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FCC TEST REPORT

REPORT NO.: RF141016C15

MODEL NO.: FORTIAP-112Dxxxxxx(where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only)

(Refer to item 3.1 for the more details)

FCC ID: TVE-121233

RECEIVED: Oct. 15, 2014

TESTED: Oct. 15 ~ Nov. 28, 2014

ISSUED: Dec. 02, 2014

APPLICANT: Fortinet Inc.

ADDRESS: 899 Kifer Road Sunnyvale, CA 94086 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
RF141016C15	Original release	Dec. 02, 2014

1. CERTIFICATION

PRODUCT: Secured Wireless Access Point

MODEL NO.: FORTIAP-112Dxxxxxx

(where "x" can be used as "A-Z", or "0-9", or "-", or blank for software changes or marketing purposes only) (Refer to item 3.1 for the more details)

BRAND: Fortinet Inc.


APPLICANT: Fortinet Inc.

TESTED: Oct. 15 ~ Nov. 28, 2014

TEST SAMPLE: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.247)

The above equipment (model: FORTIAP-112D) 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** : Dec. 02, 2014
Pettie Chen / Senior Specialist

APPROVED BY :  , **DATE** : Dec. 02, 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 -6.53dB at 0.56121MHz.
15.205 & 209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390.00 & 7311.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB 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 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	Secured Wireless Access Point
MODEL NO.	FORTIAP-112Dxxxxxx (where “x” can be used as “A-Z”, or “0-9”, or “-”, or blank for software changes or marketing purposes only) (Refer to NOTE for the more details)
POWER SUPPLY	48Vdc (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 150.0Mbps
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
OUTPUT POWER	116.681mW
ANTENNA TYPE	Printed antenna with 6.5dBi gain
ANTENNA CONNECTOR	IPEX
DATA CABLE	NA
I/O PORTS	Refer to user’s manual
ACCESSORY DEVICES	PoE

NOTE:

- All models are listed as below.

Brand	Model	Difference
Fortinet Inc.	FORTIAP-112Dxxxxxx	where “x” can be used as “A-Z”, or “0-9”, or “-”, or blank for software changes or marketing purposes only
	FortiAP-112Dxxxxxx	
	FAP-112Dxxxxxx	

*Model: FORTIAP-112D was the final model.

- The EUT provides one completed transmitter and one receiver.

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

3. The EUT use following PoE.

PoE	
Brand:	EnGenius
Model:	EPE-48GR
Input:	48Vdc

Adapter of PoE	
Brand:	Powertron Electronics Corp.
Model:	PA1040-480IB080
P/N:	PA1040-480IB080-324
Input:	100-240Vac~50-60Hz, 1.5A
Output:	48Vdc, 0.8A, 38.4W Max
Power Cord:	1.5m cable with one core

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 \geq 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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:

The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-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)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0

POWER LINE CONDUCTED EMISSION TEST:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0

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)
-	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	120Vac, 60Hz	Jones Chang
RE<1G	21deg. C, 71%RH	120Vac, 60Hz	Nick Hsu
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 DUTY CYCLE OF TEST SIGNAL

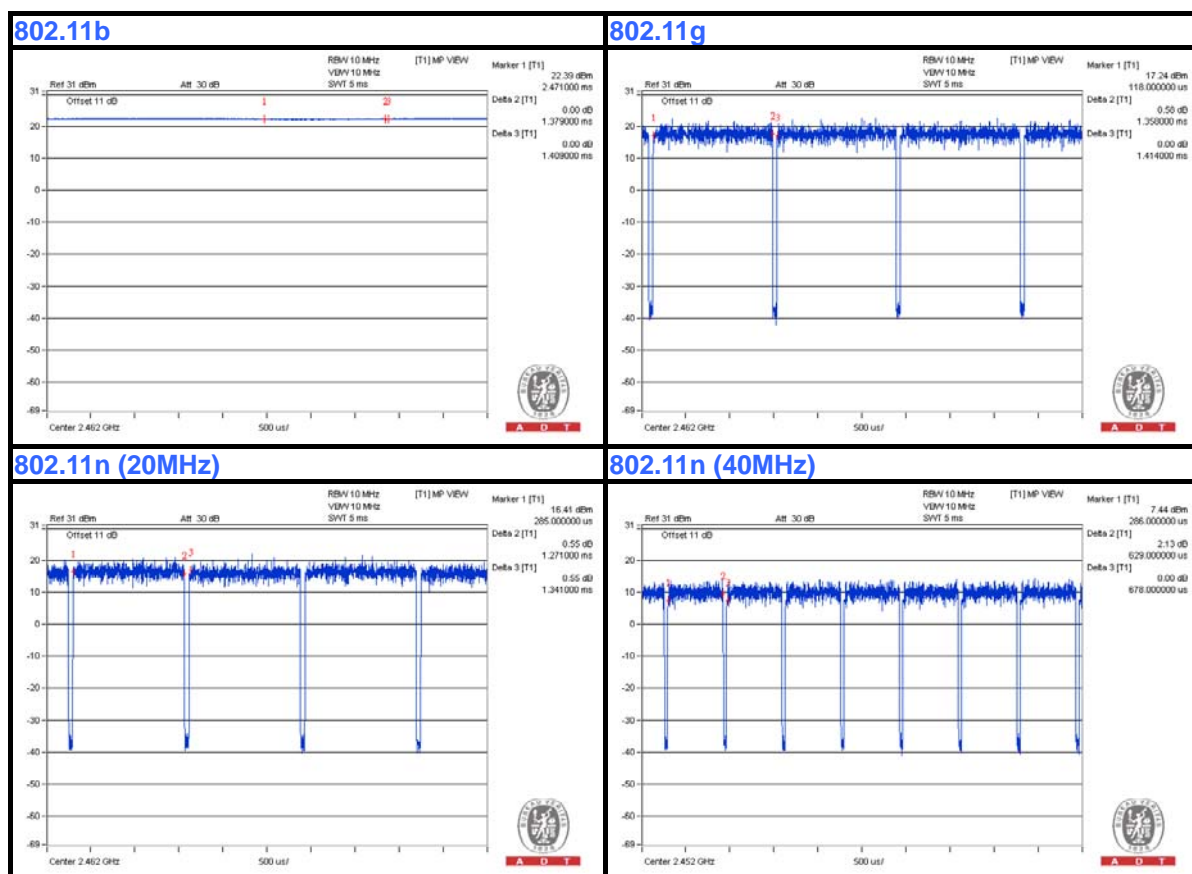
Duty cycle is < 98%, duty factor shall be considered.

802.11b: Duty cycle = $1.379/1.409 = 0.979$, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11g: Duty cycle = $1.358/1.414 = 0.96$, Duty factor = $10 * \log(1/0.96) = 0.18$

802.11n (20MHz): Duty cycle = $1.271/1.341 = 0.948$, Duty factor = $10 * \log(1/0.948) = 0.23$

802.11n (40MHz): Duty cycle = $0.629/0.678 = 0.928$, Duty factor = $10 * \log(1/0.928) = 0.33$



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.

