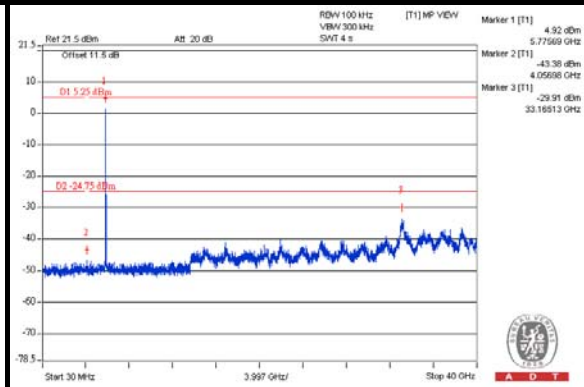
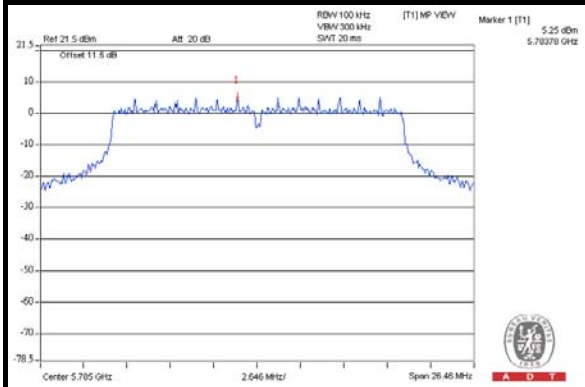


CHAIN 2

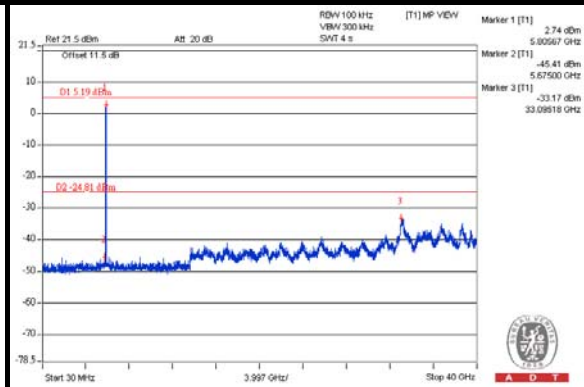
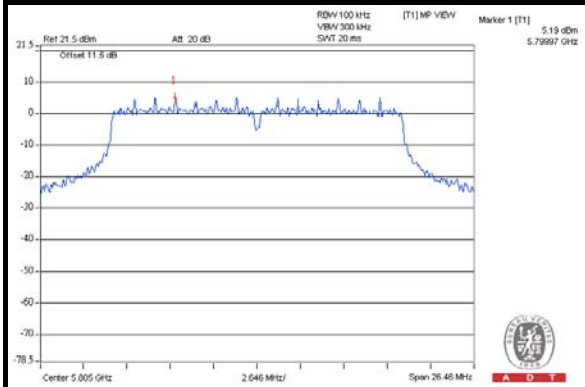
CH 149



