FCC Test Report

Report No.:	RF161114C05
FCC ID:	TYM-BRIO
Test Model:	K175
Series Model:	K165
Received Date:	Nov. 14 , 2016
Test Date:	Dec. 01 ~ Dec. 29, 2016
Issued Date:	Jan. 04, 2017
Applicant:	AVAYA
Address:	250 Sidney Street, Belleville, Ontario , K8P 3Z3 ,Canada
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF161114C05	Original release.	Jan. 04, 2017

1 Certificate of Conformity

Product:	IP Phone
Brand:	AVAYA
Test Model:	K175
Series Model:	K165
Sample Status:	Engineering sample
Applicant:	AVAYA
Test Date:	Dec. 01 ~ Dec. 29, 2016
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:** Jan. 04, 2017

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Jan. 04, 2017

Ken Liu / Senior 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 -6.90dB at 0.40391MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.8dB at 2390.00MHz.
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	Antenna connector is i-pex(MHF) not a standard connector.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	IP Phone
Brand	AVAYA
Test Model	K175
Series Model	K165
Model Difference	K175: With camera K165: Without camera
Sample Status	Engineering sample
Power Supply Rating	48Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 400Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	130.288mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter
Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function
802.11b	1TX (diversity)
802.11g	1TX (Fixed chain 0)
802.11n (HT20)	2TX
802.11n (HT40)	2TX

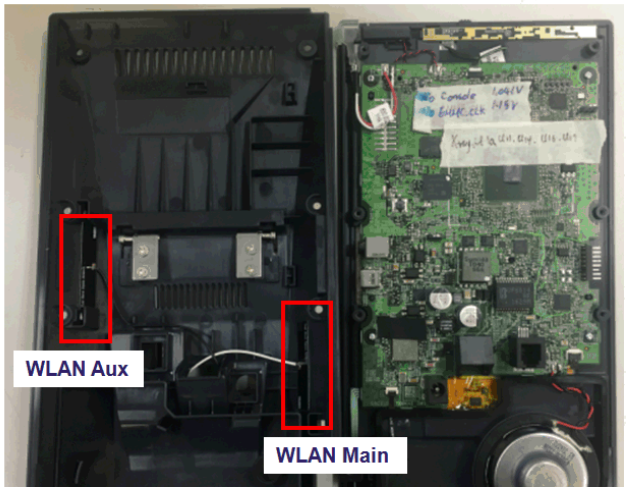
*802.11b: Chain 1 was the worst for the final tests.

2. The EUT uses the following Adapter.

Adapter	
Brand	DELTA Electronics, INC.
Model	ADP-30HR B
Input Power	100-240ac~1A 50-60Hz
Output Power	48Vdc / 0.66A
Power Line	1.45m power cable with one core attached on adapter

3. WLAN and BT technologies cannot transmit at same time.
   WLAN and NFC technologies can transmit at same time.
   Bluetooth and NFC technologies can transmit at same time.

4. The following antennas were provided to the EUT.



Antenna Type		PCB			Connecter Type		i-pex(MHF)		
Frequency (MHz)		2400	2450	2500	5150	5350	5470	5725	5850
Gain (dBi)	Main (Chain 0)	2.55	2.96	2.78	4.81	4.09	3.90	2.85	2.84
	AUX (Chain 1)	2.87	2.83	2.50	3.93	3.90	3.18	3.44	4.11

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	Model: K175

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.

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	Date 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	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Date Rate (Mbps)
-	802.11b	1 to 13	1	DSSS	DBPSK	1

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	Date Rate (Mbps)
-	802.11b	1 to 13	1	DSSS	DBPSK	1

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	Date 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	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

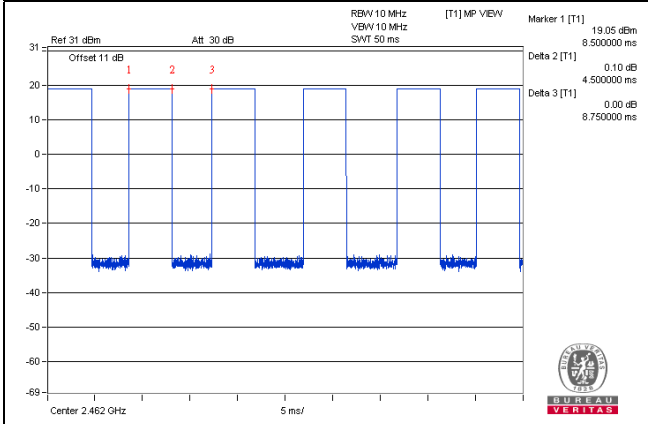
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	21 deg. C, 66% RH	120Vac, 60Hz	James Yang
RE<1G	20 deg. C, 65% RH	120Vac, 60Hz	James Yang
PLC	25 deg. C, 60% RH	120Vac, 60Hz	James Yang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Tank Wu

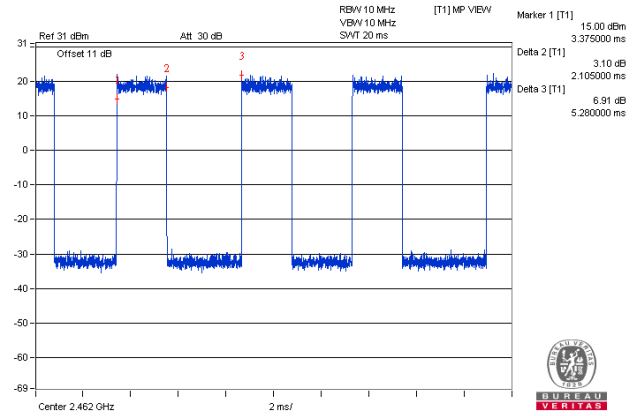
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is > 98%, duty factor is not required
Duty cycle of test signal is < 98 %, duty factor is required
802.11b: Duty cycle = 4.5/8.75 = 0.514, Duty factor = 10 * log(1/0.514) = 2.89
802.11g: Duty cycle = 2.105/5.28 = 0.399, Duty factor = 10 * log(1/0.399) = 3.99
802.11n (HT20): Duty cycle = 1.938/5.176 = 0.374, Duty factor = 10 * log(1/0.374) = 4.27
802.11n (HT40): Duty cycle = 0.9/6.15=14.6, Duty factor = 10 * log(1/14.6) = 8.35

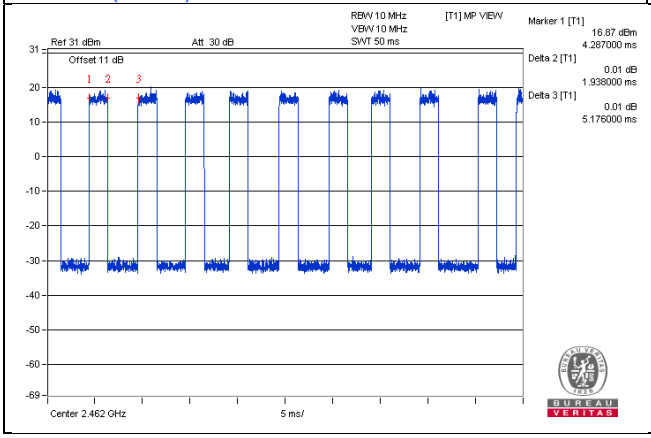
802.11b



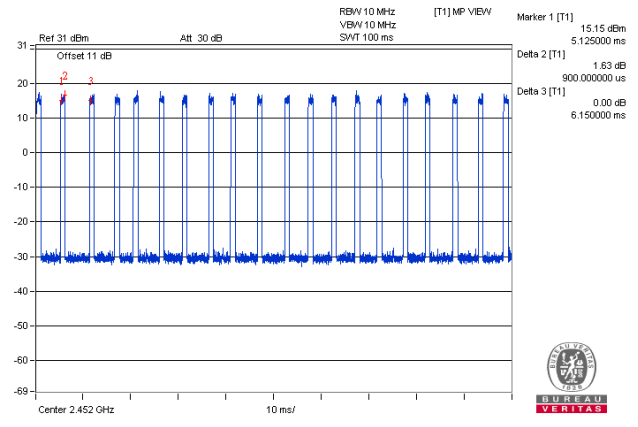
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

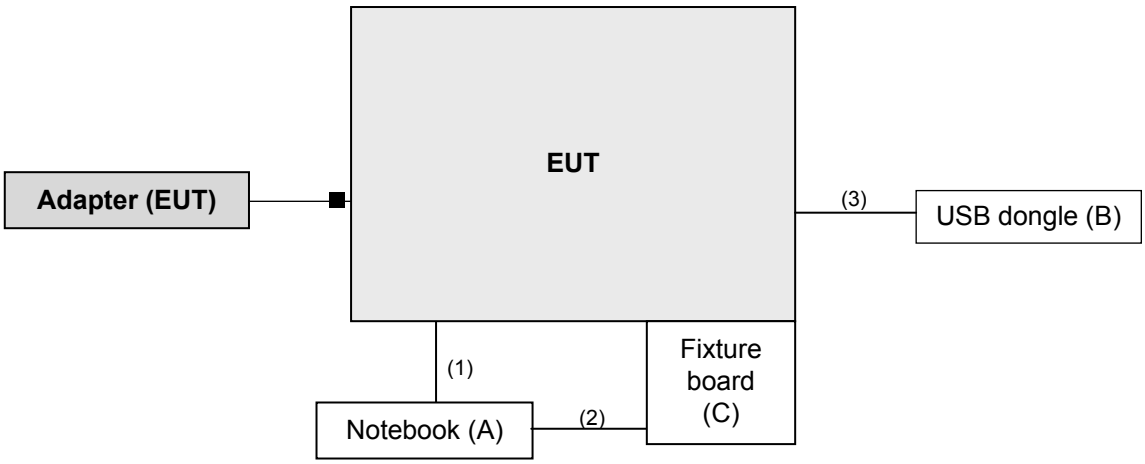
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	NA	NA	FCC DoC Approved	Provided by client
B.	USB dongle	NA	NA	NA	NA	Provided by client
C.	Fixture board	NA	NA	NA	NA	Provided by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	2.0	N	0	Provided by client
2.	USB cable	1	0.92	N	0	Provided by client
3.	USB cable	1	0.2	N	0	Provided by client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 DTS Meas Guidance v03r05
KDB 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 30dB 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 30dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 16, 2016	Nov. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Jan. 08, 2016	Jan. 07, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8447D	2944A10738	Aug. 22, 2016	Aug. 21, 2017
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2016	Aug. 21, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2016	Aug. 21, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2016	Aug. 21, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017

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 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 988962.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case 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.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

