FCC TEST REPORT

REPORT NO.: RF140910C20

MODEL NO.: APL27-0B1

FCC ID: E2K-APL270B1

RECEIVED: Sep. 10, 2014

TESTED: Sep. 15 ~ Sep. 30, 2014

ISSUED: Oct. 14, 2014

APPLICANT: Dell Inc.

ADDRESS: One Dell Way, Round Rock, Texas 78682, USA

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

LAB ADDRESS: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140910C20	Original release.	Oct. 14, 2014

1. CERTIFICATION

PRODUCT:	Wireless Access Point
MODEL NO.:	APL27-0B1
BRAND:	Dell, Dell Sonicwall, Sonicwall
APPLICANT:	Dell Inc.
TESTED:	Sep. 15 ~ Sep. 30, 2014
TEST SAMPLE:	ENGINEERING SAMPLE
STANDARDS:	**FCC Part 15, Subpart C (Section 15.247)**
	ANSI C63.10-2009

The above equipment (model: APL27-0B1) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch,** and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ **, DATE :** Oct. 14, 2014

Pettie Chen / Senior Specialist

APPROVED BY : _____ **, DATE :** Oct. 14, 2014

Ken Liu / Senior Manager

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 -2.37dB at 0.18906MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -0.7dB at 4824.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.3dB at 2483.5MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is IPEX 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	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 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	Wireless Access Point
MODEL NO.	APL27-0B1
POWER SUPPLY	52Vdc from PoE
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 450.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
OUTPUT POWER	364.125mW
ANTENNA TYPE	Refer to Note
ANTENNA CONNECTOR	IPEX
POWER CORD	NA
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	NA

NOTE:

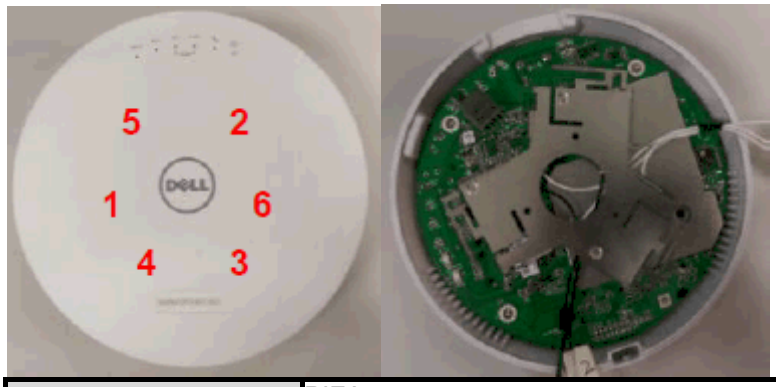
1. The EUT incorporates a MIMO function. Physically, the EUT provides three completed transmitters and three receivers.

MODULATION MODE	TX FUNCTION
802.11b	3TX
802.11g	3TX
802.11n (20MHz)	3TX
802.11n (40MHz)	3TX

2. The EUT uses following PoE. (Support units only)

PoE	
Model:	PE911
Input:	100~240Vac, 50/60Hz
Output:	52Vdc, 0.5A
Power Cord:	1m non-shielded cable without core

3. The following antennas were provided to the EUT.



Ant. Type	PIFA antenna										
Ant. Gain(dBi)	Frequency (MHz)										
	2400	2450	2500	5150	5250	5350	5450	5550	5650	5750	5850
Ant 1	2.87	2.84	3.88	-	-	-	-	-	-	-	-
Ant 2	2.33	2.49	4.29	-	-	-	-	-	-	-	-
Ant 3	2.92	2.85	3.73	-	-	-	-	-	-	-	-
Ant 4	-	-	-	5.41	5.25	5.89	5.71	6.09	5.89	5.83	5.57
Ant 5	-	-	-	5.78	5.66	5.97	6.13	5.66	5.94	5.01	5.18
Ant 6	-	-	-	5.94	5.76	6.04	5.35	4.94	5.14	5.13	5.51

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

3.2 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

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 (40MHz):

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

NOTE: 1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-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 (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	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)	1 to 11	6	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)	1 to 11	6	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)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 9	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)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
RE≥1G	21deg. C, 67%RH 20deg. C, 65%RH	120Vac, 60Hz	Jones Chang
RE<1G	22deg. C, 65%RH	120Vac, 60Hz	Jones Chang
PLC	25deg. C, 70%RH	120Vac, 60Hz	Jones Chang
APCM	24deg. C, 64%RH	120Vac, 60Hz	Antony Lee

3.3 DUTY CYCLE OF TEST SIGNAL

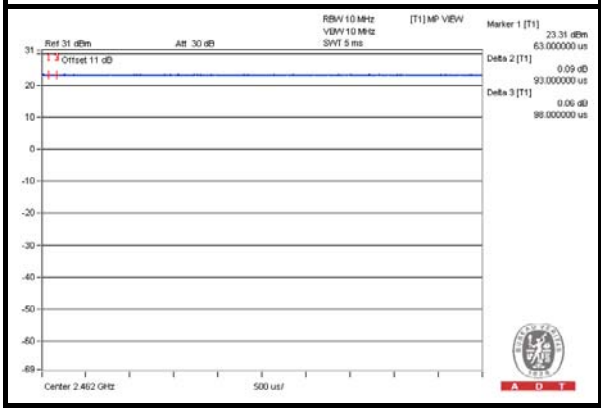
802.11b: Duty cycle = 0.717/0.725 = 0.989 > 98 %

802.11g: Duty cycle = 2.021/2.079 = 0.972, Duty factor = 10 * log(1/0.972) = 0.12

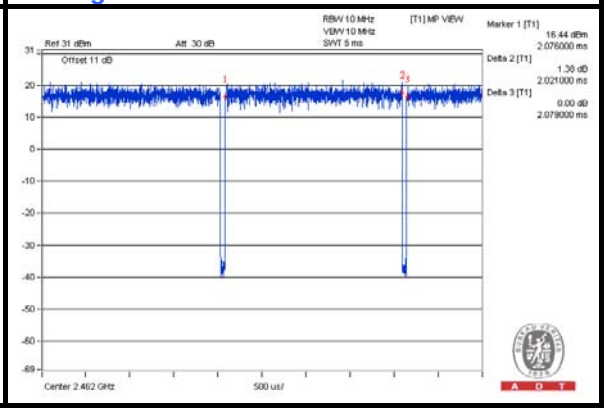
802.11n (20MHz): Duty cycle = 1.886/1.956 = 0.964, Duty factor = 10 * log(1/0.964) = 0.16

802.11n (40MHz): Duty cycle = 0.486/0.541 = 0.898, Duty factor = 10 * log(1/0.898) = 0.47

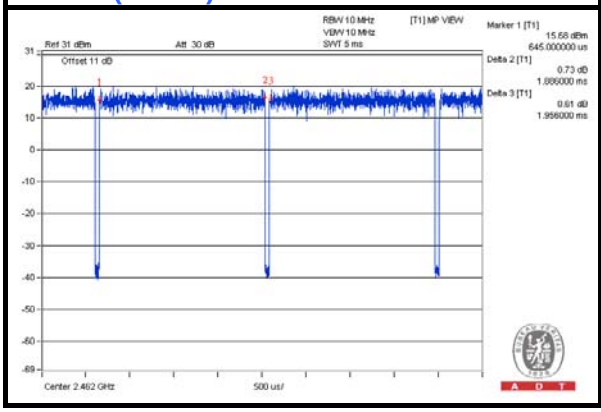
802.11b



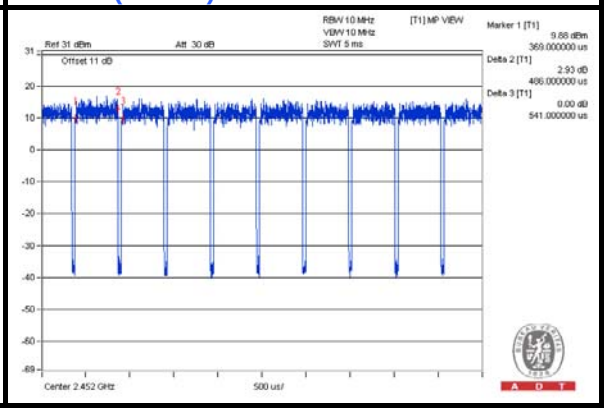
802.11g



802.11n (20MHz)



802.11n (40MHz)



3.4 DESCRIPTION OF SUPPORT UNITS

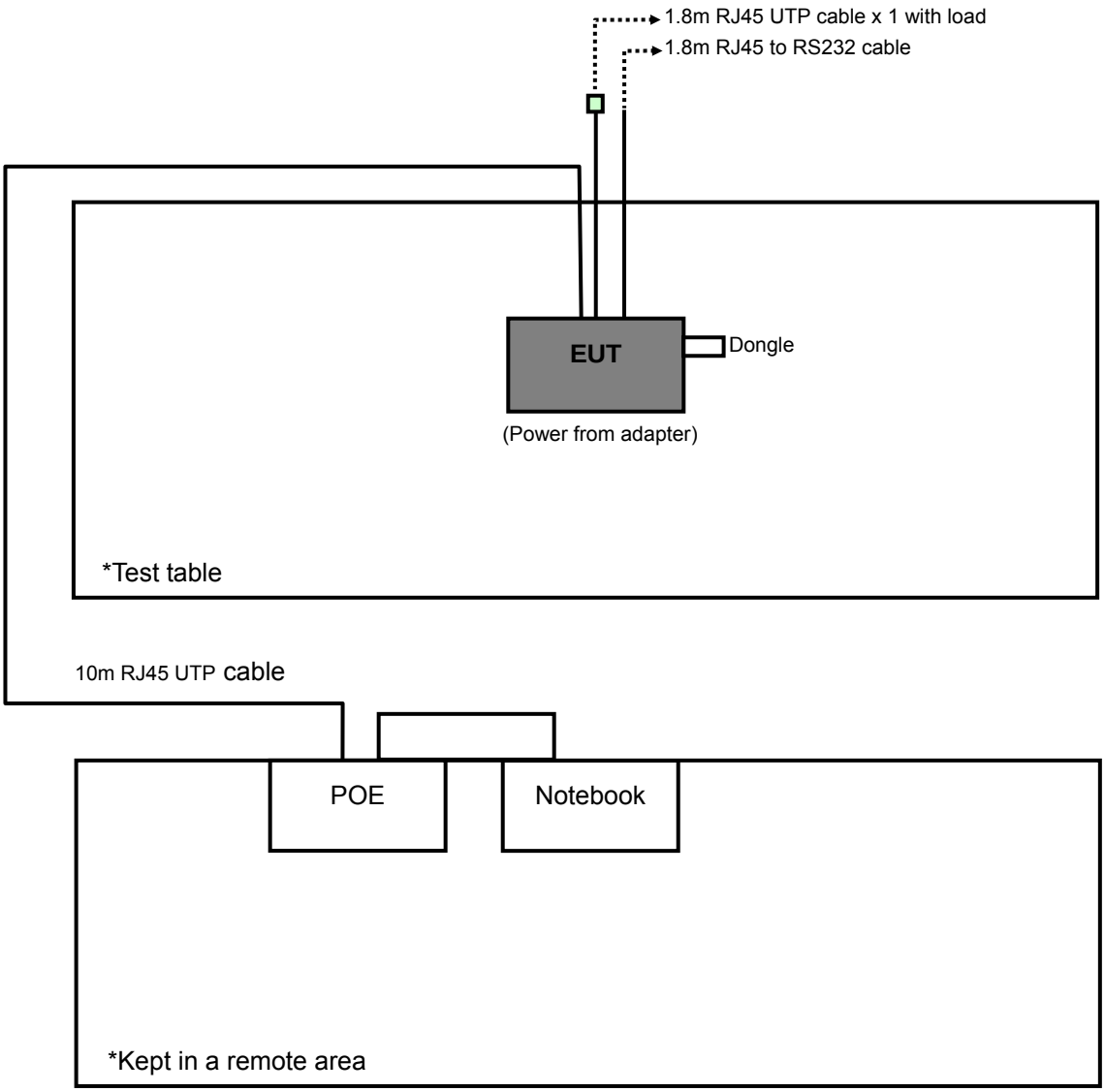
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	PoE	NA	PE911	NA	NA
3	Dongle	SANDISK	SDCZ6-1024	NA	NA

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	10m RJ45 UTP cable
2	NA
3	NA

NOTE:
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1, 2 acted as communication partners to transfer data.
3. Item 2 was provided by client.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

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

FCC Part 15, Subpart C (15.247)
558074 D01 DTS Meas Guidance v03r02
662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2009

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

NOTE: The EUT 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 30dB below the highest level of the desired power:

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 30dB under any condition of modulation.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Jan. 02, 2014	Jan. 01, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Mar. 03, 2014	Mar. 02, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	9120D	209	Aug. 25, 2014	Aug. 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 17, 2014	Feb. 16, 2015
Preamplifier Agilent	8447D	2944A10633	Oct. 07, 2014	Oct. 05, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	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. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015

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

2. The test was performed in HwaYa Chamber 3.

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 988962.

5. The IC Site Registration No. is IC 7450F-3.

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. Height of receiving 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 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:

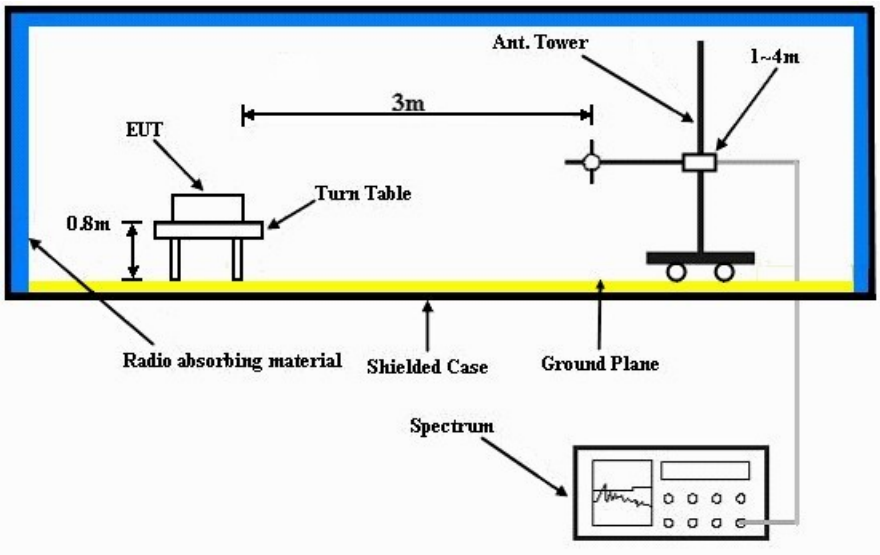
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

4.1.4 DEVIATION FROM TEST STANDARD

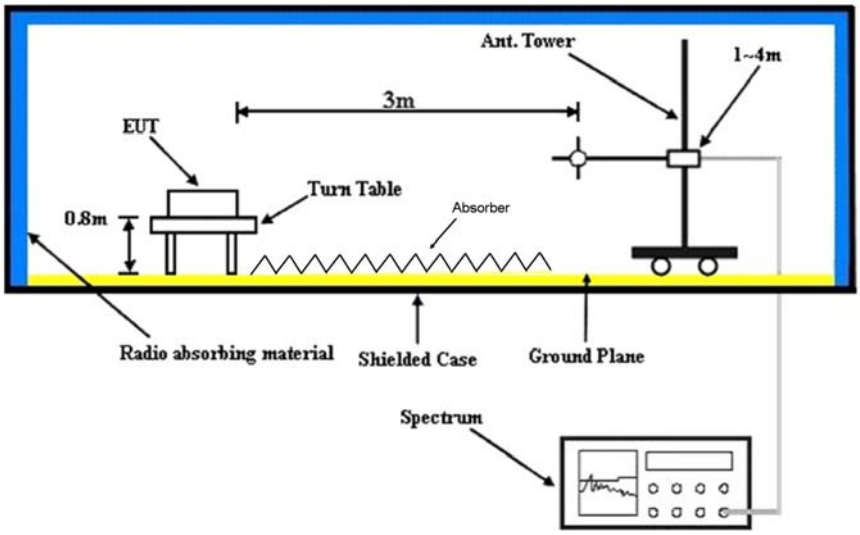
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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

4.1.6 EUT OPERATING CONDITIONS

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

4.1.7 TEST RESULTS

ABOVE 1GHz DATA：

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2390.00	59.5 PK	74.0	-14.5	1.10 H	300	26.30	33.20
2	2390.00	48.4 AV	54.0	-5.6	1.10 H	300	15.20	33.20
3	*2412.00	110.3 PK			1.45 H	337	77.00	33.30
4	*2412.00	107.0 AV			1.45 H	337	73.70	33.30
5	4824.00	56.0 PK	74.0	-18.0	1.09 H	16	49.90	6.10
6	**4824.00**	**53.3 AV**	**54.0**	**-0.7**	**1.09 H**	**16**	**47.20**	**6.10**

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	2390.00	59.1 PK	74.0	-14.9	1.00 V	14	25.90	33.20
2	2390.00	47.8 AV	54.0	-6.2	1.00 V	14	14.60	33.20
3	*2412.00	109.6 PK			2.24 V	334	76.30	33.30
4	*2412.00	106.3 AV			2.24 V	334	73.00	33.30
5	4824.00	55.8 PK	74.0	-18.2	1.00 V	12	49.70	6.10
6	4824.00	51.4 AV	54.0	-2.6	1.00 V	12	45.30	6.10

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.

