

FCC Test Report

Report No.: RF151111C29

FCC ID: SXE-JAO1501

Test Model: JAO15

Received Date: Nov. 11, 2015

Test Date: Nov. 17, 2015 ~ Nov. 19, 2015

Issued Date: Nov. 30, 2015

Applicant: Barco N.V

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

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Release Control Record

Issue No.	Description	Date Issued
RF151111C29	Original Release	Nov. 30, 2015

1 Certificate of Conformity

Product: Panel PC

Brand: Barco

Test Model: JAO15

Sample Status: Identical Prototype

Applicant: Barco N.V

Test Date: Nov. 17, 2015 ~ Nov. 19, 2015

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2009

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 : Gina Liu, **Date:** Nov. 30, 2015
Gina Liu / Specialist

Approved by : Stanley Wu, **Date:** Nov. 30, 2015
Stanley Wu / 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 -16.71 dB at 0.41560 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -1.03 dB at 4824 MHz.
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:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 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

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Panel PC
Brand	Barco
Test Model	JAO15
Status of EUT	Identical Prototype
Power Supply Rating	19Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to MCS7
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (20MHz) 7 for 802.11n (40MHz)
Output Power	194.09mW
Antenna Type	Dipole antenna with 3.66 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

- The EUT provides one completed transmitter and one receiver.

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

- The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	N/A	MDS-090AAS19 B	I/P: 100-240Vac, 50/60Hz, 1.5mA O/P: 19Vdc, 4.74mA

- 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 (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 $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-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	MCS0
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Radiated Emission Test (Below 1GHz):

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

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

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

Power Line Conducted Emission Test:

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

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	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, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	MCS0

Antenna Port Conducted Measurement:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	MCS0
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	MCS0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	25deg. C, 65%RH	120Vac, 60Hz	Karl Lee
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Karl Lee
PLC	25deg. C, 68%RH	120Vac, 60Hz	Toby Tian
APCM	21deg. C, 60%RH	120Vac, 60Hz	Carlos Chen

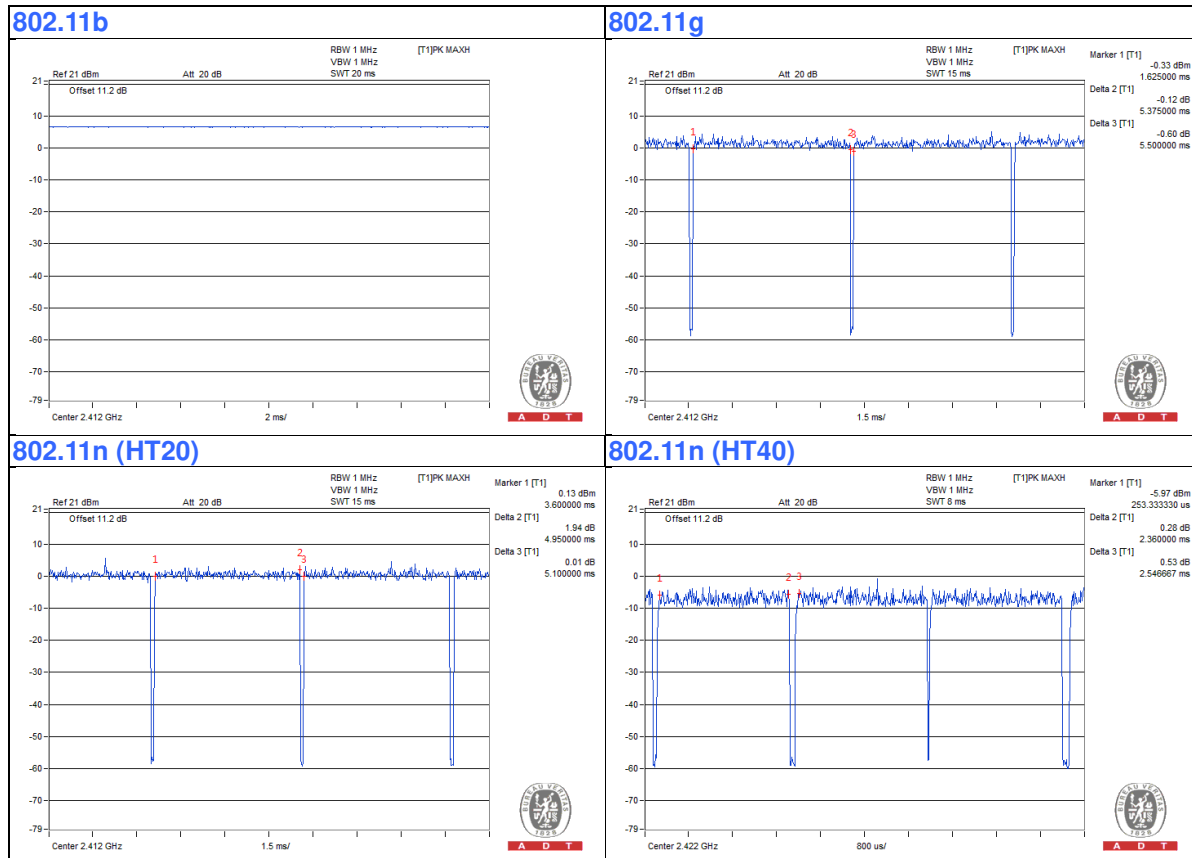
3.3 Duty Cycle of Test Signal

802.11b: Duty cycle of test signal is 100 %

802.11g: Duty cycle = $5.375/5.50 = 0.977$, Duty factor = $10 * \log(1/0.977) = 0.10$

802.11n (HT20): Duty cycle = $4.95/5.10 = 0.971$, Duty factor = $10 * \log(1/0.971) = 0.13$

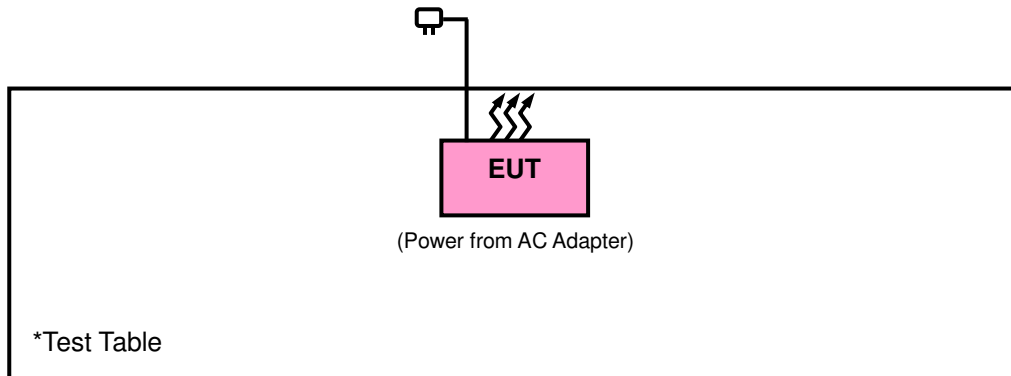
802.11n (HT40): Duty cycle = $2.36/2.547 = 0.927$, Duty factor = $10 * \log(1/0.927) = 0.33$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

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 C63.10-2009

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC).
The test report has been issued separately.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2015	Jan. 21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220207	Sep. 11, 2015	Sep. 10, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 10, 2014	Dec. 09, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 12, 2014	Dec. 11, 2015
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2014	Dec. 26, 2015
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 12, 2015	Oct. 11, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 12, 2015	Oct. 11, 2016
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2015	Oct. 11, 2016
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and HP preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC7450F-10.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

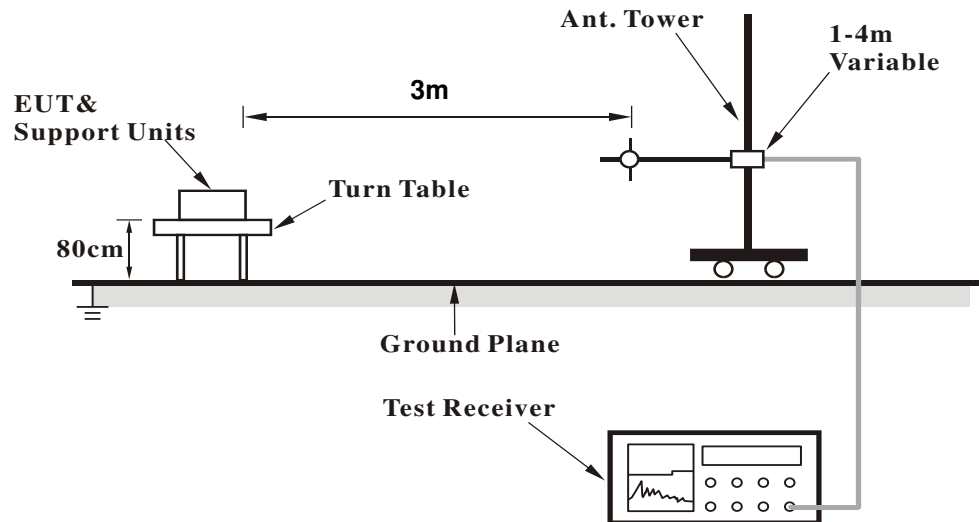
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz 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 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

