

FCC Test Report

Report No.: RF170220C13-2

FCC ID: NM82PZC100

Test Model: 2PZC100

Received Date: Feb. 20, 2017

Test Date: Mar. 16, 2017 ~ Mar. 29, 2017

Issued Date: Apr. 19, 2017

Applicant: HTC Corporation

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

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R.O.C



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Release Control Record

Issue No.	Description	Date Issued
RF170220C13-2	Original Release	Apr. 19, 2017

1 Certificate of Conformity

Product: Smartphone

Brand: HTC

Test Model: 2PZC100

Sample Status: Production Unit

Applicant: HTC Corporation

Test Date: Mar. 16, 2017 ~ Mar. 29, 2017

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 :

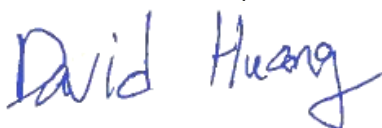


Date:

Apr. 19, 2017

Ivonne Wu / Supervisor

Approved by :



Date:

Apr. 19, 2017

David Huang / Project Engineer

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 -16.56 dB at 0.68958 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.02 dB at 2389.92 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB 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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smartphone
Brand	HTC
Test Model	2PZC100
Status of EUT	Production Unit
Power Supply Rating	5.0 Vdc or 9 Vdc or 12 Vdc (adapter) 5.0 Vdc (adapter) 3.85 Vdc (Li-ion battery)
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 MCS15
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	323.959 mW
Antenna Type	PIFA antenna with -2.5 dBi gain
Antenna Connector	N/A
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

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

Modulation Mode	TX Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX

2. The EUT's accessories list refers to Ext. Pho.
3. 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 (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

7 channels are provided for 802.11n (HT40):

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

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 1 GHz **RE<1G**: Radiated Emission below 1 GHz
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 1 GHz):

- ☒ 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 1 GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT40)	3 to 9	3	OFDM	BPSK	MCS0

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)
-	802.11n (HT40)	3 to 9	3	OFDM	BPSK	MCS0

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:

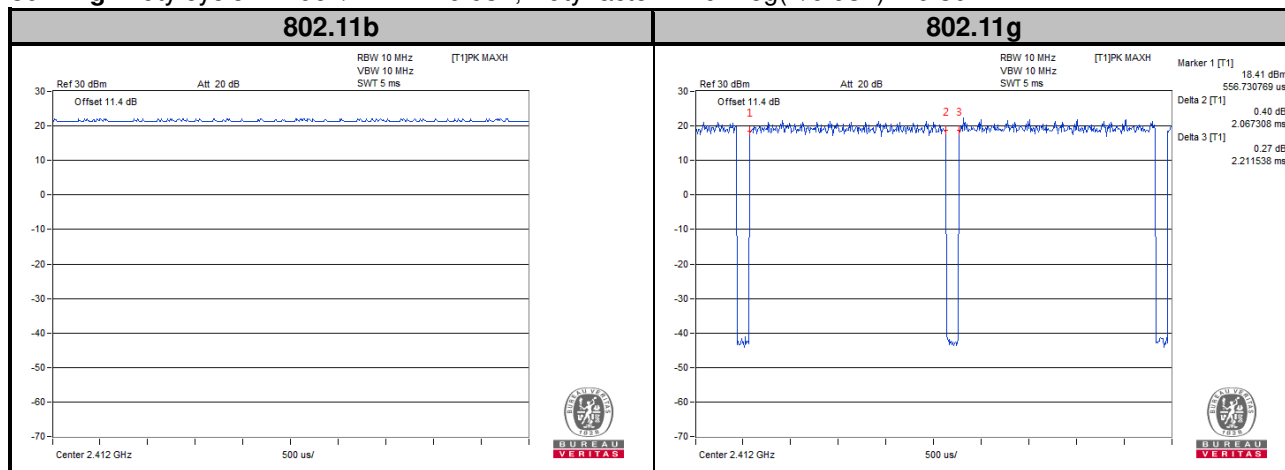
Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Getaz Yang
APCM	25 deg. C, 65 % RH	3.85 Vdc	Wayne Lin

3.3 Duty Cycle of Test Signal

<1TX>

802.11b: Duty cycle of test signal is 100 %

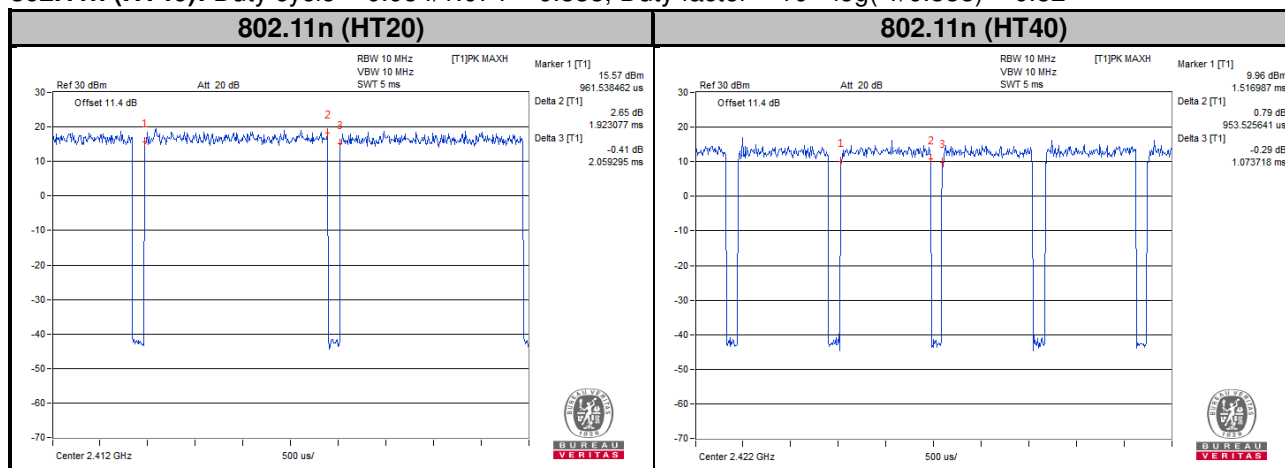
802.11g: Duty cycle = $2.067/2.212 = 0.934$, Duty factor = $10 * \log(1/0.934) = 0.30$



<2TX>

802.11n (HT20): Duty cycle = $1.923/2.059 = 0.934$, Duty factor = $10 * \log(1/0.934) = 0.30$

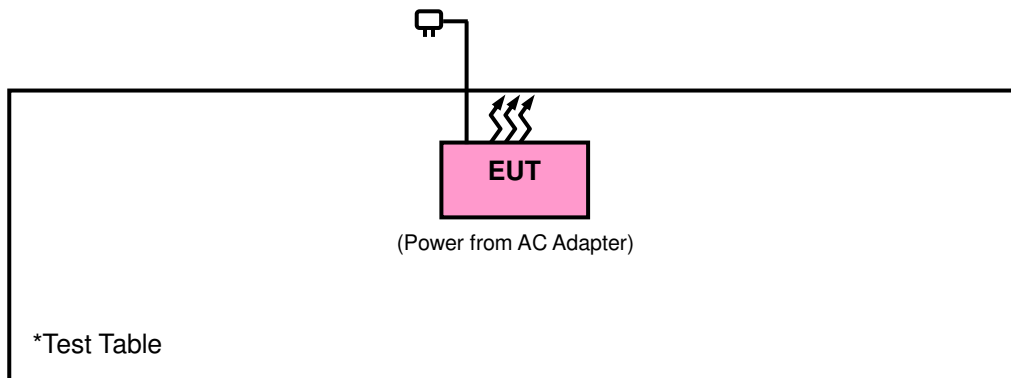
802.11n (HT40): Duty cycle = $0.954/1.074 = 0.888$, Duty factor = $10 * \log(1/0.888) = 0.52$



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 v03r05

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB 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 1000 MHz, 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 20 dB 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 Technologies	N9038A	MY52260177	Jun. 21, 2016	Jun. 20, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 16, 2016	Dec. 15, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 29, 2016	Dec. 28, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 14, 2016	Dec. 13, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
Bluetooth Tester	CBT	100980	Apr. 27, 2015	Apr. 26, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	310N	187226	Jun. 24, 2016	Jun. 23, 2017
Preamplifier Agilent	83017A	MY39501357	Jun. 24, 2016	Jun. 23, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 24, 2016	Jun. 23, 2017
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24)	Jun. 24, 2016	Jun. 23, 2017
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HsinTien Chamber 1.
3. The horn antenna and preamplifier (model: 83017A) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The FCC Site Registration No. is 149147.
5. The IC Site Registration No. is IC7450I-1.

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:

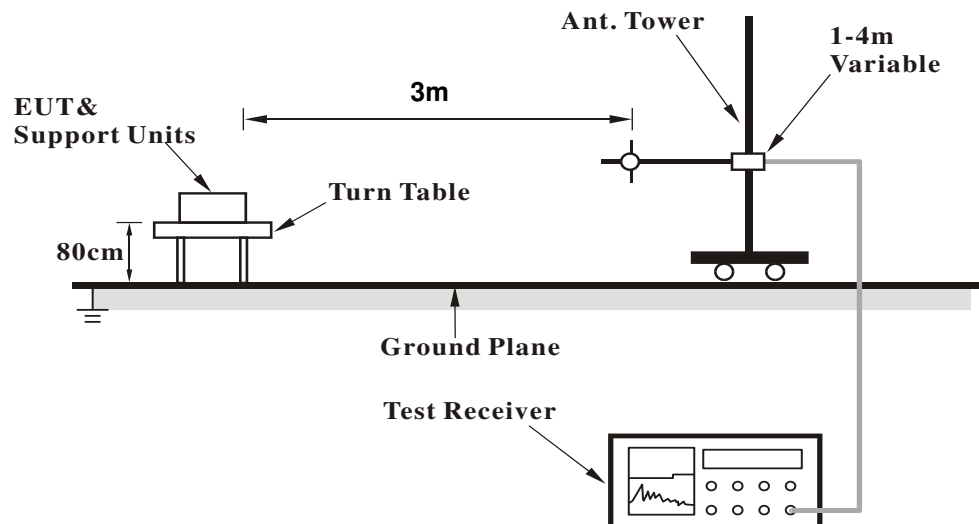
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for RMS Average (Duty cycle < 98 %) for Peak detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 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