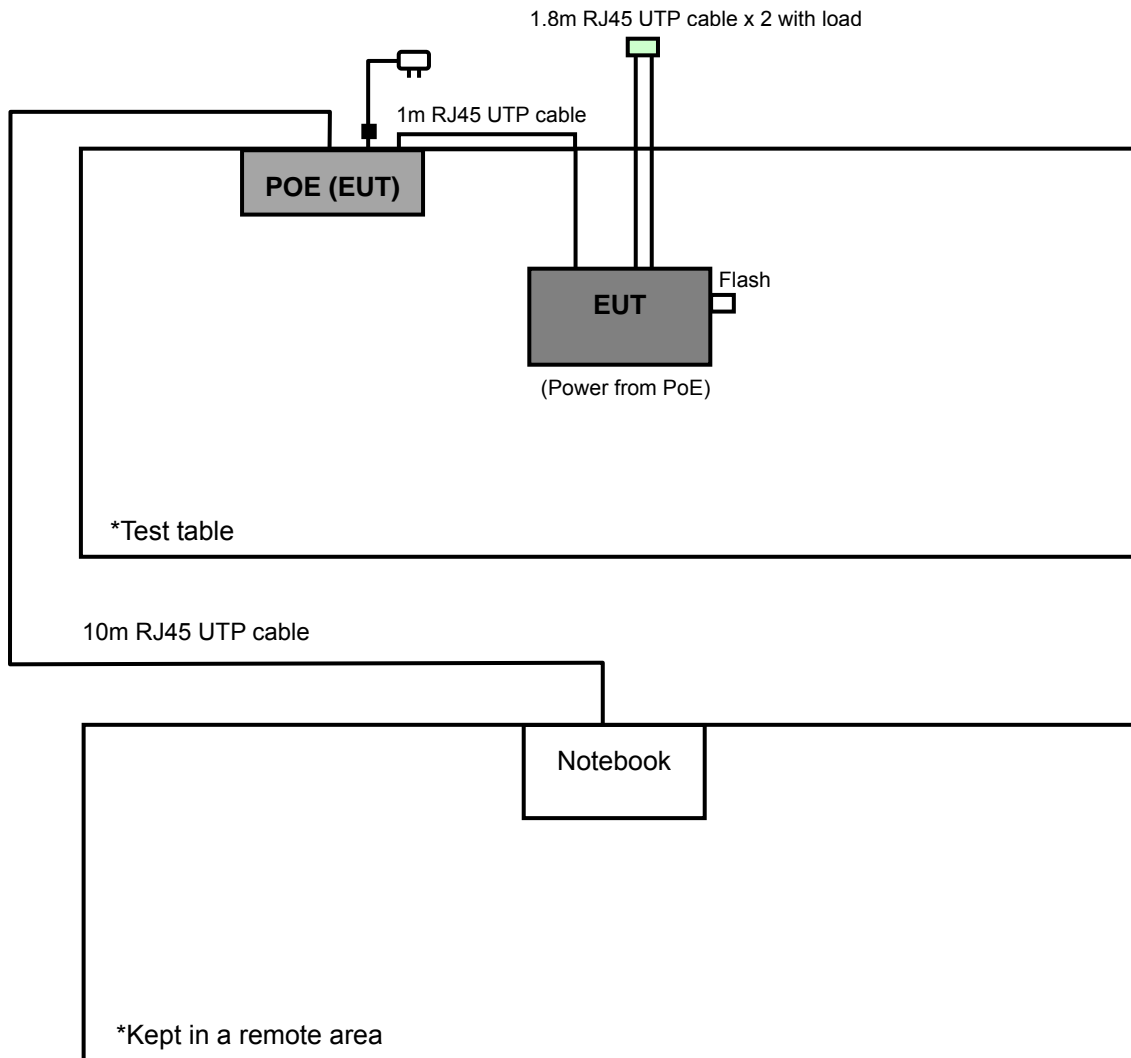
NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved
2	Flash	Transcend	V85	538455 4490	NA

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

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Items 1 acted as communication partner to transfer data.

3.4.1 CONFIGURATION OF SYSTEM UNDER TEST





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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

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	2944A10738	Oct.18, 2014	Oct. 17, 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 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. 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:

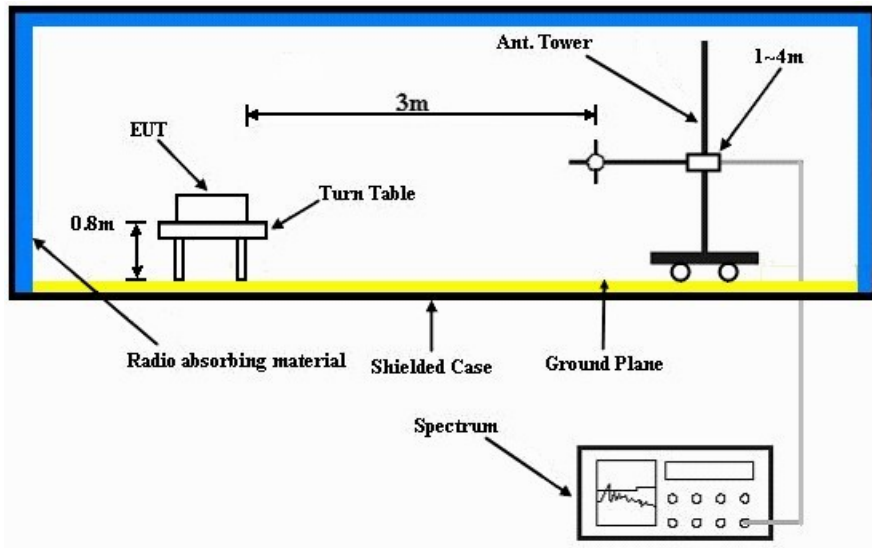
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

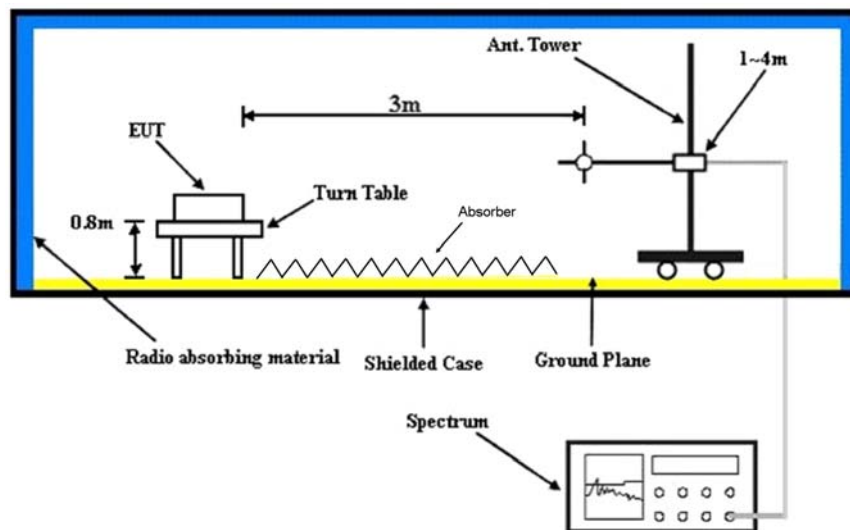
No deviation.

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

- 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)
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	64.6 PK	74.0	-9.4	1.12 H	336	31.40	33.20
2	2390.00	49.0 AV	54.0	-5.0	1.12 H	336	15.80	33.20
3	*2412.00	109.8 PK			1.10 H	333	76.50	33.30
4	*2412.00	105.9 AV			1.10 H	333	72.60	33.30
5	4824.00	54.2 PK	74.0	-19.8	1.06 H	308	48.10	6.10
6	4824.00	50.0 AV	54.0	-4.0	1.06 H	308	43.90	6.10
7	#7236.00	57.3 PK	79.8	-22.5	1.89 H	328	45.30	12.00
8	#7236.00	50.5 AV	75.9	-25.4	1.89 H	328	38.50	12.00
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	2390.00	68.1 PK	74.0	-5.9	1.00 V	0	34.90	33.20
2	2390.00	50.4 AV	54.0	-3.6	1.00 V	0	17.20	33.20
3	*2412.00	111.9 PK			1.00 V	348	78.60	33.30
4	*2412.00	108.3 AV			1.00 V	348	75.00	33.30
5	4824.00	55.6 PK	74.0	-18.4	1.12 V	6	49.50	6.10
6	4824.00	52.9 AV	54.0	-1.1	1.12 V	6	46.80	6.10
7	#7236.00	57.9 PK	81.9	-24.0	1.21 V	285	45.90	12.00
8	#7236.00	52.5 AV	78.3	-25.8	1.21 V	285	40.50	12.00

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.2 PK			1.12 H	342	77.80	33.40
2	*2437.00	107.6 AV			1.12 H	342	74.20	33.40
3	4874.00	54.5 PK	74.0	-19.5	1.07 H	322	48.30	6.20
4	4874.00	49.6 AV	54.0	-4.4	1.07 H	322	43.40	6.20
5	7311.00	58.5 PK	74.0	-15.5	1.75 H	324	46.30	12.20
6	7311.00	51.5 AV	54.0	-2.5	1.75 H	324	39.30	12.20
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	*2437.00	112.9 PK			1.22 V	358	79.50	33.40
2	*2437.00	109.3 AV			1.22 V	358	75.90	33.40
3	4874.00	55.8 PK	74.0	-18.2	1.10 V	11	49.60	6.20
4	4874.00	52.4 AV	54.0	-1.6	1.10 V	11	46.20	6.20
5	7311.00	58.0 PK	74.0	-16.0	1.00 V	351	45.80	12.20
6	7311.00	52.2 AV	54.0	-1.8	1.00 V	351	40.00	12.20

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.



