

FCC TEST REPORT (15.247)

REPORT NO.: RF140320C25A-2

MODEL NO.: WAP131

FCC ID: PD5-WAP131

RECEIVED: Mar. 19, 2014

TESTED: Apr. 02 ~ May 23, 2014

ISSUED: May 23, 2014

APPLICANT: Delta Networks, Inc.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140320C25A-2	Original release	May 23, 2014



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1. CERTIFICATION

PRODUCT: Wireless-N Dual Radio Access Point with PoE
MODEL NO.: WAP131
BRAND: CISCO
APPLICANT: Delta Networks, Inc.
TESTED: Apr. 02 ~ May 23, 2014
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

The above equipment (model: WAP131) 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 : Maggie Wu , **DATE :** May 23, 2014
Maggie Wu / Specialist

APPROVED BY : Ken Liu , **DATE :** May 23, 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 -11.83dB at 0.50641MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390.00 & 2483.50MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex (MHF) 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	3.19 dB
	200MHz ~1000MHz	3.21 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	Wireless-N Dual Radio Access Point with PoE
MODEL NO.	WAP131
POWER SUPPLY	12Vdc (Adapter) 55 or 56Vdc (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 300.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
OUTPUT POWER	418.853mW for 2412 ~ 2462MHz
ANTENNA TYPE	Refer to note
ANTENNA CONNECTOR	Refer to note
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Adapter

NOTE:

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

MODULATION MODE	TX FUNCTION
802.11b	1TX
802.11g	2TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

2. The EUT consumes power from the following adapter.

Brand	DVE
Model	DSA-20CA-12 120150
Input Power	100-240Vac, 50/60Hz, 0.8A
Output Power	12Vdc, 1.5A
Power Line	DC 1.5m power cable without core attached on adapter

3. The EUT consumes power from the following POEs (provided as support units only).

POE 1	
Brand	PowerDsine™
Model	9001G-40/SP
Input Power	100-240Vac, 50-60Hz, 1.5A
Output Power	55Vdc, 0.73A

POE 2	
Brand	CISCO
Model	AIR-PWRINJ1500-2
Input Power	100-240Vac, 50-60Hz, 1.5A
Output Power	56Vdc, 1.43A, 80W max

4. There are 2 antennas for the EUT.

No.	Frequency	Location	Type	Connector	Gain(dBi)	CHAIN
1	2.4GHz	Top	PIFA	i-pex (MHF)	3.03	0
2	2.4GHz	Front	Dipole	i-pex (MHF)	3.39	1

* For all test items except radiated emission above 1GHz test for frequency 2.4GHz 802.11b, the No. 2 antenna was chosen for final test according to the result of pre-testing and recorded in the report.

5. The above EUT information is declared by manufacturer and for more detailed feature 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 $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by POE

Where **RE $\geq$ 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 **X-plane**.
2. "-" means no effect.

RADIATED EMISSION TEST (ABOVE 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)	TX CHAIN
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	0
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0	1
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0	0 / 1
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2	0 / 1
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0	0 / 1

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)
A & B	802.11n (40MHz)	3 to 9	6	OFDM	BPSK	15.0

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A & B	802.11n (40MHz)	3 to 9	6	OFDM	BPSK	15.0

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)
A	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 11	OFDM	BPSK	7.2
A	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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	15.0



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TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH 23deg. C, 66%RH	120Vac, 60Hz	Brad Tung Alan Wu
RE<1G	25deg. C, 65%RH	120Vac, 60Hz 55Vdc	Brad Tung
PLC	22deg. C, 68%RH	120Vac, 60Hz 55Vdc	Brad Tung
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 DUTY CYCLE OF TEST SIGNAL

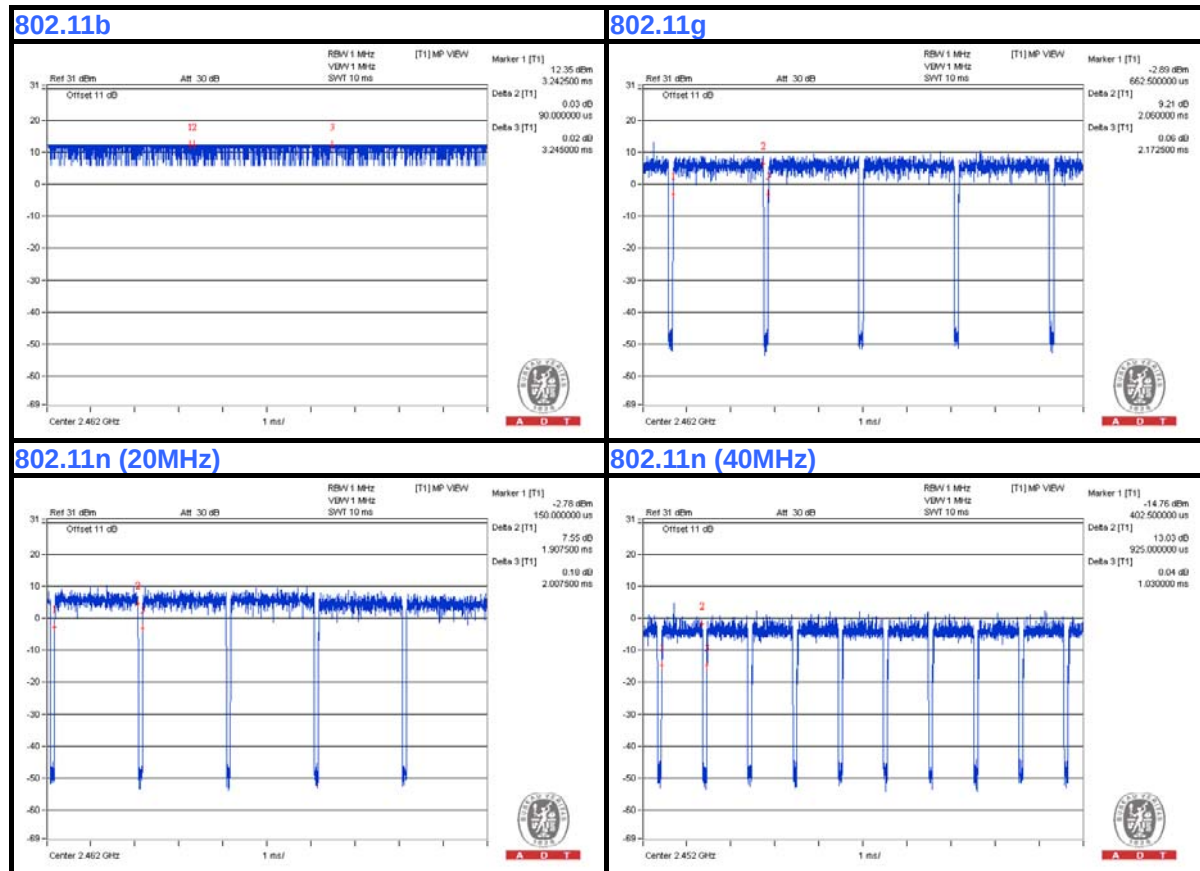
802.11b: Duty cycle of test signal is > 98 %

802.11g, 802.11n (20MHz), 802.11n (40MHz): Duty cycle of test signal is < 98%

802.11g: Duty cycle = $2.060/2.173 = 0.949$, Duty factor = $10 * \log(1/0.949) = 0.23$

802.11n (20MHz): Duty cycle = $1.908/2.008 = 0.950$, Duty factor = $10 * \log(1/0.950) = 0.22$

802.11n (40MHz): Duty cycle = $0.925/1.030 = 0.898$, Duty factor = $10 * \log(1/0.898) = 0.47$





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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	E5420	BPQ7MQ1	FCC Doc Approved
2	POE	PowerDsine™	9001G-40/SP	NA	NA

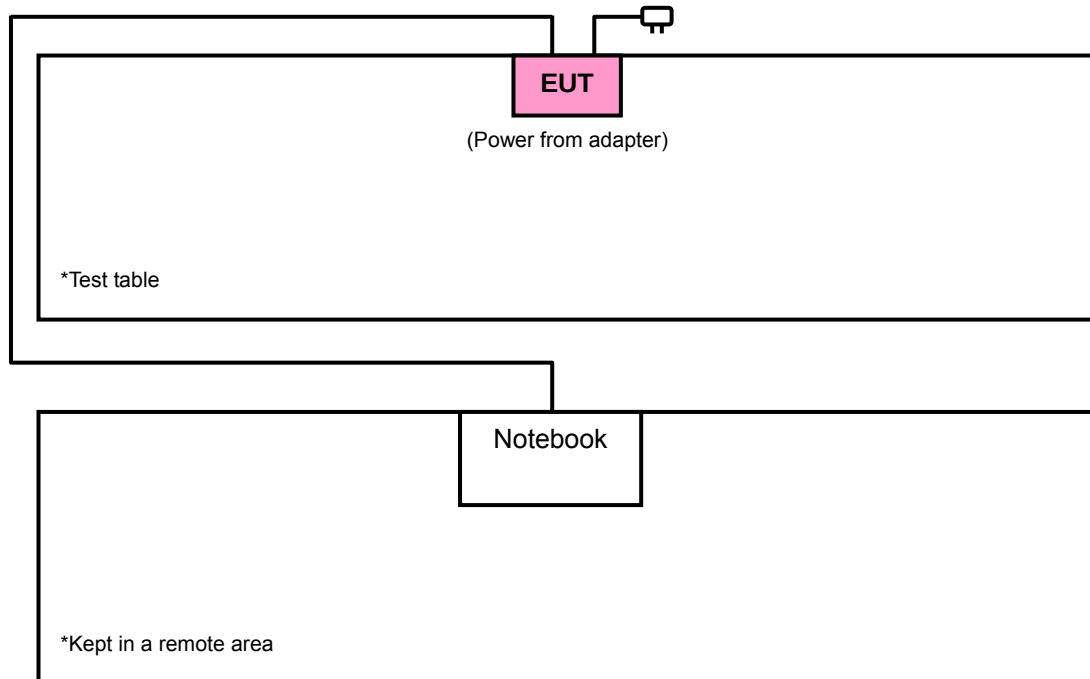
NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	3m LAN cable for mode A, 1.8m LAN cable for mode B
2	3m LAN cable

NOTE:

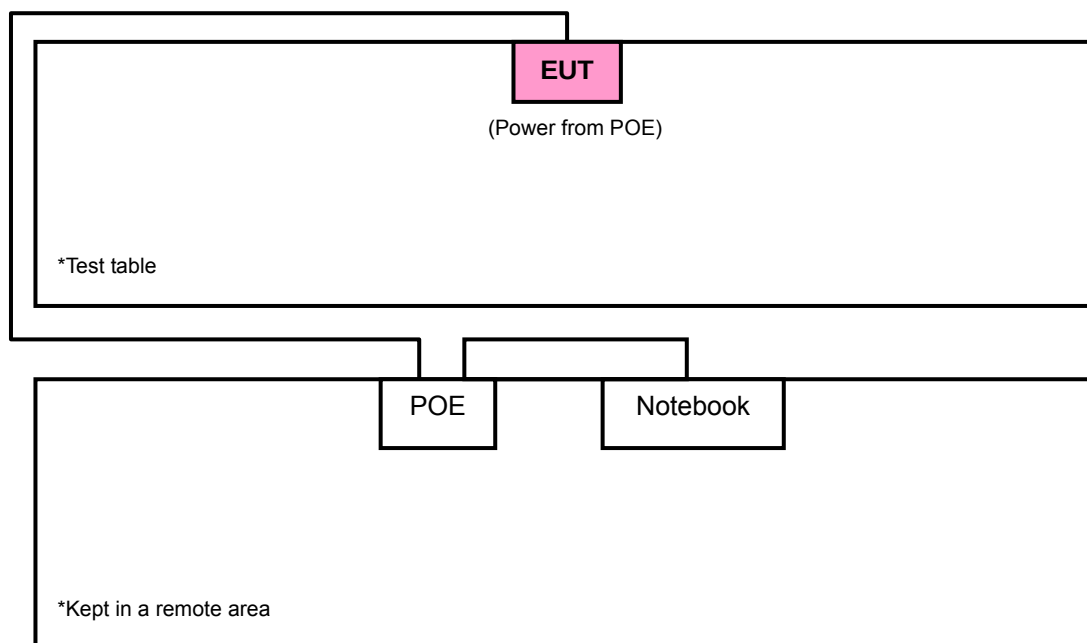
1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as a communication partner to transfer data.
3. Item 2 was used for mode B only.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST