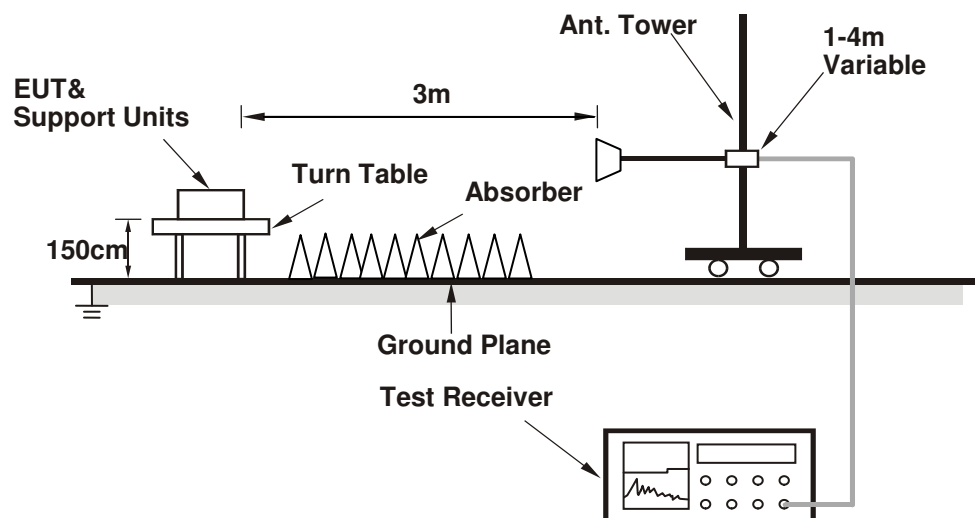
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range above 1 GHz>



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 1 GHz Data :

<1TX>

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2385.24	51.54	49.85	74	-22.46	31.78	5.4	35.49	278	358	Peak
2389.38	41.21	39.5	54	-12.79	31.8	5.4	35.49	278	358	Average
2412	105.25	103.48			31.81	5.43	35.47	278	358	Average
2412	107.21	105.44			31.81	5.43	35.47	278	358	Peak
4824	39.61	31.48	54	-14.39	33.97	8.26	34.1	165	339	Average
4824	47.43	39.3	74	-26.57	33.97	8.26	34.1	165	339	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2387.49	40.81	39.1	54	-13.19	31.8	5.4	35.49	116	12	Average
2389.65	52.05	50.34	74	-21.95	31.8	5.4	35.49	116	12	Peak
2412	104.48	102.71			31.81	5.43	35.47	116	12	Average
2412	106.32	104.55			31.81	5.43	35.47	116	12	Peak
4824	39.68	31.55	54	-14.32	33.97	8.26	34.1	177	159	Average
4824	47.71	39.58	74	-26.29	33.97	8.26	34.1	177	159	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2321.34	51.29	49.78	74	-22.71	31.73	5.3	35.52	278	358	Peak
2389.56	40.42	38.71	54	-13.58	31.8	5.4	35.49	278	358	Average
2437	105.22	103.37			31.85	5.46	35.46	278	358	Average
2437	107.57	105.72			31.85	5.46	35.46	278	358	Peak
2483.96	40.84	38.88	54	-13.16	31.88	5.5	35.42	278	358	Average
2497.04	52.11	50.09	74	-21.89	31.9	5.53	35.41	278	358	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2335.83	52.15	50.6	74	-21.85	31.74	5.33	35.52	116	12	Peak
2386.77	40.43	38.72	54	-13.57	31.8	5.4	35.49	116	12	Average
2437	104.1	102.25			31.85	5.46	35.46	116	12	Average
2437	106.18	104.33			31.85	5.46	35.46	116	12	Peak
2487.28	52.27	50.28	74	-21.73	31.88	5.53	35.42	116	12	Peak
2498.24	40.84	38.82	54	-13.16	31.9	5.53	35.41	116	12	Average

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2462	105.33	103.4			31.87	5.5	35.44	278	358	Average
2462	107.73	105.8			31.87	5.5	35.44	278	358	Peak
2484.2	51.68	49.69	74	-22.32	31.88	5.53	35.42	278	358	Peak
2485.52	40.96	38.97	54	-13.04	31.88	5.53	35.42	278	358	Average
4924	39.29	31.04	54	-14.71	33.99	8.28	34.02	113	30	Average
4924	47.95	39.7	74	-26.05	33.99	8.28	34.02	113	30	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2462	104.47	102.54			31.87	5.5	35.44	116	12	Average
2462	106.78	104.85			31.87	5.5	35.44	116	12	Peak
2487.36	40.9	38.91	54	-13.1	31.88	5.53	35.42	116	12	Average
2489.08	52.31	50.3	74	-21.69	31.9	5.53	35.42	116	12	Peak
4924	39.24	30.99	54	-14.76	33.99	8.28	34.02	105	144	Average
4924	47.48	39.23	74	-26.52	33.99	8.28	34.02	105	144	Peak

Remarks:

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

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EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2389.38	59.89	58.18	74	-14.11	31.8	5.4	35.49	280	56	Peak
2389.92	48.51	46.78	54	-5.49	31.8	5.4	35.47	280	56	Average
2412	100.25	98.48			31.81	5.43	35.47	280	56	Average
2412	107.84	106.07			31.81	5.43	35.47	280	56	Peak
4824	39.24	31.11	54	-14.76	33.97	8.26	34.1	106	255	Average
4824	48.29	40.16	74	-25.71	33.97	8.26	34.1	106	255	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2389.29	55.72	54.01	74	-18.28	31.8	5.4	35.49	115	13	Peak
2389.92	44.62	42.89	54	-9.38	31.8	5.4	35.47	115	13	Average
2412	98.74	96.97			31.81	5.43	35.47	115	13	Average
2412	106.5	104.73			31.81	5.43	35.47	115	13	Peak
4824	39.13	31	54	-14.87	33.97	8.26	34.1	177	188	Average
4824	46.78	38.65	74	-27.22	33.97	8.26	34.1	177	188	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2389.65	51.75	50.04	74	-22.25	31.8	5.4	35.49	211	52	Peak
2389.92	41.88	40.15	54	-12.12	31.8	5.4	35.47	211	52	Average
2437	100.28	98.43			31.85	5.46	35.46	211	52	Average
2437	108.18	106.33			31.85	5.46	35.46	211	52	Peak
2483.8	41.27	39.31	54	-12.73	31.88	5.5	35.42	211	52	Average
2484.56	52.2	50.21	74	-21.8	31.88	5.53	35.42	211	52	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2389.11	40.68	38.97	54	-13.32	31.8	5.4	35.49	115	5	Average
2389.47	51.64	49.93	74	-22.36	31.8	5.4	35.49	115	5	Peak
2437	98.38	96.53			31.85	5.46	35.46	115	5	Average
2437	106.17	104.32			31.85	5.46	35.46	115	5	Peak
2484.72	41.32	39.33	54	-12.68	31.88	5.53	35.42	115	5	Average
2497.2	52.27	50.25	74	-21.73	31.9	5.53	35.41	115	5	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2462	101	99.07			31.87	5.5	35.44	187	52	Average
2462	108.99	107.06			31.87	5.5	35.44	187	52	Peak
2483.56	46.14	44.18	54	-7.86	31.88	5.5	35.42	187	52	Average
2484.6	58.25	56.26	74	-15.75	31.88	5.53	35.42	187	52	Peak
4924	38.82	30.57	54	-15.18	33.99	8.28	34.02	147	4	Average
4924	47.74	39.49	74	-26.26	33.99	8.28	34.02	147	4	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2462	99.24	97.31			31.87	5.5	35.44	114	12	Average
2462	107.05	105.12			31.87	5.5	35.44	114	12	Peak
2483.56	44.21	42.25	54	-9.79	31.88	5.5	35.42	114	12	Average
2483.56	56.2	54.24	74	-17.8	31.88	5.5	35.42	114	12	Peak
4924	39.27	31.02	54	-14.73	33.99	8.28	34.02	162	339	Average
4924	46.89	38.64	74	-27.11	33.99	8.28	34.02	162	339	Peak

Remarks:

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

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EUT Test Condition		Measurement Detail	
Channel	Channel 1	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2389.74	59.3	57.59	74	-14.7	31.8	5.4	35.49	112	38	Peak
2389.92	48.45	46.72	54	-5.55	31.8	5.4	35.47	112	38	Average
2412	97.62	95.85			31.81	5.43	35.47	109	43	Average
2412	105.52	103.75			31.81	5.43	35.47	109	43	Peak
4824	38.34	30.21	54	-15.66	33.97	8.26	34.1	129	227	Average
4824	47.25	39.12	74	-26.75	33.97	8.26	34.1	129	227	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2389.56	55.52	53.81	74	-18.48	31.8	5.4	35.49	115	6	Peak
2389.92	43.95	42.22	54	-10.05	31.8	5.4	35.47	115	6	Average
2412	95.46	93.69			31.81	5.43	35.47	115	0	Average
2412	103.65	101.88			31.81	5.43	35.47	115	0	Peak
4824	38.47	30.34	54	-15.53	33.97	8.26	34.1	131	168	Average
4824	47.28	39.15	74	-26.72	33.97	8.26	34.1	131	168	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2386.41	51.95	50.24	74	-22.05	31.8	5.4	35.49	109	43	Peak
2389.02	41.26	39.55	54	-12.74	31.8	5.4	35.49	109	43	Average
2437	97.92	96.07			31.85	5.46	35.46	109	43	Average
2437	105.57	103.72			31.85	5.46	35.46	109	43	Peak
2483.76	40.94	38.98	54	-13.06	31.88	5.5	35.42	109	43	Average
2485.12	51.79	49.8	74	-22.21	31.88	5.53	35.42	109	43	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2352.3	51.97	50.38	74	-22.03	31.76	5.33	35.5	115	3	Peak
2389.38	40.37	38.66	54	-13.63	31.8	5.4	35.49	115	3	Average
2437	95.65	93.8			31.85	5.46	35.46	115	3	Average
2437	103.87	102.02			31.85	5.46	35.46	115	3	Peak
2493.68	52.48	50.46	74	-21.52	31.9	5.53	35.41	115	3	Peak
2499.08	40.97	38.95	54	-13.03	31.9	5.53	35.41	115	3	Average

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 11	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2462	98.55	96.62			31.87	5.5	35.44	106	53	Average
2462	107.1	105.17			31.87	5.5	35.44	106	53	Peak
2483.56	44.63	42.67	54	-9.37	31.88	5.5	35.42	135	44	Average
2483.64	56.08	54.12	74	-17.92	31.88	5.5	35.42	135	44	Peak
4924	38.27	30.02	54	-15.73	33.99	8.28	34.02	147	203	Average
4924	47.26	39.01	74	-26.74	33.99	8.28	34.02	147	203	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2462	97.12	95.19			31.87	5.5	35.44	113	0	Average
2462	105.36	103.43			31.87	5.5	35.44	113	0	Peak
2483.52	43.09	41.13	54	-10.91	31.88	5.5	35.42	113	0	Average
2484.44	53.82	51.83	74	-20.18	31.88	5.53	35.42	113	0	Peak
4924	37.83	29.58	54	-16.17	33.99	8.28	34.02	164	193	Average
4924	47.05	38.8	74	-26.95	33.99	8.28	34.02	164	193	Peak

Remarks:

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

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2389.92	52.98	51.25	54	-1.02	31.8	5.4	35.47	131	42	Average
2389.92	59.61	57.88	74	-14.39	31.8	5.4	35.47	131	42	Peak
2422	95.92	94.12			31.83	5.43	35.46	126	42	Average
2422	103.7	101.9			31.83	5.43	35.46	126	42	Peak
2484.2	51.56	49.57	74	-22.44	31.88	5.53	35.42	131	42	Peak
2485.96	41.36	39.37	54	-12.64	31.88	5.53	35.42	131	42	Average
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2389.92	44.76	43.03	54	-9.24	31.8	5.4	35.47	112	6	Average
2389.92	55.33	53.6	74	-18.67	31.8	5.4	35.47	112	6	Peak
2422	93.69	91.89			31.83	5.43	35.46	115	0	Average
2422	101.44	99.64			31.83	5.43	35.46	115	0	Peak
2486.64	41.73	39.74	54	-12.27	31.88	5.53	35.42	112	6	Average
2491.12	52.21	50.2	74	-21.79	31.9	5.53	35.42	112	6	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2389.74	61.44	59.73	74	-12.56	31.8	5.4	35.49	126	34	Peak
2389.92	49.29	47.56	54	-4.71	31.8	5.4	35.47	126	34	Average
2437	95.98	94.13			31.85	5.46	35.46	108	41	Average
2437	104.06	102.21			31.85	5.46	35.46	108	41	Peak
2483.56	46.23	44.27	54	-7.77	31.88	5.5	35.42	126	34	Average
2483.92	56.91	54.95	74	-17.09	31.88	5.5	35.42	126	34	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2389.74	54.88	53.17	74	-19.12	31.8	5.4	35.49	107	3	Peak
2389.92	44.29	42.56	54	-9.71	31.8	5.4	35.47	107	3	Average
2437	93.65	91.8			31.85	5.46	35.46	115	3	Average
2437	101.94	100.09			31.85	5.46	35.46	115	3	Peak
2483.64	43.51	41.55	54	-10.49	31.88	5.5	35.42	107	3	Average
2484.88	53.92	51.93	74	-20.08	31.88	5.53	35.42	107	3	Peak

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 9	Frequency Range	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (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
2388.66	41.14	39.43	54	-12.86	31.8	5.4	35.49	113	48	Average
2389.2	51.68	49.97	74	-22.32	31.8	5.4	35.49	113	48	Peak
2452	94.95	93.08			31.85	5.46	35.44	106	53	Average
2452	102.41	100.54			31.85	5.46	35.44	106	53	Peak
2483.52	52.34	50.38	54	-1.66	31.88	5.5	35.42	113	48	Average
2483.84	58.49	56.53	74	-15.51	31.88	5.5	35.42	113	48	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
2374.44	51.63	49.97	74	-22.37	31.78	5.37	35.49	122	7	Peak
2389.02	40.72	39.01	54	-13.28	31.8	5.4	35.49	122	7	Average
2452	92.81	90.94			31.85	5.46	35.44	113	0	Average
2452	100.57	98.7			31.85	5.46	35.44	113	0	Peak
2483.72	46.8	44.84	54	-7.2	31.88	5.5	35.42	122	7	Average
2485.04	56.58	54.59	74	-17.42	31.88	5.53	35.42	122	7	Peak

Remarks:

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

30 MHz ~ 1 GHz WORST-CASE DATA:

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	Frequency Range	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	Detector Function	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	Tested By	Karl Lee

Antennal Polarity & Test Distance: Horizontal at 3 m										
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Limit (dBuV/m)	Margin (dB)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
89.67	25.29	46.99	43.5	-18.21	8.9	1.11	31.71	195	246	Peak
161.76	22.13	42.22	43.5	-21.37	10.65	1.52	32.26	164	138	Peak
256.26	20.64	37.64	46	-25.36	13.16	1.94	32.1	154	117	Peak
451.9	17.1	28.66	46	-28.9	18.09	2.49	32.14	145	272	Peak
746.6	23.07	28.76	46	-22.93	23.23	3.22	32.14	158	165	Peak
861.4	24.01	28.09	46	-21.99	24.2	3.44	31.72	103	127	Peak
Antennal Polarity & Test Distance: Vertical at 3 m										
Frequency (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
57.54	24.59	48.88	40	-15.41	7.04	0.9	32.23	124	108	Peak
159.33	14.76	34.77	43.5	-28.74	10.74	1.52	32.27	196	307	Peak
224.67	14.07	32.77	46	-31.93	11.85	1.65	32.2	184	223	Peak
404.3	16.72	28.57	46	-29.28	18.03	2.34	32.22	142	110	Peak
708.1	22.56	28.36	46	-23.44	23.19	3.11	32.1	169	324	Peak
890.1	24.67	27.8	46	-21.33	24.92	3.49	31.54	174	115	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 0.50 MHz.

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. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
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

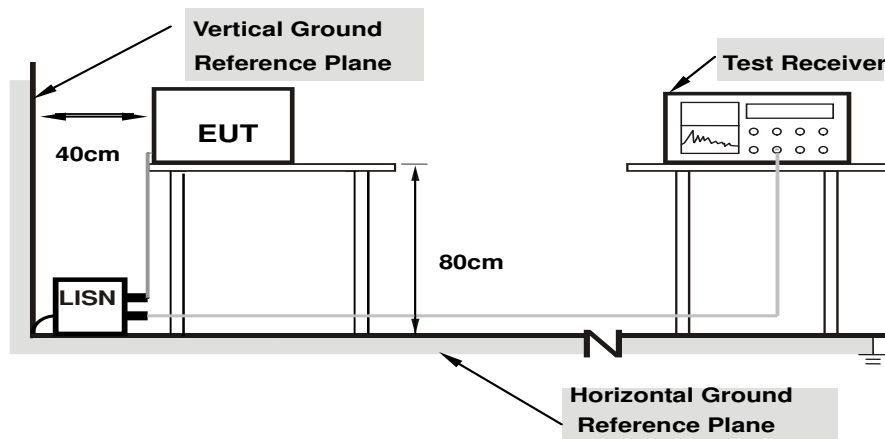
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance 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 30 MHz was searched. Emission levels under (Limit – 20 dB) 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

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

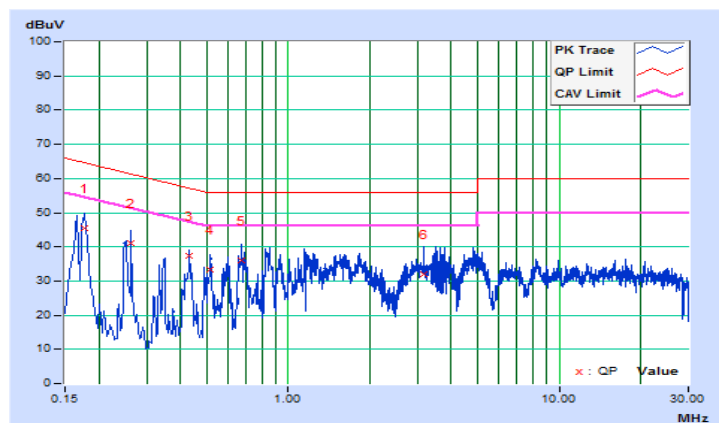
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/3/29
Test Mode	Mode 1		

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	0.17737	10.36	35.20	17.61	45.56	27.97	64.61	54.61	-19.05	-26.64
2	0.26339	10.38	30.72	13.11	41.10	23.49	61.32	51.32	-20.22	-27.83
3	0.43152	10.40	26.81	14.12	37.21	24.52	57.22	47.22	-20.01	-22.70
4	0.51754	10.40	22.93	13.21	33.33	23.61	56.00	46.00	-22.67	-22.39
5	0.67394	10.40	25.59	16.61	35.99	27.01	56.00	46.00	-20.01	-18.99
6	3.16461	10.52	21.33	13.80	31.85	24.32	56.00	46.00	-24.15	-21.68

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

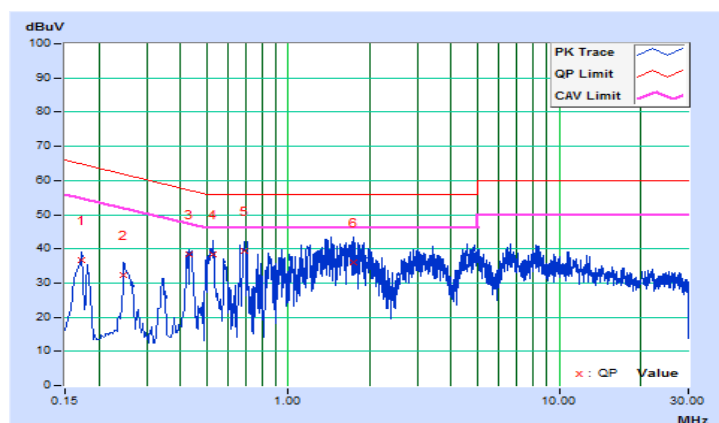


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 65%RH
Tested by	Getaz Yang	Test Date	2017/3/29
Test Mode	Mode 1		

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	0.17328	10.12	26.61	17.46	36.73	27.58	64.80	54.80	-28.07	-27.22
2	0.24775	10.14	22.35	8.45	32.49	18.59	61.83	51.83	-29.34	-33.24
3	0.43152	10.16	28.24	14.44	38.40	24.60	57.22	47.22	-18.82	-22.62
4	0.52927	10.16	28.37	11.24	38.53	21.40	56.00	46.00	-17.47	-24.60
5	0.68958	10.16	29.28	17.61	39.44	27.77	56.00	46.00	-16.56	-18.23
6	1.74528	10.21	25.89	15.01	36.10	25.22	56.00	46.00	-19.90	-20.78

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

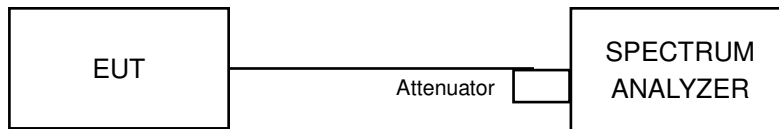


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB 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) = 100 kHz
- 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

<1TX>

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	8.12	0.5	Pass
6	2437	8.08	0.5	Pass
11	2462	6.14	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.99	0.5	Pass
6	2437	16.39	0.5	Pass
11	2462	16.38	0.5	Pass

<2TX>

802.11n (HT20)

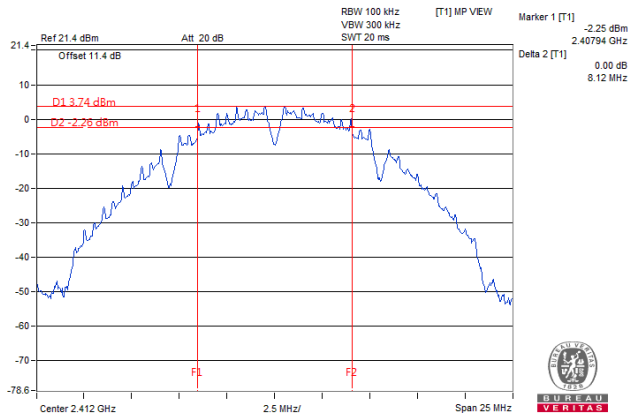
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.19	17.61	0.5	Pass
6	2437	17.64	16.41	0.5	Pass
11	2462	17.33	17.60	0.5	Pass