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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	111.6 PK			1.10 H	349	78.30	33.30
2	*2462.00	108.0 AV			1.10 H	349	74.70	33.30
3	2483.50	71.7 PK	74.0	-2.3	1.10 H	349	38.30	33.40
4	2483.50	49.7 AV	54.0	-4.3	1.10 H	349	16.30	33.40
5	4924.00	53.4 PK	74.0	-20.6	1.04 H	338	47.10	6.30
6	4924.00	47.2 AV	54.0	-6.8	1.04 H	338	40.90	6.30
7	7386.00	58.6 PK	74.0	-15.4	1.76 H	329	46.30	12.30
8	7386.00	50.3 AV	54.0	-3.7	1.76 H	329	38.00	12.30
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	112.9 PK			1.00 V	359	79.60	33.30
2	*2462.00	109.4 AV			1.00 V	359	76.10	33.30
3	2483.50	72.9 PK	74.0	-1.1	1.00 V	0	39.50	33.40
4	2483.50	52.0 AV	54.0	-2.0	1.00 V	0	18.60	33.40
5	4924.00	52.7 PK	74.0	-21.3	1.10 V	14	46.40	6.30
6	4924.00	49.9 AV	54.0	-4.1	1.10 V	14	43.60	6.30
7	7386.00	58.4 PK	74.0	-15.6	1.05 V	347	46.10	12.30
8	7386.00	52.2 AV	54.0	-1.8	1.05 V	347	39.90	12.30

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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802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.6 PK	74.0	-5.4	1.13 H	335	35.40	33.20
2	2390.00	51.8 AV	54.0	-2.2	1.13 H	335	18.60	33.20
3	*2412.00	108.9 PK			1.13 H	335	75.60	33.30
4	*2412.00	98.9 AV			1.13 H	335	65.60	33.30
5	4824.00	50.2 PK	74.0	-23.8	1.06 H	300	44.10	6.10
6	4824.00	37.0 AV	54.0	-17.0	1.06 H	300	30.90	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	72.0 PK	74.0	-2.0	1.02 V	2	38.80	33.20
2	2390.00	52.8 AV	54.0	-1.2	1.02 V	2	19.60	33.20
3	*2412.00	112.6 PK			1.00 V	1	79.30	33.30
4	*2412.00	102.0 AV			1.00 V	1	68.70	33.30
5	4824.00	51.7 PK	74.0	-22.3	1.12 V	5	45.60	6.10
6	4824.00	37.4 AV	54.0	-16.6	1.12 V	5	31.30	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	2390.00	60.5 PK	74.0	-13.5	1.12 H	340	27.30	33.20
2	2390.00	49.6 AV	54.0	-4.4	1.12 H	340	16.40	33.20
3	*2437.00	113.8 PK			1.12 H	344	80.40	33.40
4	*2437.00	104.1 AV			1.12 H	344	70.70	33.40
5	2483.50	63.7 PK	74.0	-10.3	1.12 H	340	30.30	33.40
6	2483.50	50.2 AV	54.0	-3.8	1.12 H	340	16.80	33.40
7	4874.00	52.9 PK	74.0	-21.1	1.08 H	334	46.70	6.20
8	4874.00	39.2 AV	54.0	-14.8	1.08 H	334	33.00	6.20
9	7311.00	68.4 PK	74.0	-5.6	1.85 H	330	56.20	12.20
10	7311.00	53.0 AV	54.0	-1.0	1.85 H	330	40.80	12.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.2 PK	74.0	-10.8	1.02 V	341	30.00	33.20
2	2390.00	50.9 AV	54.0	-3.1	1.02 V	341	17.70	33.20
3	*2437.00	115.7 PK			1.02 V	356	82.30	33.40
4	*2437.00	106.0 AV			1.02 V	356	72.60	33.40
5	2483.50	62.9 PK	74.0	-11.1	1.00 V	354	29.50	33.40
6	2483.50	51.0 AV	54.0	-3.0	1.00 V	354	17.60	33.40
7	4874.00	56.1 PK	74.0	-17.9	1.00 V	0	49.90	6.20
8	4874.00	41.1 AV	54.0	-12.9	1.00 V	0	34.90	6.20
9	7311.00	69.6 PK	74.0	-4.4	1.00 V	352	57.40	12.20
10	7311.00	52.9 AV	54.0	-1.1	1.00 V	352	40.70	12.20

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	108.5 PK			1.32 H	336	75.20	33.30
2	*2462.00	98.8 AV			1.32 H	336	65.50	33.30
3	2483.50	66.7 PK	74.0	-7.3	1.32 H	339	33.30	33.40
4	2483.50	52.2 AV	54.0	-1.8	1.32 H	339	18.80	33.40
5	4924.00	49.9 PK	74.0	-24.1	1.10 H	314	43.60	6.30
6	4924.00	36.2 AV	54.0	-17.8	1.10 H	314	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	112.1 PK			1.00 V	357	78.80	33.30
2	*2462.00	101.7 AV			1.00 V	357	68.40	33.30
3	2483.50	70.9 PK	74.0	-3.1	1.01 V	0	37.50	33.40
4	2483.50	52.3 AV	54.0	-1.7	1.01 V	0	18.90	33.40
5	4924.00	49.6 PK	74.0	-24.4	1.08 V	60	43.30	6.30
6	4924.00	37.1 AV	54.0	-16.9	1.08 V	60	30.80	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)
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	65.4 PK	74.0	-8.6	1.12 H	327	32.20	33.20
2	2390.00	51.4 AV	54.0	-2.6	1.12 H	327	18.20	33.20
3	*2412.00	106.0 PK			1.12 H	327	72.70	33.30
4	*2412.00	96.9 AV			1.12 H	327	63.60	33.30
5	4824.00	48.7 PK	74.0	-25.3	1.11 H	350	42.60	6.10
6	4824.00	35.9 AV	54.0	-18.1	1.11 H	350	29.80	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	72.3 PK	74.0	-1.7	1.00 V	0	39.10	33.20
2	2390.00	52.4 AV	54.0	-1.6	1.00 V	0	19.20	33.20
3	*2412.00	111.0 PK			1.00 V	0	77.70	33.30
4	*2412.00	100.6 AV			1.00 V	0	67.30	33.30
5	4824.00	50.2 PK	74.0	-23.8	1.00 V	6	44.10	6.10
6	4824.00	36.8 AV	54.0	-17.2	1.00 V	6	30.70	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)
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	63.5 PK	74.0	-10.5	1.13 H	338	30.30	33.20
2	2390.00	50.2 AV	54.0	-3.8	1.13 H	338	17.00	33.20
3	*2437.00	114.8 PK			1.13 H	345	81.40	33.40
4	*2437.00	104.4 AV			1.13 H	345	71.00	33.40
5	2483.50	62.7 PK	74.0	-11.3	1.13 H	338	29.30	33.40
6	2483.50	50.1 AV	54.0	-3.9	1.13 H	338	16.70	33.40
7	4874.00	53.7 PK	74.0	-20.3	1.06 H	333	47.50	6.20
8	4874.00	39.9 AV	54.0	-14.1	1.06 H	333	33.70	6.20
9	7311.00	69.0 PK	74.0	-5.0	1.84 H	329	56.80	12.20
10	7311.00	53.0 AV	54.0	-1.0	1.84 H	329	40.80	12.20
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.3 PK	74.0	-10.7	1.00 V	340	30.10	33.20
2	2390.00	52.2 AV	54.0	-1.8	1.00 V	340	19.00	33.20
3	*2437.00	116.2 PK			1.00 V	342	82.80	33.40
4	*2437.00	106.8 AV			1.00 V	342	73.40	33.40
5	2483.50	63.7 PK	74.0	-10.3	1.00 V	340	30.30	33.40
6	2483.50	51.2 AV	54.0	-2.8	1.00 V	340	17.80	33.40
7	4874.00	56.8 PK	74.0	-17.2	1.09 V	4	50.60	6.20
8	4874.00	42.2 AV	54.0	-11.8	1.09 V	4	36.00	6.20
9	7311.00	67.3 PK	74.0	-6.7	1.00 V	355	55.10	12.20
10	7311.00	52.5 AV	54.0	-1.5	1.00 V	355	40.30	12.20

