

FCC TEST REPORT (WLAN)

Report No.: RF150723C09-2

FCC ID: O57PB1750M

Test Model: Lenovo PB1-750M

Received Date: Jul. 23, 2015

Test Date: Jul. 23, 2015 ~ Aug. 12, 2015

Issued Date: Aug. 13, 2015

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

Address: No. 68 Building, 199 Fenju Road, Wai Gao Qiao FTZ ,
Shanghai , China

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd.,
Taoyuan Branch

Lab Address: No. 47-2, 14th Ling, Chia Cau Vil., Lin Kou Dist., New Taipei
City, Taiwan (R.O.C.)

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

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF150723C09-2	Original release	Aug. 13, 2015

1 Certificate of Conformity

Product: Portable Tablet Computer

Brand: Lenovo

Test Model: Lenovo PB1-750M


Sample Status: Production unit

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

Test Date: Jul. 23, 2015 ~ Aug. 12, 2015

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:** Aug. 13, 2015
Amyee Qian / Engineer

Approved by :  _____, **Date:** Aug. 13, 2015
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 -14.13dB at 0.55096MHz.
15.205 & 15.209	Band Edge Emission Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.09dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	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	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	Portable Tablet Computer
Brand	Lenovo
Test Model	Lenovo PB1-750M
Power Supply Rating	5.0Vdc (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(20MHz)
Output Power	85.310 mW
Antenna Type	PIFA Antenna with 0dBi gain
Accessory Device	Refer to note as below
Data Cable Supplied	USB cable: Unshielded, detachable, 1.0m Earphone cable: Unshielded, detachable,1.1m

Note:

- 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.
- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX Function
802.11b	1TX /1RX
802.11g	1TX /1RX
802.11n (HT20)	1TX /1RX
802.11n (HT40)	1TX /1RX

- The EUT was powered by the following adapters:

ADAPTER 1	
BRAND:	Lenovo
MODEL:	C-P62
INPUT:	AC 100-240V, 300mA
OUTPUT:	DC 5V, 1500mA
MANUFACTURER:	Acbel

ADAPTER 2	
BRAND:	Lenovo
MODEL:	C-P62
INPUT:	AC 100-240V, 300mA
OUTPUT:	DC 5V, 1500mA
MANUFACTURER:	Huntkey

- The EUT matched the following USB Cable and Earphone.

USB CABLE	
BRAND:	lenovo
MODEL:	0154-117
SIGNAL LINE:	1.0 METER

EARPHONE	
BRAND:	Lenovo
MODEL:	LS-118M-09
SIGNAL LINE:	1.1 METER

5. Sample A and Sample B were tested for this project and the differences are as below:

Parts	Sample A		Sample B	
	Brand	Model Name	Brand	Model Name
Battery	Lenovo(Sun woda)	L15D1P32	Lenovo (SCUD)	L15D1P32
LCD Panel	BOE	TV070HDM	DSBJ	DO0700HHF00
Front Camera	O-film	L545F00	AVC	CPLBF05003
Rear Camera	Sunny	F13V01L	Qtech	ECM13M0166QF
Main Broad	Chinabuilder	08B05112C	js-huashen	82AD005A0
eMCP	Samsung	KMR820001M-B609(2G+16G) KMQ82000SM-B418(1G+16G)	Hynix	H9TQ17A8GTMCUR-KUM(1G+16G)
CPU	Qualcomm	MSM8916	Qualcomm	MSM8916

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

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	Chris Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 68%RH	120Vac, 60Hz	Sun Lin
APCM	21deg. C, 60%RH	120Vac, 60Hz	Nick Chen

3.3 Duty Cycle of Test Signal

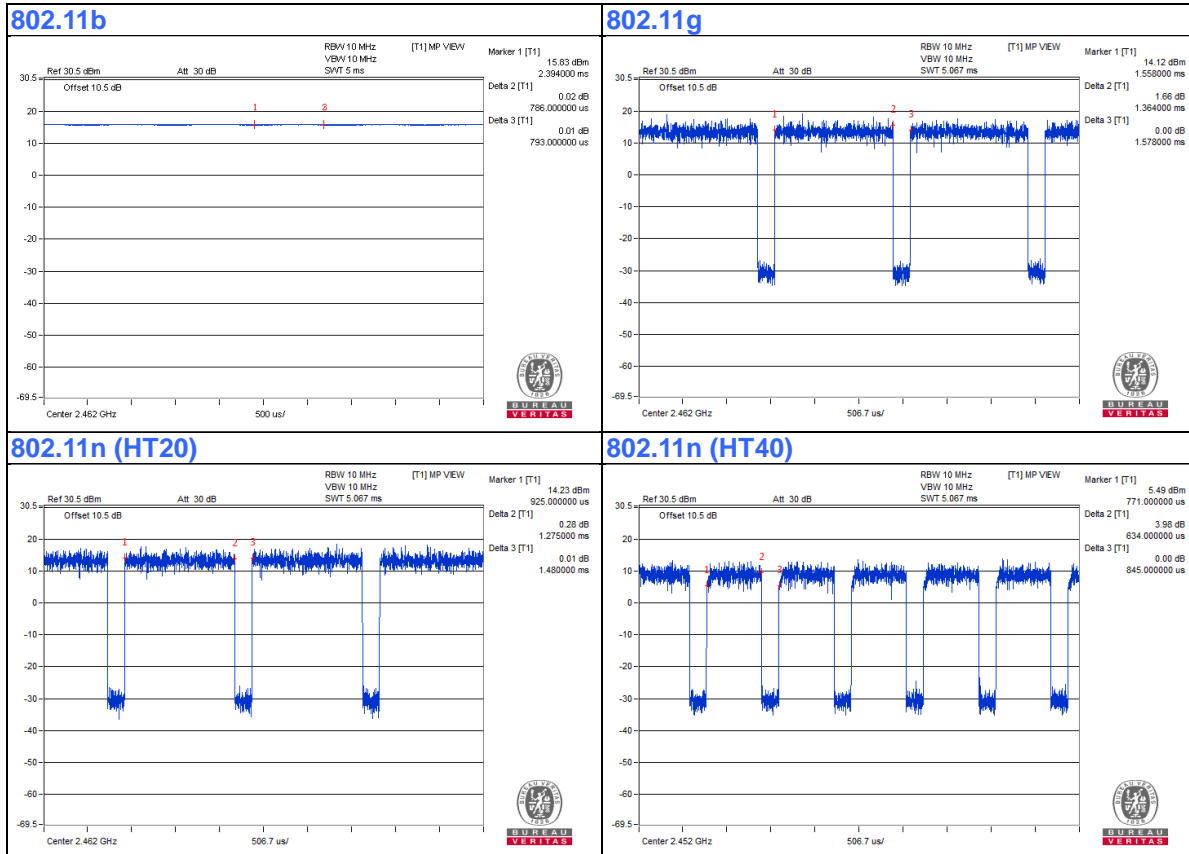
WIFI 2.4GHz

802.11b: Duty cycle = $0.786/0.793 = 0.991 > 98\%$, Duty factor is not required.

802.11g: Duty cycle = $1.364/1.578 = 0.864 < 98\%$, Duty factor = $10 * \log(1/0.864) = 0.63$

802.11n (HT20): Duty cycle = $1.275/1.480 = 0.861 < 98\%$, Duty factor = $10 * \log(1/0.861) = 0.65$

802.11n (HT40): Duty cycle = $0.634/0.845 = 0.750 < 98\%$, Duty factor = $10 * \log(1/0.750) = 1.25$



