

FCC TEST REPORT (15.247)

REPORT NO.: RF140819C26
MODEL NO.: ML1101
FCC ID: 2ACZ7-ML1101
RECEIVED: Aug. 19, 2014
TESTED: Nov. 13, 2014 ~ Nov. 20, 2014
ISSUED: Nov. 25, 2014

APPLICANT: Luxul Technology Inc.

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

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

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140819C26	Original release	Nov. 25, 2014

1. CERTIFICATION

PRODUCT: Wi-Fi Luminaire Controller

MODEL NO.: ML1101

BRAND: MATCH

APPLICANT: Luxul Technology Inc.

TESTED: Nov. 13, 2014 ~ Nov. 20, 2014

TEST SAMPLE: Production Unit

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

ANSI C63.10-2009

The above equipment (model: ML1101) 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 : Rona Chen , **DATE** : Nov. 25, 2014
Rona Chen / Specialist

APPROVED BY : Sam chen , **DATE** : Nov. 25, 2014
Sam Chen / Senior Project Engineer

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 -8.13dB at 15.7745MHz.
15.205 & 15.209	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.0dB at 2390MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

2.1 MEASUREMENT UNCERTAINTY

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

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

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

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

EUT	Wi-Fi Luminaire Controller
MODEL NO.	ML1101
POWER SUPPLY	90~260 Vac
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 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
OPERATING FREQUENCY	2412 ~ 2462MHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (20MHz), 7 for 802.11n (40MHz)
OUTPUT POWER	161.81mW
ANTENNA TYPE	PCB antenna with 0dBi gain
ANTENNA CONNECTOR	NA
DATA CABLE	Refer to Note as below
I/O PORTS	Refer to user's manual
ACCESSORY DEVICES	Refer to Note as below

NOTE:

1. The provides 1 completed transmitter and 1 receiver.

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

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

3.2 DESCRIPTION OF TEST MODES

FOR 2.4GHz:

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

WLAN 2.4GHz:

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 **Y-plane**.

RADIATED EMISSION TEST (ABOVE 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

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	1	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	1	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, 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	MCS0
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

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	MCS0
-	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

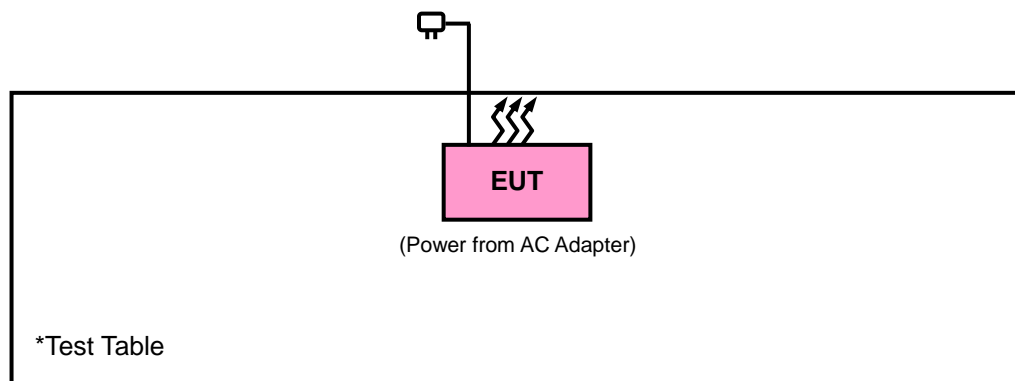
TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	25deg. C, 65%RH	120Vac, 60Hz	Toby Tian
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Toby Tian
PLC	25deg. C, 65%RH	120Vac, 60Hz	Gavin Wu
APCM	25deg. C, 65%RH	120Vac, 60Hz	Howard Kao

3.3 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.

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST



3.4 DUTY CYCLE TEST SIGNAL

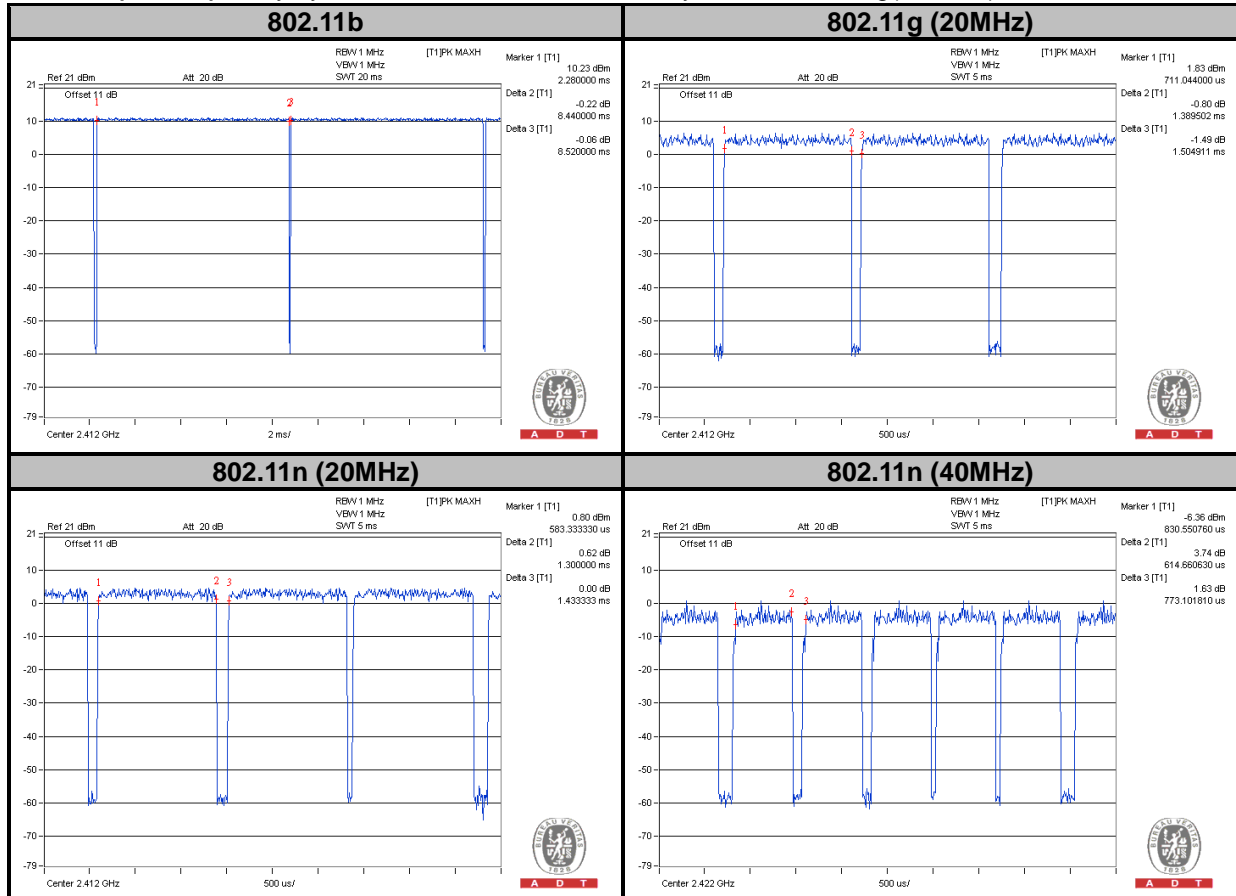
WLAN 2.4GHz

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

802.11g: Duty cycle = $1.390/1.505 = 0.923$, Duty factor = $10 * \log(1/0.923) = 0.35$

802.11n (20MHz): Duty cycle = $1.300/1.433 = 0.907$, Duty factor = $10 * \log(1/0.907) = 0.42$

802.11n (40MHz): Duty cycle = $0.615/0.773 = 0.795$, Duty factor = $10 * \log(1/0.795) = 1.00$



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 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 (FOR 2.4GHz BAND)

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 Agilent	N9038A	MY51210203	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 21, 2013	Dec. 20, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 27, 2014	Feb. 26, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 19, 2014	Feb. 18, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 18, 2013	Dec. 17, 2014
Loop Antenna	HFH2-Z2	100070	Mar. 06, 2014	Mar. 05, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 26, 2013	Dec. 25, 2014
Preamplifier EMCI	EMC 184045	980116	Jan. 13, 2014	Jan. 12, 2015
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2013	Dec. 26, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Nov. 07, 2014	Nov. 06, 2015
RF signal cable Worken	RG-213	NA	Nov. 06, 2014	Nov. 05, 2015
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Power Meter	ML2495A	1232002	Sep. 17, 2014	Sep. 16, 2015
Power Sensor	MA2411B	1207325	Sep. 17, 2014	Sep. 16, 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in HwaYa Chamber 10.
4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
5. The FCC Site Registration No. is 690701.
6. The IC Site Registration No. is IC 7450F-10.