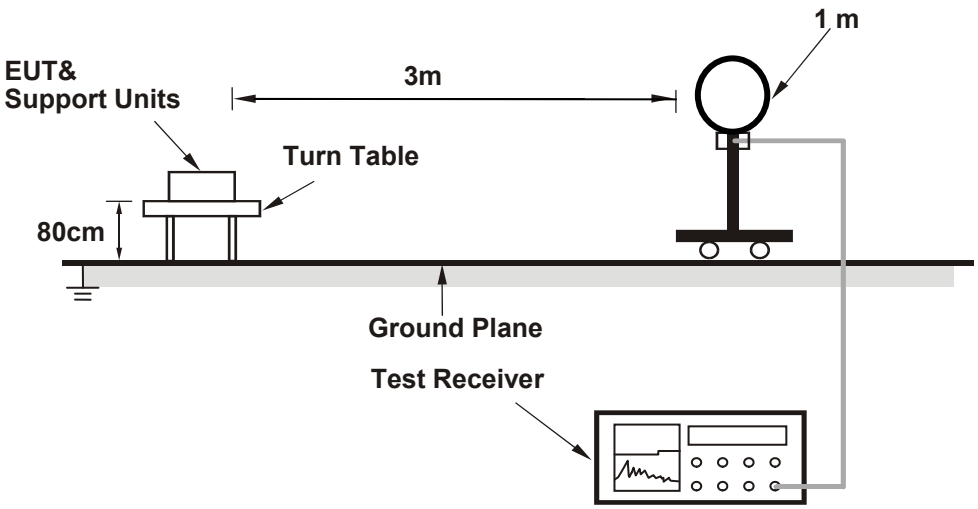
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

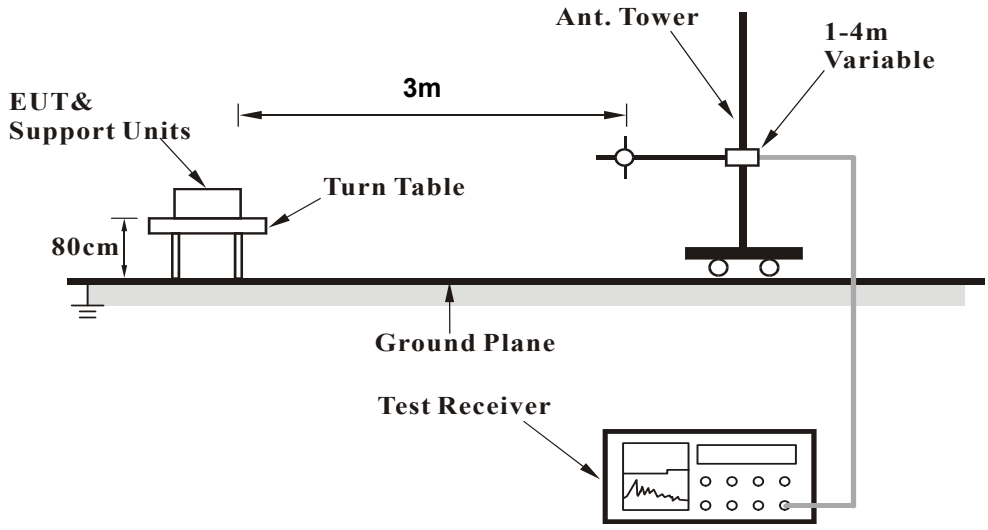
No deviation.

4.1.5 Test Setup

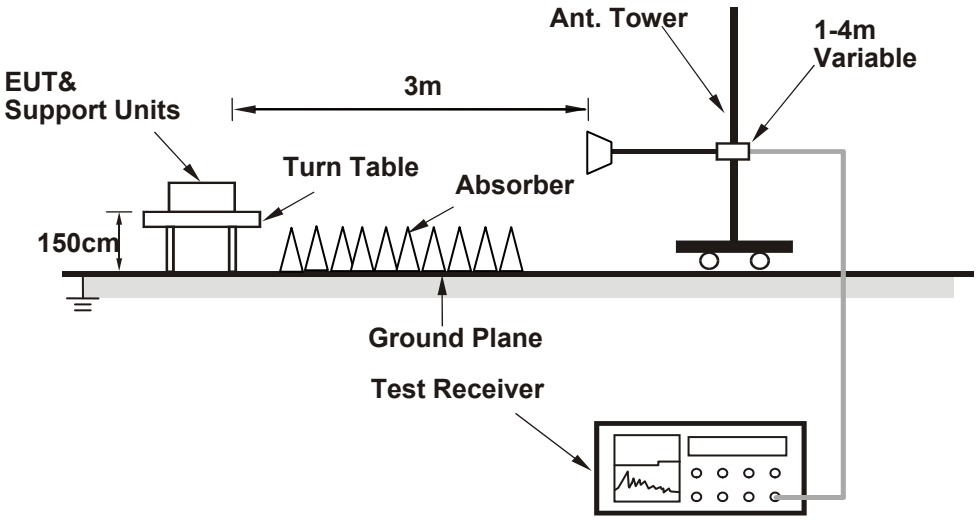
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Connected the EUT with the notebook and placed them on the testing table.
b. Set the EUT under transmission condition continuously at specific channel frequency.
c. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data：

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	1.73 H	172	28.9	30.9
2	2390.00	51.9 AV	54.0	-2.1	1.73 H	172	21.0	30.9
3	*2412.00	105.0 PK			1.44 H	168	73.9	31.1
4	*2412.00	101.4 AV			1.44 H	168	70.3	31.1
5	4824.00	54.0 PK	74.0	-20.0	1.69 H	194	49.5	4.5
6	4824.00	51.0 AV	54.0	-3.0	1.69 H	194	46.5	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.8 PK	74.0	-13.2	1.54 V	133	29.9	30.9
2	**2390.00**	**53.2 AV**	**54.0**	**-0.8**	**1.54 V**	**133**	**22.3**	**30.9**
3	*2412.00	106.1 PK			1.72 V	225	75.0	31.1
4	*2412.00	102.1 AV			1.72 V	225	71.0	31.1
5	4824.00	54.8 PK	74.0	-19.2	1.19 V	194	50.3	4.5
6	4824.00	52.3 AV	54.0	-1.7	1.19 V	194	47.8	4.5

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.6 PK			1.70 H	169	75.5	31.1
2	*2437.00	102.7 AV			1.70 H	169	71.6	31.1
3	4874.00	54.4 PK	74.0	-19.6	1.61 H	194	49.8	4.6
4	4874.00	51.3 AV	54.0	-2.7	1.61 H	194	46.7	4.6
5	7311.00	53.4 PK	74.0	-20.6	1.56 H	197	41.3	12.1
6	7311.00	41.1 AV	54.0	-12.9	1.56 H	197	29.0	12.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.7 PK			1.85 V	228	75.6	31.1
2	*2437.00	102.7 AV			1.85 V	228	71.6	31.1
3	4874.00	54.9 PK	74.0	-19.1	1.13 V	196	50.3	4.6
4	4874.00	52.1 AV	54.0	-1.9	1.13 V	196	47.5	4.6
5	7311.00	58.9 PK	74.0	-15.1	1.36 V	188	46.8	12.1
6	7311.00	52.8 AV	54.0	-1.2	1.36 V	188	40.7	12.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.2 PK			1.68 H	169	72.0	31.2
2	*2462.00	99.3 AV			1.68 H	169	68.1	31.2
3	2483.50	57.6 PK	74.0	-16.4	1.65 H	169	26.3	31.3
4	2483.50	48.1 AV	54.0	-5.9	1.65 H	169	16.8	31.3
5	4924.00	50.5 PK	74.0	-23.5	1.56 H	190	46.0	4.5
6	4924.00	45.8 AV	54.0	-8.2	1.56 H	190	41.3	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.1 PK			1.75 V	161	72.9	31.2
2	*2462.00	100.2 AV			1.75 V	161	69.0	31.2
3	2483.50	60.1 PK	74.0	-13.9	1.66 V	153	28.8	31.3
4	2483.50	52.7 AV	54.0	-1.3	1.66 V	153	21.4	31.3
5	4924.00	51.0 PK	74.0	-23.0	1.54 V	206	46.5	4.5
6	4924.00	46.6 AV	54.0	-7.4	1.54 V	206	42.1	4.5

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	1.22 H	157	30.1	30.9
2	2390.00	45.4 AV	54.0	-8.6	1.22 H	157	14.5	30.9
3	*2412.00	92.3 PK			1.26 H	162	61.2	31.1
4	*2412.00	82.3 AV			1.26 H	162	51.2	31.1
5	4824.00	45.3 PK	74.0	-28.7	1.33 H	141	40.8	4.5
6	4824.00	32.6 AV	54.0	-21.4	1.33 H	141	28.1	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	71.6 PK	74.0	-2.4	1.41 V	134	40.7	30.9
2	2390.00	52.8 AV	54.0	-1.2	1.41 V	134	21.9	30.9
3	*2412.00	102.4 PK			1.38 V	132	71.3	31.1
4	*2412.00	92.2 AV			1.38 V	132	61.1	31.1
5	4824.00	49.6 PK	74.0	-24.4	1.60 V	121	45.1	4.5
6	4824.00	35.5 AV	54.0	-18.5	1.60 V	121	31.0	4.5

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	99.6 PK			1.32 H	180	68.5	31.1
2	*2437.00	89.4 AV			1.32 H	180	58.3	31.1
3	4874.00	49.7 PK	74.0	-24.3	1.28 H	140	45.1	4.6
4	4874.00	36.3 AV	54.0	-17.7	1.28 H	140	31.7	4.6
5	7311.00	57.3 PK	74.0	-16.7	1.28 H	118	45.2	12.1
6	7311.00	44.2 AV	54.0	-9.8	1.28 H	118	32.1	12.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	109.2 PK			1.47 V	134	78.1	31.1
2	*2437.00	99.1 AV			1.47 V	134	68.0	31.1
3	4874.00	59.8 PK	74.0	-14.2	1.46 V	116	55.2	4.6
4	4874.00	46.2 AV	54.0	-7.8	1.46 V	116	41.6	4.6
5	7311.00	67.7 PK	74.0	-6.3	1.68 V	140	55.6	12.1
6	7311.00	52.8 AV	54.0	-1.2	1.68 V	140	40.7	12.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	94.3 PK			1.31 H	172	63.1	31.2
2	*2462.00	84.0 AV			1.31 H	172	52.8	31.2
3	2483.50	59.6 PK	74.0	-14.4	1.36 H	181	28.3	31.3
4	2483.50	46.8 AV	54.0	-7.2	1.36 H	181	15.5	31.3
5	4924.00	45.7 PK	74.0	-28.3	1.87 H	314	41.2	4.5
6	4924.00	32.7 AV	54.0	-21.3	1.87 H	314	28.2	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.8 PK			1.01 V	132	72.6	31.2
2	*2462.00	94.1 AV			1.01 V	132	62.9	31.2
3	2483.50	66.8 PK	74.0	-7.2	1.33 V	135	35.5	31.3
4	2483.50	53.0 AV	54.0	-1.0	1.33 V	135	21.7	31.3
5	4924.00	48.2 PK	74.0	-25.8	1.42 V	110	43.7	4.5
6	4924.00	35.3 AV	54.0	-18.7	1.42 V	110	30.8	4.5