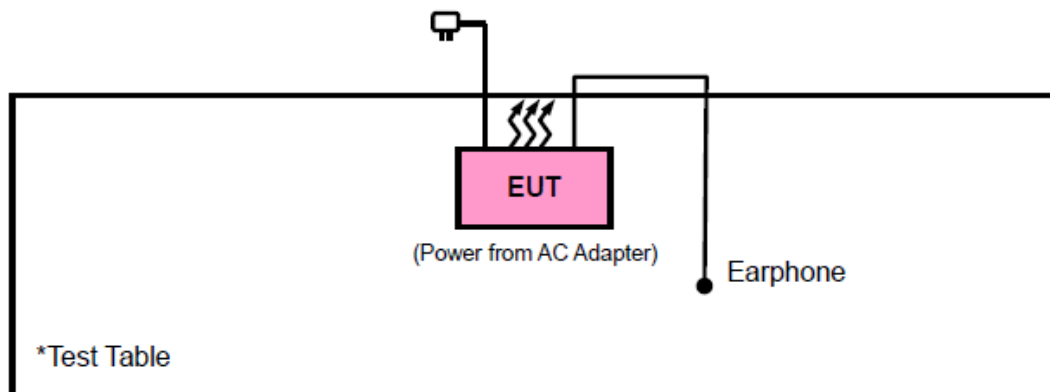
3.4 Description of Support Units

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)**
- 558074 D01 DTS Meas Guidance v03r03**
- 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 (DoC). The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Spectrum Analyzer Agilent Technologies	N9038A	MY52260177	May 19, 2015	May 18, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna ETS-Lindgren	3142E	117536	Feb. 24, 2014	Feb. 23, 2015
HORN Antenna ETS-Lindgren	3117	00143293	Aug. 28, 2014	Aug. 27, 2015
Bluetooth Tester	CBT	100980	Apr. 27, 2015	Apr. 26, 2016
Agilent Communications Tester-Wireless	8960 Series 10	MY53201073	Jul. 06, 2015	Jul. 05, 2017
Preamplifier Agilent	310N	187226	Jun. 29, 2015	Jun. 28, 2016
Preamplifier Agilent	83017A	980116	Jan. 09, 2015	Jan. 08, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 17, 2014	Sep. 16, 2015
Power Sensor Anritsu	MA2411B	1207325	Sep. 17, 2014	Sep. 16, 2015
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 27, 2015	Jun. 26, 2016
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 27, 2015	Jun. 26, 2016
Software BV ADT	E38.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	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 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:

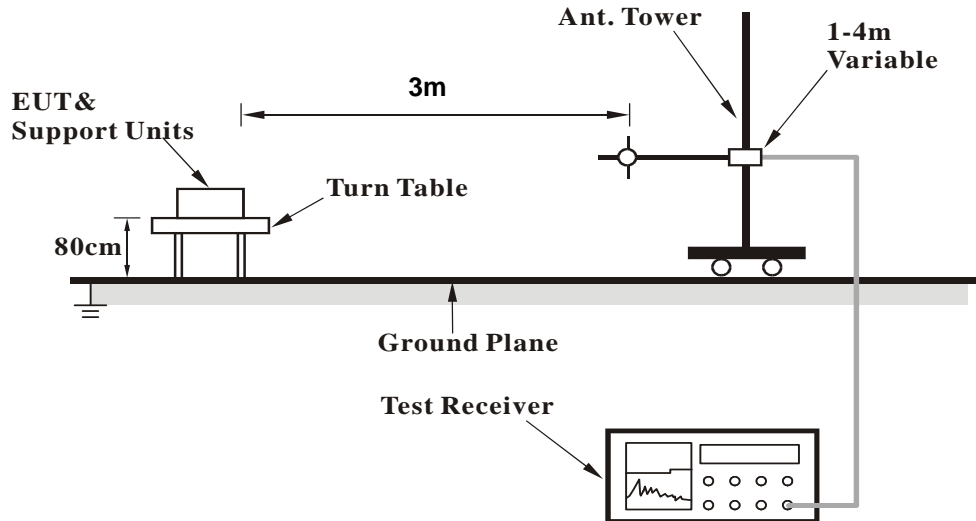
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

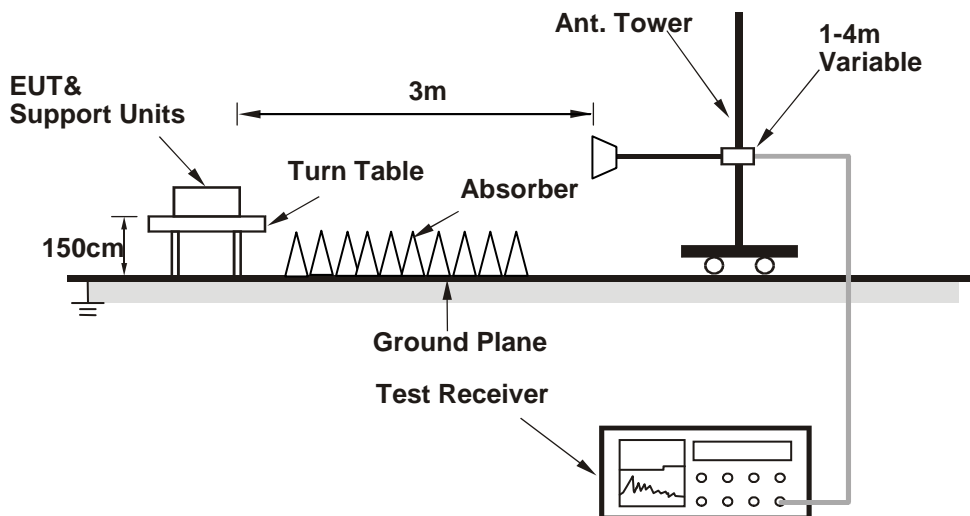
No deviation.

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

- a. Placed the EUT on the testing table.
- b. 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:

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
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 (m)	TABLE ANGLE (Degree)	REMARK
104.25	27.62	49.02	43.50	-15.88	9.58	1.28	32.26	100	360	Peak
187.95	22.42	42.66	43.50	-21.08	10.40	1.61	32.25	100	360	Peak
290.01	17.27	33.55	46.00	-28.73	13.82	2.03	32.13	100	360	Peak
466.6	20.17	31.11	46.00	-25.83	18.63	2.56	32.13	166	45	Peak
679.4	24.72	30.47	46.00	-21.28	23.31	3.05	32.11	140	20	Peak
842.5	26.30	31.05	46.00	-19.70	23.70	3.38	31.83	126	301	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 (m)	TABLE ANGLE (Degree)	REMARK
31.35	35.60	50.30	40.00	-4.40	16.82	0.74	32.26	131	35	Peak
48.09	34.72	57.64	40.00	-5.28	8.40	0.90	32.22	147	159	Peak
257.34	14.81	31.76	46.00	-31.19	13.21	1.94	32.10	130	20	Peak
559.7	38.23	47.44	46.00	-7.77	20.23	2.76	32.20	155	97	Peak
605.9	26.49	34.42	46.00	-19.51	21.39	2.87	32.19	160	59	Peak
933.5	36.83	38.25	46.00	-9.17	26.20	3.62	31.24	199	365	Peak

REMARKS:

1. 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 (m)	TABLE ANGLE (Degree)	REMARK
2388	46.20	44.49	54.00	-7.80	31.80	5.40	35.49	109	19	Average
2388	56.61	54.90	74.00	-17.39	31.80	5.40	35.49	109	19	Peak
2412	99.35	97.58			31.81	5.43	35.47	109	19	Average
2412	102.20	100.43			31.81	5.43	35.47	109	19	Peak
2494	39.83	37.81	54.00	-14.17	31.90	5.53	35.41	109	19	Average
2494	55.68	53.66	74.00	-18.32	31.90	5.53	35.41	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2390	42.00	40.27	54.00	-12.00	31.80	5.40	35.47	114	4	Average
2390	55.87	54.14	74.00	-18.13	31.80	5.40	35.47	114	4	Peak
2412	96.65	94.88			31.81	5.43	35.47	114	4	Average
2412	99.29	97.52			31.81	5.43	35.47	114	4	Peak
2496	39.83	37.81	54.00	-14.17	31.90	5.53	35.41	114	4	Average
2496	55.21	53.19	74.00	-18.79	31.90	5.53	35.41	114	4	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 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 (m)	TABLE ANGLE (Degree)	REMARK
2372	39.55	37.89	54.00	-14.45	31.78	5.37	35.49	109	19	Average
2372	55.28	53.62	74.00	-18.72	31.78	5.37	35.49	109	19	Peak
2437	99.41	97.56			31.85	5.46	35.46	109	19	Average
2437	102.10	100.25			31.85	5.46	35.46	109	19	Peak
2486	39.91	37.92	54.00	-14.09	31.88	5.53	35.42	109	19	Average
2486	55.11	53.12	74.00	-18.89	31.88	5.53	35.42	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2384	39.38	37.69	54.00	-14.62	31.78	5.40	35.49	111	4	Average
2384	55.06	53.37	74.00	-18.94	31.78	5.40	35.49	111	4	Peak
2437	96.91	95.06			31.85	5.46	35.46	111	4	Average
2437	99.50	97.65			31.85	5.46	35.46	111	4	Peak
2486	39.91	37.92	54.00	-14.09	31.88	5.53	35.42	111	4	Average
2486	56.07	54.08	74.00	-17.93	31.88	5.53	35.42	111	4	Peak

