

FCC Test Report

Report No.: RF150921D01

FCC ID: R48V3UP

Test Model: V3USP15

Series Model: V3US15

Received Date: Sep. 21, 2015

Test Date: Sep. 22 ~ Nov. 20, 2015

Issued Date: Nov. 24, 2015

Applicant: Meiloon Industrial Co., Ltd.

Address: No. 99, Xingfu Road, Taoyuan Dist., Taoyuan City 330, Taiwan.

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

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Table of Contents

Release Control Record.....	4
1 Certificate of Conformity.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty.....	6
2.2 Modification Record.....	6
3 General Information.....	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	9
3.2.1 Test Mode Applicability and Tested Channel Detail.....	10
3.3 Duty Cycle of Test Signal.....	12
3.4 Description of Support Units	13
3.4.1 Configuration of System under Test	13
3.5 General Description of Applied Standards.....	14
4 Test Types and Results.....	15
4.1 Radiated Emission and Bandedge Measurement.....	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement	15
4.1.2 Test Instruments	16
4.1.3 Test Procedures	17
4.1.4 Deviation from Test Standard	17
4.1.5 Test Set Up.....	18
4.1.6 EUT Operating Conditions	18
4.1.7 Test Results.....	19
4.2 Conducted Emission Measurement	32
4.2.1 Limits of Conducted Emission Measurement.....	32
4.2.2 Test Instruments	32
4.2.3 Test Procedures	33
4.2.4 Deviation from Test Standard	33
4.2.5 Test Setup	33
4.2.6 EUT Operating Conditions	33
4.2.7 Test Results.....	34
4.3 6dB Bandwidth Measurement.....	38
4.3.1 Limits of 6dB Bandwidth Measurement	38
4.3.2 Test Setup	38
4.3.3 Test Instruments	38
4.3.4 Test Procedure	38
4.3.5 Deviation from Test Standard	38
4.3.6 EUT Operating Conditions	38
4.3.7 Test Result	39
4.4 Conducted Output Power Measurement.....	41
4.4.1 Limits of Conducted Output Power Measurement	41
4.4.2 Test Setup	41
4.4.3 Test Instruments	41
4.4.4 Test Procedures	41
4.4.5 Deviation from Test Standard	41
4.4.6 EUT Operating Conditions	41
4.4.7 Test Results.....	42
4.5 Power Spectral Density Measurement	44
4.5.1 Limits of Power Spectral Density Measurement.....	44
4.5.2 Test Setup	44
4.5.3 Test Instruments	44
4.5.4 Test Procedure	44
4.5.5 Deviation from Test Standard	44

4.5.6 EUT Operating Condition.....	44
4.5.7 Test Results.....	45
4.6 Conducted Out of Band Emission Measurement.....	47
4.6.1 Limits of Conducted Out of Band Emission Measurement.....	47
4.6.2 Test Setup.....	47
4.6.3 Test Instruments.....	47
4.6.4 Test Procedure.....	47
4.6.5 Deviation from Test Standard.....	47
4.6.6 EUT Operating Condition.....	47
4.6.7 Test Results.....	48
5 Pictures of Test Arrangements.....	56
Appendix – Information on the Testing Laboratories.....	57



A D T

Release Control Record

Issue No.	Description	Date Issued
RF150921D01	Original release.	Nov. 24, 2015

1 Certificate of Conformity

Product: network audio receiver

Brand: WREN

Test Model: V3USP15

Series Model: V3US15

Sample Status: Engineering sample

Applicant: Meiloon Industrial Co., Ltd.

Test Date: Sep. 22 ~ Nov. 20, 2015

Standards: 47 CFR 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: Nov. 24, 2015

Jessica Cheng / Senior Specialist

Approved by :



Date: Nov. 24, 2015

Rex Lai / Assistant Manager

2 Summary of Test Results

47 CFR 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 -10.16dB at 0.41681MHz.
15.205 / 15.209 /	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.2dB at 2390.00MHz.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -3.2dB 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	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.43 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	4.00 dB
Radiated Emissions above 1 GHz	Above 1GHz	3.36 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	network audio receiver
Brand	WREN
Test Model	V3USP15
Series Model	V3US15
Model Difference	Refer to table as below
Status of EUT	Engineering sample
Power Supply Rating	20Vdc from adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b:11/ 5.5/ 2/ 1Mbps 802.11g: 54/ 48/ 36/ 24/ 18/ 12/ 9/ 6Mbps 802.11n: up to 150.0Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
Output Power	175.792mW
Antenna Type	PCB DIPOLE antenna with 2.79dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

- The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (20MHz)	1TX
802.11n (40MHz)	1TX

- All models are listed as below.

Model	V3US15	V3USP15
Power	AC adapter *2	AC adapter *2
Bluetooth module	2.4G Rayson "BTM-720 DID : B019599"	2.4G Rayson "BTM-720 DID : B019599"
Play-Fi module	Phorus-CAP-TSD-0010 2.4GHz/5GHz 802.11 a/b/g/n	Phorus-CAP-TSD-0010 2.4GHz/5GHz 802.11 a/b/g/n
Battery pack	without	with
I/O port	USB Port*1 (for Service) AUX in*1 DC in*1	

3. The EUT uses following adapters.

Adapter	1
Brand	DYS
Model	DYS650-200200W-K
Input Power	100-240Vac 50/60Hz 1.3A Max
Output Power	20.0Vdc 2.0A
Power Line	AC 2-pin DC-Nonshielded (1.8m) cable
Adapter	2
Brand	EPS
Model	EW40-2020-AU
Input Power	100-240Vac 50-60Hz 1.8A Max
Output Power	20.0Vdc 2.0A
Power Line	AC 2-pin DC-Nonshielded (1.8m) cable with one core.

After pre-tested above adapters, **adapter 1** was selected as a representative one and therefore only its test data was recorded in this report.

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz)

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (40MHz):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter 1
8	-	-	√	-	Powered by adapter 2

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
 RE<1G: Radiated Emission below 1GHz
 PLC: Power Line Conducted Emission
 APCM: Antenna Port Conducted Measurement

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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

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

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (20MHz)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
A	802.11n (40MHz)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

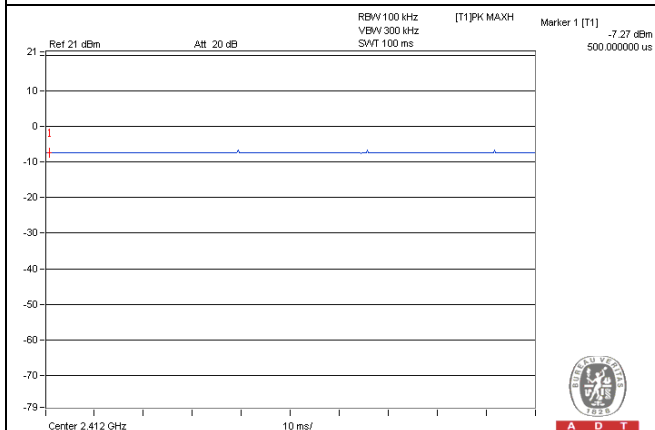
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	26deg. C, 75%RH	120Vac, 60Hz	Dalen Dai
RE $<$ 1G	26deg. C, 75%RH	120Vac, 60Hz	Aaron You
PLC	28deg. C, 72%RH	120Vac, 60Hz	Chiawei Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Saxon Lee

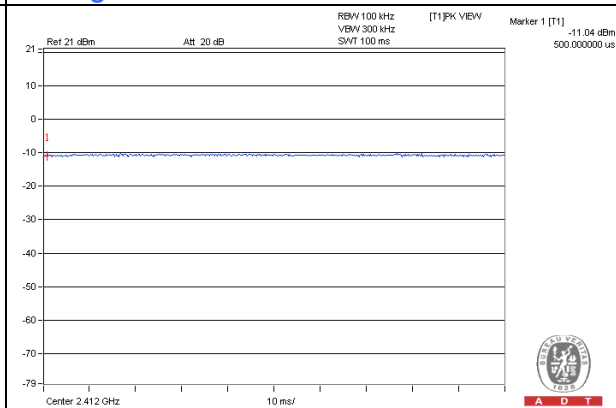
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %.

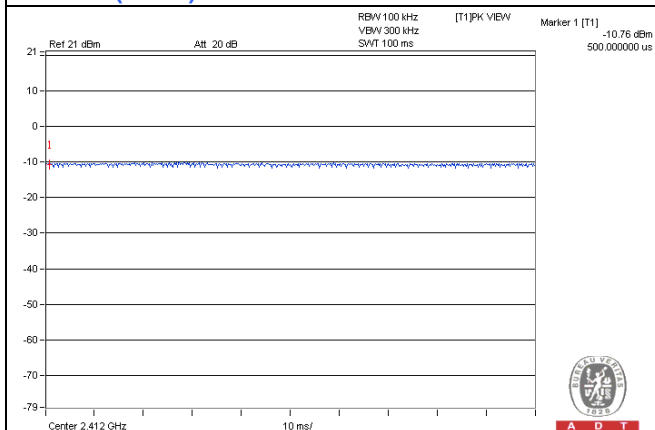
802.11b



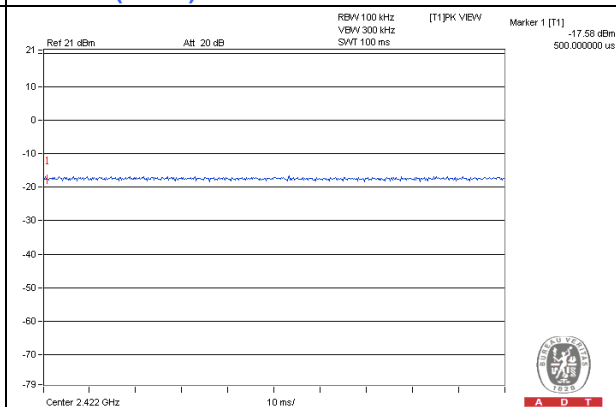
802.11g



802.11n (HT20)