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.1 PK	74.0	-16.9	1.78 H	191	26.2	30.9
2	2390.00	44.0 AV	54.0	-10.0	1.78 H	191	13.1	30.9
3	*2412.00	99.9 PK			1.78 H	187	68.8	31.1
4	*2412.00	90.1 AV			1.78 H	187	59.0	31.1
5	4824.00	45.1 PK	74.0	-28.9	1.65 H	120	40.6	4.5
6	4824.00	32.6 AV	54.0	-21.4	1.65 H	120	28.1	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.9 PK	74.0	-1.1	1.42 V	130	42.0	30.9
2	2390.00	49.5 AV	54.0	-4.5	1.42 V	130	18.6	30.9
3	*2412.00	106.6 PK			1.45 V	128	75.5	31.1
4	*2412.00	96.9 AV			1.45 V	128	65.8	31.1
5	4824.00	51.0 PK	74.0	-23.0	1.18 V	127	46.5	4.5
6	4824.00	37.3 AV	54.0	-16.7	1.18 V	127	32.8	4.5

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	106.4 PK			1.72 H	187	75.3	31.1
2	*2437.00	96.7 AV			1.72 H	187	65.6	31.1
3	4874.00	52.1 PK	74.0	-21.9	1.72 H	176	47.5	4.6
4	4874.00	38.9 AV	54.0	-15.1	1.72 H	176	34.3	4.6
5	7311.00	60.7 PK	74.0	-13.3	1.75 H	123	48.6	12.1
6	7311.00	47.1 AV	54.0	-6.9	1.75 H	123	35.0	12.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	111.4 PK			1.96 V	186	80.3	31.1
2	*2437.00	102.1 AV			1.96 V	186	71.0	31.1
3	4874.00	58.4 PK	74.0	-15.6	2.05 V	132	53.8	4.6
4	4874.00	45.8 AV	54.0	-8.2	2.05 V	132	41.2	4.6
5	7311.00	65.1 PK	74.0	-8.9	1.64 V	136	53.0	12.1
6	7311.00	52.9 AV	54.0	-1.1	1.64 V	136	40.8	12.1

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	101.4 PK			1.69 H	184	70.2	31.2
2	*2462.00	92.0 AV			1.69 H	184	60.8	31.2
3	2483.50	58.6 PK	74.0	-15.4	1.56 H	169	27.3	31.3
4	2483.50	45.4 AV	54.0	-8.6	1.56 H	169	14.1	31.3
5	4924.00	45.6 PK	74.0	-28.4	1.87 H	228	41.1	4.5
6	4924.00	33.1 AV	54.0	-20.9	1.87 H	228	28.6	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	104.4 PK			1.77 V	168	73.2	31.2
2	*2462.00	95.2 AV			1.77 V	168	64.0	31.2
3	2483.50	63.1 PK	74.0	-10.9	1.70 V	156	31.8	31.3
4	2483.50	52.7 AV	54.0	-1.3	1.70 V	156	21.4	31.3
5	4924.00	50.1 PK	74.0	-23.9	1.68 V	135	45.6	4.5
6	4924.00	36.0 AV	54.0	-18.0	1.68 V	135	31.5	4.5

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.9 PK	74.0	-11.1	1.89 H	160	32.0	30.9
2	2390.00	47.7 AV	54.0	-6.3	1.89 H	160	16.8	30.9
3	*2422.00	96.6 PK			1.91 H	166	65.5	31.1
4	*2422.00	87.2 AV			1.91 H	166	56.1	31.1
5	4844.00	45.8 PK	74.0	-28.2	1.77 H	84	41.4	4.4
6	4844.00	32.7 AV	54.0	-21.3	1.77 H	84	28.3	4.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.4 PK	74.0	-5.6	1.69 V	156	37.5	30.9
2	2390.00	52.9 AV	54.0	-1.1	1.69 V	156	22.0	30.9
3	*2422.00	103.4 PK			1.64 V	157	72.3	31.1
4	*2422.00	93.4 AV			1.64 V	157	62.3	31.1
5	4844.00	47.4 PK	74.0	-26.6	1.73 V	133	43.0	4.4
6	4844.00	34.7 AV	54.0	-19.3	1.73 V	133	30.3	4.4

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.4 PK	74.0	-11.6	2.09 H	190	31.5	30.9
2	2390.00	47.1 AV	54.0	-6.9	2.09 H	190	16.2	30.9
3	*2437.00	100.7 PK			2.05 H	189	69.6	31.1
4	*2437.00	91.4 AV			2.05 H	189	60.3	31.1
5	2483.50	65.1 PK	74.0	-8.9	1.96 H	187	33.8	31.3
6	2483.50	50.5 AV	54.0	-3.5	1.96 H	187	19.2	31.3
7	4874.00	45.8 PK	74.0	-28.2	2.73 H	351	41.2	4.6
8	4874.00	32.7 AV	54.0	-21.3	2.73 H	351	28.1	4.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.1 PK	74.0	-6.9	1.71 V	160	36.2	30.9
2	2390.00	52.6 AV	54.0	-1.4	1.71 V	160	21.7	30.9
3	*2437.00	104.0 PK			1.78 V	185	72.9	31.1
4	*2437.00	93.7 AV			1.78 V	185	62.6	31.1
5	2483.50	62.9 PK	74.0	-11.1	1.67 V	162	31.6	31.3
6	2483.50	48.4 AV	54.0	-5.6	1.67 V	162	17.1	31.3
7	4874.00	47.5 PK	74.0	-26.5	1.69 V	203	42.9	4.6
8	4874.00	34.8 AV	54.0	-19.2	1.69 V	203	30.2	4.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	99.1 PK			2.03 H	190	67.9	31.2
2	*2452.00	89.3 AV			2.03 H	190	58.1	31.2
3	2483.50	60.6 PK	74.0	-13.4	2.02 H	184	29.3	31.3
4	2483.50	47.6 AV	54.0	-6.4	2.02 H	184	16.3	31.3
5	4904.00	45.8 PK	74.0	-28.2	1.97 H	112	41.3	4.5
6	4904.00	32.7 AV	54.0	-21.3	1.97 H	112	28.2	4.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	102.7 PK			1.77 V	166	71.5	31.2
2	*2452.00	93.5 AV			1.77 V	166	62.3	31.2
3	2483.50	63.1 PK	74.0	-10.9	1.76 V	167	31.8	31.3
4	2483.50	52.7 AV	54.0	-1.3	1.76 V	167	21.4	31.3
5	4904.00	46.6 PK	74.0	-27.4	1.69 V	137	42.1	4.5
6	4904.00	34.5 AV	54.0	-19.5	1.69 V	137	30.0	4.5

REMARKS:

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

Below 1GHz Worst-Case Data: 802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	97.95	41.0 QP	43.5	-2.5	2.00 H	290	60.1	-19.1
2	249.60	43.1 QP	46.0	-2.9	1.00 H	271	57.1	-14.0
3	374.04	36.6 QP	46.0	-9.4	1.00 H	137	47.1	-10.5
4	500.42	39.0 QP	46.0	-7.0	1.50 H	140	46.9	-7.9
5	624.98	42.4 QP	46.0	-3.6	1.23 H	283	47.1	-4.7
6	751.23	40.4 QP	46.0	-5.6	1.50 H	7	42.6	-2.2
7	875.67	41.1 QP	46.0	-4.9	1.50 H	314	41.2	-0.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.23	34.6 QP	40.0	-5.4	1.50 V	285	50.9	-16.3
2	249.60	36.8 QP	46.0	-9.2	2.00 V	8	50.8	-14.0
3	374.04	37.1 QP	46.0	-8.9	1.50 V	197	47.6	-10.5
4	550.97	40.3 QP	46.0	-5.7	1.00 V	177	47.4	-7.1
5	624.85	43.0 QP	46.0	-3.0	1.00 V	170	47.7	-4.7
6	751.23	39.6 QP	46.0	-6.4	1.50 V	5	41.8	-2.2
7	875.67	38.2 QP	46.0	-7.8	1.00 V	324	38.3	-0.1
8	1000.10	40.6 QP	54.0	-13.4	1.00 V	170	38.6	2.0

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 24, 2016	Oct. 23, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
			Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2016	Feb. 25, 2017
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 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

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

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

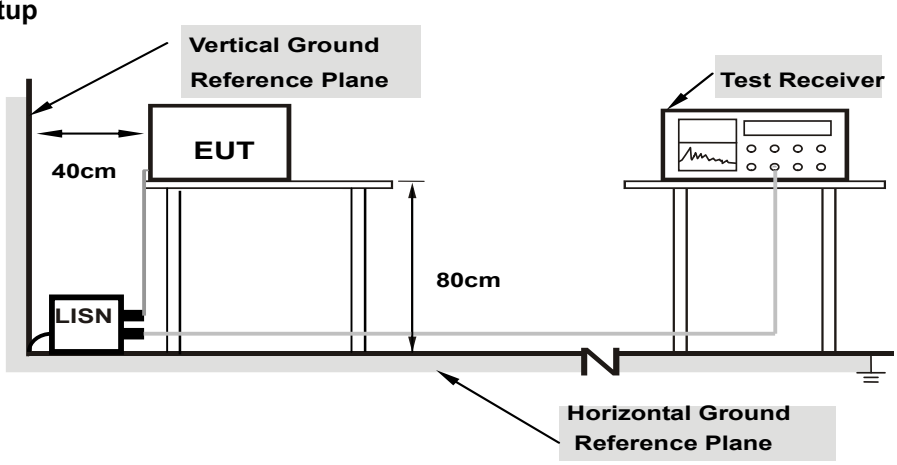
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