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	2320.00	60.6 PK	74.0	-13.4	1.08 H	333	27.70	32.90
2	2320.00	49.4 AV	54.0	-4.6	1.08 H	333	16.50	32.90
3	*2437.00	115.2 PK			1.06 H	319	81.80	33.40
4	*2437.00	111.8 AV			1.06 H	319	78.40	33.40
5	4874.00	57.1 PK	74.0	-16.9	1.08 H	331	50.90	6.20
6	4874.00	53.0 AV	54.0	-1.0	1.08 H	331	46.80	6.20
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	2320.00	58.5 PK	74.0	-15.5	1.00 V	353	25.60	32.90
2	2320.00	47.3 AV	54.0	-6.7	1.00 V	353	14.40	32.90
3	*2437.00	110.8 PK			1.07 V	16	77.40	33.40
4	*2437.00	107.3 AV			1.07 V	16	73.90	33.40
5	4874.00	56.1 PK	74.0	-17.9	1.15 V	338	49.90	6.20
6	4874.00	52.3 AV	54.0	-1.7	1.15 V	338	46.10	6.20

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 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	116.2 PK			1.03 H	309	82.90	33.30
2	*2462.00	112.8 AV			1.03 H	309	79.50	33.30
3	2483.50	61.2 PK	74.0	-12.8	1.00 H	314	27.80	33.40
4	2483.50	49.8 AV	54.0	-4.2	1.00 H	314	16.40	33.40
5	4924.00	58.1 PK	74.0	-15.9	1.10 H	335	51.80	6.30
6	4924.00	53.0 AV	54.0	-1.0	1.10 H	335	46.70	6.30
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	113.7 PK			1.30 V	19	80.40	33.30
2	*2462.00	109.3 AV			1.30 V	19	76.00	33.30
3	2483.50	59.7 PK	74.0	-14.3	1.06 V	14	26.30	33.40
4	2483.50	49.0 AV	54.0	-5.0	1.06 V	14	15.60	33.40
5	4924.00	53.9 PK	74.0	-20.1	1.33 V	19	47.60	6.30
6	4924.00	49.9 AV	54.0	-4.1	1.33 V	19	43.60	6.30

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.7 PK	74.0	-4.3	1.07 H	331	36.50	33.20
2	2390.00	52.1 AV	54.0	-1.9	1.07 H	331	18.90	33.20
3	*2412.00	109.6 PK			1.03 H	311	76.30	33.30
4	*2412.00	100.1 AV			1.03 H	311	66.80	33.30
5	4824.00	49.4 PK	74.0	-24.6	1.11 H	323	43.30	6.10
6	4824.00	38.3 AV	54.0	-15.7	1.11 H	323	32.20	6.10
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	2390.00	65.6 PK	74.0	-8.4	1.90 V	326	32.40	33.20
2	2390.00	49.5 AV	54.0	-4.5	1.90 V	326	16.30	33.20
3	*2412.00	106.1 PK			1.85 V	330	72.80	33.30
4	*2412.00	97.0 AV			1.85 V	330	63.70	33.30
5	4824.00	53.4 PK	74.0	-20.6	1.00 V	328	47.30	6.10
6	4824.00	38.0 AV	54.0	-16.0	1.00 V	328	31.90	6.10

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.

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	68.2 PK	74.0	-5.8	1.09 H	328	35.00	33.20
2	2390.00	52.2 AV	54.0	-1.8	1.09 H	328	19.00	33.20
3	*2437.00	116.1 PK			1.30 H	308	82.70	33.40
4	*2437.00	106.3 AV			1.30 H	308	72.90	33.40
5	4824.00	61.1 PK	74.0	-12.9	1.18 H	351	55.00	6.10
6	4824.00	46.4 AV	54.0	-7.6	1.18 H	351	40.30	6.10
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	2390.00	62.1 PK	74.0	-11.9	1.11 V	19	28.90	33.20
2	2390.00	49.6 AV	54.0	-4.4	1.11 V	19	16.40	33.20
3	*2437.00	115.0 PK			1.09 V	15	81.60	33.40
4	*2437.00	104.5 AV			1.09 V	15	71.10	33.40
5	4874.00	57.6 PK	74.0	-16.4	1.92 V	12	51.40	6.20
6	4874.00	43.0 AV	54.0	-11.0	1.92 V	12	36.80	6.20

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 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	111.1 PK			1.31 H	309	77.80	33.30
2	*2462.00	101.0 AV			1.31 H	309	67.70	33.30
3	2483.50	70.5 PK	74.0	-3.5	1.04 H	325	37.10	33.40
4	2483.50	52.7 AV	54.0	-1.3	1.04 H	325	19.30	33.40
5	4924.00	49.5 PK	74.0	-24.5	1.10 H	4	43.20	6.30
6	4924.00	35.9 AV	54.0	-18.1	1.10 H	4	29.60	6.30
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	108.7 PK			1.59 V	5	75.40	33.30
2	*2462.00	98.9 AV			1.59 V	5	65.60	33.30
3	2483.50	65.1 PK	74.0	-8.9	1.10 V	14	31.70	33.40
4	2483.50	50.3 AV	54.0	-3.7	1.10 V	14	16.90	33.40
5	4924.00	49.3 PK	74.0	-24.7	1.00 V	300	43.00	6.30
6	4924.00	37.0 AV	54.0	-17.0	1.00 V	300	30.70	6.30

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 (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	73.0 PK	74.0	-1.0	1.07 H	318	39.80	33.20
2	2390.00	51.8 AV	54.0	-2.2	1.07 H	318	18.60	33.20
3	*2412.00	108.9 PK			1.01 H	314	75.60	33.30
4	*2412.00	99.6 AV			1.01 H	314	66.30	33.30
5	4824.00	48.2 PK	74.0	-25.8	1.21 H	322	42.10	6.10
6	4824.00	36.3 AV	54.0	-17.7	1.21 H	322	30.20	6.10
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	2390.00	59.9 PK	74.0	-14.1	1.06 V	16	26.70	33.20
2	2390.00	48.7 AV	54.0	-5.3	1.06 V	16	15.50	33.20
3	*2412.00	104.9 PK			1.14 V	4	71.60	33.30
4	*2412.00	95.1 AV			1.14 V	4	61.80	33.30
5	4824.00	49.6 PK	74.0	-24.4	1.00 V	321	43.50	6.10
6	4824.00	37.6 AV	54.0	-16.4	1.00 V	321	31.50	6.10

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.

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	66.4 PK	74.0	-7.6	1.06 H	334	33.20	33.20
2	2390.00	50.4 AV	54.0	-3.6	1.06 H	334	17.20	33.20
3	*2437.00	115.9 PK			1.09 H	319	82.50	33.40
4	*2437.00	105.3 AV			1.09 H	319	71.90	33.40
5	2483.50	70.1 PK	74.0	-3.9	1.02 H	321	36.70	33.40
6	2483.50	52.3 AV	54.0	-1.7	1.02 H	321	18.90	33.40
7	4874.00	62.0 PK	74.0	-12.0	1.10 H	349	55.80	6.20
8	4874.00	45.9 AV	54.0	-8.1	1.10 H	349	39.70	6.20
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	60.6 PK	74.0	-13.4	1.22 V	303	27.40	33.20
2	2390.00	49.0 AV	54.0	-5.0	1.22 V	303	15.80	33.20
3	*2437.00	112.8 PK			1.91 V	328	79.40	33.40
4	*2437.00	103.1 AV			1.91 V	328	69.70	33.40
5	2483.50	62.3 PK	74.0	-11.7	1.16 V	330	28.90	33.40
6	2483.50	49.5 AV	54.0	-4.5	1.16 V	330	16.10	33.40
7	4874.00	60.5 PK	74.0	-13.5	1.11 V	334	54.30	6.20
8	4874.00	45.1 AV	54.0	-8.9	1.11 V	334	38.90	6.20

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 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	110.4 PK			1.01 H	315	77.10	33.30
2	*2462.00	100.8 AV			1.01 H	315	67.50	33.30
3	2483.50	71.8 PK	74.0	-2.2	1.03 H	320	38.40	33.40
4	2483.50	52.5 AV	54.0	-1.5	1.03 H	320	19.10	33.40
5	4924.00	49.2 PK	74.0	-24.8	1.00 H	330	42.90	6.30
6	4924.00	36.2 AV	54.0	-17.8	1.00 H	330	29.90	6.30
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	108.6 PK			1.10 V	10	75.30	33.30
2	*2462.00	98.4 AV			1.10 V	10	65.10	33.30
3	2483.50	66.9 PK	74.0	-7.1	1.15 V	359	33.50	33.40
4	2483.50	49.8 AV	54.0	-4.2	1.15 V	359	16.40	33.40
5	4924.00	49.5 PK	74.0	-24.5	1.00 V	335	43.20	6.30
6	4924.00	36.9 AV	54.0	-17.1	1.00 V	335	30.60	6.30

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 (40MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.9 PK	74.0	-8.1	1.06 H	318	32.70	33.20
2	2390.00	52.1 AV	54.0	-1.9	1.06 H	318	18.90	33.20
3	*2422.00	103.8 PK			1.03 H	315	70.50	33.30
4	*2422.00	93.4 AV			1.03 H	315	60.10	33.30
5	4844.00	48.1 PK	74.0	-25.9	1.10 H	41	42.00	6.10
6	4844.00	35.1 AV	54.0	-18.9	1.10 H	41	29.00	6.10
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	2390.00	59.6 PK	74.0	-14.4	1.09 V	335	26.40	33.20
2	2390.00	47.8 AV	54.0	-6.2	1.09 V	335	14.60	33.20
3	*2422.00	99.2 PK			1.60 V	332	65.90	33.30
4	*2422.00	89.8 AV			1.60 V	332	56.50	33.30
5	4844.00	47.8 PK	74.0	-26.2	1.06 V	23	41.70	6.10
6	4844.00	35.0 AV	54.0	-19.0	1.06 V	23	28.90	6.10

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.

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	70.2 PK	74.0	-3.8	1.06 H	319	37.00	33.20
2	2390.00	52.2 AV	54.0	-1.8	1.06 H	319	19.00	33.20
3	*2437.00	108.5 PK			1.35 H	318	75.10	33.40
4	*2437.00	98.3 AV			1.35 H	318	64.90	33.40
5	4874.00	48.1 PK	74.0	-25.9	1.18 H	26	41.90	6.20
6	4874.00	35.1 AV	54.0	-18.9	1.18 H	26	28.90	6.20
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	58.8 PK	74.0	-15.2	1.04 V	313	25.60	33.20
2	2390.00	47.9 AV	54.0	-6.1	1.04 V	313	14.70	33.20
3	*2437.00	105.6 PK			1.09 V	11	72.20	33.40
4	*2437.00	95.9 AV			1.09 V	11	62.50	33.40
5	4874.00	48.4 PK	74.0	-25.6	1.08 V	326	42.20	6.20
6	4874.00	35.4 AV	54.0	-18.6	1.08 V	326	29.20	6.20

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	105.7 PK			1.00 H	309	72.30	33.40
2	*2452.00	95.9 AV			1.00 H	309	62.50	33.40
3	2483.50	65.7 PK	74.0	-8.3	1.00 H	306	32.30	33.40
4	2483.50	52.4 AV	54.0	-1.6	1.00 H	306	19.00	33.40
5	4904.00	47.7 PK	74.0	-26.3	1.14 H	22	41.60	6.10
6	4904.00	34.7 AV	54.0	-19.3	1.14 H	22	28.60	6.10
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	*2452.00	103.1 PK			1.10 V	12	69.70	33.40
2	*2452.00	93.4 AV			1.10 V	12	60.00	33.40
3	2483.50	63.5 PK	74.0	-10.5	1.08 V	319	30.10	33.40
4	2483.50	50.4 AV	54.0	-3.6	1.08 V	319	17.00	33.40
5	4904.00	48.1 PK	74.0	-25.9	1.30 V	302	42.00	6.10
6	4904.00	34.9 AV	54.0	-19.1	1.30 V	302	28.80	6.10

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 radiated frequency is out of the restricted band.

BELOW 1GHz WORST-CASE DATA

802.11n (20MHz)

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	29.90	35.1 QP	40.0	-4.9	1.00 H	289	51.00	-15.90
2	57.12	32.4 QP	40.0	-7.6	2.00 H	325	47.00	-14.60
3	500.42	42.0 QP	46.0	-4.0	1.50 H	195	50.30	-8.30
4	624.85	34.1 QP	46.0	-11.9	1.00 H	40	39.60	-5.50
5	751.23	34.8 QP	46.0	-11.2	1.00 H	343	37.80	-3.00
6	848.45	33.7 QP	46.0	-12.3	1.00 H	7	35.10	-1.40
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	57.12	35.0 QP	40.0	-5.0	1.49 V	16	49.60	-14.60
2	195.16	28.9 QP	43.5	-14.6	1.00 V	216	45.40	-16.50
3	480.97	36.1 QP	46.0	-9.9	1.00 V	11	44.80	-8.70
4	500.42	40.4 QP	46.0	-5.6	1.99 V	147	48.70	-8.30
5	848.45	34.2 QP	46.0	-11.8	1.49 V	9	35.60	-1.40
6	1000.00	36.2 QP	54.0	-17.8	1.00 V	317	35.10	1.10

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB)
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	100289	Nov. 29, 2013	Nov. 28, 2014
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 27, 2013	Dec. 26, 2014
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 13, 2014	Feb. 12, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

2. The test was performed in HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 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.

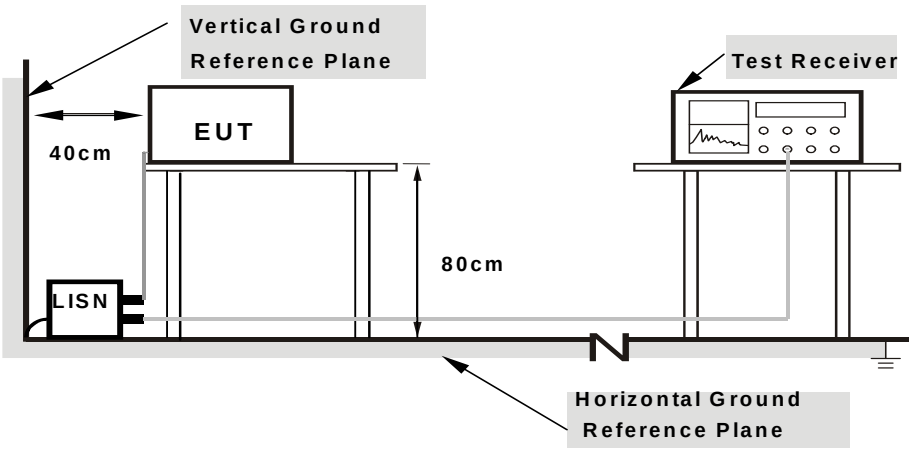
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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 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 4.1.6.