CH 157



CH 161

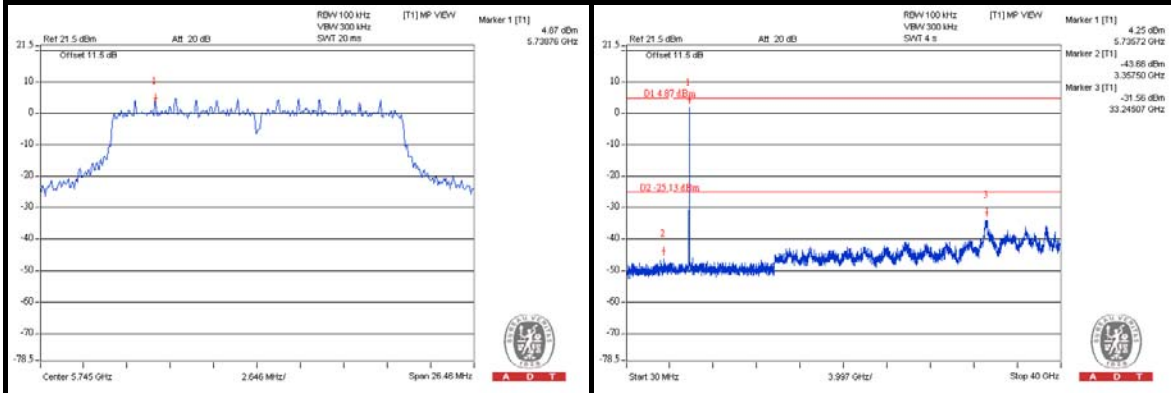




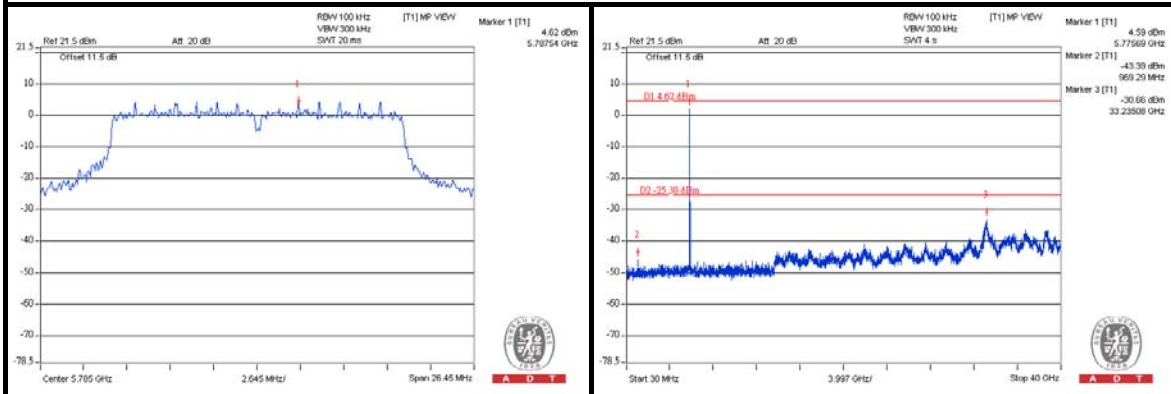
A D T

CHAIN 3

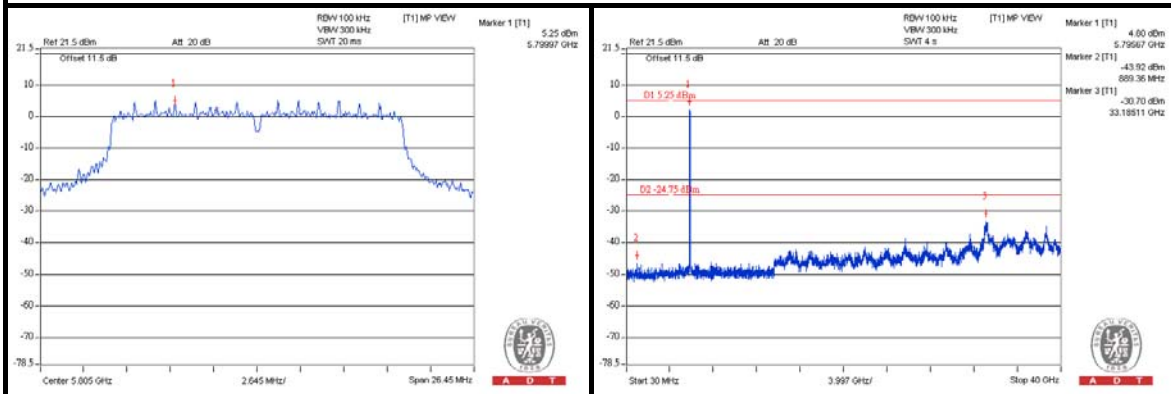