TEST MODE A



TEST MODE B



3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specification of the EUT declared by 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 20dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Sep. 09, 2013	Sep. 08, 2014
Spectrum Analyzer ROHDE & SCHWARZ	FSU 43	100115	Dec. 18, 2013	Dec. 17, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Feb. 26, 2014	Feb. 25, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-404	Jan. 05, 2014	Jan. 04, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	148	Jul. 15, 2013	Jul. 14, 2014
Preamplifier Agilent	8449B	3008A01961	Oct. 28, 2013	Oct. 27, 2014
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 26, 2013	Aug. 25, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 26, 2013	Aug. 25, 2014
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100.	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2013	Oct. 17, 2014
High Speed Peak Power Meter	ML2495A	0824011	Jul. 29, 2013	Jul. 28, 2014
Power Sensor	MA2411B	0738171	Jul. 29, 2013	Jul. 28, 2014

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

4.1.3 TEST PROCEDURES

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

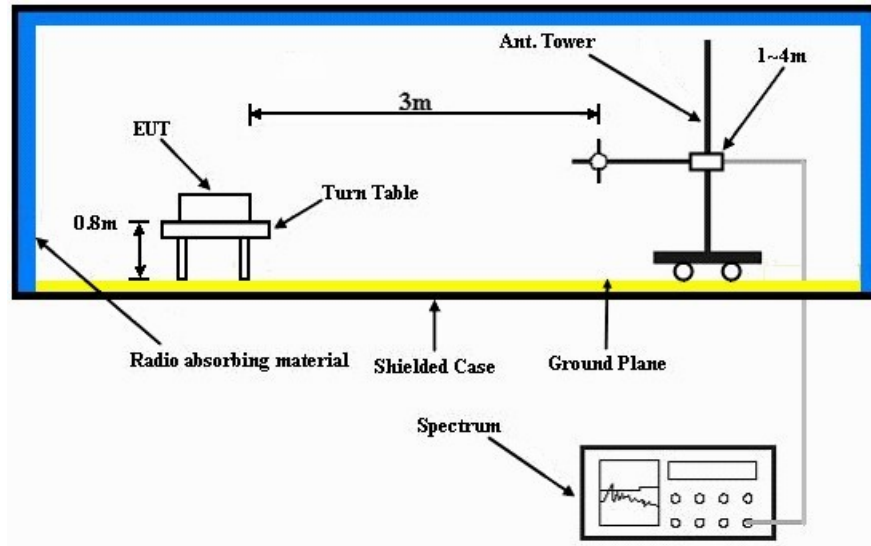
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (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

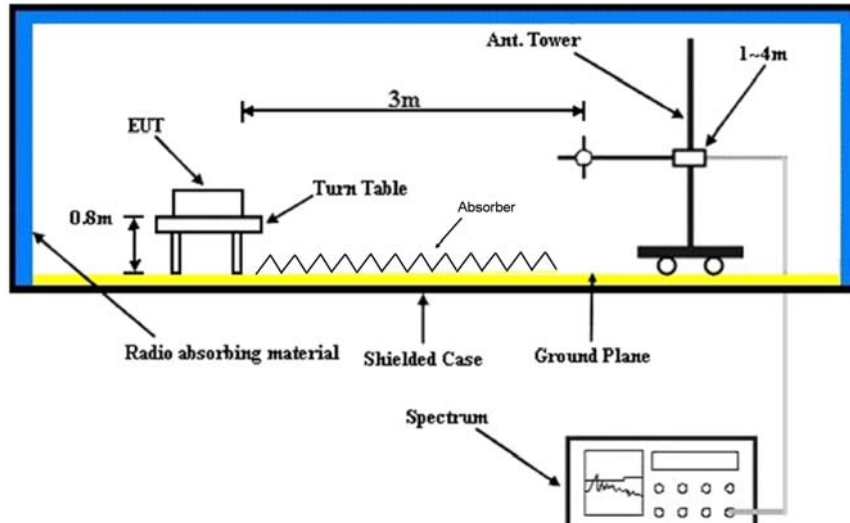
No deviation.

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

TEST MODE A

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

TEST MODE B

- a. Placed the EUT on the testing table.
- b. Prepared a notebook and a POE to act as communication partners and placed them outside of testing area.
- c. The POE was connected with the EUT and the notebook via RJ45 cables and the notebook ran a test program (provided by manufacturer) to enable the EUT under transmission condition continuously at specific channel frequency.
- d. The communication partners sent data to EUT by command "PING".



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4.1.7 TEST RESULTS

ABOVE 1GHz DATA:

802.11b_CHAIN 0

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 66%RH	TESTED BY	Alan Wu

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	54.7 PK	74.0	-19.3	1.00 H	139	22.70	32.00
2	2390.00	41.3 AV	54.0	-12.7	1.00 H	139	9.30	32.00
3	*2412.00	95.7 PK			1.00 H	139	63.70	32.00
4	*2412.00	92.3 AV			1.00 H	139	60.30	32.00
5	4824.00	47.3 PK	74.0	-26.7	1.00 H	126	42.10	5.20
6	4824.00	35.1 AV	54.0	-18.9	1.00 H	126	29.90	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	55.2 PK	74.0	-18.8	1.00 V	215	23.20	32.00
2	2390.00	42.1 AV	54.0	-11.9	1.00 V	215	10.10	32.00
3	*2412.00	106.2 PK			1.00 V	242	74.20	32.00
4	*2412.00	103.6 AV			1.00 V	242	71.60	32.00
5	4824.00	48.5 PK	74.0	-25.5	1.00 V	192	43.30	5.20
6	4824.00	36.5 AV	54.0	-17.5	1.00 V	192	31.30	5.20

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 66%RH	TESTED BY	Alan Wu

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	97.8 PK			1.07 H	194	65.70	32.10
2	*2437.00	94.0 AV			1.07 H	194	61.90	32.10
3	4874.00	47.6 PK	74.0	-26.4	1.00 H	122	42.30	5.30
4	4874.00	35.9 AV	54.0	-18.1	1.00 H	122	30.60	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.8 PK			1.00 V	237	74.70	32.10
2	*2437.00	103.7 AV			1.00 V	237	71.60	32.10
3	4874.00	48.8 PK	74.0	-25.2	1.00 V	190	43.50	5.30
4	4874.00	36.3 AV	54.0	-17.7	1.00 V	190	31.00	5.30

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	23deg. C, 66%RH	TESTED BY	Alan Wu

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	97.3 PK			1.06 H	193	65.00	32.30
2	*2462.00	93.7 AV			1.06 H	193	61.40	32.30
3	2483.50	55.5 PK	74.0	-18.5	1.00 H	192	23.10	32.40
4	2483.50	42.7 AV	54.0	-11.3	1.00 H	192	10.30	32.40
5	4924.00	48.2 PK	74.0	-25.8	1.00 H	120	42.80	5.40
6	4924.00	35.4 AV	54.0	-18.6	1.00 H	120	30.00	5.40
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	*2462.00	106.2 PK			1.00 V	241	73.90	32.30
2	*2462.00	102.3 AV			1.00 V	241	70.00	32.30
3	2483.50	56.0 PK	74.0	-18.0	1.00 V	246	23.60	32.40
4	2483.50	43.4 AV	54.0	-10.6	1.00 V	246	11.00	32.40
5	4924.00	49.3 PK	74.0	-24.7	1.00 V	196	43.90	5.40
6	4924.00	36.8 AV	54.0	-17.2	1.00 V	196	31.40	5.40

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



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802.11b_CHAIN 1

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	61.2 PK	74.0	-12.8	1.04 H	4	29.20	32.00
2	2390.00	52.5 AV	54.0	-1.5	1.04 H	4	20.50	32.00
3	*2412.00	112.9 PK			1.04 H	2	80.90	32.00
4	*2412.00	108.9 AV			1.04 H	2	76.90	32.00
5	4824.00	52.3 PK	74.0	-21.7	1.00 H	336	47.10	5.20
6	4824.00	48.8 AV	54.0	-5.2	1.00 H	336	43.60	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.0 PK	74.0	-17.0	1.00 V	250	25.00	32.00
2	2390.00	48.2 AV	54.0	-5.8	1.00 V	250	16.20	32.00
3	*2412.00	101.4 PK			1.00 V	247	69.40	32.00
4	*2412.00	98.5 AV			1.00 V	247	66.50	32.00
5	4824.00	50.2 PK	74.0	-23.8	1.00 V	61	45.00	5.20
6	4824.00	46.8 AV	54.0	-7.2	1.00 V	61	41.60	5.20

REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	*2437.00	111.9 PK			1.02 H	0	79.80	32.10
2	*2437.00	108.0 AV			1.02 H	0	75.90	32.10
3	4874.00	53.1 PK	74.0	-20.9	1.00 H	306	47.80	5.30
4	4874.00	47.3 AV	54.0	-6.7	1.00 H	306	42.00	5.30
5	7311.00	56.5 PK	74.0	-17.5	1.72 H	42	45.20	11.30
6	7311.00	49.2 AV	54.0	-4.8	1.72 H	42	37.90	11.30
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	*2437.00	101.9 PK			1.58 V	276	69.80	32.10
2	*2437.00	97.8 AV			1.58 V	276	65.70	32.10
3	4874.00	51.1 PK	74.0	-22.9	1.02 V	52	45.80	5.30
4	4874.00	45.3 AV	54.0	-8.7	1.02 V	52	40.00	5.30
5	7311.00	57.8 PK	74.0	-16.2	1.66 V	319	46.50	11.30
6	7311.00	50.7 AV	54.0	-3.3	1.66 V	319	39.40	11.30

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	*2462.00	113.4 PK			1.02 H	9	81.10	32.30
2	*2462.00	109.7 AV			1.02 H	9	77.40	32.30
3	2483.50	63.6 PK	74.0	-10.4	1.02 H	9	31.20	32.40
4	2483.50	51.6 AV	54.0	-2.4	1.02 H	9	19.20	32.40
5	4924.00	54.2 PK	74.0	-19.8	1.00 H	326	48.80	5.40
6	4924.00	48.8 AV	54.0	-5.2	1.00 H	326	43.40	5.40
7	7386.00	56.0 PK	74.0	-18.0	1.77 H	30	44.60	11.40
8	7386.00	49.0 AV	54.0	-5.0	1.77 H	30	37.60	11.40
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	*2462.00	102.9 PK			1.53 V	265	70.60	32.30
2	*2462.00	99.2 AV			1.53 V	265	66.90	32.30
3	2483.50	55.3 PK	74.0	-18.7	1.53 V	265	22.90	32.40
4	2483.50	45.7 AV	54.0	-8.3	1.53 V	265	13.30	32.40
5	4924.00	52.2 PK	74.0	-21.8	1.03 V	48	46.80	5.40
6	4924.00	46.8 AV	54.0	-7.2	1.03 V	48	41.40	5.40
7	7386.00	57.5 PK	74.0	-16.5	1.63 V	318	46.10	11.40
8	7386.00	50.4 AV	54.0	-3.6	1.63 V	318	39.00	11.40

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



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802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	72.1 PK	74.0	-1.9	1.06 H	3	40.10	32.00
2	2390.00	52.9 AV	54.0	-1.1	1.06 H	3	20.90	32.00
3	*2412.00	111.0 PK			1.04 H	355	79.00	32.00
4	*2412.00	100.0 AV			1.04 H	355	68.00	32.00
5	4824.00	45.8 PK	74.0	-28.2	1.23 H	30	40.60	5.20
6	4824.00	35.0 AV	54.0	-19.0	1.23 H	30	29.80	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.0 PK	74.0	-5.0	1.18 V	155	37.00	32.00
2	2390.00	49.0 AV	54.0	-5.0	1.18 V	155	17.00	32.00
3	*2412.00	106.9 PK			1.21 V	165	74.90	32.00
4	*2412.00	97.9 AV			1.21 V	165	65.90	32.00
5	4824.00	45.1 PK	74.0	-28.9	1.08 V	300	39.90	5.20
6	4824.00	34.8 AV	54.0	-19.2	1.08 V	300	29.60	5.20

REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	71.9 PK	74.0	-2.1	1.05 H	0	39.90	32.00
2	2390.00	53.0 AV	54.0	-1.0	1.05 H	0	21.00	32.00
3	*2437.00	116.1 PK			1.05 H	0	84.00	32.10
4	*2437.00	106.5 AV			1.05 H	0	74.40	32.10
5	7311.00	62.2 PK	74.0	-11.8	1.60 H	7	50.90	11.30
6	7311.00	48.0 AV	54.0	-6.0	1.60 H	7	36.70	11.30
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	2390.00	65.2 PK	74.0	-8.8	1.59 V	272	33.20	32.00
2	2390.00	48.9 AV	54.0	-5.1	1.59 V	272	16.90	32.00
3	*2437.00	113.3 PK			1.59 V	272	81.20	32.10
4	*2437.00	104.0 AV			1.59 V	272	71.90	32.10
5	7311.00	65.0 PK	74.0	-9.0	1.76 V	336	53.70	11.30
6	7311.00	50.9 AV	54.0	-3.1	1.76 V	336	39.60	11.30