802.11n (HT40)

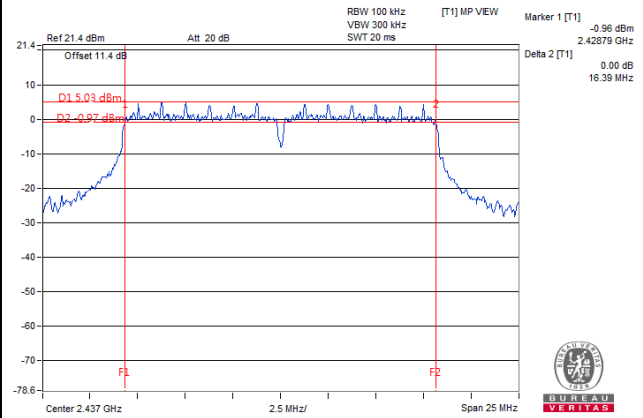
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.20	35.40	0.5	Pass
6	2437	36.46	35.84	0.5	Pass
9	2452	36.37	36.40	0.5	Pass

Spectrum Plot of Worst Value

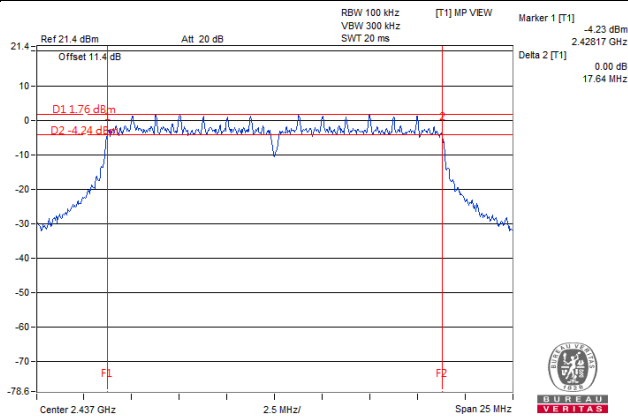
802.11b



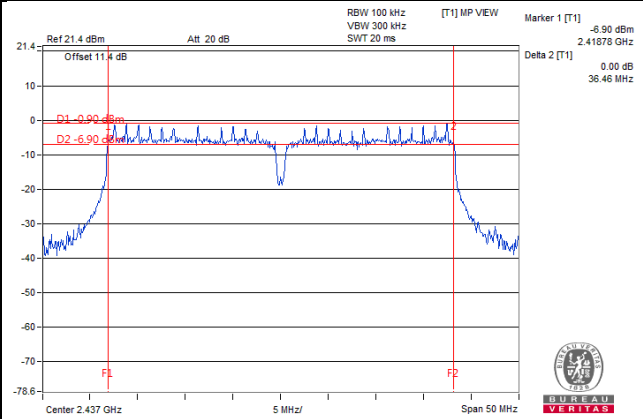
802.11g



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 (30 dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

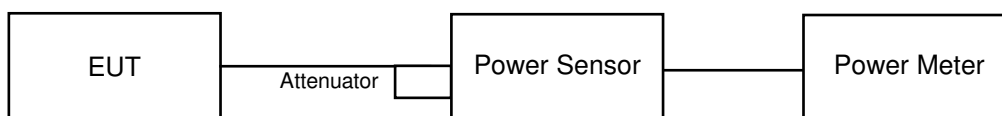
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = $5 \log(NANT/NSS)$ dB or 3 dB, whichever is less for 20 MHz channel widths with $NANT \geq 5$.

For power measurements on all other devices: Array Gain = $10 \log(NANT/NSS)$ dB.

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

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

4.4.7 Test Results

<1TX>

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	125.026	20.97	30	Pass
6	2437	127.644	21.06	30	Pass
11	2462	130.017	21.14	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	240.991	23.82	30	Pass
6	2437	238.781	23.78	30	Pass
11	2462	239.332	23.79	30	Pass

<2TX>

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.89	22.29	323.959	25.10	30	Pass
6	2437	21.51	21.87	295.394	24.70	30	Pass
11	2462	21.76	21.86	303.43	24.82	30	Pass

802.11n (HT40)

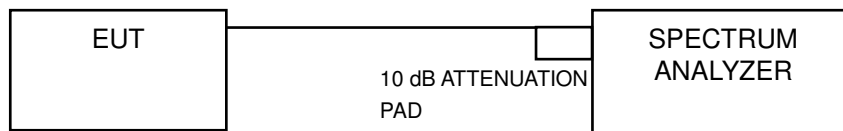
Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	22.01	21.95	315.53	24.99	30	Pass
6	2437	21.92	21.87	309.412	24.91	30	Pass
9	2452	21.98	21.94	314.076	24.97	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm.

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

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

4.5.7 Test Results

<1TX>

802.11b

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-5.89	8	Pass
6	2437	-5.72	8	Pass
11	2462	-5.61	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Pass / Fail
1	2412	-10.91	8	Pass
6	2437	-11.07	8	Pass
11	2462	-11.18	8	Pass

<2TX>

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	1	2412	-13.96	3.01	-10.95	8	Pass
	6	2437	-14.61	3.01	-11.60	8	Pass
	11	2462	-14.78	3.01	-11.77	8	Pass
1	1	2412	-13.94	3.01	-10.93	8	Pass
	6	2437	-14.34	3.01	-11.33	8	Pass
	11	2462	-14.29	3.01	-11.28	8	Pass

NOTE: Directional gain = -2.5 dBi + 10log(2) = 0.51 dBi < 6 dBi, so the limit no need to reduced.

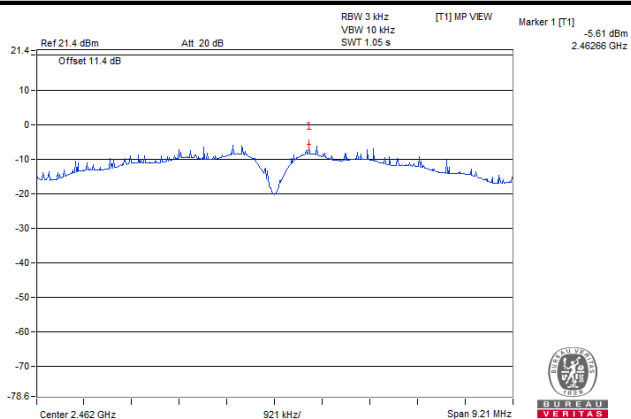
802.11n (HT40)

TX Chain	Channel	Freq. (MHz)	PSD (dBm)	10 log (N=2) dB	Total PSD (dBm)	Limit (dBm)	Pass / Fail
0	3	2422	-16.41	3.01	-13.40	8	Pass
	6	2437	-16.79	3.01	-13.78	8	Pass
	9	2452	-16.61	3.01	-13.60	8	Pass
1	3	2422	-16.04	3.01	-13.03	8	Pass
	6	2437	-16.57	3.01	-13.56	8	Pass
	9	2452	-16.23	3.01	-13.22	8	Pass

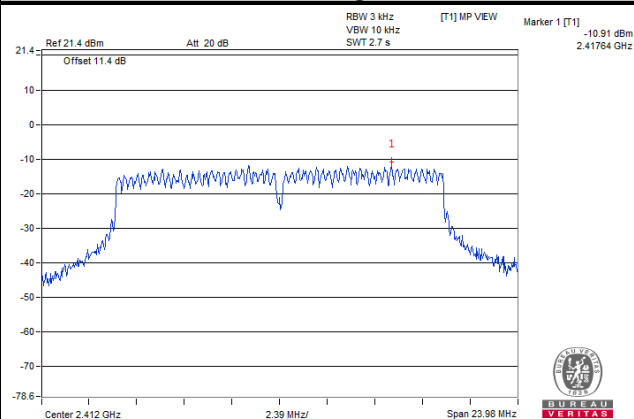
NOTE: Directional gain = -2.5 dBi + 10log(2) = 0.51 dBi < 6 dBi, so the limit no need to reduced.

Spectrum Plot of Worst Value

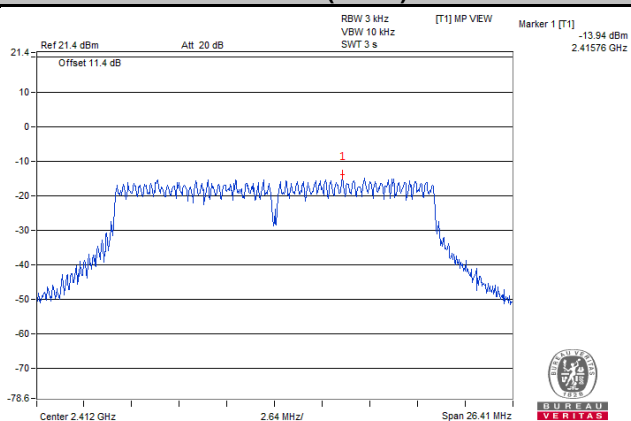
802.11b



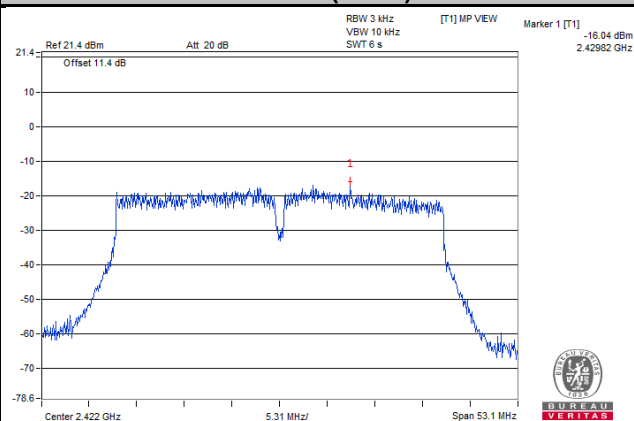
802.11g



802.11n (HT20)



802.11n (HT40)

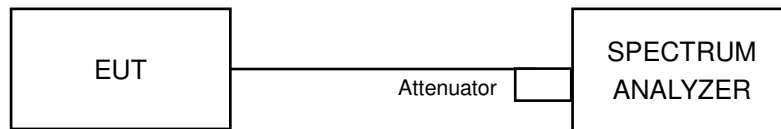


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20 dB of the highest emission level of operating band (in 100 kHz 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

