

FCC TEST REPORT (WLAN)

Report No.: RF160520W001-2

FCC ID: O57PB2650Y

Test Model: Lenovo PB2-650Y

Received Date: May 20, 2016

Test Date: May 21, 2016 ~ Jun. 13, 2016

Issued Date: Jun. 14, 2016

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF160520W001-2	Original release	Jun. 14, 2016

1 Certificate of Conformity

Product: Lenovo Mobile Phone

Brand: Lenovo

Test Model: Lenovo PB2-650Y

Sample Status: Identical Prototype

Applicant: Lenovo(Shanghai) Electronics Technology Co., Ltd.

Test Date: May 21, 2016 ~ Jun. 13, 2016

Standards: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10: 2013

The above equipment 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:** Jun. 14, 2016
Amyee Qian / Engineer

Approved by :  , **Date:** Jun. 14, 2016
William Chung / Manager

2 Summary of Test Results

FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is 12.37dB at 0.162000MHz.
15.205 & 15.209	Band Edge Emission Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -2.01dB at 2483.5MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	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	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	9kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	9KHZ ~ 30MHZ	2.74 dB
	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
Radiated Emissions above 1 GHz	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

Product	Lenovo Mobile Phone
Brand	Lenovo
Test Model	Lenovo PB2-650Y
Power Supply Rating	5.2Vdc (adapter or host equipment) 3.8Vdc (battery)
Modulation Technology	DSSS, OFDM
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: 11/ 5.5/ 2.0 / 1.0 Mbps 802.11g: 54/ 48/ 36 / 24 / 18 / 9/ 6 Mbps 802.11n: up to 135 Mbps
Operating Frequency	2412 ~ 2462MHz for 11b/g/n(HT20) 2422 ~ 2452MHz for 11b/g/n(HT40)
Number of Channel	11 for 802.11b, 802.11g, 802.11n(20MHz) 7 for 802.11n(40MHz)
Output Power	102.802mW
Antenna Type	PIFA Antenna with -4.5dBi gain
Accessory Device	Refer to note as below
Data Cable Supplied	USB cable: non-shielded, detachable, 1.0m

Note:

1. 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.
2. There were Sample A and Sample B for this project, the difference is as below:

SAMPLE	EUT CONFIGURATION INFORMATION
A	LCD panel +TP1+Front camera 1+back camera 1+eMMC 1/ eMMC 2+speaker 1+receiver 1+vibrator 1+battery 1
B	LCD panel +TP2+Front camera 2+back camera 2+eMMC 3/ eMMC 4+speaker 2+receiver 2+vibrator 2+battery 2

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

LIST OF ACCESSORIES:

ACCESSORIES	BRAND	MANUFACTURER	MODEL	SPECIFICATION
AC Adapter 1	Lenovo	Acbel	C-P35	I/P:100-240Vac, 500mA O/P:5.2Vdc, 2000mA
AC Adapter 2	Lenovo	Huntkey	C-P35	I/P:100-240Vac, 500mA O/P:5.2Vdc, 2000mA
Battery 1	Lenovo	SCUD	L16D1P31	Rating: 3.8Vdc, 4050mAh
Battery 2	Lenovo	SUNWODA	L16D1P32	Rating: 3.8Vdc, 4050mAh
USB Cable 1	LIQI	--	LQ-025254	1.0m non-shielded cable w/o core
USB Cable 2	STARW	--	XJ-007046-1	1.0m non-shielded cable w/o core
LCD Panel+TP1	Tianma	--	TM065JVSP03-00IPS gold MIPI	--
LCD Panel+TP2	GIS	--	TC064GFL01 IPS Black MIPI	--
Front Camera 1	O-Film	--	L5693F20	--
Front Camera 2	Q Technology Limited	--	F5693AQ	--
Back Camera 1	Q Technology Limited	--	F3M2YBX	--
Back Camera 2	Sunny Opotech	--	F13S05Y	--
eMMC 1	SAMSUNG	--	KMRX1000BM-B614	32G
eMMC2	Samsung	--	KMQE10013M-B318	16G
eMMC 3	Hynix	--	H9TQ26ADFTACUR-KUM	32G
eMMC 4	Hynix	--	H9TQ17ABJTACUR-KUM	16G
Speaker 1	Haosheng	--	P9898_SPK_BOX_ASM	--
Speaker 2	Midi	--	P9898_SPK_BOX_ASM_MD	--
receiver 1	Xichun	--	KFR1506G2.8-32-HV	--
receiver 2	Midi	--	MIDRC1506M2.8	--
vibrator 1	Hongzhifa	--	HZF1027A-P02L9	--
vibrator 2	AWA SEIMITSU	--	LC-B68L	--

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

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 (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement
 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**.

NOTE: "-" means no effect.

Radiated Emission Test (Above 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Radiated Emission Test (Below 1GHz):

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11n (20MHz)	1 to 11	6	OFDM	BPSK	7.2

Power Line Conducted Emission Test:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 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 (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 65%RH	120Vac, 60Hz	Alex Chen
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Alex Chen
PLC	25deg. C, 68%RH	120Vac, 60Hz	Yuqiang Yin
APCM	21deg. C, 60%RH	120Vac, 60Hz	Wenliang Wu

3.3 Duty Cycle of Test Signal

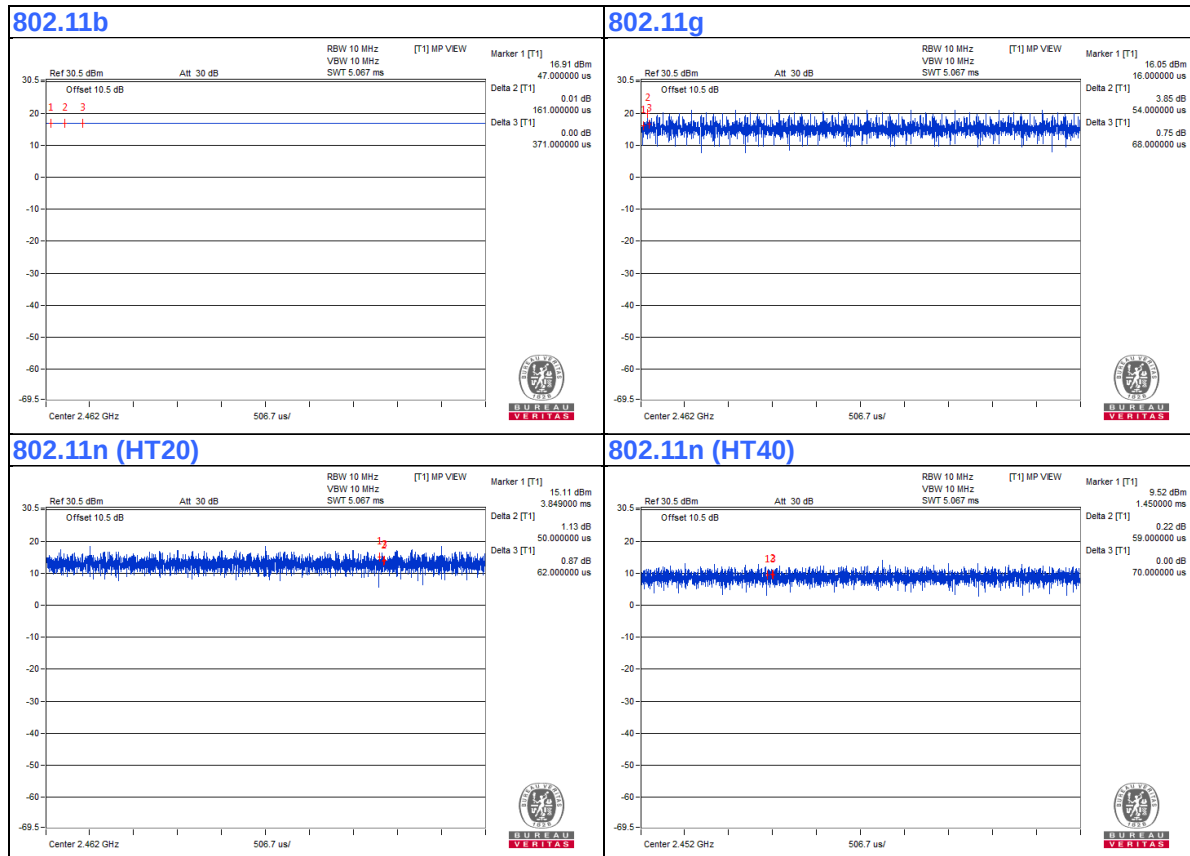
WIFI 2.4GHz

802.11b: Duty cycle = $0.161/0.371 = 0.434 < 98\%$, Duty factor = $10 * \log(1/0.434) = 3.625$

802.11g: Duty cycle = $0.054/0.068 = 0.794 < 98\%$, Duty factor = $10 * \log(1/0.794) = 1.002$