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	*2462.00	113.3 PK			1.04 H	5	81.00	32.30
2	*2462.00	102.4 AV			1.04 H	5	70.10	32.30
3	2483.50	73.0 PK	74.0	-1.0	1.04 H	5	40.60	32.40
4	2483.50	52.6 AV	54.0	-1.4	1.04 H	5	20.20	32.40
5	4924.00	46.5 PK	74.0	-27.5	1.06 H	128	41.10	5.40
6	4924.00	35.4 AV	54.0	-18.6	1.06 H	128	30.00	5.40
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	*2462.00	109.3 PK			1.20 V	153	77.00	32.30
2	*2462.00	98.4 AV			1.20 V	153	66.10	32.30
3	2483.50	70.0 PK	74.0	-4.0	1.20 V	153	37.60	32.40
4	2483.50	49.2 AV	54.0	-4.8	1.20 V	153	16.80	32.40
5	4924.00	46.2 PK	74.0	-27.8	1.11 V	289	40.80	5.40
6	4924.00	35.2 AV	54.0	-18.8	1.11 V	289	29.80	5.40

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



A D T

802.11n (20MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	72.3 PK	74.0	-1.7	1.05 H	1	40.30	32.00
2	2390.00	53.0 AV	54.0	-1.0	1.05 H	1	21.00	32.00
3	*2412.00	111.8 PK			1.05 H	1	79.80	32.00
4	*2412.00	100.3 AV			1.05 H	1	68.30	32.00
5	4824.00	45.7 PK	74.0	-28.3	1.20 H	17	40.50	5.20
6	4824.00	35.1 AV	54.0	-18.9	1.20 H	17	29.90	5.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.0 PK	74.0	-5.0	1.15 V	163	37.00	32.00
2	2390.00	49.0 AV	54.0	-5.0	1.15 V	163	17.00	32.00
3	*2412.00	107.8 PK			1.15 V	163	75.80	32.00
4	*2412.00	96.3 AV			1.15 V	163	64.30	32.00
5	4824.00	45.5 PK	74.0	-28.5	1.00 V	275	40.30	5.20
6	4824.00	35.0 AV	54.0	-19.0	1.00 V	275	29.80	5.20

REMARKS:

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



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Alan Wu

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	66.9 PK	74.0	-7.1	1.00 H	10	34.90	32.00
2	2390.00	47.0 AV	54.0	-7.0	1.00 H	10	15.00	32.00
3	*2437.00	111.5 PK			1.00 H	13	79.40	32.10
4	*2437.00	100.5 AV			1.00 H	13	68.40	32.10
5	7311.00	59.9 PK	74.0	-14.1	1.62 H	16	48.60	11.30
6	7311.00	45.9 AV	54.0	-8.1	1.62 H	16	34.60	11.30
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	2390.00	62.5 PK	74.0	-11.5	1.63 V	267	30.50	32.00
2	2390.00	43.5 AV	54.0	-10.5	1.63 V	267	11.50	32.00
3	*2437.00	107.1 PK			1.57 V	263	75.00	32.10
4	*2437.00	98.2 AV			1.57 V	263	66.10	32.10
5	7311.00	62.8 PK	74.0	-11.2	1.75 V	337	51.50	11.30
6	7311.00	48.7 AV	54.0	-5.3	1.75 V	337	37.40	11.30

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	*2462.00	111.9 PK			1.02 H	0	79.60	32.30
2	*2462.00	100.9 AV			1.02 H	0	68.60	32.30
3	2483.50	73.0 PK	74.0	-1.0	1.02 H	0	40.60	32.40
4	2483.50	52.4 AV	54.0	-1.6	1.02 H	0	20.00	32.40
5	4924.00	46.4 PK	74.0	-27.6	1.10 H	120	41.00	5.40
6	4924.00	35.3 AV	54.0	-18.7	1.10 H	120	29.90	5.40
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	*2462.00	108.7 PK			1.16 V	158	76.40	32.30
2	*2462.00	98.0 AV			1.16 V	158	65.70	32.30
3	2483.50	69.0 PK	74.0	-5.0	1.16 V	158	36.60	32.40
4	2483.50	47.3 AV	54.0	-6.7	1.16 V	158	14.90	32.40
5	4924.00	46.1 PK	74.0	-27.9	1.00 V	299	40.70	5.40
6	4924.00	35.5 AV	54.0	-18.5	1.00 V	299	30.10	5.40

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



A D T

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	68.7 PK	74.0	-5.3	1.06 H	0	36.70	32.00
2	2390.00	52.7 AV	54.0	-1.3	1.06 H	0	20.70	32.00
3	*2422.00	105.6 PK			1.06 H	0	73.50	32.10
4	*2422.00	94.5 AV			1.06 H	0	62.40	32.10
5	4844.00	46.3 PK	74.0	-27.7	1.06 H	27	41.00	5.30
6	4844.00	35.1 AV	54.0	-18.9	1.06 H	27	29.80	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.0 PK	74.0	-10.0	1.00 V	214	32.00	32.00
2	2390.00	48.7 AV	54.0	-5.3	1.00 V	214	16.70	32.00
3	*2422.00	101.6 PK			1.00 V	214	69.50	32.10
4	*2422.00	90.5 AV			1.00 V	214	58.40	32.10
5	4844.00	48.0 PK	74.0	-26.0	1.08 V	153	42.70	5.30
6	4844.00	36.1 AV	54.0	-17.9	1.08 V	153	30.80	5.30

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	2390.00	70.9 PK	74.0	-3.1	1.02 H	0	38.90	32.00
2	2390.00	52.5 AV	54.0	-1.5	1.02 H	0	20.50	32.00
3	*2437.00	109.1 PK			1.02 H	0	77.00	32.10
4	*2437.00	98.0 AV			1.02 H	0	65.90	32.10
5	4874.00	47.1 PK	74.0	-26.9	1.20 H	14	41.80	5.30
6	4874.00	35.1 AV	54.0	-18.9	1.20 H	14	29.80	5.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.0 PK	74.0	-8.0	1.00 V	220	34.00	32.00
2	2390.00	48.1 AV	54.0	-5.9	1.00 V	220	16.10	32.00
3	*2437.00	105.1 PK			1.00 V	220	73.00	32.10
4	*2437.00	94.0 AV			1.00 V	220	61.90	32.10
5	4874.00	47.3 PK	74.0	-26.7	1.11 V	147	42.00	5.30
6	4874.00	35.9 AV	54.0	-18.1	1.11 V	147	30.60	5.30

REMARKS:

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



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1 ~ 25GHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%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	*2452.00	105.2 PK			1.02 H	10	72.90	32.30
2	*2452.00	94.4 AV			1.02 H	10	62.10	32.30
3	2483.50	69.5 PK	74.0	-4.5	1.02 H	10	37.10	32.40
4	2483.50	52.7 AV	54.0	-1.3	1.02 H	10	20.30	32.40
5	4904.00	46.6 PK	74.0	-27.4	1.10 H	45	41.20	5.40
6	4904.00	35.3 AV	54.0	-18.7	1.10 H	45	29.90	5.40
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	*2452.00	101.2 PK			1.00 V	209	68.90	32.30
2	*2452.00	90.4 AV			1.00 V	209	58.10	32.30
3	2483.50	65.6 PK	74.0	-8.4	1.00 V	209	33.20	32.40
4	2483.50	49.1 AV	54.0	-4.9	1.00 V	209	16.70	32.40
5	4904.00	46.2 PK	74.0	-27.8	1.16 V	175	40.80	5.40
6	4904.00	35.1 AV	54.0	-18.9	1.16 V	175	29.70	5.40

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)
– Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. “ * ”: Fundamental frequency.



A D T

BELOW 1GHz WORST-CASE DATA: 802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER	120Vac, 60Hz	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Tung
TEST MODE	A		

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	53.18	32.7 QP	40.0	-7.3	1.50 H	75	46.70	-14.00
2	101.69	37.7 QP	43.5	-5.8	1.25 H	126	55.80	-18.10
3	177.37	30.2 QP	43.5	-13.3	1.00 H	98	45.00	-14.80
4	249.17	34.9 QP	46.0	-11.1	2.00 H	228	49.30	-14.40
5	375.29	33.6 QP	46.0	-12.4	1.25 H	89	44.70	-11.10
6	625.60	28.2 QP	46.0	-17.8	1.00 H	204	34.30	-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	53.18	32.8 QP	40.0	-7.2	1.50 V	8	46.80	-14.00
2	185.13	32.1 QP	43.5	-11.4	1.00 V	282	47.90	-15.80
3	249.17	32.4 QP	46.0	-13.6	1.25 V	282	46.80	-14.40
4	375.29	30.7 QP	46.0	-15.3	1.00 V	73	41.80	-11.10
5	499.48	31.9 QP	46.0	-14.1	1.50 V	217	40.80	-8.90
6	625.60	31.6 QP	46.0	-14.4	2.00 V	280	37.70	-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)
– Pre-Amplifier Factor (dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value



A D T

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 6	FREQUENCY RANGE	Below 1000MHz
INPUT POWER (POE)	55Vdc	DETECTOR FUNCTION	Quasi-Peak
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Brad Tung
TEST MODE	B		

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	53.18	36.2 QP	40.0	-3.8	1.49 H	106	50.20	-14.00
2	152.15	31.5 QP	43.5	-12.0	1.49 H	121	45.20	-13.70
3	249.99	43.8 QP	46.0	-2.2	1.25 H	250	58.20	-14.40
4	375.29	29.8 QP	46.0	-16.2	1.00 H	174	40.90	-11.10
5	625.60	31.8 QP	46.0	-14.2	1.49 H	204	37.90	-6.10
6	875.91	32.9 QP	46.0	-13.1	2.00 H	199	34.90	-2.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	53.18	37.2 QP	40.0	-2.8	1.00 V	192	51.20	-14.00
2	163.79	29.4 QP	43.5	-14.1	1.50 V	12	43.20	-13.80
3	249.17	40.2 QP	46.0	-5.8	1.00 V	280	54.60	-14.40
4	375.29	30.4 QP	46.0	-15.6	1.25 V	253	41.50	-11.10
5	625.60	31.3 QP	46.0	-14.7	1.50 V	110	37.40	-6.10
6	875.91	30.5 QP	46.0	-15.5	2.00 V	294	32.50	-2.00

REMARKS:

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

4.2 CONDUCTED EMISSION MEASUREMENT

4.2.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY 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. 17, 2013	Jul. 16, 2014
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

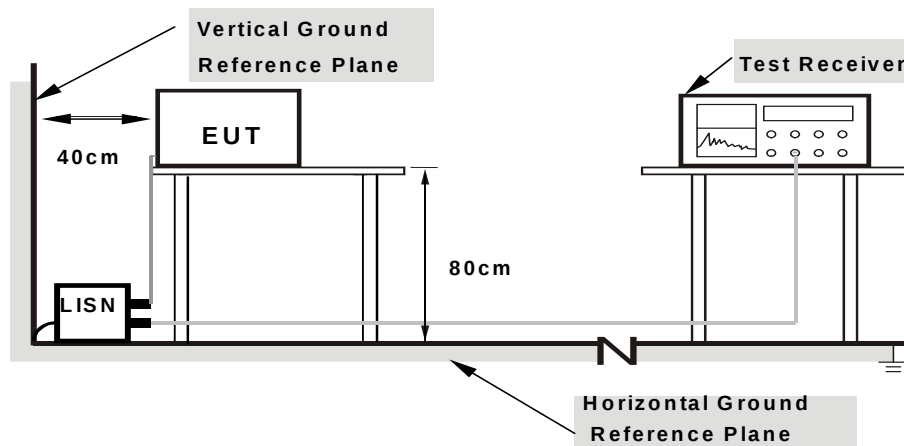
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were 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