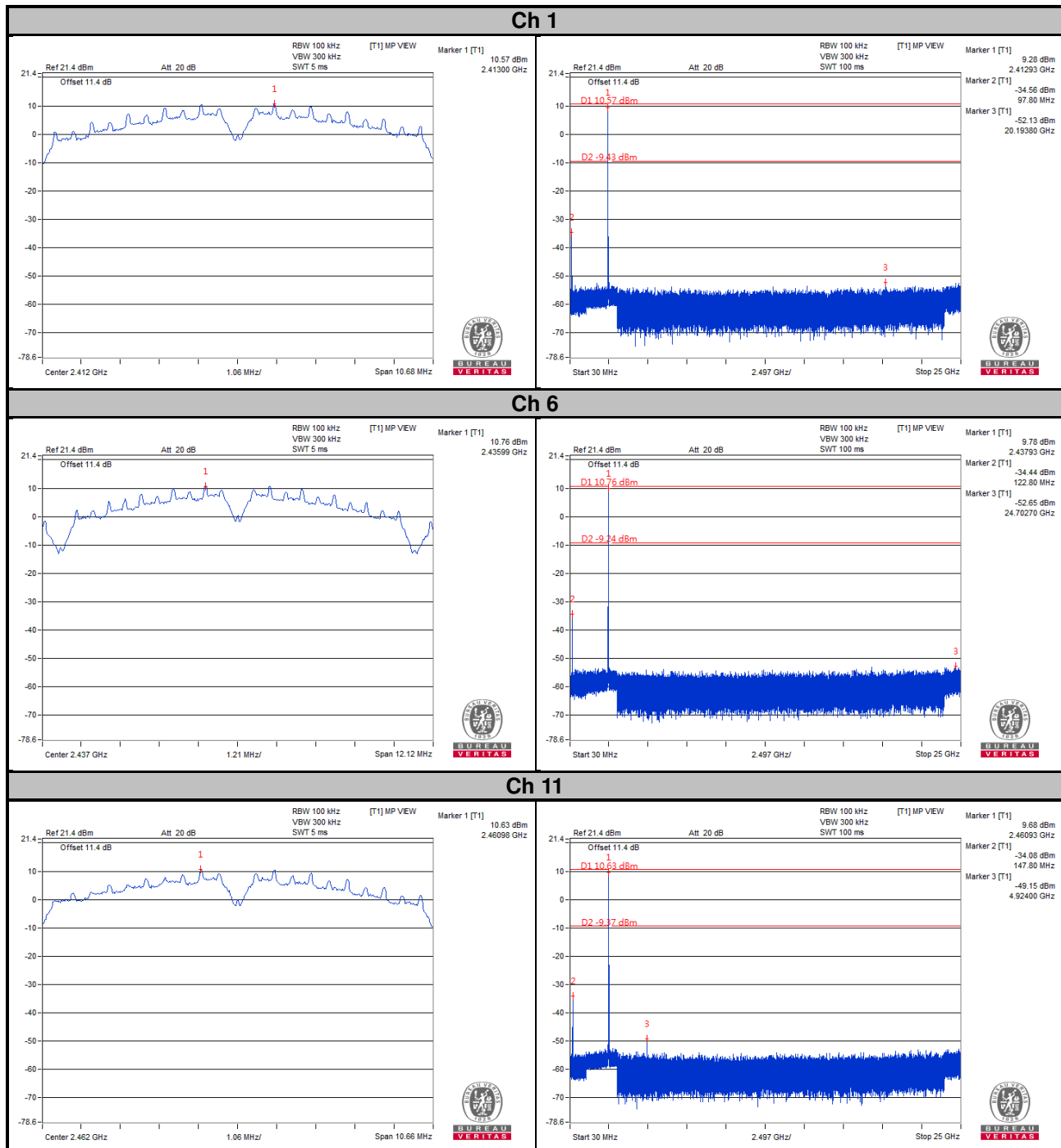
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

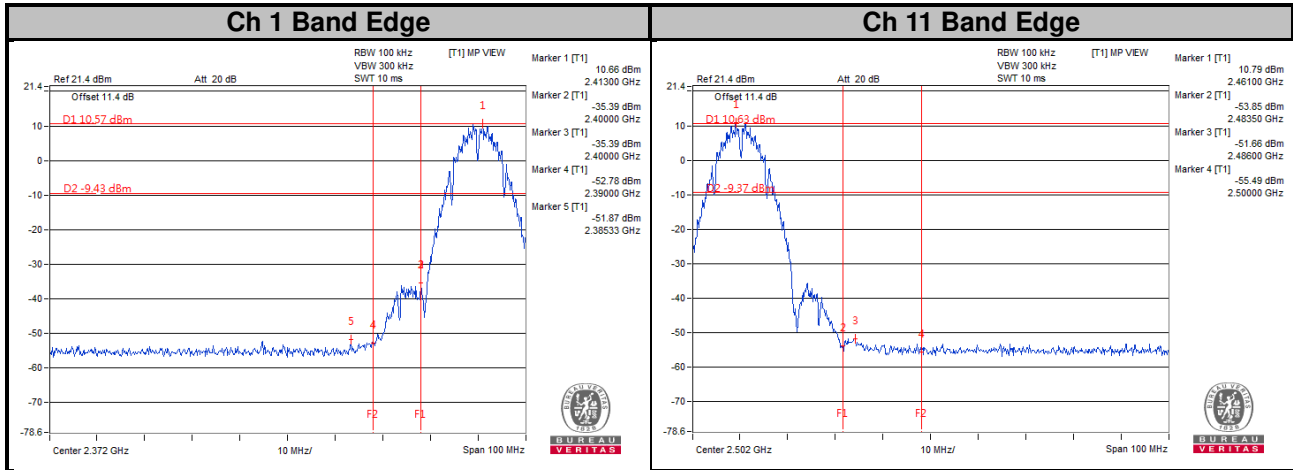
4.6.7 Test Results

The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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

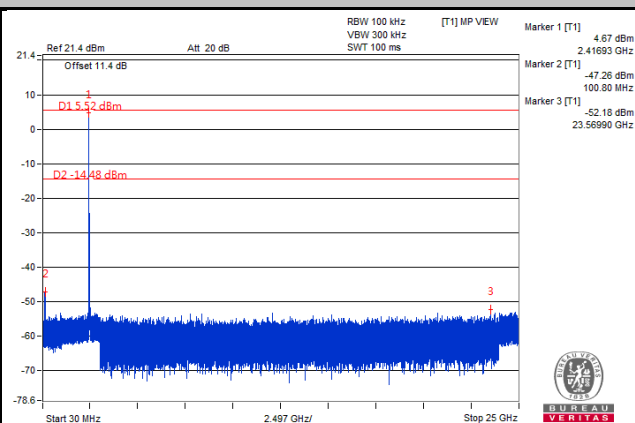
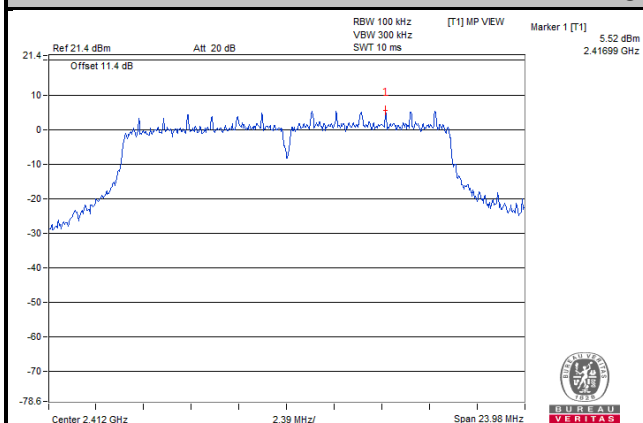
<1TX>
802.11b



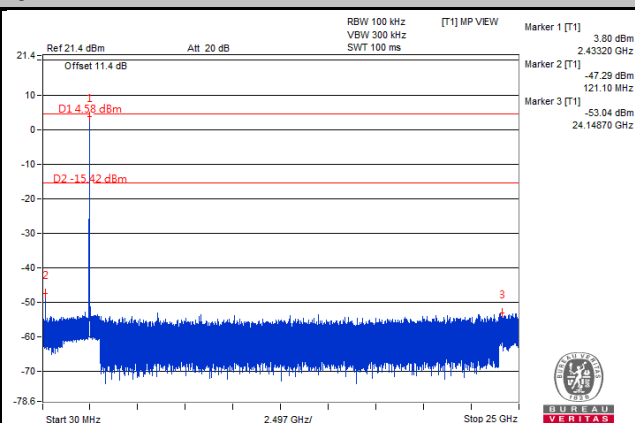
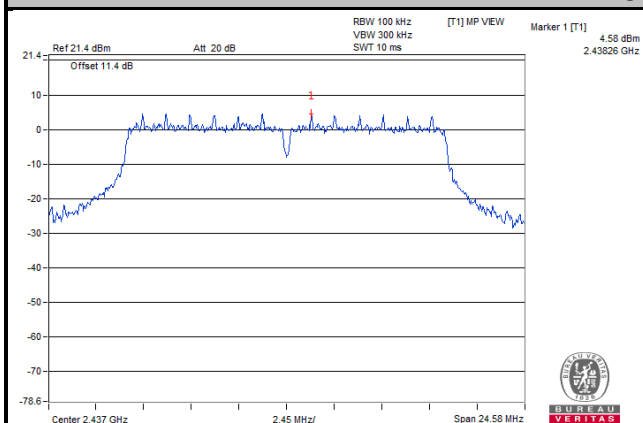


802.11g

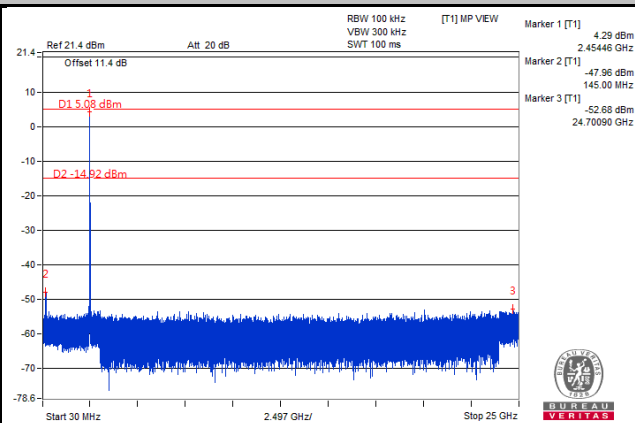
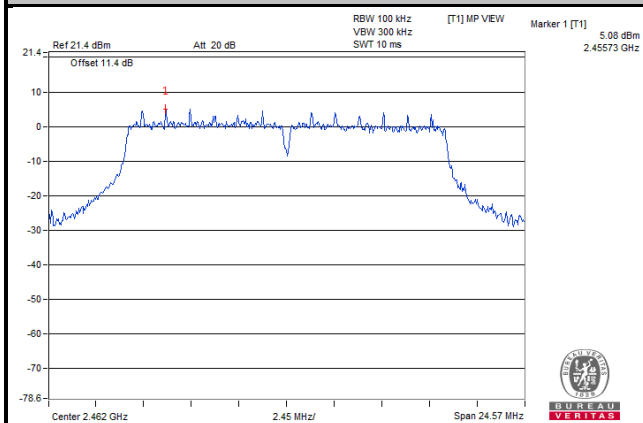
Ch 1