REMARKS:

- Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
- 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 (m)	TABLE ANGLE (Degree)	REMARK
2326	39.53	38.02	54.00	-14.47	31.73	5.30	35.52	107	19	Average
2326	56.30	54.79	74.00	-17.70	31.73	5.30	35.52	107	19	Peak
2462	96.06	94.13			31.87	5.50	35.44	107	19	Average
2462	99.69	97.76			31.87	5.50	35.44	107	19	Peak
2484	50.03	48.07	54.00	-3.97	31.88	5.50	35.42	107	19	Average
2484	58.73	56.77	74.00	-15.27	31.88	5.50	35.42	107	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2362	39.53	37.90	54.00	-14.47	31.76	5.37	35.50	111	4	Average
2362	55.19	53.56	74.00	-18.81	31.76	5.37	35.50	111	4	Peak
2462	93.46	91.53			31.87	5.50	35.44	111	4	Average
2462	96.47	94.54			31.87	5.50	35.44	111	4	Peak
2488	48.73	46.72	54.00	-5.27	31.90	5.53	35.42	111	4	Average
2488	58.45	56.44	74.00	-15.55	31.90	5.53	35.42	111	4	Peak

REMARKS:

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

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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 (m)	TABLE ANGLE (Degree)	REMARK
2390	45.80	44.07	54.00	-8.20	31.80	5.40	35.47	109	19	Average
2390	60.43	58.70	74.00	-13.57	31.80	5.40	35.47	109	19	Peak
2412	89.05	87.28			31.81	5.43	35.47	109	19	Average
2412	97.30	95.53			31.81	5.43	35.47	109	19	Peak
2492	40.83	38.81	54.00	-13.17	31.90	5.53	35.41	109	19	Average
2492	55.11	53.09	74.00	-18.89	31.90	5.53	35.41	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2390	43.00	41.27	54.00	-11.00	31.80	5.40	35.47	100	4	Average
2390	58.29	56.56	74.00	-15.71	31.80	5.40	35.47	100	4	Peak
2412	86.25	84.48			31.81	5.43	35.47	100	4	Average
2412	94.87	93.10			31.81	5.43	35.47	100	4	Peak
2500	40.06	38.04	54.00	-13.94	31.90	5.53	35.41	100	4	Average
2500	55.62	53.60	74.00	-18.38	31.90	5.53	35.41	100	4	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 (m)	TABLE ANGLE (Degree)	REMARK
2330	39.96	38.42	54.00	-14.04	31.73	5.33	35.52	109	19	Average
2330	54.95	53.41	74.00	-19.05	31.73	5.33	35.52	109	19	Peak
2437	89.51	87.66			31.85	5.46	35.46	109	19	Average
2437	97.22	95.37			31.85	5.46	35.46	109	19	Peak
2500	40.83	38.81	54.00	-13.17	31.90	5.53	35.41	109	19	Average
2500	55.96	53.94	74.00	-18.04	31.90	5.53	35.41	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2330	39.96	38.42	54.00	-14.04	31.73	5.33	35.52	111	4	Average
2330	55.97	54.43	74.00	-18.03	31.73	5.33	35.52	111	4	Peak
2437	86.61	84.76			31.85	5.46	35.46	111	4	Average
2437	94.54	92.69			31.85	5.46	35.46	111	4	Peak
2488	40.83	38.82	54.00	-13.17	31.90	5.53	35.42	111	4	Average
2488	54.80	52.79	74.00	-19.20	31.90	5.53	35.42	111	4	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 (m)	TABLE ANGLE (Degree)	REMARK
2364	40.03	38.40	54.00	-13.97	31.76	5.37	35.50	107	19	Average
2364	54.89	53.26	74.00	-19.11	31.76	5.37	35.50	107	19	Peak
2462	88.06	86.13			31.87	5.50	35.44	107	19	Average
2462	96.66	94.73			31.87	5.50	35.44	107	19	Peak
2484	50.51	48.55	54.00	-3.49	31.88	5.50	35.42	107	19	Average
2484	67.14	65.18	74.00	-6.86	31.88	5.50	35.42	107	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2350	40.08	38.51	54.00	-13.92	31.74	5.33	35.50	111	4	Average
2350	55.45	53.88	74.00	-18.55	31.74	5.33	35.50	111	4	Peak
2462	86.06	84.13			31.87	5.50	35.44	111	4	Average
2462	93.19	91.26			31.87	5.50	35.44	111	4	Peak
2484	49.21	47.25	54.00	-4.79	31.88	5.50	35.42	111	4	Average
2484	66.58	64.62	74.00	-7.42	31.88	5.50	35.42	111	4	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 (m)	TABLE ANGLE (Degree)	REMARK
2390	47.60	45.87	54.00	-6.40	31.80	5.40	35.47	109	19	Average
2390	61.68	59.95	74.00	-12.32	31.80	5.40	35.47	109	19	Peak
2412	89.55	87.78			31.81	5.43	35.47	109	19	Average
2412	97.18	95.41			31.81	5.43	35.47	109	19	Peak
2496	40.83	38.81	54.00	-13.17	31.90	5.53	35.41	109	19	Average
2496	55.40	53.38	74.00	-18.60	31.90	5.53	35.41	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2390	44.50	42.77	54.00	-9.50	31.80	5.40	35.47	100	4	Average
2390	58.98	57.25	74.00	-15.02	31.80	5.40	35.47	100	4	Peak
2412	86.25	84.48			31.81	5.43	35.47	100	4	Average
2412	94.66	92.89			31.81	5.43	35.47	100	4	Peak
2484	40.78	38.82	54.00	-13.22	31.88	5.50	35.42	100	4	Average
2484	55.14	53.18	74.00	-18.86	31.88	5.50	35.42	100	4	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 (m)	TABLE ANGLE (Degree)	REMARK
2380	40.55	38.89	54.00	-13.45	31.78	5.37	35.49	109	19	Average
2380	55.56	53.90	74.00	-18.44	31.78	5.37	35.49	109	19	Peak
2437	89.31	87.46			31.85	5.46	35.46	109	19	Average
2437	97.47	95.62			31.85	5.46	35.46	109	19	Peak
2496	40.83	38.81	54.00	-13.17	31.90	5.53	35.41	109	19	Average
2496	56.23	54.21	74.00	-17.77	31.90	5.53	35.41	109	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2382	40.48	38.79	54.00	-13.52	31.78	5.40	35.49	111	4	Average
2382	55.08	53.39	74.00	-18.92	31.78	5.40	35.49	111	4	Peak
2437	86.41	84.56			31.85	5.46	35.46	111	4	Average
2437	94.61	92.76			31.85	5.46	35.46	111	4	Peak
2498	40.73	38.71	54.00	-13.27	31.90	5.53	35.41	111	4	Average
2498	55.45	53.43	74.00	-18.55	31.90	5.53	35.41	111	4	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 (m)	TABLE ANGLE (Degree)	REMARK
2390	40.27	38.54	54.00	-13.73	31.80	5.40	35.47	106	19	Average
2390	54.95	53.22	74.00	-19.05	31.80	5.40	35.47	106	19	Peak
2462	88.22	86.29			31.87	5.50	35.44	106	19	Average
2462	96.97	95.04			31.87	5.50	35.44	106	19	Peak
2483.5	50.91	48.95	54.00	-3.09	31.88	5.50	35.42	106	19	Average
2483.5	67.62	65.66	74.00	-6.38	31.88	5.50	35.42	106	19	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 (m)	TABLE ANGLE (Degree)	REMARK
2372	40.35	38.69	54.00	-13.65	31.78	5.37	35.49	100	1	Average
2372	55.19	53.53	74.00	-18.81	31.78	5.37	35.49	100	1	Peak
2462	85.53	83.60			31.87	5.50	35.44	100	1	Average
2462	93.79	91.86			31.87	5.50	35.44	100	1	Peak
2483.5	49.85	47.89	54.00	-4.15	31.88	5.50	35.42	100	1	Average
2483.5	64.54	62.58	74.00	-9.46	31.88	5.50	35.42	100	1	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 (m)	TABLE ANGLE (Degree)	REMARK
2368	40.25	38.61	54.00	-13.75	31.76	5.37	35.49	110	30	Average
2368	54.92	53.28	74.00	-19.08	31.76	5.37	35.49	110	30	Peak
2422	87.79	85.99			31.83	5.43	35.46	110	30	Average
2422	95.37	93.57			31.83	5.43	35.46	110	30	Peak
2500	41.00	38.98	54.00	-13.00	31.90	5.53	35.41	110	30	Average
2500	54.56	52.54	74.00	-19.44	31.90	5.53	35.41	110	30	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 (m)	TABLE ANGLE (Degree)	REMARK
2384	40.75	39.06	54.00	-13.25	31.78	5.40	35.49	101	342	Average
2384	55.86	54.17	74.00	-18.14	31.78	5.40	35.49	101	342	Peak
2422	84.83	83.03			31.83	5.43	35.46	101	342	Average
2422	92.24	90.44			31.83	5.43	35.46	101	342	Peak
2498	40.96	38.94	54.00	-13.04	31.90	5.53	35.41	101	342	Average
2498	56.55	54.53	74.00	-17.45	31.90	5.53	35.41	101	342	Peak