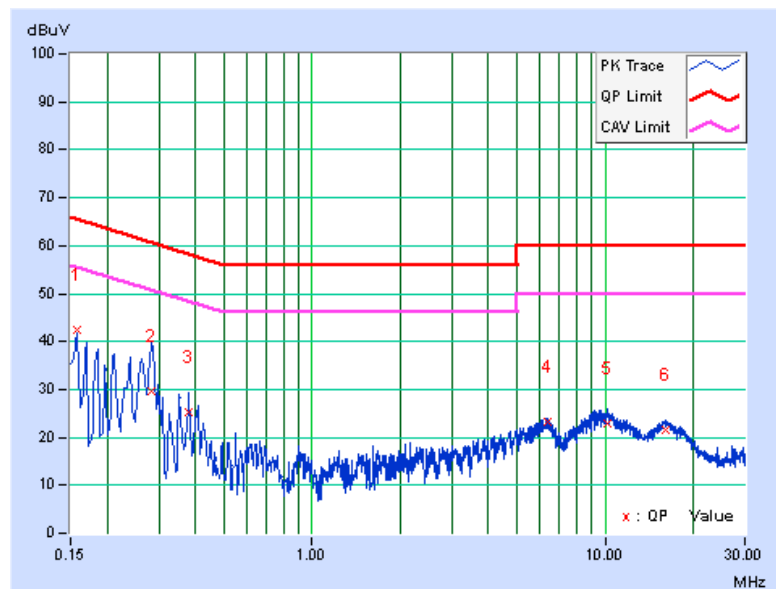
CONDUCTED WORST-CASE DATA: 802.11n (40MHz)

PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	A		

No	Freq.	Corr. Factor	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	0.15782	0.11	42.24	33.49	42.35	33.60	65.58	55.58	-23.23	-21.98
2	0.28288	0.10	29.60	20.58	29.70	20.68	60.73	50.73	-31.03	-30.05
3	0.38069	0.11	25.10	18.01	25.21	18.12	58.26	48.26	-33.06	-30.15
4	6.37074	0.37	23.03	15.96	23.40	16.33	60.00	50.00	-36.60	-33.67
5	10.24953	0.56	22.35	15.68	22.91	16.24	60.00	50.00	-37.09	-33.76
6	16.05588	0.89	20.58	15.10	21.47	15.99	60.00	50.00	-38.53	-34.01

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

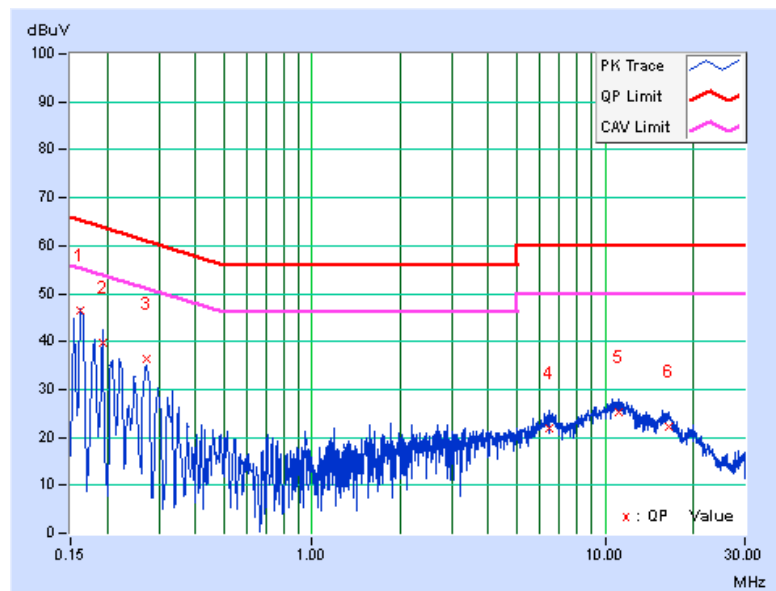


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	A		

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	0.16181	0.06	46.41	35.11	46.47	35.17	65.37	55.37	-18.90	-20.20
2	0.19301	0.08	39.63	29.16	39.71	29.24	63.91	53.91	-24.19	-24.66
3	0.27120	0.12	36.41	34.35	36.53	34.47	61.08	51.08	-24.55	-16.61
4	6.42946	0.37	21.63	14.73	22.00	15.10	60.00	50.00	-38.00	-34.90
5	11.17620	0.60	24.72	16.79	25.32	17.39	60.00	50.00	-34.68	-32.61
6	16.41169	0.85	21.24	14.80	22.09	15.65	60.00	50.00	-37.91	-34.35

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

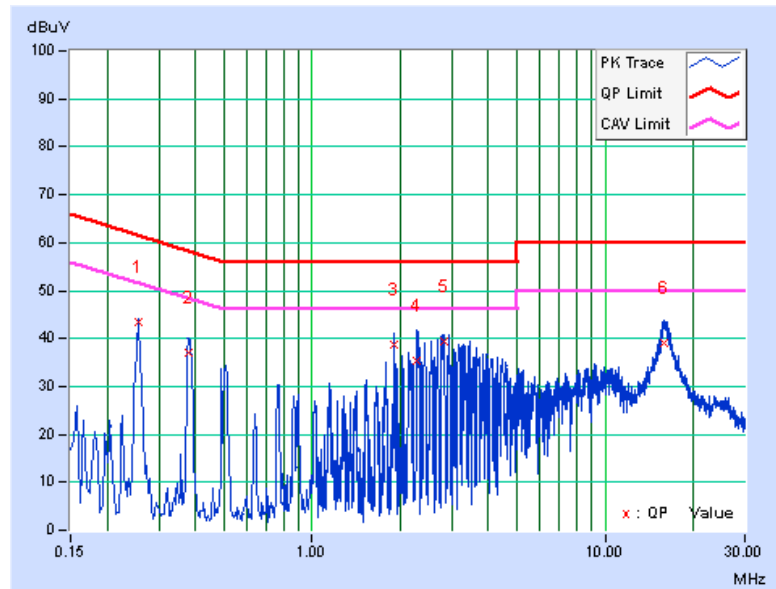


PHASE	Line 1	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.25557	0.07	43.27	39.03	43.34	39.10	61.57	51.57	-18.23	-12.47
2	0.37700	0.08	36.80	30.20	36.88	30.28	58.35	48.35	-21.47	-18.07
3	1.90559	0.15	38.68	23.01	38.83	23.16	56.00	46.00	-17.17	-22.84
4	2.27704	0.16	35.29	18.66	35.45	18.82	56.00	46.00	-20.55	-27.18
5	2.80880	0.18	39.23	32.58	39.41	32.76	56.00	46.00	-16.59	-13.24
6	15.91903	0.82	38.28	32.74	39.10	33.56	60.00	50.00	-20.90	-16.44

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

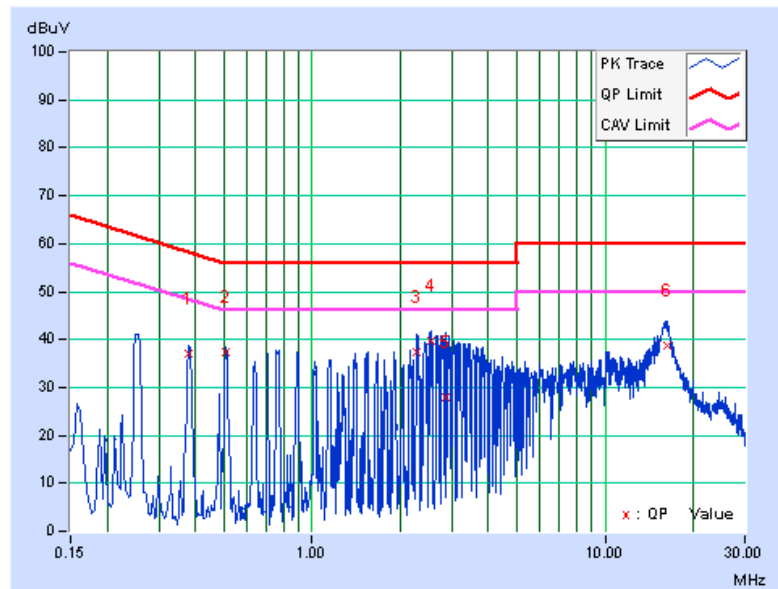


PHASE	Line 2	6dB BANDWIDTH	9kHz
TEST MODE	B		

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	0.37999	0.07	37.09	35.14	37.16	35.21	58.28	48.28	-21.12	-13.07
2	0.50641	0.07	37.39	34.10	37.46	34.17	56.00	46.00	-18.54	-11.83
3	2.28095	0.15	37.38	22.03	37.53	22.18	56.00	46.00	-18.47	-23.82
4	2.53993	0.16	39.61	29.41	39.77	29.57	56.00	46.00	-16.23	-16.43
5	2.86354	0.17	27.88	1.52	28.05	1.69	56.00	46.00	-27.95	-44.31
6	16.24356	0.73	38.07	32.62	38.80	33.35	60.00	50.00	-21.20	-16.65

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

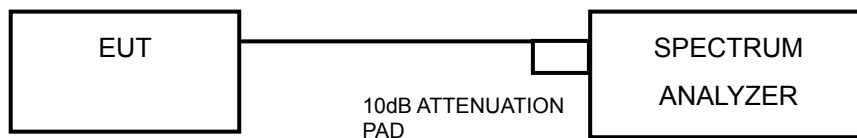


4.3 6dB BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.3.4 TEST PROCEDURE

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	8.09	0.5	PASS
6	2437	8.10	0.5	PASS
11	2462	8.13	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	14.37	14.51	0.5	PASS
6	2437	15.14	15.14	0.5	PASS
11	2462	14.45	15.13	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
1	2412	14.55	15.15	0.5	PASS
6	2437	15.16	15.68	0.5	PASS
11	2462	15.04	15.68	0.5	PASS

802.11n (40MHz)

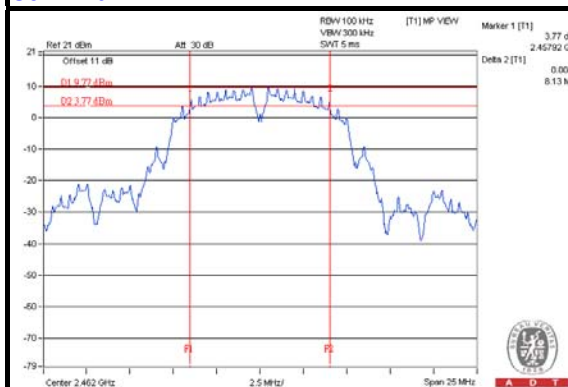
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)		MINIMUM LIMIT (MHz)	PASS / FAIL
		CHAIN 0	CHAIN 1		
3	2422	35.18	35.86	0.5	PASS
6	2437	35.49	35.83	0.5	PASS
9	2452	35.13	35.79	0.5	PASS



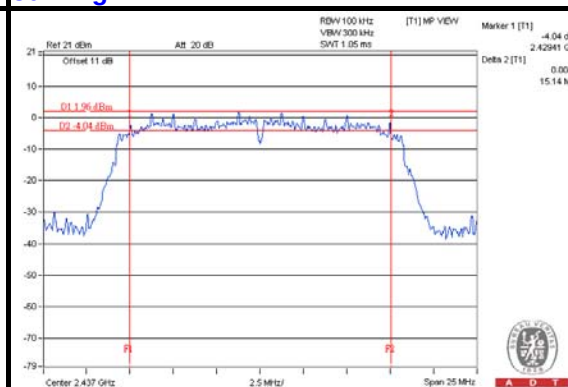
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SPECTRUM PLOT OF WORST VALUE

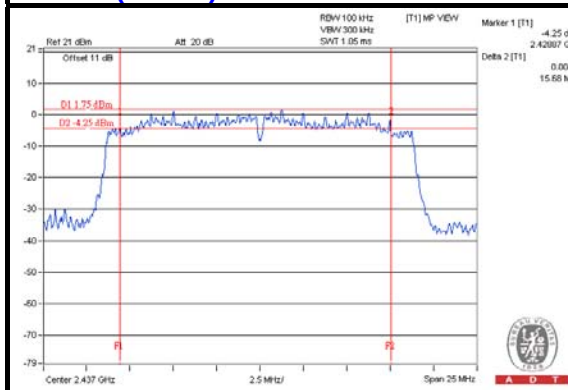
802.11b



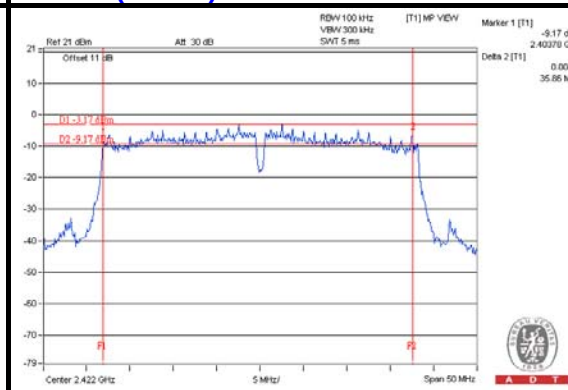
802.11g



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,

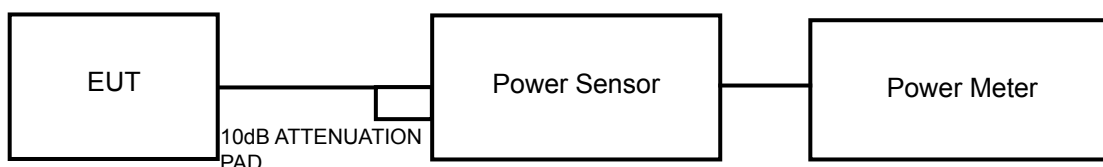
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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



4.4.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.4.4 TEST PROCEDURES

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



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4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.3.6.