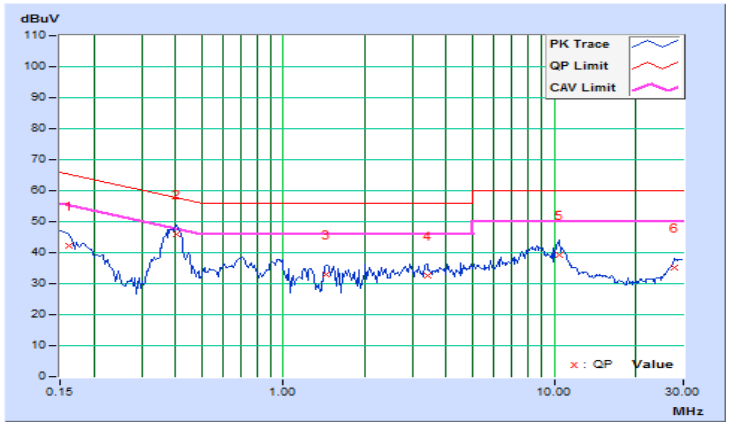
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	10.19	32.05	22.22	42.24	32.41	65.38	55.38	-23.14	-22.97
2	**0.40391**	**10.24**	**35.81**	**30.63**	**46.05**	**40.87**	**57.77**	**47.77**	**-11.72**	**-6.90**
3	1.44531	10.34	22.46	16.75	32.80	27.09	56.00	46.00	-23.20	-18.91
4	3.41016	10.40	22.15	16.74	32.55	27.14	56.00	46.00	-23.45	-18.86
5	10.42969	10.53	28.70	22.69	39.23	33.22	60.00	50.00	-20.77	-16.78
6	27.82813	10.52	24.69	19.89	35.21	30.41	60.00	50.00	-24.79	-19.59

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.

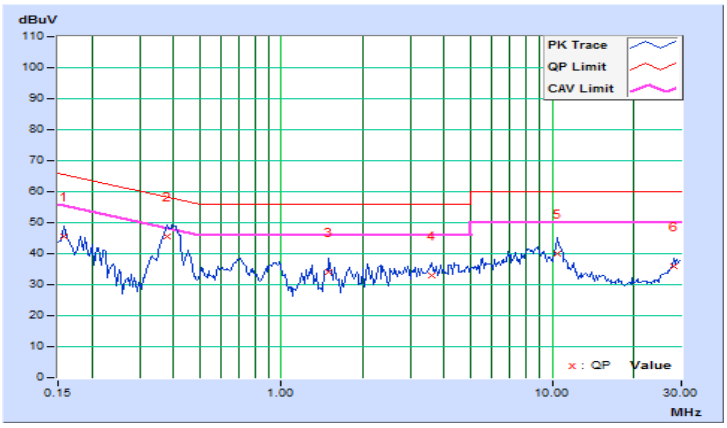


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.19	35.35	26.27	45.54	36.46	65.58	55.58	-20.04	-19.12
2	0.38047	10.29	35.33	29.56	45.62	39.85	58.27	48.27	-12.65	-8.42
3	1.49219	10.35	23.59	18.58	33.94	28.93	56.00	46.00	-22.06	-17.07
4	3.58203	10.52	22.27	16.56	32.79	27.08	56.00	46.00	-23.21	-18.92
5	10.50391	10.62	29.22	23.05	39.84	33.67	60.00	50.00	-20.16	-16.33
6	28.02344	10.69	25.17	20.43	35.86	31.12	60.00	50.00	-24.14	-18.88

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.

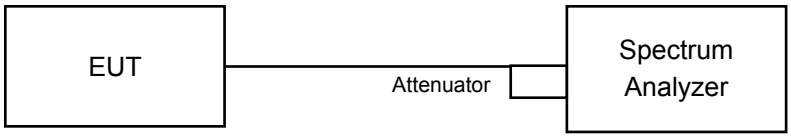


4.3 6dB Bandwidth Measurement

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

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.09	0.5	Pass
6	2437	10.10	0.5	Pass
11	2462	10.10	0.5	Pass

802.11g

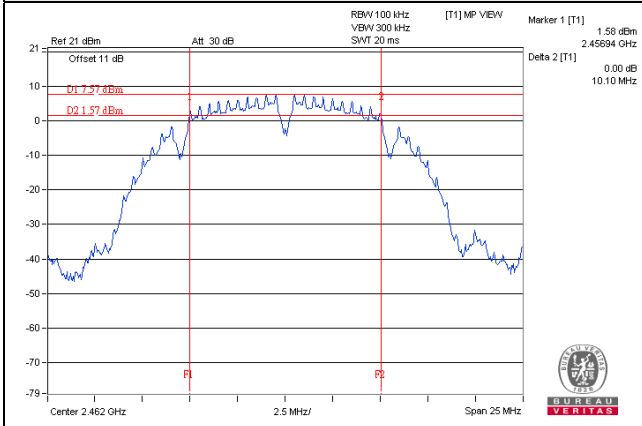
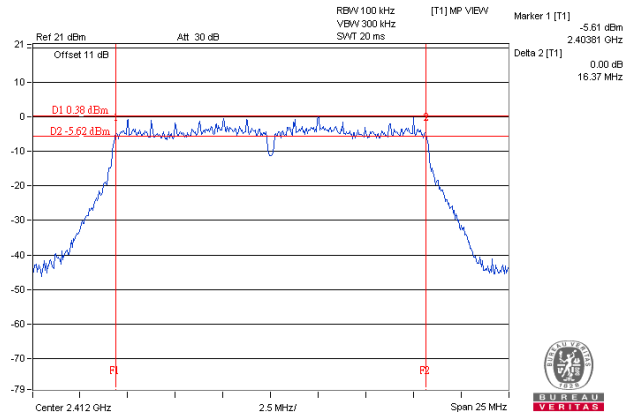
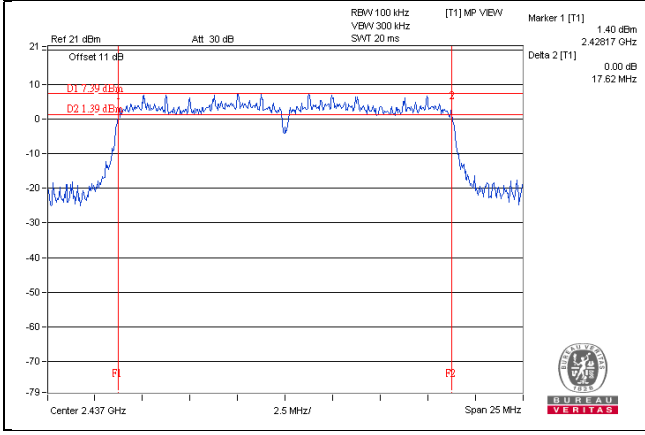
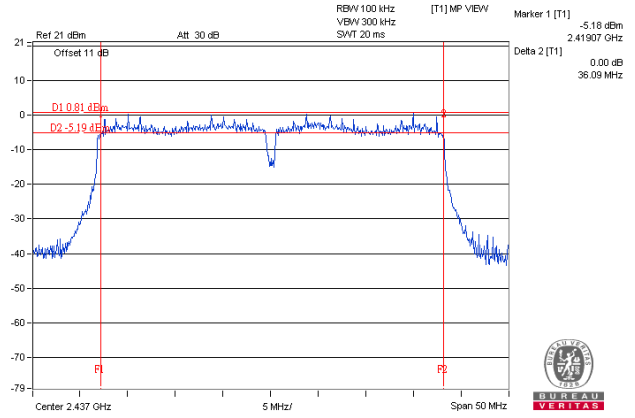
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.37	0.5	Pass
6	2437	16.36	0.5	Pass
11	2462	16.37	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.33	17.58	0.5	Pass
6	2437	17.31	17.62	0.5	Pass
11	2462	17.35	17.60	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.79	35.80	0.5	Pass
6	2437	35.87	36.09	0.5	Pass
9	2452	35.84	35.82	0.5	Pass

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

4.4 Conducted Output Power Measurement

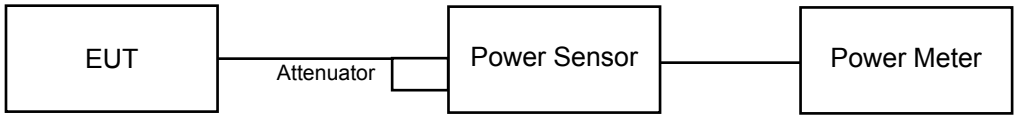
4.4.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)
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 $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) 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

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as item 4.3.6.

4.4.7 Test Results

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	79.068	18.98	30	Pass
6	2437	83.176	19.20	30	Pass
11	2462	41.495	16.18	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	11.722	10.69	30	Pass
6	2437	43.152	16.35	30	Pass
11	2462	18.707	12.72	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	11.31	11.72	28.380	14.53	30	Pass
6	2437	17.61	18.61	**130.288**	21.15	30	Pass
11	2462	10.87	11.90	27.706	14.43	30	Pass

802.11n (HT40)

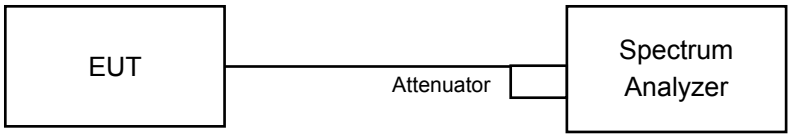
Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	13.88	13.34	46.011	16.63	30	Pass
6	2437	14.72	14.48	57.702	17.61	30	Pass
9	2452	12.85	12.35	36.454	15.62	30	Pass

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

For AVG. power (duty cycle < 98%)
a) Measure the duty cycle (x).
b) Set instrument center frequency to DTS channel center frequency.
c) Set span to at least 1.5 times the OBW.
d) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
e) Set VBW ≥3 x RBW.
f) Detector = power averaging (RMS) or sample detector (when RMS not available).
g) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
h) Sweep time = auto couple.
i) Do not use sweep triggering. Allow sweep to “free run”.
j) Employ trace averaging (RMS) mode over a minimum of 100 traces.
k) Use the peak marker function to determine the maximum amplitude level.
l) Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Duty Factor	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-29.36	2.89	-26.47	8	Pass
6	2437	-28.11	2.89	-25.22	8	Pass
11	2462	-31.38	2.89	-28.49	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Duty Factor	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-45.99	3.99	-42.00	8	Pass
6	2437	-42.54	3.99	-38.55	8	Pass
11	2462	-43.58	3.99	-39.59	8	Pass

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass/Fail
0	1	2412	-33.69	3.01	4.27	-26.41	8	Pass
	6	2437	-44.13	3.01	4.27	-36.85	8	Pass
	11	2462	-35.19	3.01	4.27	-27.91	8	Pass
1	1	2412	-35.38	3.01	4.27	-28.10	8	Pass
	6	2437	-28.14	3.01	4.27	-20.86	8	Pass
	11	2462	-34.32	3.01	4.27	-27.04	8	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2$/N] = 5.93dBi < 6dBi, so the limit no need to reduce.