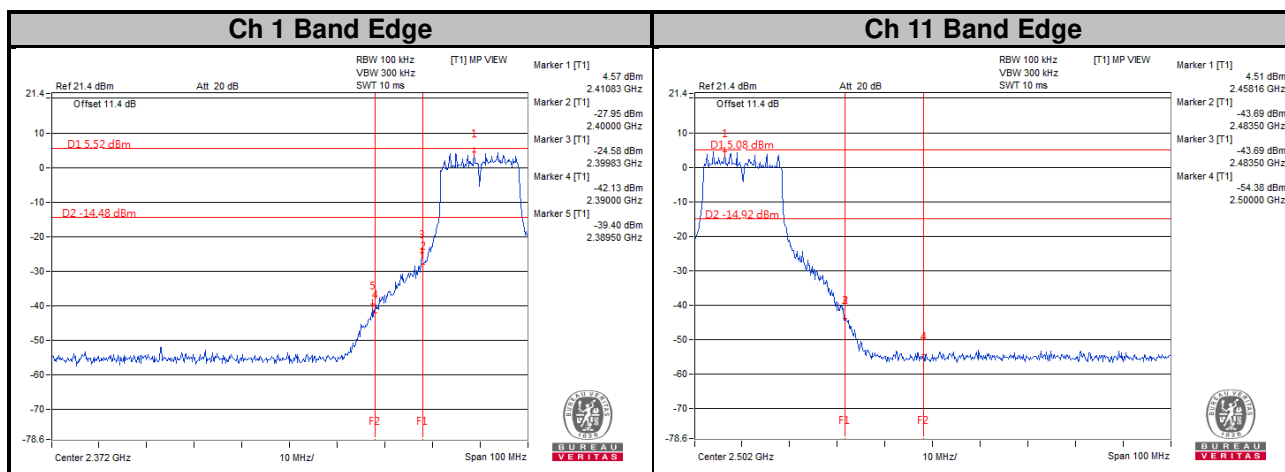


Ch 6



Ch 11



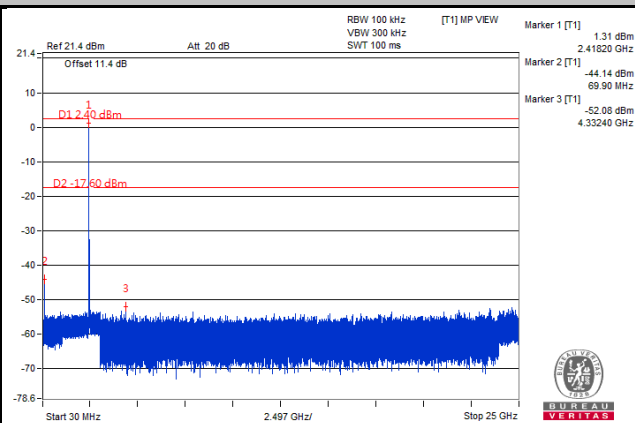
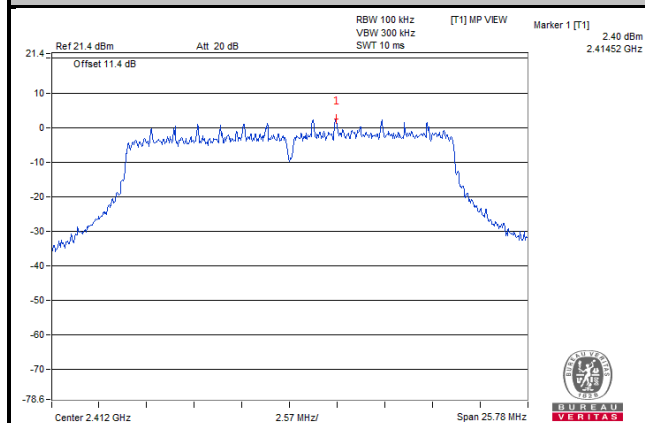


<2TX>

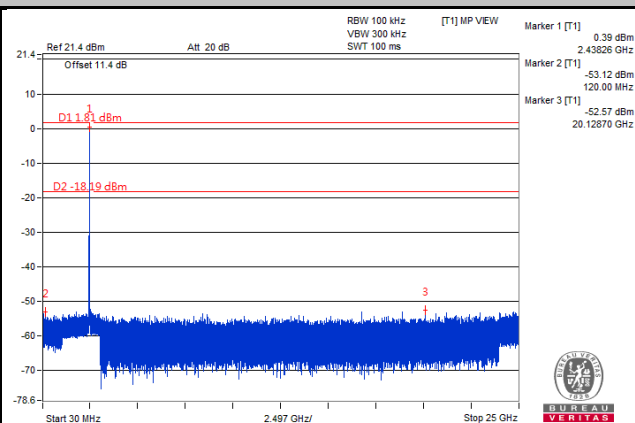
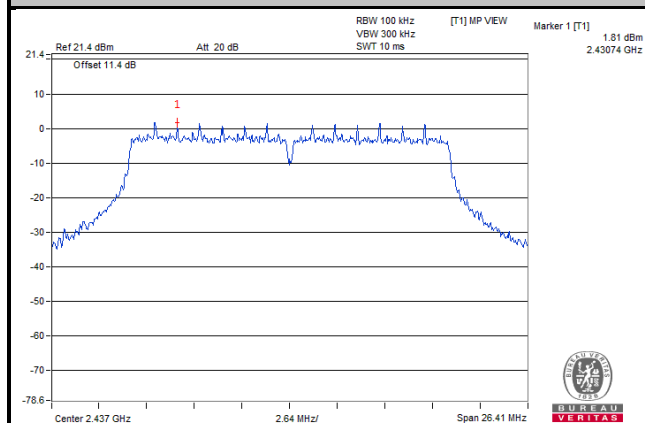
802.11n (HT20)

CHAIN 0

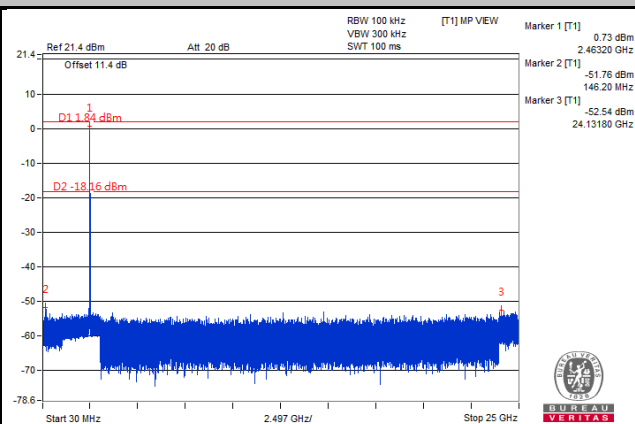
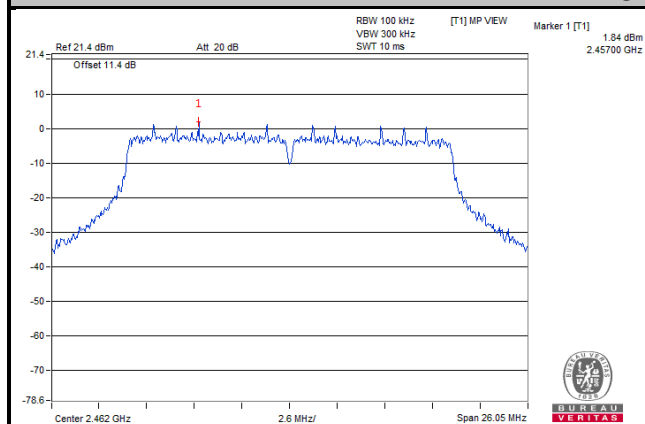
Ch 1

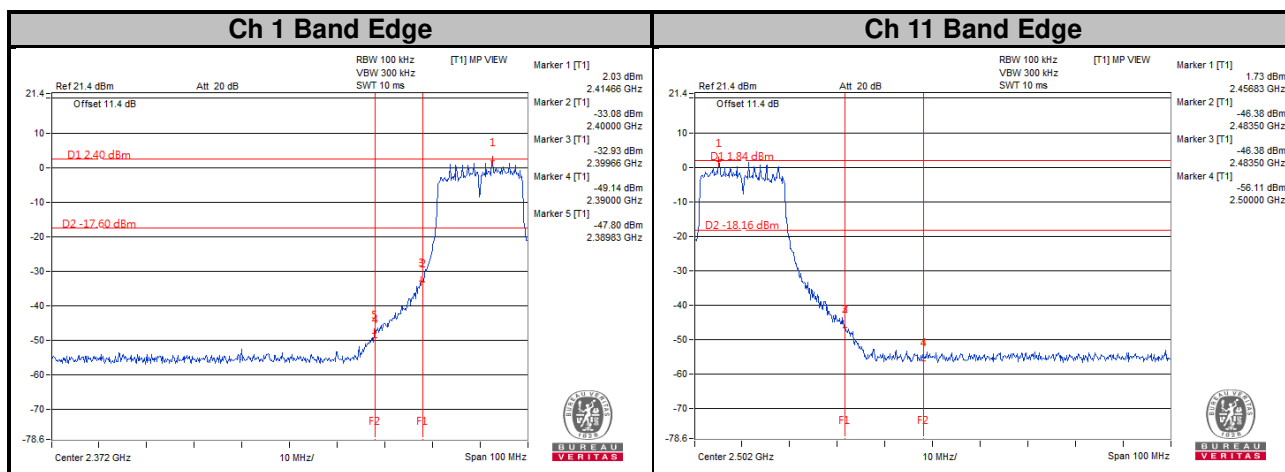


Ch 6



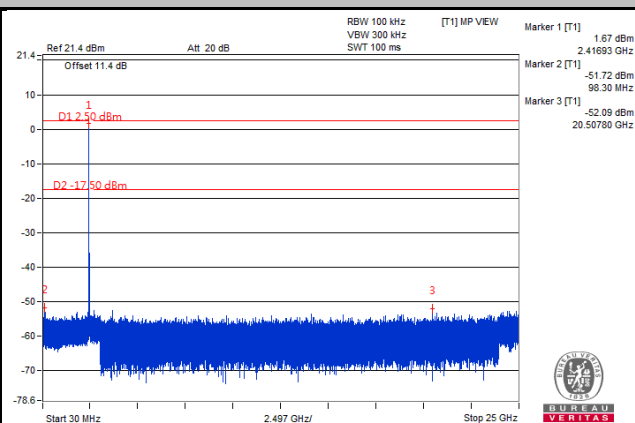
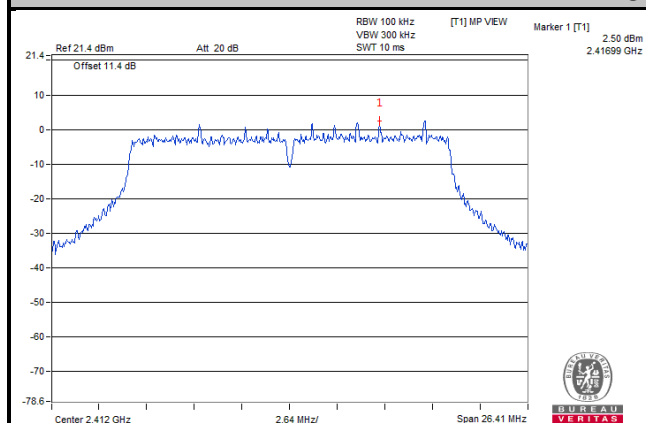
Ch 11