4.4.7 TEST RESULTS

FOR PEAK POWER

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	93.541	19.71	30	PASS
6	2437	96.383	19.84	30	PASS
11	2462	108.143	20.34	30	PASS

802.11g

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	22.67	22.37	357.511	25.53	30	PASS
6	2437	22.56	22.38	353.284	25.48	30	PASS
11	2462	22.77	22.02	348.455	25.42	30	PASS

802.11n (20MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
1	2412	22.03	22.21	325.929	25.13	30	PASS
6	2437	22.24	22.47	344.098	25.37	30	PASS
11	2462	22.00	22.42	333.071	25.23	30	PASS

802.11n (40MHz)

CHAN.	FREQ. (MHz)	PEAK POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
3	2422	18.32	19.98	167.461	22.24	30	PASS
6	2437	22.99	23.42	418.853	26.22	30	PASS
9	2452	19.86	21.10	225.653	23.53	30	PASS

FOR AVERAGE POWER

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	40.365	16.06
6	2437	40.738	16.10
11	2462	43.752	16.41

802.11g

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	13.16	13.01	40.700	16.10
6	2437	13.00	13.01	39.952	16.02
11	2462	13.29	13.28	42.611	16.30

802.11n (20MHz)

CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
1	2412	12.65	12.75	37.244	15.71
6	2437	13.43	13.07	42.306	16.26
11	2462	13.02	13.22	41.034	16.13

802.11n (40MHz)

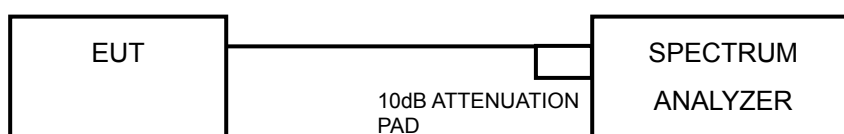
CHAN.	FREQUENCY (MHz)	AVG. POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)
		CHAIN 0	CHAIN 1		
3	2422	9.05	10.29	18.726	12.72
6	2437	13.67	13.15	43.935	16.43
9	2452	10.42	10.75	22.900	13.60

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

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

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
1	2412	-4.16	8	PASS
6	2437	-4.42	8	PASS
11	2462	-4.70	8	PASS

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.35	3.01	-8.34	7.78	PASS
	6	2437	-11.84	3.01	-8.83	7.78	PASS
	11	2462	-10.77	3.01	-7.76	7.78	PASS
1	1	2412	-11.96	3.01	-8.95	7.78	PASS
	6	2437	-11.33	3.01	-8.32	7.78	PASS
	11	2462	-10.19	3.01	-7.18	7.78	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 6.22 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.22 - 6) = 7.78\text{dBm}$.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-12.60	3.01	-9.59	7.78	PASS
	6	2437	-11.62	3.01	-8.61	7.78	PASS
	11	2462	-11.62	3.01	-8.61	7.78	PASS
1	1	2412	-12.72	3.01	-9.71	7.78	PASS
	6	2437	-12.44	3.01	-9.43	7.78	PASS
	11	2462	-12.42	3.01	-9.41	7.78	PASS

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 6.22 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.22 - 6) = 7.78\text{dBm}$.



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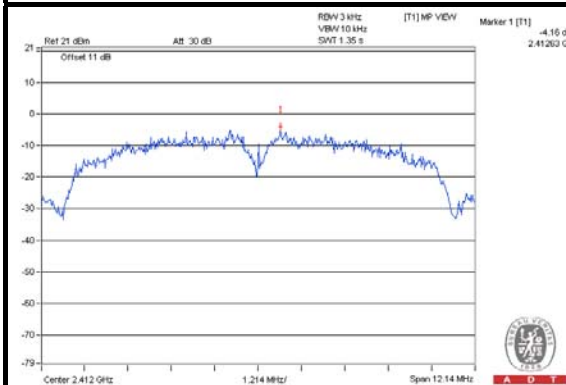
802.11n (40MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-18.51	3.01	-15.50	7.78	PASS
	6	2437	-14.77	3.01	-11.76	7.78	PASS
	9	2452	-15.92	3.01	-12.91	7.78	PASS
1	3	2422	-18.30	3.01	-15.29	7.78	PASS
	6	2437	-14.35	3.01	-11.34	7.78	PASS
	9	2452	-17.06	3.01	-14.05	7.78	PASS

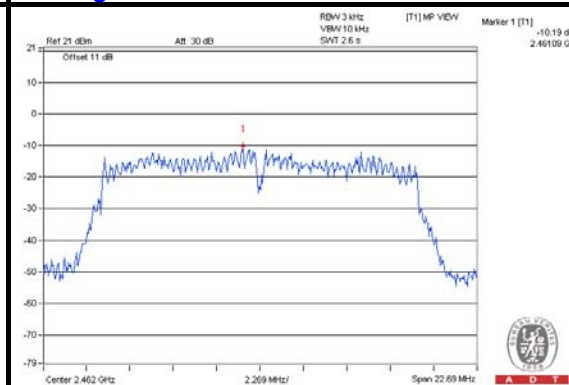
NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 6.22 > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.22 - 6) = 7.78\text{dBm}$.

SPECTRUM PLOT OF WORST VALUE

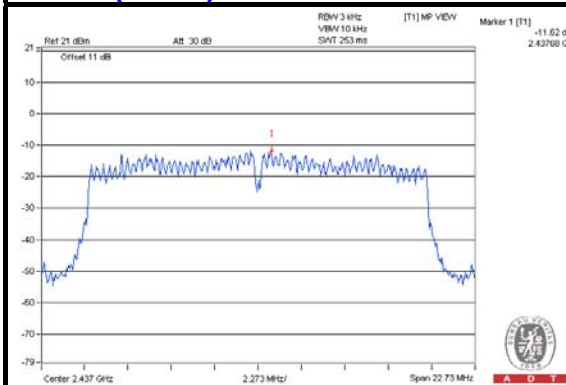
802.11b



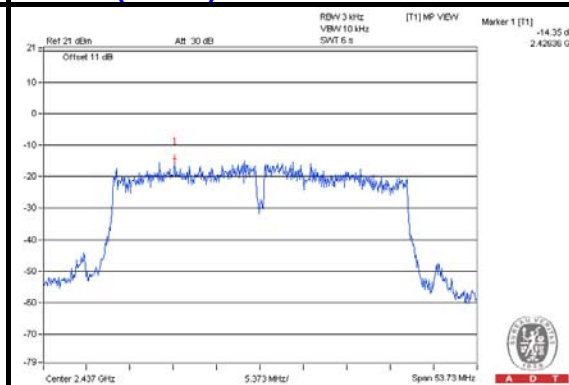
802.11g



802.11n (20MHz)



802.11n (40MHz)

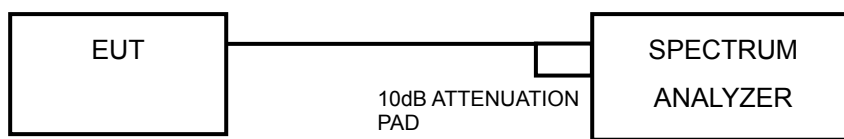


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT OF BAND EMISSION MEASUREMENT

Below -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.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Ensure that the number of measurement points $\geq$ span/RBW
4. According to measurement points to set differ measurement span.
5. Detector = peak.
6. Trace Mode = max hold.
7. 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 10log (N) since the limit is relative emission limit.

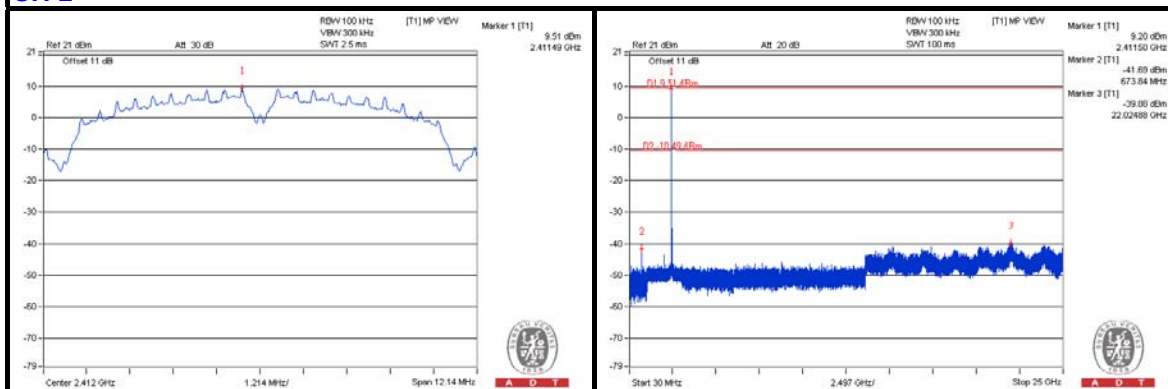
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



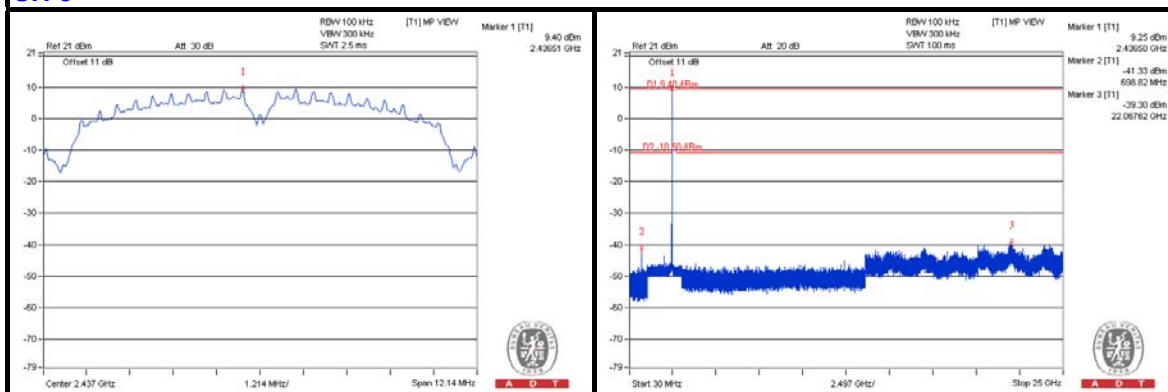
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802.11b