802.11n (HT20): Duty cycle = $0.050/0.062 = 0.806 < 98\%$, Duty factor = $10 * \log(1/0.806) = 0.937$

802.11n (HT40): Duty cycle = $0.059/0.070 = 0.843 < 98\%$, Duty factor = $10 * \log(1/0.843) = 0.742$



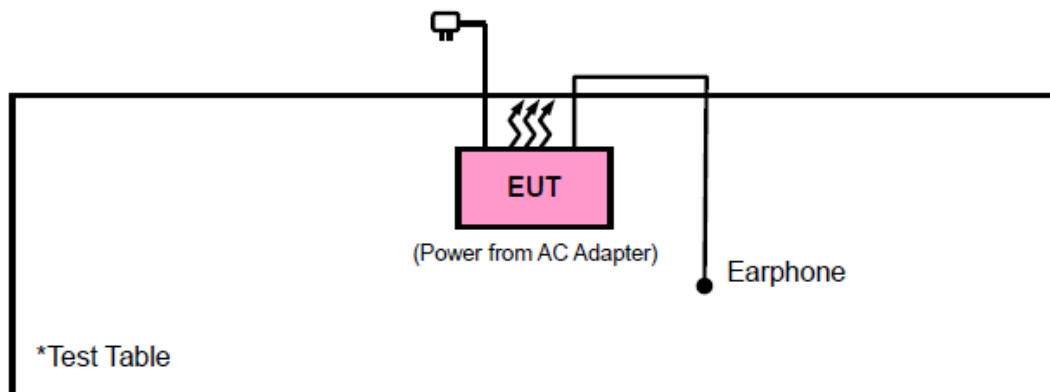
3.4 Description of Support Units

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	DC source	LONG WEI	PS-6403D	010934269	N/A
2	PC	HP	A6608CN	3CR83825X3	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m
2	AC Line: Unshielded, Detachable 1.5m

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v03r05

ANSI C63.10-2013

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 (Verification). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

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

4.1.2 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101494	Apr. 05,16	Apr. 04,17
Bilog Antenna	Teseq	CBL 6111D	30643	Jul. 16, 15	Jul. 15, 16
Loop Antenna	Daze	ZN30900A	0708	Dec. 30, 15	Dec. 29, 16
Horn Antenna (1GHz -18GHz)	ETS -Lindgren	3117	00062558	May 30, 14	May 29, 17
Amplifier	Burgeon	BPA-530	100220	Apr. 05,16	Apr. 04,17
Pre-Amplifier (18GHz-40GHz)	EMCI	EMC 184045	980102	Nov. 20,15	Nov. 19,17
Pre-Amplifier	HP	8449B	3008A00409	Apr. 25,15	Apr. 24,17
GPS Generator+ Antenna	TOJOIN	GNSS-5000A	E1-010119	Aug. 08, 14	Aug. 07, 16
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Mar. 12,16	Mar. 11,18
Test Software	ADT	ADT_Radiated V7.6.15.9.2	N/A	N/A	N/A

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 4.

4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

5. The FCC Site Registration No. is 460141.

6. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

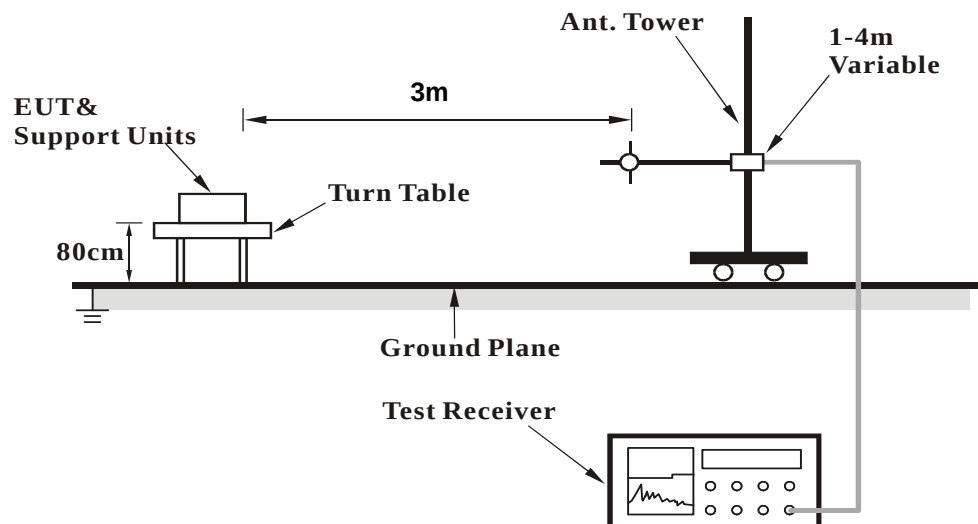
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ($10 \log(1/\text{duty cycle})$).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

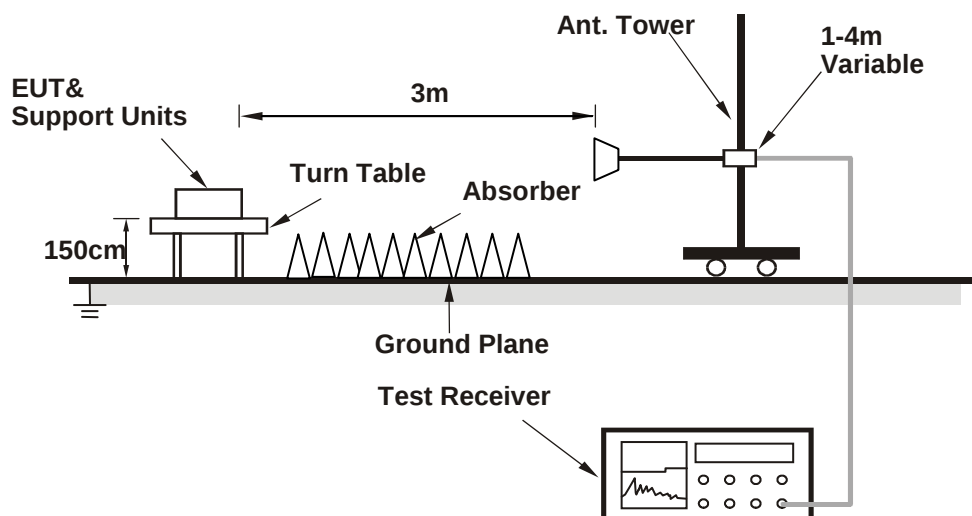
No deviation.

4.1.5 Test Set Up

<Frequency Range below 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

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

4.1.7 Test Results

BELOW 1GHz WORST-CASE DATA:

9 KHz – 30 MHz data: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

30 MHz – 1GHz data:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

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
89.17	14.98	43.70	43.50	-28.52	6.88	1.45	37.05	101	300	QP
154.16	20.13	45.38	43.50	-23.37	9.62	1.90	36.77	101	300	QP
195.87	27.74	52.10	43.50	-15.76	10.06	2.15	36.57	101	360	QP
399.57	16.10	32.49	46.00	-29.90	17.18	3.15	36.72	101	360	QP
619.76	20.60	32.96	46.00	-25.40	20.85	4.06	37.27	101	120	QP
798.24	24.38	34.33	46.00	-21.62	23.00	4.67	37.62	101	120	QP
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
32.91	31.20	52.81	40.00	-8.80	15.09	0.84	37.54	101	100	QP
46.49	25.25	53.84	40.00	-14.75	7.80	1.03	37.42	101	100	QP
84.32	17.40	46.36	40.00	-22.60	6.73	1.41	37.10	101	100	QP
192.96	21.02	45.45	43.50	-22.48	10.03	2.13	36.59	101	180	QP
363.68	14.16	32.14	46.00	-31.84	15.67	2.99	36.64	101	150	QP
595.51	20.35	33.39	46.00	-25.65	20.21	3.99	37.24	101	150	QP

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.