4.2.7 TEST RESULTS

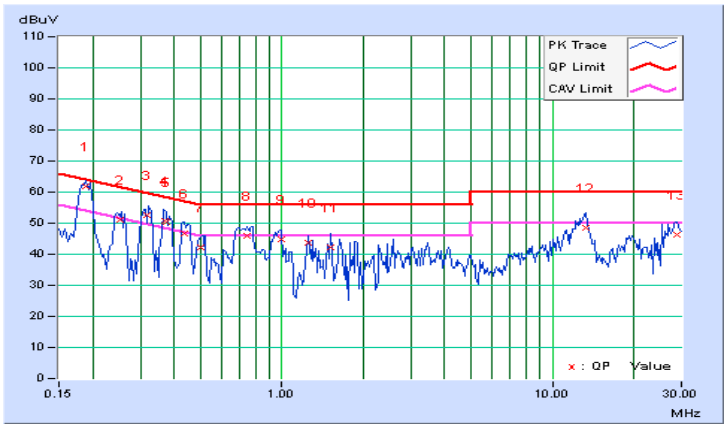
CONDUCTED WORST-CASE DATA：802.11n (20MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.18906**	**0.07**	**61.64**	**49.26**	**61.71**	**49.33**	**64.08**	**54.08**	**-2.37**	**-4.75**
2	0.25292	0.07	50.95	41.05	51.02	41.12	61.66	51.66	-10.64	-10.54
3	0.31755	0.08	52.37	41.49	52.45	41.57	59.77	49.77	-7.32	-8.20
4	0.37203	0.08	50.65	40.19	50.73	40.27	58.46	48.46	-7.73	-8.19
5	0.37266	0.08	50.35	40.13	50.43	40.21	58.44	48.44	-8.01	-8.23
6	0.43516	0.08	46.77	36.41	46.85	36.49	57.15	47.15	-10.30	-10.66
7	0.50156	0.09	42.11	30.07	42.20	30.16	56.00	46.00	-13.80	-15.84
8	0.73984	0.10	45.69	31.95	45.79	32.05	56.00	46.00	-10.21	-13.95
9	0.99375	0.11	44.79	30.79	44.90	30.90	56.00	46.00	-11.10	-15.10
10	1.25781	0.12	43.41	28.03	43.53	28.15	56.00	46.00	-12.47	-17.85
11	1.50781	0.13	42.23	27.45	42.36	27.58	56.00	46.00	-13.64	-18.42
12	13.38281	0.69	47.69	34.17	48.38	34.86	60.00	50.00	-11.62	-15.14
13	28.83594	1.31	44.81	38.87	46.12	40.18	60.00	50.00	-13.88	-9.82

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.

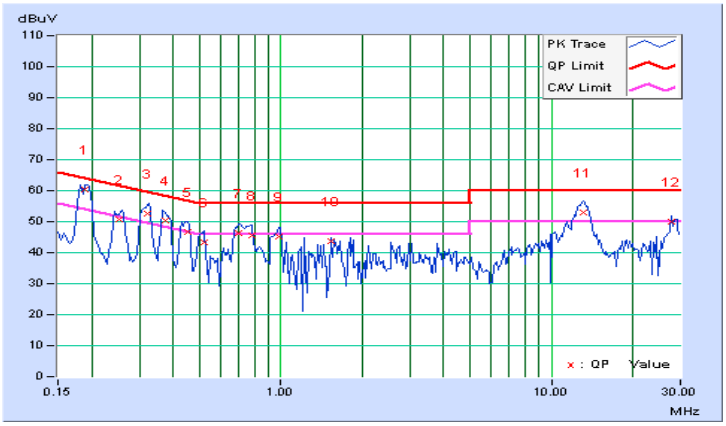


PHASE	Line 2	6dB BANDWIDTH	9kHz

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18804	0.05	60.14	47.78	60.19	47.83	64.12	54.12	-3.93	-6.29
2	0.25349	0.06	50.52	40.86	50.58	40.92	61.64	51.64	-11.07	-10.73
3	0.31983	0.06	52.60	41.74	52.66	41.80	59.71	49.71	-7.05	-7.91
4	0.37479	0.07	50.28	39.88	50.35	39.95	58.39	48.39	-8.05	-8.45
5	0.45078	0.07	46.62	36.12	46.69	36.19	56.86	46.86	-10.17	-10.67
6	0.51854	0.07	43.20	31.94	43.27	32.01	56.00	46.00	-12.73	-13.99
7	0.70078	0.08	46.06	31.92	46.14	32.00	56.00	46.00	-9.86	-14.00
8	0.77891	0.08	45.58	32.58	45.66	32.66	56.00	46.00	-10.34	-13.34
9	0.97813	0.09	45.16	33.14	45.25	33.23	56.00	46.00	-10.75	-12.77
10	1.54297	0.12	43.52	30.70	43.64	30.82	56.00	46.00	-12.36	-15.18
11	13.19531	0.59	52.38	38.16	52.97	38.75	60.00	50.00	-7.03	-11.25
12	27.71272	1.08	48.94	46.20	50.02	47.28	60.00	50.00	-9.98	-2.72

REMARKS:

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

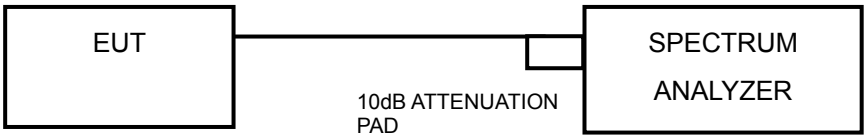


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION 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

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	6.12	6.10	6.08	0.5	PASS
6	2437	6.07	6.06	6.07	0.5	PASS
11	2462	6.09	6.08	6.10	0.5	PASS

802.11g

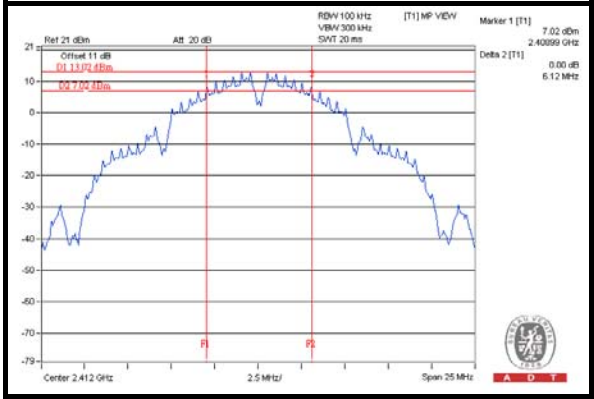
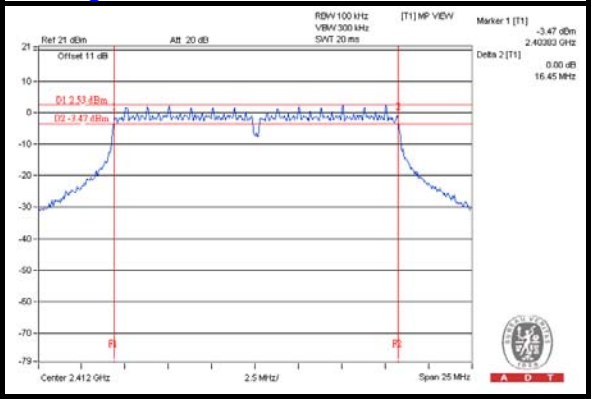
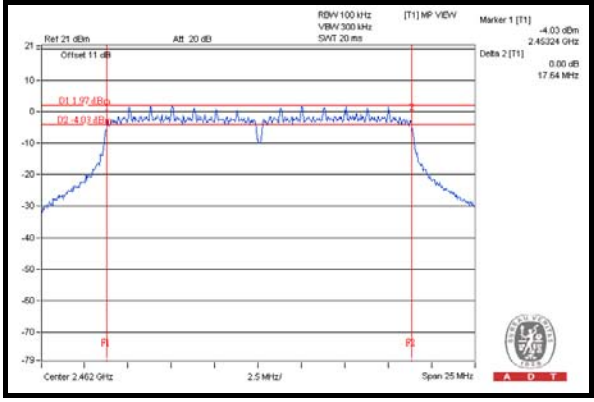
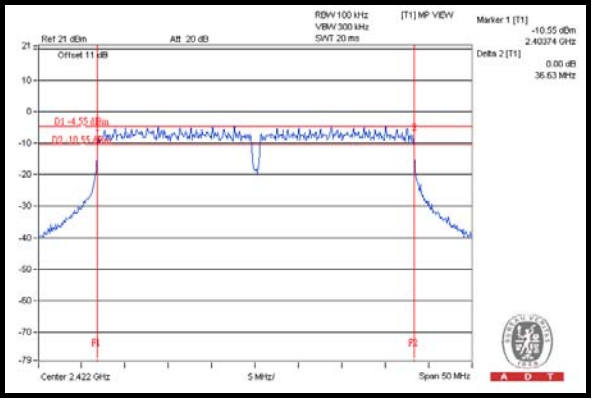
CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	16.42	16.42	16.45	0.5	PASS
6	2437	16.39	16.38	16.39	0.5	PASS
11	2462	16.39	16.40	16.40	0.5	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
1	2412	17.63	17.63	17.63	0.5	PASS
6	2437	17.60	17.61	17.60	0.5	PASS
11	2462	17.63	17.63	17.64	0.5	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)			MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2		
3	2422	36.16	36.56	36.63	0.5	PASS
6	2437	35.97	36.54	36.54	0.5	PASS
9	2452	36.01	36.54	36.54	0.5	PASS

SPECTRUM PLOT OF WORST VALUE	
802.11b	**802.11g**
	
802.11n (20MHz)	**802.11n (40MHz)**
	

4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

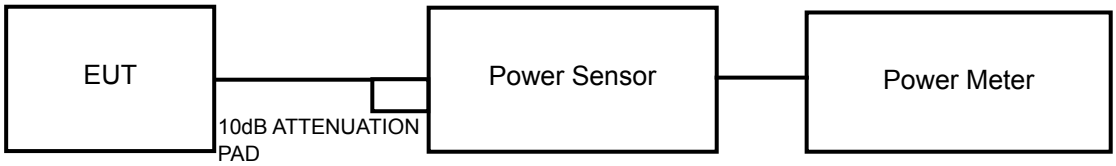
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

Per KDB 662911 D01 Multiple Transmitter Output v02r01 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

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

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR AVERAGE POWER

802.11b

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	20.17	20.28	19.37	297.149	24.73	30	PASS
6	2437	19.52	19.68	19.19	265.418	24.24	30	PASS
11	2462	20.37	19.79	19.76	298.797	24.75	30	PASS

802.11g

CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
1	2412	15.92	15.22	14.61	101.257	20.05	30	PASS
6	2437	20.94	20.87	20.44	357.007	25.53	30	PASS
11	2462	15.61	14.59	14.76	95.089	19.78	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				
1	2412	15.92	14.95	14.32	97.385	19.88	30	PASS
6	2437	20.91	20.92	20.69	**364.125**	25.61	30	PASS
11	2462	14.51	13.51	13.86	75.010	18.75	30	PASS

802.11n (40MHz)

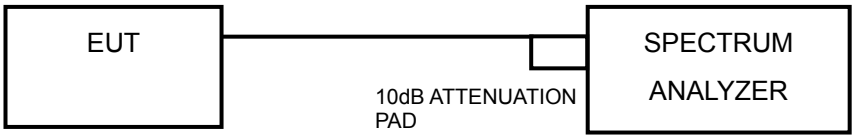
CHAN.	CHAN. FREQ. (MHz)	AVG. POWER (dBm)			TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1	CHAIN 2				
3	2422	11.66	10.93	10.47	38.186	15.82	30	PASS
6	2437	15.57	15.13	14.67	97.951	19.91	30	PASS
9	2452	14.01	12.60	12.61	61.613	17.90	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

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

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Total PSD (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-6.15	4.77	-1.38	5.26	PASS
	6	2437	-3.59	4.77	1.18	5.26	PASS
	11	2462	-5.65	4.77	-0.88	5.26	PASS
1	1	2412	-6.93	4.77	-2.16	5.26	PASS
	6	2437	-7.58	4.77	-2.81	5.26	PASS
	11	2462	-7.10	4.77	-2.33	5.26	PASS
2	1	2412	-7.61	4.77	-2.84	5.26	PASS
	6	2437	-7.31	4.77	-2.54	5.26	PASS
	11	2462	-6.88	4.77	-2.11	5.26	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 8.74 dBi > 6dBi, so the power density limit shall be reduced to 8-(8.74-6) = 5.26dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-7.51	4.77	0.12	-2.62	5.26	PASS
	6	2437	-5.89	4.77	0.12	-1.00	5.26	PASS
	11	2462	-12.61	4.77	0.12	-7.72	5.26	PASS
1	1	2412	-15.10	4.77	0.12	-10.21	5.26	PASS
	6	2437	-9.38	4.77	0.12	-4.49	5.26	PASS
	11	2462	-15.79	4.77	0.12	-10.90	5.26	PASS
2	1	2412	-16.27	4.77	0.12	-11.38	5.26	PASS
	6	2437	-9.97	4.77	0.12	-5.08	5.26	PASS
	11	2462	-12.16	4.77	0.12	-7.27	5.26	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 8.74 dBi > 6dBi, so the power density limit shall be reduced to 8-(8.74-6) = 5.26dBm.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	1	2412	-13.34	4.77	0.16	-8.41	5.26	PASS
	6	2437	-9.42	4.77	0.16	-4.49	5.26	PASS
	11	2462	-13.75	4.77	0.16	-8.82	5.26	PASS
1	1	2412	-16.06	4.77	0.16	-11.13	5.26	PASS
	6	2437	-9.60	4.77	0.16	-4.67	5.26	PASS
	11	2462	-17.24	4.77	0.16	-12.31	5.26	PASS
2	1	2412	-17.11	4.77	0.16	-12.18	5.26	PASS
	6	2437	-7.22	4.77	0.16	-2.29	5.26	PASS
	11	2462	-17.39	4.77	0.16	-12.46	5.26	PASS

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 8.74 dBi > 6dBi, so the power density limit shall be reduced to 8-(8.74-6) = 5.26dBm.

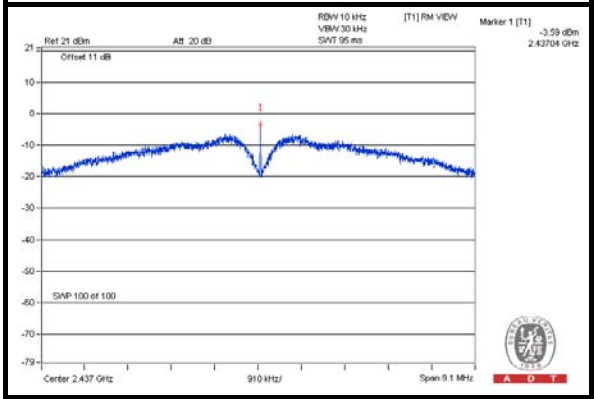
802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=3) dB	Duty Factor	Total PSD with Duty Factor (dBm)	Limit (dBm)	PASS /FAIL
0	3	2422	-20.95	4.77	0.47	-15.71	5.26	PASS
	6	2437	-9.73	4.77	0.47	-4.49	5.26	PASS
	9	2452	-18.35	4.77	0.47	-13.11	5.26	PASS
1	3	2422	-20.99	4.77	0.47	-15.75	5.26	PASS
	6	2437	-17.71	4.77	0.47	-12.47	5.26	PASS
	9	2452	-19.70	4.77	0.47	-14.46	5.26	PASS
2	3	2422	-22.70	4.77	0.47	-17.46	5.26	PASS
	6	2437	-11.62	4.77	0.47	-6.38	5.26	PASS
	9	2452	-19.79	4.77	0.47	-14.55	5.26	PASS

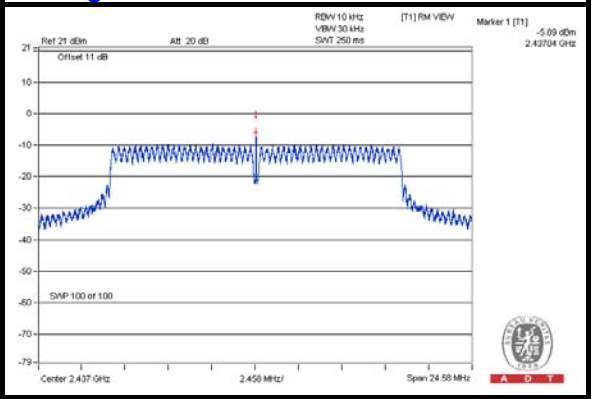
NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$]= 8.74 dBi > 6dBi, so the power density limit shall be reduced to 8-(8.74-6) = 5.26dBm.