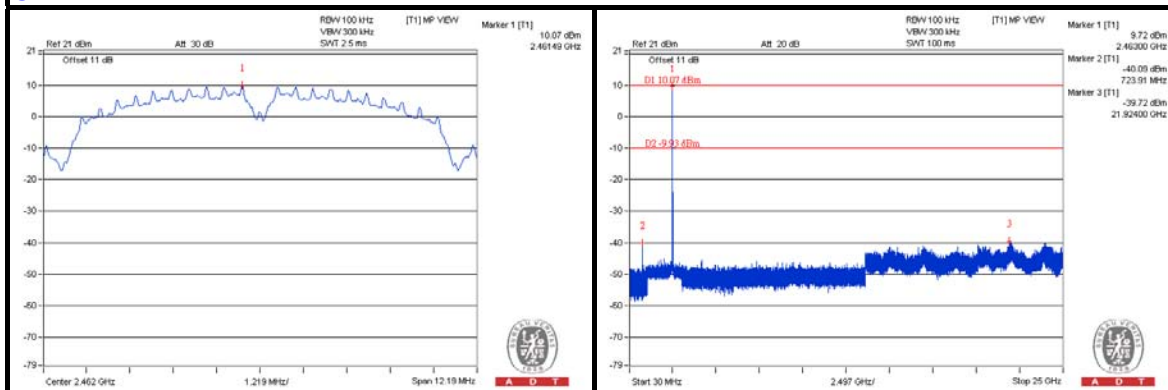
CH 1



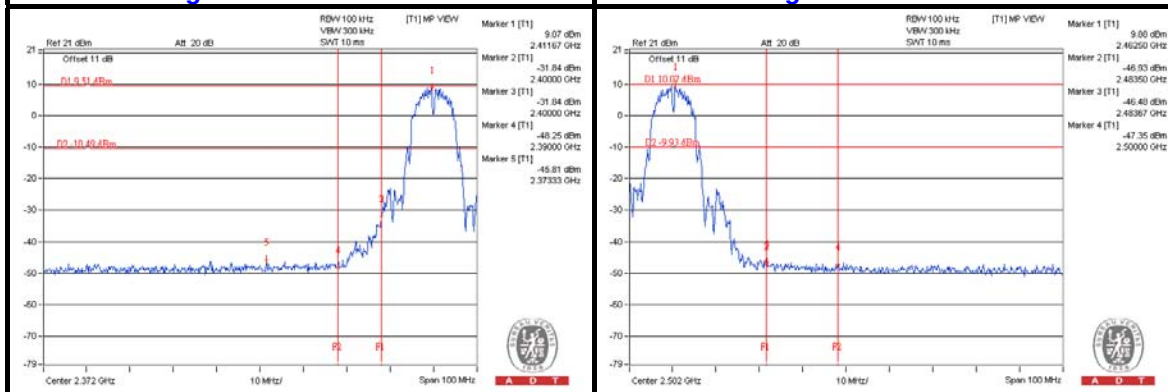
CH 6



CH 11



CH 1 Band edge

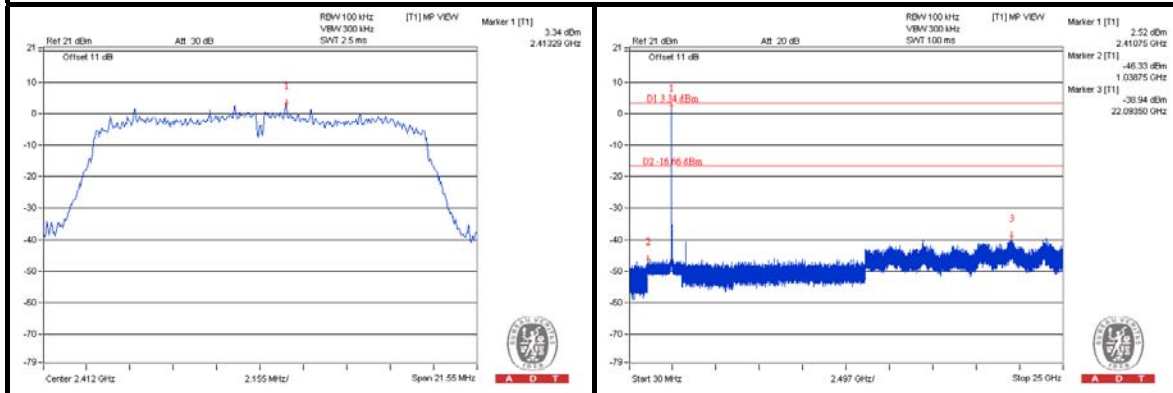




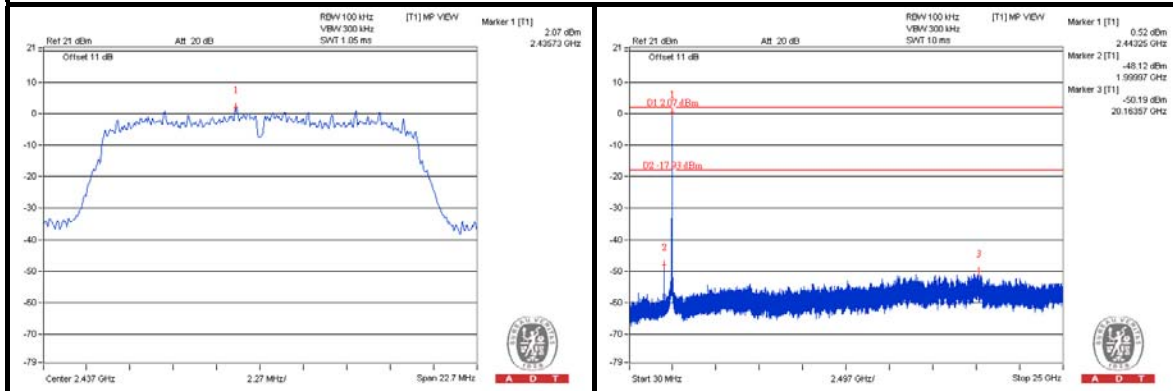
A D T

802.11g
CHAIN 0

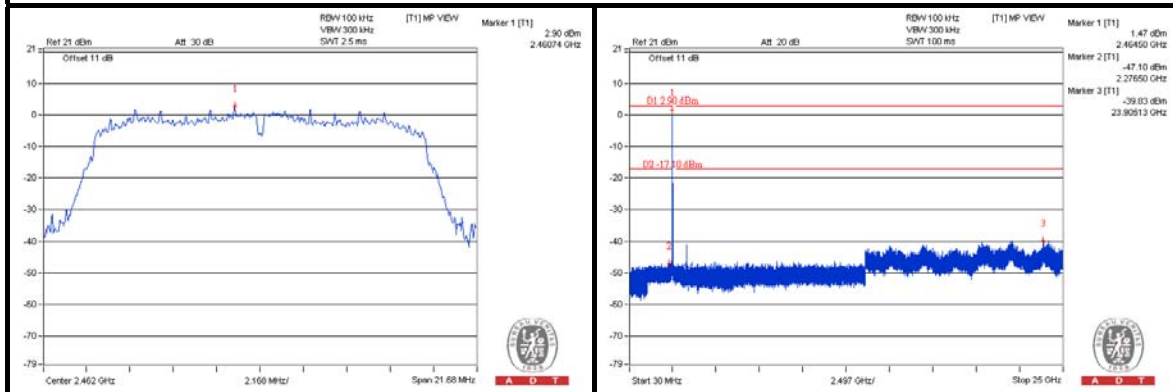
CH 1



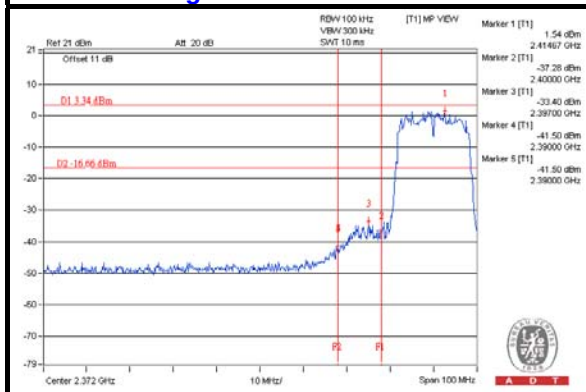
CH 6



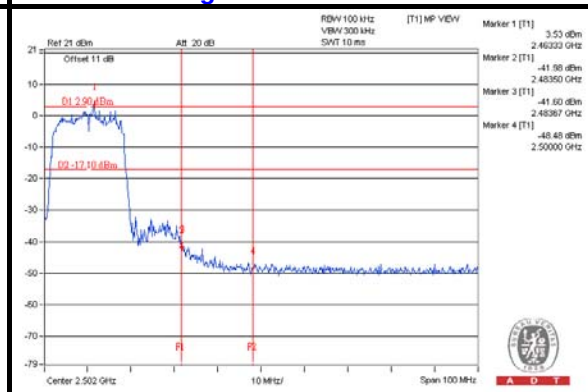
CH 11



CH 1 Band edge

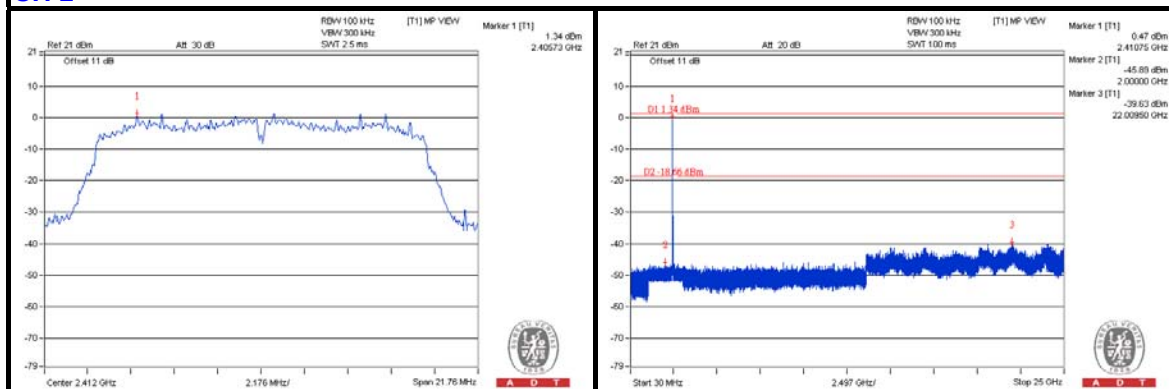


CH 11 Band edge

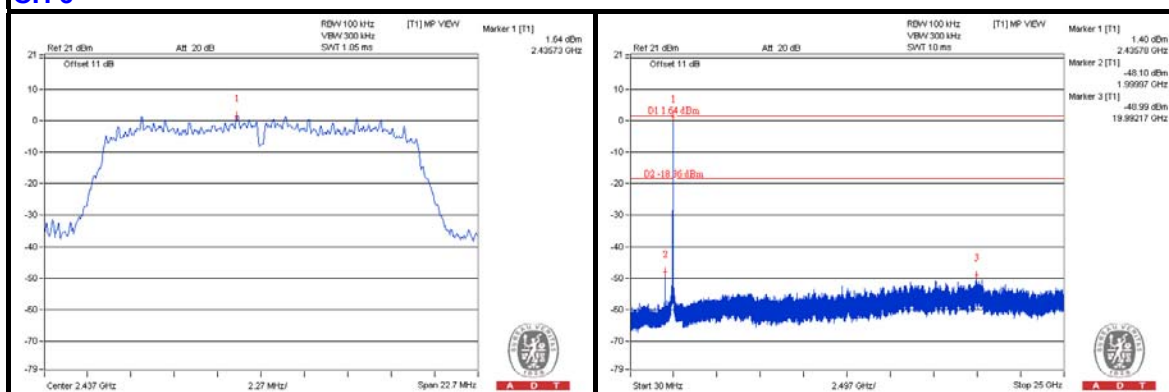


CHAIN 1

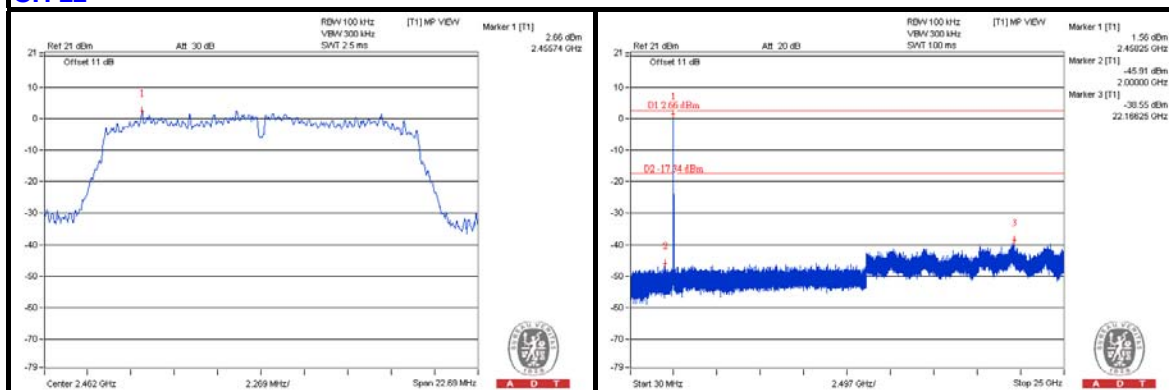
CH 1



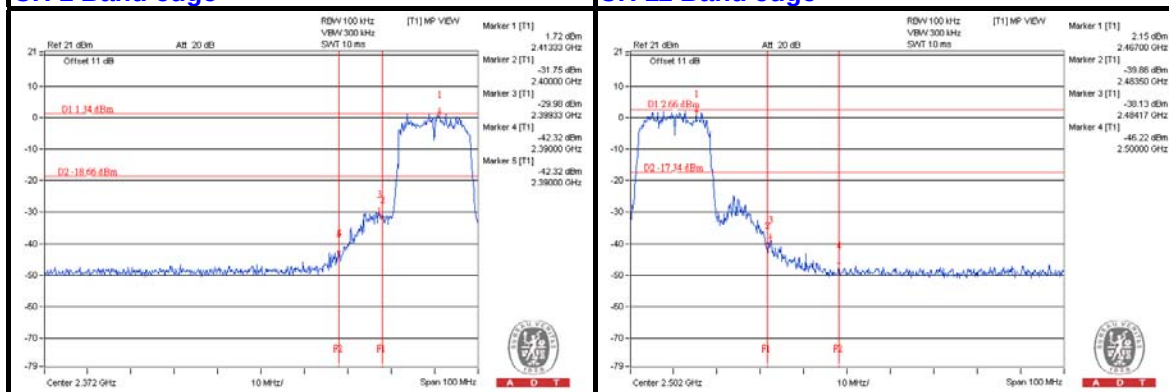
CH 6



CH 11



CH 1 Band edge



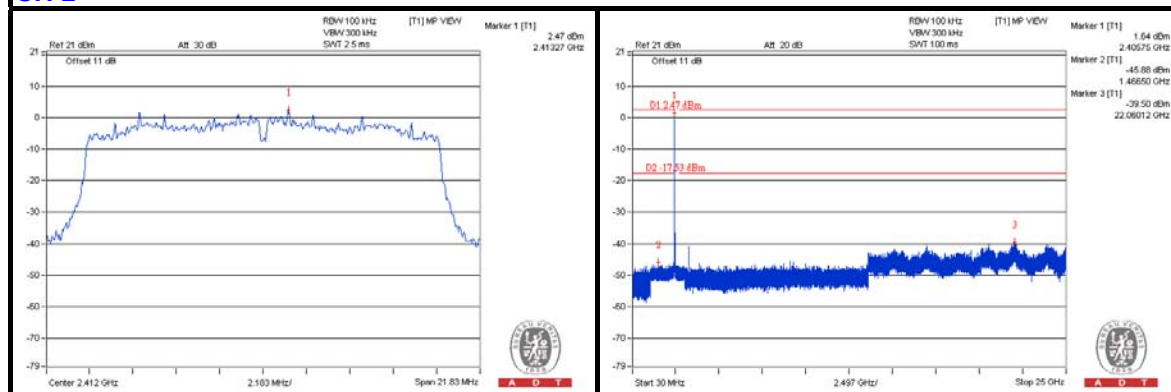


A D T

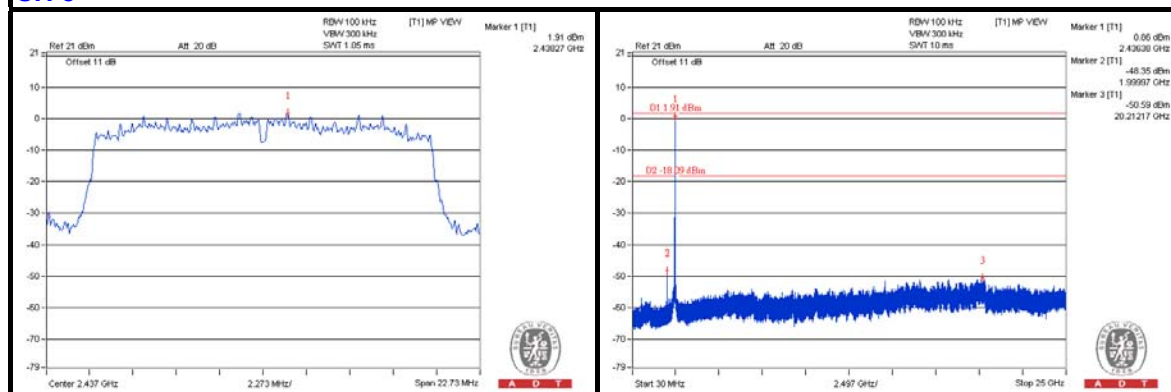
802.11n (20MHz)