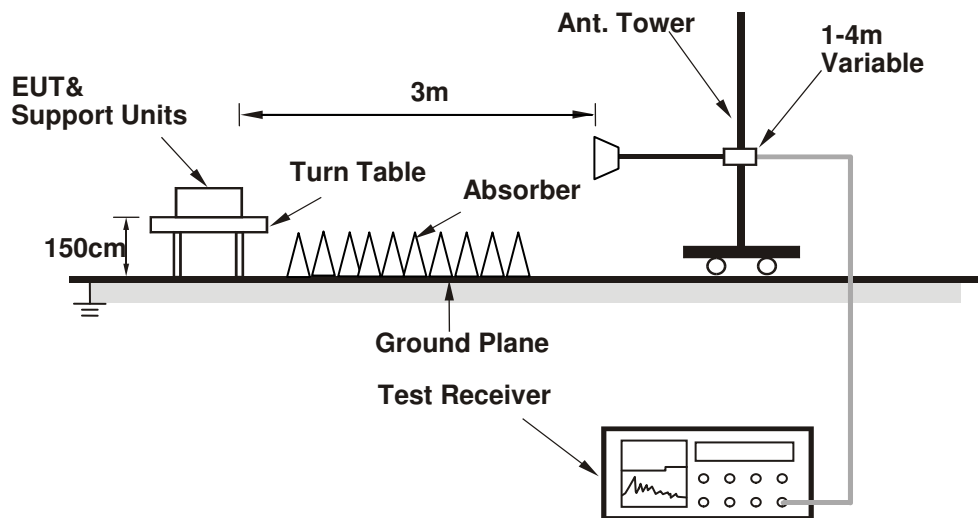
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz Data :

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2388	45.58	43.87	54	-8.42	31.8	5.4	35.49	115	265	Average
2388	57.68	55.97	74	-16.32	31.8	5.4	35.49	115	265	Peak
2412	107.53	105.76			31.81	5.43	35.47	115	265	Average
2412	110.01	108.24			31.81	5.43	35.47	115	265	Peak
2488	40.34	38.33	54	-13.66	31.9	5.53	35.42	115	265	Average
2488	55.78	53.77	74	-18.22	31.9	5.53	35.42	115	265	Peak
4824	52.97	44.84	54	-1.03	33.97	8.26	34.1	112	201	Average
4824	56.78	48.65	74	-17.22	33.97	8.26	34.1	112	201	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2356	40.86	39.23	54	-13.14	31.76	5.37	35.5	263	137	Average
2356	55.73	54.1	74	-18.27	31.76	5.37	35.5	263	137	Peak
2412	101.45	99.68			31.81	5.43	35.47	263	137	Average
2412	104.03	102.26			31.81	5.43	35.47	263	137	Peak
2484	40.04	38.08	54	-13.96	31.88	5.5	35.42	263	137	Average
2484	55.94	53.98	74	-18.06	31.88	5.5	35.42	263	137	Peak
4824	48.53	40.4	54	-5.47	33.97	8.26	34.1	152	285	Average
4824	53.43	45.3	74	-20.57	33.97	8.26	34.1	152	285	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2358	40.13	38.5	54	-13.87	31.76	5.37	35.5	113	267	Average
2358	54.99	53.36	74	-19.01	31.76	5.37	35.5	113	267	Peak
2437	104.81	102.96			31.85	5.46	35.46	113	267	Average
2437	107.36	105.51			31.85	5.46	35.46	113	267	Peak
2500	41.43	39.41	54	-12.57	31.9	5.53	35.41	113	267	Average
2500	55.69	53.67	74	-18.31	31.9	5.53	35.41	113	267	Peak
4874	52.53	44.34	54	-1.47	33.98	8.27	34.06	124	212	Average
4874	56.14	47.95	74	-17.86	33.98	8.27	34.06	124	212	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2320	39.43	37.92	54	-14.57	31.73	5.3	35.52	257	133	Average
2320	56.16	54.65	74	-17.84	31.73	5.3	35.52	257	133	Peak
2437	98.81	96.96			31.85	5.46	35.46	257	133	Average
2437	101.41	99.56			31.85	5.46	35.46	257	133	Peak
2484	40.08	38.12	54	-13.92	31.88	5.5	35.42	257	133	Average
2484	56.65	54.69	74	-17.35	31.88	5.5	35.42	257	133	Peak
4874	44.89	36.7	54	-9.11	33.98	8.27	34.06	153	185	Average
4874	52.1	43.91	74	-21.9	33.98	8.27	34.06	153	185	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2380	39.55	37.89	54	-14.45	31.78	5.37	35.49	127	266	Average
2380	55.22	53.56	74	-18.78	31.78	5.37	35.49	127	266	Peak
2462	104.8	102.87			31.87	5.5	35.44	127	266	Average
2462	107.46	105.53			31.87	5.5	35.44	127	266	Peak
2500	41.83	39.81	54	-12.17	31.9	5.53	35.41	127	266	Average
2500	56.28	54.26	74	-17.72	31.9	5.53	35.41	127	266	Peak
4924	52.96	44.71	54	-1.04	33.99	8.28	34.02	185	241	Average
4924	56.98	48.73	74	-17.02	33.99	8.28	34.02	185	241	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2348	39.53	37.96	54	-14.47	31.74	5.33	35.5	100	28	Average
2348	55.42	53.85	74	-18.58	31.74	5.33	35.5	100	28	Peak
2462	98.36	96.43			31.87	5.5	35.44	100	28	Average
2462	101.85	99.92			31.87	5.5	35.44	100	28	Peak
2496	40.43	38.41	54	-13.57	31.9	5.53	35.41	100	28	Average
2496	55.8	53.78	74	-18.2	31.9	5.53	35.41	100	28	Peak
4924	47.88	39.63	54	-6.12	33.99	8.28	34.02	100	186	Average
4924	52.27	44.02	74	-21.73	33.99	8.28	34.02	100	186	Peak

REMARKS:

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

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.48	50.75	54	-1.52	31.8	5.4	35.47	115	265	Average
2390	68.11	66.38	74	-5.89	31.8	5.4	35.47	115	265	Peak
2412	97.09	95.32			31.81	5.43	35.47	115	265	Average
2412	105.29	103.52			31.81	5.43	35.47	115	265	Peak
2492	41.02	39	54	-12.98	31.9	5.53	35.41	115	265	Average
2492	55.9	53.88	74	-18.1	31.9	5.53	35.41	115	265	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.42	43.69	54	-8.58	31.8	5.4	35.47	263	137	Average
2390	62.42	60.69	74	-11.58	31.8	5.4	35.47	263	137	Peak
2412	91.28	89.51			31.81	5.43	35.47	263	137	Average
2412	99.67	97.9			31.81	5.43	35.47	263	137	Peak
2494	40.98	38.96	54	-13.02	31.9	5.53	35.41	263	137	Average
2494	56.3	54.28	74	-17.7	31.9	5.53	35.41	263	137	Peak

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.53	47.8	54	-4.47	31.8	5.4	35.47	113	267	Average
2390	70.25	68.52	74	-3.75	31.8	5.4	35.47	113	267	Peak
2437	107.13	105.28			31.85	5.46	35.46	113	267	Average
2437	115.69	113.84			31.85	5.46	35.46	113	267	Peak
2484	48.24	46.28	54	-5.76	31.88	5.5	35.42	113	267	Average
2484	69.68	67.72	74	-4.32	31.88	5.5	35.42	113	267	Peak
4874	52.34	44.15	54	-1.66	33.98	8.27	34.06	124	212	Average
4874	60.91	52.72	74	-13.09	33.98	8.27	34.06	124	212	Peak
7311	44.63	34.14	54	-9.37	35.54	9.95	35	190	212	Average
7311	55.5	45.01	74	-18.5	35.54	9.95	35	190	212	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.02	43.29	54	-8.98	31.8	5.4	35.47	257	133	Average
2390	63.9	62.17	74	-10.1	31.8	5.4	35.47	257	133	Peak
2437	100.94	99.09			31.85	5.46	35.46	257	133	Average
2437	108.85	107			31.85	5.46	35.46	257	133	Peak
2486	42.3	40.31	54	-11.7	31.88	5.53	35.42	257	133	Average
2486	59.6	57.61	74	-14.4	31.88	5.53	35.42	257	133	Peak
4874	45.04	36.85	54	-8.96	33.98	8.27	34.06	153	185	Average
4874	53.41	45.22	74	-20.59	33.98	8.27	34.06	153	185	Peak
7311	43.89	33.4	54	-10.11	35.54	9.95	35	153	184	Average
7311	53.39	42.9	74	-20.61	35.54	9.95	35	153	184	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	40.51	38.8	54	-13.49	31.8	5.4	35.49	127	266	Average
2386	55.66	53.95	74	-18.34	31.8	5.4	35.49	127	266	Peak
2462	97.77	95.84			31.87	5.5	35.44	127	266	Average
2462	105.81	103.88			31.87	5.5	35.44	127	266	Peak
2484	52.3	50.34	54	-1.7	31.88	5.5	35.42	127	266	Average
2484	70.54	68.58	74	-3.46	31.88	5.5	35.42	127	266	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2368	40.35	38.71	54	-13.65	31.76	5.37	35.49	100	28	Average
2368	55.36	53.72	74	-18.64	31.76	5.37	35.49	100	28	Peak
2462	91.82	89.89			31.87	5.5	35.44	100	28	Average
2462	99.42	97.49			31.87	5.5	35.44	100	28	Peak
2484	47.06	45.1	54	-6.94	31.88	5.5	35.42	100	28	Average
2484	65.32	63.36	74	-8.68	31.88	5.5	35.42	100	28	Peak