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	107.7 PK			1.12 H	348	74.40	33.30
2	*2462.00	97.8 AV			1.12 H	348	64.50	33.30
3	2483.50	65.7 PK	74.0	-8.3	1.12 H	344	32.30	33.40
4	2483.50	51.6 AV	54.0	-2.4	1.12 H	344	18.20	33.40
5	4924.00	50.1 PK	74.0	-23.9	1.19 H	311	43.80	6.30
6	4924.00	35.7 AV	54.0	-18.3	1.19 H	311	29.40	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	111.1 PK			1.01 V	3	77.80	33.30
2	*2462.00	100.8 AV			1.01 V	3	67.50	33.30
3	2483.50	70.5 PK	74.0	-3.5	1.00 V	0	37.10	33.40
4	2483.50	52.4 AV	54.0	-1.6	1.00 V	0	19.00	33.40
5	4924.00	50.7 PK	74.0	-23.3	1.13 V	11	44.40	6.30
6	4924.00	36.4 AV	54.0	-17.6	1.13 V	11	30.10	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)
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	66.5 PK	74.0	-7.5	1.12 H	336	33.30	33.20
2	2390.00	50.8 AV	54.0	-3.2	1.12 H	336	17.60	33.20
3	*2422.00	102.2 PK			1.13 H	339	68.90	33.30
4	*2422.00	92.0 AV			1.13 H	339	58.70	33.30
5	4844.00	49.4 PK	74.0	-24.6	1.10 H	345	43.30	6.10
6	4844.00	35.1 AV	54.0	-18.9	1.10 H	345	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	69.5 PK	74.0	-4.5	1.00 V	359	36.30	33.20
2	2390.00	52.8 AV	54.0	-1.2	1.00 V	359	19.60	33.20
3	*2422.00	105.0 PK			1.02 V	349	71.70	33.30
4	*2422.00	94.5 AV			1.02 V	349	61.20	33.30
5	4844.00	48.8 PK	74.0	-25.2	1.12 V	0	42.70	6.10
6	4844.00	35.0 AV	54.0	-19.0	1.12 V	0	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	66.3 PK	74.0	-7.7	1.12 H	341	33.10	33.20
2	2390.00	52.0 AV	54.0	-2.0	1.12 H	341	18.80	33.20
3	*2437.00	106.0 PK			1.12 H	340	72.60	33.40
4	*2437.00	96.0 AV			1.12 H	340	62.60	33.40
5	2483.50	66.3 PK	74.0	-7.7	1.12 H	341	32.90	33.40
6	2483.50	49.9 AV	54.0	-4.1	1.12 H	341	16.50	33.40
7	4874.00	49.3 PK	74.0	-24.7	1.29 H	0	43.10	6.20
8	4874.00	35.8 AV	54.0	-18.2	1.29 H	0	29.60	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	70.1 PK	74.0	-3.9	1.02 V	357	36.90	33.20
2	2390.00	53.0 AV	54.0	-1.0	1.02 V	357	19.80	33.20
3	*2437.00	108.4 PK			1.00 V	355	75.00	33.40
4	*2437.00	98.2 AV			1.00 V	355	64.80	33.40
5	2483.50	68.1 PK	74.0	-5.9	1.00 V	355	34.70	33.40
6	2483.50	51.0 AV	54.0	-3.0	1.00 V	355	17.60	33.40
7	4874.00	48.8 PK	74.0	-25.2	1.10 V	0	42.60	6.20
8	4874.00	35.8 AV	54.0	-18.2	1.10 V	0	29.60	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	102.2 PK			1.11 H	343	68.80	33.40
2	*2452.00	92.5 AV			1.11 H	343	59.10	33.40
3	2483.50	67.2 PK	74.0	-6.8	1.11 H	343	33.80	33.40
4	2483.50	51.4 AV	54.0	-2.6	1.11 H	343	18.00	33.40
5	4904.00	49.1 PK	74.0	-24.9	1.29 H	355	43.00	6.10
6	4904.00	35.6 AV	54.0	-18.4	1.29 H	355	29.50	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	105.2 PK			1.00 V	356	71.80	33.40
2	*2452.00	94.7 AV			1.00 V	356	61.30	33.40
3	2483.50	69.9 PK	74.0	-4.1	1.00 V	359	36.50	33.40
4	2483.50	52.7 AV	54.0	-1.3	1.00 V	359	19.30	33.40
5	4904.00	49.3 PK	74.0	-24.7	1.09 V	5	43.20	6.10
6	4904.00	36.0 AV	54.0	-18.0	1.09 V	5	29.90	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.

BELOW 1GHz WORST-CASE DATA:

802.11g

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	57.12	32.2 QP	40.0	-7.8	1.50 H	44	46.70	-14.50
2	179.61	30.7 QP	43.5	-12.8	1.50 H	154	45.60	-14.90
3	249.60	29.2 QP	46.0	-16.8	1.00 H	109	43.30	-14.10
4	375.98	30.2 QP	46.0	-15.8	1.00 H	1	40.70	-10.50
5	624.85	32.9 QP	46.0	-13.1	1.00 H	101	38.20	-5.30
6	875.67	34.7 QP	46.0	-11.3	1.50 H	208	35.50	-0.80
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	33.23	37.3 QP	40.0	-2.7	1.00 V	70	53.10	-15.80
2	45.45	35.8 QP	40.0	-4.2	1.00 V	330	50.50	-14.70
3	375.98	28.9 QP	46.0	-17.1	1.49 V	155	39.40	-10.50
4	480.97	40.8 QP	46.0	-5.2	1.00 V	263	49.30	-8.50
5	624.85	32.1 QP	46.0	-13.9	1.00 V	149	37.40	-5.30
6	875.67	35.3 QP	46.0	-10.7	1.00 V	235	36.10	-0.80

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	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
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

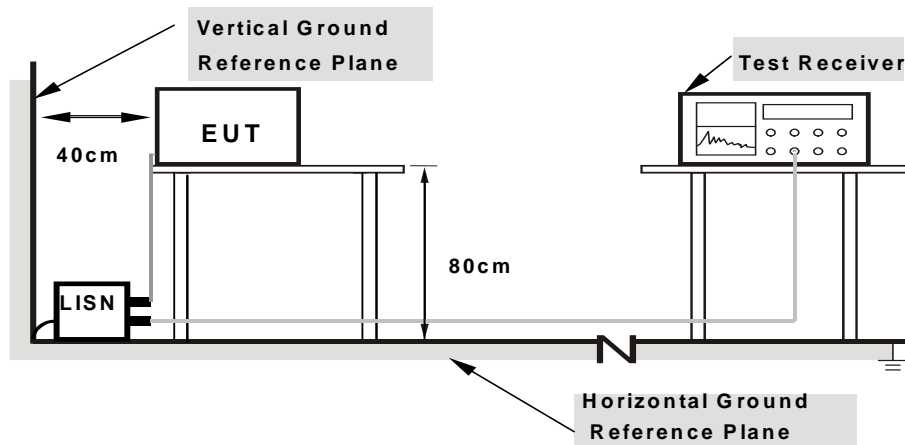
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



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

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

4.2.6 EUT OPERATING CONDITIONS

Same as 4.1.6.

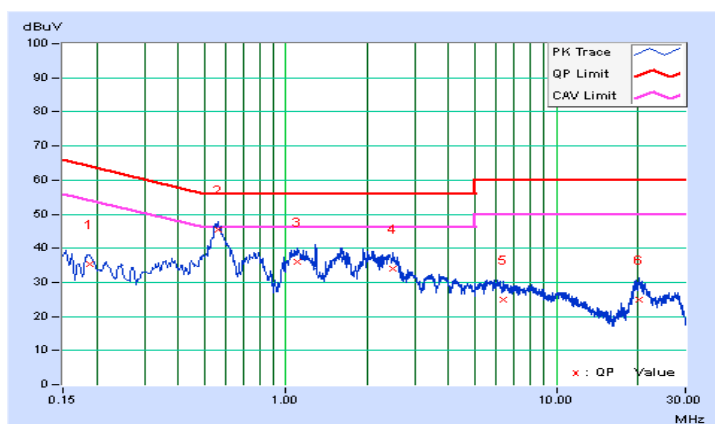
4.2.7 TEST RESULTS

CONDUCTED WORST-CASE DATA : 802.11g

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18754	0.07	35.15	26.58	35.22	26.65	64.14	54.14	-28.92	-27.49
2	0.56121	0.09	45.21	39.38	45.30	39.47	56.00	46.00	-10.70	-6.53
3	1.09622	0.11	36.03	30.24	36.14	30.35	56.00	46.00	-19.86	-15.65
4	2.49600	0.17	33.75	28.25	33.92	28.42	56.00	46.00	-22.08	-17.58
5	6.39427	0.34	24.70	18.78	25.04	19.12	60.00	50.00	-34.96	-30.88
6	20.19657	1.05	23.84	17.98	24.89	19.03	60.00	50.00	-35.11	-30.97

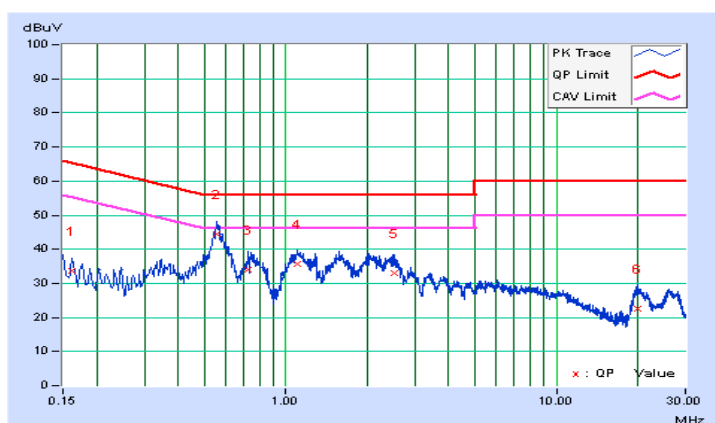
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor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



PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	0.05	33.50	21.70	33.55	21.75	65.37	55.37	-31.82	-33.62
2	0.55664	0.08	44.32	38.53	44.40	38.61	56.00	46.00	-11.60	-7.39
3	0.72465	0.08	33.86	27.92	33.94	28.00	56.00	46.00	-22.06	-18.00
4	1.10404	0.10	35.51	29.76	35.61	29.86	56.00	46.00	-20.39	-16.14
5	2.53119	0.16	32.90	27.64	33.06	27.80	56.00	46.00	-22.94	-18.20
6	19.86422	0.90	21.80	14.86	22.70	15.76	60.00	50.00	-37.30	-34.24

- 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.