SPECTRUM PLOT OF WORST VALUE

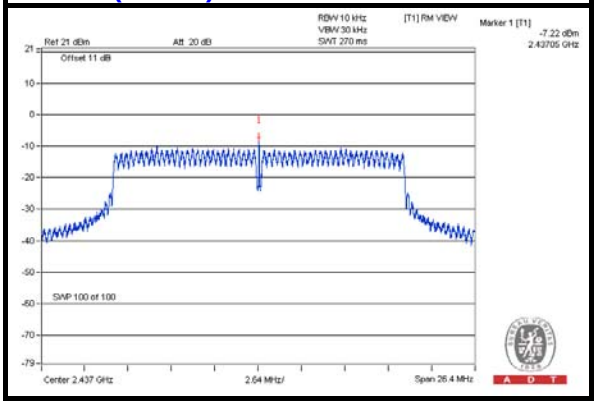
802.11b



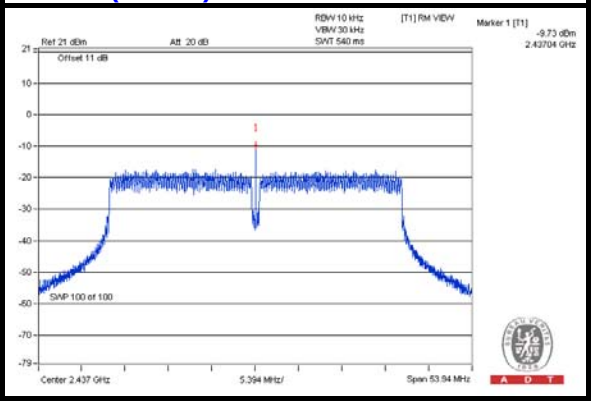
802.11g



802.11n (20MHz)



802.11n (40MHz)



4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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

4.6.2 TEST SETUP

4.6.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.6.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.6.7 TEST RESULTS

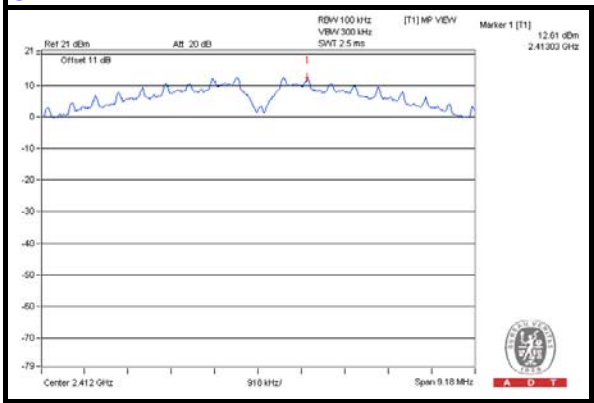
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

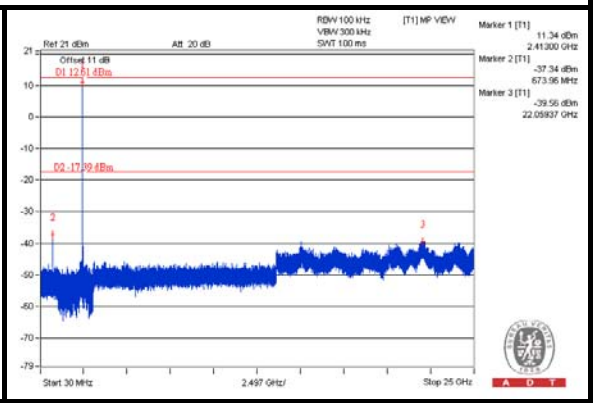
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

CHAIN 0

CH 1





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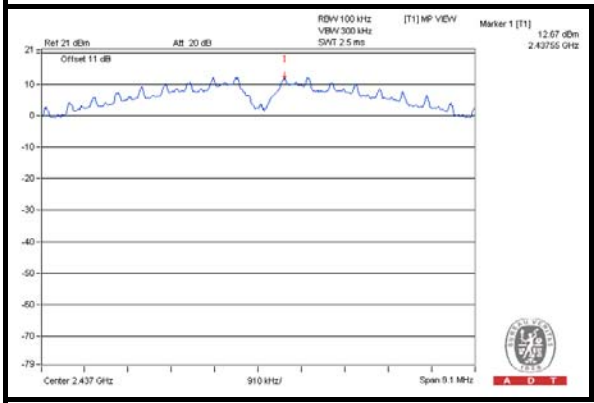

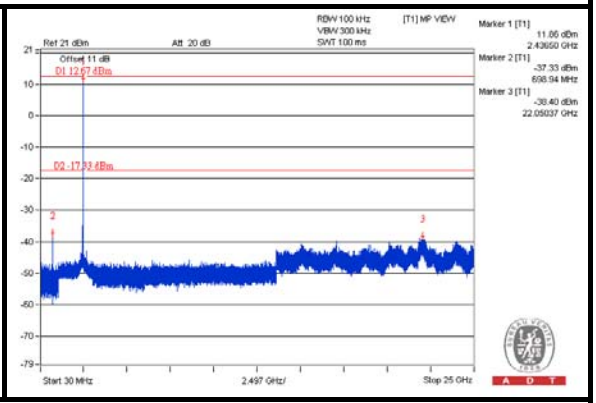

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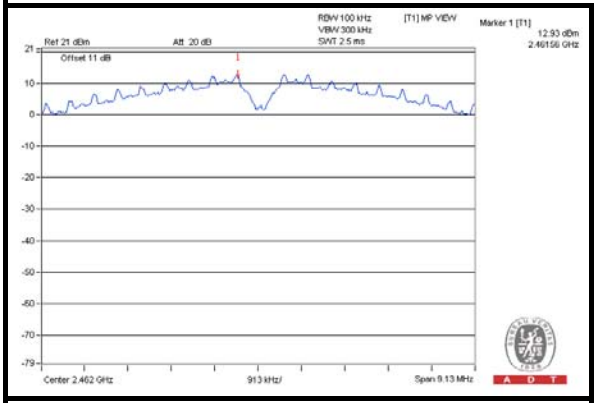

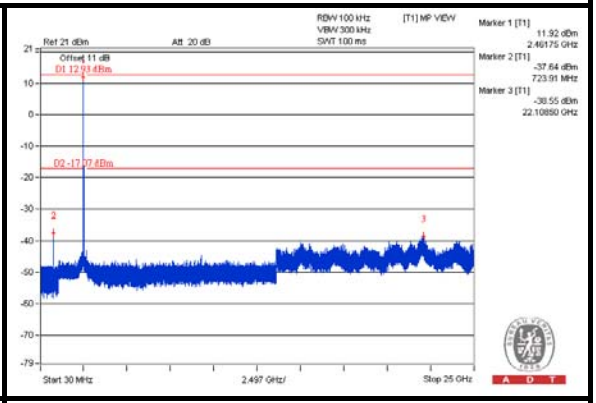

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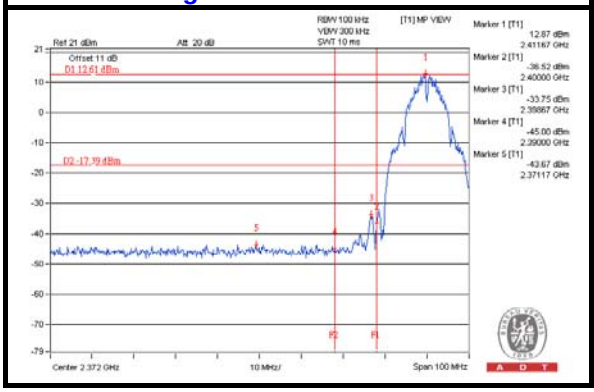

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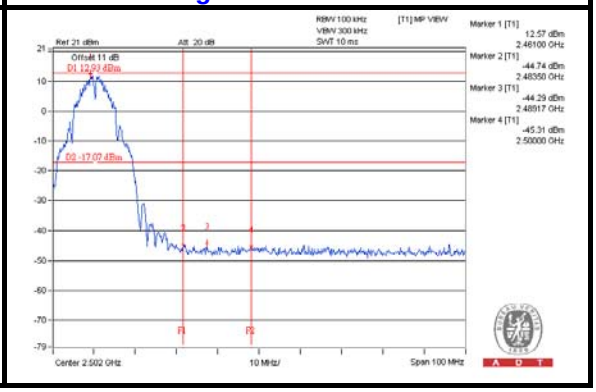
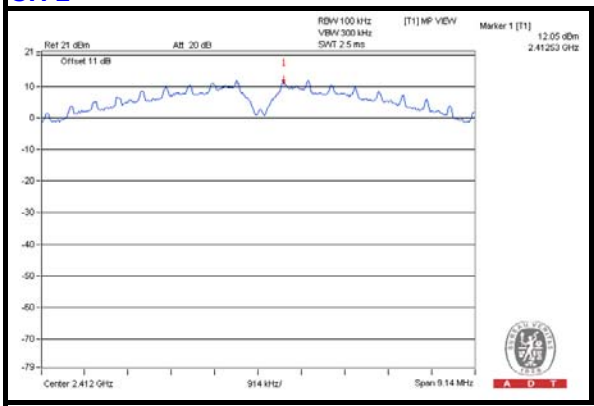
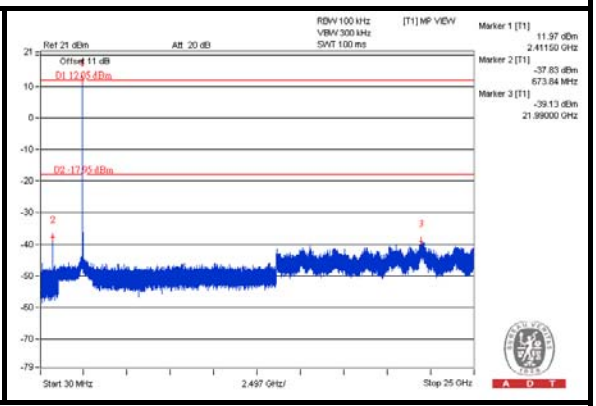


CHAIN 1

CH 1





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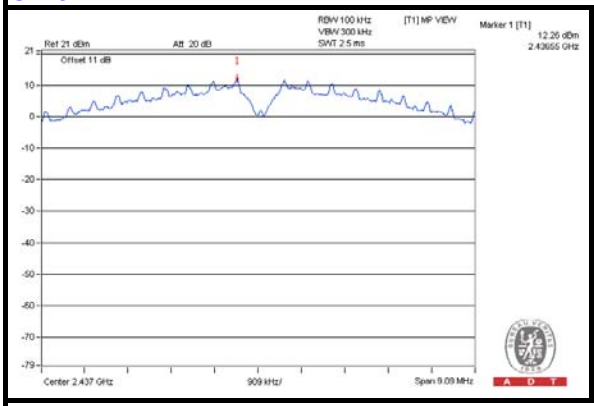

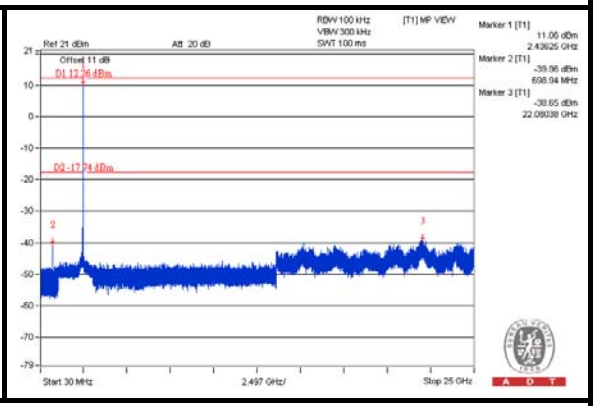

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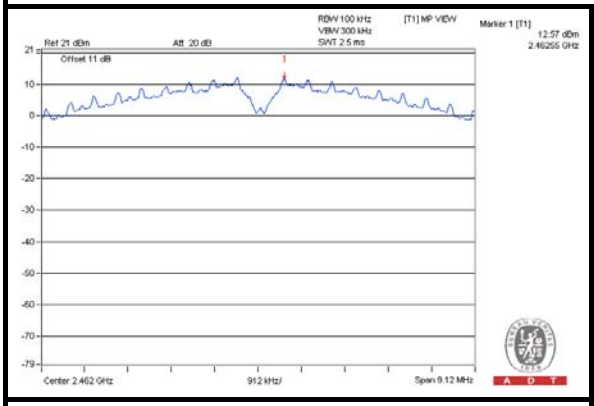

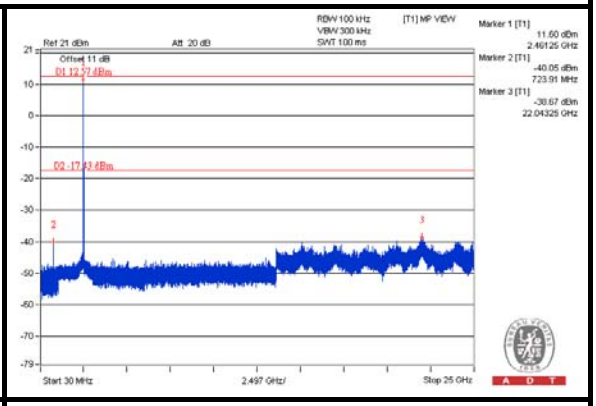

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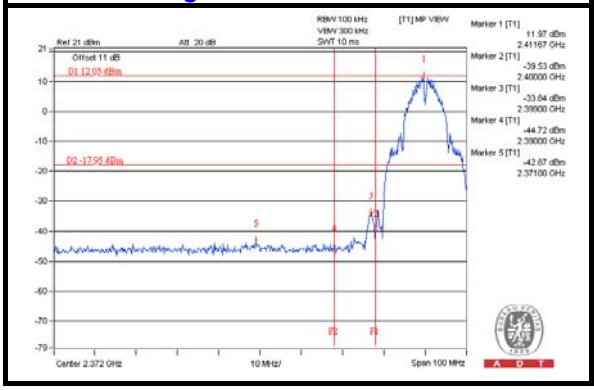

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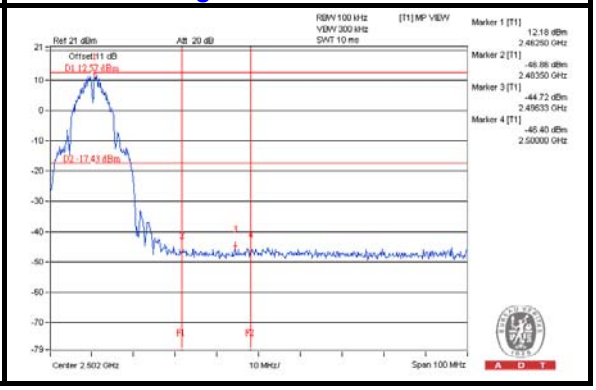
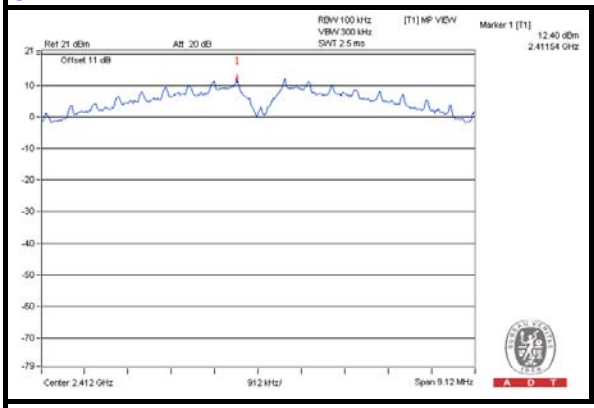
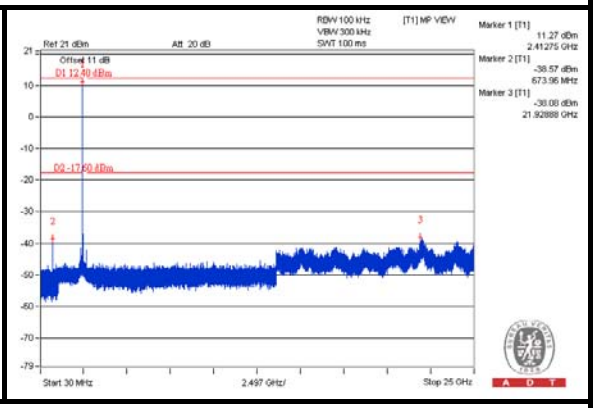