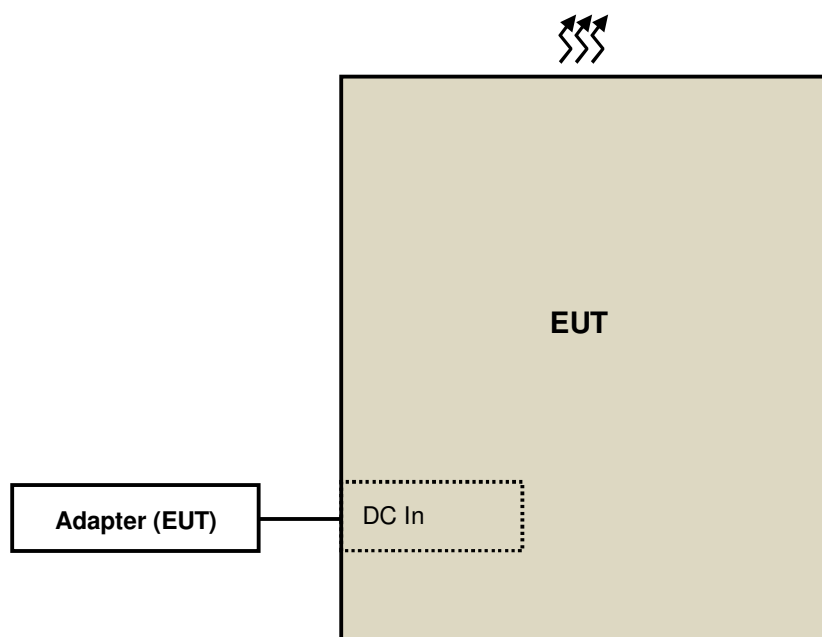
802.11n (HT40)



3.4 Description of Support Units

The EUT has been tested as an independent unit together without other necessary accessories or support units.

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 v03r05

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

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.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 26, 2015	Feb. 25, 2016
HP Preamplifier	8449B	3008A01201	Feb. 26, 2015	Feb. 25, 2016
MITEQ Preamplifier	AMF-6F-260400-3 3-8P	892164	Mar. 01, 2015	Feb. 28, 2016
Agilent Spectrum	E4446A	MY51100009	May 30, 2015	May 29, 2016
Agilent TEST RECEIVER	N9038A	MY51210129	Jan. 20, 2015	Jan. 19, 2016
Schwarzbeck Antenna	VULB 9168	139	Feb. 04, 2015	Feb. 03, 2016
Schwarzbeck Antenna	VHBA 9123	480	May 29, 2015	May 28, 2017
Schwarzbeck Horn Antenna	BBHA-9170	212	Feb. 09, 2015	Feb. 08, 2016
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Feb. 10, 2015	Feb. 09, 2016
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15. 9.4	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 15, 2015	Aug. 14, 2016
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 15, 2015	Aug. 14, 2016
EMCO Horn Antenna	3115	00028257	Feb. 05, 2015	Feb. 04, 2016
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2015	Sep. 22, 2016
Anritsu Power Sensor	MA2411B	0738404	Apr. 21, 2015	Apr. 20, 2016
Anritsu Power Meter	ML2495A	0842014	Apr. 21, 2015	Apr. 20, 2016

- NOTE:**
1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
 2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 3. The test was performed in Chamber No. 6.
 4. The Industry Canada Reference No. IC 7450E-6.
 5. The FCC Site Registration No. is 447212.

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:

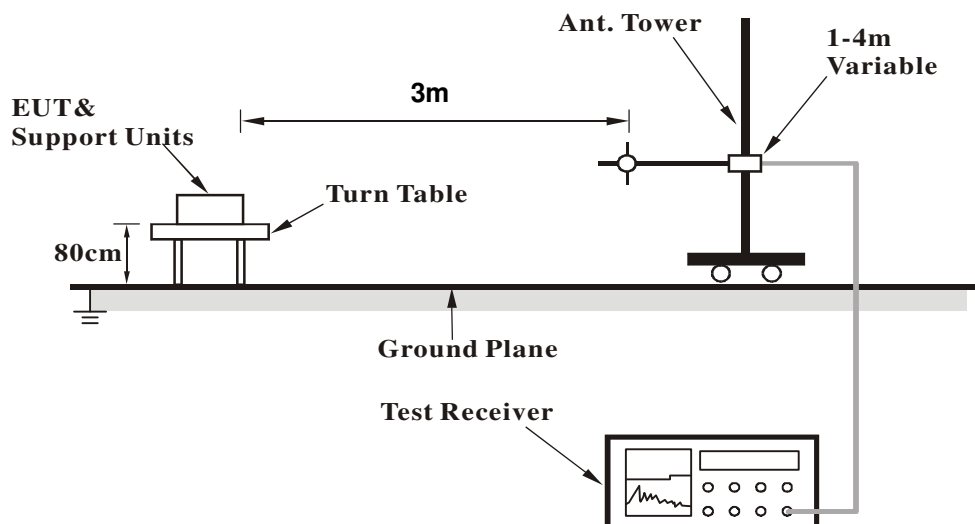
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

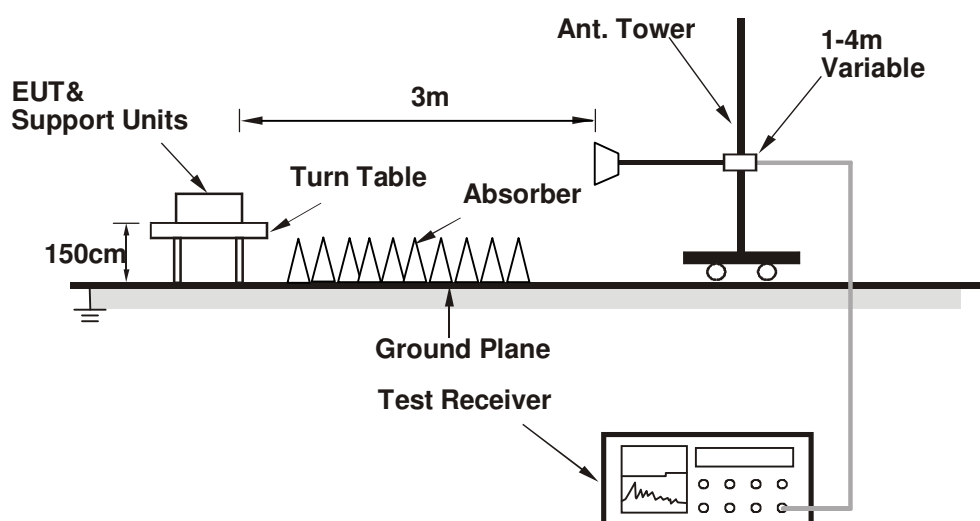
No deviation.

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

Connected the EUT to adapter.

Set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data :

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.2 PK	74.0	-15.8	2.37 H	304	57.71	0.52
2	2390.00	46.8 AV	54.0	-7.2	2.37 H	304	46.25	0.52
3	*2412.00	102.5 PK			2.37 H	304	101.80	0.65
4	*2412.00	100.0 AV			2.37 H	304	99.32	0.65
5	4824.00	52.3 PK	74.0	-21.7	2.03 H	298	44.48	7.83
6	4824.00	47.0 AV	54.0	-7.0	2.03 H	298	39.20	7.83
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	46.2 PK	74.0	-27.8	1.06 V	193	45.71	0.52
2	2390.00	33.8 AV	54.0	-20.2	1.06 V	193	33.24	0.52
3	*2412.00	92.7 PK			1.06 V	193	92.03	0.65
4	*2412.00	90.0 AV			1.06 V	193	89.37	0.65
5	4824.00	52.4 PK	74.0	-21.7	1.00 V	59	44.52	7.83
6	4824.00	42.1 AV	54.0	-11.9	1.00 V	59	34.27	7.83

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	103.9 PK			1.77 H	325	103.14	0.76
2	*2437.00	100.8 AV			1.77 H	325	100.03	0.76
3	4874.00	54.5 PK	74.0	-19.6	1.39 H	287	46.52	7.93
4	4874.00	46.9 AV	54.0	-7.1	1.39 H	287	38.94	7.93
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	93.3 PK			1.00 V	180	92.51	0.76
2	*2437.00	90.4 AV			1.00 V	180	89.63	0.76
3	4874.00	52.9 PK	74.0	-21.1	1.04 V	72	44.93	7.93
4	4874.00	42.6 AV	54.0	-11.4	1.04 V	72	34.71	7.93

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.7 PK			1.82 H	327	102.85	0.88
2	*2462.00	100.6 AV			1.82 H	327	99.72	0.88
3	2483.50	54.7 PK	74.0	-19.3	1.82 H	327	53.69	0.98
4	2483.50	45.8 AV	54.0	-8.2	1.82 H	327	44.81	0.98
5	4924.00	53.2 PK	74.0	-20.8	1.63 H	291	45.12	8.08
6	4924.00	46.3 AV	54.0	-7.7	1.63 H	291	38.26	8.08
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	93.8 PK			1.03 V	186	92.91	0.88
2	*2462.00	90.7 AV			1.03 V	186	89.84	0.88
3	2483.50	51.4 PK	74.0	-22.6	1.03 V	186	50.42	0.98
4	2483.50	41.3 AV	54.0	-12.7	1.03 V	186	40.31	0.98
5	4924.00	52.2 PK	74.0	-21.8	1.08 V	60	44.13	8.08
6	4924.00	42.3 AV	54.0	-11.7	1.08 V	60	34.25	8.08

REMARKS:

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

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.9 PK	74.0	-4.1	1.14 H	320	69.36	0.52
2	2390.00	52.7 AV	54.0	-1.3	1.14 H	320	52.19	0.52
3	*2412.00	105.5 PK			1.14 H	320	104.87	0.65
4	*2412.00	96.2 AV			1.14 H	320	95.51	0.65
5	4824.00	50.0 PK	74.0	-24.0	1.32 H	304	42.18	7.83
6	4824.00	40.6 AV	54.0	-13.4	1.32 H	304	32.77	7.83

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.5 PK	74.0	-16.5	1.00 V	180	56.97	0.52
2	2390.00	41.6 AV	54.0	-12.4	1.00 V	180	41.08	0.52
3	*2412.00	94.4 PK			1.00 V	180	93.78	0.65
4	*2412.00	84.9 AV			1.00 V	180	84.25	0.65
5	4824.00	48.9 PK	74.0	-25.1	1.02 V	114	41.06	7.83
6	4824.00	38.5 AV	54.0	-15.5	1.02 V	114	30.71	7.83

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.7 PK			1.21 H	317	104.93	0.76
2	*2437.00	96.3 AV			1.21 H	317	95.58	0.76
3	4874.00	50.3 PK	74.0	-23.7	1.41 H	292	42.35	7.93
4	4874.00	40.5 AV	54.0	-13.5	1.41 H	292	32.61	7.93
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	95.0 PK			1.01 V	182	94.27	0.76
2	*2437.00	85.7 AV			1.01 V	182	84.96	0.76
3	4874.00	49.1 PK	74.0	-24.9	1.00 V	119	41.18	7.93
4	4874.00	38.5 AV	54.0	-15.5	1.00 V	119	30.60	7.93

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.5 PK			1.00 H	320	104.65	0.88
2	*2462.00	96.1 AV			1.00 H	320	95.17	0.88
3	2483.50	70.7 PK	74.0	-3.3	1.00 H	320	69.73	0.98
4	2483.50	50.8 AV	54.0	-3.2	1.00 H	320	49.81	0.98
5	4924.00	50.6 PK	74.0	-23.4	1.30 H	298	42.51	8.08
6	4924.00	40.8 AV	54.0	-13.2	1.30 H	298	32.70	8.08
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	94.4 PK			1.00 V	183	93.54	0.88
2	*2462.00	85.7 AV			1.00 V	183	84.79	0.88
3	2483.50	54.4 PK	74.0	-19.6	1.00 V	183	53.42	0.98
4	2483.50	44.6 AV	54.0	-9.5	1.00 V	183	43.57	0.98
5	4924.00	49.3 PK	74.0	-24.7	1.07 V	93	41.18	8.08
6	4924.00	38.7 AV	54.0	-15.3	1.07 V	93	30.59	8.08

REMARKS:

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

802.11n (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	70.7 PK	74.0	-3.3	1.93 H	318	70.16	0.52
2	2390.00	52.9 AV	54.0	-1.2	1.93 H	318	52.33	0.52
3	*2412.00	104.4 PK			1.93 H	318	103.72	0.65
4	*2412.00	95.5 AV			1.93 H	318	94.88	0.65
5	4824.00	49.4 PK	74.0	-24.6	1.27 H	289	41.56	7.83
6	4824.00	39.6 AV	54.0	-14.4	1.27 H	289	31.74	7.83
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.7 PK	74.0	-16.3	1.03 V	178	57.18	0.52
2	2390.00	42.7 AV	54.0	-11.3	1.03 V	178	42.17	0.52
3	*2412.00	93.5 PK			1.03 V	178	92.89	0.65
4	*2412.00	83.8 AV			1.03 V	178	83.14	0.65
5	4824.00	48.7 PK	74.0	-25.4	1.07 V	123	40.82	7.83
6	4824.00	38.0 AV	54.0	-16.0	1.07 V	123	30.19	7.83

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	105.6 PK			1.91 H	313	104.83	0.76
2	*2437.00	96.0 AV			1.91 H	313	95.27	0.76
3	4874.00	50.8 PK	74.0	-23.2	1.33 H	291	42.85	7.93
4	4874.00	40.5 AV	54.0	-13.5	1.33 H	291	32.61	7.93
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	94.2 PK			1.05 V	182	93.42	0.76
2	*2437.00	84.5 AV			1.05 V	182	83.69	0.76
3	4874.00	48.3 PK	74.0	-25.7	1.06 V	131	40.38	7.93
4	4874.00	38.2 AV	54.0	-15.8	1.06 V	131	30.25	7.93

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	105.0 PK			1.96 H	319	104.08	0.88
2	*2462.00	95.2 AV			1.96 H	319	94.29	0.88
3	2483.50	66.8 PK	74.0	-7.2	1.96 H	319	65.84	0.98
4	2483.50	49.0 AV	54.0	-5.0	1.96 H	319	48.06	0.98
5	4924.00	50.2 PK	74.0	-23.8	1.24 H	287	42.08	8.08
6	4924.00	40.2 AV	54.0	-13.8	1.24 H	287	32.15	8.08
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	94.6 PK			1.03 V	184	93.75	0.88
2	*2462.00	85.1 AV			1.03 V	184	84.21	0.88
3	2483.50	54.5 PK	74.0	-19.6	1.03 V	184	53.47	0.98
4	2483.50	43.2 AV	54.0	-10.8	1.03 V	184	42.19	0.98
5	4924.00	49.0 PK	74.0	-25.0	1.00 V	118	40.93	8.08
6	4924.00	38.9 AV	54.0	-15.1	1.00 V	118	30.81	8.08

REMARKS:

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

802.11n (40MHz)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.9 PK	74.0	-8.1	1.93 H	318	65.39	0.52
2	2390.00	51.4 AV	54.0	-2.6	1.93 H	318	50.91	0.52
3	*2422.00	98.8 PK			1.93 H	318	98.11	0.69
4	*2422.00	89.2 AV			1.93 H	318	88.53	0.69
5	4844.00	51.4 PK	74.0	-22.6	1.30 H	292	43.56	7.87
6	4844.00	41.1 AV	54.0	-13.0	1.30 H	292	33.18	7.87
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.9 PK	74.0	-16.1	1.00 V	177	57.39	0.52
2	2390.00	44.7 AV	54.0	-9.3	1.00 V	177	44.18	0.52
3	*2422.00	90.6 PK			1.00 V	177	89.93	0.69
4	*2422.00	80.8 AV			1.00 V	177	80.07	0.69
5	4844.00	49.0 PK	74.0	-25.0	1.02 V	107	41.15	7.87
6	4844.00	38.8 AV	54.0	-15.2	1.02 V	107	30.96	7.87

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	100.1 PK			1.93 H	324	99.31	0.76
2	*2437.00	90.5 AV			1.93 H	324	89.72	0.76
3	4874.00	51.6 PK	74.0	-22.4	1.33 H	295	43.67	7.93
4	4874.00	41.2 AV	54.0	-12.8	1.33 H	295	33.29	7.93
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	90.4 PK			1.00 V	181	89.62	0.76
2	*2437.00	80.9 AV			1.00 V	181	80.17	0.76
3	4874.00	48.8 PK	74.0	-25.2	1.06 V	113	40.91	7.93
4	4874.00	38.5 AV	54.0	-15.5	1.06 V	113	30.58	7.93

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	99.8 PK			1.91 H	322	98.93	0.83
2	*2452.00	90.4 AV			1.91 H	322	89.54	0.83
3	2483.50	63.9 PK	74.0	-10.1	1.91 H	322	62.89	0.98
4	2483.50	49.0 AV	54.0	-5.0	1.91 H	322	48.06	0.98
5	4904.00	51.7 PK	74.0	-22.3	1.37 H	299	43.67	8.00
6	4904.00	41.5 AV	54.0	-12.5	1.37 H	299	33.49	8.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	90.1 PK			1.06 V	179	89.23	0.83
2	*2452.00	80.7 AV			1.06 V	179	79.85	0.83
3	2483.50	54.2 PK	74.0	-19.8	1.06 V	179	53.18	0.98
4	2483.50	43.9 AV	54.0	-10.1	1.06 V	179	42.96	0.98
5	4904.00	49.1 PK	74.0	-25.0	1.00 V	115	41.05	8.00
6	4904.00	38.8 AV	54.0	-15.2	1.00 V	115	30.82	8.00

REMARKS:

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

Below 1GHz Data:

802.11g

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	78.06	25.6 QP	40.0	-14.4	4.00 H	274	38.38	-12.77
2	119.24	26.4 QP	43.5	-17.1	4.00 H	86	37.61	-11.24
3	167.01	26.3 QP	43.5	-17.2	3.82 H	352	34.82	-8.50
4	409.75	26.4 QP	46.0	-19.6	2.51 H	126	31.06	-4.69
5	598.42	29.4 QP	46.0	-16.7	1.90 H	20	29.94	-0.59
6	971.68	35.0 QP	54.0	-19.0	1.00 H	211	29.18	5.80
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	33.06	33.7 QP	40.0	-6.4	1.62 V	111	44.17	-10.52
2	103.87	24.9 QP	43.5	-18.7	1.00 V	248	37.44	-12.59
3	270.03	23.0 QP	46.0	-23.0	1.00 V	231	30.76	-7.76
4	551.62	27.9 QP	46.0	-18.1	2.25 V	70	29.52	-1.60
5	768.51	31.7 QP	46.0	-14.3	2.97 V	56	29.46	2.25
6	982.69	35.1 QP	54.0	-18.9	2.03 V	162	29.21	5.93

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (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.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 01, 2015	Mar. 31, 2016
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	Apr. 27, 2015	Apr. 26, 2016
LISN With Adapter (for EUT)	AD10	C10Ada-002	Apr. 27, 2015	Apr. 26, 2016
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 25, 2014	Nov. 24, 2015
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 06, 2015	May 05, 2016
Software	Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 17, 2015	Feb. 16, 2016
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 19, 2015	May 18, 2016
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 20, 2014	Nov. 19, 2015
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 20, 2014	Nov. 19, 2015

Notes: 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 Shielded Room No. 10.