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:

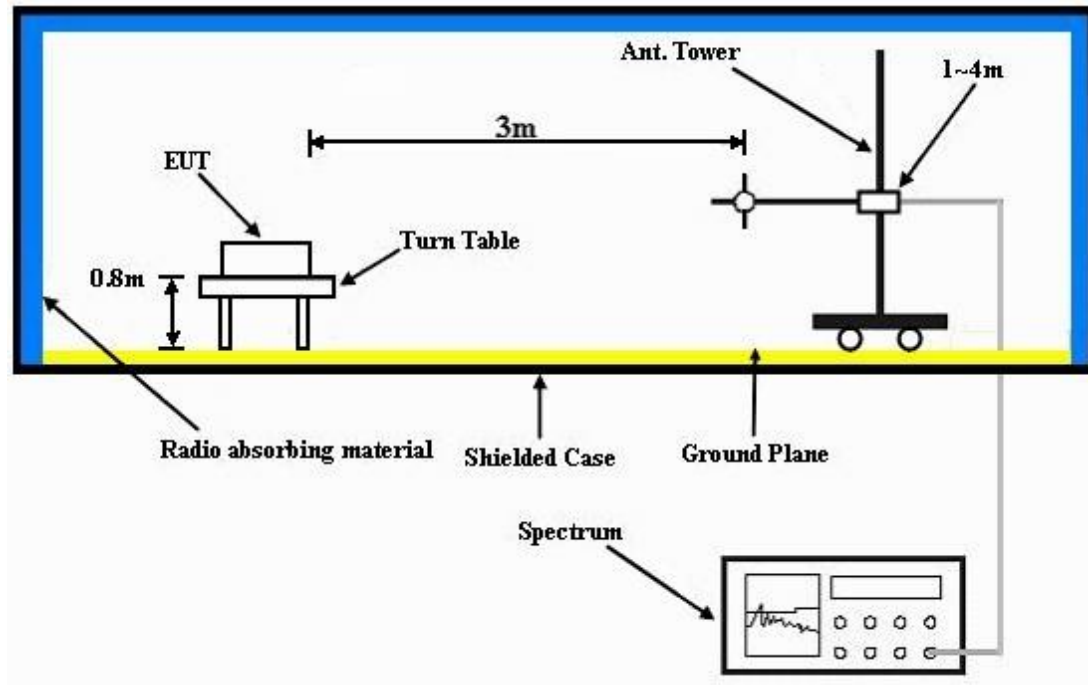
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution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

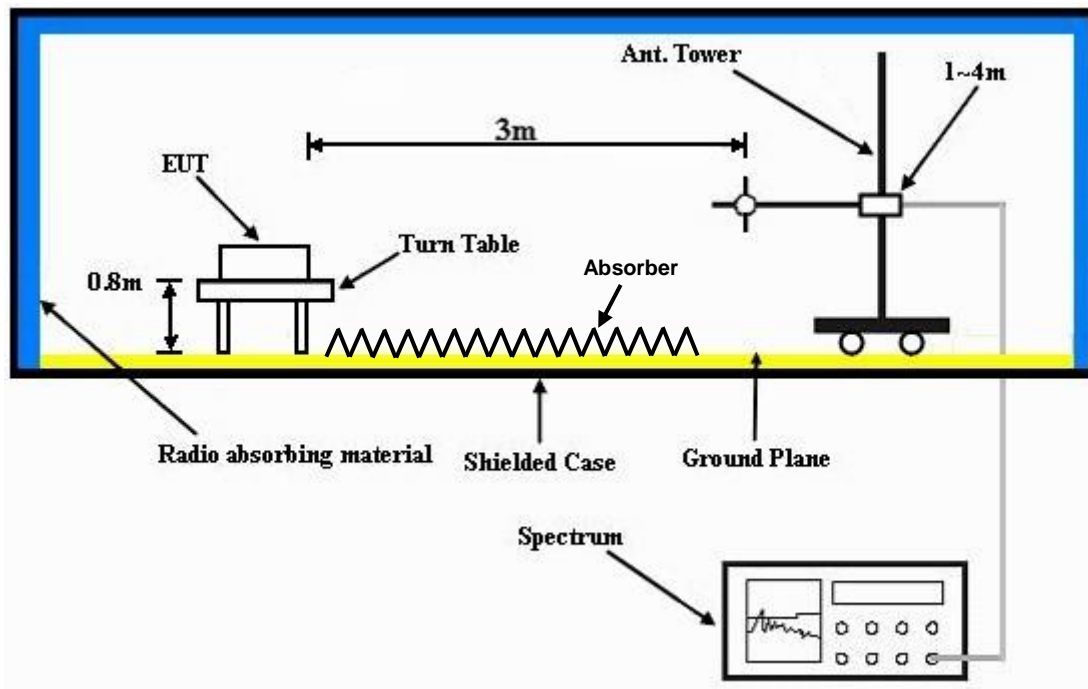
No deviation.

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).



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4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 TEST RESULTS

ABOVE 1GHz WORST-CASE DATA

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.28	59.35	54	-1.72	26.91	3.54	37.52	100	313	Average
2390	59.6	66.67	74	-14.4	26.91	3.54	37.52	100	313	Peak
2412	103.8	110.82			26.96	3.54	37.52	100	313	Average
2412	108.3	115.32			26.96	3.54	37.52	100	313	Peak
2488	36.47	42.97	54	-17.53	27.2	3.62	37.32	100	313	Average
2488	56.31	62.81	74	-17.69	27.2	3.62	37.32	100	313	Peak
4824	45.07	61.39	54	-8.93	30.99	5.77	53.08	135	272	Average
4824	45.55	61.87	74	-28.45	30.99	5.77	53.08	135	272	Peak
7236	45.68	55.36	83.8	-38.12	35.68	6.65	52.01	159	247	Average
7236	51.57	61.25	88.3	-36.73	35.68	6.65	52.01	159	247	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	46.84	53.91	54	-7.16	26.91	3.54	37.52	191	289	Average
2390	57.36	64.43	74	-16.64	26.91	3.54	37.52	191	289	Peak
2412	101.23	108.25			26.96	3.54	37.52	191	289	Average
2412	105.7	112.72			26.96	3.54	37.52	191	289	Peak
2498	34.69	41.12	54	-19.31	27.2	3.62	37.25	191	289	Average
2498	55.95	62.38	74	-18.05	27.2	3.62	37.25	191	289	Peak
4824	46.04	62.36	54	-7.96	30.99	5.77	53.08	135	252	Average
4824	46.99	63.31	74	-27.01	30.99	5.77	53.08	135	252	Peak
7236	52.06	61.74	81.23	-29.17	35.68	6.65	52.01	155	208	Average
7236	56.05	65.73	85.7	-29.65	35.68	6.65	52.01	155	208	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.
- 7236MHz: Out of restricted band



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	40.35	47.42	54	-13.65	26.91	3.52	37.5	156	206	Average
2386	56.65	63.72	74	-17.35	26.91	3.52	37.5	156	206	Peak
2437	104.72	111.56			27.06	3.56	37.46	156	206	Average
2437	109.34	116.18			27.06	3.56	37.46	156	206	Peak
2484	40.04	46.61	54	-13.96	27.15	3.6	37.32	156	206	Average
2484	56.81	63.38	74	-17.19	27.15	3.6	37.32	156	206	Peak
4874	43.65	59.84	54	-10.35	31.06	5.8	53.05	100	143	Average
4874	47.53	63.72	74	-26.47	31.06	5.8	53.05	100	143	Peak
7311	46.88	56.21	54	-7.12	35.84	6.68	51.85	161	260	Average
7311	53.62	62.95	74	-20.38	35.84	6.68	51.85	161	260	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2348	35.22	42.44	54	-18.78	26.77	3.5	37.49	109	272	Average
2348	56.82	64.04	74	-17.18	26.77	3.5	37.49	109	272	Peak
2437	102.09	108.93			27.06	3.56	37.46	109	272	Average
2437	106.58	113.42			27.06	3.56	37.46	109	272	Peak
2484	36.29	42.86	54	-17.71	27.15	3.6	37.32	109	272	Average
2484	56.43	63	74	-17.57	27.15	3.6	37.32	109	272	Peak
4874	45.1	61.29	54	-8.9	31.06	5.8	53.05	100	242	Average
4874	48.61	64.8	74	-25.39	31.06	5.8	53.05	100	242	Peak
7311	53	62.33	54	-1	35.84	6.68	51.85	102	212	Average
7311	58.99	68.32	74	-15.01	35.84	6.68	51.85	102	212	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.