ABOVE 1GHz WORST-CASE 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										
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	33.24	41.11	54.00	-20.76	32.29	8.15	48.31	120	200	Average
2390	43.40	51.27	74.00	-30.60	32.29	8.15	48.31	120	200	Peak
2412	94.53	102.34			32.31	8.19	48.31	120	220	Average
2412	97.27	105.08			32.31	8.19	48.31	120	220	Peak
2489.7	34.05	41.63	54.00	-19.95	32.39	8.33	48.30	120	120	Average
2489.7	45.85	53.43	74.00	-28.15	32.39	8.33	48.30	120	120	Peak
4824	51.67	53.64	54.00	-2.33	34.30	12.63	48.90	120	150	Average
4824	55.21	57.18	74.00	-18.79	34.30	12.63	48.90	120	150	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	33.85	41.72	54.00	-20.15	32.29	8.15	48.31	100	120	Average
2390	45.44	53.31	74.00	-28.56	32.29	8.15	48.31	100	125	Peak
2412	98.62	106.43			32.31	8.19	48.31	100	125	Average
2412	101.23	109.04			32.31	8.19	48.31	100	110	Peak
2493.8	35.86	43.43	54.00	-18.14	32.39	8.34	48.30	100	110	Average
2493.8	47.39	54.96	74.00	-26.61	32.39	8.34	48.30	100	120	Peak
4824	51.12	53.09	54.00	-2.88	34.30	12.63	48.90	100	120	Average
4824	54.05	56.02	74.00	-19.95	34.30	12.63	48.90	100	120	Peak

REMARKS:

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

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

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	33.55	41.42	54.00	-20.45	32.29	8.15	48.31	120	222	Average
2390	42.32	50.19	74.00	-31.68	32.29	8.15	48.31	120	222	Peak
2437	92.36	100.09			32.34	8.24	48.31	120	222	Average
2437	94.64	102.37			32.34	8.24	48.31	120	222	Peak
2491.7	34.61	42.18	54.00	-19.39	32.39	8.34	48.30	120	222	Average
2491.7	46.91	54.48	74.00	-27.09	32.39	8.34	48.30	120	222	Peak
4874	51.39	53.20	54.00	-2.61	34.30	12.81	48.92	100	305	Average
4874	55.07	56.88	74.00	-18.93	34.30	12.81	48.92	100	305	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	32.88	40.75	54.00	-21.12	32.29	8.15	48.31	100	125	Average
2390	43.17	51.04	74.00	-30.83	32.29	8.15	48.31	100	125	Peak
2437	98.65	106.38			32.34	8.24	48.31	100	120	Average
2437	101.36	109.09			32.34	8.24	48.31	100	120	Peak
2484.6	38.36	45.96	54.00	-15.64	32.38	8.32	48.30	100	128	Average
2484.6	49.10	56.70	74.00	-24.90	32.38	8.32	48.30	100	128	Peak
4874	51.58	53.39	54.00	-2.42	34.30	12.81	48.92	100	128	Average
4874	55.47	57.28	74.00	-18.53	34.30	12.81	48.92	100	128	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	33.47	41.34	54.00	-20.53	32.29	8.15	48.31	100	225	Average
2390	44.09	51.96	74.00	-29.91	32.29	8.15	48.31	100	225	Peak
2462	93.40	101.06			32.36	8.28	48.30	100	225	Average
2462	95.98	103.64			32.36	8.28	48.30	100	225	Peak
2486.8	34.10	41.68	54.00	-19.90	32.39	8.33	48.30	100	225	Average
2486.8	46.01	53.59	74.00	-27.99	32.39	8.33	48.30	100	225	Peak
4924	48.41	50.05	54.00	-5.59	34.30	13.00	48.94	100	312	Average
4924	53.55	55.19	74.00	-20.45	34.30	13.00	48.94	100	312	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	32.86	40.73	54.00	-21.14	32.29	8.15	48.31	100	128	Average
2390	42.52	50.39	74.00	-31.48	32.29	8.15	48.31	100	128	Peak
2462	100.10	107.76			32.36	8.28	48.30	100	128	Average
2462	102.20	109.86			32.36	8.28	48.30	100	128	Peak
2483.5	39.75	47.35	54.00	-14.25	32.38	8.32	48.30	100	128	Average
2483.5	49.25	56.85	74.00	-24.75	32.38	8.32	48.30	100	128	Peak
4924	47.55	49.19	54.00	-6.45	34.30	13.00	48.94	100	248	Average
4924	53.35	54.99	74.00	-20.65	34.30	13.00	48.94	100	248	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2462MHz: Fundamental frequency.

802.11g

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

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	34.37	42.24	54.00	-19.63	32.29	8.15	48.31	100	210	Average
2390	44.41	52.28	74.00	-29.59	32.29	8.15	48.31	100	210	Peak
2412	88.55	96.36			32.31	8.19	48.31	100	218	Average
2412	96.07	103.88			32.31	8.19	48.31	100	218	Peak
2487.9	34.60	42.18	54.00	-19.40	32.39	8.33	48.30	100	218	Average
2487.9	46.93	54.51	74.00	-27.07	32.39	8.33	48.30	100	218	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	42.03	49.90	54.00	-11.97	32.29	8.15	48.31	100	118	Average
2390	58.82	66.69	74.00	-15.18	32.29	8.15	48.31	100	118	Peak
2412	94.43	102.24			32.31	8.19	48.31	100	122	Average
2412	102.10	109.91			32.31	8.19	48.31	100	122	Peak
2492	40.42	47.99	54.00	-13.58	32.39	8.34	48.30	100	122	Average
2492	50.20	57.77	74.00	-23.80	32.39	8.34	48.30	100	122	Peak

REMARKS:

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

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

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	33.50	41.37	54.00	-20.50	32.29	8.15	48.31	100	225	Average
2390	43.85	51.72	74.00	-30.15	32.29	8.15	48.31	100	225	Peak
2437	87.80	95.53			32.34	8.24	48.31	100	225	Average
2437	96.65	104.38			32.34	8.24	48.31	100	225	Peak
2493.5	35.55	43.12	54.00	-18.45	32.39	8.34	48.30	100	225	Average
2493.5	47.20	54.77	74.00	-26.80	32.39	8.34	48.30	100	225	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	33.48	41.35	54.00	-20.52	32.29	8.15	48.31	100	125	Average
2390	43.49	51.36	74.00	-30.51	32.29	8.15	48.31	100	125	Peak
2437	92.96	100.69			32.34	8.24	48.31	100	125	Average
2437	101.44	109.17			32.34	8.24	48.31	100	125	Peak
2493.1	42.30	49.87	54.00	-11.70	32.39	8.34	48.30	100	125	Average
2493.1	53.83	61.40	74.00	-20.17	32.39	8.34	48.30	100	125	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	33.47	41.34	54.00	-20.53	32.29	8.15	48.31	100	200	Average
2390	42.92	50.79	74.00	-31.08	32.29	8.15	48.31	100	200	Peak
2462	89.68	97.34			32.36	8.28	48.30	100	212	Average
2462	97.72	105.38			32.36	8.28	48.30	100	212	Peak
2485.2	34.64	42.23	54.00	-19.36	32.39	8.32	48.30	100	212	Average
2485.2	46.75	54.34	74.00	-27.25	32.39	8.32	48.30	100	212	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	33.18	41.05	54.00	-20.82	32.29	8.15	48.31	100	126	Average
2390	43.10	50.97	74.00	-30.90	32.29	8.15	48.31	100	126	Peak
2462	95.60	103.26			32.36	8.28	48.30	100	126	Average
2462	103.72	111.38			32.36	8.28	48.30	100	126	Peak
2483.5	43.88	51.48	54.00	-10.12	32.38	8.32	48.30	100	125	Average
2483.5	56.58	64.18	74.00	-17.42	32.38	8.32	48.30	100	120	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2462MHz: 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										
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	35.68	43.55	54.00	-18.32	32.29	8.15	48.31	125	220	Average
2390	45.61	53.48	74.00	-28.39	32.29	8.15	48.31	125	225	Peak
2412	88.16	95.97			32.31	8.19	48.31	125	235	Average
2412	96.20	104.01			32.31	8.19	48.31	125	235	Peak
2487.2	33.19	40.77	54.00	-20.81	32.39	8.33	48.30	125	235	Average
2487.2	45.02	52.60	74.00	-28.98	32.39	8.33	48.30	125	205	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	45.84	53.71	54.00	-8.16	32.29	8.15	48.31	100	100	Average
2390	63.02	70.89	74.00	-10.98	32.29	8.15	48.31	100	126	Peak
2412	93.39	101.20			32.31	8.19	48.31	100	130	Average
2412	101.27	109.08			32.31	8.19	48.31	100	130	Peak
2484.5	39.90	47.50	54.00	-14.10	32.38	8.32	48.30	100	130	Average
2484.5	51.58	59.18	74.00	-22.42	32.38	8.32	48.30	100	130	Peak

REMARKS:

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

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

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	33.68	41.55	54.00	-20.32	32.29	8.15	48.31	125	205	Average
2390	45.90	53.77	74.00	-28.10	32.29	8.15	48.31	125	238	Peak
2437	85.73	93.46			32.34	8.24	48.31	125	238	Average
2437	95.14	102.87			32.34	8.24	48.31	125	210	Peak
2483.5	34.21	41.81	54.00	-19.79	32.38	8.32	48.30	125	238	Average
2483.5	45.88	53.48	74.00	-28.12	32.38	8.32	48.30	125	230	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	33.56	41.43	54.00	-20.44	32.29	8.15	48.31	100	100	Average
2390	44.43	52.30	74.00	-29.57	32.29	8.15	48.31	100	100	Peak
2437	92.34	100.07			32.34	8.24	48.31	100	123	Average
2437	100.32	108.05			32.34	8.24	48.31	100	123	Peak
2484.2	41.04	48.64	54.00	-12.96	32.38	8.32	48.30	100	123	Average
2484.2	53.05	60.65	74.00	-20.95	32.38	8.32	48.30	100	123	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2437MHz: Fundamental frequency.