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.94	51.21	54	-1.06	31.8	5.4	35.47	115	265	Average
2390	68.7	66.97	74	-5.3	31.8	5.4	35.47	115	265	Peak
2412	97.99	96.22			31.81	5.43	35.47	115	265	Average
2412	105.85	104.08			31.81	5.43	35.47	115	265	Peak
2490	40.94	38.93	54	-13.06	31.9	5.53	35.42	115	265	Average
2490	56.37	54.36	74	-17.63	31.9	5.53	35.42	115	265	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.4	43.67	54	-8.6	31.8	5.4	35.47	263	137	Average
2390	61.25	59.52	74	-12.75	31.8	5.4	35.47	263	137	Peak
2412	91.28	89.51			31.81	5.43	35.47	263	137	Average
2412	99.91	98.14			31.81	5.43	35.47	263	137	Peak
2488	40.85	38.84	54	-13.15	31.9	5.53	35.42	263	137	Average
2488	56.72	54.71	74	-17.28	31.9	5.53	35.42	263	137	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	49.85	48.12	54	-4.15	31.8	5.4	35.47	113	267	Average
2390	69.86	68.13	74	-4.14	31.8	5.4	35.47	113	267	Peak
2437	107.54	105.69			31.85	5.46	35.46	113	267	Average
2437	115.24	113.39			31.85	5.46	35.46	113	267	Peak
2484	49.15	47.19	54	-4.85	31.88	5.5	35.42	113	267	Average
2484	68.81	66.85	74	-5.19	31.88	5.5	35.42	113	267	Peak
4874	51.19	43	54	-2.81	33.98	8.27	34.06	124	213	Average
4874	59.89	51.7	74	-14.11	33.98	8.27	34.06	124	213	Peak
7311	44.59	34.1	54	-9.41	35.54	9.95	35	190	213	Average
7311	54.06	43.57	74	-19.94	35.54	9.95	35	190	213	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	45.37	43.64	54	-8.63	31.8	5.4	35.47	257	133	Average
2390	63.06	61.33	74	-10.94	31.8	5.4	35.47	257	133	Peak
2437	101.28	99.43			31.85	5.46	35.46	257	133	Average
2437	109.7	107.85			31.85	5.46	35.46	257	133	Peak
2484	42.83	40.87	54	-11.17	31.88	5.5	35.42	257	133	Average
2484	60.92	58.96	74	-13.08	31.88	5.5	35.42	257	133	Peak
4874	44.19	36	54	-9.81	33.98	8.27	34.06	153	185	Average
4874	54.51	46.32	74	-19.49	33.98	8.27	34.06	153	185	Peak
7311	43.49	33	54	-10.51	35.54	9.95	35	152	185	Average
7311	53.27	42.78	74	-20.73	35.54	9.95	35	152	185	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2346	40.41	38.84	54	-13.59	31.74	5.33	35.5	127	266	Average
2346	56.24	54.67	74	-17.76	31.74	5.33	35.5	127	266	Peak
2462	97.16	95.23			31.87	5.5	35.44	127	266	Average
2462	105.82	103.89			31.87	5.5	35.44	127	266	Peak
2484	51.62	49.66	54	-2.38	31.88	5.5	35.42	127	266	Average
2484	69.78	67.82	74	-4.22	31.88	5.5	35.42	127	266	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2312	42.36	40.88	54	-11.64	31.71	5.3	35.53	100	28	Average
2312	55.67	54.19	74	-18.33	31.71	5.3	35.53	100	28	Peak
2462	91.16	89.23			31.87	5.5	35.44	100	28	Average
2462	99.37	97.44			31.87	5.5	35.44	100	28	Peak
2484	45.87	43.91	54	-8.13	31.88	5.5	35.42	100	28	Average
2484	59.04	57.08	74	-14.96	31.88	5.5	35.42	100	28	Peak

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2388	52.58	50.87	54	-1.42	31.8	5.4	35.49	115	265	Average
2388	72.23	70.52	74	-1.77	31.8	5.4	35.49	115	265	Peak
2422	95.84	94.04			31.83	5.43	35.46	115	265	Average
2422	103.98	102.18			31.83	5.43	35.46	115	265	Peak
2500	40.84	38.82	54	-13.16	31.9	5.53	35.41	115	265	Average
2500	55.79	53.77	74	-18.21	31.9	5.53	35.41	115	265	Peak

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2386	46.04	44.33	54	-7.96	31.8	5.4	35.49	264	138	Average
2386	63.05	61.34	74	-10.95	31.8	5.4	35.49	264	138	Peak
2422	90.69	88.89			31.83	5.43	35.46	264	138	Average
2422	98.11	96.31			31.83	5.43	35.46	264	138	Peak
2500	40.87	38.85	54	-13.13	31.9	5.53	35.41	264	138	Average
2500	56.3	54.28	74	-17.7	31.9	5.53	35.41	264	138	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	52.92	51.19	54	-1.08	31.8	5.4	35.47	113	267	Average
2390	70.58	68.85	74	-3.42	31.8	5.4	35.47	113	267	Peak
2437	98.45	96.6			31.85	5.46	35.46	113	267	Average
2437	106.25	104.4			31.85	5.46	35.46	113	267	Peak
2486	51.61	49.62	54	-2.39	31.88	5.53	35.42	113	267	Average
2486	66.64	64.65	74	-7.36	31.88	5.53	35.42	113	267	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2390	46.68	44.95	54	-7.32	31.8	5.4	35.47	257	133	Average
2390	61.93	60.2	74	-12.07	31.8	5.4	35.47	257	133	Peak
2437	92.15	90.3			31.85	5.46	35.46	257	133	Average
2437	100.45	98.6			31.85	5.46	35.46	257	133	Peak
2484	43.63	41.67	54	-10.37	31.88	5.5	35.42	257	133	Average
2484	58.02	56.06	74	-15.98	31.88	5.5	35.42	257	133	Peak

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2388	40.48	38.77	54	-13.52	31.8	5.4	35.49	127	266	Average
2388	55.22	53.51	74	-18.78	31.8	5.4	35.49	127	266	Peak
2452	95.94	94.07			31.85	5.46	35.44	127	266	Average
2452	103.01	101.14			31.85	5.46	35.44	127	266	Peak
2484	52.21	50.25	54	-1.79	31.88	5.5	35.42	127	266	Average
2484	70.68	68.72	74	-3.32	31.88	5.5	35.42	127	266	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
2364	40.42	38.79	54	-13.58	31.76	5.37	35.5	100	28	Average
2364	55.26	53.63	74	-18.74	31.76	5.37	35.5	100	28	Peak
2452	89.13	87.26			31.85	5.46	35.44	100	28	Average
2452	97.23	95.36			31.85	5.46	35.44	100	28	Peak
2486	46.12	44.13	54	-7.88	31.88	5.53	35.42	100	28	Average
2486	61.04	59.05	74	-12.96	31.88	5.53	35.42	100	28	Peak

REMARKS:

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

9 kHz ~ 30 MHz DATA:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

Below 1GHz Data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
95.88	24.07	43.08	43.5	-19.43	11.75	1.28	32.04	169	238	Peak
206.85	26.71	46.2	43.5	-16.79	11.13	1.65	32.27	185	128	Peak
288.66	35.83	53.08	46	-10.17	12.85	2.03	32.13	165	314	Peak
342	32.95	48.73	46	-13.05	14.11	2.19	32.08	106	128	Peak
619.9	29.67	40.79	46	-16.33	18.13	2.93	32.18	164	175	Peak
857.2	35.75	42.94	46	-10.25	21.12	3.44	31.75	195	126	Peak
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M										
FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	READ LEVEL (dBuV)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA FACTOR (dB/m)	CABLE LOSS (dB)	PREAMP FACTOR (dB)	ANTENNA HEIGHT (cm)	TABLE ANGLE (Degree)	REMARK
96.69	21.83	40.77	43.5	-21.67	11.88	1.28	32.1	174	281	Peak
186.06	13.25	33.61	43.5	-30.25	10.28	1.61	32.25	165	219	Peak
255.99	23.72	41.46	46	-22.28	12.42	1.94	32.1	154	128	Peak
350.4	31.15	46.81	46	-14.85	14.22	2.19	32.07	130	241	Peak
514.2	28.96	41.85	46	-17.04	16.53	2.7	32.12	165	320	Peak
707.4	33.28	42.94	46	-12.72	19.33	3.11	32.1	132	12	Peak