CHAIN 2

CH 1





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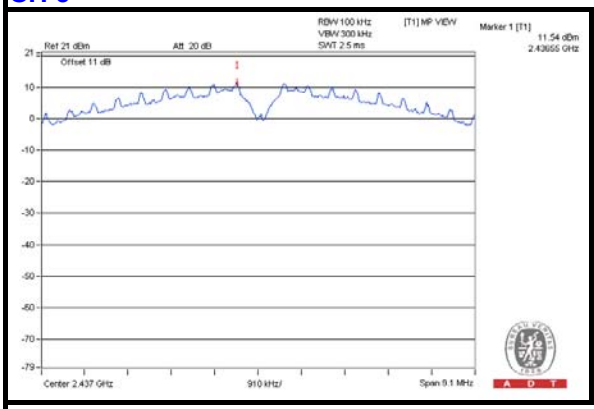

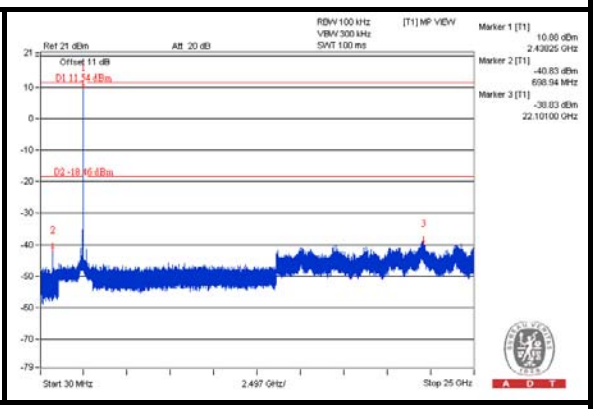

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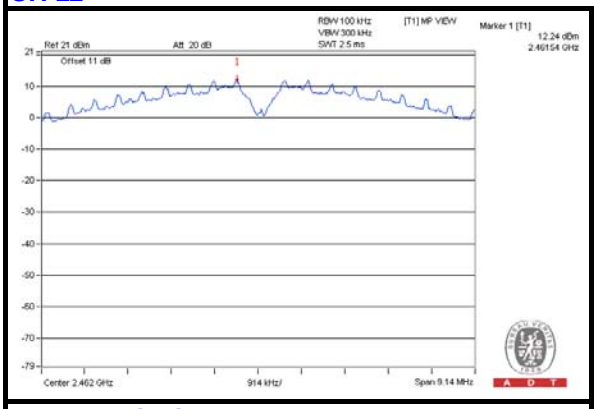

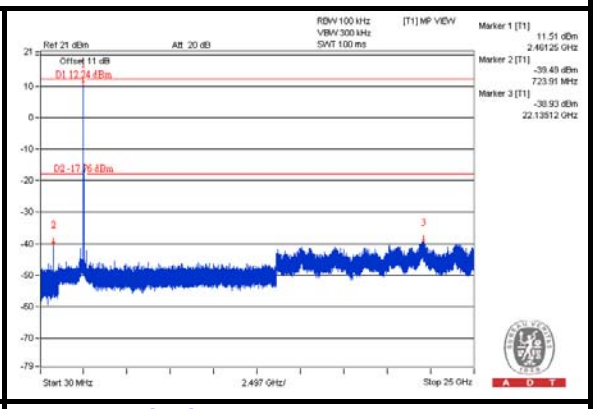

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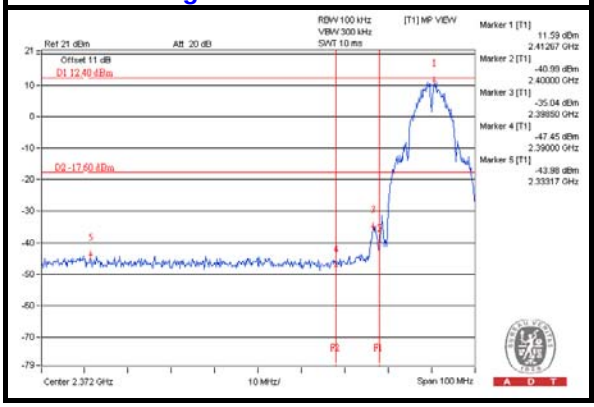

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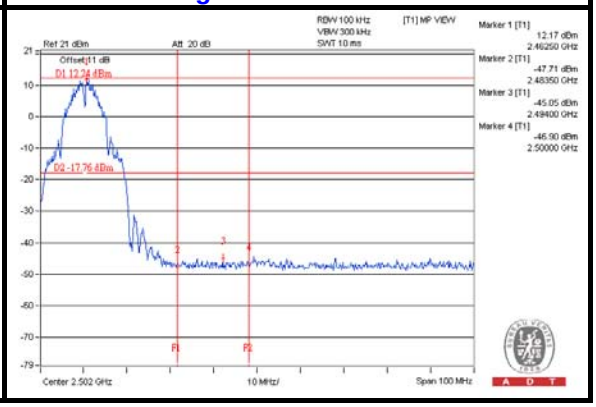

802.11g
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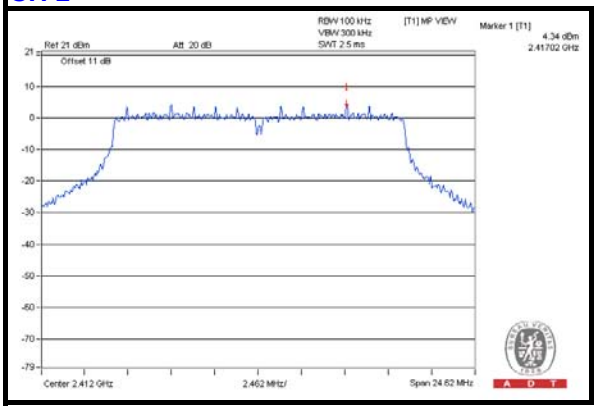

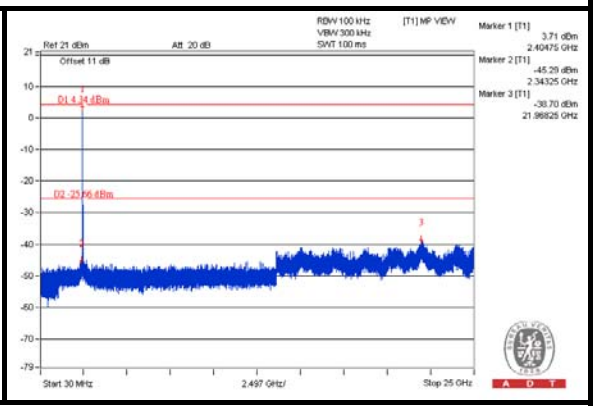

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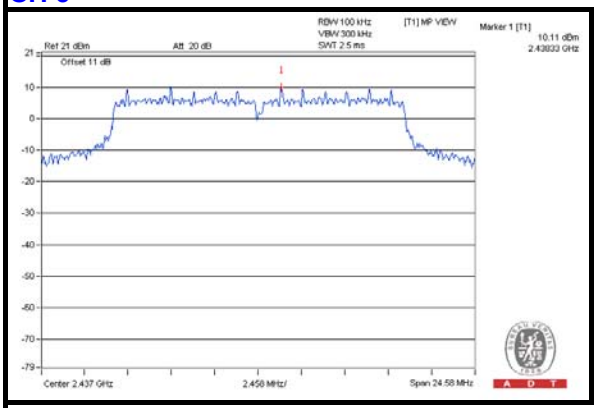

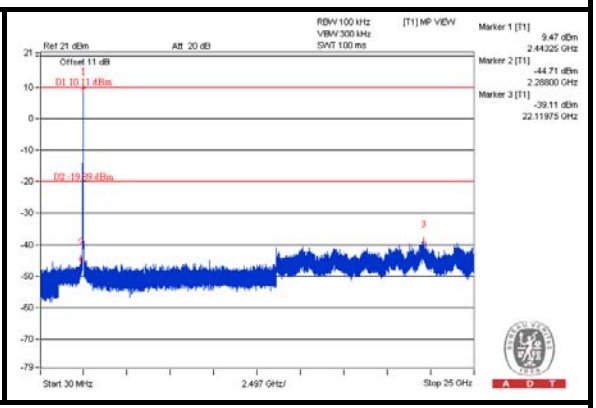

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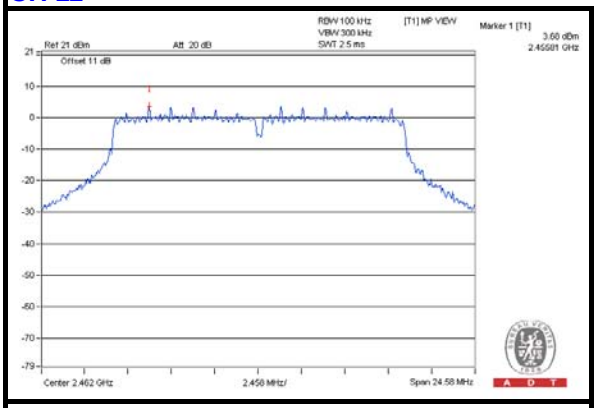

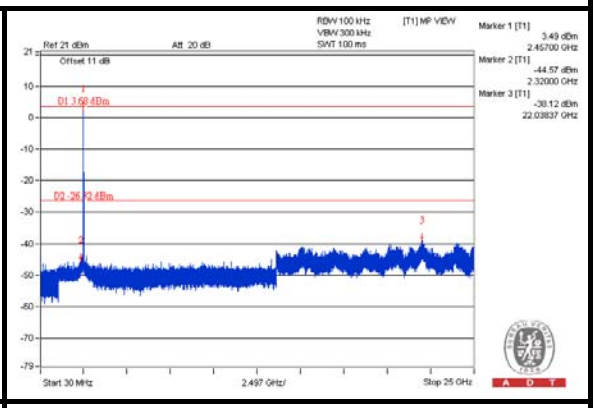

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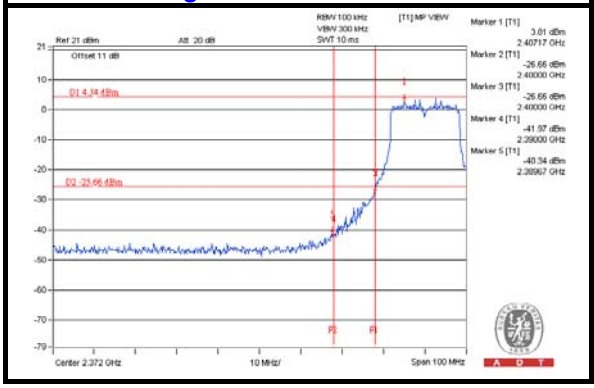

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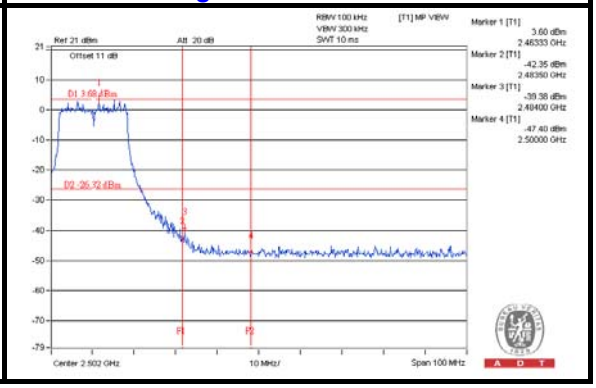
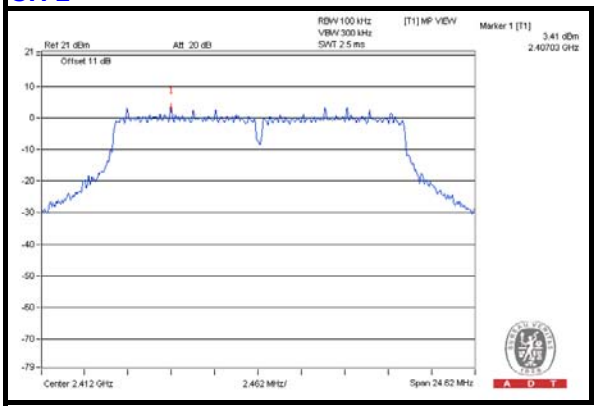
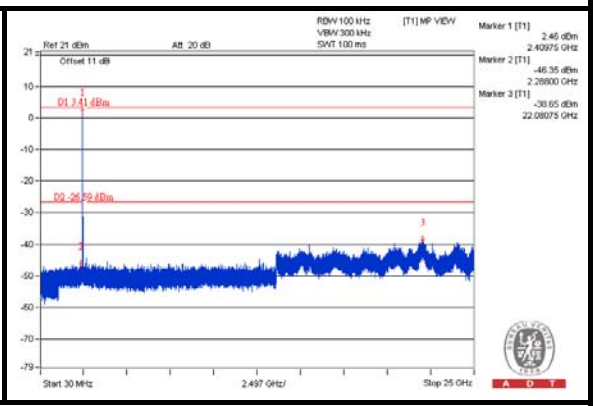


CHAIN 1

CH 1





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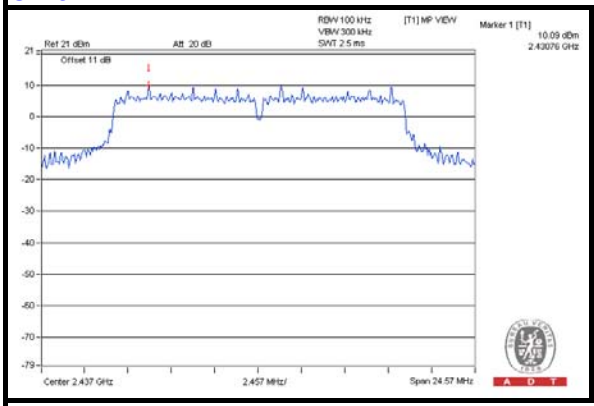