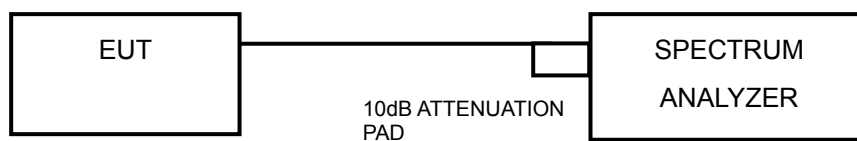


4.3 6dB BANDWIDTH MEASUREMENT

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

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

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

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

4.3.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.13	0.5	PASS
6	2437	10.12	0.5	PASS
11	2462	10.12	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.40	0.5	PASS
6	2437	16.37	0.5	PASS
11	2462	16.41	0.5	PASS

802.11n (20MHz)

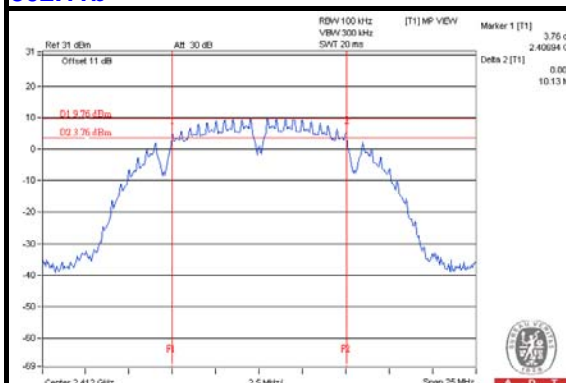
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.62	0.5	PASS
6	2437	17.39	0.5	PASS
11	2462	17.62	0.5	PASS

802.11n (40MHz)

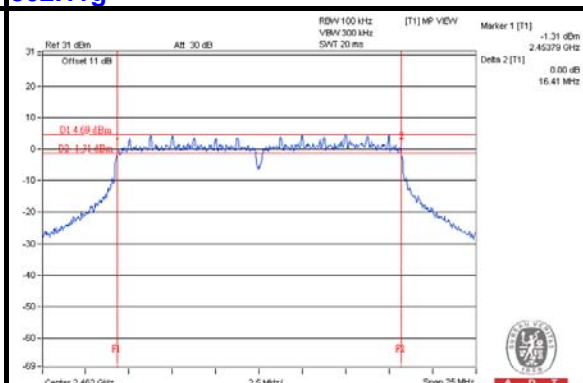
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.44	0.5	PASS
6	2437	36.13	0.5	PASS
9	2452	36.41	0.5	PASS

SPECTRUM PLOT OF WORST VALUE

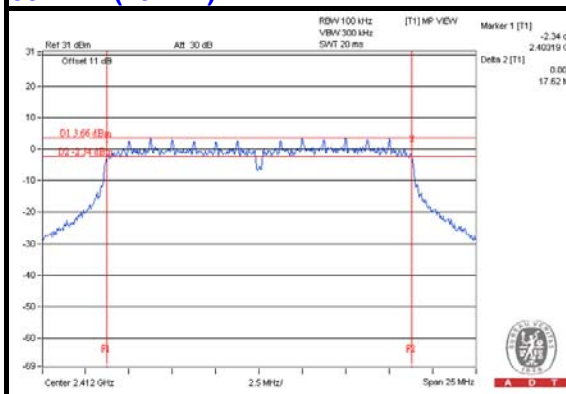
802.11b



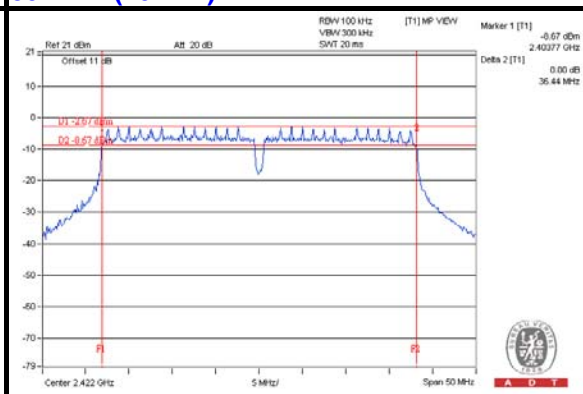
802.11g



802.11n (20MHz)



802.11n (40MHz)

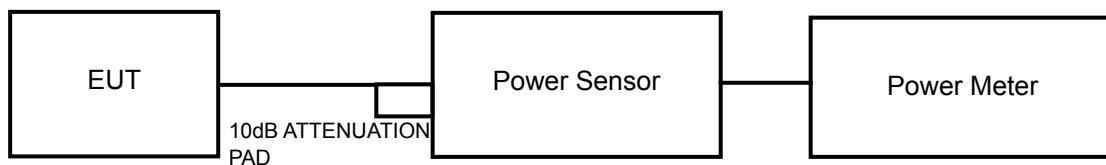


4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

802.11b

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	85.310	19.31	29.5	PASS
6	2437	87.096	19.40	29.5	PASS
11	2462	94.189	19.74	29.5	PASS

NOTE: Gain = 6.5dBi > 6dBi, so the conducted power limit shall be reduced to $30 - (6.5 - 6) = 29.5$ dBm.

802.11g

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	41.591	16.19	29.5	PASS
6	2437	116.681	20.67	29.5	PASS
11	2462	37.239	15.71	29.5	PASS

NOTE: Gain = 6.5dBi > 6dBi, so the conducted power limit shall be reduced to $30 - (6.5 - 6) = 29.5$ dBm.

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	28.184	14.50	29.5	PASS
6	2437	112.720	20.52	29.5	PASS
11	2462	30.690	14.87	29.5	PASS

NOTE: Gain = 6.5dBi > 6dBi, so the conducted power limit shall be reduced to $30 - (6.5 - 6) = 29.5$ dBm.

802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	AVG. POWER (mW)	AVG. POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	15.922	12.02	29.5	PASS
6	2437	33.884	15.30	29.5	PASS
9	2452	17.179	12.35	29.5	PASS

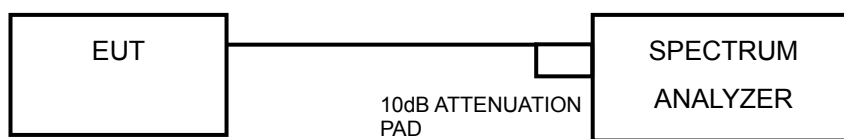
NOTE: Gain = 6.5dBi > 6dBi, so the conducted power limit shall be reduced to $30 - (6.5 - 6) = 29.5$ dBm.

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 instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

Same as Item 4.3.6

4.5.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-9.36	0.09	-9.27	7.50	PASS
6	2437	-9.26	0.09	-9.17	7.50	PASS
11	2462	-8.71	0.09	-8.62	7.50	PASS

NOTE: 1. Gain = 6.5dBi > 6dBi, so the power density limit shall be reduced to $8 - (6.5 - 6) = 7.5$ dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11g

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-14.30	0.18	-14.12	7.50	PASS
6	2437	-8.97	0.18	-8.79	7.50	PASS
11	2462	-14.39	0.18	-14.21	7.50	PASS

NOTE: 1. Gain = 6.5dBi > 6dBi, so the power density limit shall be reduced to $8 - (6.5 - 6) = 7.5$ dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
1	2412	-15.31	0.23	-15.08	7.50	PASS
6	2437	-9.60	0.23	-9.37	7.50	PASS
11	2462	-15.50	0.23	-15.27	7.50	PASS

NOTE: 1. Gain = 6.5dBi > 6dBi, so the power density limit shall be reduced to $8 - (6.5 - 6) = 7.5$ dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

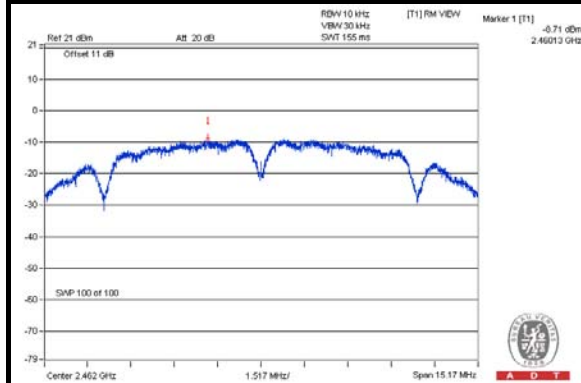
802.11n (40MHz)

CHANNEL	FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)	DUTY FACTOR	PSD WITH DUTY FACTOR (dBm)	MAXIMUM LIMIT (dBm)	PASS/FAIL
3	2422	-20.85	0.33	-20.52	7.50	PASS
6	2437	-16.89	0.33	-16.56	7.50	PASS
9	2452	-20.09	0.33	-19.76	7.50	PASS