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (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.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	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

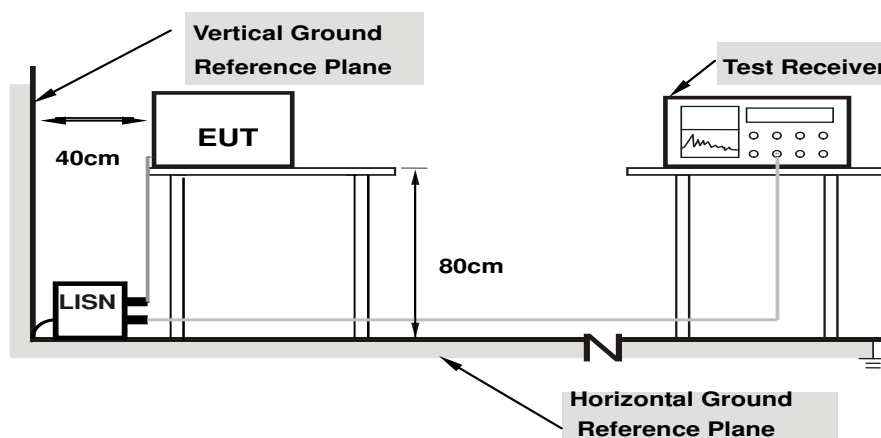
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm / 50uH of coupling 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 150 kHz 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.

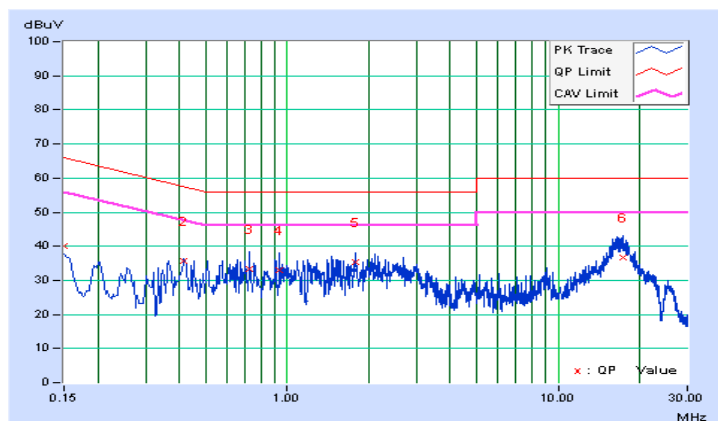
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.84	30.26	21.28	40.10	31.12	66.00	56.00	-25.90	-24.88
2	0.41560	9.90	25.95	20.92	35.85	30.82	57.54	47.54	-21.68	-16.71
3	0.72477	9.97	23.41	15.01	33.38	24.98	56.00	46.00	-22.62	-21.02
4	0.93982	10.02	22.88	12.36	32.90	22.38	56.00	46.00	-23.10	-23.62
5	1.78436	10.08	25.28	14.14	35.36	24.22	56.00	46.00	-20.64	-21.78
6	17.33836	10.99	25.79	16.02	36.78	27.01	60.00	50.00	-23.22	-22.99

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.

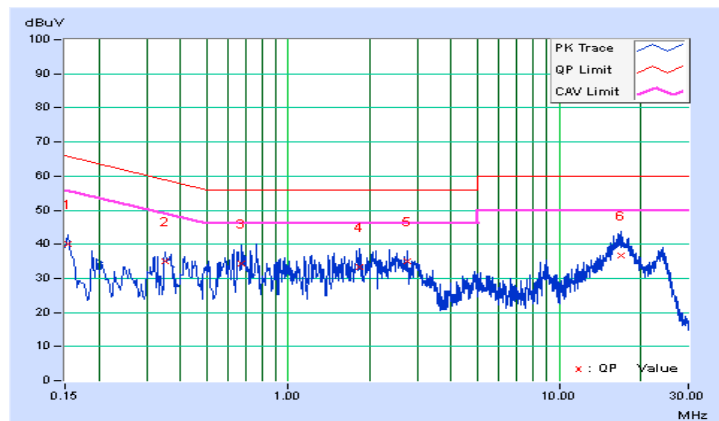


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

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	9.90	30.04	23.73	39.94	33.63	65.79	55.79	-25.85	-22.16
2	0.34941	10.00	25.14	11.49	35.14	21.49	58.98	48.98	-23.84	-27.49
3	0.67394	10.01	24.42	13.25	34.43	23.26	56.00	46.00	-21.57	-22.74
4	1.84303	10.08	23.23	11.22	33.31	21.30	56.00	46.00	-22.69	-24.70
5	2.75015	10.18	24.89	13.49	35.07	23.67	56.00	46.00	-20.93	-22.33
6	16.86916	10.91	25.74	16.20	36.65	27.11	60.00	50.00	-23.35	-22.89

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.

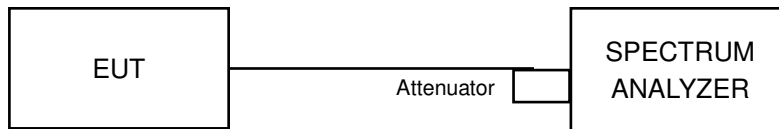


4.3 6dB Bandwidth Measurement

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	10.08	0.5	PASS
6	2437	10.11	0.5	PASS
11	2462	10.12	0.5	PASS

802.11g

Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.34	0.5	PASS
6	2437	16.36	0.5	PASS
11	2462	16.36	0.5	PASS

802.11n (HT20)

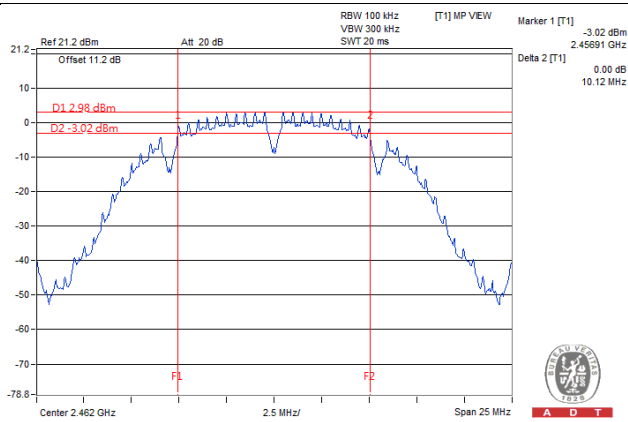
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.58	0.5	Pass
6	2437	17.59	0.5	Pass
11	2462	17.61	0.5	Pass

802.11n (HT40)

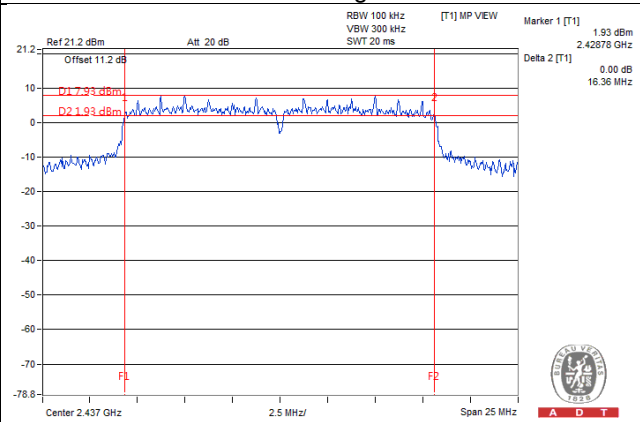
Channel	Frequency (MHz)	6db Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	35.18	0.5	Pass
6	2437	35.14	0.5	Pass
9	2452	35.23	0.5	Pass

Spectrum Plot of Worst Value

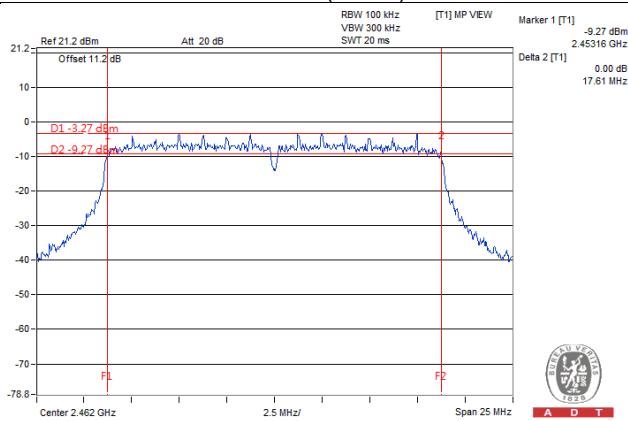
802.11b



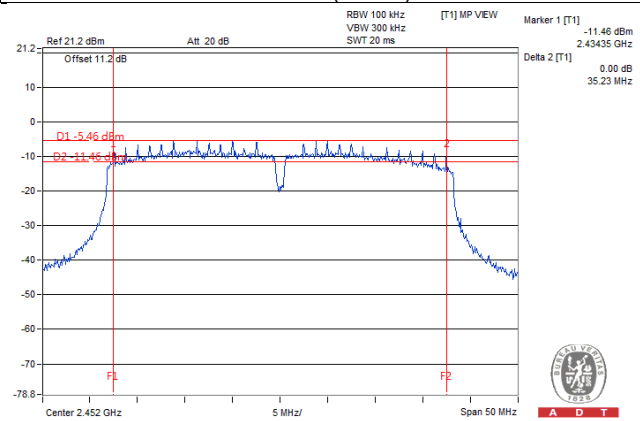
802.11g



802.11n (HT20)



802.11n (HT40)

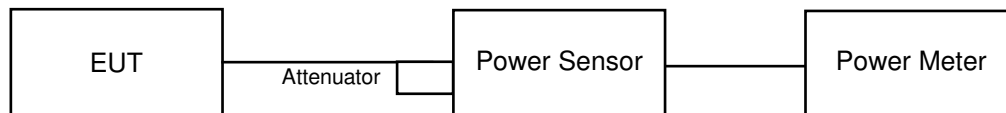


4.4 Conducted Output Power Measurement

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as 4.3.6.