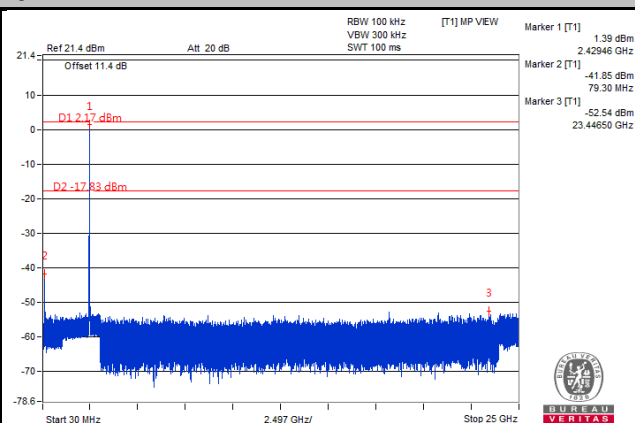
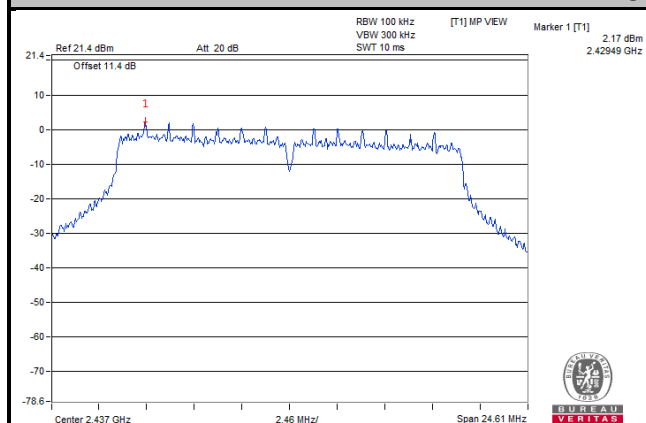


CHAIN 1

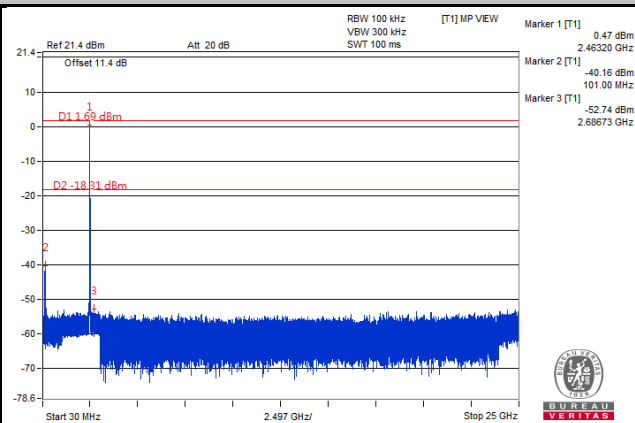
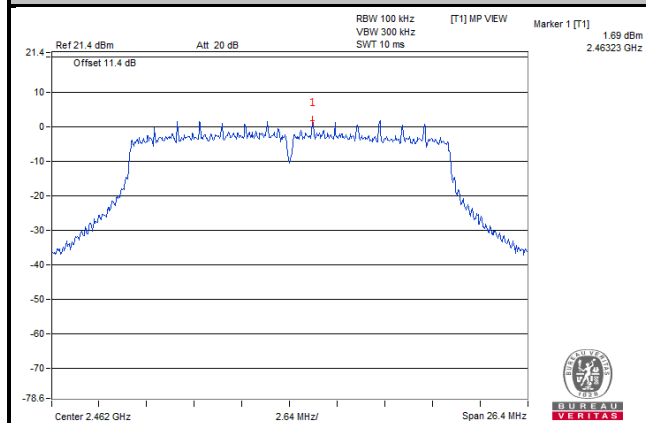
Ch 1

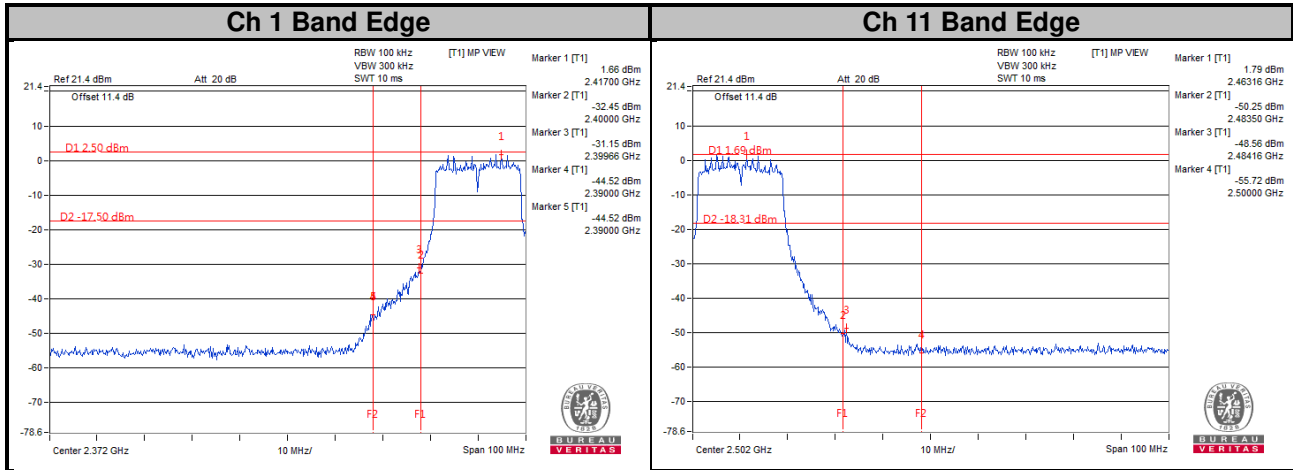


Ch 6



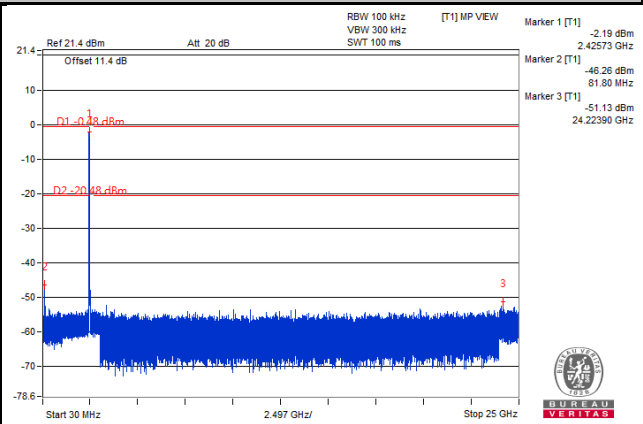
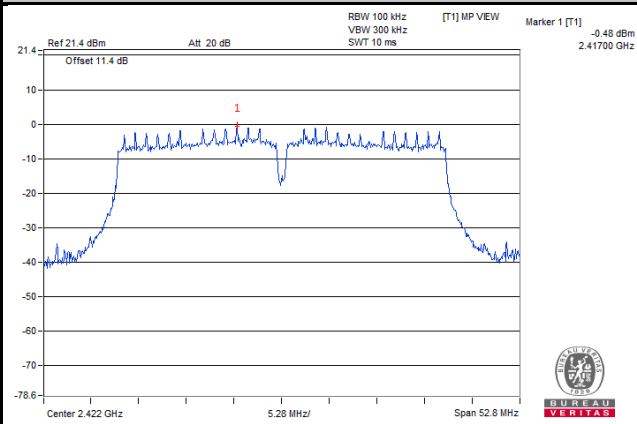
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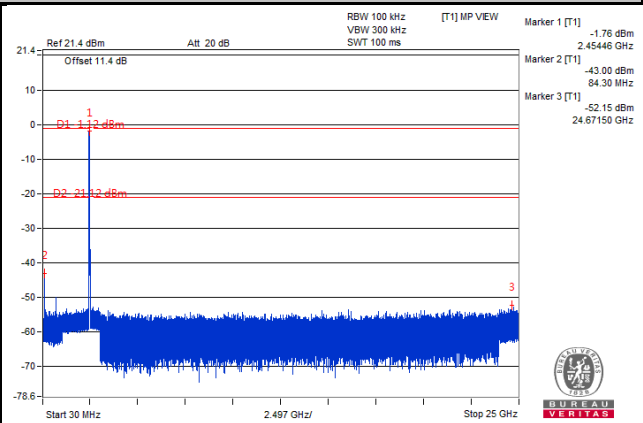
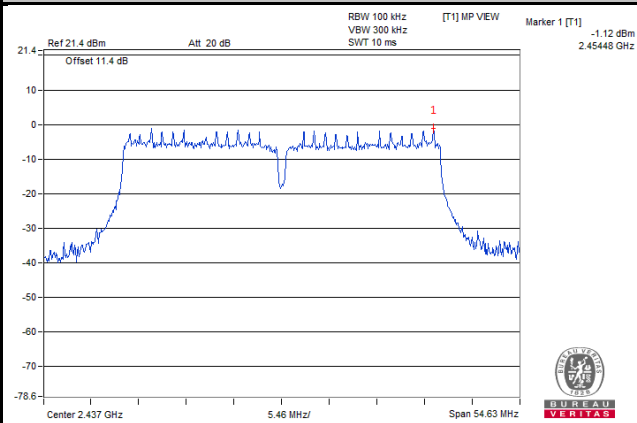