REMARKS:

1. Emission Level = Read Level+ Antenna Factor + Cable Loss- Preamp Factor
Margin value = Emission level – Limit value.
2. 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 (m)	TABLE ANGLE (Degree)	REMARK
2374	41.04	39.38	54.00	-12.96	31.78	5.37	35.49	110	30	Average
2374	56.09	54.43	74.00	-17.91	31.78	5.37	35.49	110	30	Peak
2437	87.87	86.02			31.85	5.46	35.46	110	30	Average
2437	95.84	93.99			31.85	5.46	35.46	110	30	Peak
2492	40.96	38.94	54.00	-13.04	31.90	5.53	35.41	110	30	Average
2492	55.78	53.76	74.00	-18.22	31.90	5.53	35.41	110	30	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 (m)	TABLE ANGLE (Degree)	REMARK
2340	40.40	38.83	54.00	-13.60	31.74	5.33	35.50	103	342	Average
2340	55.39	53.82	74.00	-18.61	31.74	5.33	35.50	103	342	Peak
2437	84.88	83.03			31.85	5.46	35.46	103	342	Average
2437	92.35	90.50			31.85	5.46	35.46	103	342	Peak
2486	41.98	39.99	54.00	-12.02	31.88	5.53	35.42	103	342	Average
2486	55.62	53.63	74.00	-18.38	31.88	5.53	35.42	103	342	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 (m)	TABLE ANGLE (Degree)	REMARK
2374	40.67	39.01	54.00	-13.33	31.78	5.37	35.49	254	51	Average
2374	54.73	53.07	74.00	-19.27	31.78	5.37	35.49	254	51	Peak
2452	86.45	84.58			31.85	5.46	35.44	254	51	Average
2452	94.52	92.65			31.85	5.46	35.44	254	51	Peak
2483.5	50.16	48.20	54.00	-3.84	31.88	5.50	35.42	254	51	Average
2483.5	62.78	60.82	74.00	-11.22	31.88	5.50	35.42	254	51	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 (m)	TABLE ANGLE (Degree)	REMARK
2378	40.71	39.05	54.00	-13.29	31.78	5.37	35.49	103	342	Average
2378	55.77	54.11	74.00	-18.23	31.78	5.37	35.49	103	342	Peak
2452	83.84	81.97			31.85	5.46	35.44	103	342	Average
2452	91.25	89.38			31.85	5.46	35.44	103	342	Peak
2483.5	49.15	47.19	54.00	-4.85	31.88	5.50	35.42	103	342	Average
2483.5	59.15	57.19	74.00	-14.85	31.88	5.50	35.42	103	342	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

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 11, 2014	Nov. 10, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2015	Feb. 25, 2016
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

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

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

4.2.3 Test Procedures

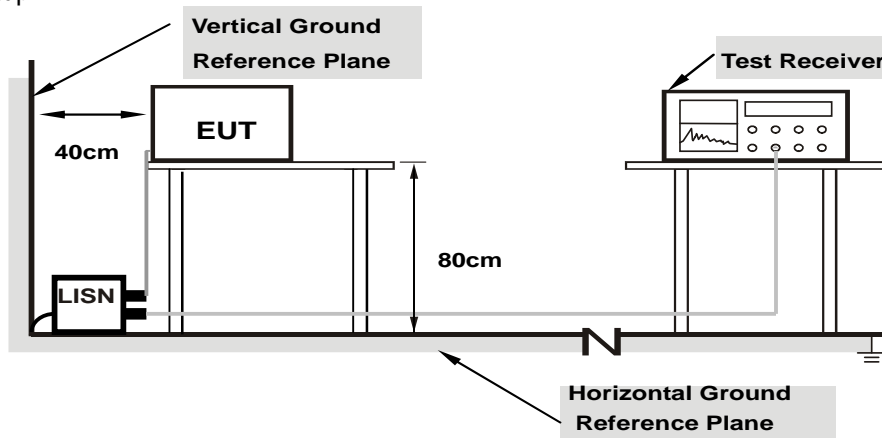
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

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

4.2.6 EUT Operating Conditions

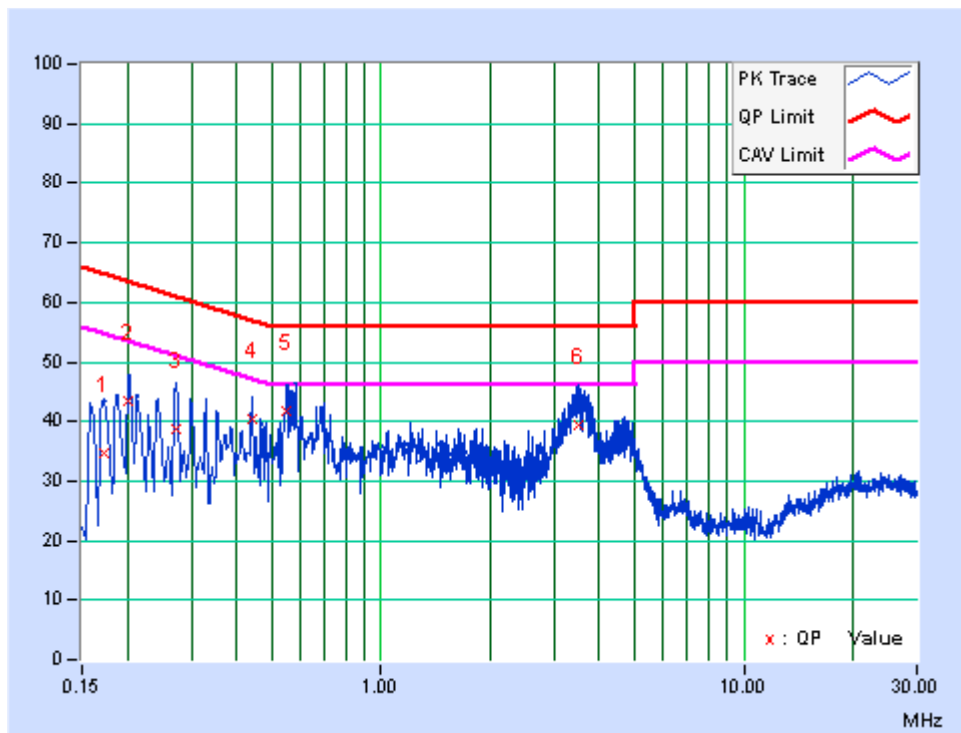
Same as 4.1.6.