4.4.7 Test Results

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	47.53	16.77	30	Pass
6	2437	32.21	15.08	30	Pass
11	2462	30.34	14.82	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	63.39	18.02	30	Pass
6	2437	190.11	22.79	30	Pass
11	2462	58.34	17.66	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	58.61	17.68	30	Pass
6	2437	194.09	22.88	30	Pass
11	2462	50.23	17.01	30	Pass

802.11n (HT40)

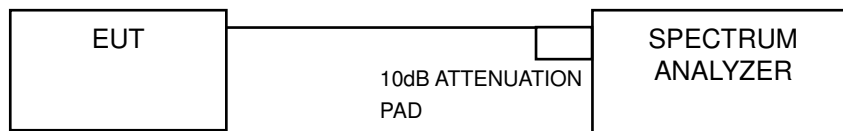
Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
3	2422	46.77	16.70	30	Pass
6	2437	77.80	18.91	30	Pass
9	2452	48.53	16.86	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set 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	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-8.34	8	Pass
6	2437	-11.83	8	Pass
11	2462	-10.45	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-16.27	8	Pass
6	2437	-6.98	8	Pass
11	2462	-16.77	8	Pass

802.11n (HT20)

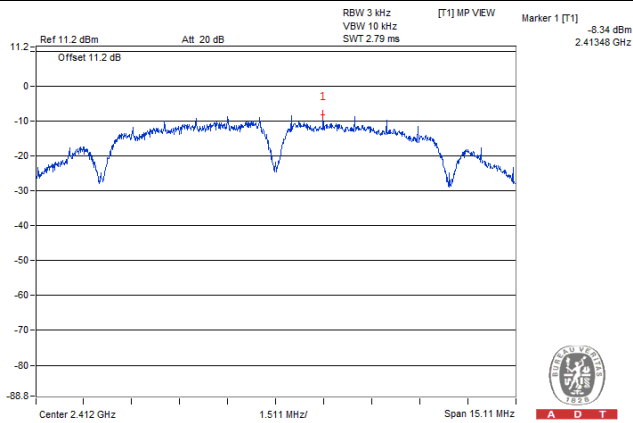
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass /Fail
1	2412	-16.09	8	Pass
6	2437	-8.17	8	Pass
11	2462	-18.18	8	Pass

802.11n (HT40)

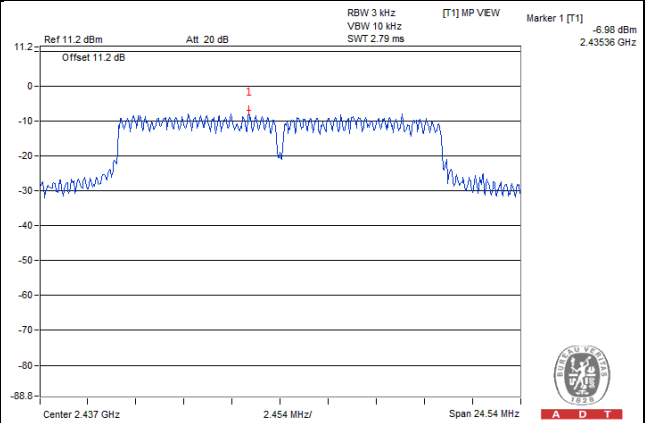
Channel	Freq. (MHz)	PSD (dBm)	Limit (dBm)	PASS /FAIL
3	2422	-19.90	8	PASS
6	2437	-18.46	8	PASS
9	2452	-20.27	8	PASS

Spectrum Plot of Worst Value

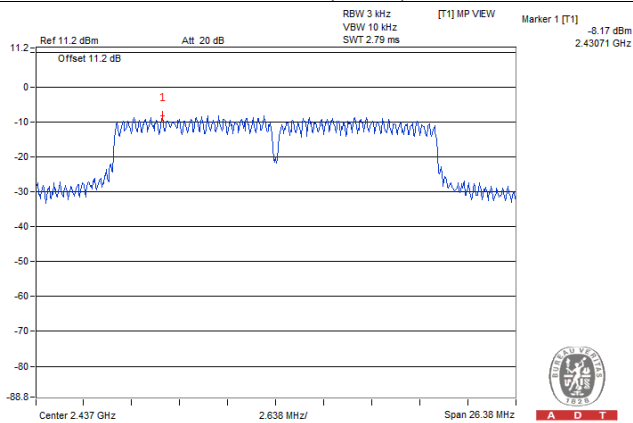
802.11b



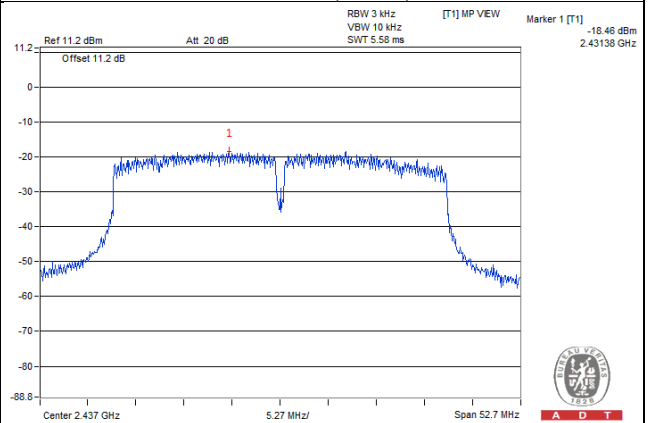
802.11g



802.11n (HT20)



802.11n (HT40)

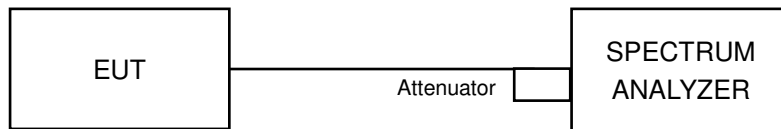


4.6 Conducted Out of Band Emission Measurement

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 4.3.6

4.6.7 Test Results

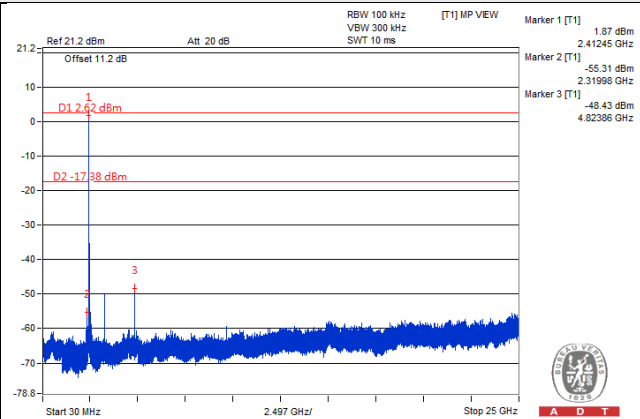
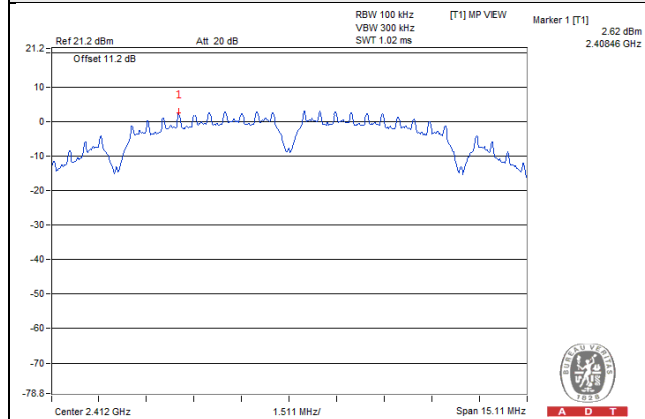
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