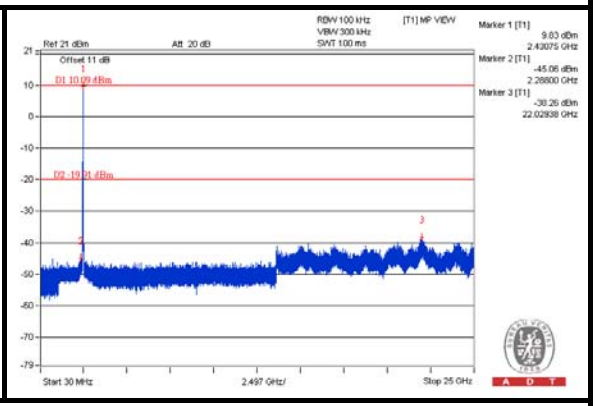

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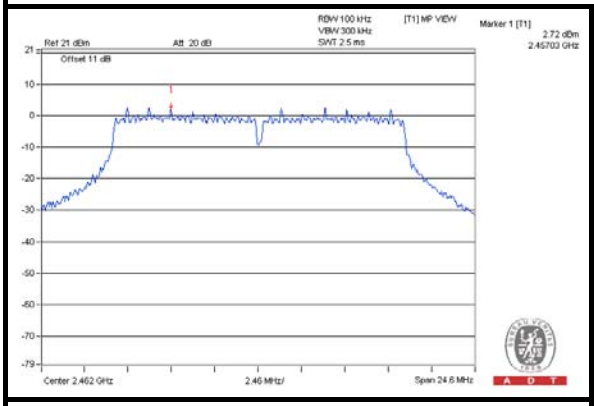
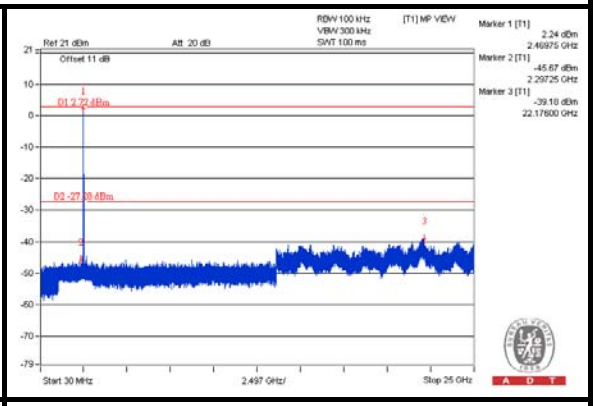
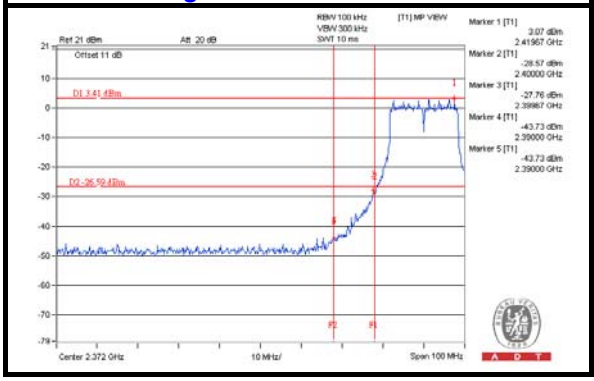
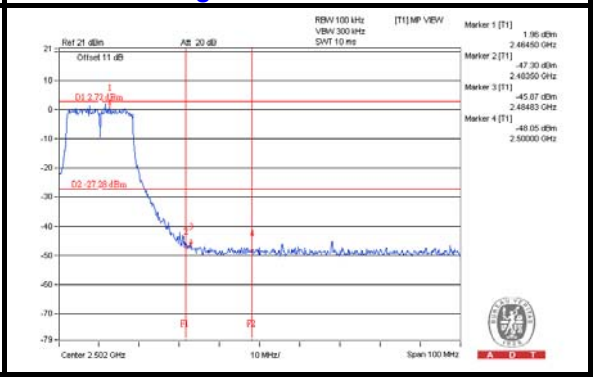




CH 1 Band edge

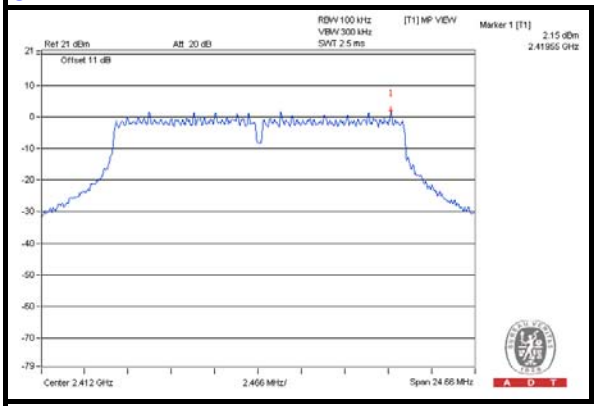


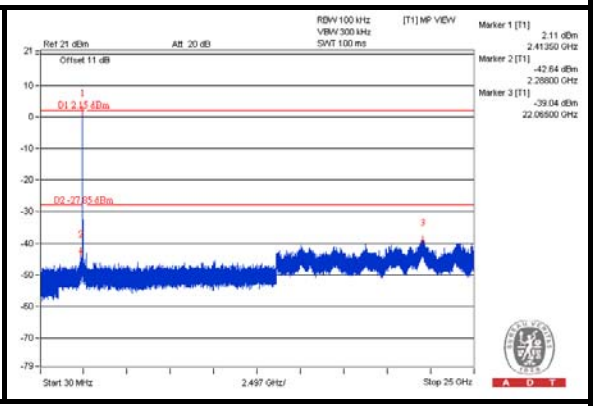
CH 11 Band edge



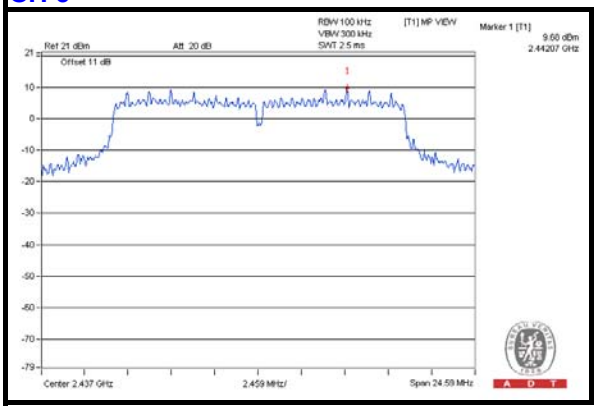
CHAIN 2

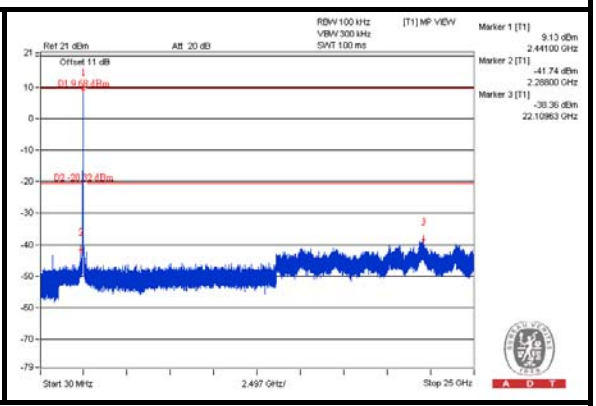
CH 1



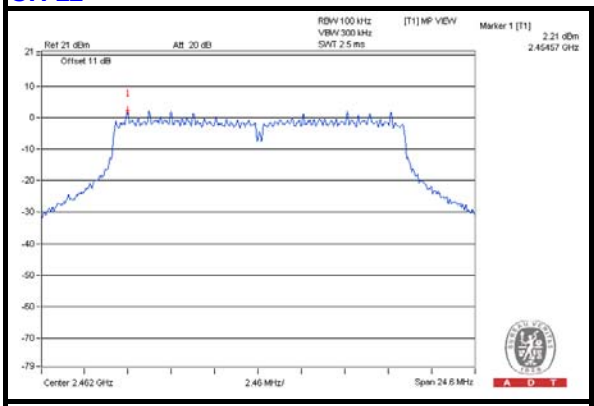


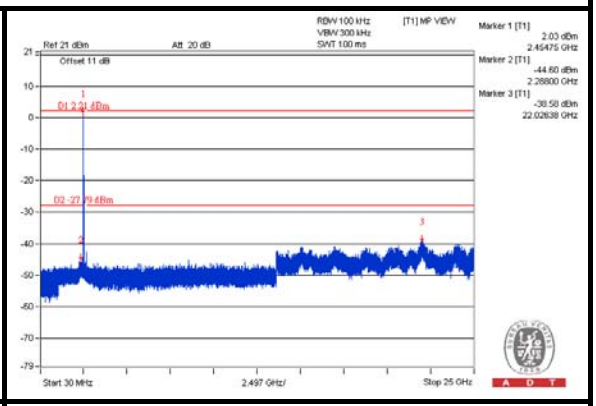
CH 6



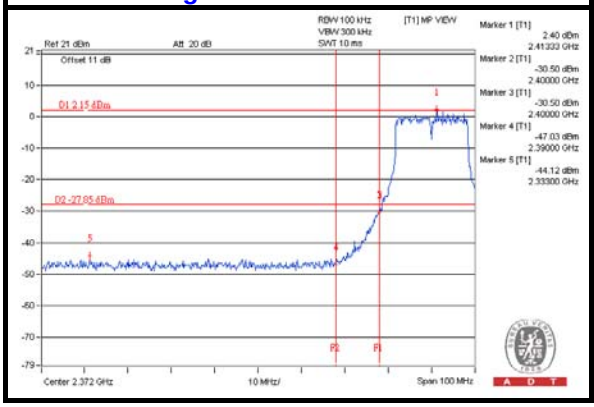


CH 11

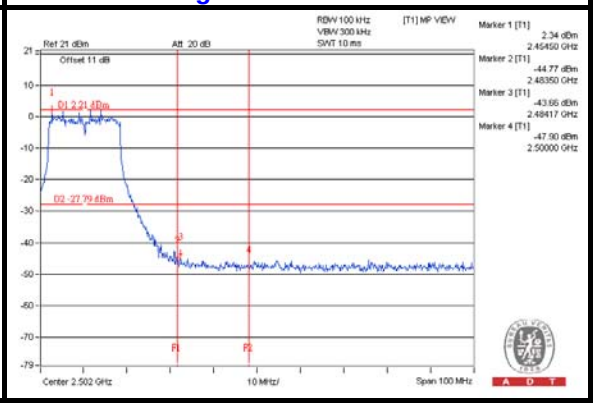




CH 1 Band edge



CH 11 Band edge



802.11n (20MHz)
CHAIN 0

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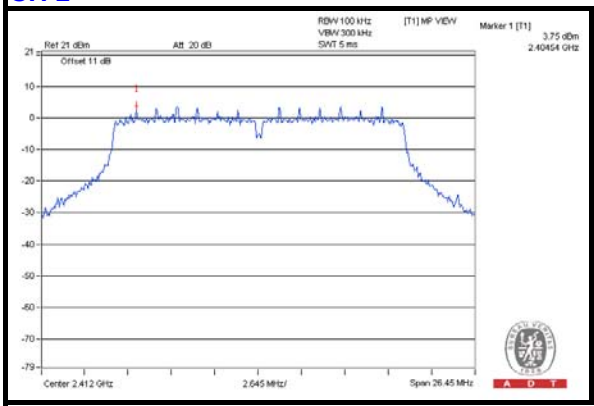
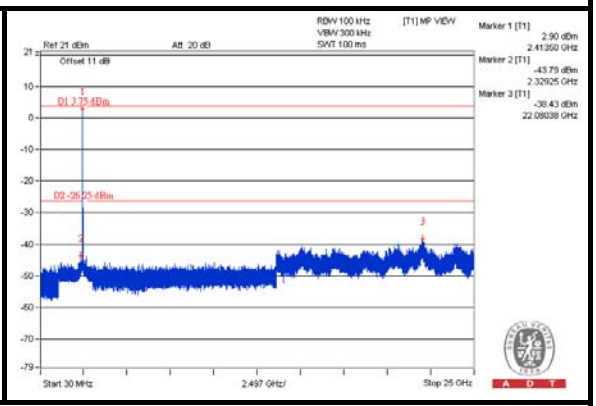
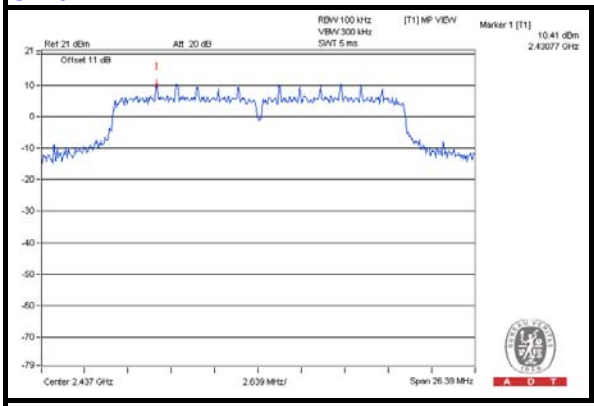
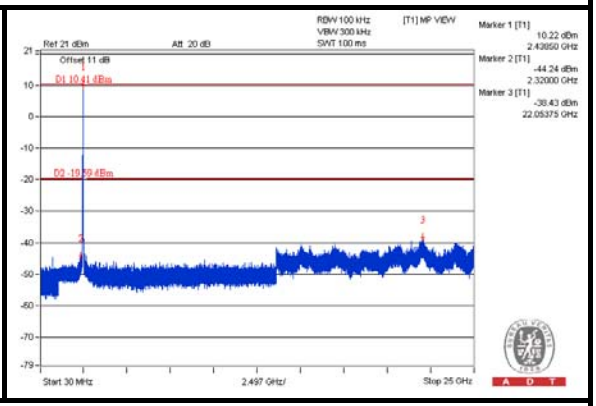




CH 6





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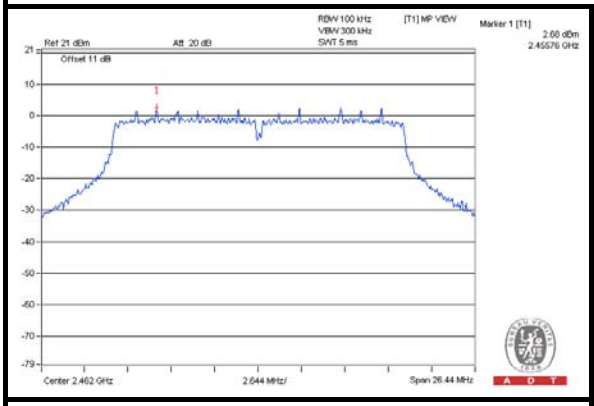
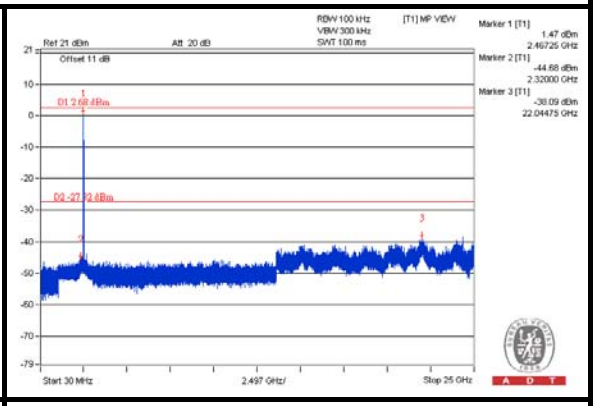
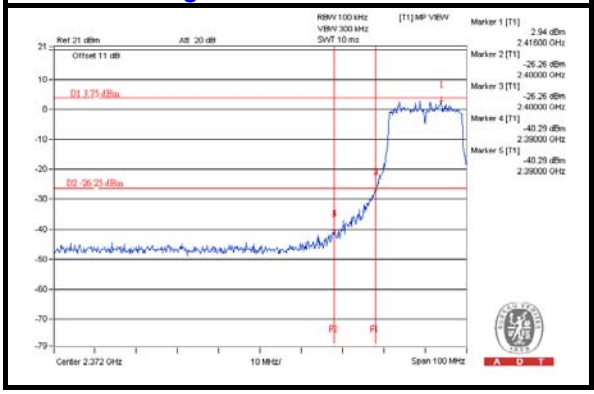




CH 1 Band edge



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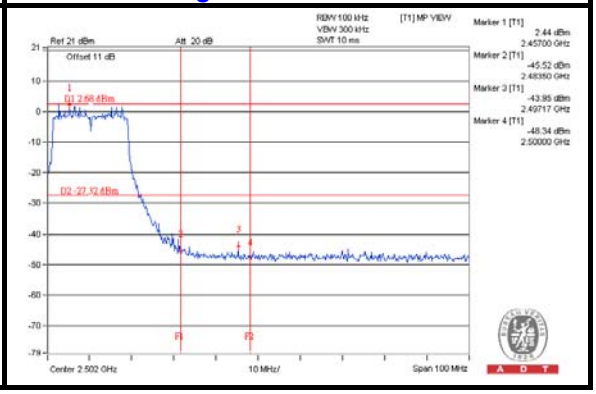
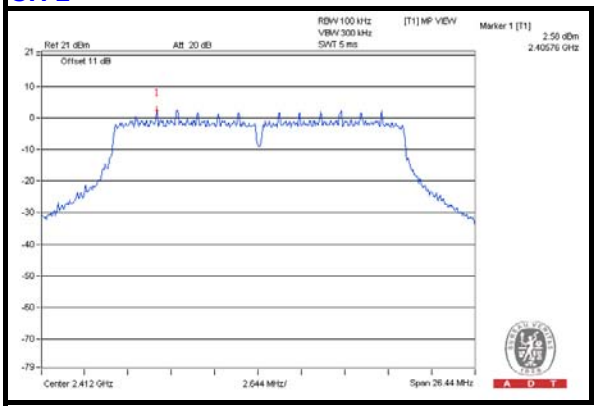
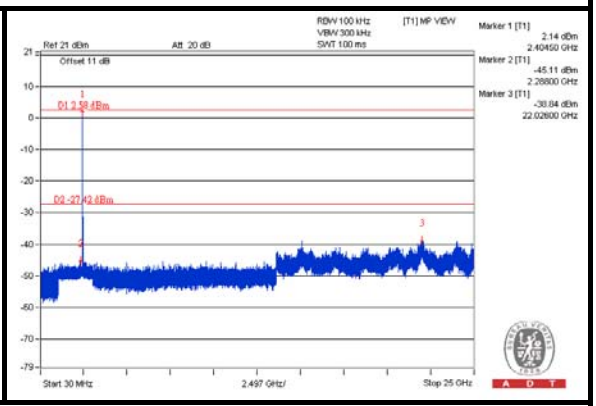