4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.17237	10.74	23.96	11.13	34.70	21.87	64.85	54.85	-30.14	-32.97
2	0.20084	10.63	32.85	19.85	43.48	30.48	63.58	53.58	-20.10	-23.10
3	0.27120	10.60	28.28	15.21	38.88	25.81	61.08	51.08	-22.20	-25.27
4	0.44273	10.56	29.80	17.62	40.36	28.18	57.01	47.01	-16.65	-18.83
5	0.55096	10.52	31.35	20.37	41.87	30.89	56.00	46.00	-14.13	-15.11
6	3.49305	10.19	29.15	16.98	39.34	27.17	56.00	46.00	-16.66	-18.83

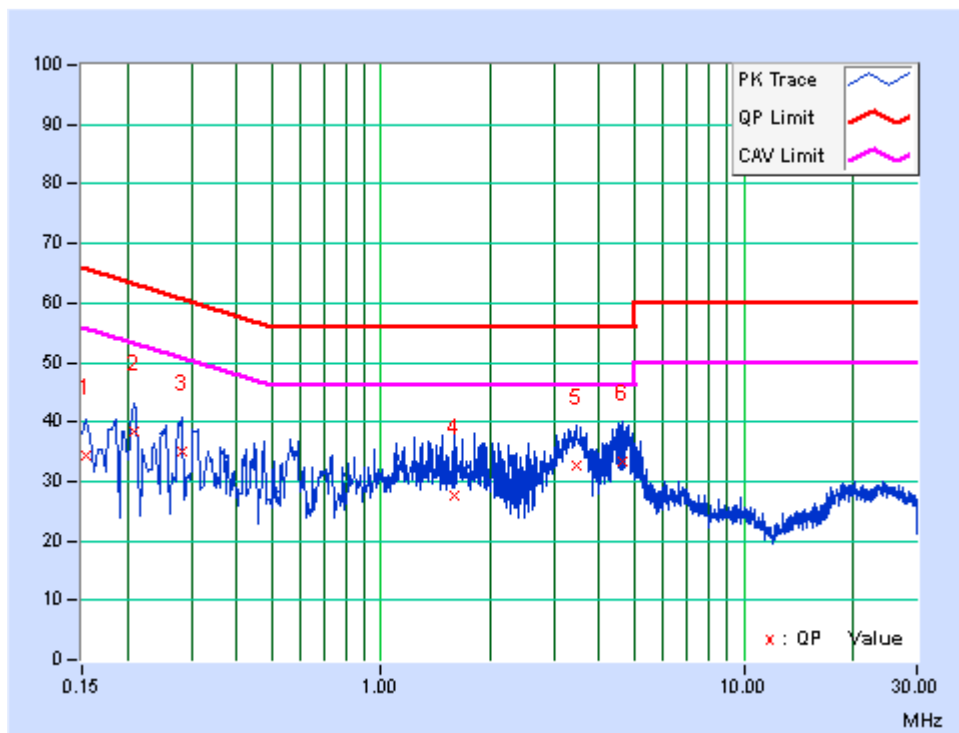
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
 3. The emission levels of other frequencies were very low against the limit.
 4. Margin value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



Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15391	10.62	23.69	9.96	34.31	20.58	65.79	55.79	-31.47	-35.20
2	0.20893	10.52	27.86	12.32	38.38	22.84	63.25	53.25	-24.87	-30.41
3	0.28288	10.52	24.43	11.04	34.95	21.56	60.73	50.73	-25.78	-29.17
4	1.58888	10.04	17.65	10.85	27.69	20.89	56.00	46.00	-28.31	-25.11
5	3.45786	9.94	22.76	16.50	32.70	26.44	56.00	46.00	-23.30	-19.56
6	4.62695	9.96	23.25	13.41	33.21	23.37	56.00	46.00	-22.79	-22.63

- 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.

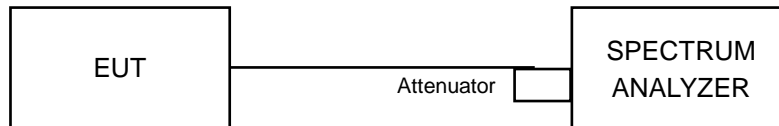


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.08	0.5	PASS
6	2437	8.56	0.5	PASS
11	2462	9.07	0.5	PASS

802.11g

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.38	0.5	PASS
6	2437	16.35	0.5	PASS
11	2462	16.36	0.5	PASS

802.11n (HT20)

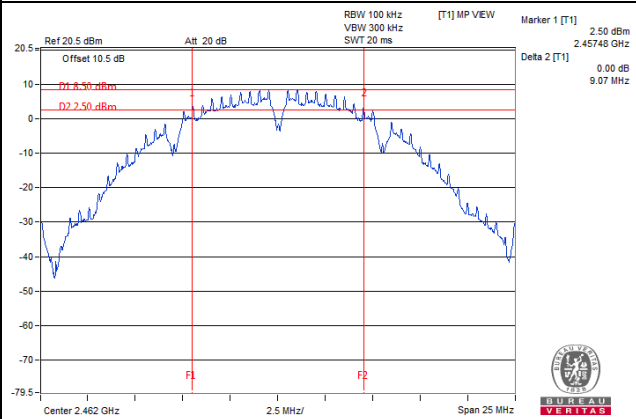
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.59	0.5	Pass
6	2437	17.57	0.5	Pass
11	2462	17.59	0.5	Pass

802.11n (HT40)

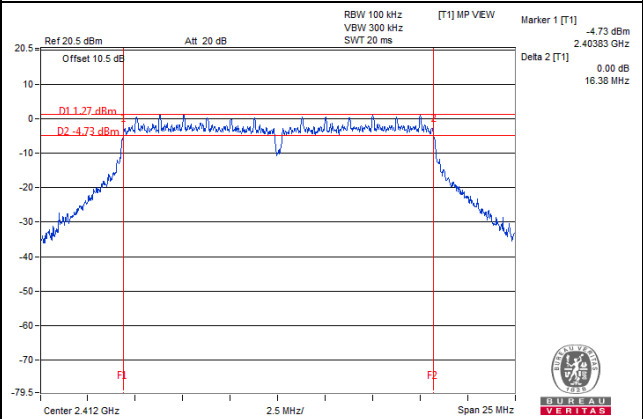
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.16	0.5	Pass
6	2437	35.19	0.5	Pass
9	2452	35.39	0.5	Pass

Spectrum Plot of Worst Value

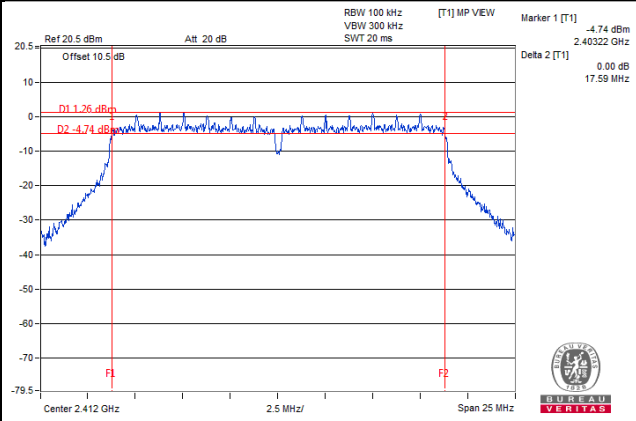
802.11b



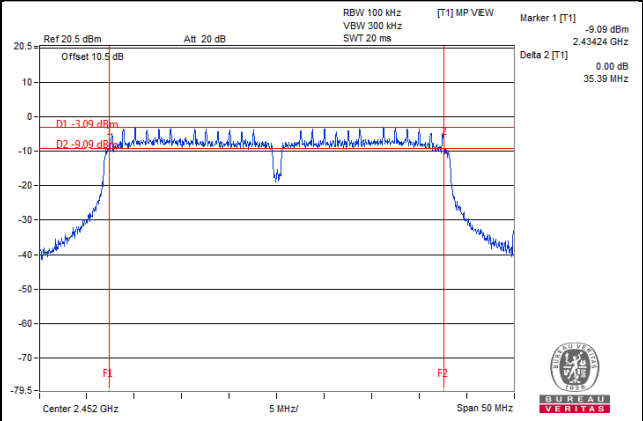
802.11g



802.11n (HT20)



802.11n (HT40)

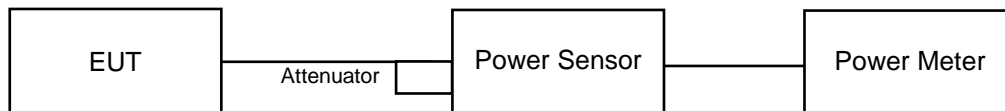


4.4 Conducted Output Power Measurement

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 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

A peak / average power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak / average power sensor. Record the 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	17.10	51.286	1	PASS
6	2437	17.27	53.333	1	PASS
11	2462	17.16	52.000	1	PASS

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	18.89	77.446	1	PASS
6	2437	19.31	85.310	1	PASS
11	2462	19.19	82.985	1	PASS

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
1	2412	18.74	74.817	1	PASS
6	2437	18.81	76.033	1	PASS
11	2462	18.52	71.121	1	PASS

802.11n (40MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
3	2422	16.37	43.351	1	PASS
6	2437	16.58	45.499	1	PASS
9	2452	16.69	46.666	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	14.31	N/A
6	2437	14.62	N/A
11	2462	14.50	N/A

802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	11.24	N/A
6	2437	11.52	N/A
11	2462	11.43	N/A