3. The VCCI Site Registration No. C-1852.

4.2.3 Test Procedures

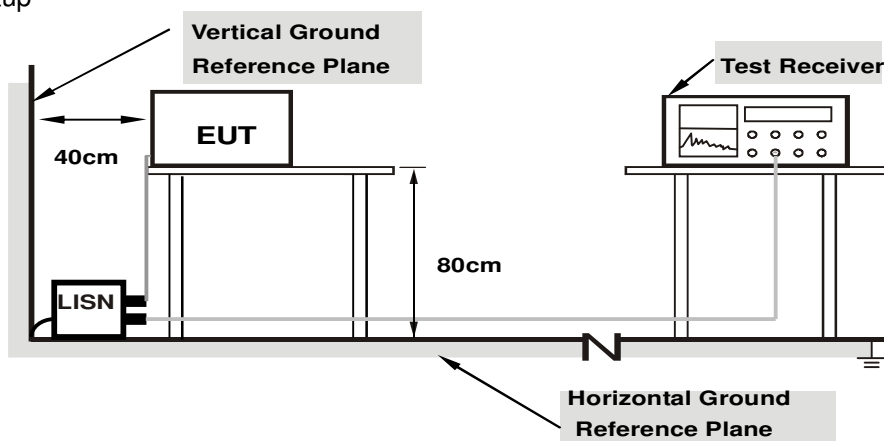
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance 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: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

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

802.11g Ch 6

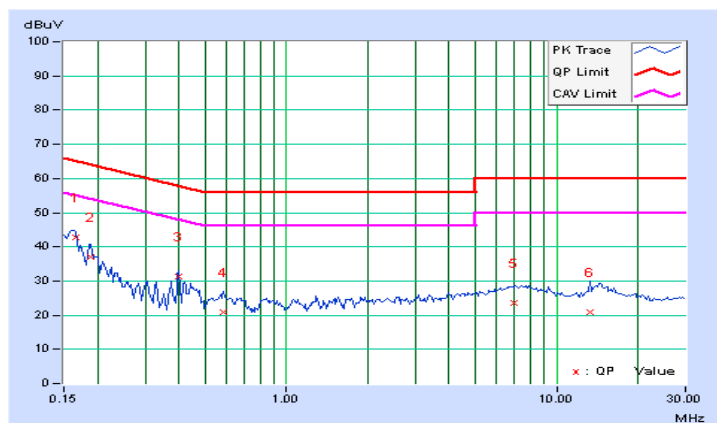
Mode A

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	9.67	33.10	19.41	42.77	29.08	65.18	55.18	-22.40	-26.09
2	0.18906	9.68	27.49	15.96	37.17	25.64	64.08	54.08	-26.91	-28.44
3	0.40000	9.69	21.70	17.27	31.39	26.96	57.85	47.85	-26.46	-20.89
4	0.58750	9.71	11.31	11.21	21.02	20.92	56.00	46.00	-34.98	-25.08
5	6.98828	10.01	13.52	6.34	23.53	16.35	60.00	50.00	-36.47	-33.65
6	13.34766	10.10	10.84	2.58	20.94	12.68	60.00	50.00	-39.06	-37.32

Remarks:

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

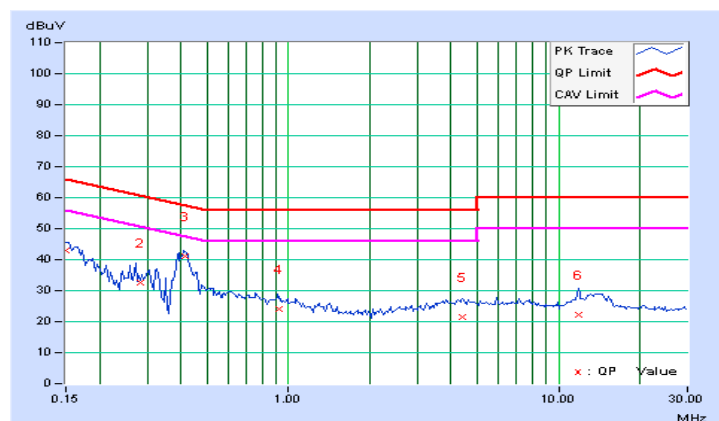


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.72	33.40	16.39	43.12	26.11	66.00	56.00	-22.88	-29.89
2	0.28382	9.73	22.88	16.38	32.61	26.11	60.70	50.70	-28.09	-24.59
3	0.41681	9.74	31.28	27.61	41.02	37.35	57.51	47.51	-16.49	-10.16
4	0.91965	9.78	14.32	6.67	24.10	16.45	56.00	46.00	-31.90	-29.55
5	4.41797	9.99	11.58	3.19	21.57	13.18	56.00	46.00	-34.43	-32.82
6	11.86719	10.14	12.13	4.45	22.27	14.59	60.00	50.00	-37.73	-35.41

Remarks:

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



802.11g Ch 6

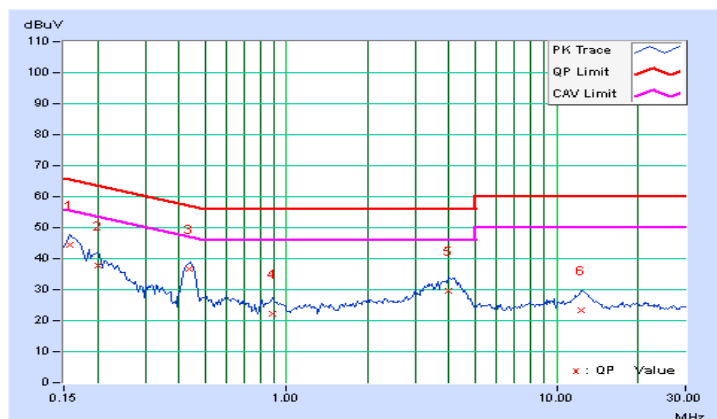
Mode B

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

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.67	34.78	18.79	44.45	28.46	65.58	55.58	-21.13	-27.12
2	0.20078	9.68	28.08	11.57	37.76	21.25	63.58	53.58	-25.82	-32.33
3	0.43651	9.69	27.03	18.31	36.72	28.00	57.13	47.13	-20.40	-19.12
4	0.88438	9.75	12.64	3.09	22.39	12.84	56.00	46.00	-33.61	-33.16
5	3.99219	9.95	19.77	7.37	29.72	17.32	56.00	46.00	-26.28	-28.68
6	12.30469	10.09	13.11	4.55	23.20	14.64	60.00	50.00	-36.80	-35.36

Remarks:

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

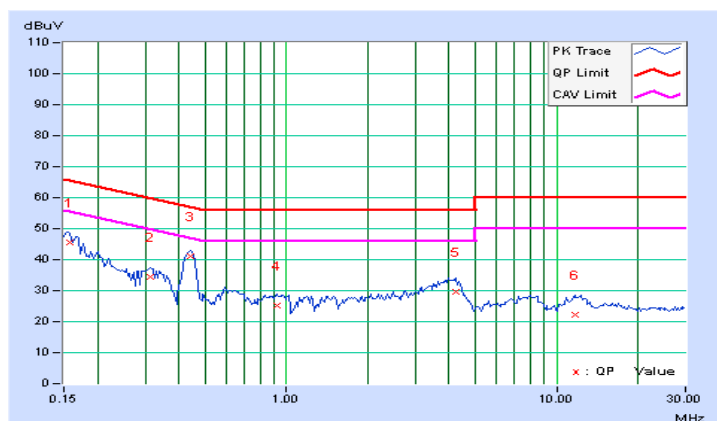


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.72	35.75	21.69	45.47	31.41	65.58	55.58	-20.11	-24.17
2	0.31406	9.74	24.58	15.83	34.32	25.57	59.86	49.86	-25.55	-24.30
3	0.43906	9.74	31.23	23.71	40.97	33.45	57.08	47.08	-16.11	-13.63
4	0.91953	9.78	15.59	6.73	25.37	16.51	56.00	46.00	-30.63	-29.49
5	4.25000	9.99	19.75	7.44	29.74	17.43	56.00	46.00	-26.26	-28.57
6	11.67578	10.14	12.17	5.23	22.31	15.37	60.00	50.00	-37.69	-34.63

Remarks:

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

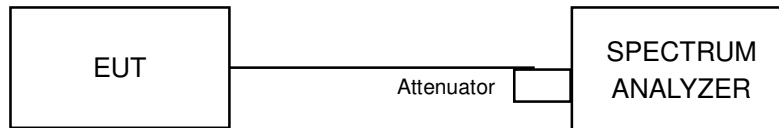


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.09	0.5	PASS
6	2437	10.09	0.5	PASS
11	2462	10.09	0.5	PASS

802.11g

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.60	0.5	PASS
6	2437	16.61	0.5	PASS
11	2462	16.47	0.5	PASS

802.11n (20MHz)

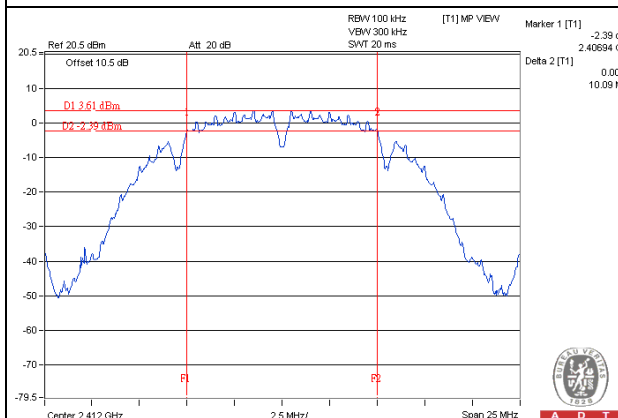
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.78	0.5	Pass
6	2437	17.85	0.5	Pass
11	2462	17.86	0.5	Pass