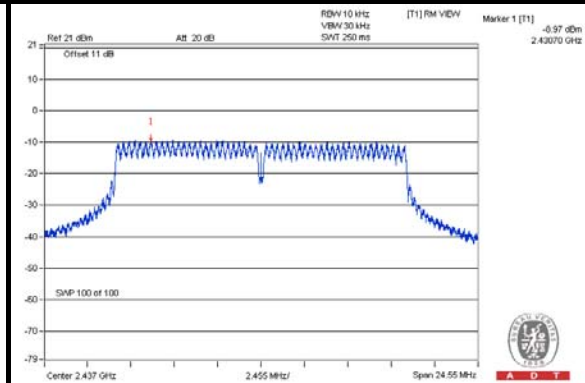
NOTE: 1. Gain = 6.5dBi > 6dBi, so the power density limit shall be reduced to $8 - (6.5 - 6) = 7.5$ dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

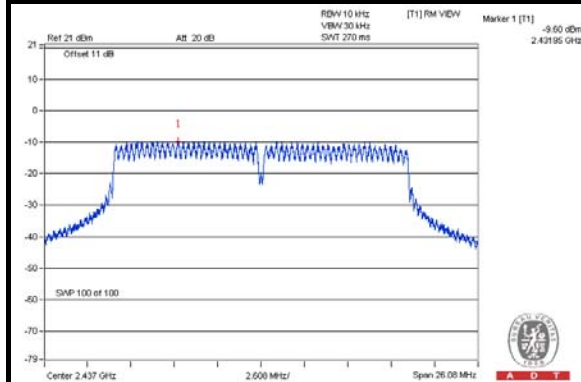
802.11b



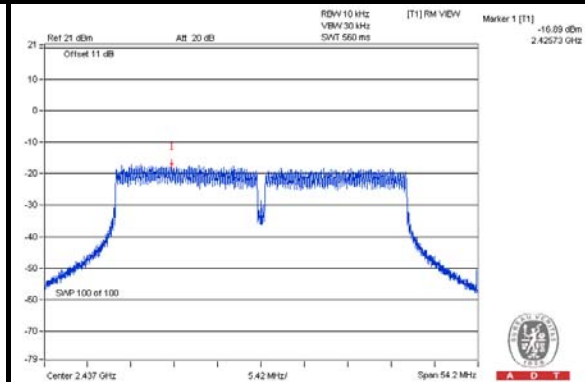
802.11g



802.11n (20MHz)



802.11n (40MHz)

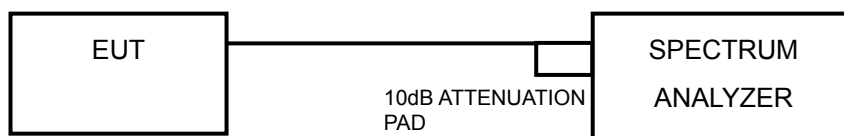


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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 \geq 300 kHz.
3. Detector = average.
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. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

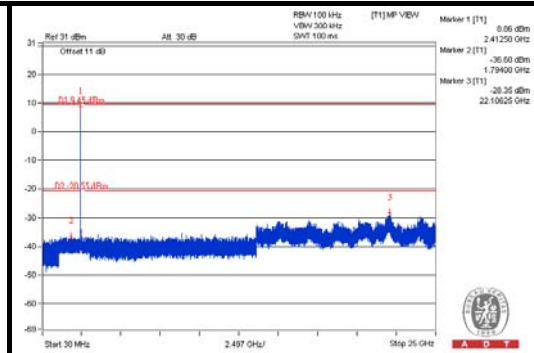
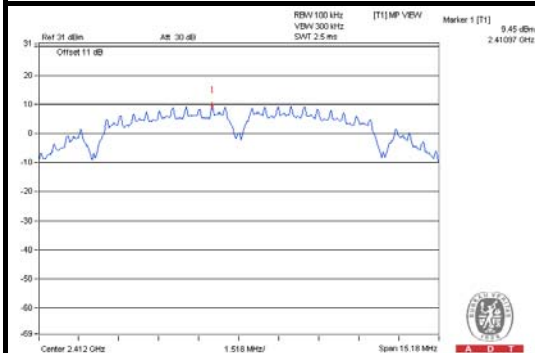
Same as Item 4.3.6

4.6.7 TEST RESULTS

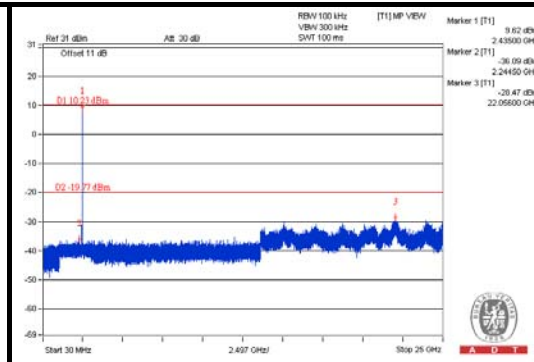
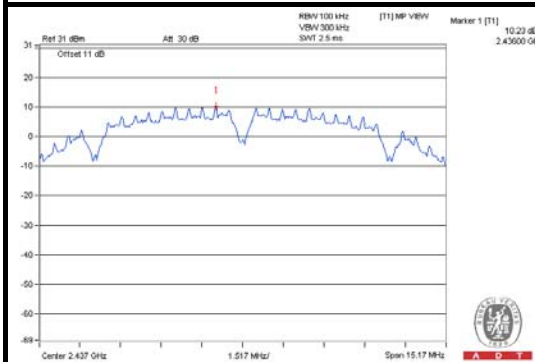
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b

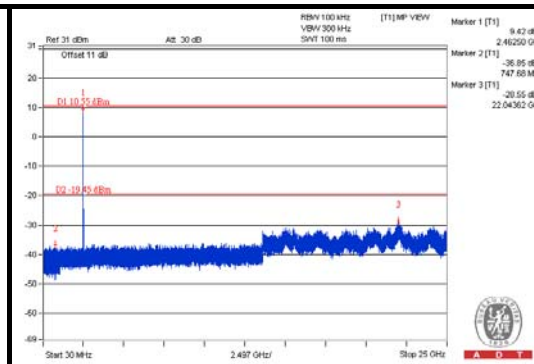
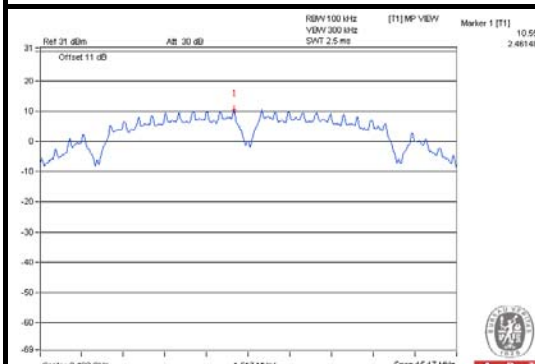
CH 1



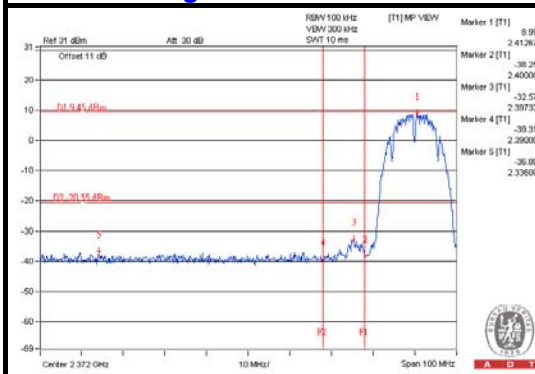
CH 6



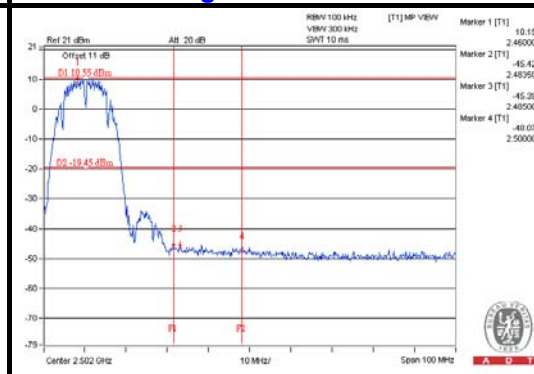
CH 11



CH 1 Band edge



CH 11 Band edge

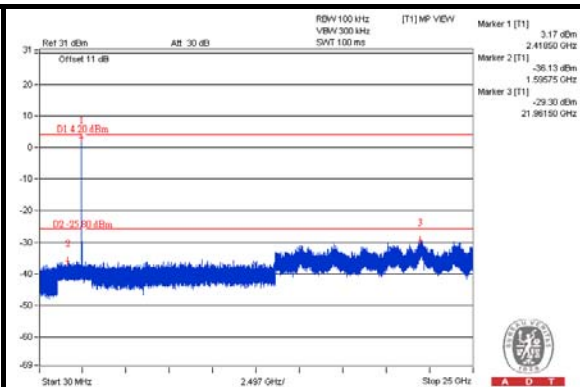
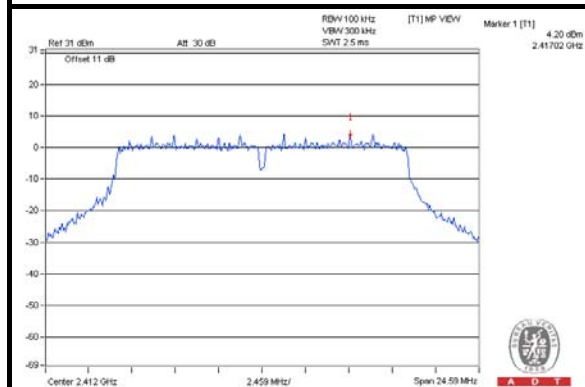