802.11n (20MHz)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
1	2412	11.61	N/A
6	2437	11.75	N/A
11	2462	11.34	N/A

802.11n (40MHz)

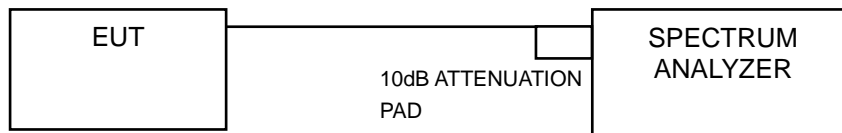
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	PASS/FAIL
3	2422	9.31	N/A
6	2437	9.44	N/A
9	2452	9.63	N/A

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 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d. Set the VBW $\geq 3 \times \text{RBW}$.
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. 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	-3.94	8	Pass
6	2437	-4.30	8	Pass
11	2462	-3.73	8	Pass

802.11g

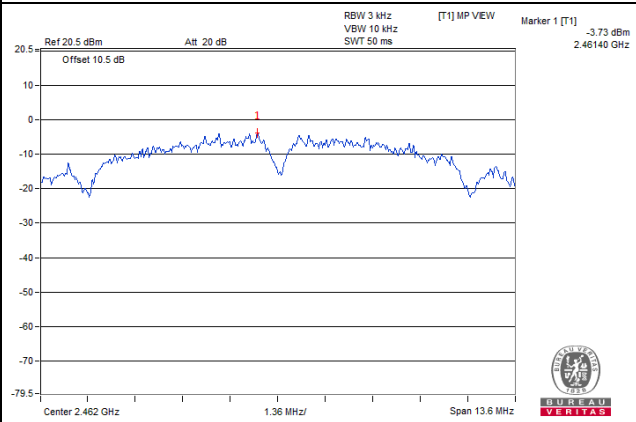
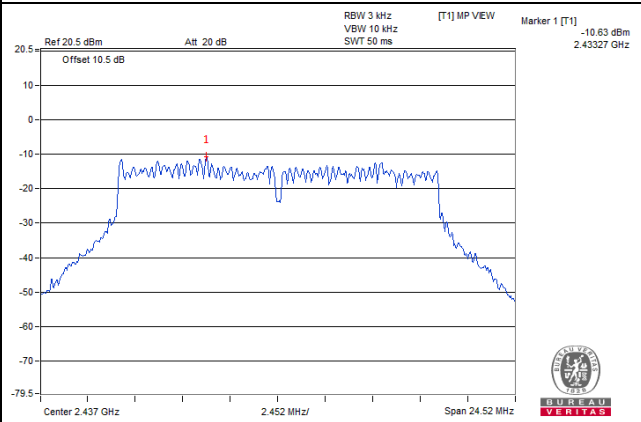
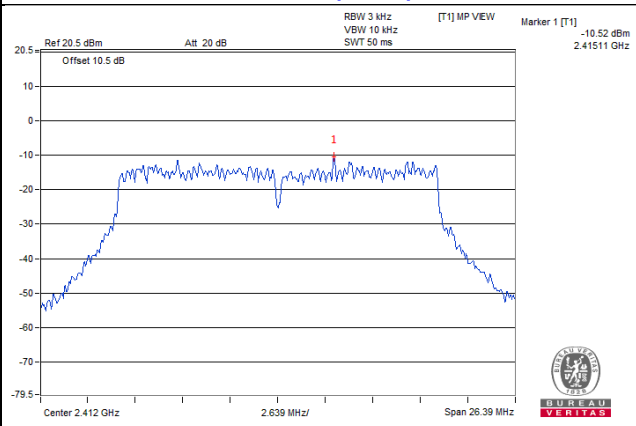
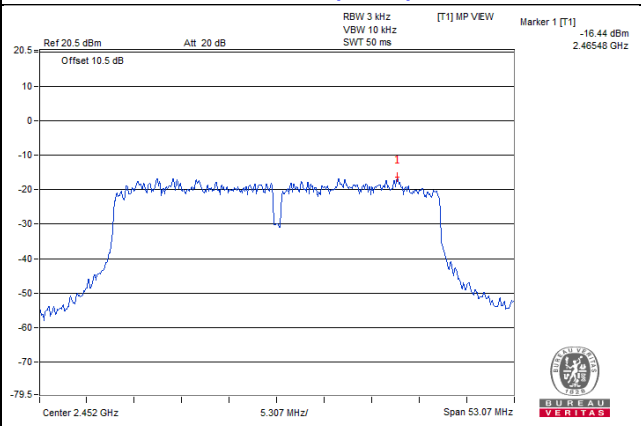
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	Pass /Fail
1	2412	-10.95	8	Pass
6	2437	-10.63	8	Pass
11	2462	-10.87	8	Pass

802.11n (HT20)

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	Pass /Fail
1	2412	-10.52	8	Pass
6	2437	-12.20	8	Pass
11	2462	-11.85	8	Pass

802.11n (HT40)

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm)	PASS /FAIL
3	2422	-16.48	8	PASS
6	2437	-16.61	8	PASS
9	2452	-16.44	8	PASS

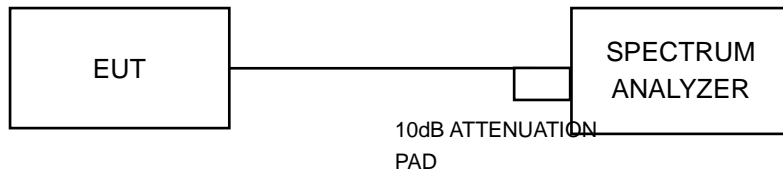
Spectrum Plot of Worst Value**802.11b****802.11g****802.11n (HT20)****802.11n (HT40)**

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 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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

4.6.5 Deviation from Test Standard

No deviation.

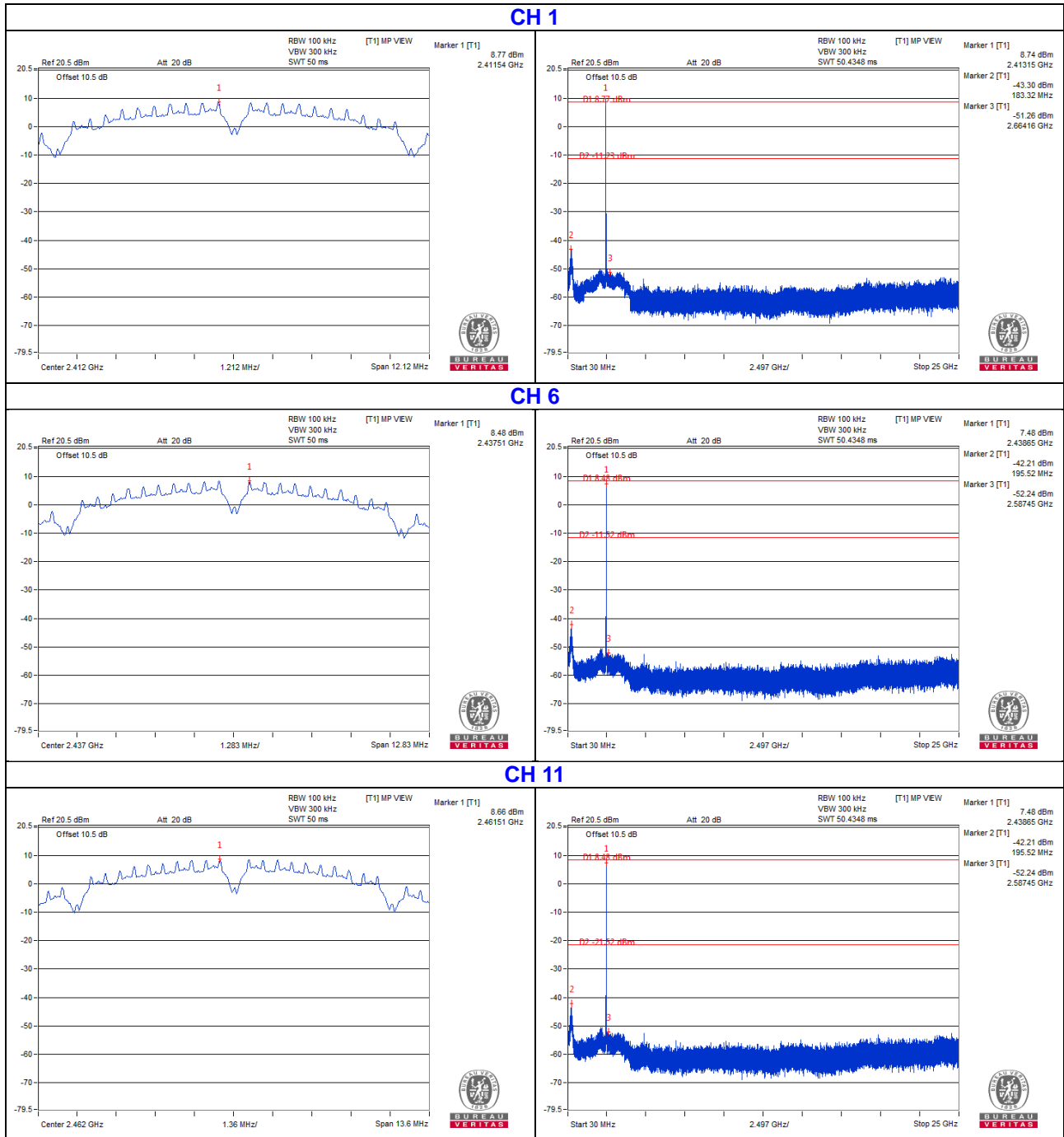
4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