802.11n (HT40)

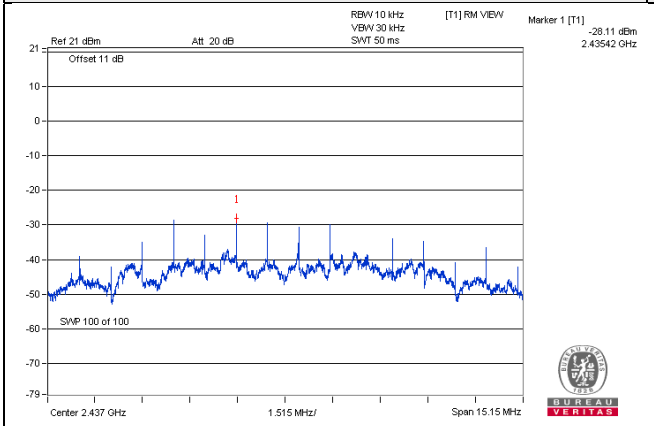
TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=2) dB	Duty Factor	Total PSD (dBm/10kHz)	Limit (dBm/3kHz)	Pass/Fail
0	3	2422	-49.65	3.01	8.35	-38.29	8	Pass
	6	2437	-47.97	3.01	8.35	-36.61	8	Pass
	9	2452	-50.43	3.01	8.35	-39.07	8	Pass
1	3	2422	-48.55	3.01	8.35	-37.19	8	Pass
	6	2437	-50.30	3.01	8.35	-38.94	8	Pass
	9	2452	-46.94	3.01	8.35	-35.58	8	Pass

Note:

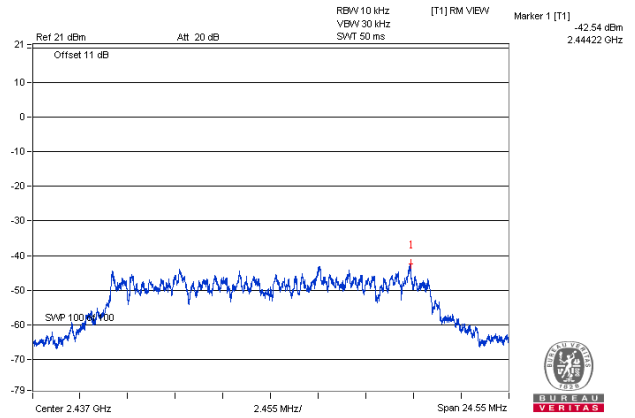
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2/N$] = 5.93dBi < 6dBi, so the limit no need to reduce.

Spectrum Plot of Worst Value

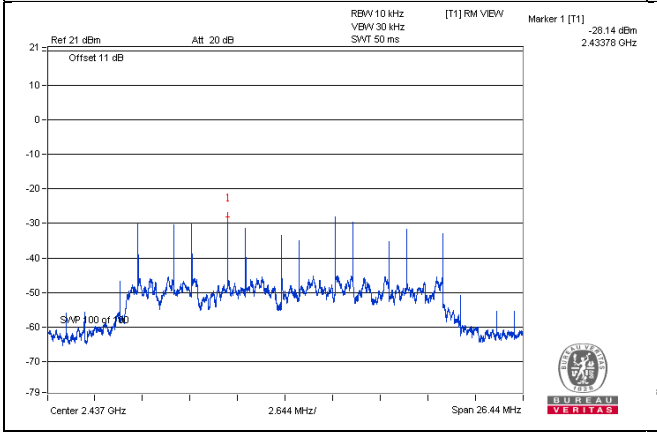
802.11b



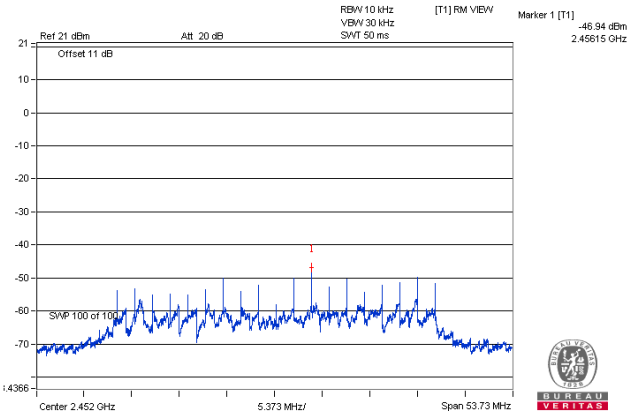
802.11g



802.11n (HT20)



802.11n (HT40)

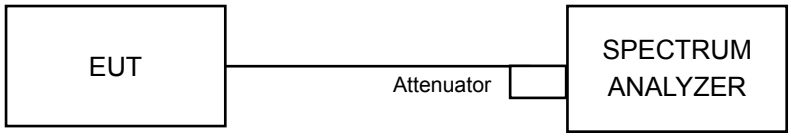


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 30dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

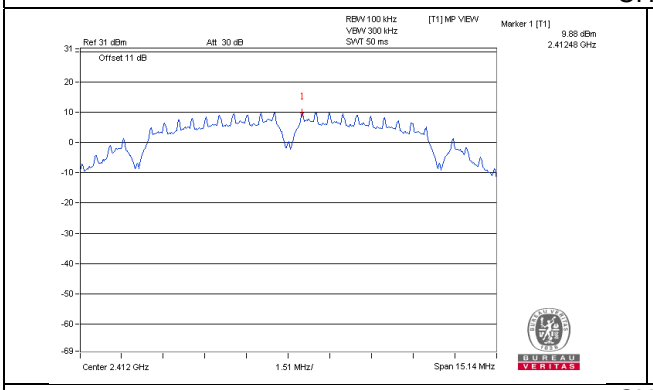
Same as item 4.3.6

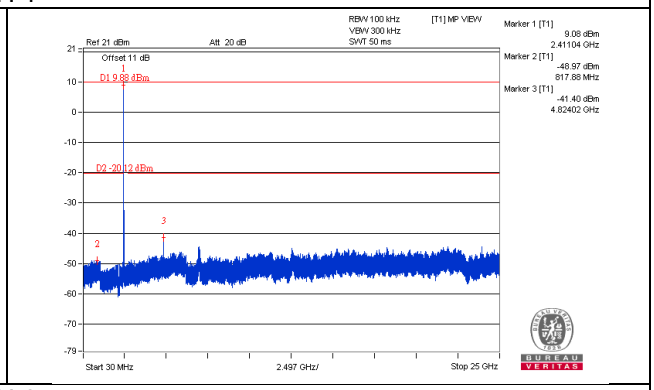
4.6.7 Test Results

The 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 pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