CH 149



CH 157



CH 161



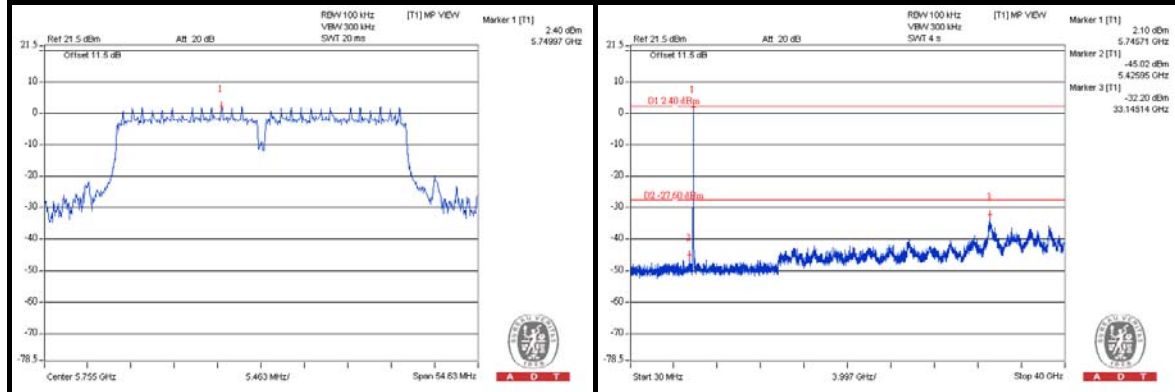


A D T

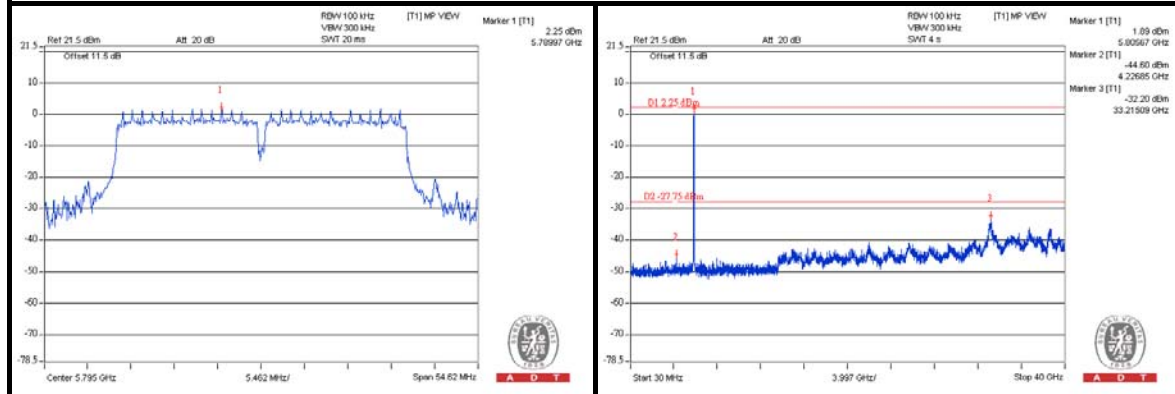
802.11n (40MHz)