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EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2344	34.91	42.13	54	-19.09	26.77	3.5	37.49	187	210	Average
2344	56.2	63.42	74	-17.8	26.77	3.5	37.49	187	210	Peak
2462	102.74	109.45			27.1	3.58	37.39	187	210	Average
2462	107.25	113.96			27.1	3.58	37.39	187	210	Peak
2488	52.27	58.77	54	-1.73	27.2	3.62	37.32	187	210	Average
2488	60.28	66.78	74	-13.72	27.2	3.62	37.32	187	210	Peak
4924	44.87	60.95	54	-9.13	31.12	5.83	53.03	159	146	Average
4924	46.91	62.99	74	-27.09	31.12	5.83	53.03	159	146	Peak
7386	44.91	53.75	54	-9.09	36.05	6.71	51.6	121	255	Average
7386	50.83	59.67	74	-23.17	36.05	6.71	51.6	121	255	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	33.72	40.79	54	-20.28	26.91	3.52	37.5	182	289	Average
2386	56.72	63.79	74	-17.28	26.91	3.52	37.5	182	289	Peak
2462	99.85	106.56			27.1	3.58	37.39	182	289	Average
2462	104.25	110.96			27.1	3.58	37.39	182	289	Peak
2486	48.87	55.44	54	-5.13	27.15	3.6	37.32	182	289	Average
2486	58.84	65.41	74	-15.16	27.15	3.6	37.32	182	289	Peak
7386	52.96	61.71	54	-1.04	36.05	6.72	51.52	100	280	Average
7386	57.58	66.33	74	-16.42	36.05	6.72	51.52	100	280	Peak
2386	33.72	40.79	54	-20.28	26.91	3.52	37.5	182	289	Average
2386	56.72	63.79	74	-17.28	26.91	3.52	37.5	182	289	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	53	60.07	54	-1	26.91	3.54	37.52	160	211	Average
2390	72.8	79.87	74	-1.2	26.91	3.54	37.52	160	211	Peak
2412	97.23	104.25			26.96	3.54	37.52	160	211	Average
2412	107.54	114.56			26.96	3.54	37.52	160	211	Peak
2490	38.2	44.7	54	-15.8	27.2	3.62	37.32	160	211	Average
2490	56.46	62.96	74	-17.54	27.2	3.62	37.32	160	211	Peak
4824	42.16	58.48	54	-11.84	30.99	5.77	53.08	100	156	Average
4824	48.8	65.12	74	-25.2	30.99	5.77	53.08	100	156	Peak
7236	37.33	47.01	77.23	-39.9	35.68	6.65	52.01	100	256	Average
7236	51.01	60.69	87.54	-36.53	35.68	6.65	52.01	100	256	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	50.74	57.81	54	-3.26	26.91	3.54	37.52	106	290	Average
2390	69.15	76.22	74	-4.85	26.91	3.54	37.52	106	290	Peak
2412	94.08	101.1			26.96	3.54	37.52	106	290	Average
2412	104.75	111.77			26.96	3.54	37.52	106	290	Peak
2484	36.19	42.76	54	-17.81	27.15	3.6	37.32	106	290	Average
2484	56.76	63.33	74	-17.24	27.15	3.6	37.32	106	290	Peak
4824	36.54	52.86	54	-17.46	30.99	5.77	53.08	100	266	Average
4824	46.46	62.78	74	-27.54	30.99	5.77	53.08	100	266	Peak
7236	41.68	51.36	74.08	-32.4	35.68	6.65	52.01	149	208	Average
7236	58.81	68.49	84.75	-25.94	35.68	6.65	52.01	149	208	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.
- 7236MHz: Out of restricted band

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	42.88	49.95	54	-11.12	26.91	3.52	37.5	156	212	Average
2386	60.82	67.89	74	-13.18	26.91	3.52	37.5	156	212	Peak
2437	97.73	104.57			27.06	3.56	37.46	156	212	Average
2437	107.77	114.61			27.06	3.56	37.46	156	212	Peak
2484	43.59	50.16	54	-10.41	27.15	3.6	37.32	156	212	Average
2484	62.29	68.86	74	-11.71	27.15	3.6	37.32	156	212	Peak
7311	39.95	49.28	54	-14.05	35.84	6.68	51.85	157	261	Average
7311	56.93	66.26	74	-17.07	35.84	6.68	51.85	157	261	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	38.54	45.61	54	-15.46	26.91	3.54	37.52	101	292	Average
2390	55.73	62.8	74	-18.27	26.91	3.54	37.52	101	292	Peak
2437	95.46	102.3			27.06	3.56	37.46	101	292	Average
2437	105.23	112.07			27.06	3.56	37.46	101	292	Peak
2484	41.5	48.07	54	-12.5	27.15	3.6	37.32	101	292	Average
2484	59.92	66.49	74	-14.08	27.15	3.6	37.32	101	292	Peak
7311	44.71	54.04	54	-9.29	35.84	6.68	51.85	103	214	Average
7311	61.22	70.55	74	-12.78	35.84	6.68	51.85	103	214	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2388	38.36	45.41	54	-15.64	26.91	3.54	37.5	152	215	Average
2388	56.92	63.97	74	-17.08	26.91	3.54	37.5	152	215	Peak
2462	96.23	102.94			27.1	3.58	37.39	152	215	Average
2462	106.1	112.81			27.1	3.58	37.39	152	215	Peak
2484	52.17	58.74	54	-1.83	27.15	3.6	37.32	152	215	Average
2484	73	79.57	74	-1	27.15	3.6	37.32	152	215	Peak
7386	43.49	52.33	54	-10.51	36.05	6.71	51.6	133	262	Average
7386	53.69	62.53	74	-20.31	36.05	6.71	51.6	133	262	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2356	35.74	42.92	54	-18.26	26.81	3.5	37.49	100	290	Average
2356	56.4	63.58	74	-17.6	26.81	3.5	37.49	100	290	Peak
2462	93.71	100.42			27.1	3.58	37.39	100	290	Average
2462	103.51	110.22			27.1	3.58	37.39	100	290	Peak
2484	49.44	56.01	54	-4.56	27.15	3.6	37.32	100	290	Average
2484	70.28	76.85	74	-3.72	27.15	3.6	37.32	100	290	Peak
7386	44.4	53.24	54	-9.6	36.05	6.71	51.6	127	212	Average
7386	60.64	69.48	74	-13.36	36.05	6.71	51.6	127	212	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	51.2	58.27	54	-2.8	26.91	3.54	37.52	157	206	Average
2390	72.98	80.05	74	-1.02	26.91	3.54	37.52	157	206	Peak
2412	96.63	103.65			26.96	3.54	37.52	157	206	Average
2412	106.81	113.83			26.96	3.54	37.52	157	206	Peak
2486	36.86	43.43	54	-17.14	27.15	3.6	37.32	157	206	Average
2486	56.39	62.96	74	-17.61	27.15	3.6	37.32	157	206	Peak
7236	38.14	47.82	76.63	-38.49	35.68	6.65	52.01	141	251	Average
7236	53.54	63.22	86.81	-33.27	35.68	6.65	52.01	141	251	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.82	52.89	54	-8.18	26.91	3.54	37.52	160	293	Average
2390	69.2	76.27	74	-4.8	26.91	3.54	37.52	160	293	Peak
2412	93.37	100.39			26.96	3.54	37.52	160	293	Average
2412	103.19	110.21			26.96	3.54	37.52	160	293	Peak
2494	34.83	41.26	54	-19.17	27.2	3.62	37.25	160	293	Average
2494	56.36	62.79	74	-17.64	27.2	3.62	37.25	160	293	Peak
7236	41.57	51.25	73.37	-31.8	35.68	6.65	52.01	129	213	Average
7236	57.55	67.23	83.19	-25.64	35.68	6.65	52.01	129	213	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2412MHz: Fundamental frequency.
- 7236MHz: Out of restricted band