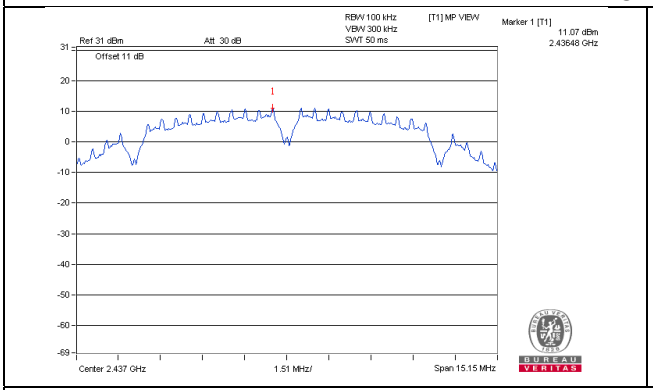
802.11b

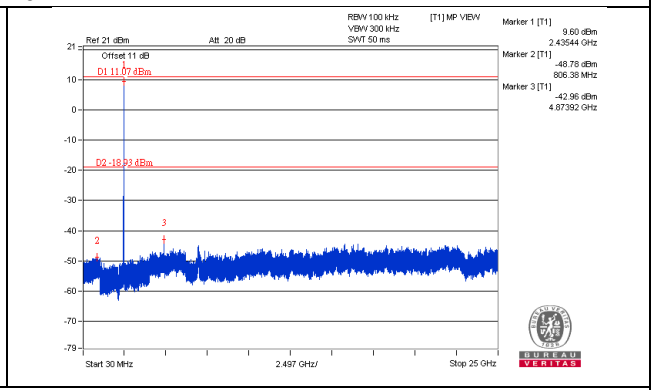
CH 1



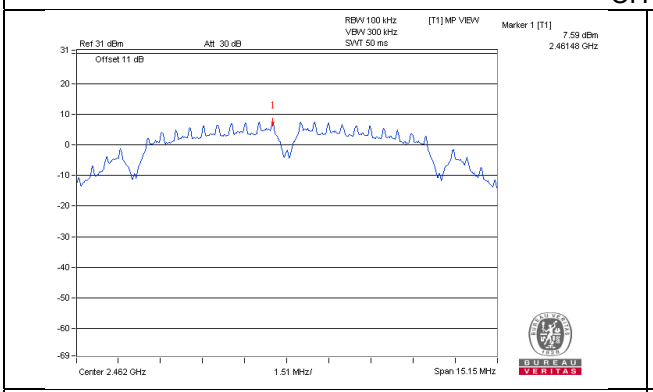


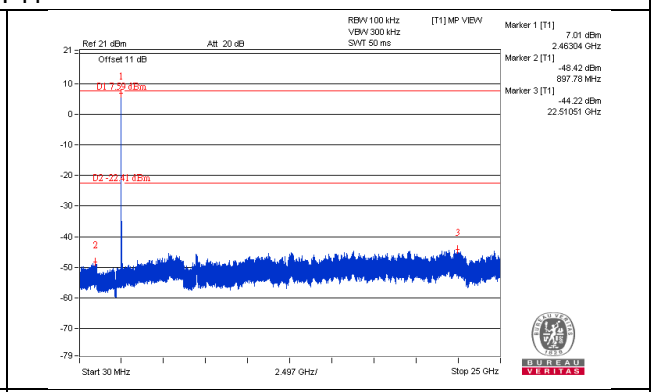
CH 6



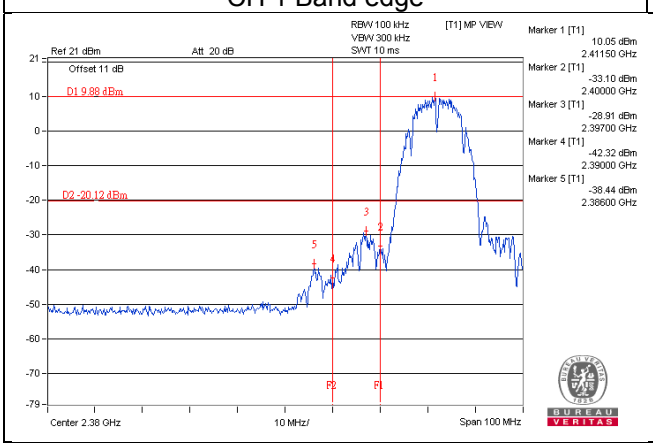


CH 11

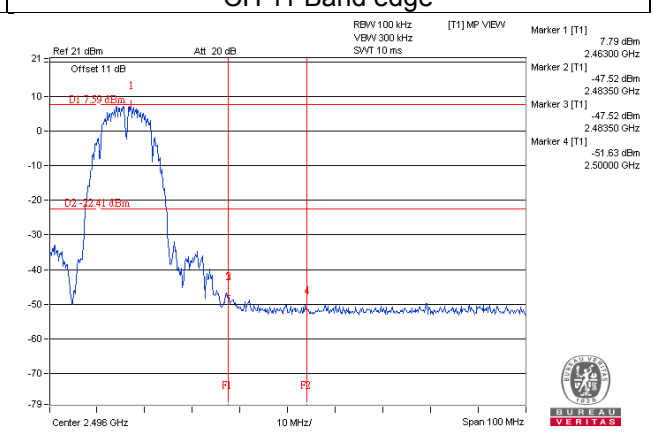




CH 1 Band edge

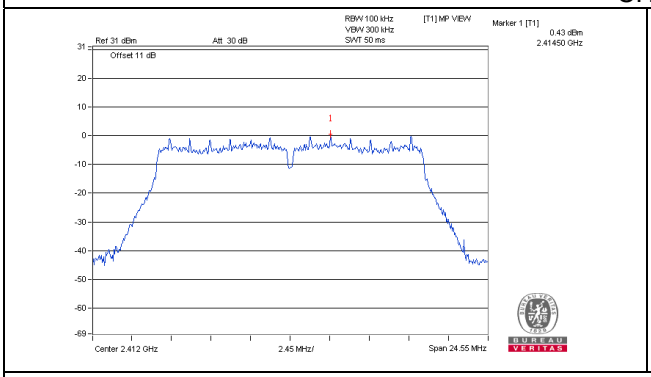


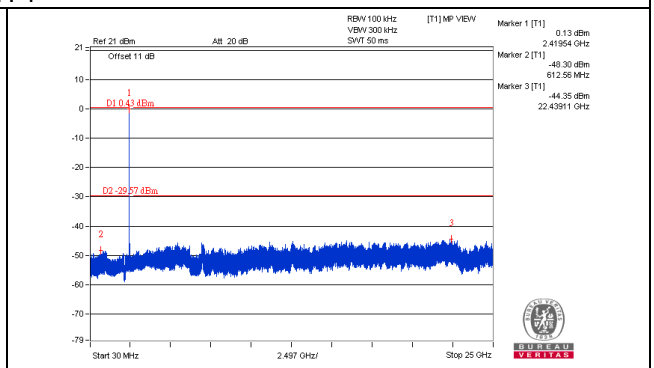
CH 11 Band edge



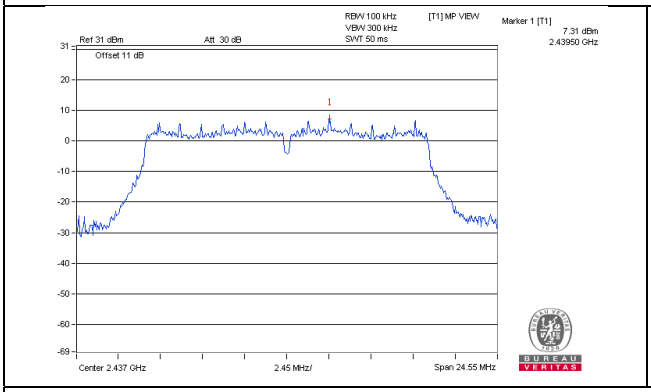
802.11g

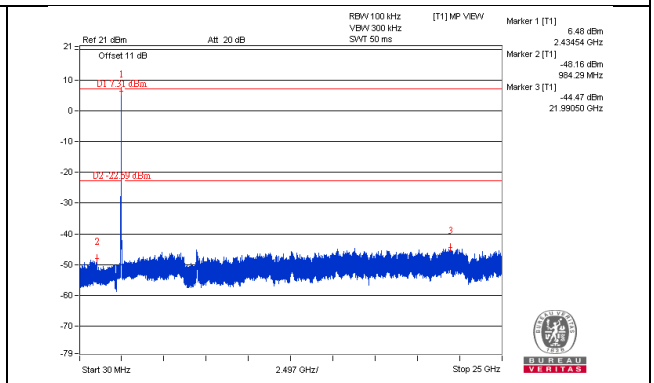
CH 1



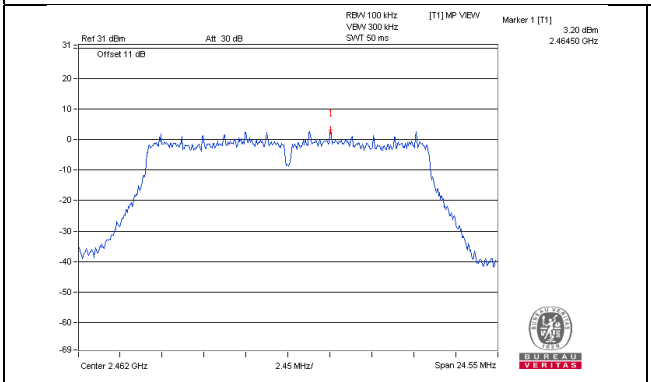


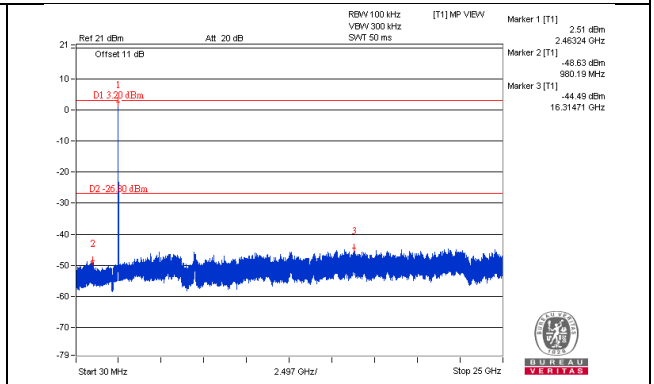
CH 6



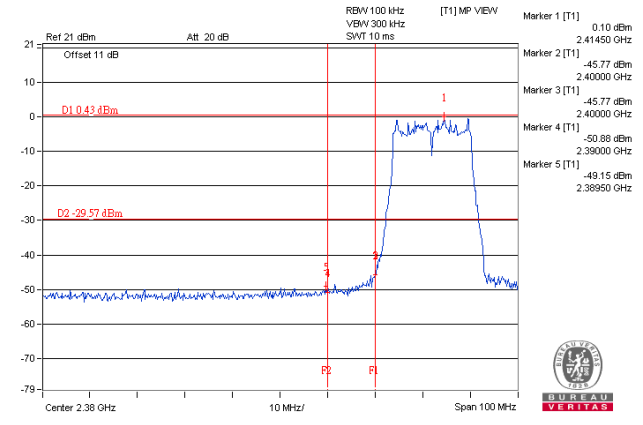


CH 11

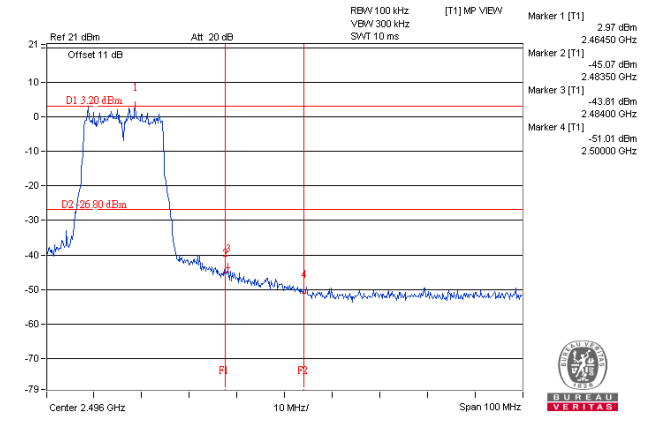