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	33.48	41.35	54.00	-20.52	32.29	8.15	48.31	150	130	Average
2390	43.25	51.12	74.00	-30.75	32.29	8.15	48.31	150	130	Peak
2462	88.47	96.13			32.36	8.28	48.30	150	110	Average
2462	96.65	104.31			32.36	8.28	48.30	150	105	Peak
2483.5	40.39	47.99	54.00	-13.61	32.38	8.32	48.30	150	110	Average
2483.5	54.95	62.55	74.00	-19.05	32.38	8.32	48.30	150	100	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	33.26	41.13	54.00	-20.74	32.29	8.15	48.31	100	120	Average
2390	45.13	53.00	74.00	-28.87	32.29	8.15	48.31	100	120	Peak
2462	93.39	101.05			32.36	8.28	48.30	100	120	Average
2462	101.66	109.32			32.36	8.28	48.30	100	120	Peak
2483.5	48.04	55.64	54.00	-5.96	32.38	8.32	48.30	100	126	Average
2483.5	63.39	70.99	74.00	-10.61	32.38	8.32	48.30	100	130	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2462MHz: 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										
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	39.27	47.14	54.00	-14.73	32.29	8.15	48.31	150	132	2390
2390	51.71	59.58	74.00	-22.29	32.29	8.15	48.31	150	130	2390
2422	88.50	96.28			32.32	8.21	48.31	150	100	2422
2422	97.00	104.78			32.32	8.21	48.31	150	126	2422
2492.8	36.16	43.73	54.00	-17.84	32.39	8.34	48.30	150	140	2492.8
2492.8	47.95	55.52	74.00	-26.05	32.39	8.34	48.30	150	140	2492.8
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	50.49	58.36	54.00	-3.51	32.29	8.15	48.31	128	125	Average
2390	64.61	72.48	74.00	-9.39	32.29	8.15	48.31	128	125	Peak
2422	92.47	100.25			32.32	8.21	48.31	128	125	Average
2422	100.75	108.53			32.32	8.21	48.31	128	125	Peak
2483.5	39.12	46.72	54.00	-14.88	32.38	8.32	48.30	128	100	Average
2483.5	49.82	57.42	74.00	-24.18	32.38	8.32	48.30	128	100	Peak

REMARKS:

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

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

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	38.87	46.74	54.00	-15.13	32.29	8.15	48.31	150	100	Average
2390	52.22	60.09	74.00	-21.78	32.29	8.15	48.31	150	100	Peak
2437	86.96	94.69			32.34	8.24	48.31	150	132	Average
2437	95.26	102.99			32.34	8.24	48.31	150	132	Peak
2483.5	41.65	49.25	54.00	-12.35	32.38	8.32	48.30	150	150	Average
2483.5	53.69	61.29	74.00	-20.31	32.38	8.32	48.30	150	150	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	47.92	55.79	54.00	-6.08	32.29	8.15	48.31	100	126	Average
2390	62.23	70.10	74.00	-11.77	32.29	8.15	48.31	100	126	Peak
2437	90.36	98.09			32.34	8.24	48.31	100	126	Average
2437	98.98	106.71			32.34	8.24	48.31	100	126	Peak
2483.6	50.10	57.70	54.00	-3.90	32.38	8.32	48.30	100	131	Average
2483.6	63.66	71.26	74.00	-10.34	32.38	8.32	48.30	100	131	Peak

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

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	33.59	41.46	54.00	-20.41	32.29	8.15	48.31	150	130	Average
2390	43.47	51.34	74.00	-30.53	32.29	8.15	48.31	150	130	Peak
2452	86.38	94.07			32.35	8.26	48.30	150	180	Average
2452	94.56	102.25			32.35	8.26	48.30	150	150	Peak
2484.1	42.44	50.04	54.00	-11.56	32.38	8.32	48.30	150	124	Average
2484.1	54.10	61.70	74.00	-19.90	32.38	8.32	48.30	150	103	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	33.49	41.36	54.00	-20.51	32.29	8.15	48.31	100	125	Average
2390	42.72	50.59	74.00	-31.28	32.29	8.15	48.31	100	125	Peak
2452	93.09	100.78			32.35	8.26	48.30	100	100	Average
2452	101.20	108.89			32.35	8.26	48.30	100	100	Peak
2483.5	51.99	59.59	54.00	-2.01	32.38	8.32	48.30	100	220	Average
2483.5	64.10	71.70	74.00	-9.90	32.38	8.32	48.30	100	231	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 2452MHz: Fundamental frequency.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	100340	May 11,15	May 10,17
Artificial Mains Network	Rohde&Schwarz	ENV216	101173	Mar. 04,16	Mar. 03,17
Artificial Mains Network	Rohde&Schwarz	ESH3-Z5	100317	Apr. 05,16	Apr. 04,17
Voltage probe	SCHWARZBECK	TK 9421	TK 9421-176	Jan. 08,16	Jan. 07,17
Test software	ADT	ADT_Cond_V7.3.7	N/A	N/A	N/A

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

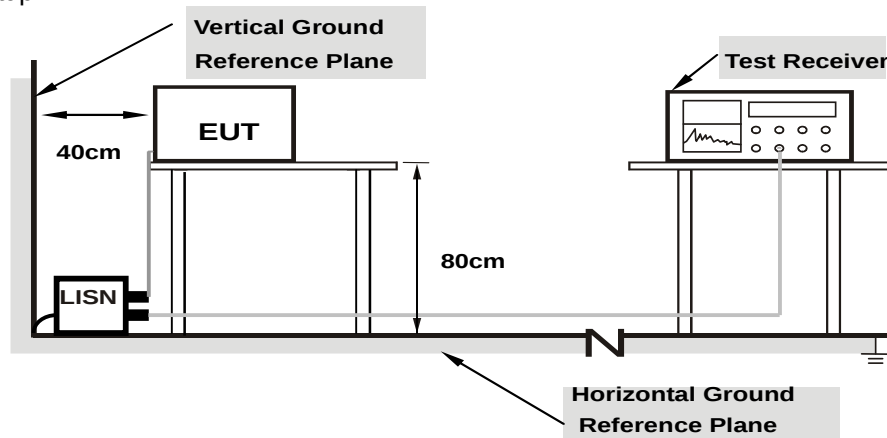
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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.

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.

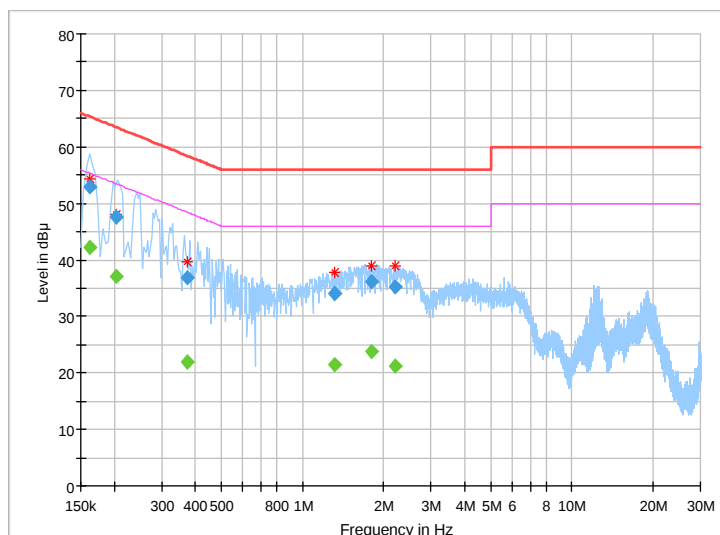
4.2.7 Test Results

TEST VOLTAGE	DC 5.2V From Adapter Input 230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 55RH	TESTED BY	Eric

Frequency (MHz)	QuasiPeak (dB μ V)	CAverage (dB μ V)	Limit (dB μ V)	Margin (dB)	Line	Filter	Corr. (dB)
0.162000	---	42.30	55.36	13.06	L	ON	9.6
0.162000	52.99	---	65.36	12.37	L	ON	9.6
0.204000	---	37.13	53.45	16.32	L	ON	9.7
0.204000	47.48	---	63.45	15.97	L	ON	9.7
0.372000	---	21.87	48.46	26.59	L	ON	9.7
0.372000	36.81	---	58.46	21.65	L	ON	9.7
1.314000	---	21.35	46.00	24.65	L	ON	9.7
1.314000	34.09	---	56.00	21.91	L	ON	9.7
1.804000	---	23.89	46.00	22.11	L	ON	9.7
1.804000	36.22	---	56.00	19.78	L	ON	9.7
2.208000	---	21.12	46.00	24.88	L	ON	9.7
2.208000	35.22	---	56.00	20.78	L	ON	9.7