802.11n (40MHz)

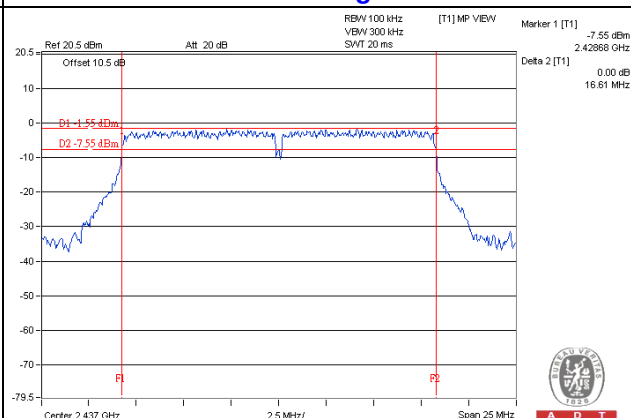
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.51	0.5	Pass
6	2437	36.41	0.5	Pass
9	2452	36.62	0.5	Pass

Spectrum Plot of Worst Value

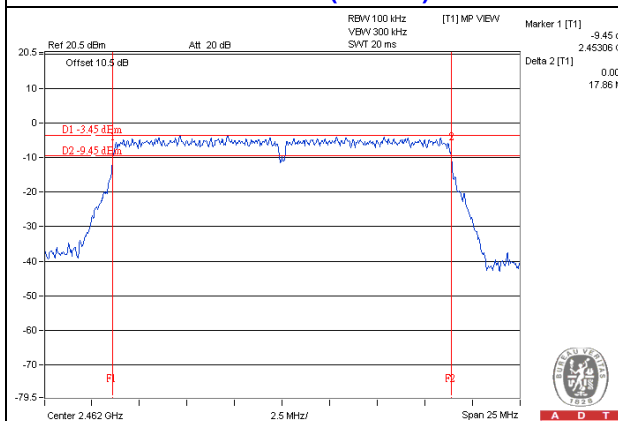
802.11b



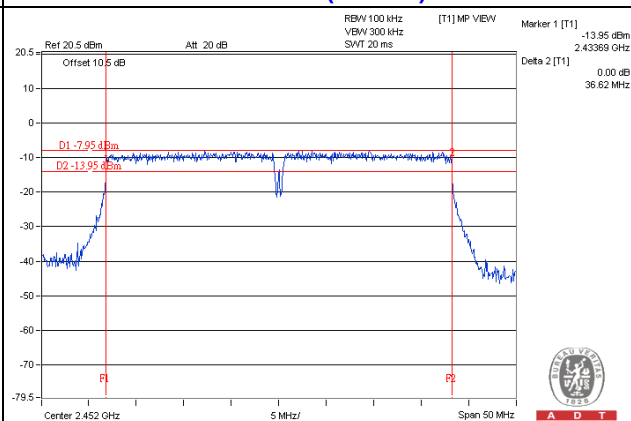
802.11g



802.11n (20MHz)



802.11n (40MHz)

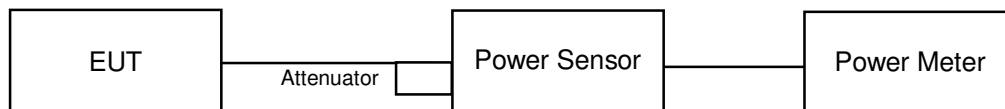


4.4 Conducted Output Power Measurement

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

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	55.719	17.46	30	Pass
6	2437	55.208	17.42	30	Pass
11	2462	57.677	17.61	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	138.038	21.40	30	Pass
6	2437	175.792	22.45	30	Pass
11	2462	159.588	22.03	30	Pass

802.11n (20MHz)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	106.660	20.28	30	Pass
6	2437	136.773	21.36	30	Pass
11	2462	136.144	21.34	30	Pass

802.11n (40MHz)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
3	2422	44.566	16.49	30	Pass
6	2437	101.158	20.05	30	Pass
9	2452	95.719	19.81	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	32.359	15.10
6	2437	32.285	15.09
11	2462	33.343	15.23

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	25.235	14.02
6	2437	26.424	14.22
11	2462	25.645	14.09

802.11n (20MHz)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	20.045	13.02
6	2437	21.086	13.24
11	2462	20.941	13.21

802.11n (40MHz)

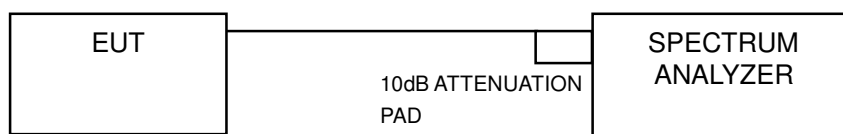
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	6.324	8.01
6	2437	16.144	12.08
9	2452	15.776	11.98

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set 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)	Limit (dBm)	Pass /Fail
1	2412	-14.72	8	Pass
6	2437	-15.99	8	Pass
11	2462	-16.29	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-16.87	8	Pass
6	2437	-13.87	8	Pass
11	2462	-15.45	8	Pass

802.11n (20MHz)

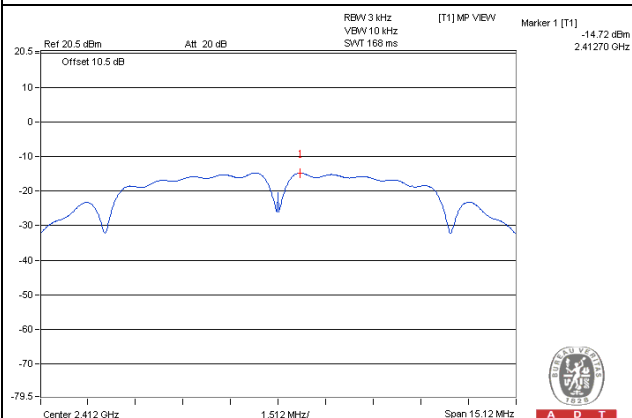
Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-17.15	8	Pass
6	2437	-16.33	8	Pass
11	2462	-16.74	8	Pass

802.11n (40MHz)

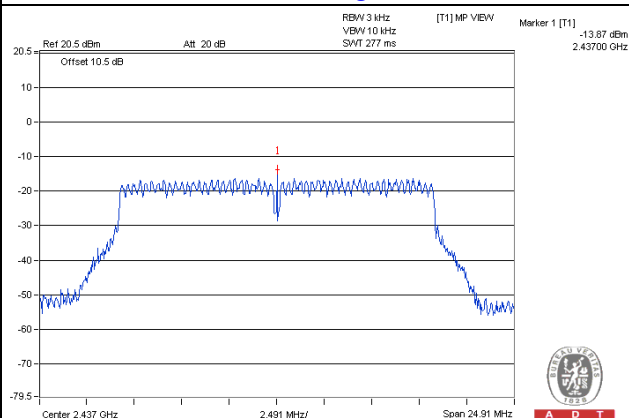
Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	PASS /FAIL
3	2422	-22.60	8	PASS
6	2437	-19.04	8	PASS
9	2452	-17.86	8	PASS

Spectrum Plot of Worst Value

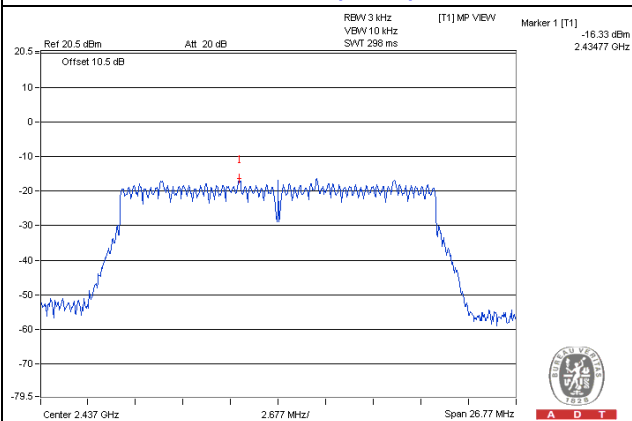
802.11b



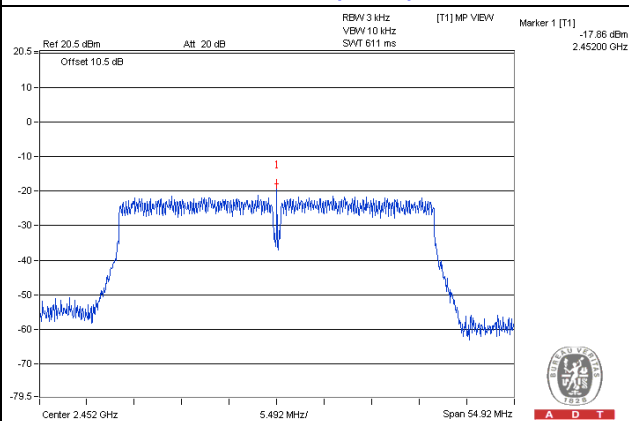
802.11g



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 $\geq$ 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