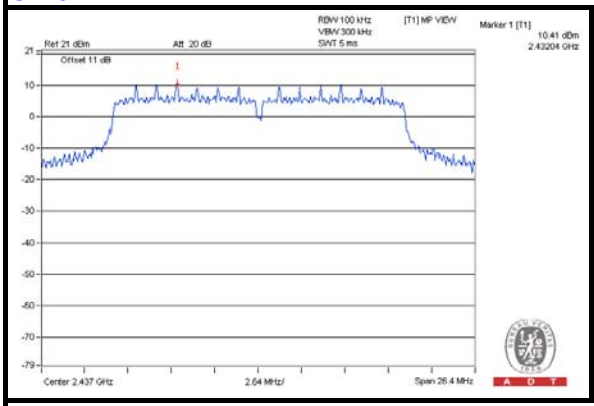
CHAIN 1

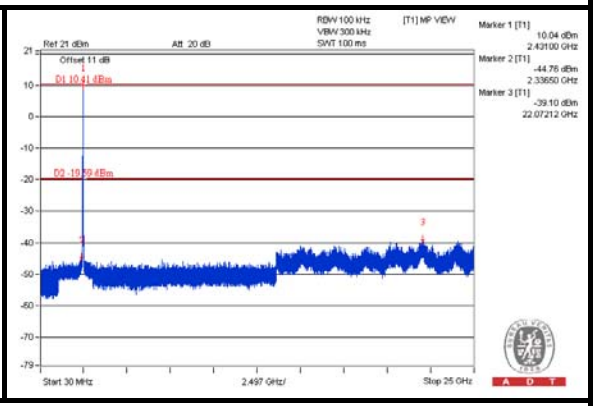
CH 1





CH 6





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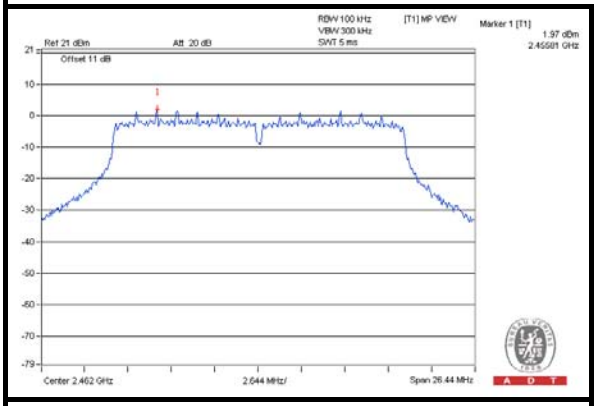
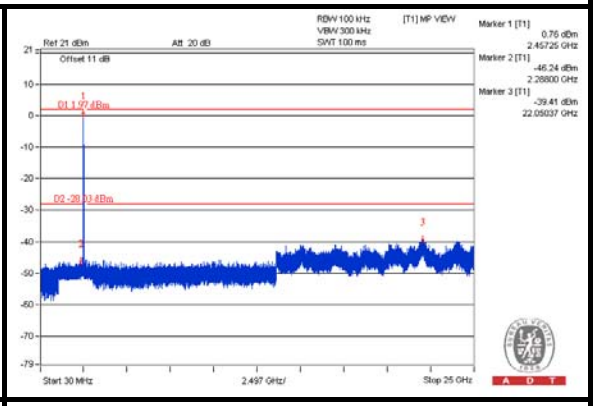
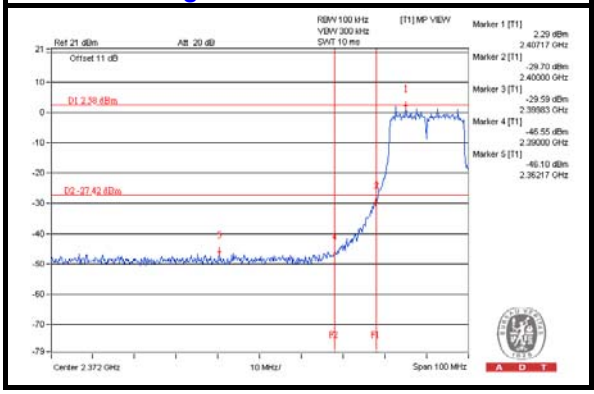
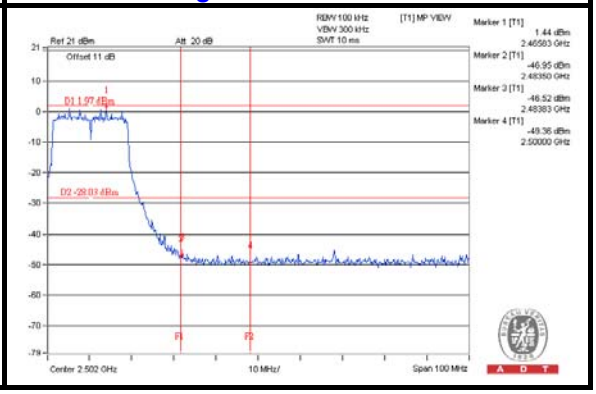