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

Full Spectrum

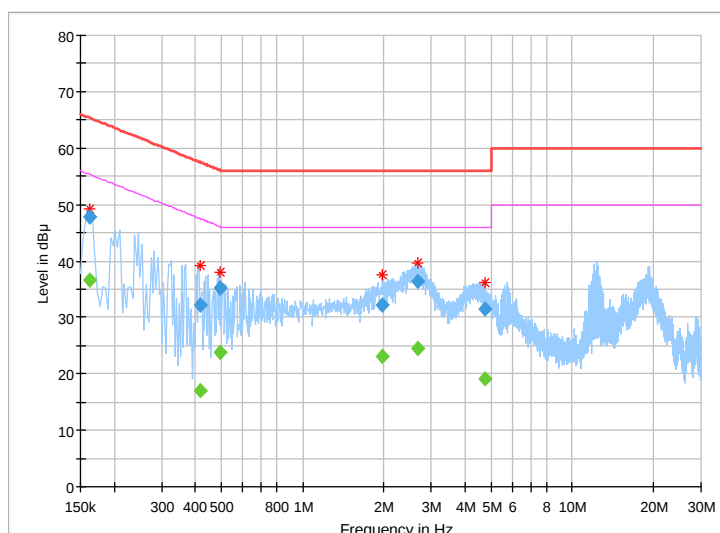


TEST VOLTAGE	DC 5.2V From Adapter Input 230 Vac, 50 Hz	6dB BANDWIDTH	9 kHz
ENVIRONMENTAL CONDITIONS	24deg. C, 55RH	TESTED BY	Eric

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.162000	---	36.58	55.36	18.78	N	ON	10.1
0.162000	47.71	---	65.36	17.65	N	ON	10.1
0.416000	---	16.96	47.53	30.57	N	ON	10.1
0.416000	32.29	---	57.53	25.24	N	ON	10.1
0.492000	---	23.68	46.13	22.45	N	ON	10.1
0.492000	35.26	---	56.13	20.87	N	ON	10.1
1.980000	---	23.20	46.00	22.80	N	ON	9.8
1.980000	32.24	---	56.00	23.76	N	ON	9.8
2.668000	---	24.49	46.00	21.51	N	ON	9.8
2.668000	36.34	---	56.00	19.66	N	ON	9.8
4.744000	---	19.06	46.00	26.94	N	ON	9.8
4.744000	31.53	---	56.00	24.47	N	ON	9.8

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

Full Spectrum

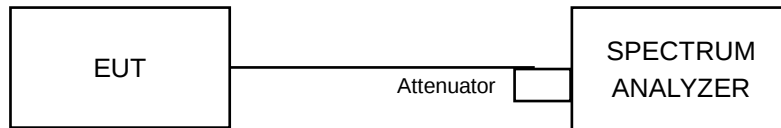


4.3 6dB Bandwidth Measurement

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

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Spectrum Analyzer (10Hz–40GHz)	Rohde&Schwarz	FSV40	101003	Apr. 05,16	Apr. 04,17
Power Meter	Anritsu	ML2495A	1139001	Feb.19,16	Feb. 18,17
Power Sensor	Anritsu	MA2411B	1126068	Feb.19,16	Feb. 18,17
Power Sensor	Keysight	U2021XA	MY55060016	May 27,15	May 26,17
Power Sensor	Keysight	U2021XA	MY55060018	May 27,15	May 26,17
Digital Multimeter	FLUKE	15B	A1220010DG	Oct. 12, 15	Oct.11, 16

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in RF Oven room.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	9.25	0.5	PASS
6	2437	9.13	0.5	PASS
11	2462	9.12	0.5	PASS

802.11g

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.09	0.5	PASS
6	2437	16.35	0.5	PASS
11	2462	16.35	0.5	PASS

802.11n (HT20)

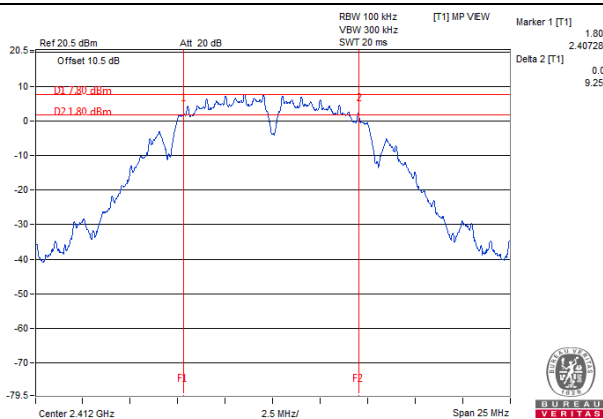
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.62	0.5	Pass
6	2437	17.80	0.5	Pass
11	2462	17.74	0.5	Pass

802.11n (HT40)

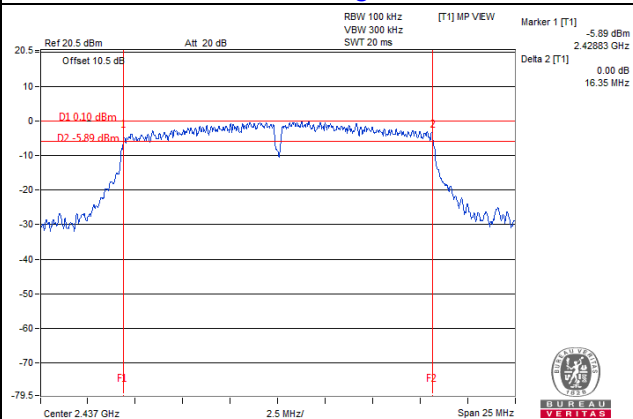
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.38	0.5	Pass
6	2437	36.44	0.5	Pass
9	2452	36.47	0.5	Pass

Spectrum Plot of Worst Value

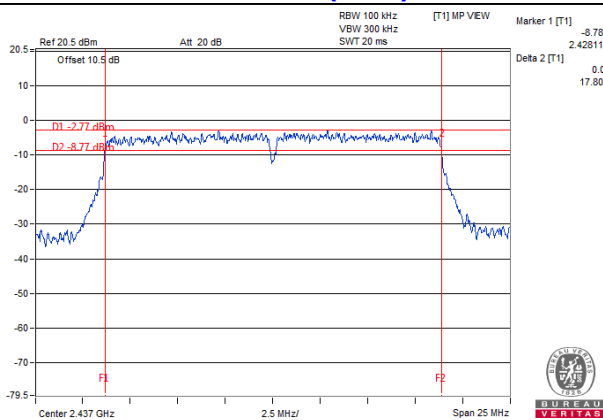
802.11b



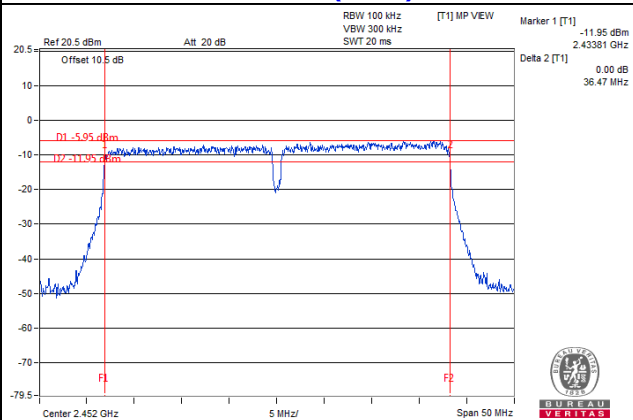
802.11g



802.11n (HT20)



802.11n (HT40)

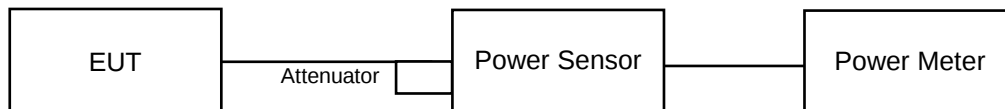


4.4 Conducted Output Power Measurement

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 4.3.3 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.7.1 Maximum Peak Output Power

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	17.29	53.580	1	PASS
6	2437	17.33	54.075	1	PASS
11	2462	17.13	51.642	1	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	19.74	94.189	1	PASS
6	2437	20.12	102.802	1	PASS
11	2462	19.60	91.201	1	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	18.46	70.146	1	PASS
6	2437	18.76	75.162	1	PASS
11	2462	18.23	66.527	1	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
3	2422	18.42	69.502	1	PASS
6	2437	18.89	77.446	1	PASS
9	2452	18.52	71.121	1	PASS