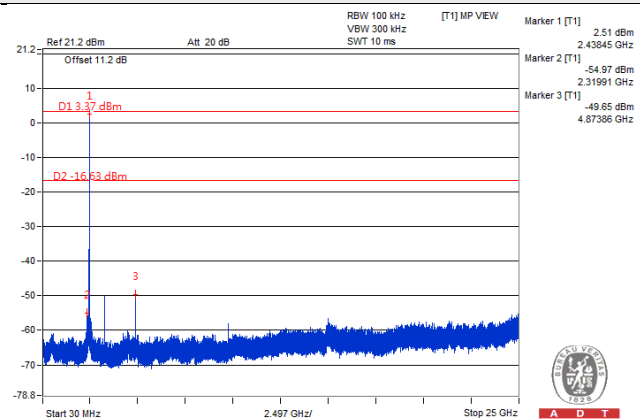
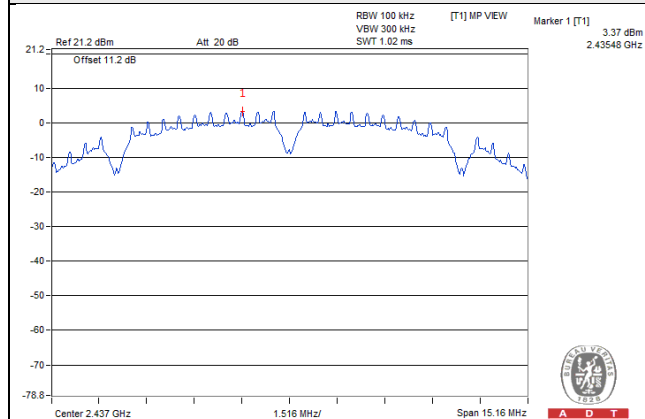
A D T

802.11b

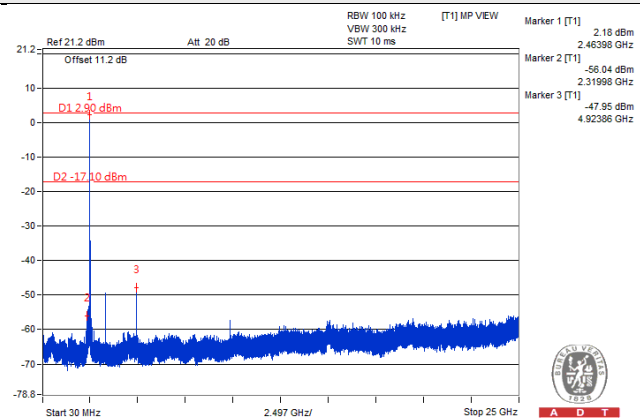
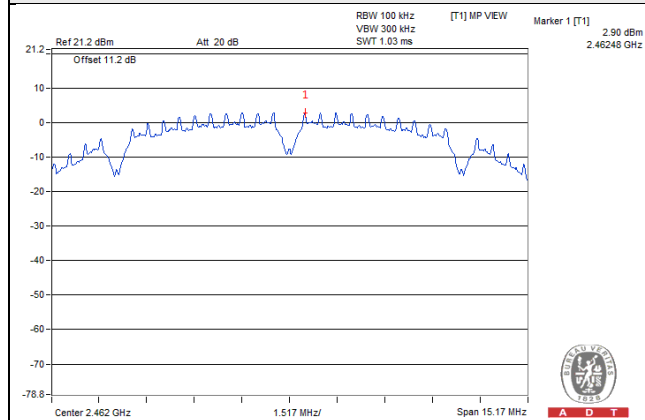
CH 1