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	42.7	49.77	54	-11.3	26.91	3.52	37.5	104	206	Average
2386	58.9	65.97	74	-15.1	26.91	3.52	37.5	104	206	Peak
2437	96.52	103.36			27.06	3.56	37.46	104	206	Average
2437	106.26	113.1			27.06	3.56	37.46	104	206	Peak
2488	39.58	46.08	54	-14.42	27.2	3.62	37.32	104	206	Average
2488	59.7	66.2	74	-14.3	27.2	3.62	37.32	104	206	Peak
7311	38.68	48.01	54	-15.32	35.84	6.68	51.85	119	258	Average
7311	56.39	65.72	74	-17.61	35.84	6.68	51.85	119	258	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2360	36.82	44	54	-17.18	26.81	3.5	37.49	186	290	Average
2360	56.21	63.39	74	-17.79	26.81	3.5	37.49	186	290	Peak
2437	93.58	100.42			27.06	3.56	37.46	186	290	Average
2437	103.49	110.33			27.06	3.56	37.46	186	290	Peak
2484	39.19	45.76	54	-14.81	27.15	3.6	37.32	186	290	Average
2484	58.21	64.78	74	-15.79	27.15	3.6	37.32	186	290	Peak
7311	44.54	53.87	54	-9.46	35.84	6.68	51.85	131	213	Average
7311	59.31	68.64	74	-14.69	35.84	6.68	51.85	131	213	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 11	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	38.27	45.34	54	-15.73	26.91	3.54	37.52	184	208	Average
2390	57.97	65.04	74	-16.03	26.91	3.54	37.52	184	208	Peak
2462	94.97	101.68			27.1	3.58	37.39	184	208	Average
2462	105.34	112.05			27.1	3.58	37.39	184	208	Peak
2484	52.73	59.3	54	-1.27	27.15	3.6	37.32	184	208	Average
2484	72.34	78.91	74	-1.66	27.15	3.6	37.32	184	208	Peak
7386	37.93	46.77	54	-16.07	36.05	6.71	51.6	131	255	Average
7386	52.41	61.25	74	-21.59	36.05	6.71	51.6	131	255	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2336	34.73	41.95	54	-19.27	26.77	3.48	37.47	185	291	Average
2336	56.07	63.29	74	-17.93	26.77	3.48	37.47	185	291	Peak
2462	92.34	99.05			27.1	3.58	37.39	185	291	Average
2462	102.48	109.19			27.1	3.58	37.39	185	291	Peak
2484	48.99	55.56	54	-5.01	27.15	3.6	37.32	185	291	Average
2484	69.51	76.08	74	-4.49	27.15	3.6	37.32	185	291	Peak
7386	43.2	52.04	54	-10.8	36.05	6.71	51.6	145	212	Average
7386	60.61	69.45	74	-13.39	36.05	6.71	51.6	145	212	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2462MHz: Fundamental frequency.

802.11n (40MHz)

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 3	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	51.86	58.93	54	-2.14	26.91	3.52	37.5	105	199	Average
2386	72.34	79.41	74	-1.66	26.91	3.52	37.5	105	199	Peak
2422	92.76	99.65			27.01	3.56	37.46	105	199	Average
2422	102.15	109.04			27.01	3.56	37.46	105	199	Peak
2484	40.29	46.86	54	-13.71	27.15	3.6	37.32	105	199	Average
2484	59.9	66.47	74	-14.1	27.15	3.6	37.32	105	199	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	46.44	53.51	54	-7.56	26.91	3.54	37.52	126	290	Average
2390	66.04	73.11	74	-7.96	26.91	3.54	37.52	126	290	Peak
2422	89.81	96.7			27.01	3.56	37.46	126	290	Average
2422	99.47	106.36			27.01	3.56	37.46	126	290	Peak
2498	39.11	45.54	54	-14.89	27.2	3.62	37.25	126	290	Average
2498	57.06	63.49	74	-16.94	27.2	3.62	37.25	126	290	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2422MHz: Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.36	52.43	54	-8.64	26.91	3.54	37.52	104	206	Average
2390	67.14	74.21	74	-6.86	26.91	3.54	37.52	104	206	Peak
2437	92.18	99.02			27.06	3.56	37.46	104	206	Average
2437	102.22	109.06			27.06	3.56	37.46	104	206	Peak
2484	46.54	53.11	54	-7.46	27.15	3.6	37.32	104	206	Average
2484	63.68	70.25	74	-10.32	27.15	3.6	37.32	104	206	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2382	40.34	47.46	54	-13.66	26.86	3.52	37.5	154	293	Average
2382	60.28	67.4	74	-13.72	26.86	3.52	37.5	154	293	Peak
2437	89.56	96.4			27.06	3.56	37.46	154	293	Average
2437	99.39	106.23			27.06	3.56	37.46	154	293	Peak
2484	43.59	50.16	54	-10.41	27.15	3.6	37.32	154	293	Average
2484	60.24	66.81	74	-13.76	27.15	3.6	37.32	154	293	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2437MHz: Fundamental frequency.

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 9	FREQUENCY RANGE	1GHz ~ 25GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK) Average (AV)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	40.7	47.77	54	-13.3	26.91	3.54	37.52	101	207	Average
2390	61.91	68.98	74	-12.09	26.91	3.54	37.52	101	207	Peak
2452	92.38	99.13			27.06	3.58	37.39	101	207	Average
2452	102.12	108.87			27.06	3.58	37.39	101	207	Peak
2488	52.92	59.42	54	-1.08	27.2	3.62	37.32	101	207	Average
2488	68.26	74.76	74	-5.74	27.2	3.62	37.32	101	207	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	37.48	44.55	54	-16.52	26.91	3.54	37.52	189	288	Average
2390	59.1	66.17	74	-14.9	26.91	3.54	37.52	189	288	Peak
2452	89.09	95.84			27.06	3.58	37.39	189	288	Average
2452	99.38	106.13			27.06	3.58	37.39	189	288	Peak
2484	50.16	56.73	54	-3.84	27.15	3.6	37.32	189	288	Average
2484	65.94	72.51	74	-8.06	27.15	3.6	37.32	189	288	Peak

REMARKS:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2452MHz: Fundamental frequency.

BELOW 1GHz WORST-CASE DATA:

802.11g

EUT TEST CONDITION		MEASUREMENT DETAIL	
CHANNEL	Channel 1	FREQUENCY RANGE	30MHz ~ 1GHz
INPUT POWER	120Vac, 60 Hz	DETECTOR FUNCTION	Peak (PK)
ENVIRONMENTAL CONDITIONS	25deg. C, 65%RH	TESTED BY	Toby Tian

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
43.5	22.52	39.33	40	-17.48	13.59	0.71	31.11	101	255	Peak
50.25	21.7	39.27	40	-18.3	12.97	0.77	31.31	108	262	Peak
147.72	25.1	42.78	43.5	-18.4	12.61	1.33	31.62	125	175	Peak
312.6	34.53	51.13	46	-11.47	13.24	2.1	31.94	128	222	Peak
468.7	33.97	46.5	46	-12.03	16.7	2.68	31.91	112	342	Peak
624.8	33.85	42.95	46	-12.15	19.9	3.16	32.16	109	147	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
42.96	24.46	41.26	40	-15.54	13.58	0.7	31.08	140	36	Peak
49.98	22.25	39.82	40	-17.75	12.97	0.77	31.31	128	359	Peak
69.69	21.15	41.3	40	-18.85	10.77	0.9	31.82	115	228	Peak
312.6	30.89	47.49	46	-15.11	13.24	2.1	31.94	100	12	Peak
468.7	35.92	48.45	46	-10.08	16.7	2.68	31.91	114	226	Peak
624.8	33.84	42.94	46	-12.16	19.9	3.16	32.16	138	297	Peak

REMARKS: Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
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 (dB μ V)	
	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-2047.

4.2.3 TEST PROCEDURES

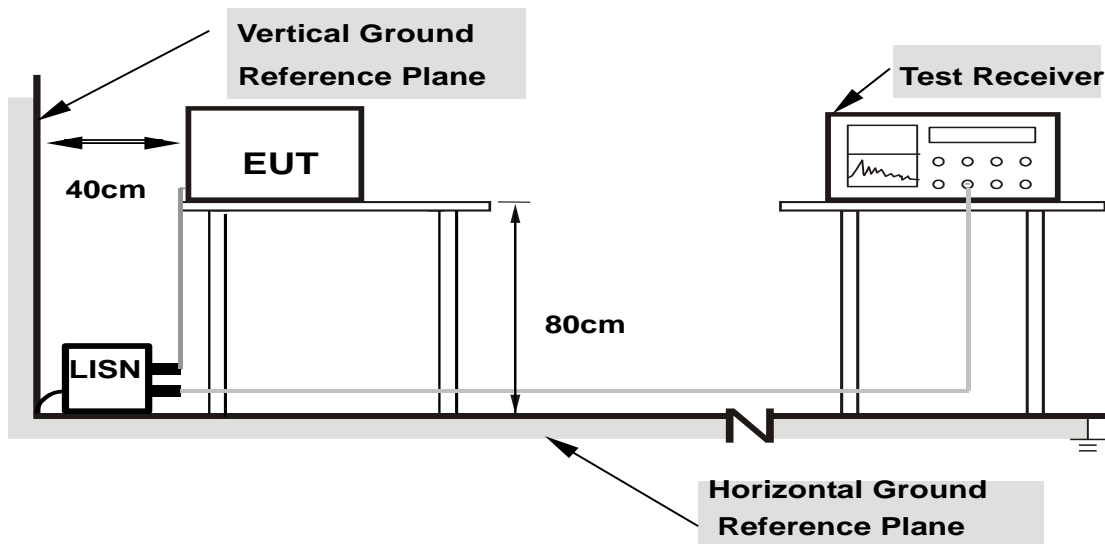
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.