CHAIN 0

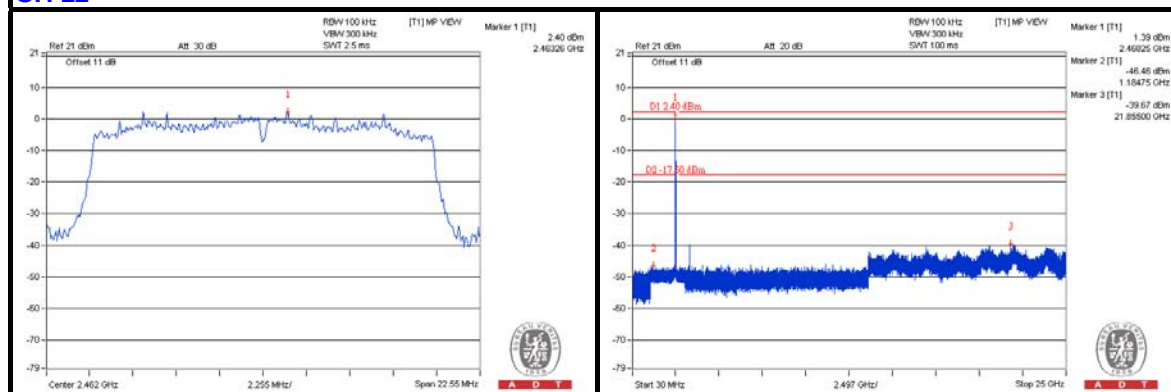
CH 1



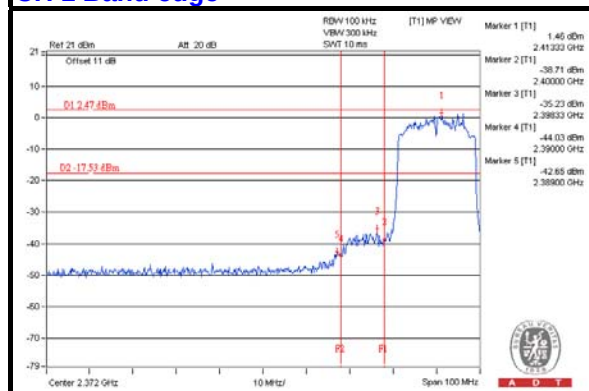
CH 6



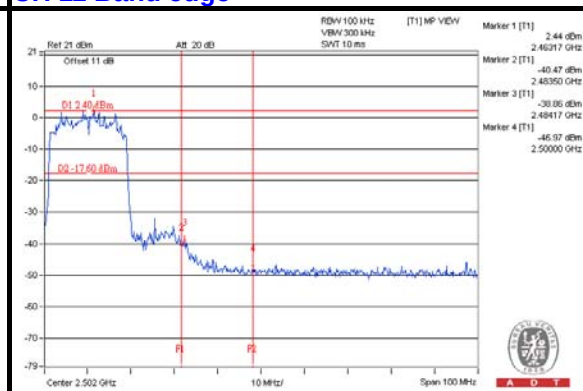
CH 11



CH 1 Band edge



CH 11 Band edge

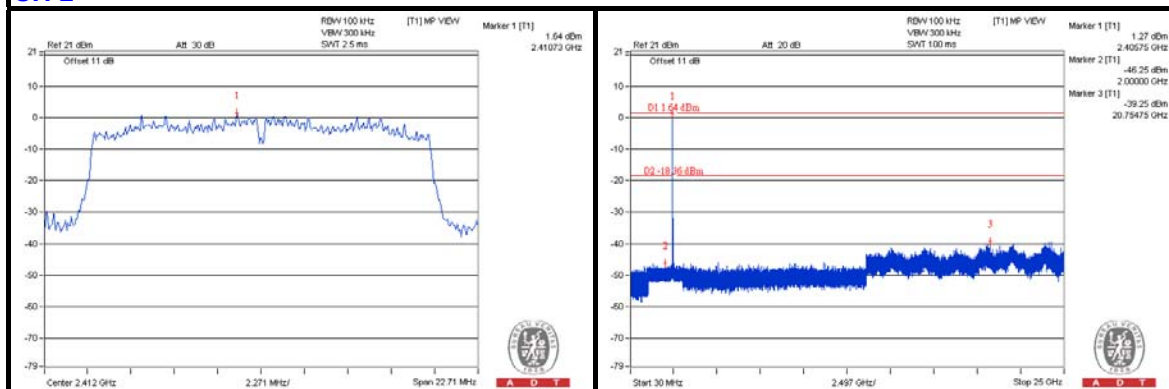




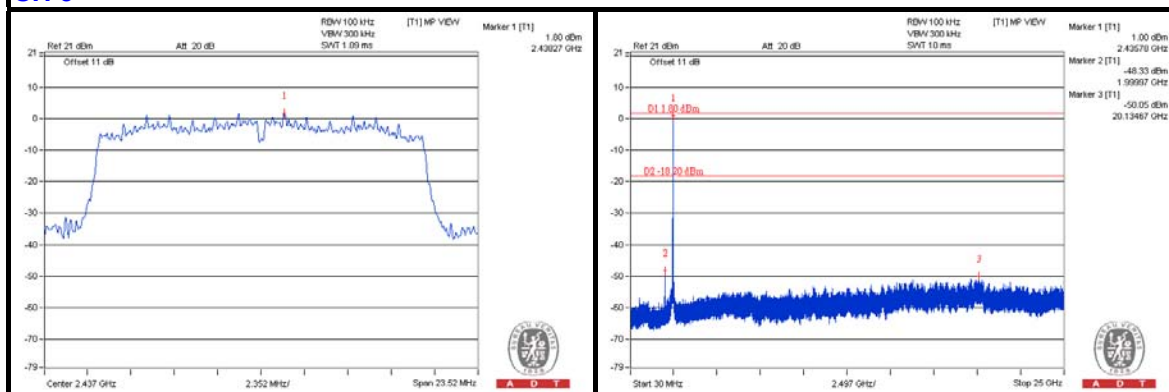
A D T

CHAIN 1

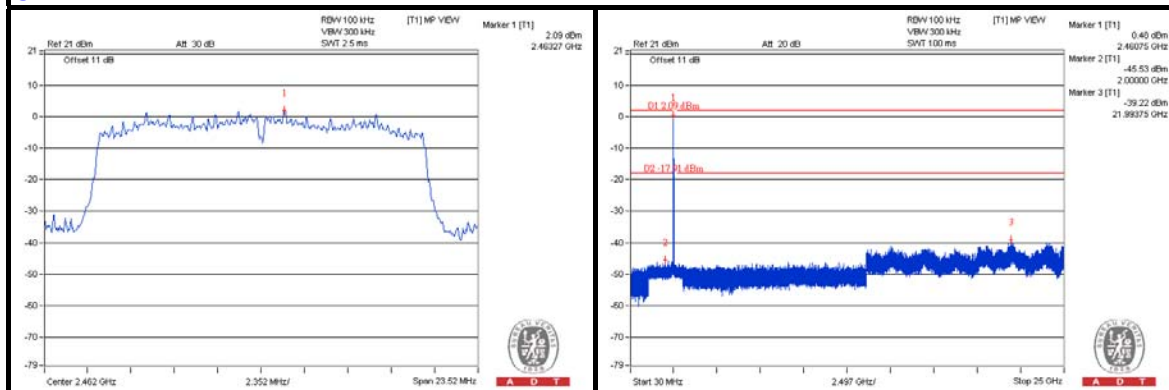
CH 1



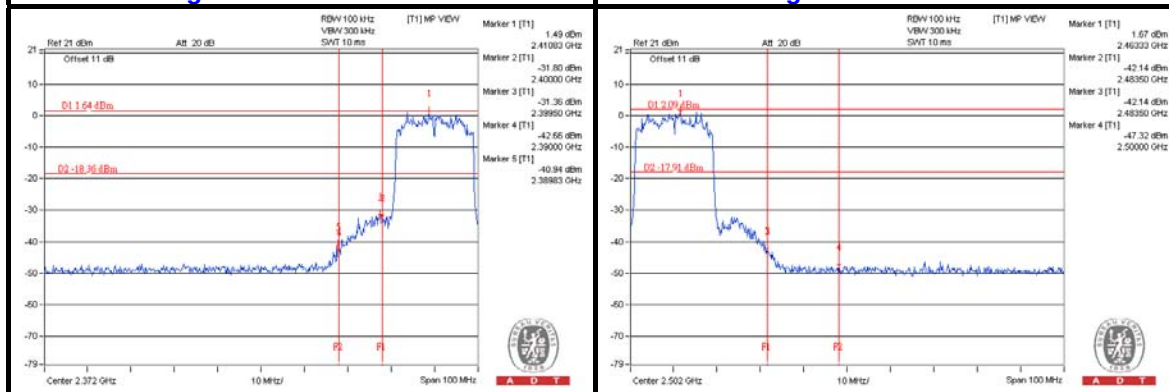
CH 6



CH 11



CH 1 Band edge



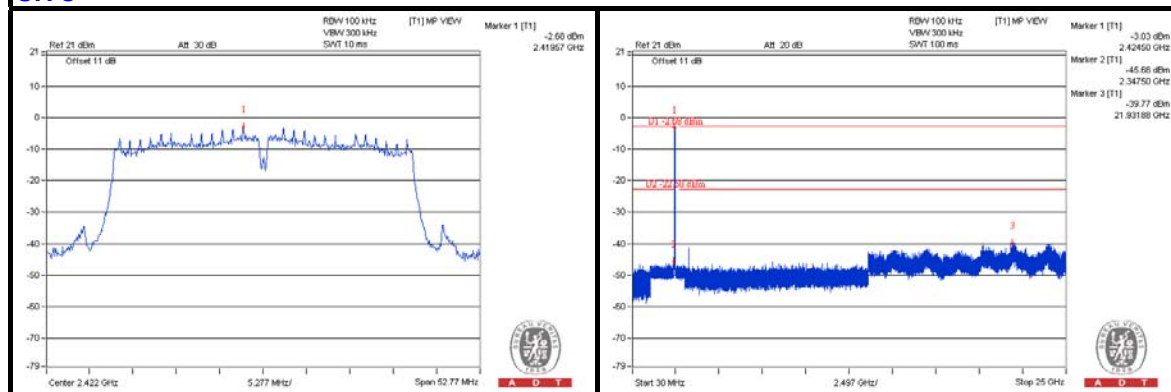


A D T

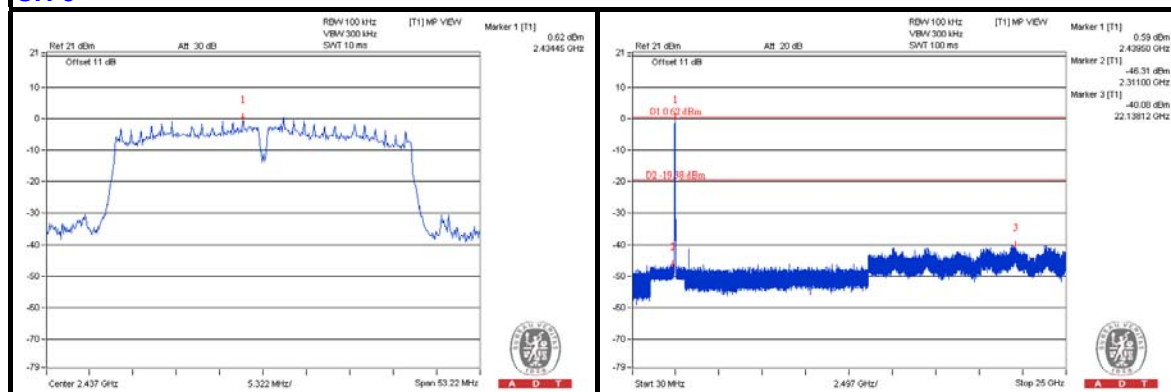
802.11n (40MHz)

CHAIN 0

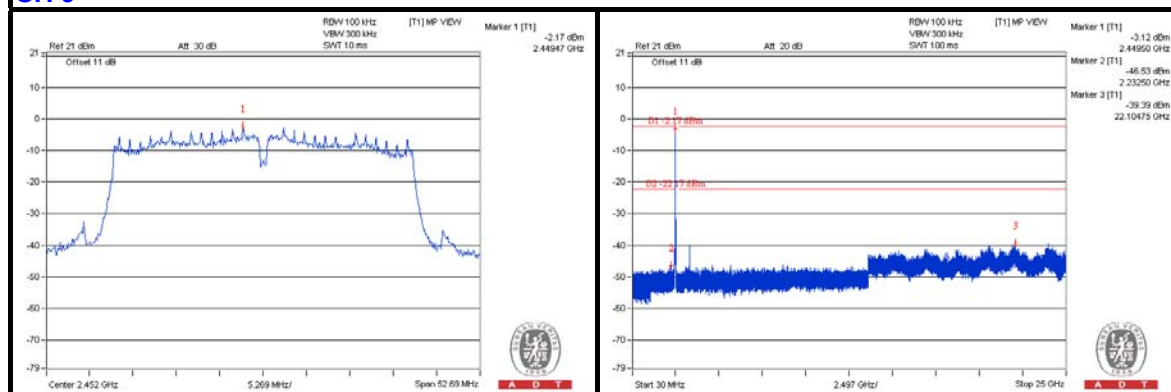