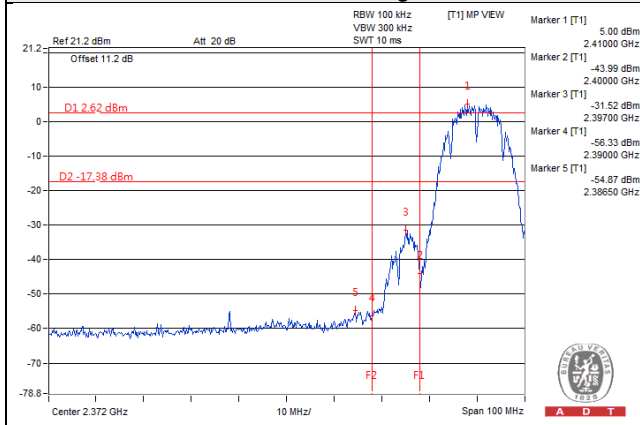
CH 6



CH 11

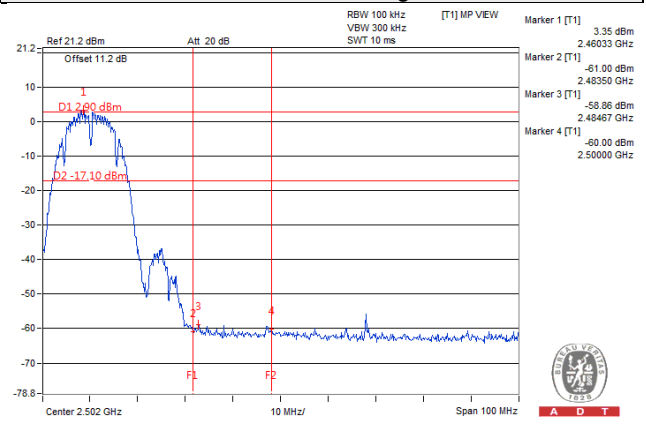


CH 1 Band edge



A D T

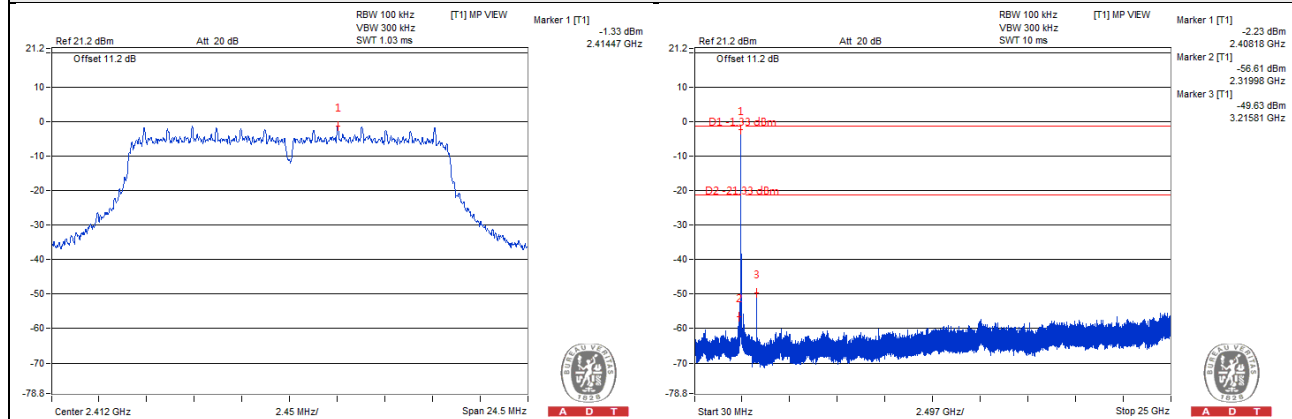
CH 11 Band edge



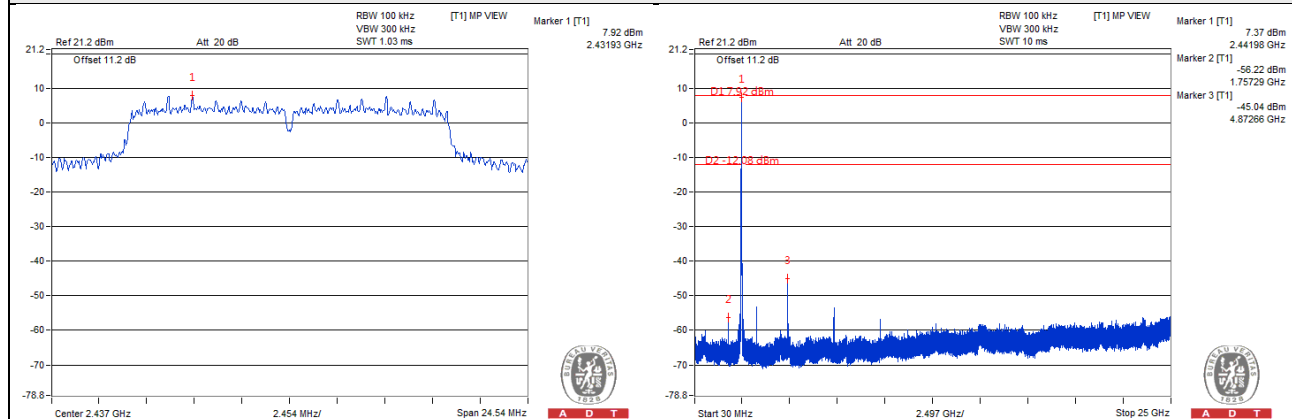
A D T

802.11g

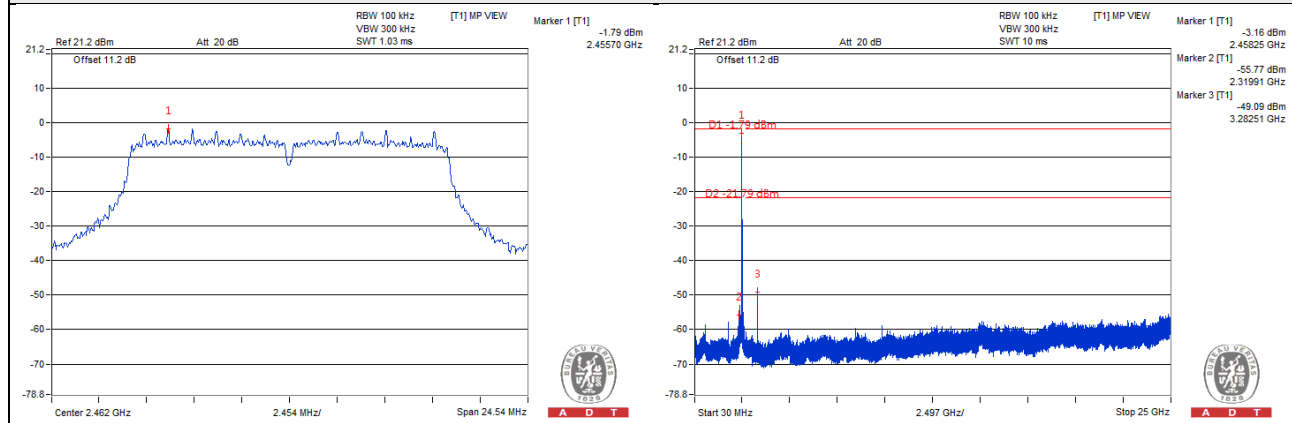
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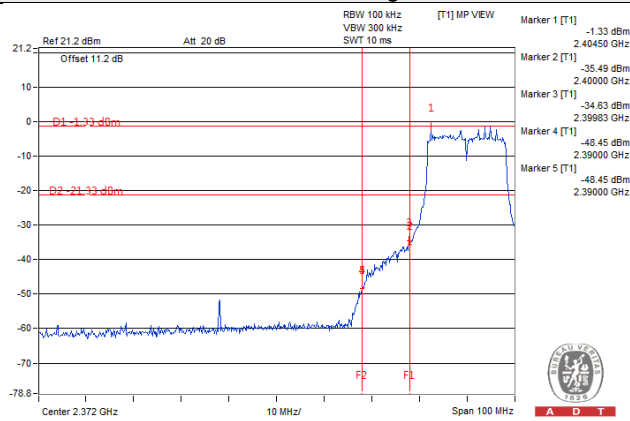
CH 6



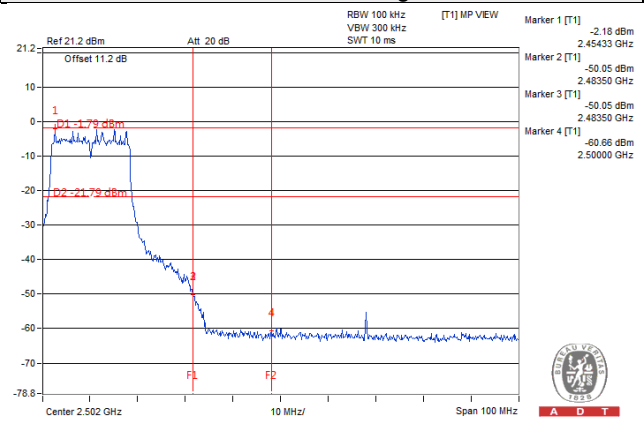
CH 11



CH 1 Band edge

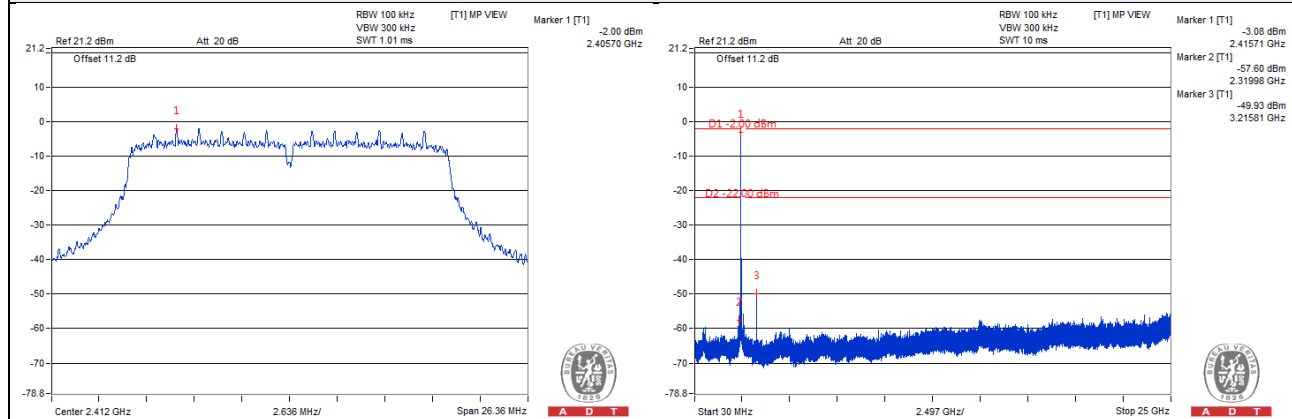


CH 11 Band edge

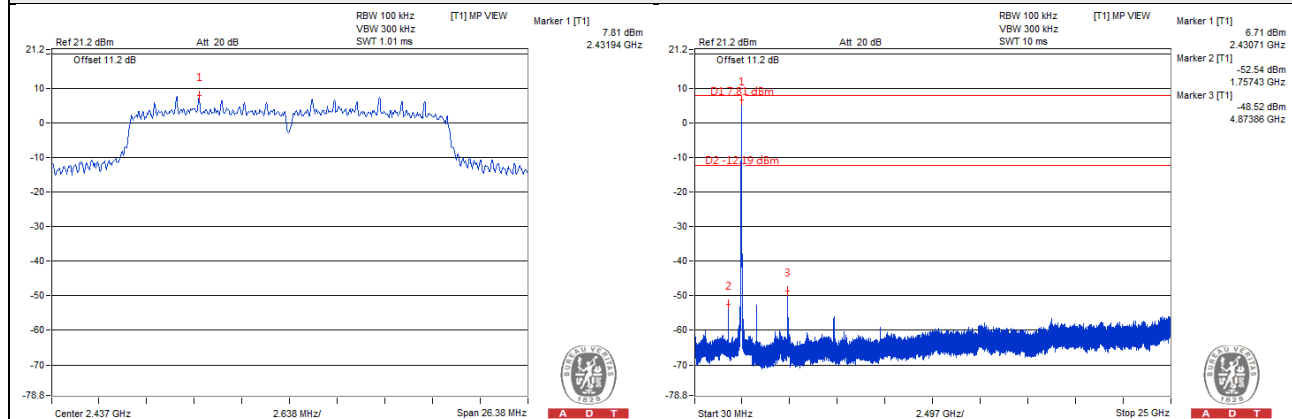


802.11n (HT20)