CH 1 Band edge

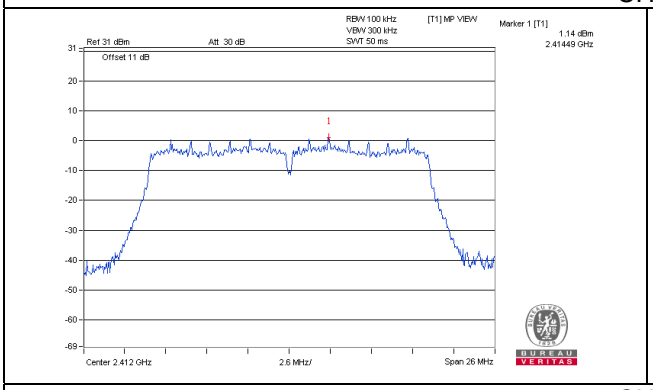


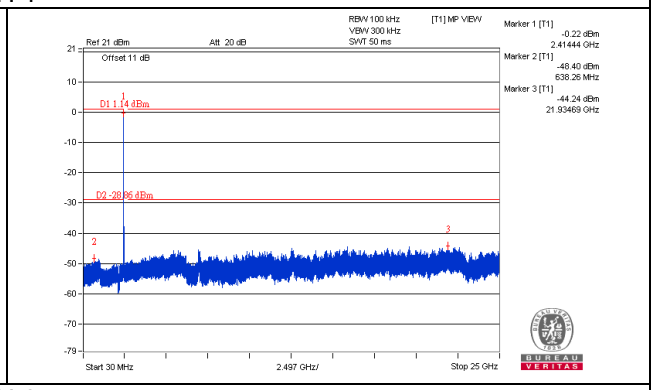
CH 11 Band edge



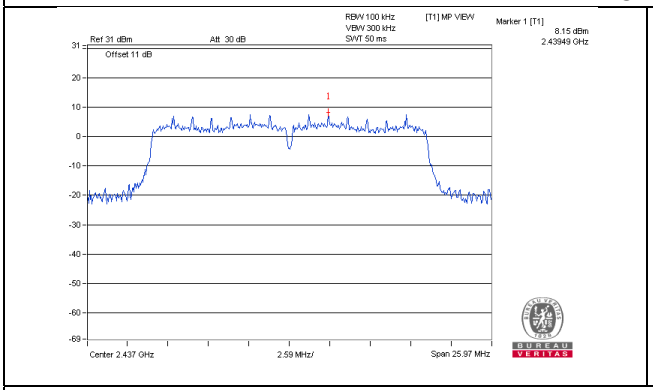
802.11n (HT20)_CHAIN 0

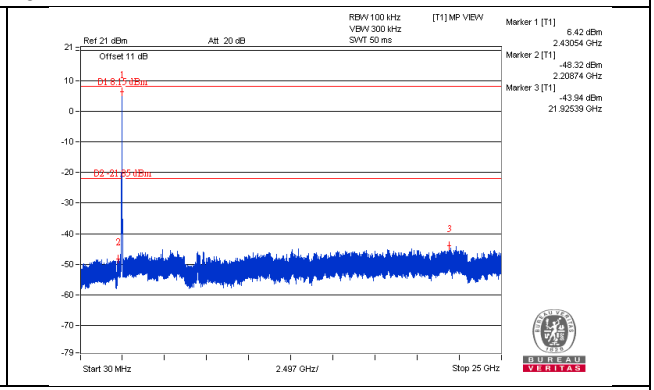
CH 1



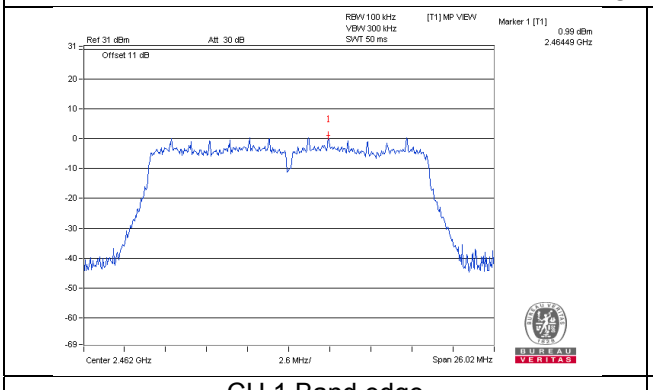


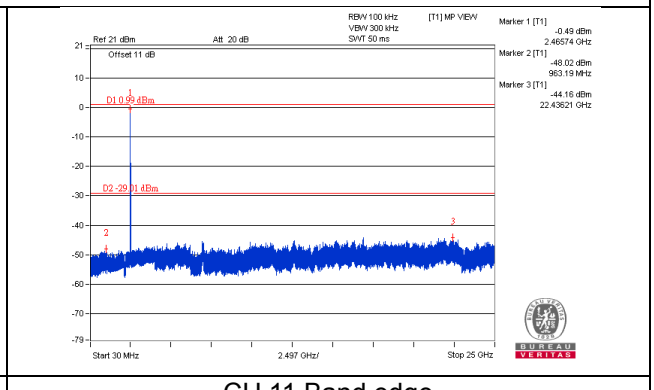
CH 6



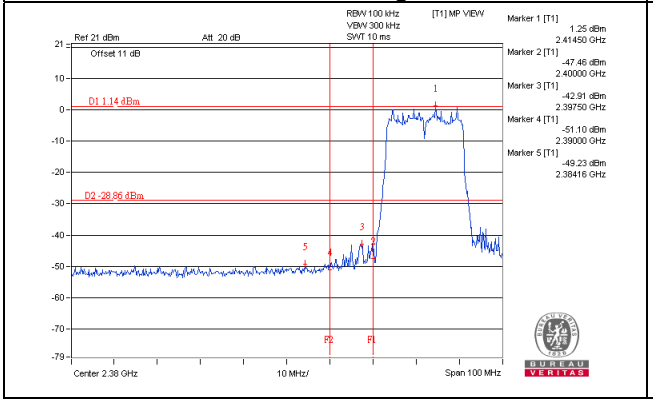


CH 11

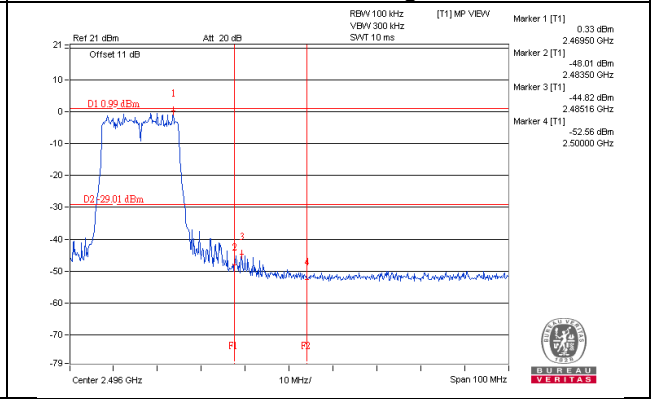




CH 1 Band edge

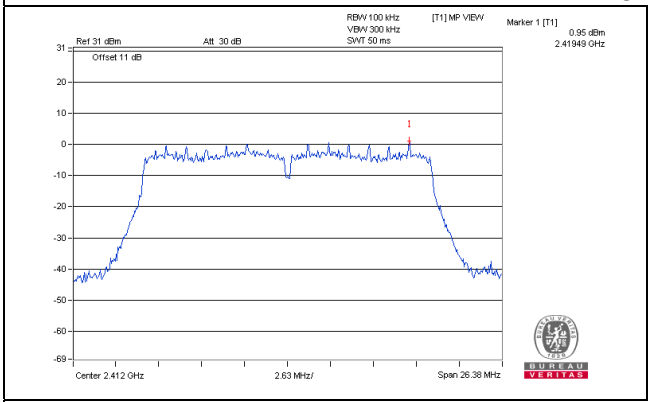


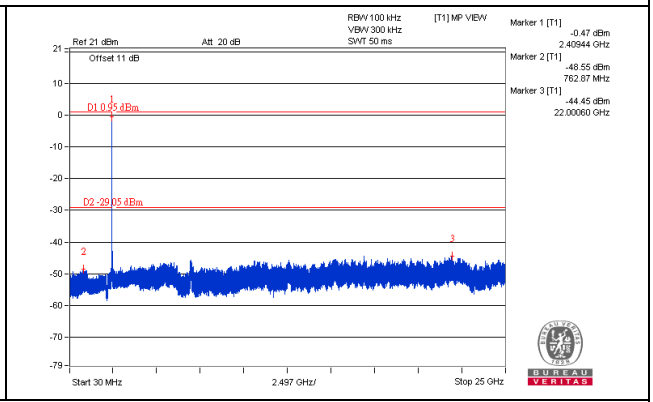
CH 11 Band edge



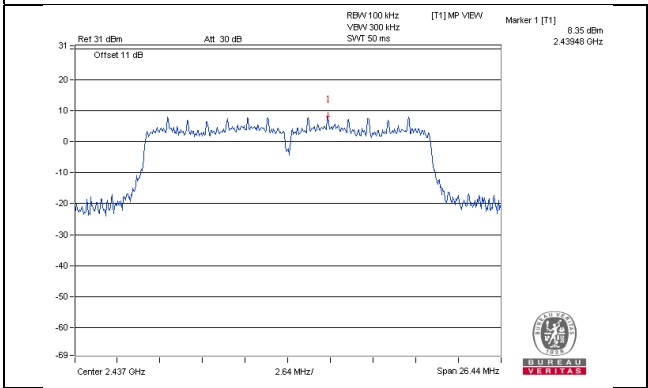
802.11n (HT20)_CHAIN 1

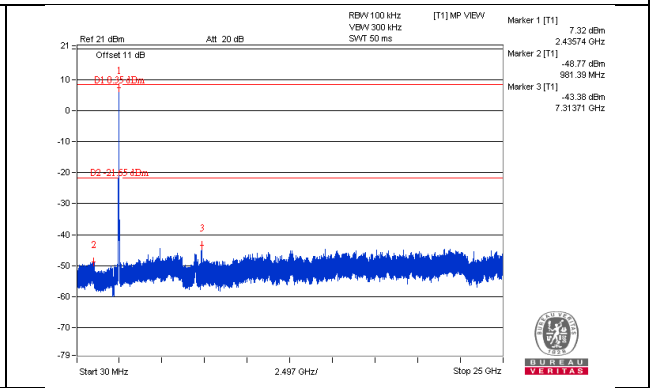
CH 1



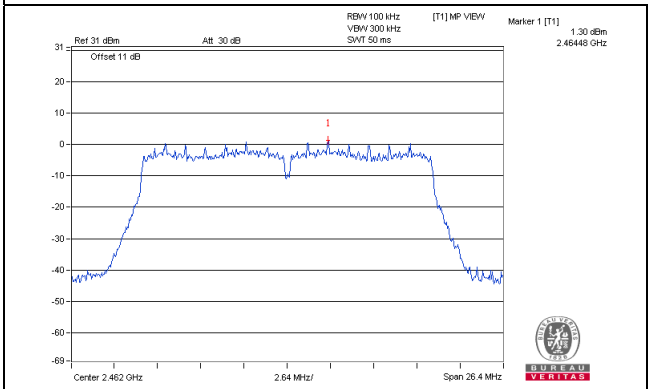