CH 3



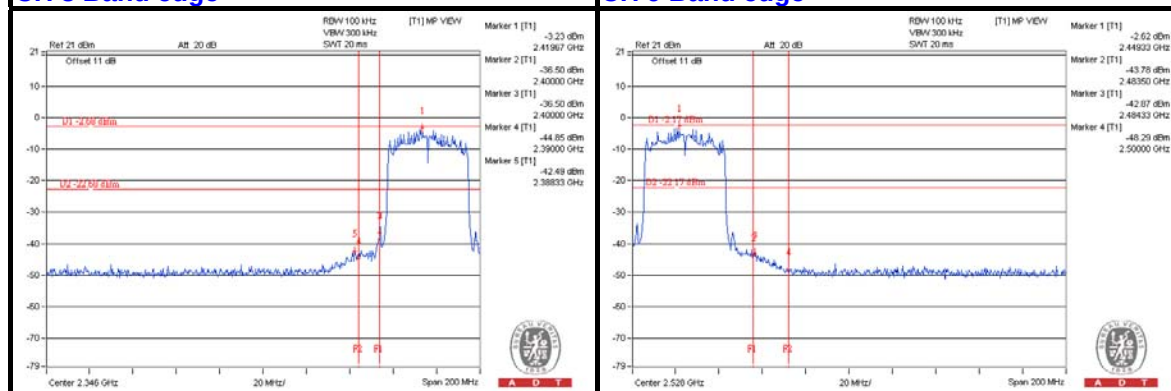
CH 6



CH 9



CH 3 Band edge

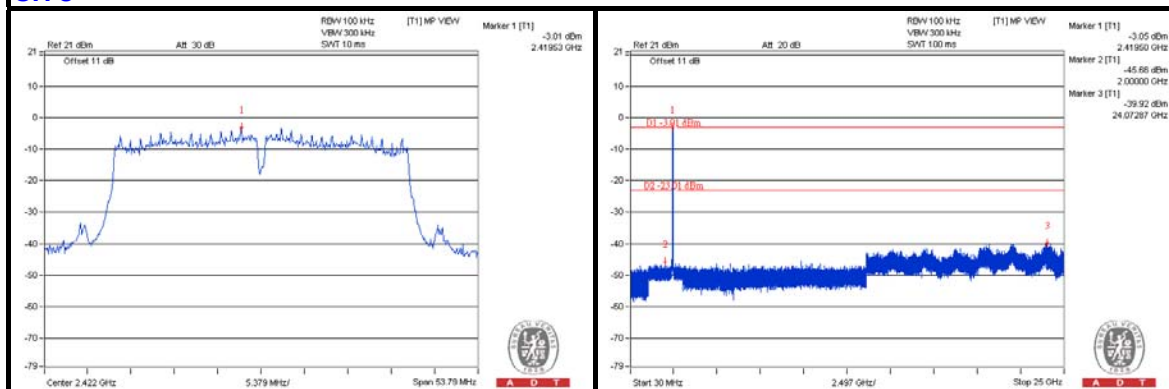




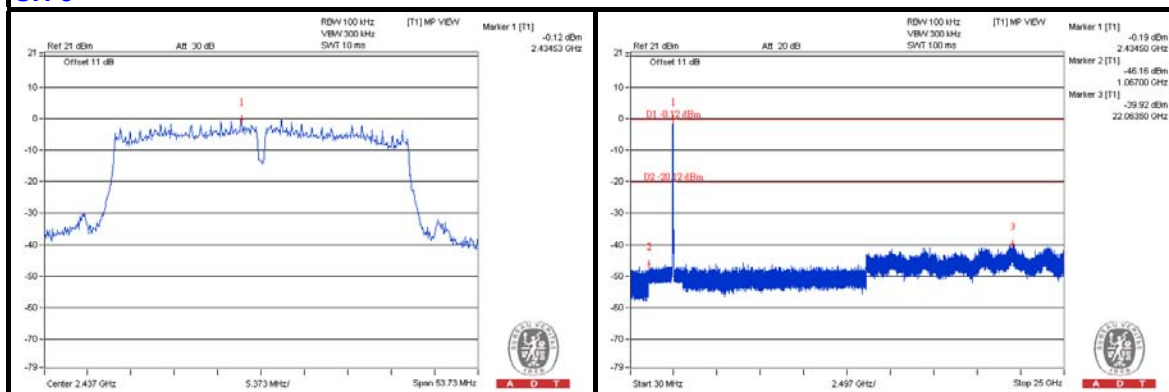
A D T

CHAIN 1

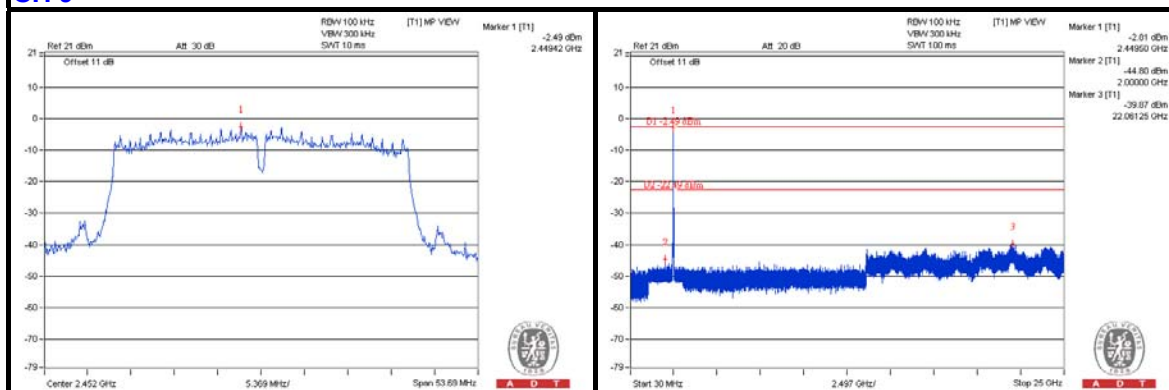
CH 3



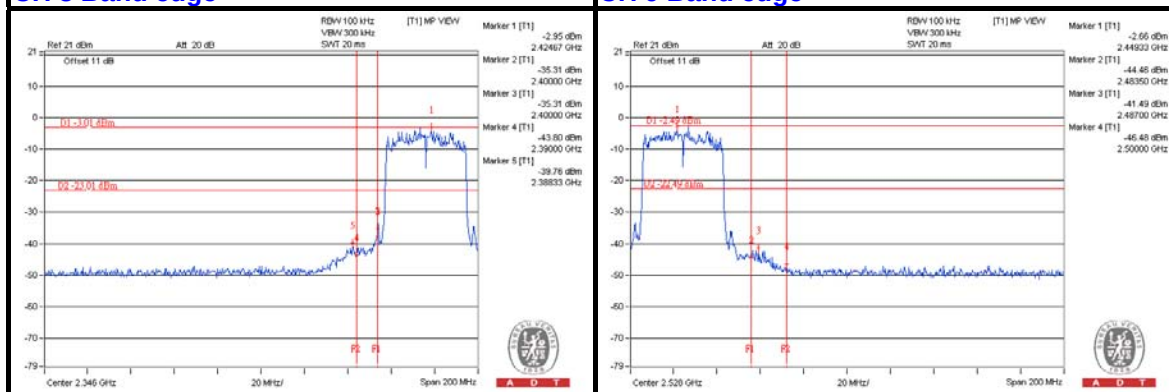
CH 6



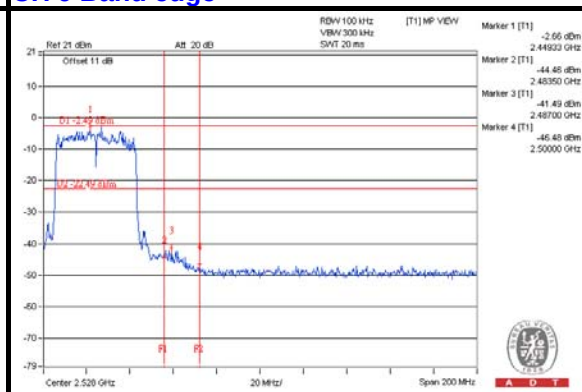
CH 9



CH 3 Band edge



CH 9 Band edge





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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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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---