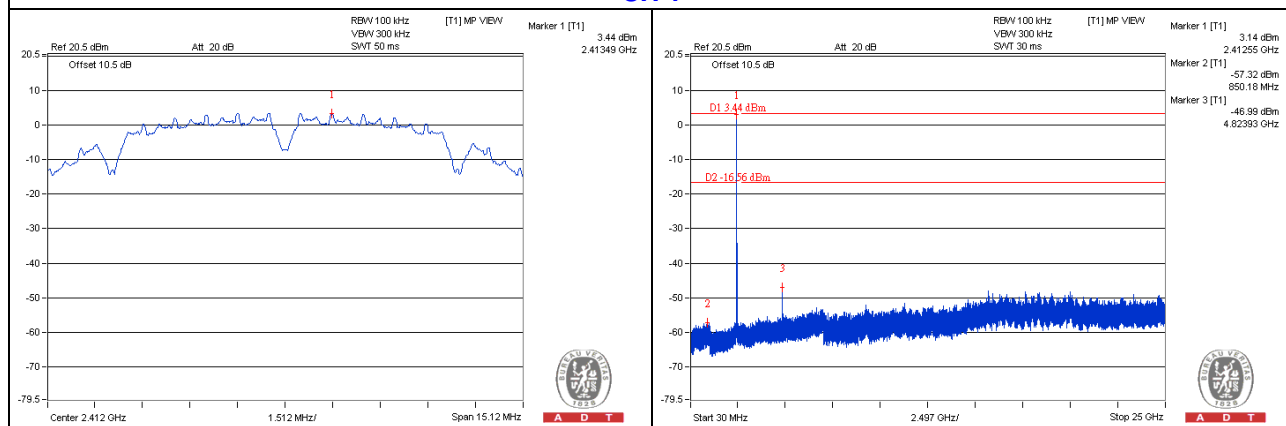
Same as Item 4.3.6

4.6.7 Test Results

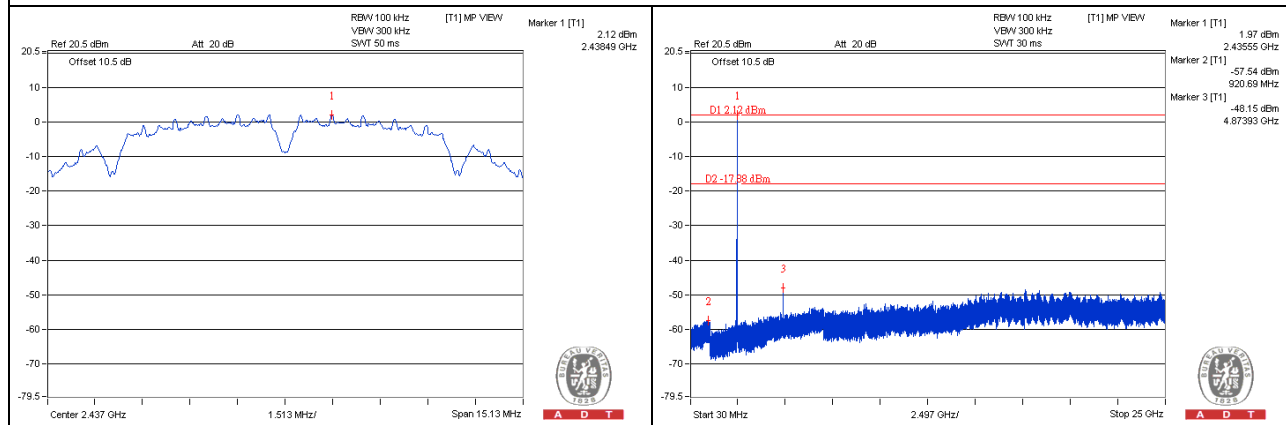
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