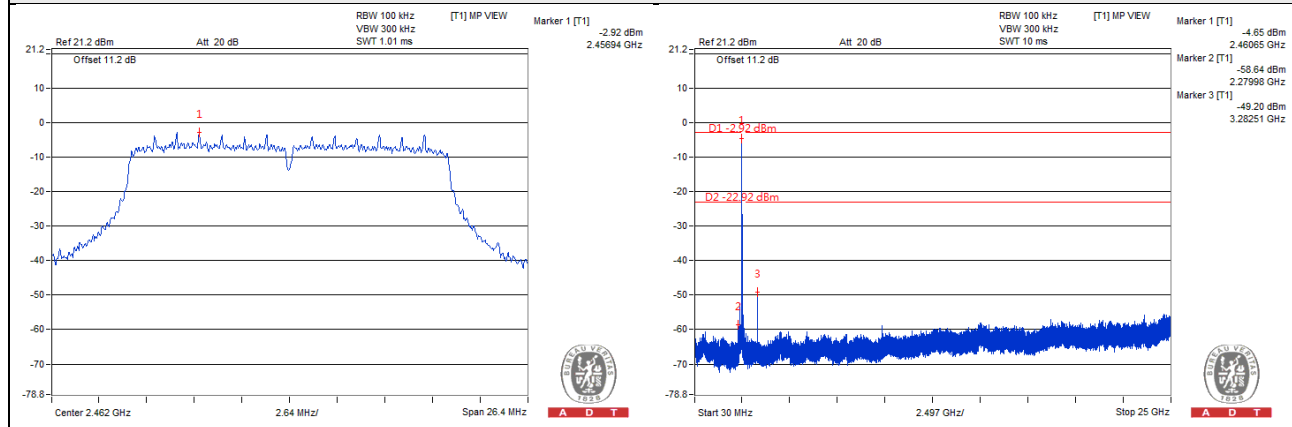
CH 1



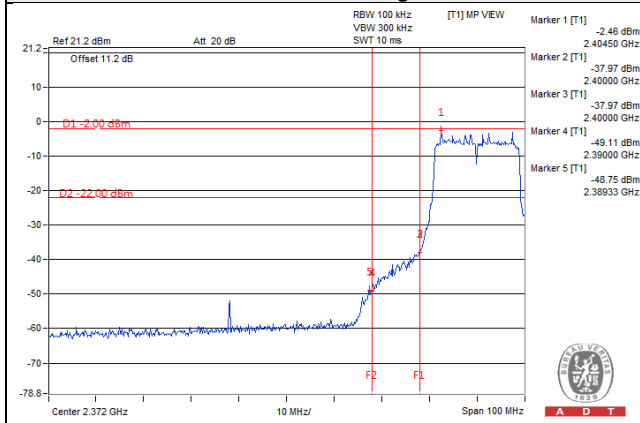
CH 6



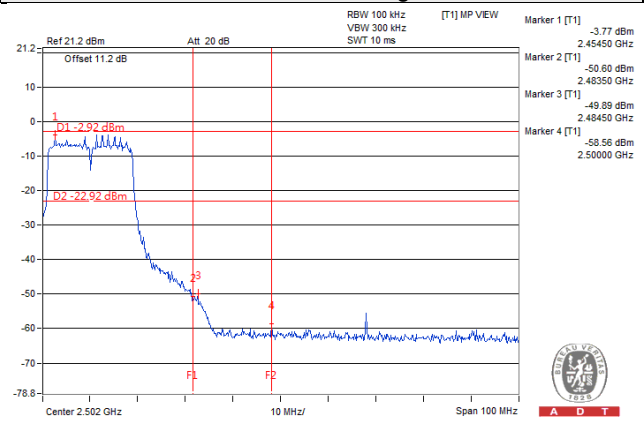
CH 11



CH 1 Band edge

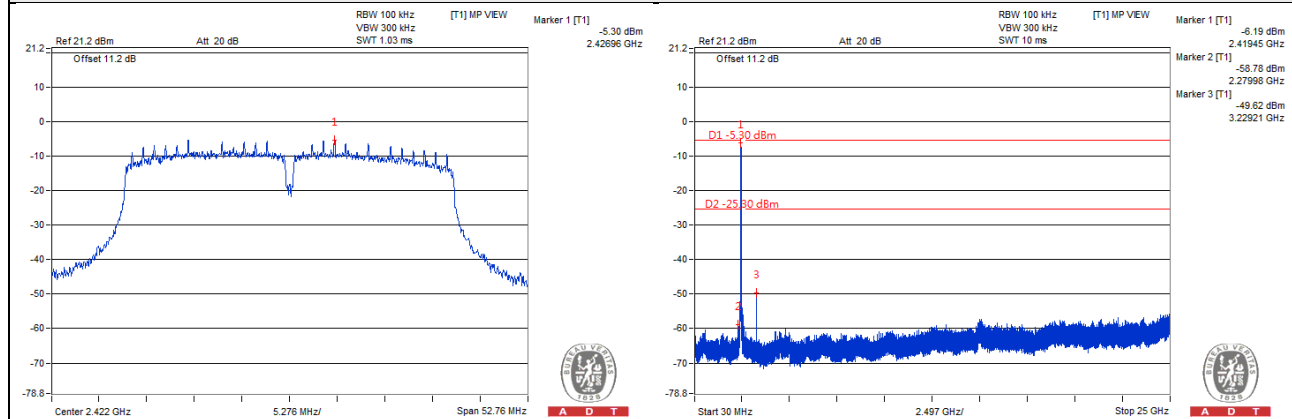


CH 11 Band edge

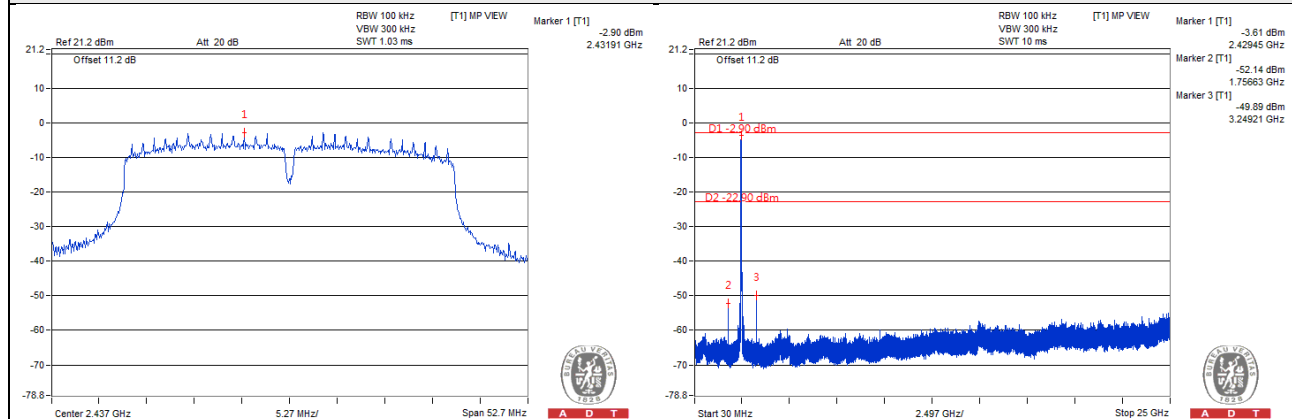


802.11n (HT40)

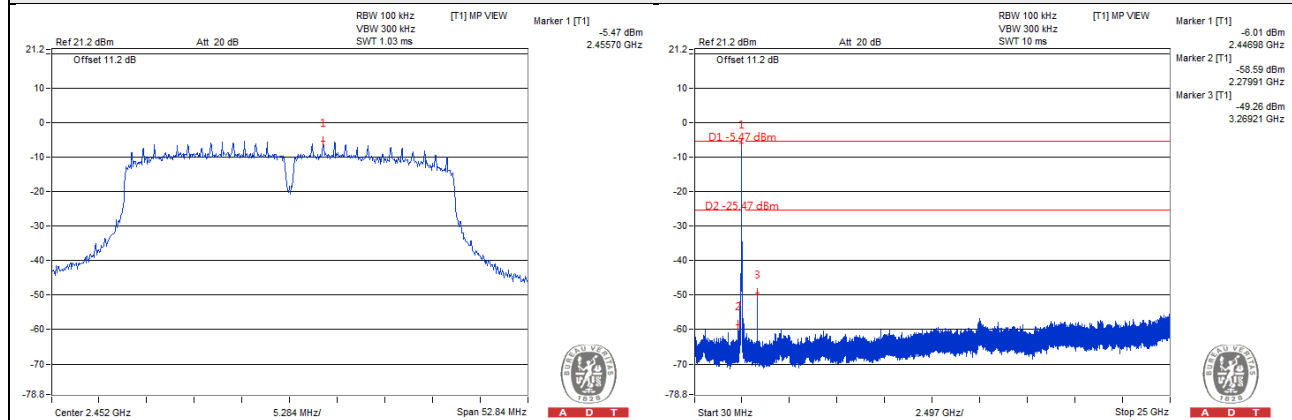
CH 3



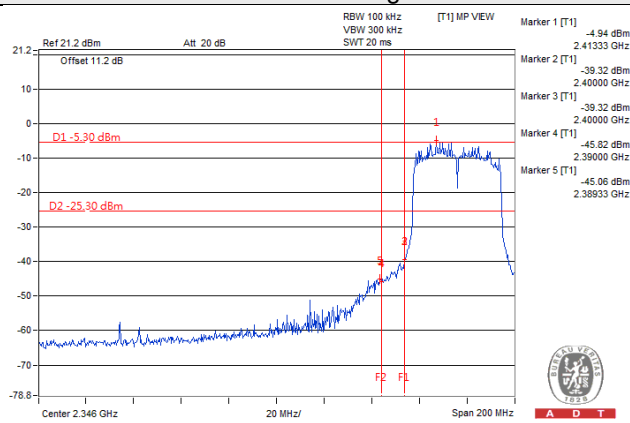
CH 6



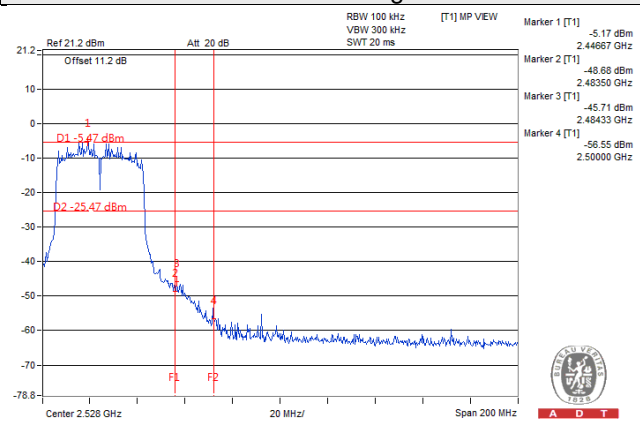
CH 9



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:

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Web Site: www.bureauveritas-adt.com

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

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