CHAIN 0

CH 151



CH 159

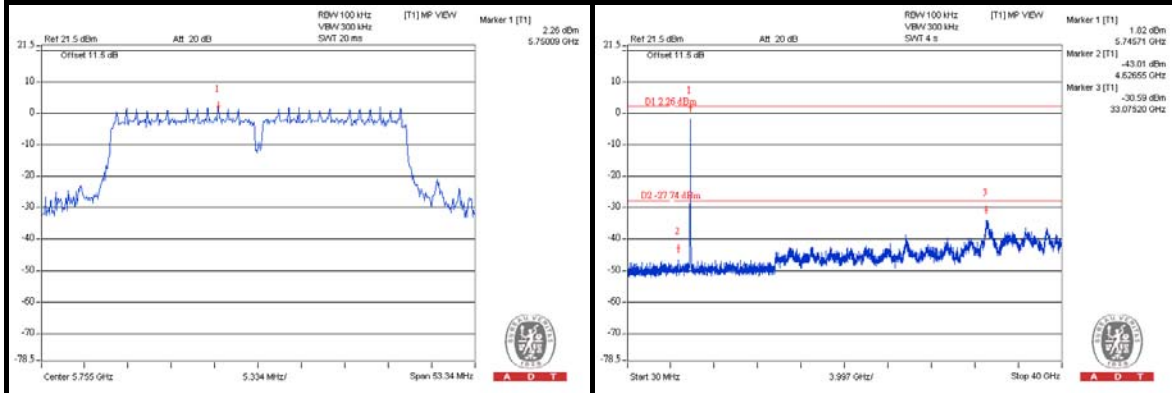




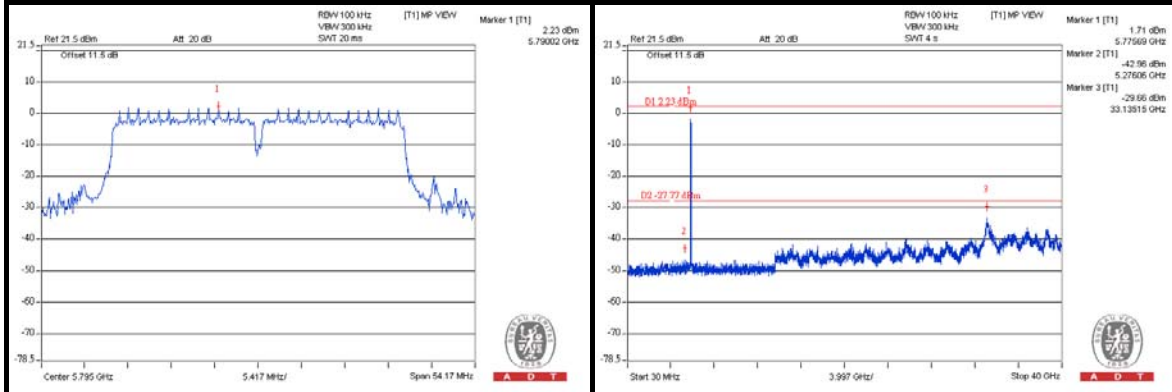
A D T

CHAIN 1

CH 151



CH 159

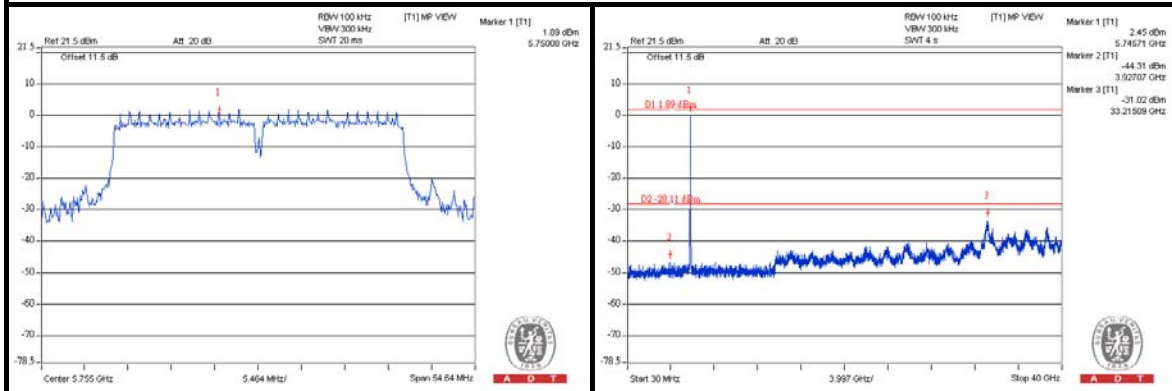




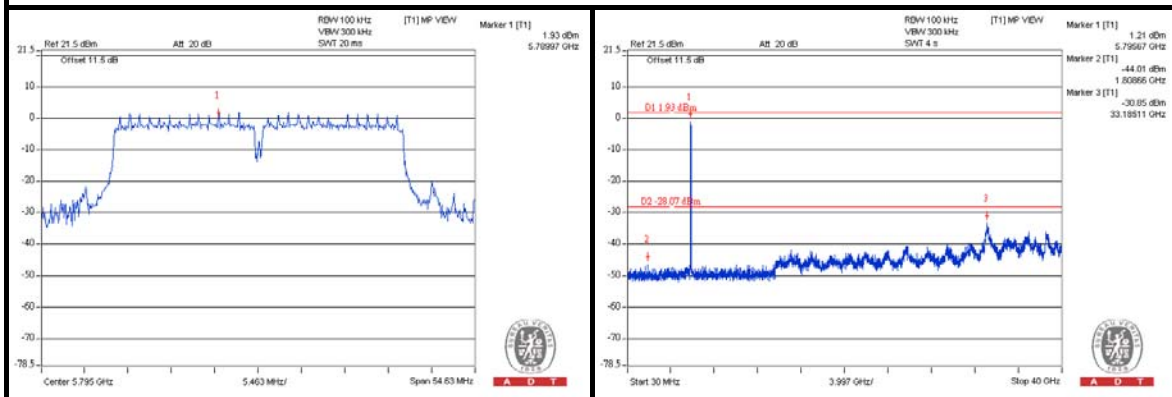
A D T

CHAIN 2

CH 151



CH 159

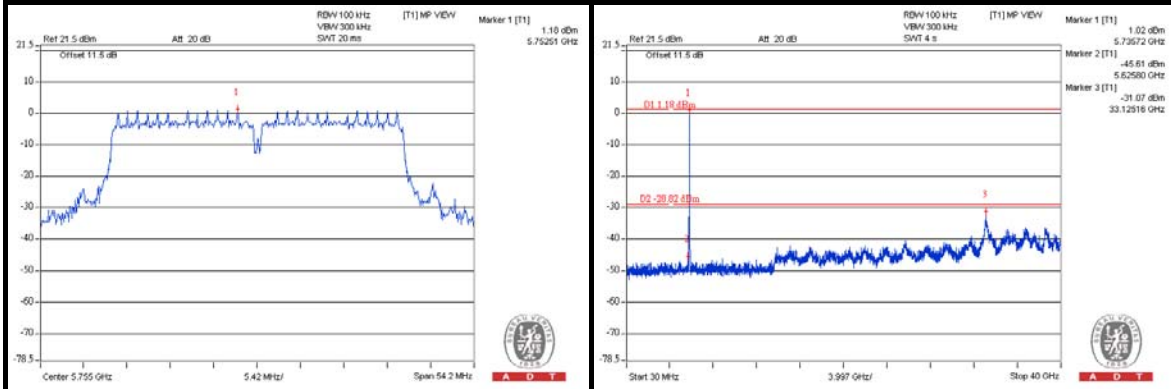




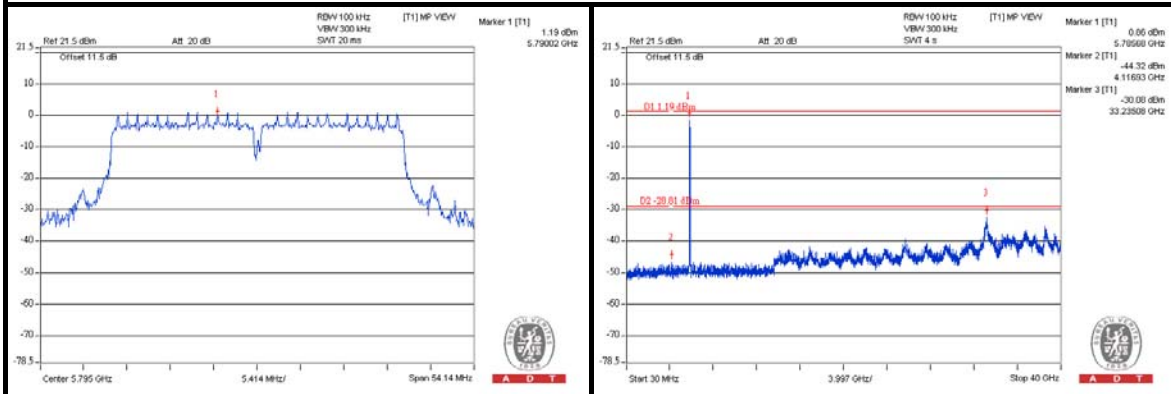
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CHAIN 3

CH 151



CH 159





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5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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6. INFORMATION ON THE TESTING LABORATORIES

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

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

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Fax: 886-2-26051924

Hsin Chu EMC/RF Lab

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Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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



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

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

---END---