4.2.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 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 section 4.1.6.

4.2.7 TEST RESULTS

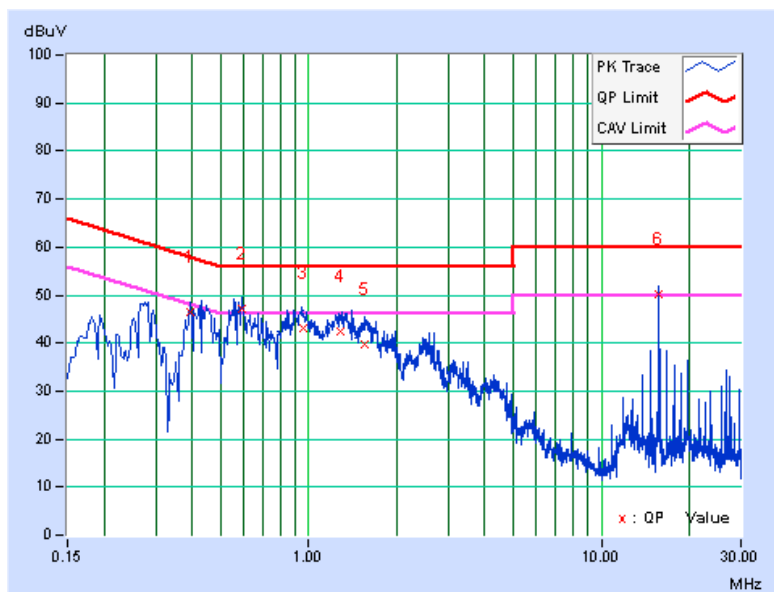
CONDUCTED WORST-CASE DATA :

PHASE	Line 1	6dB BANDWIDTH	9kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.39635	0.08	46.36	35.38	46.44	35.46	57.93	47.93	-11.49	-12.47
2	0.59183	0.09	47.12	32.84	47.21	32.93	56.00	46.00	-8.79	-13.07
3	0.95309	0.11	42.98	30.92	43.09	31.03	56.00	46.00	-12.91	-14.97
4	1.28026	0.12	42.19	30.64	42.31	30.76	56.00	46.00	-13.69	-15.24
5	1.55760	0.13	39.70	28.82	39.83	28.95	56.00	46.00	-16.17	-17.05
6	15.77014	0.82	49.37	39.51	50.19	40.33	60.00	50.00	-9.81	-9.67

REMARKS:

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

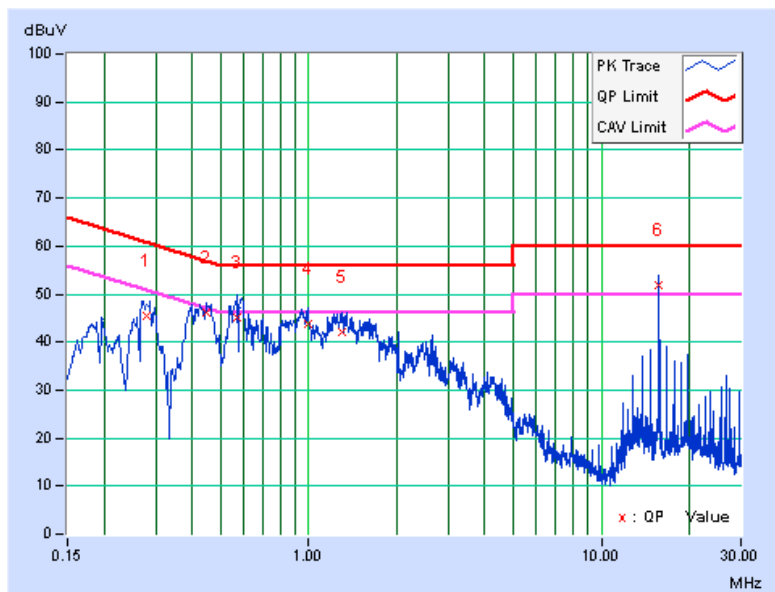


PHASE	Line 2	6dB BANDWIDTH	9kHz
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.27844	0.06	45.44	33.13	45.50	33.19	60.86	50.86	-15.36	-17.67
2	0.44742	0.07	45.91	34.05	45.98	34.12	56.92	46.92	-10.94	-12.80
3	0.56716	0.08	45.15	33.83	45.23	33.91	56.00	46.00	-10.77	-12.09
4	0.99065	0.09	43.61	32.29	43.70	32.38	56.00	46.00	-12.30	-13.62
5	1.29563	0.10	41.89	30.72	41.99	30.82	56.00	46.00	-14.01	-15.18
6	15.77045	0.71	51.16	40.45	51.87	41.16	60.00	50.00	-8.13	-8.84

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

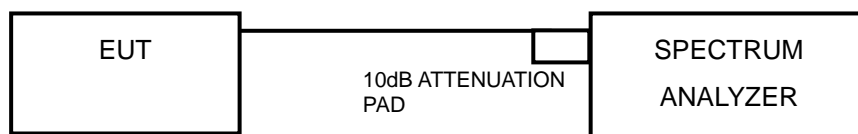


4.3 6dB BANDWIDTH MEASUREMENT

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	9.15	0.5	PASS
6	2437	9.15	0.5	PASS
11	2462	9.59	0.5	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.17	0.5	PASS
6	2437	15.11	0.5	PASS
11	2462	15.68	0.5	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	15.08	0.5	PASS
6	2437	15.11	0.5	PASS
11	2462	15.38	0.5	PASS

802.11n (40MHz)

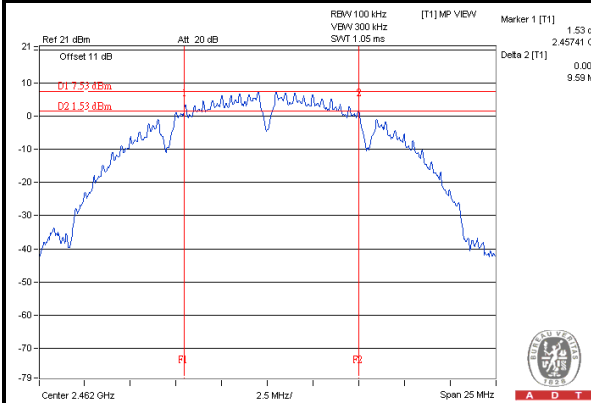
CHANNEL	FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	35.37	0.5	PASS
6	2437	35.41	0.5	PASS
9	2452	35.24	0.5	PASS



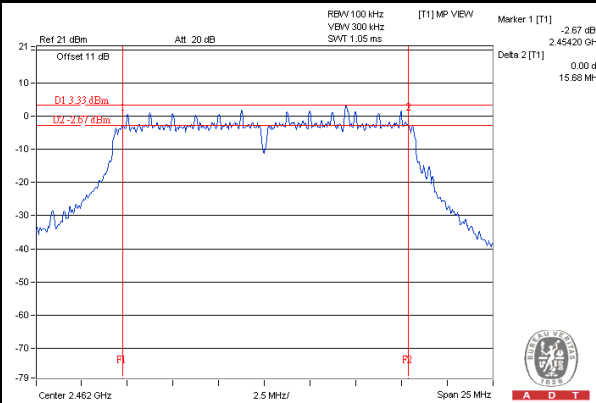
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SPECTRUM PLOT OF WORST VALUE

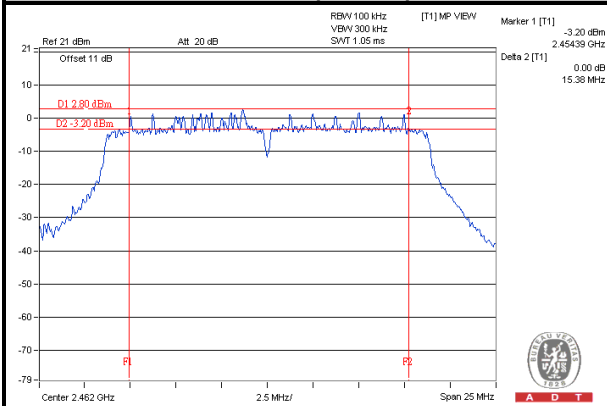
802.11b



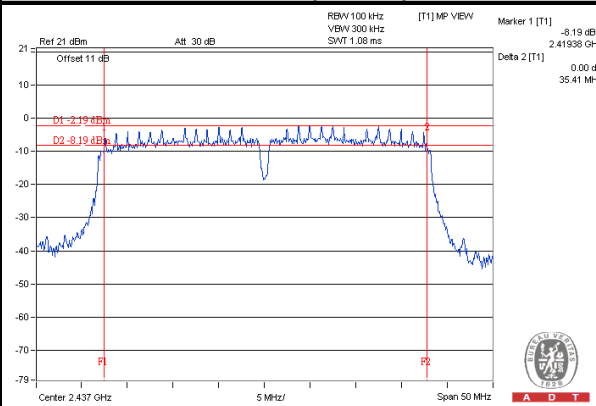
802.11g



802.11n (20MHz)



802.11n (40MHz)

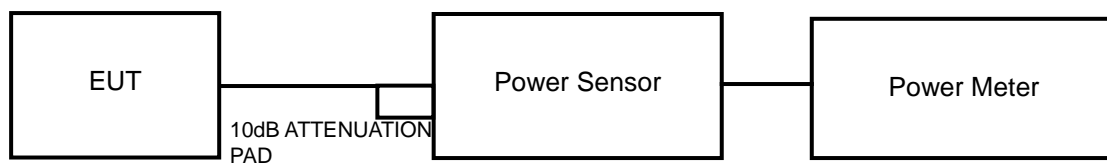


4.4 CONDUCTED OUTPUT POWER

4.4.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

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

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

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITIONS

Same as section 4.3.6.