4.4.7.2 Average Output Power (For Reference)

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

802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	14.20	N/A
6	2437	14.26	N/A
11	2462	13.96	N/A

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	12.97	N/A
6	2437	13.26	N/A
11	2462	12.76	N/A

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	11.91	N/A
6	2437	12.03	N/A
11	2462	11.72	N/A

802.11n (40MHz)

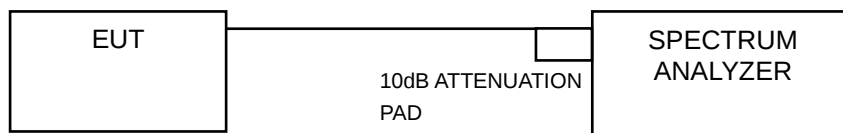
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
3	2422	11.86	N/A
6	2437	12.39	N/A
9	2452	12.00	N/A

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 4.3.3 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	Pass /Fail
1	2412	-10.55	8	Pass
6	2437	-15.20	8	Pass
11	2462	-14.82	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	Pass /Fail
1	2412	-14.15	8	Pass
6	2437	-13.67	8	Pass
11	2462	-14.37	8	Pass

802.11n (HT20)

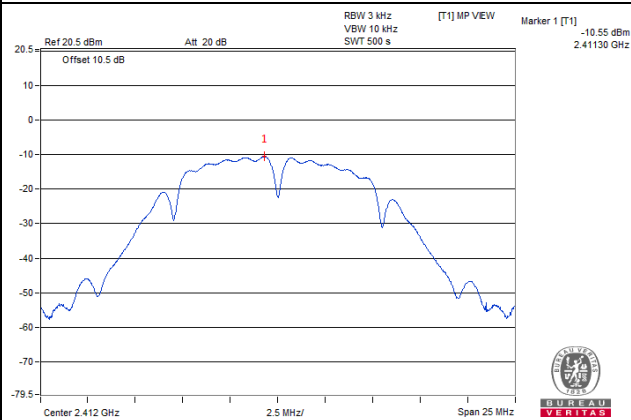
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	Pass /Fail
1	2412	-16.16	8	Pass
6	2437	-16.78	8	Pass
11	2462	-15.76	8	Pass

802.11n (HT40)

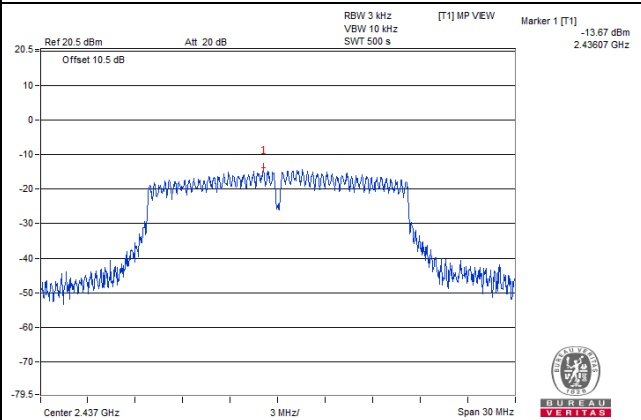
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	PASS /FAIL
3	2422	-18.14	8	PASS
6	2437	-18.06	8	PASS
9	2452	-18.46	8	PASS

Spectrum Plot of Worst Value

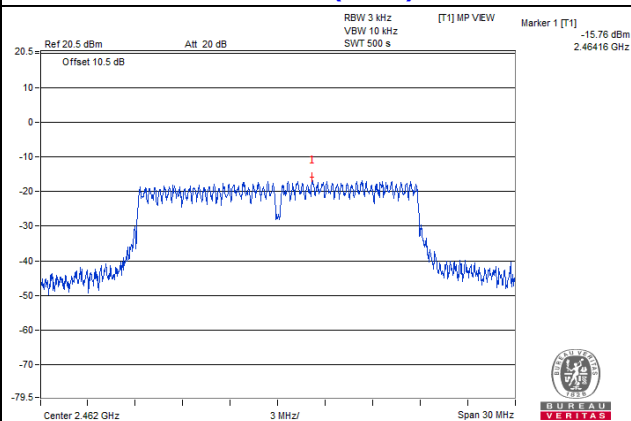
802.11b



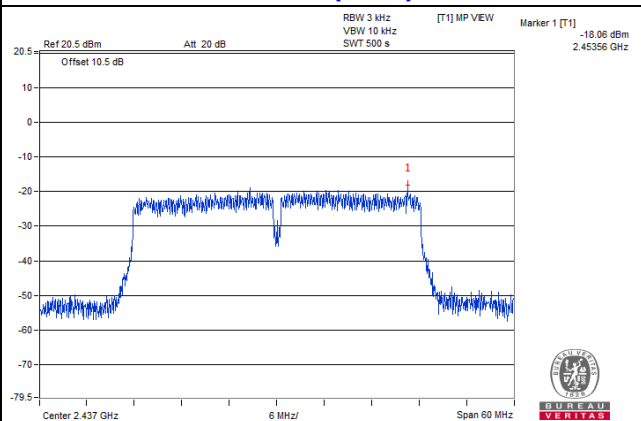
802.11g



802.11n (HT20)



802.11n (HT40)

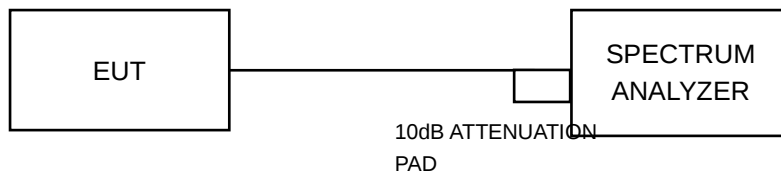


4.6 Conducted Out of Band Emission Measurement

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 4.3.3 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. 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.

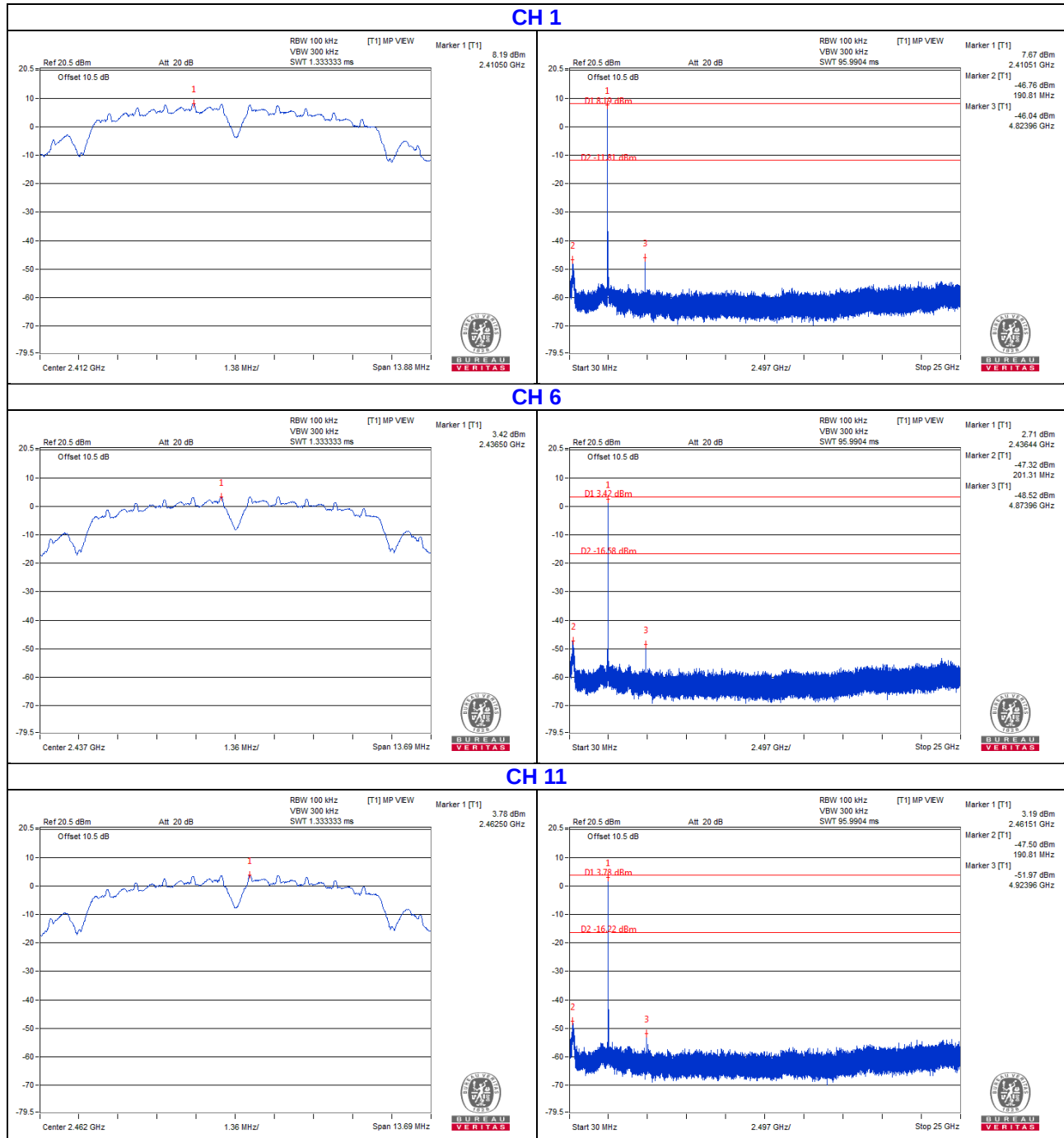
4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