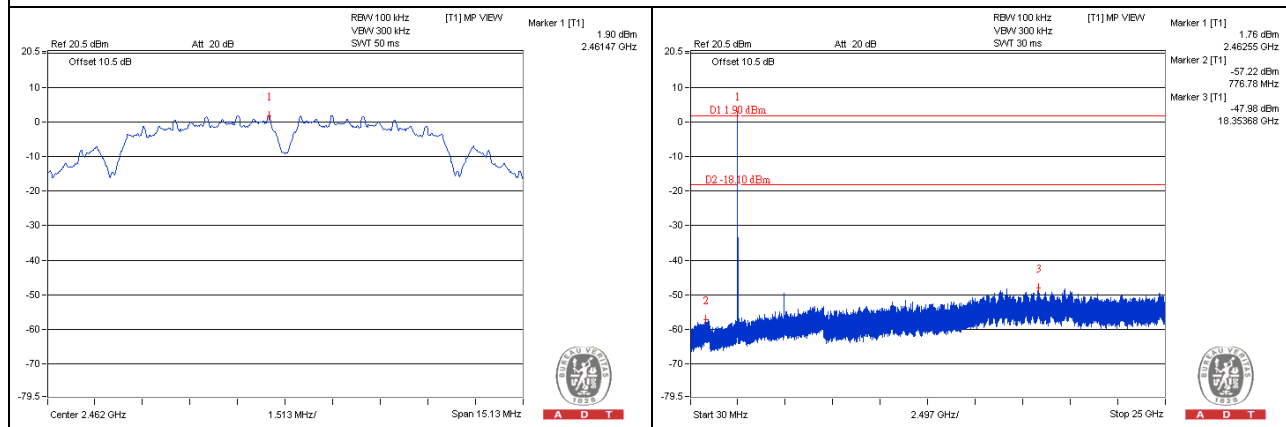
CH 1



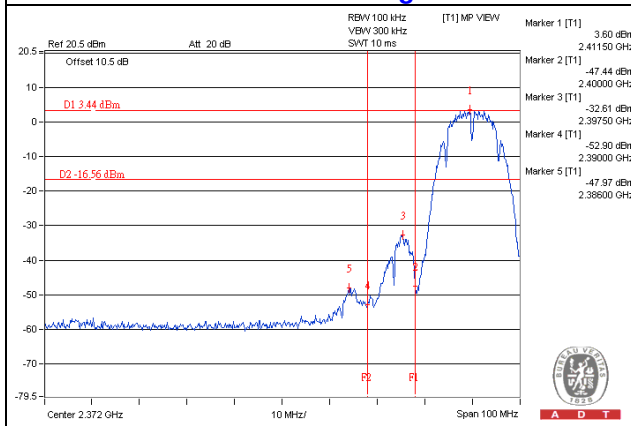
CH 6



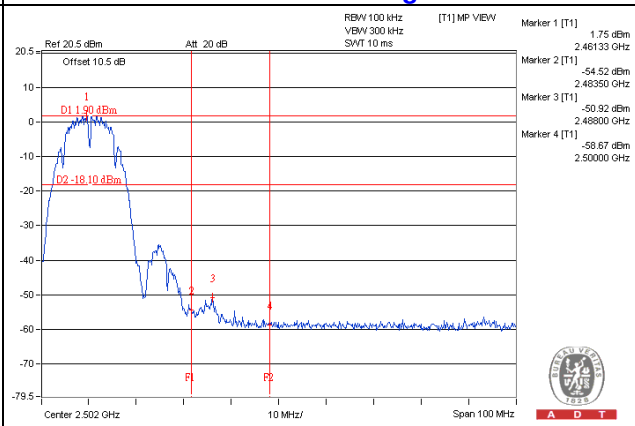
CH 11



CH 1 Band edge

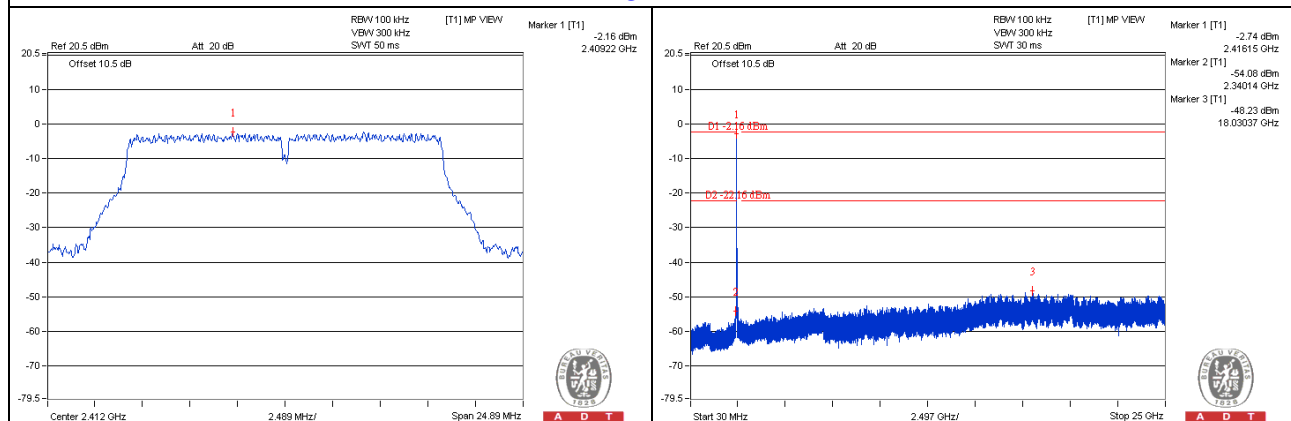


CH 11 Band edge

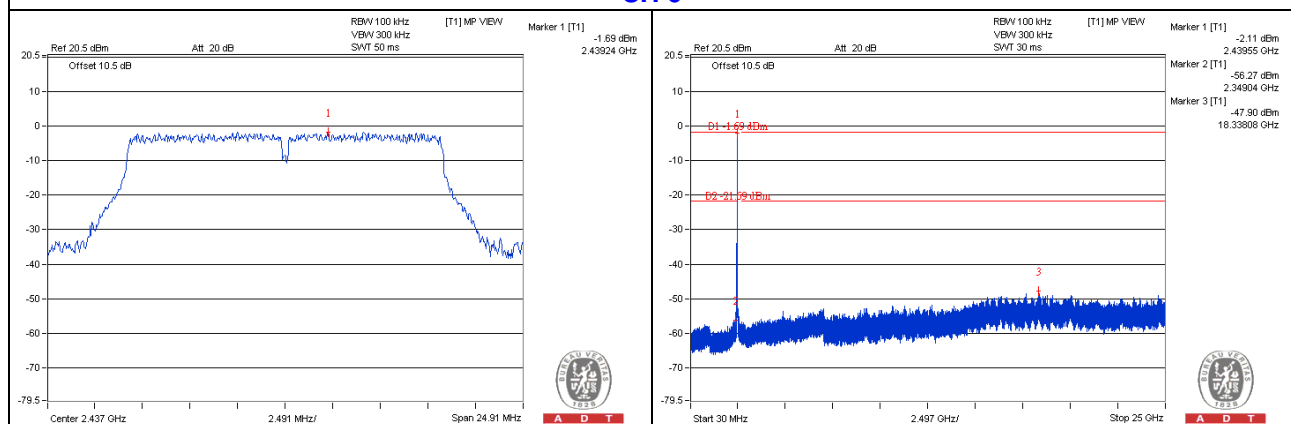


802.11g

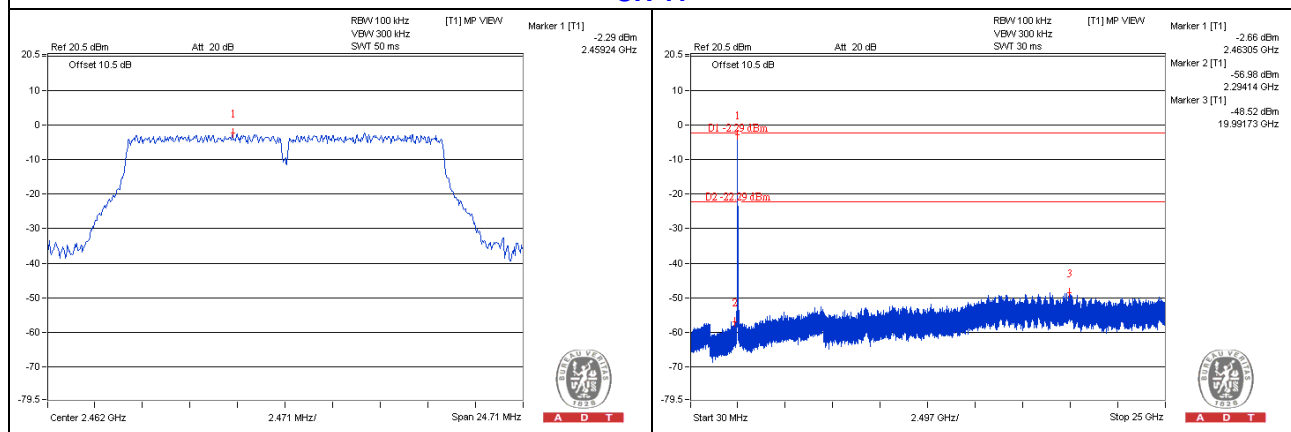
CH 1



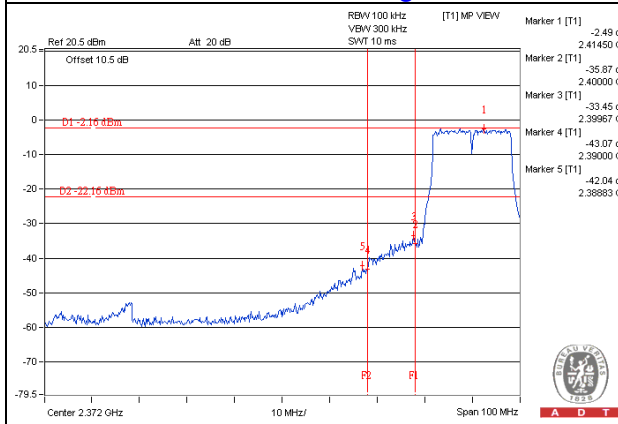
CH 6



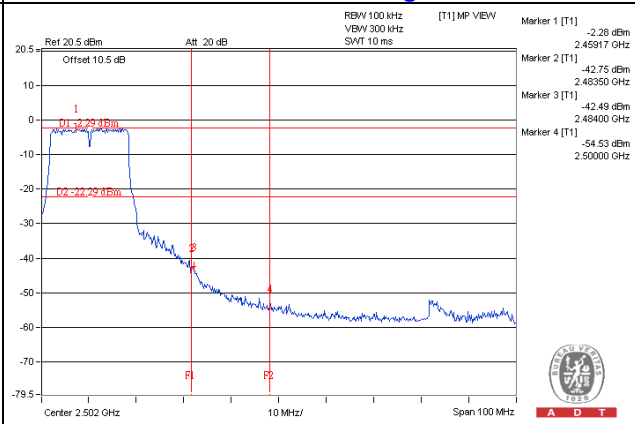
CH 11



CH 1 Band edge

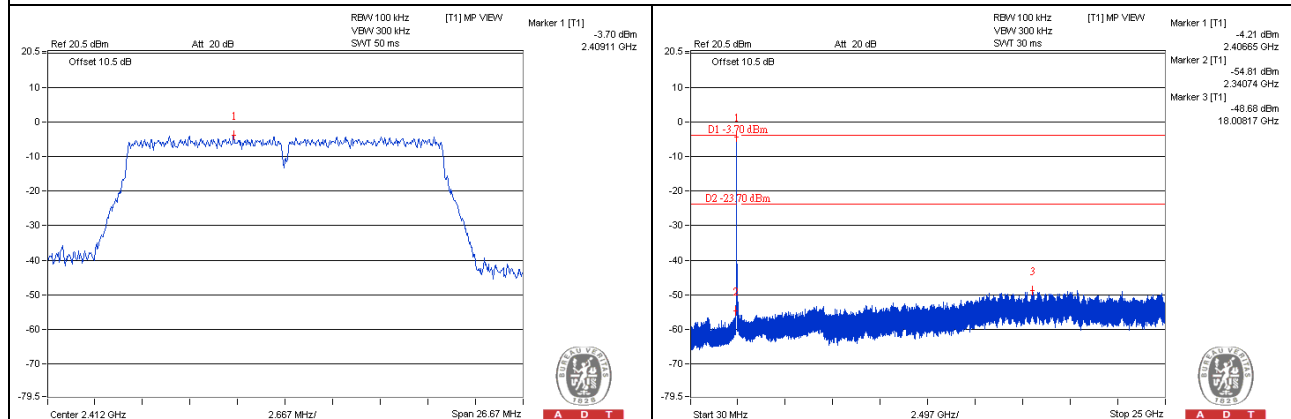


CH 11 Band edge

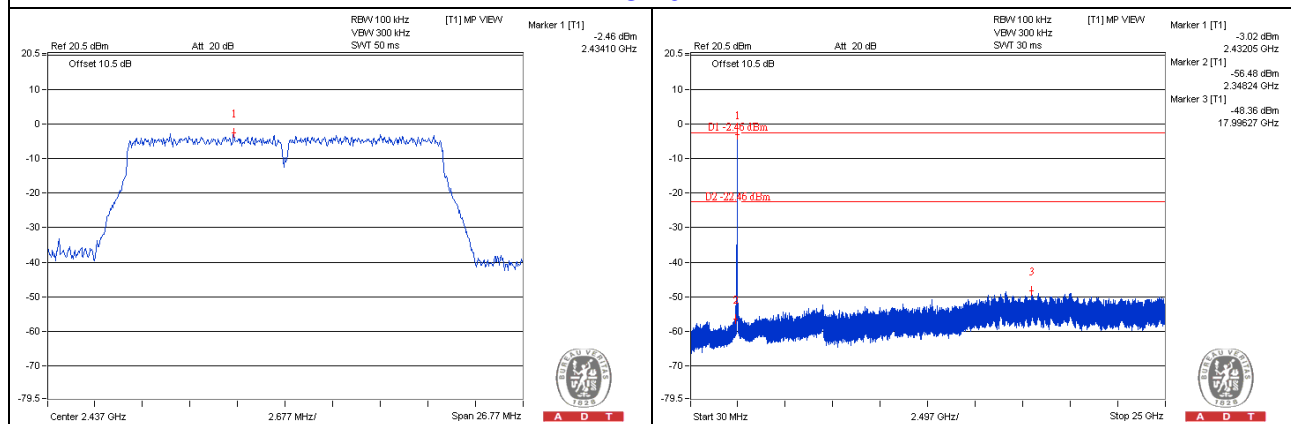


802.11n (20MHz)