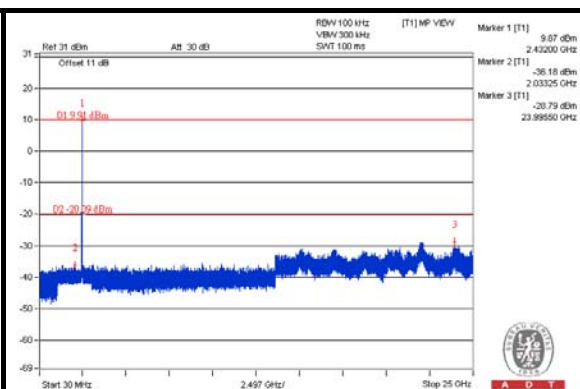
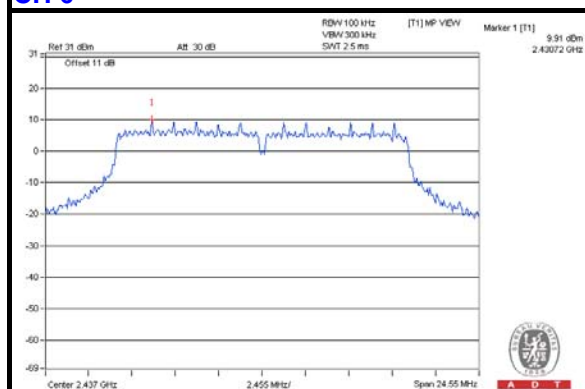
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802.11g

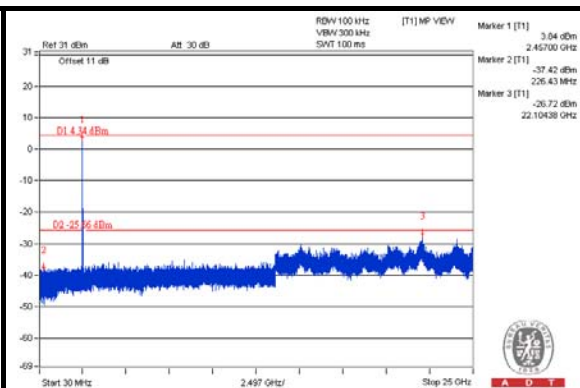
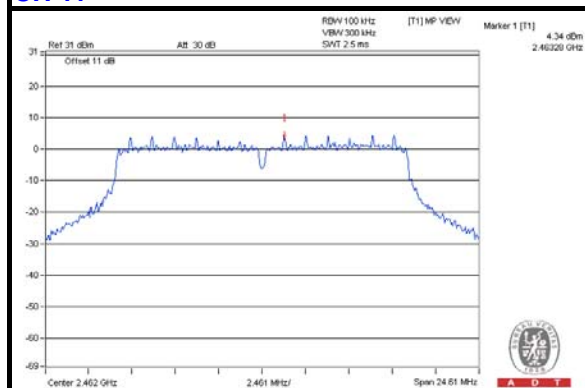
CH 1



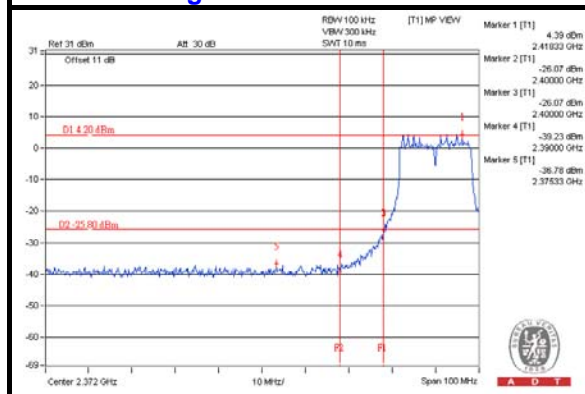
CH 6



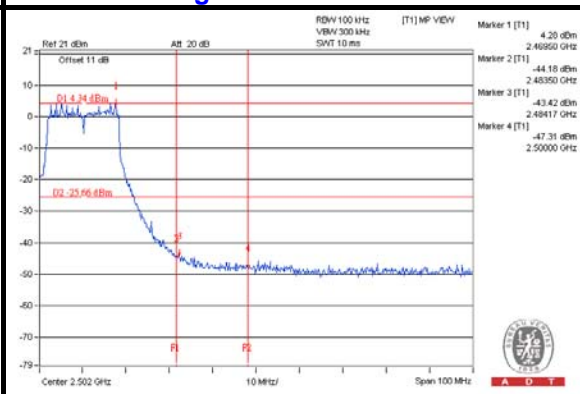
CH 11



CH 1 Band edge



CH 11 Band edge

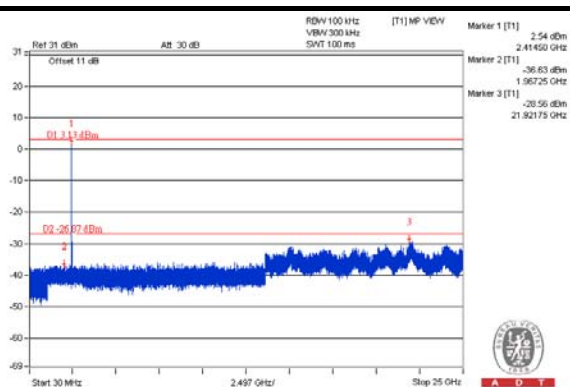
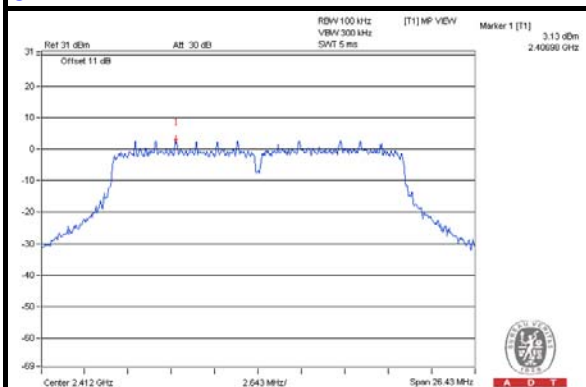




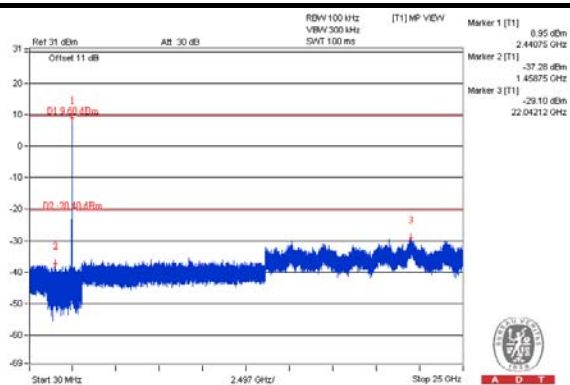
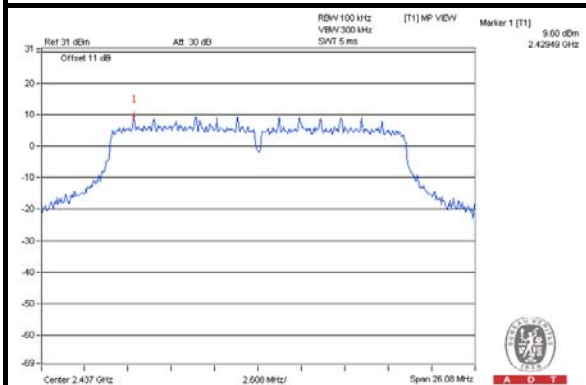
A D T

802.11n (20MHz)