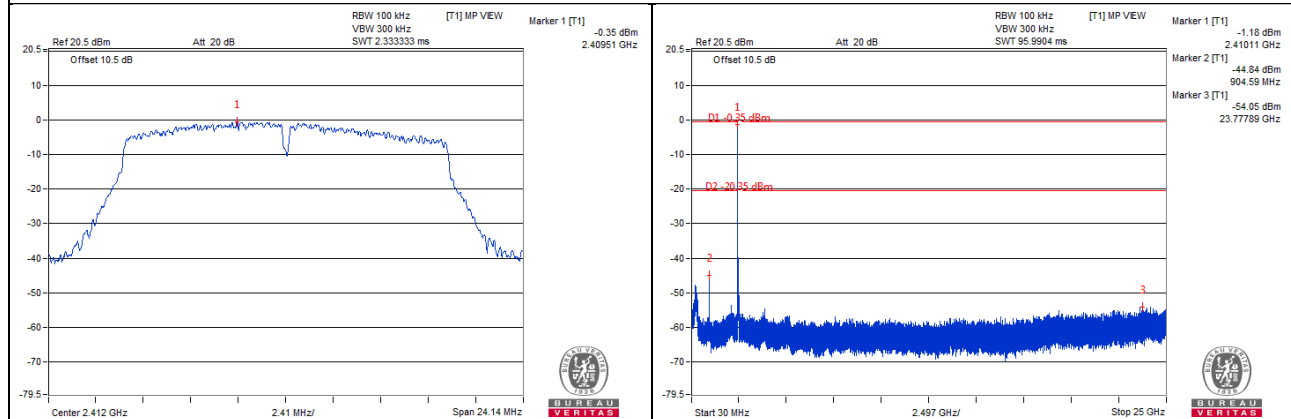
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

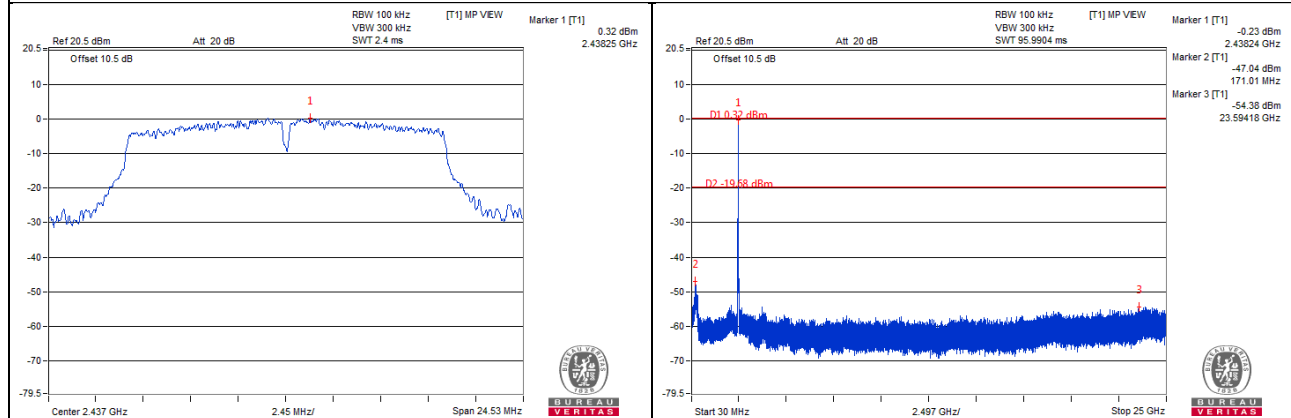


802.11g

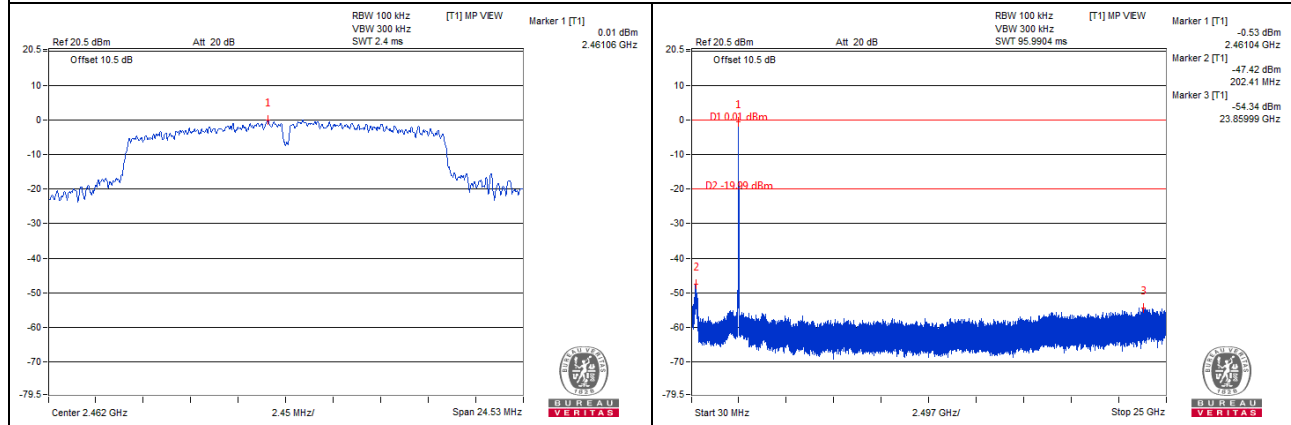
CH 1



CH 6

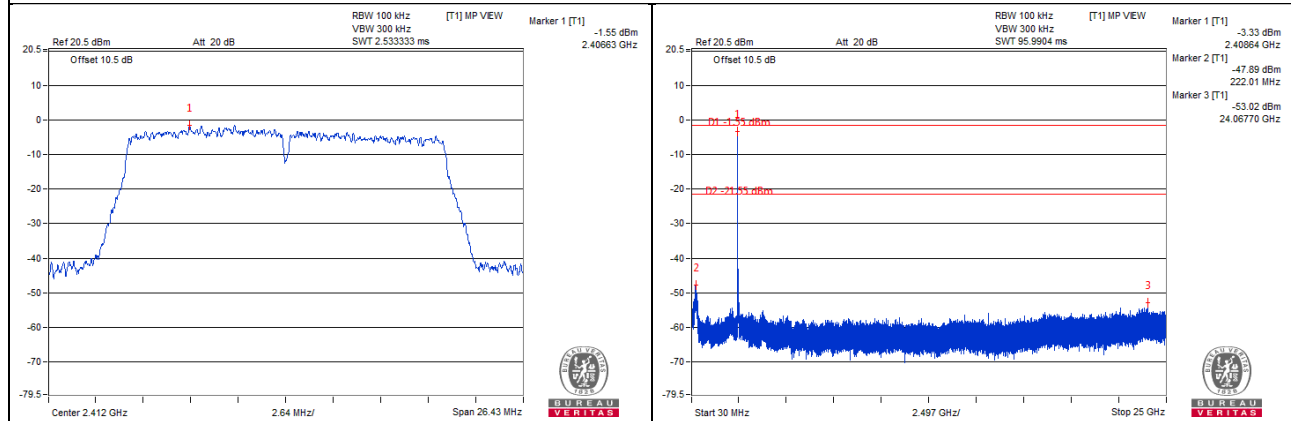


CH 11

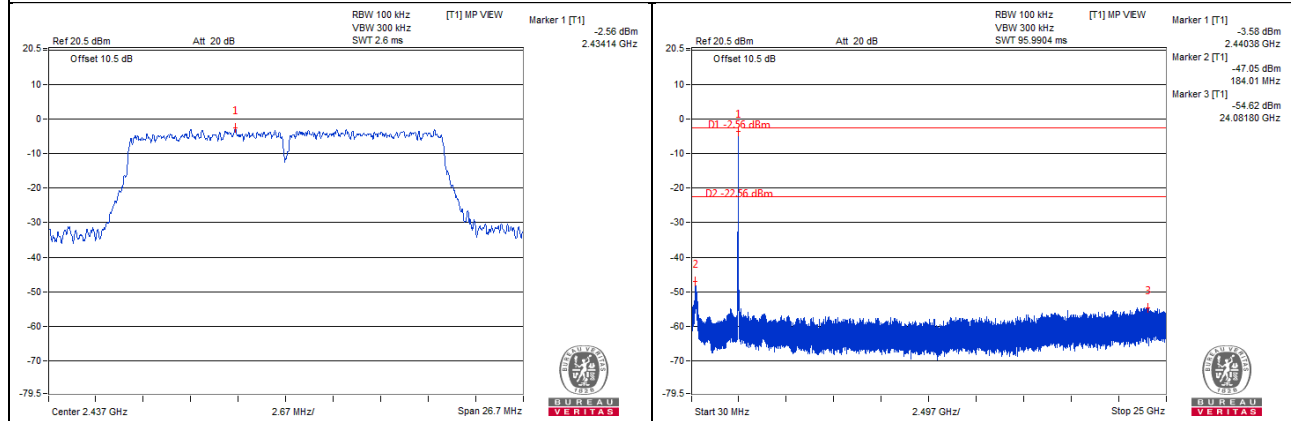


802.11n (HT20)