4.4.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	104.95	20.21	30	PASS
6	2437	114.55	20.59	30	PASS
11	2462	113.50	20.55	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	141.91	21.52	30	PASS
6	2437	161.81	22.09	30	PASS
11	2462	161.44	22.08	30	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
1	2412	130.02	21.14	30	PASS
6	2437	148.94	21.73	30	PASS
11	2462	159.59	22.03	30	PASS

802.11n (40MHz)

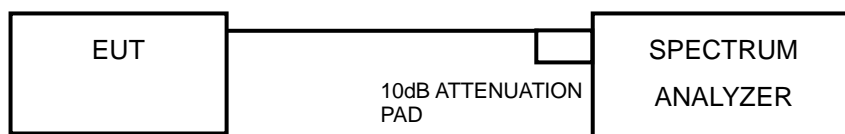
CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS / FAIL
3	2422	126.47	21.02	30	PASS
6	2437	138.68	21.42	30	PASS
9	2452	151.71	21.81	30	PASS

4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.1.2 to get information of above instrument.

4.5.4 TEST PROCEDURE

- 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 section 4.3.6.

4.5.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-5.98	8	PASS
6	2437	-7.25	8	PASS
11	2462	-6.19	8	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-14.69	8	PASS
6	2437	-14.26	8	PASS
11	2462	-15.11	8	PASS

802.11n (20MHz)

CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
1	2412	-14.90	8	PASS
6	2437	-14.33	8	PASS
11	2462	-14.78	8	PASS

802.11n (40MHz)

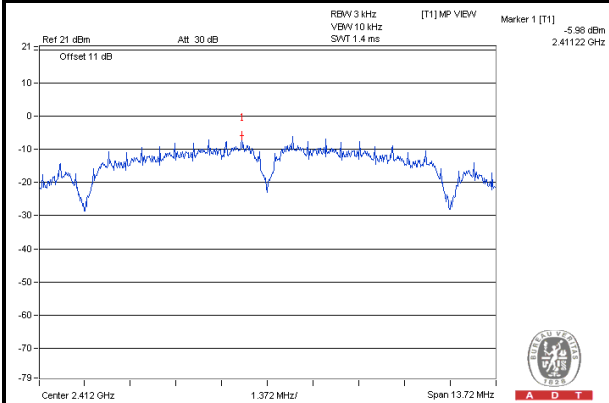
CHANNEL	FREQUENCY (MHz)	PSD (dBm/3kHz)	LIMIT (dBm/3kHz)	PASS / FAIL
3	2422	-17.29	8	PASS
6	2437	-17.04	8	PASS
9	2452	-17.06	8	PASS



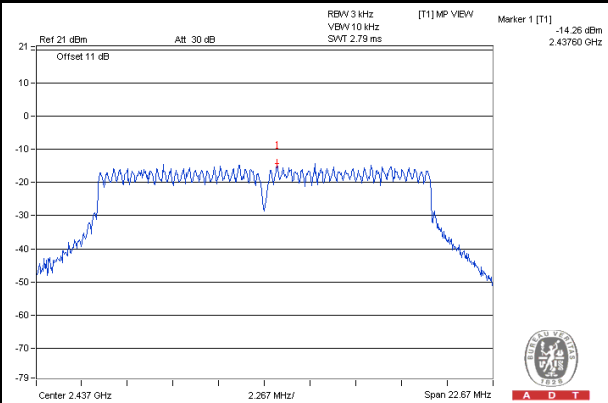
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SPECTRUM PLOT OF WORST VALUE

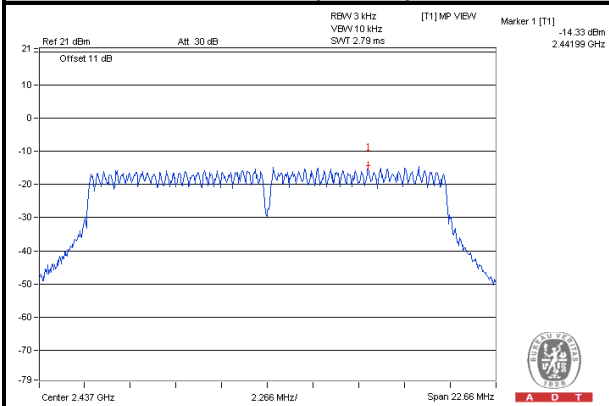
802.11b



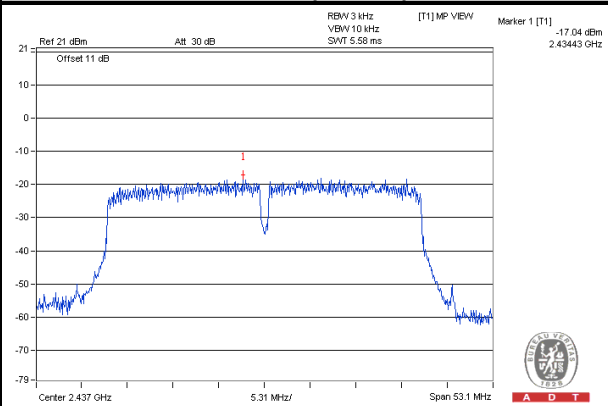
802.11g



802.11n (20MHz)



802.11n (40MHz)

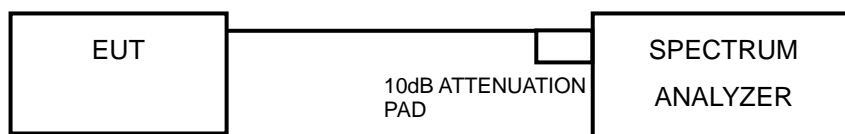


4.6 CONDUCTED OUT OF BAND EMISSION MEASUREMENT

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 $\geq 300\text{ kHz}$.
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 $\geq 300\text{ kHz}$.
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.