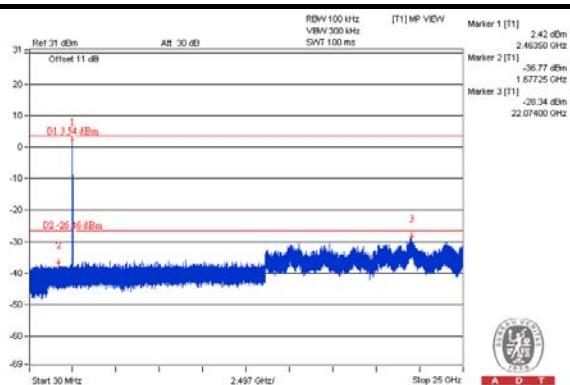
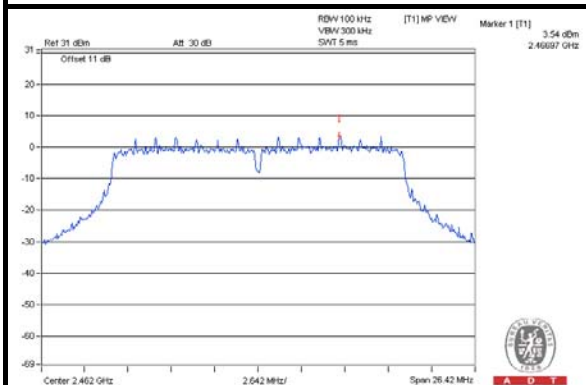
CH 1



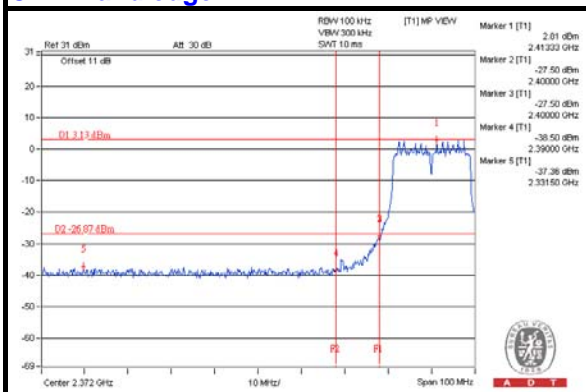
CH 6



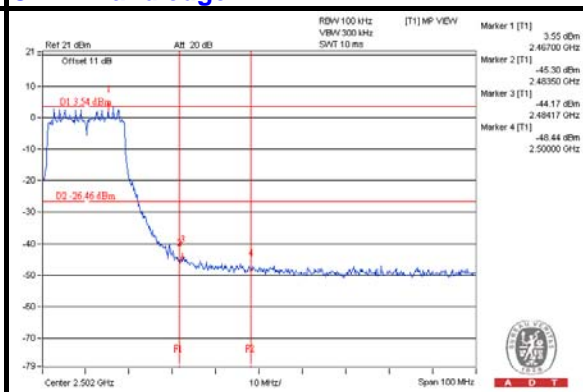
CH 11



CH 1 Band edge



CH 11 Band edge

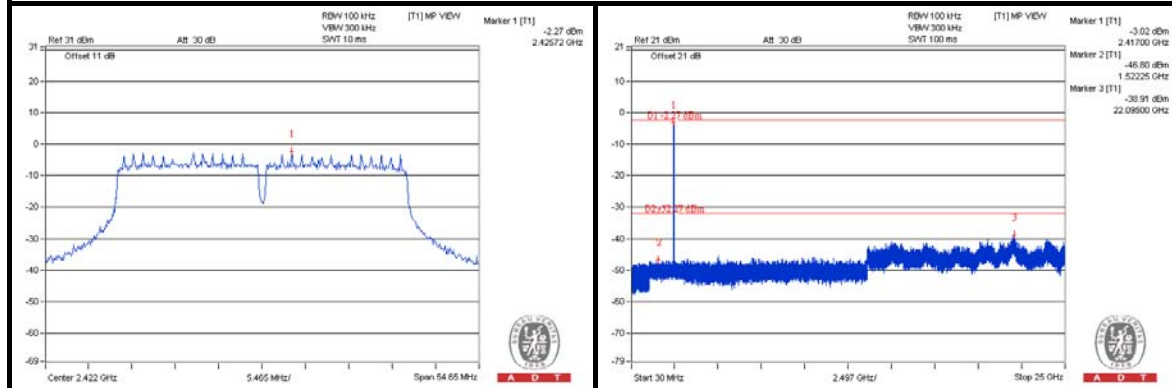




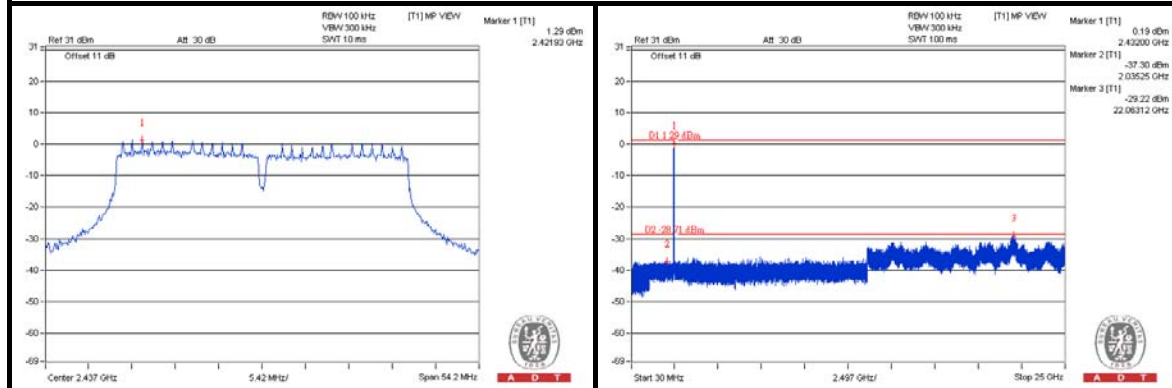
A D T

802.11n (40MHz)

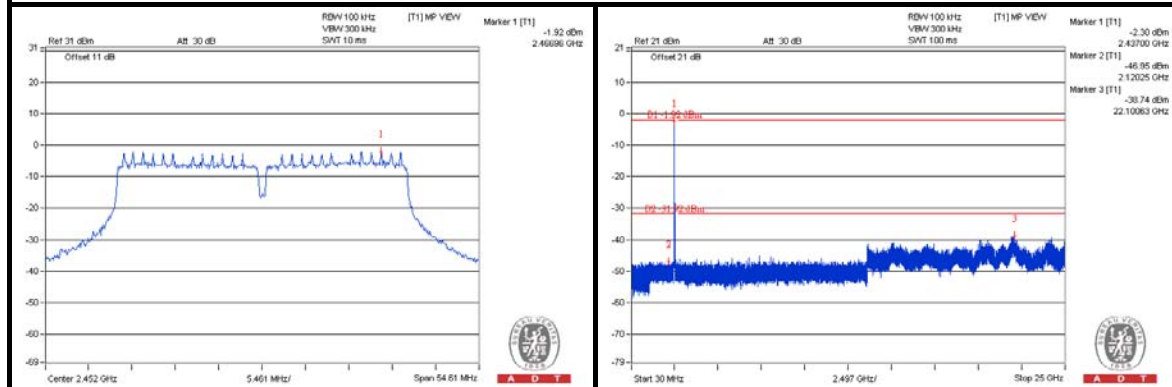
CH 3



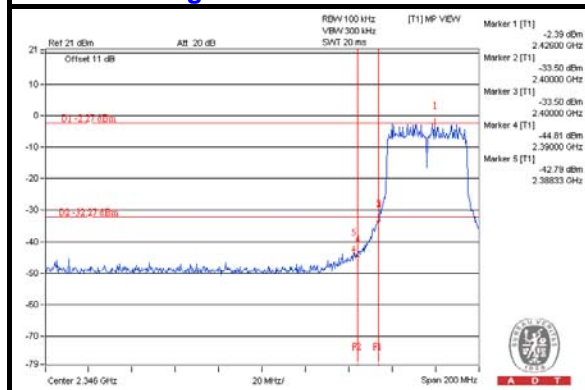
CH 6



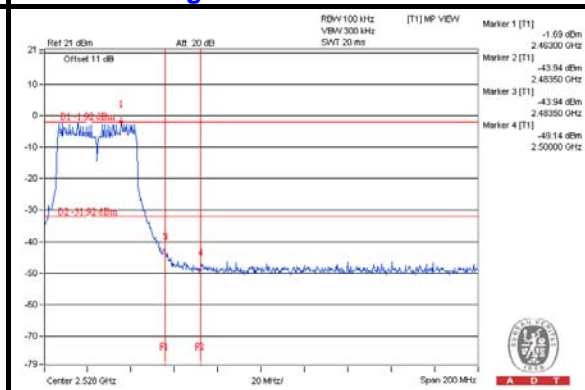
CH 9



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).

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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Web Site: www.bureauveritas-adt.com

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



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

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

---END---