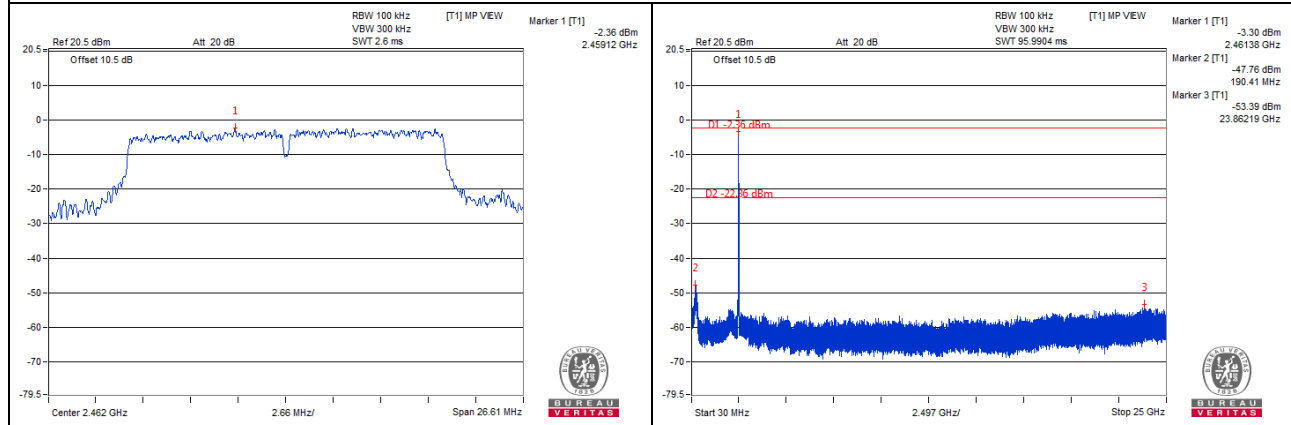
CH 1



CH 6

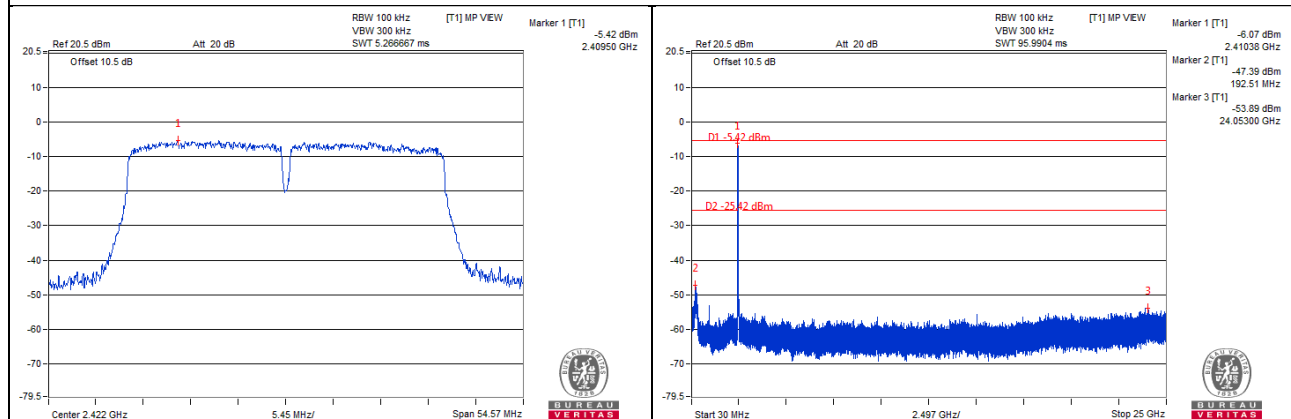


CH 11

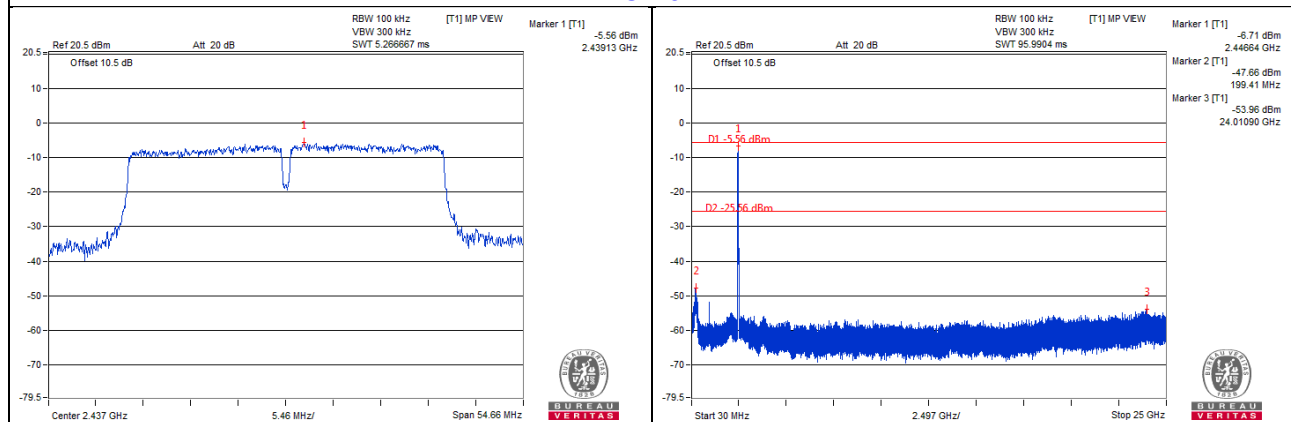


802.11n (HT40)

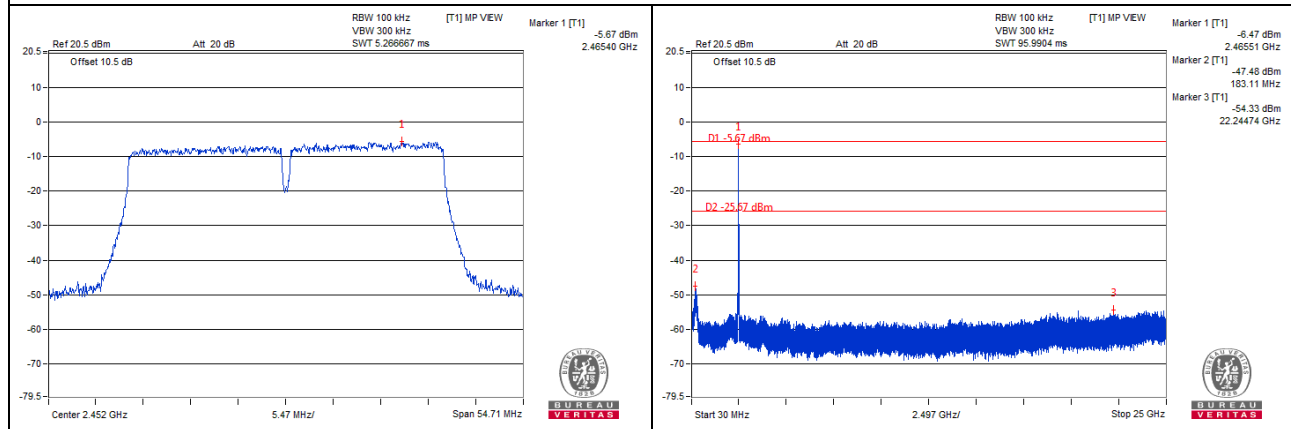
CH 3



CH 6



CH 9



5 Pictures of Test Arrangements

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

Appendix – 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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