CH 1 Band edge

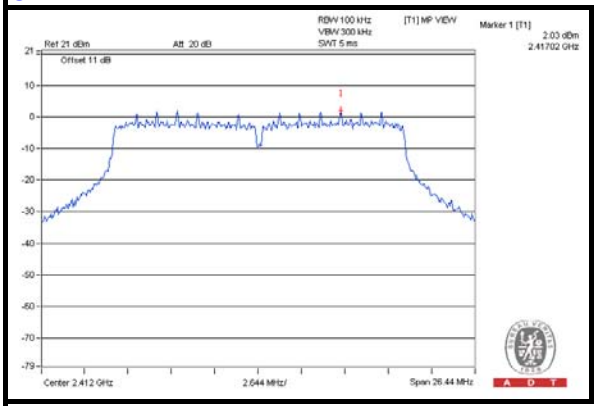


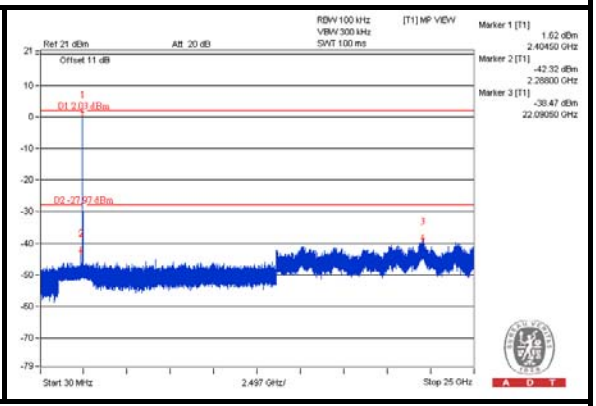
CH 11 Band edge



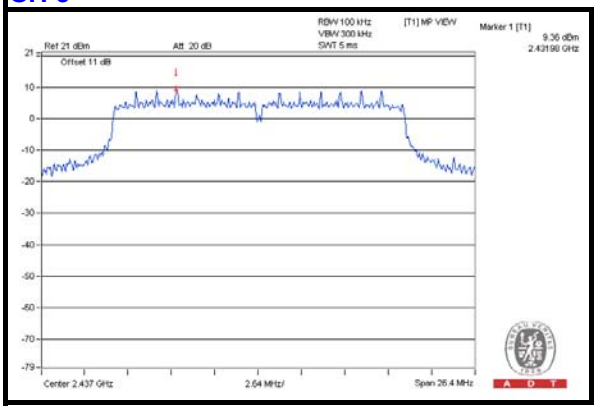
CHAIN 2

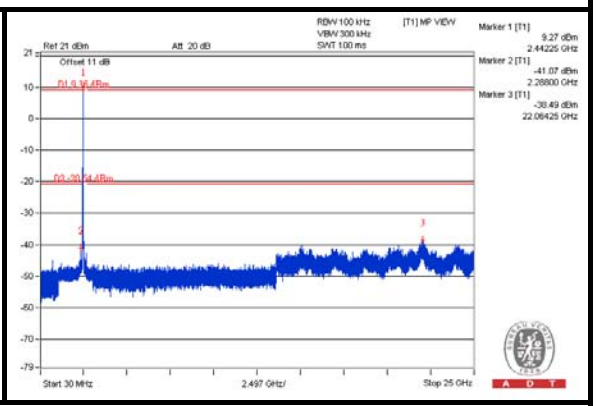
CH 1



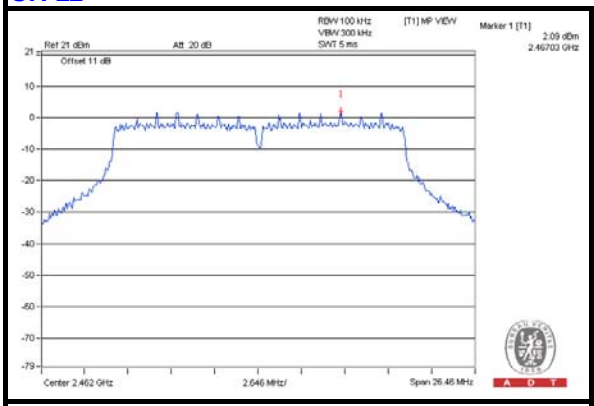


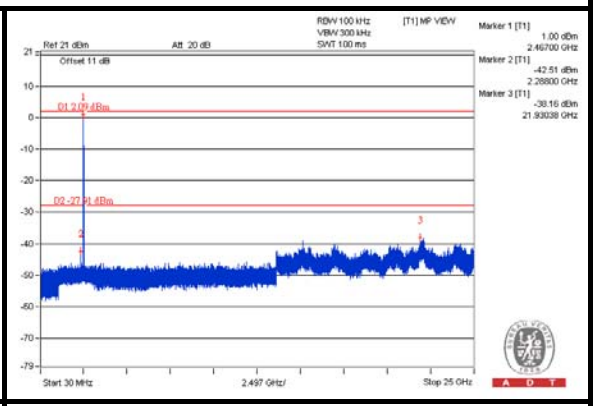
CH 6



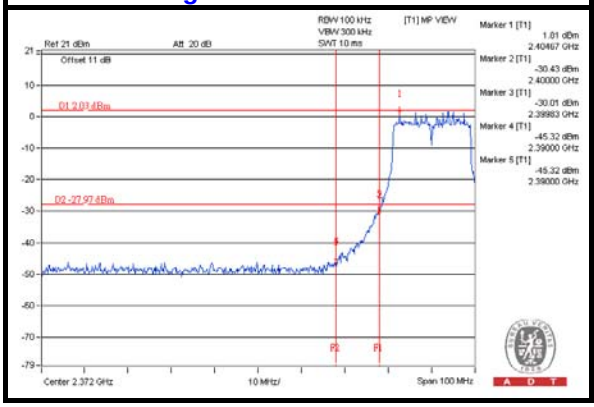


CH 11

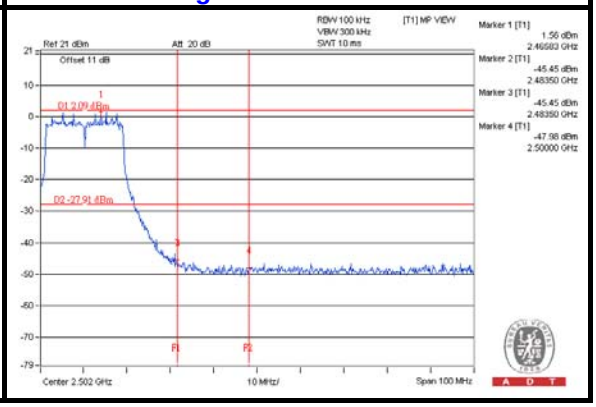




CH 1 Band edge

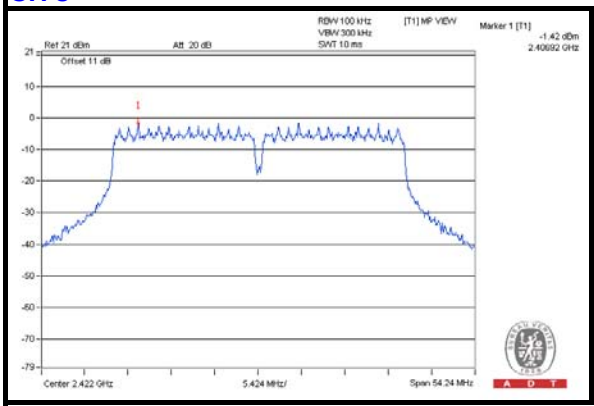


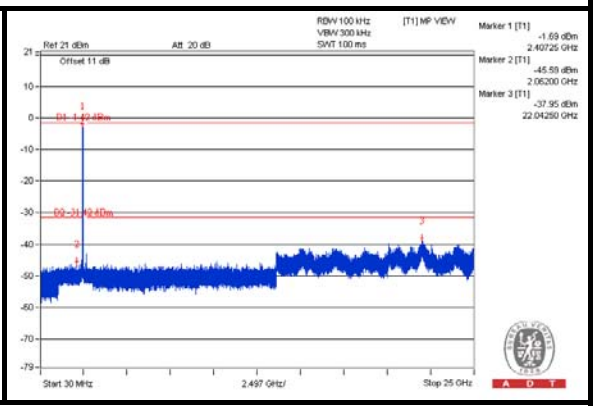
CH 11 Band edge



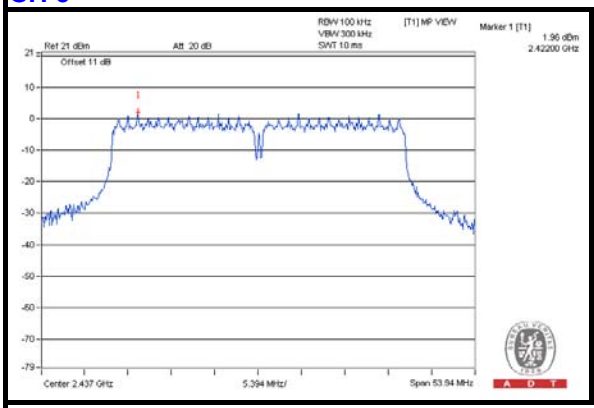
802.11n (40MHz)
CHAIN 0

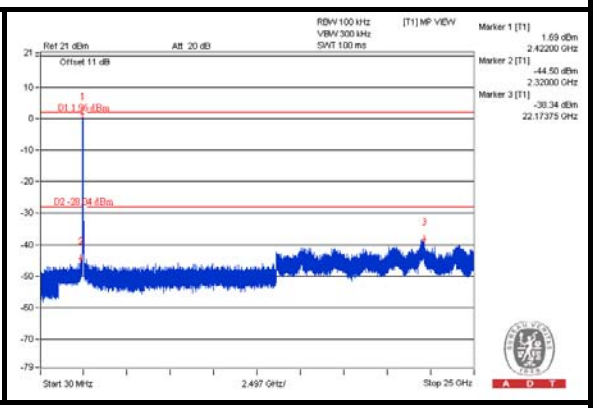
CH 3



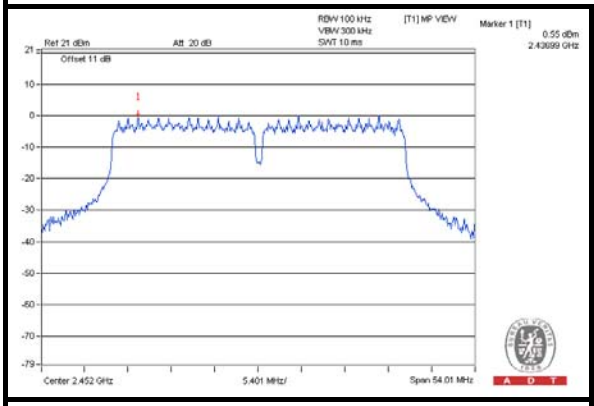


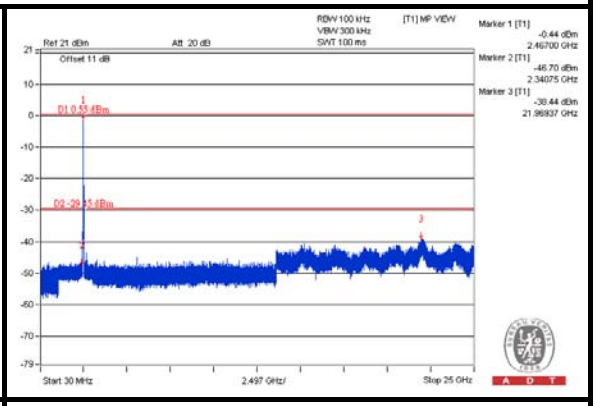
CH 6



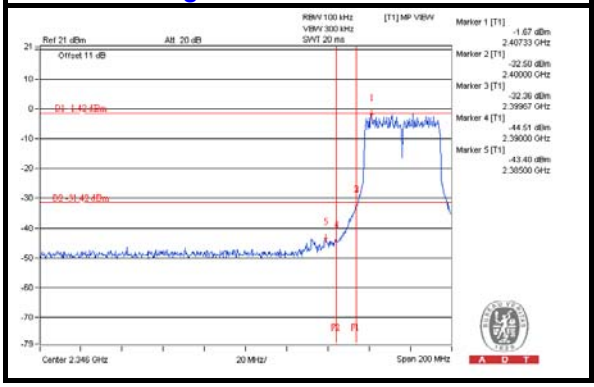


CH 9

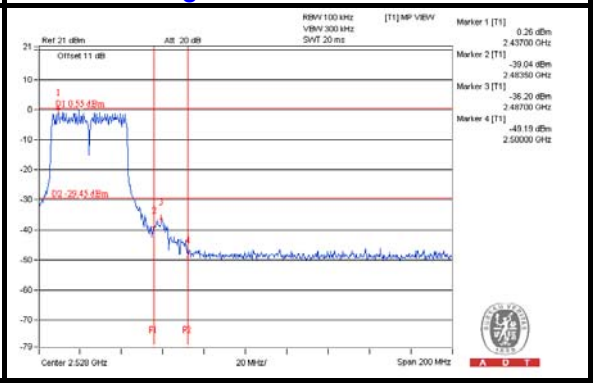




CH 3 Band edge

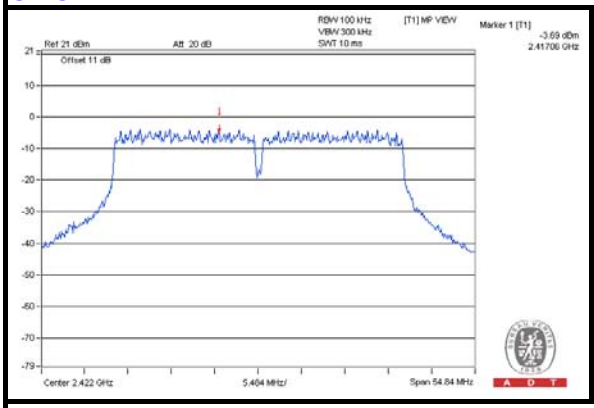


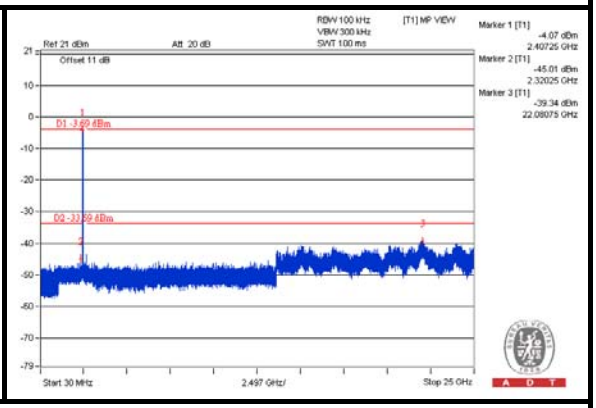
CH 9 Band edge



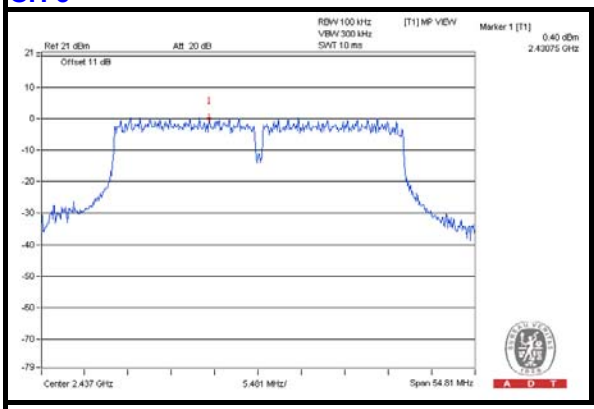
CHAIN 1

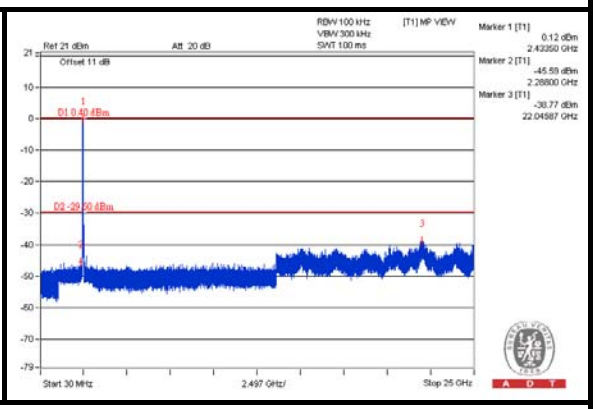
CH 3



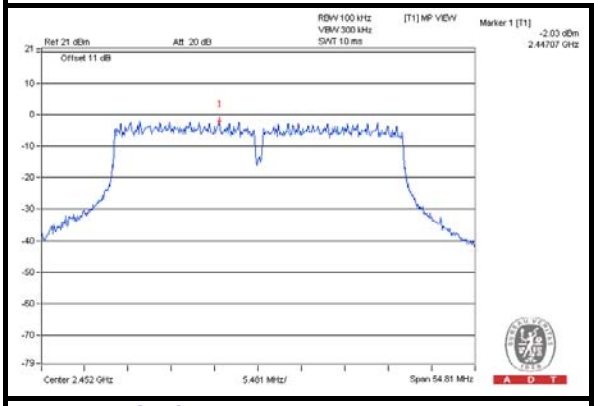


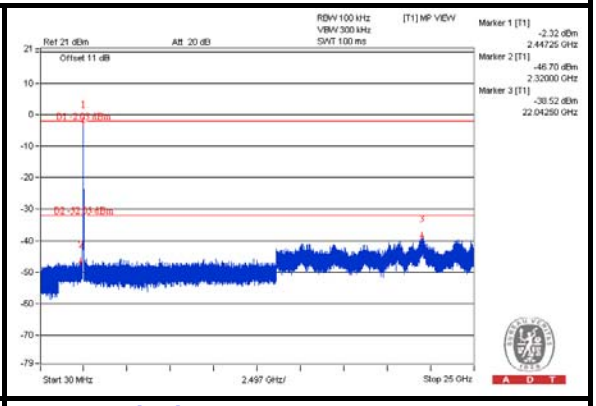
CH 6



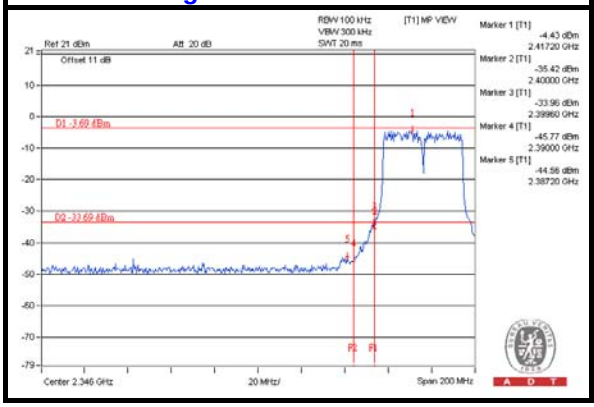


CH 9

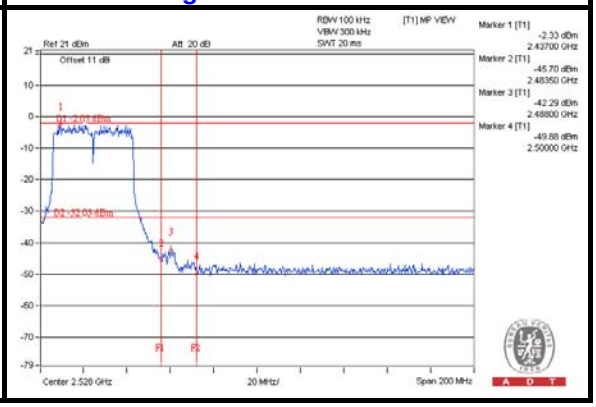




CH 3 Band edge

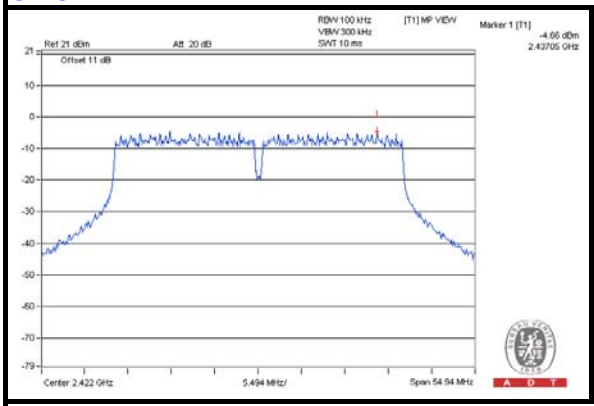


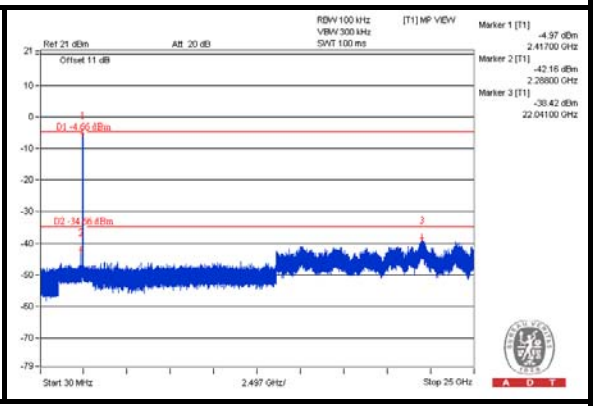
CH 9 Band edge



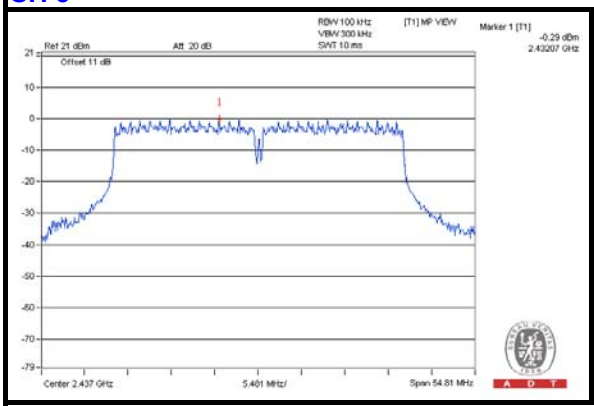
CHAIN 2

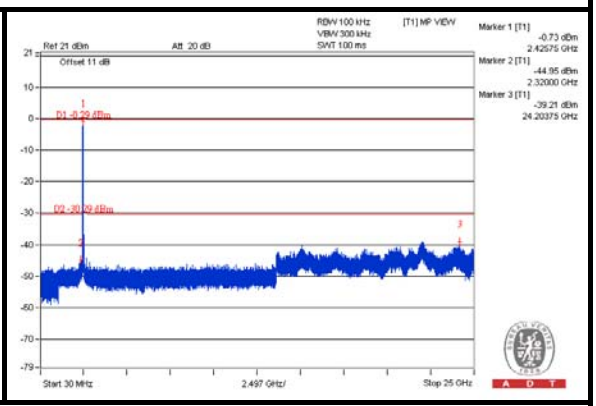
CH 3



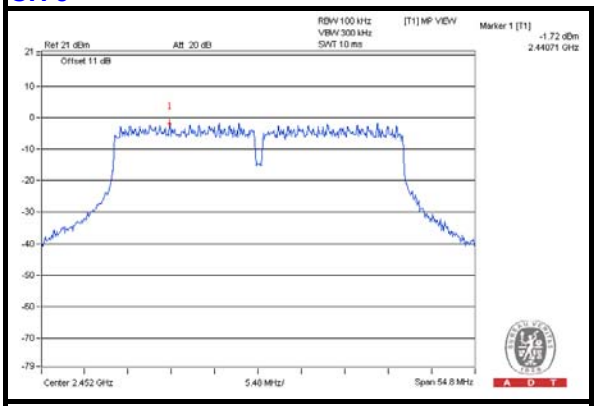


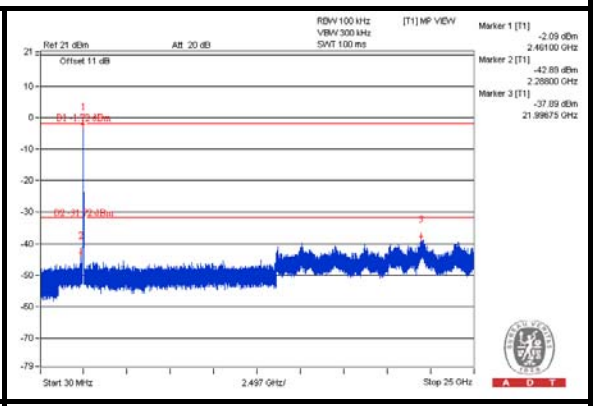
CH 6



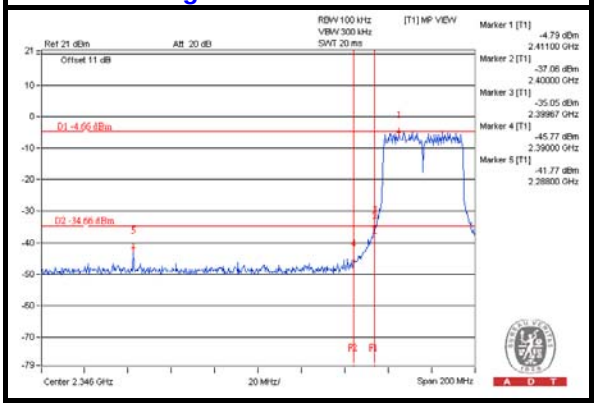


CH 9

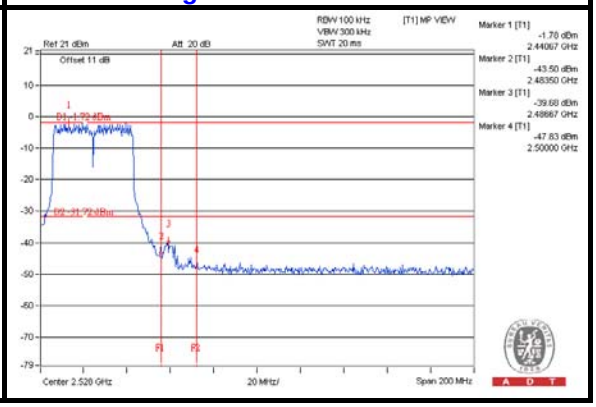




CH 3 Band edge



CH 9 Band edge



5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

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

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

No any modifications are made to the EUT by the lab during the test.

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