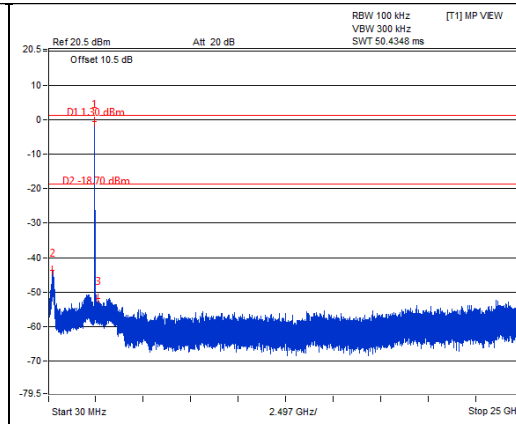
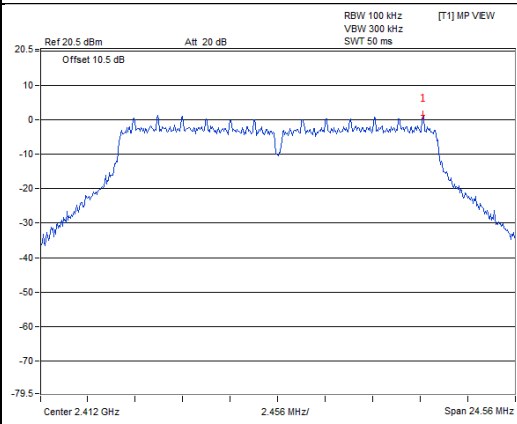
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

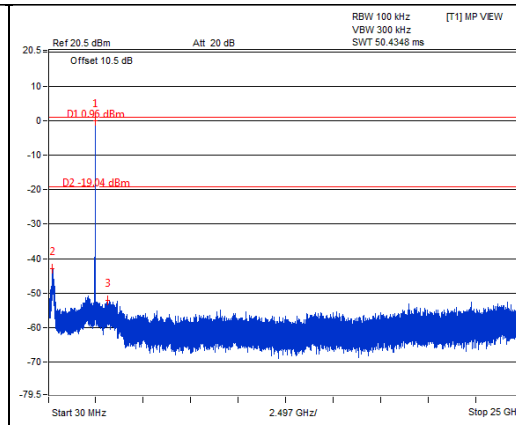
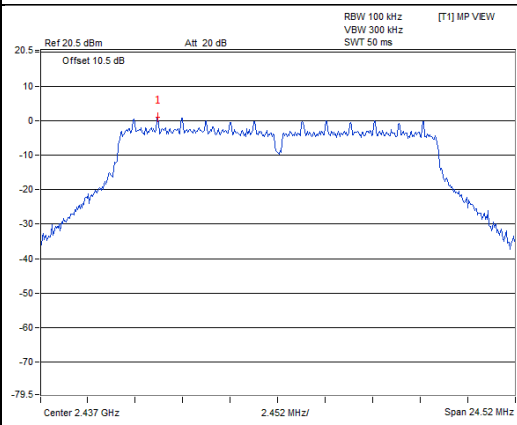


802.11g

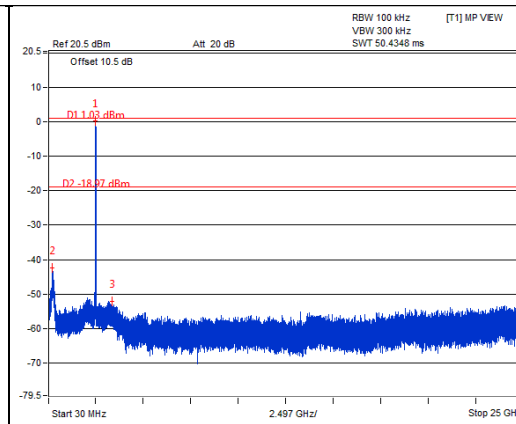
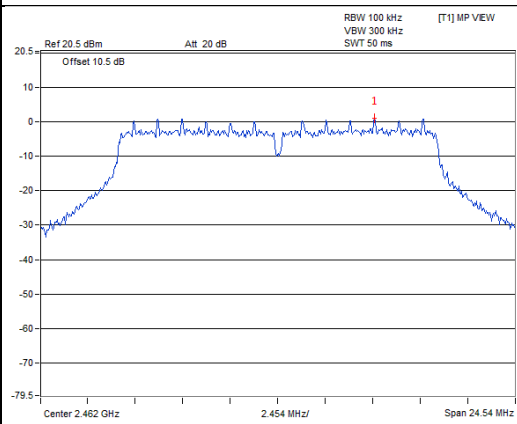
CH 1



CH 6

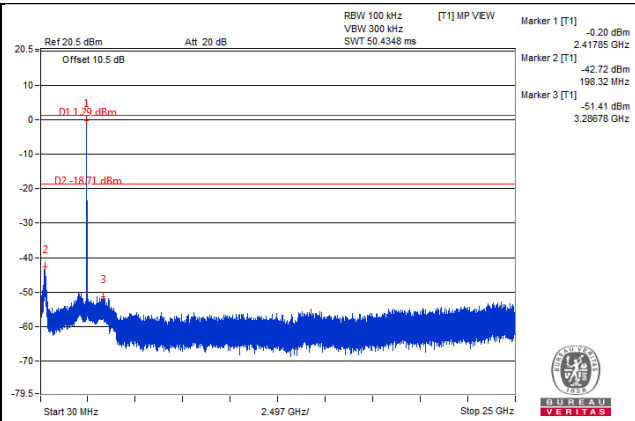
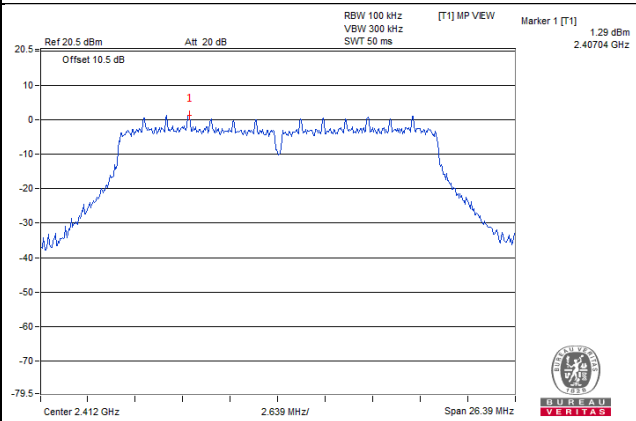