802.11n (HT40) CHAIN 0

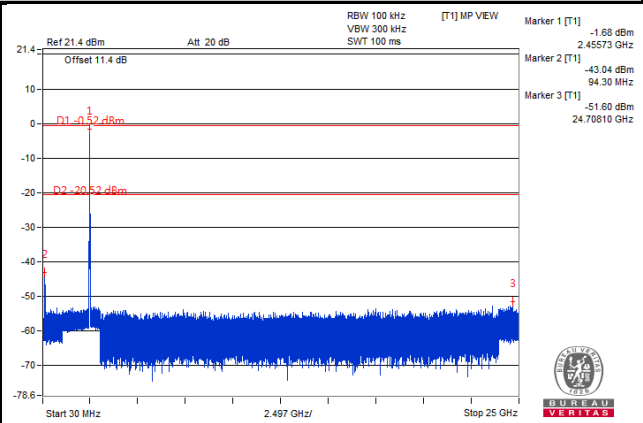
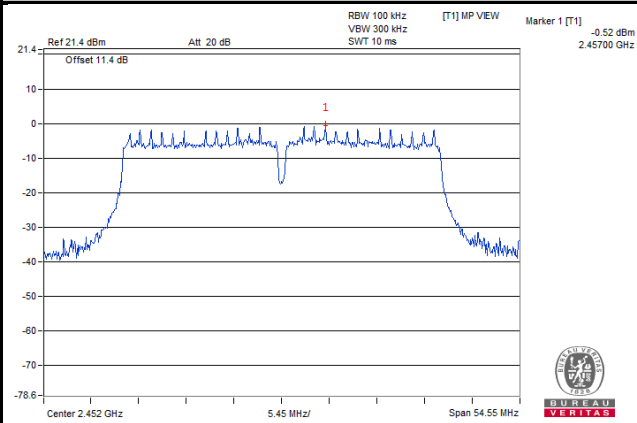
Ch 3

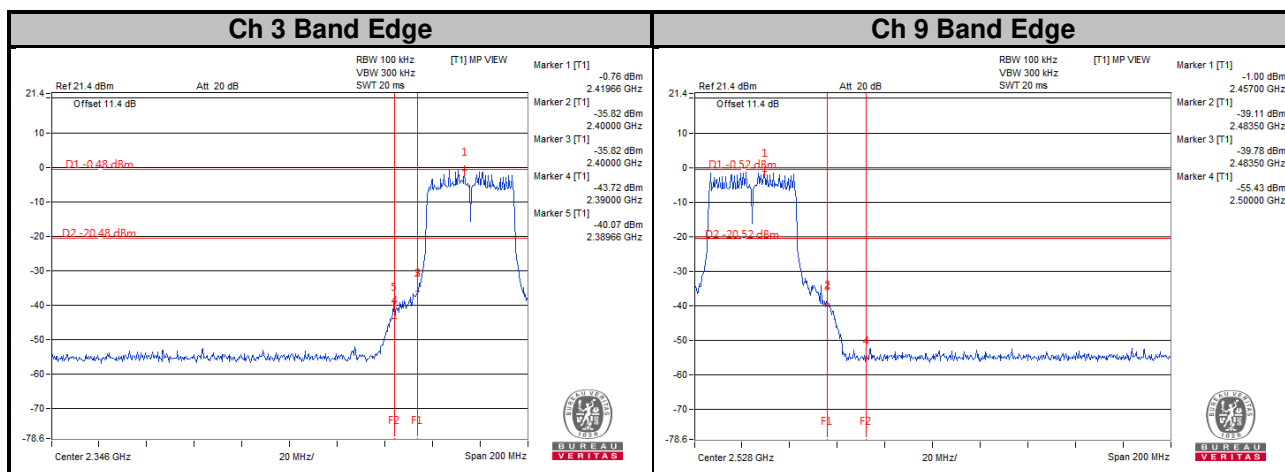


Ch 6



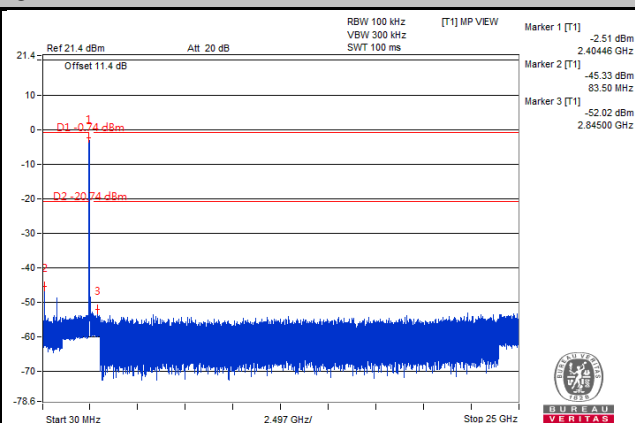
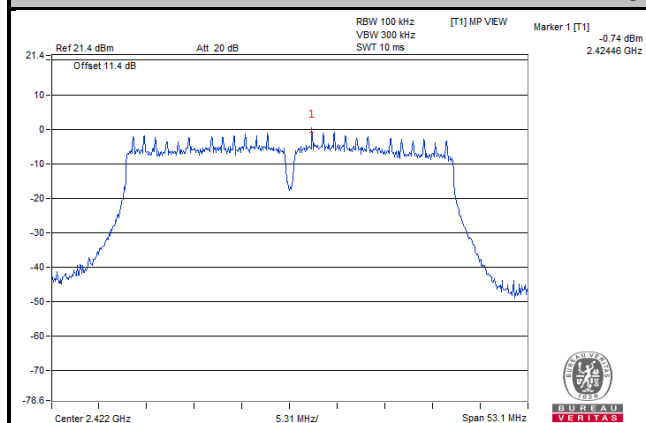
Ch 9



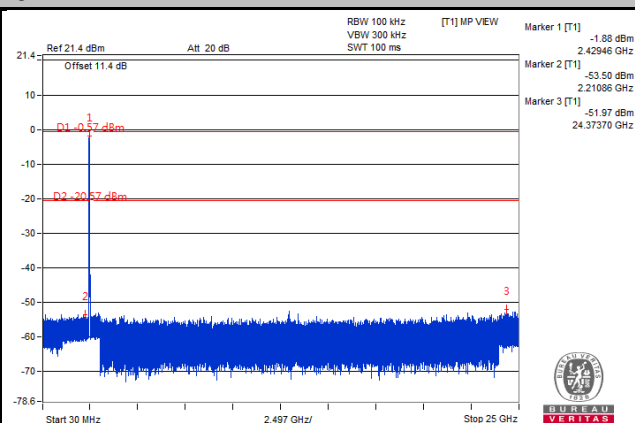
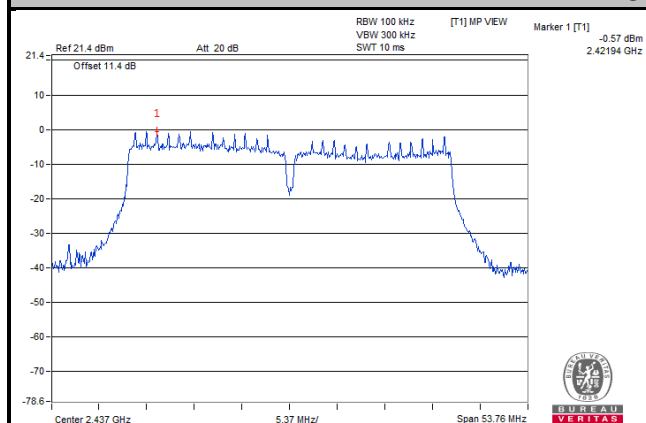


CHAIN 1

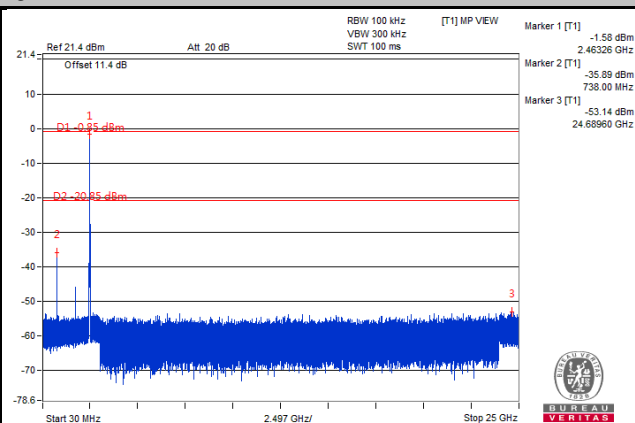
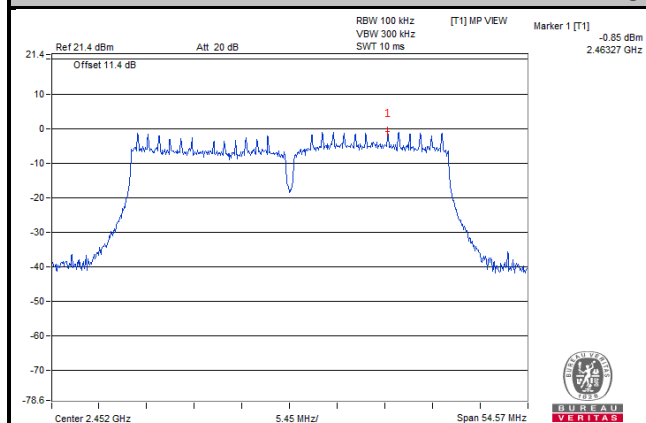
Ch 3



Ch 6

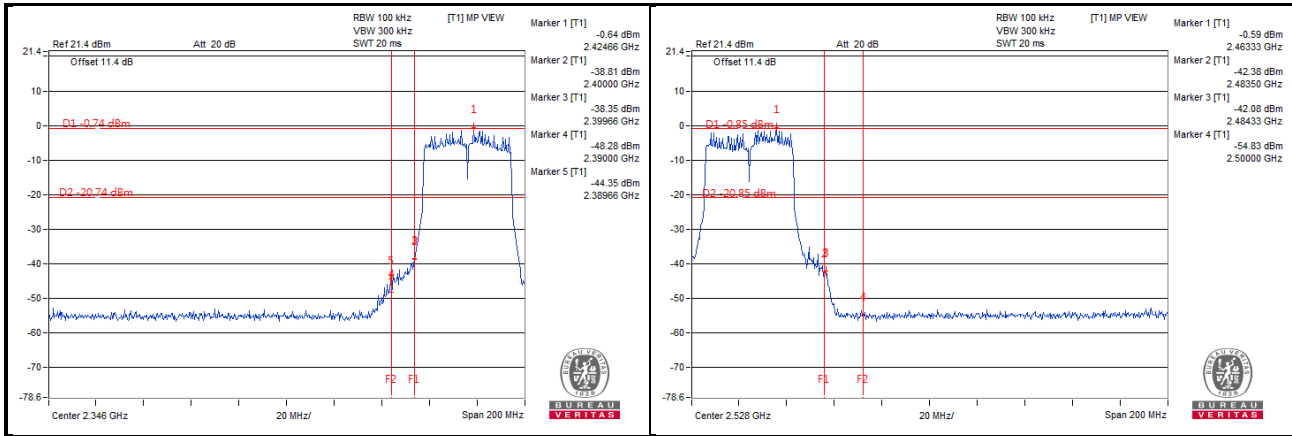


Ch 9



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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