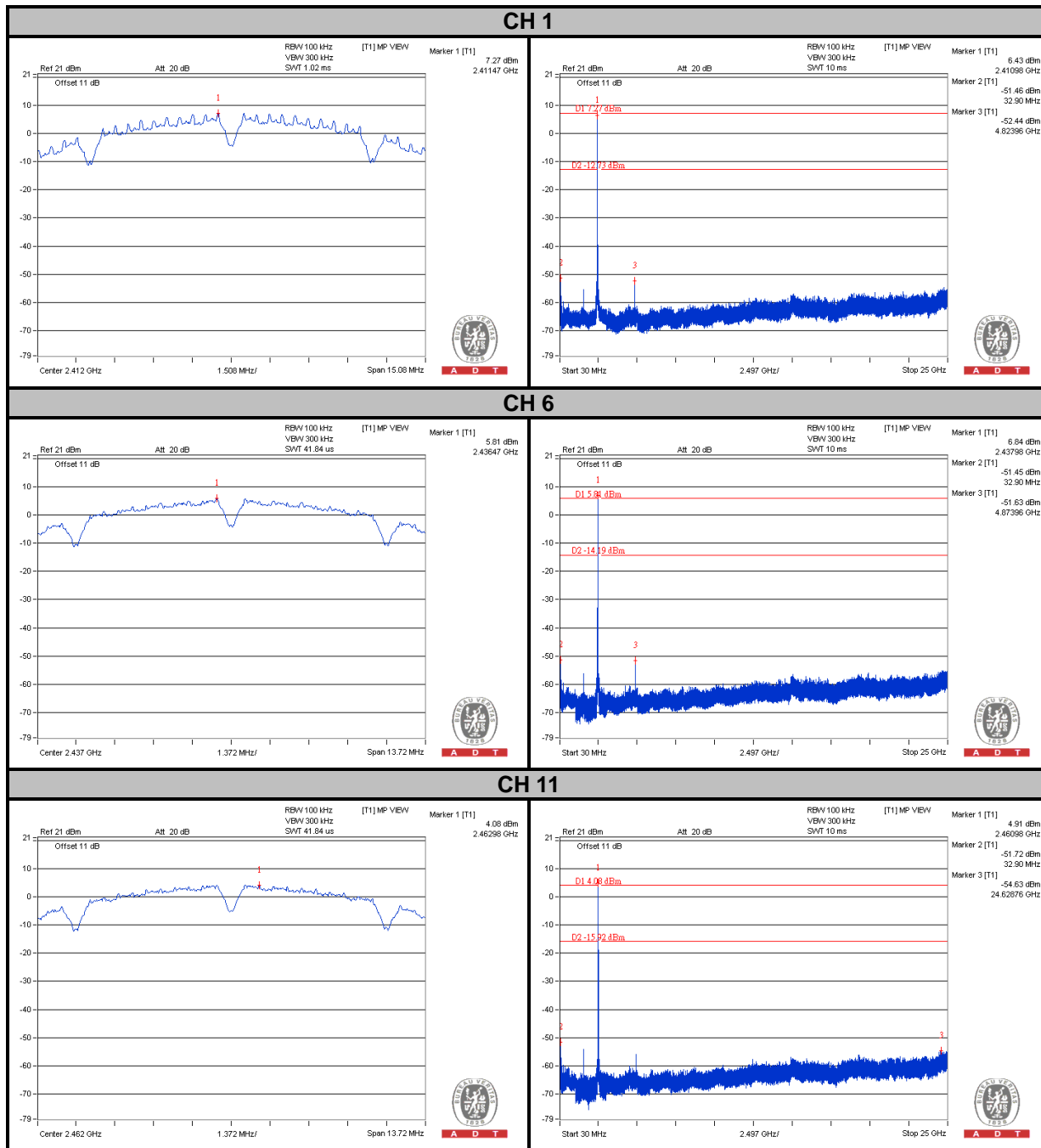
4.6.6 EUT OPERATING CONDITION

Same as section 4.3.6.

4.6.7 TEST RESULTS

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

802.11b

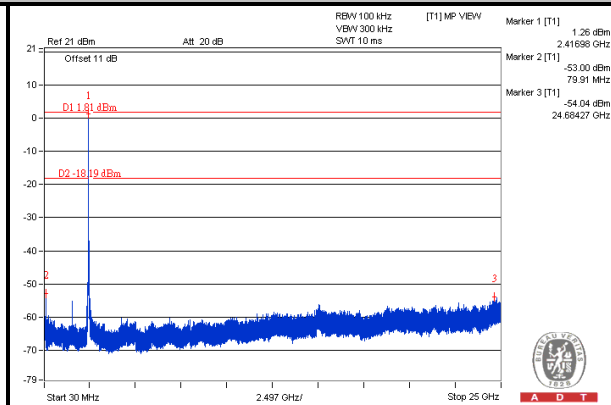
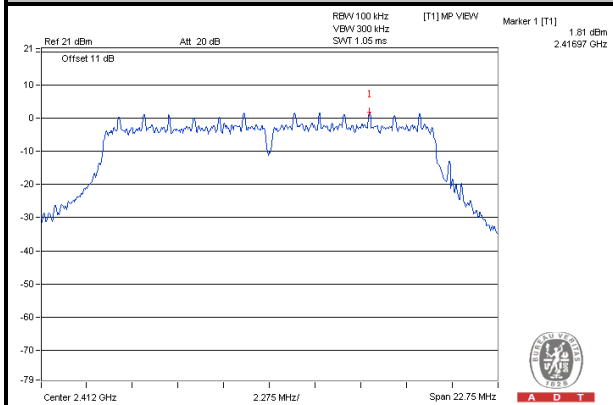




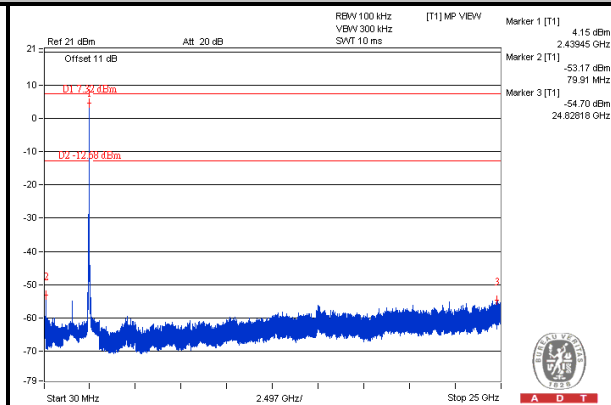
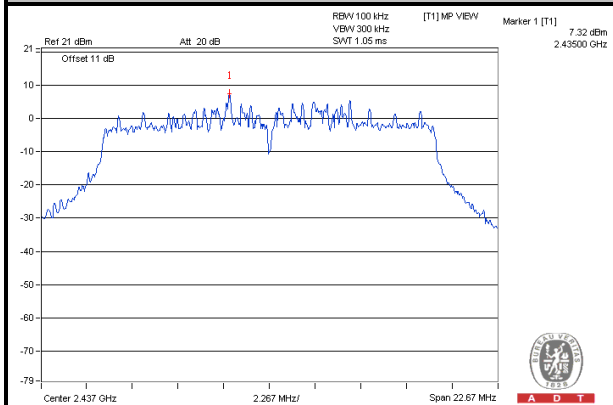
A D T

802.11g

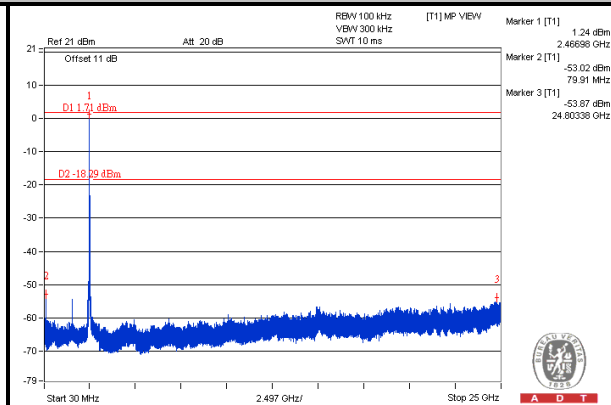
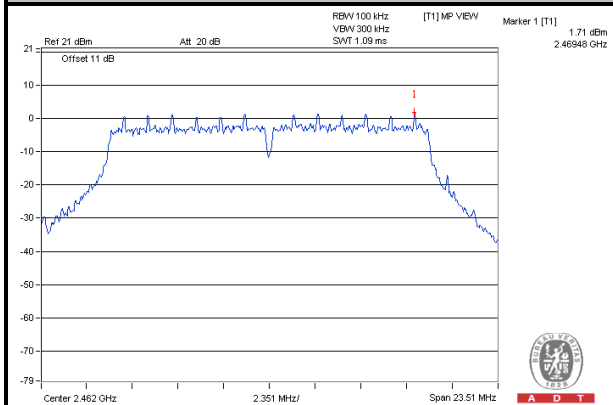
CH 1



CH 6



CH 11

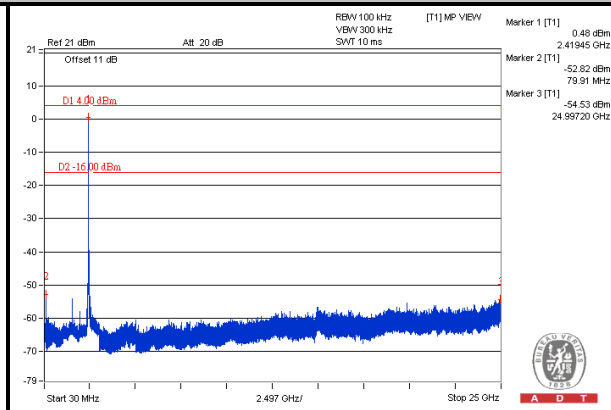
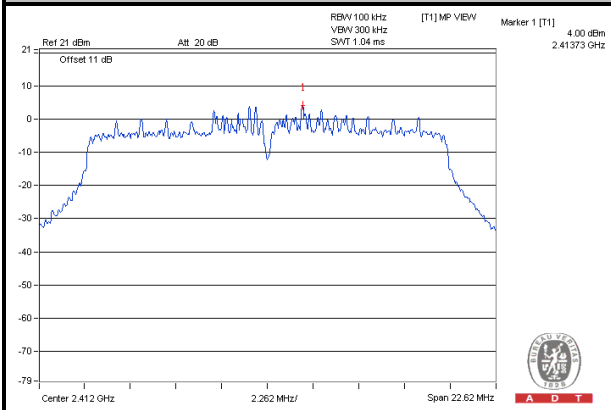