CH 11

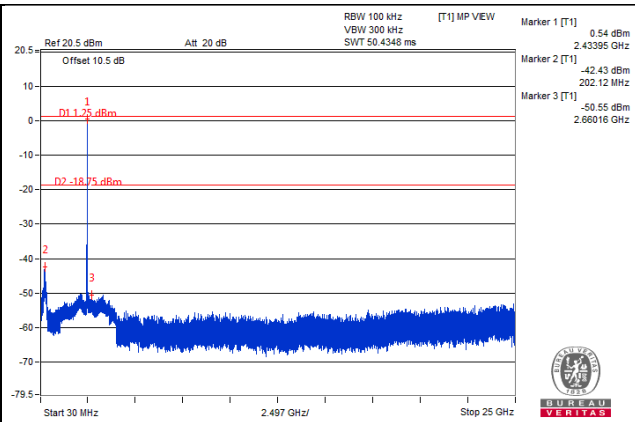
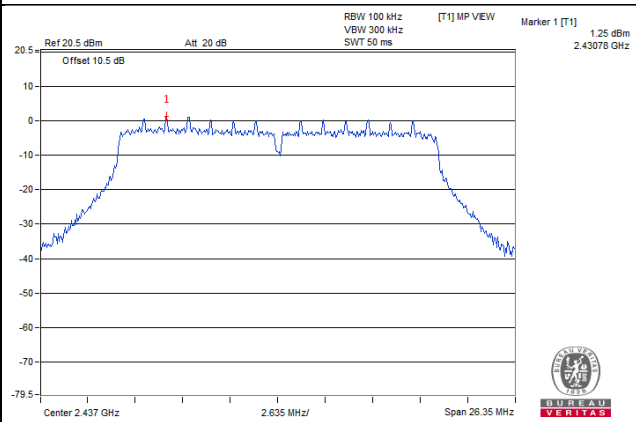


802.11n (HT20)

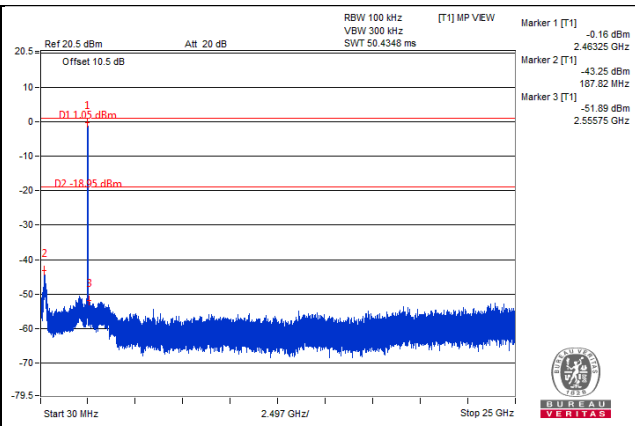
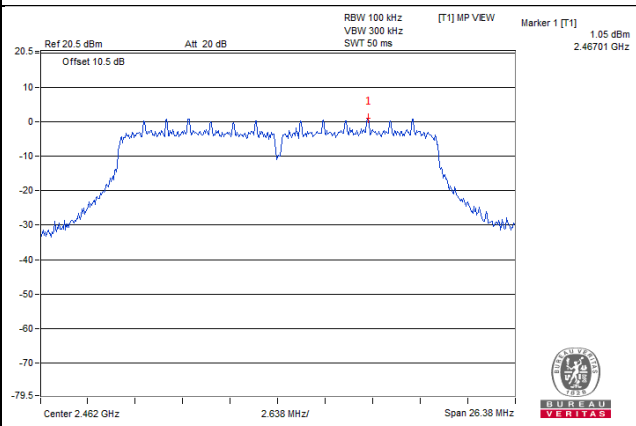
CH 1



CH 6

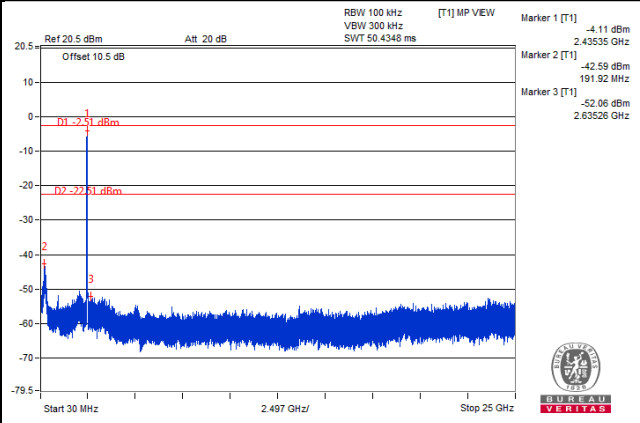
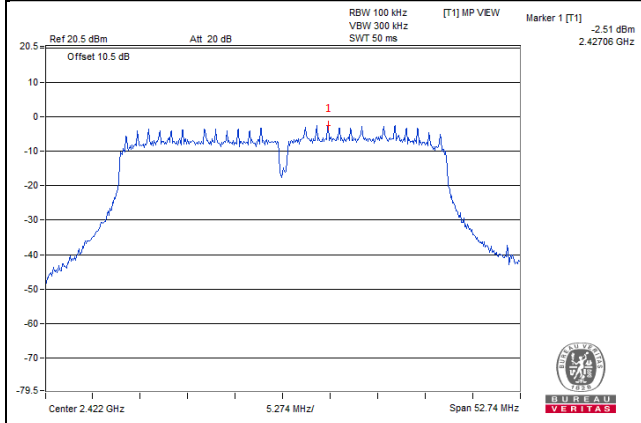


CH 11

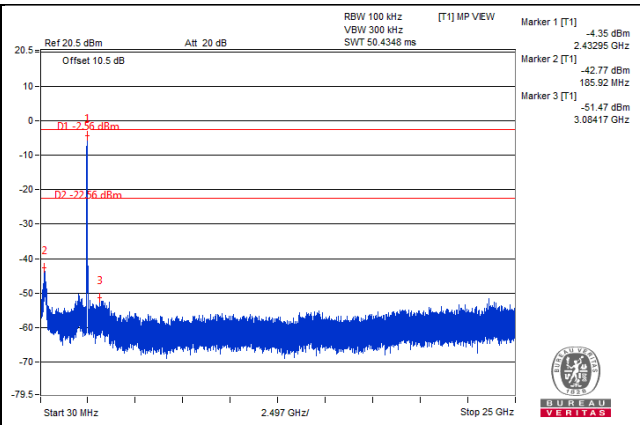
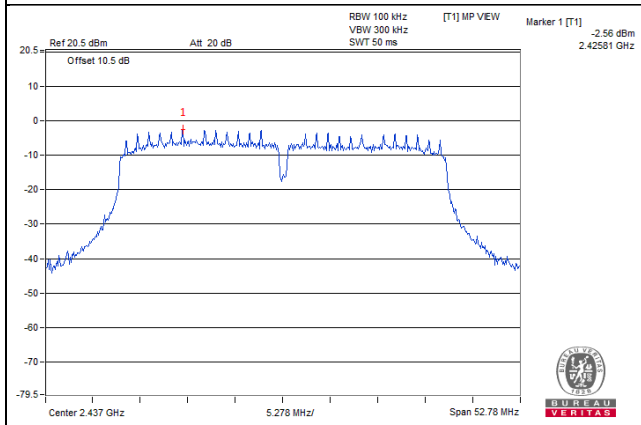


802.11n (HT40)

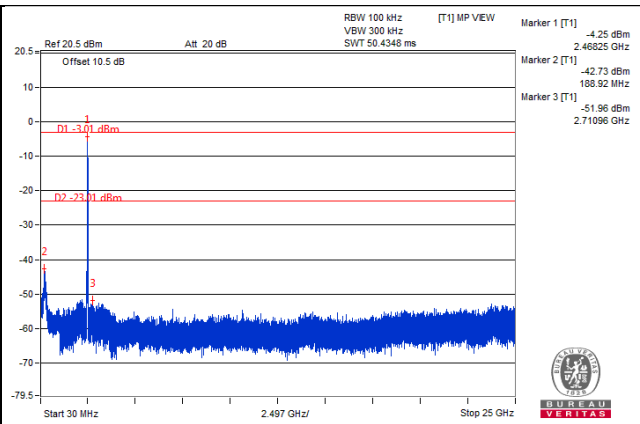
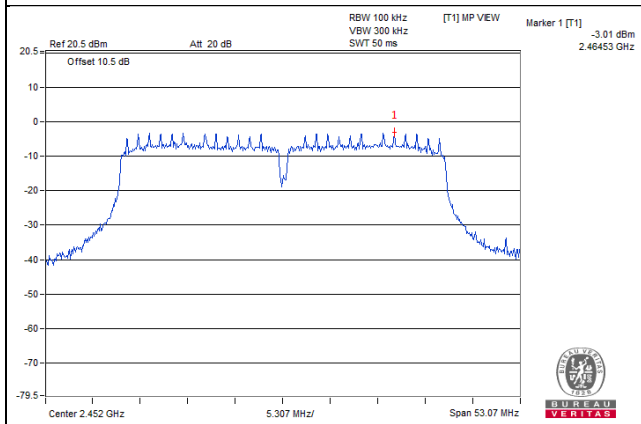
CH 3



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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

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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