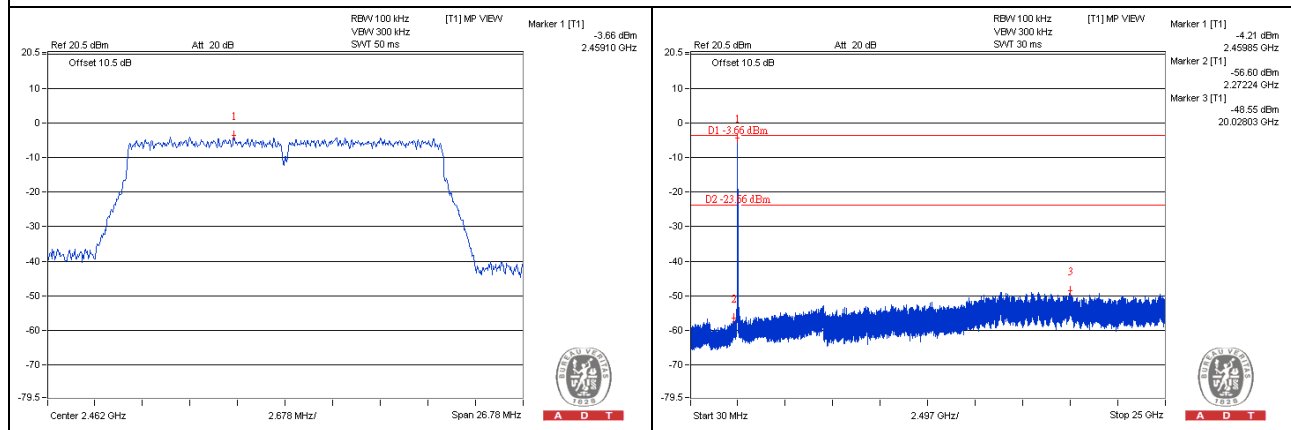
CH 1



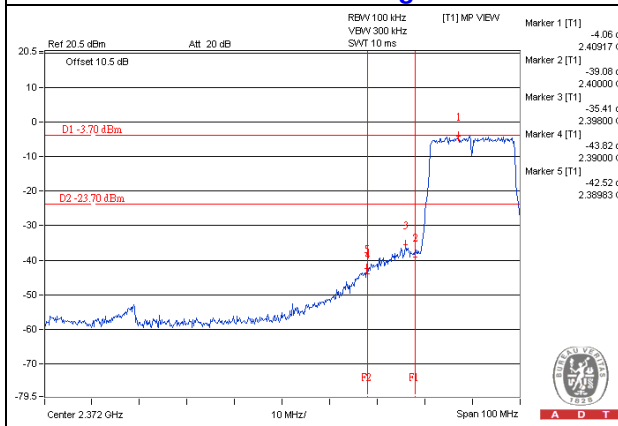
CH 6



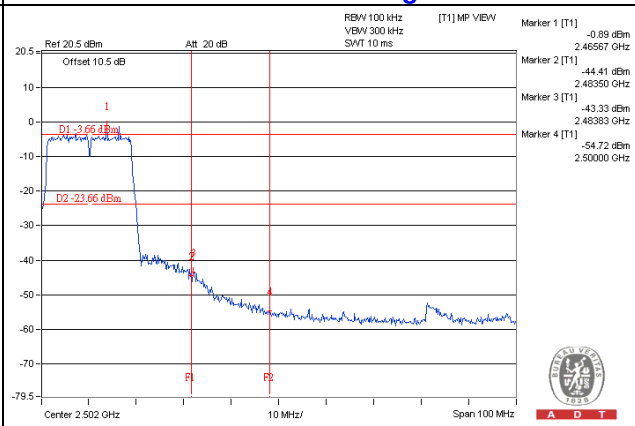
CH 11



CH 1 Band edge

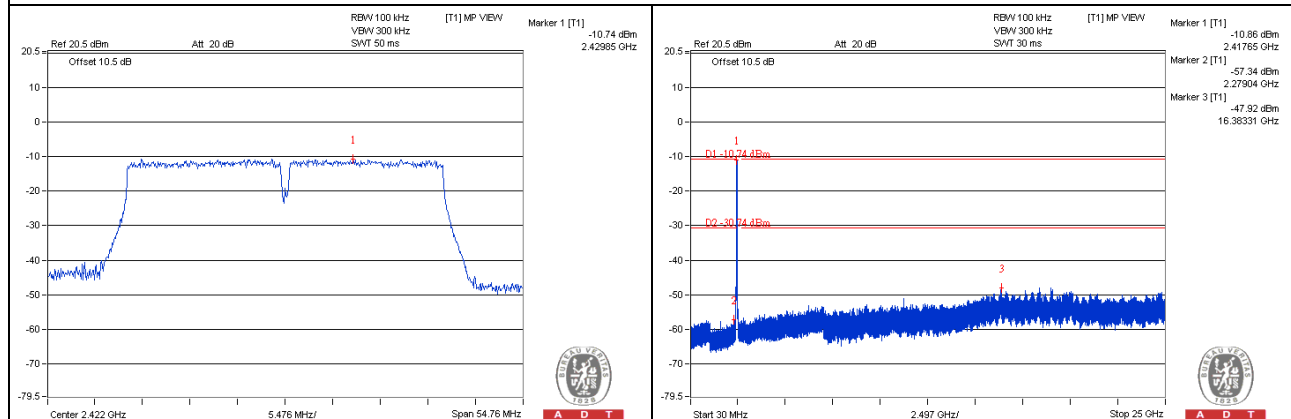


CH 11 Band edge

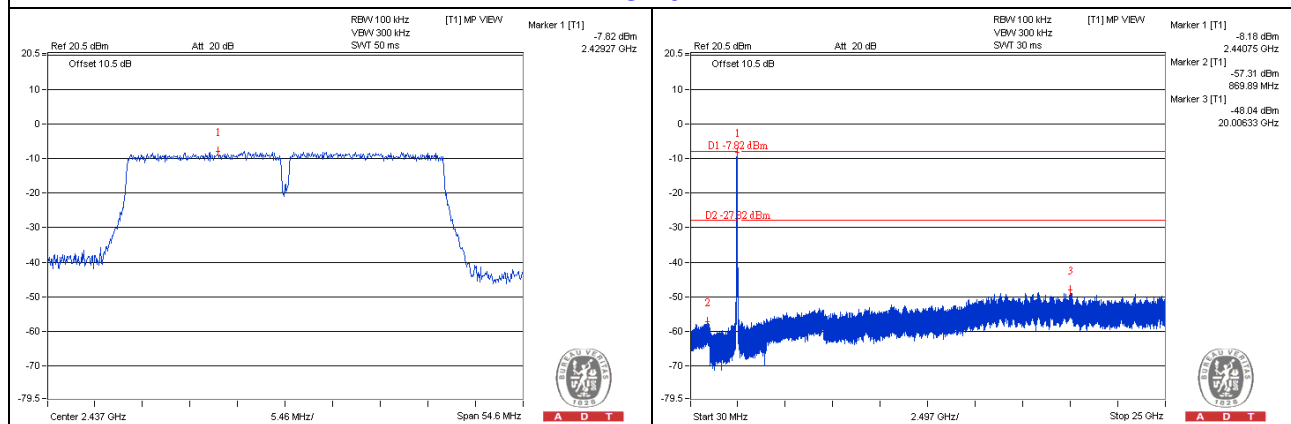


802.11n (40MHz)

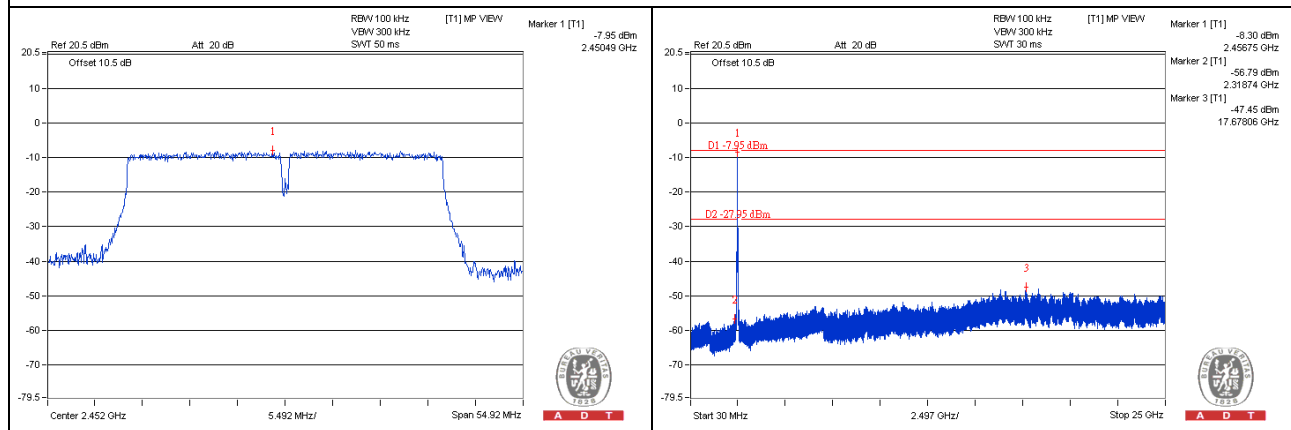
CH 3



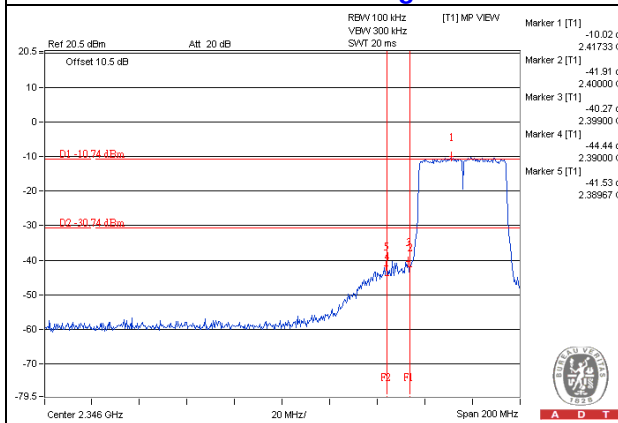
CH 6



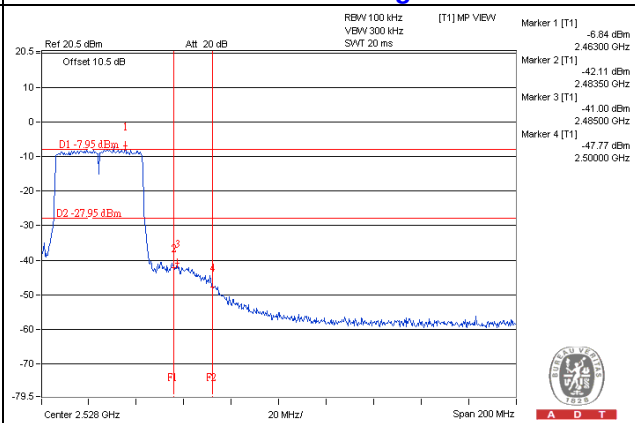
CH 9



CH 3 Band edge



CH 9 Band edge



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

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Tel: 886-3-3183232

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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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