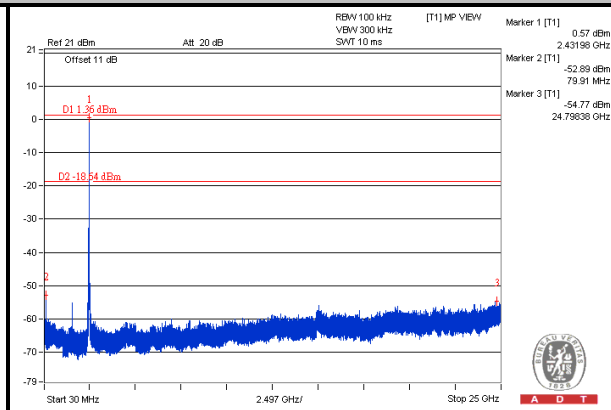
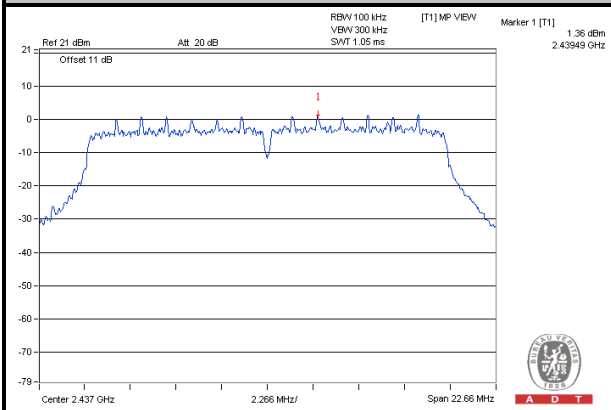
A D T

802.11n (20MHz)

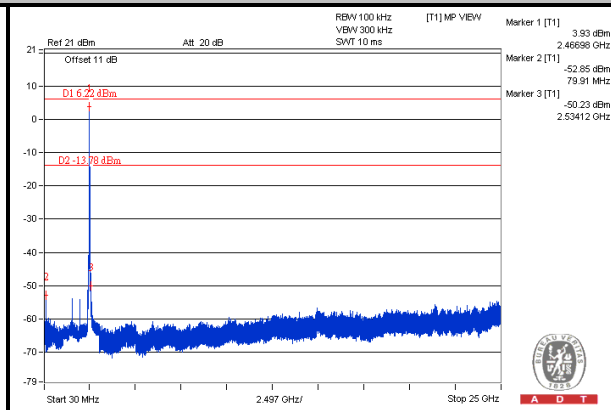
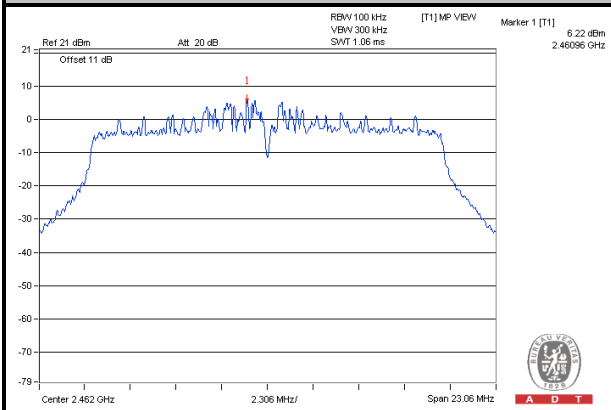
CH 1



CH 6



CH 11

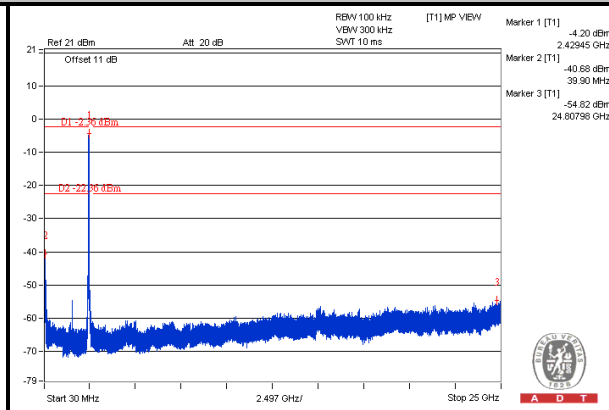
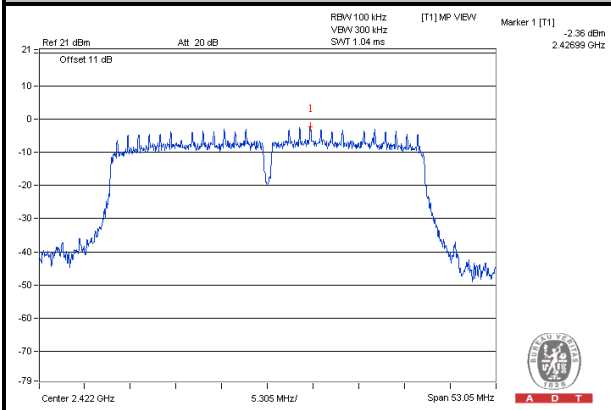




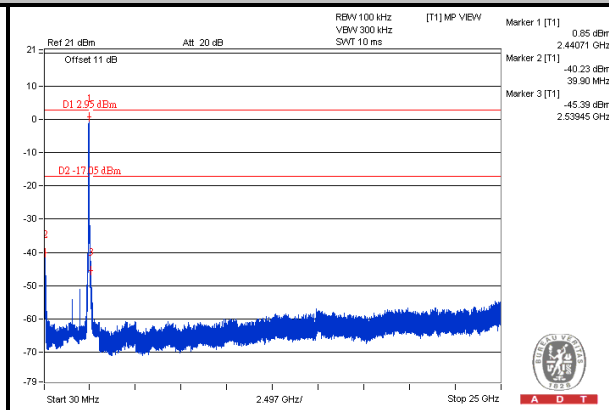
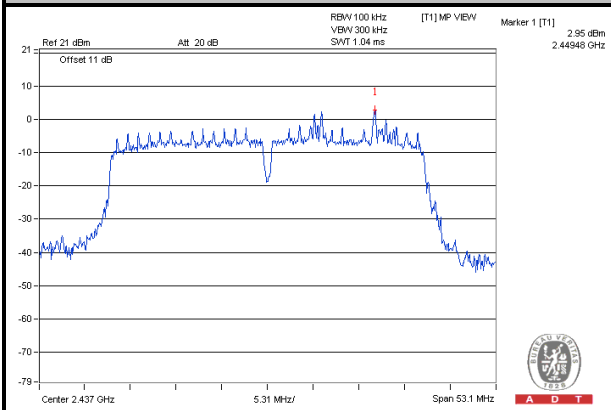
A D T

802.11n (40MHz)

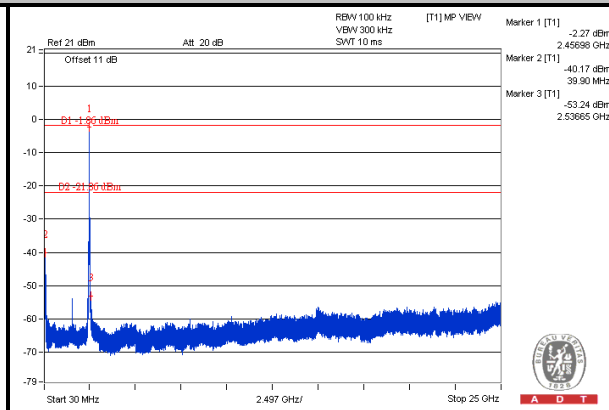
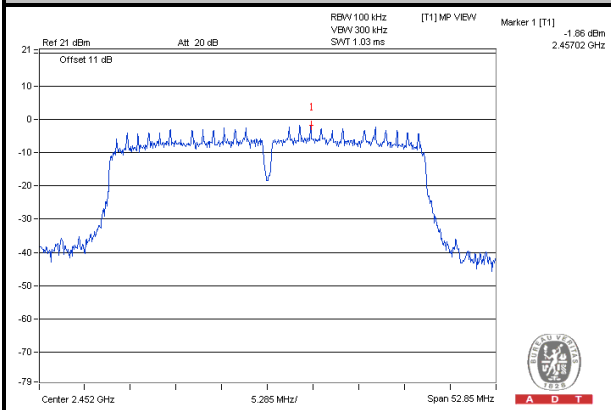
CH 3



CH 6



CH 9



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.



A D T

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

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

---END---