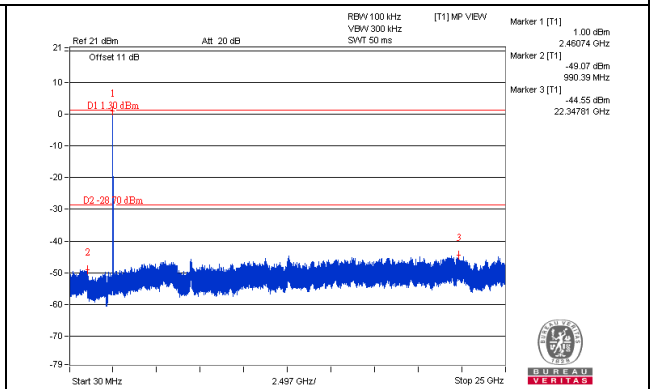
CH 6



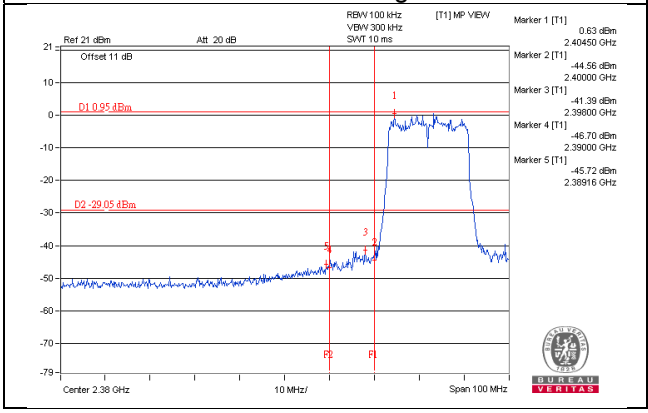


CH 11

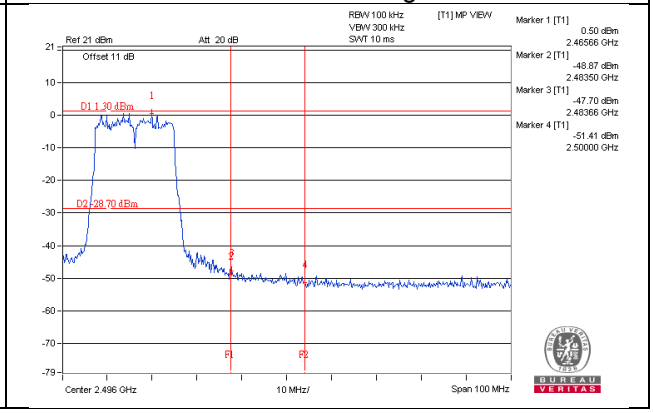




CH 1 Band edge

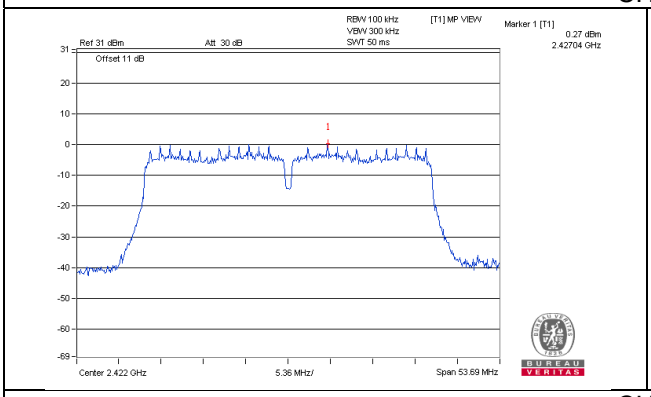


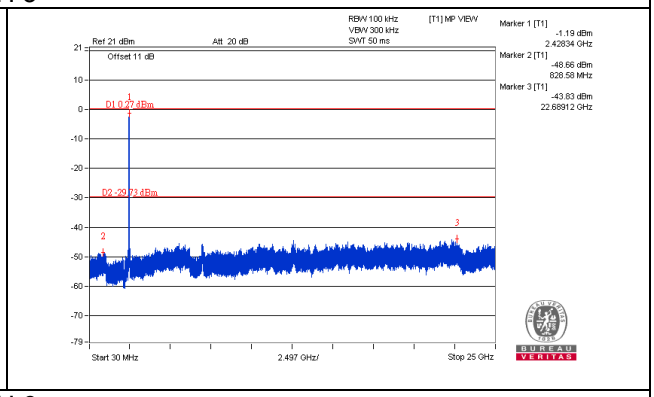
CH 11 Band edge



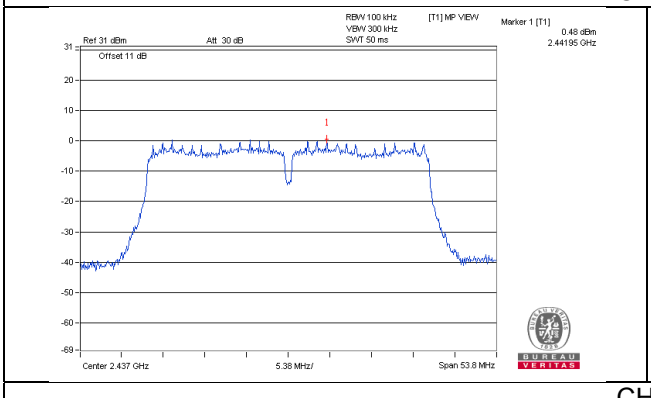
802.11n (HT40)_CHAIN 0

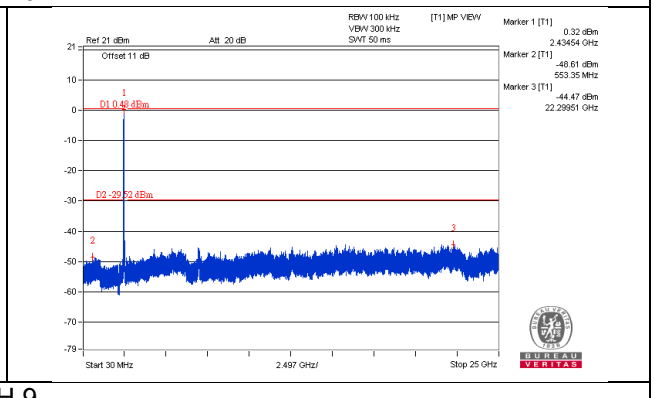
CH 3



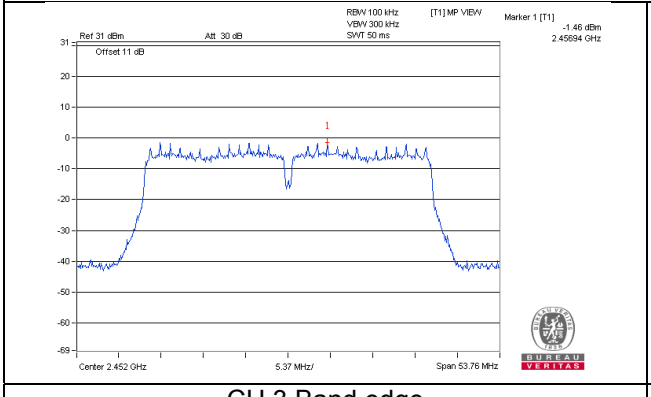


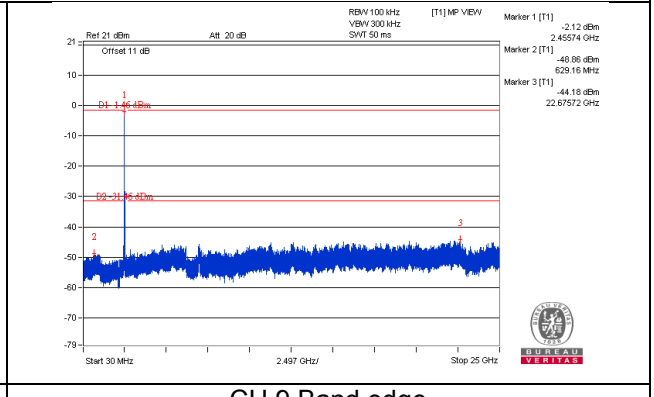
CH 6



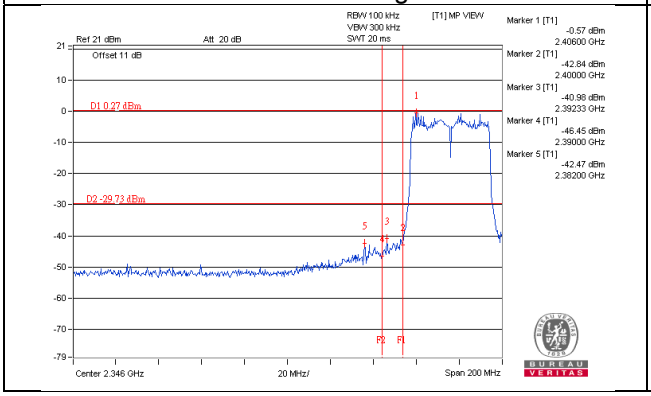


CH 9

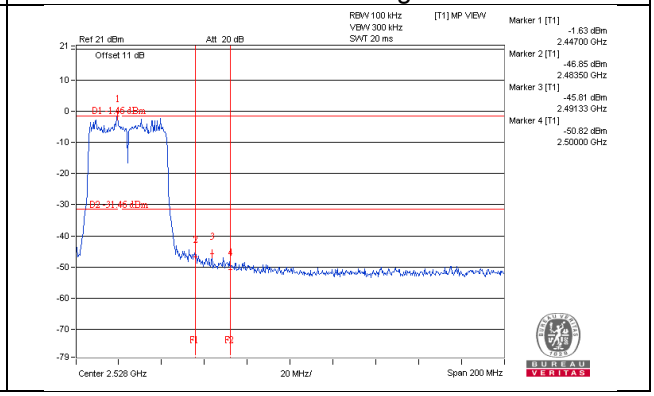




CH 3 Band edge

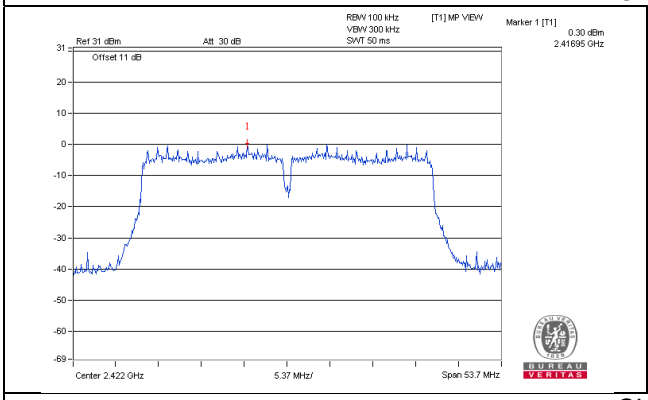


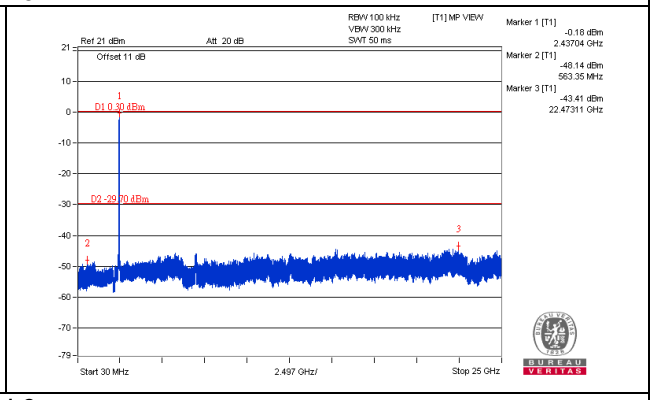
CH 9 Band edge



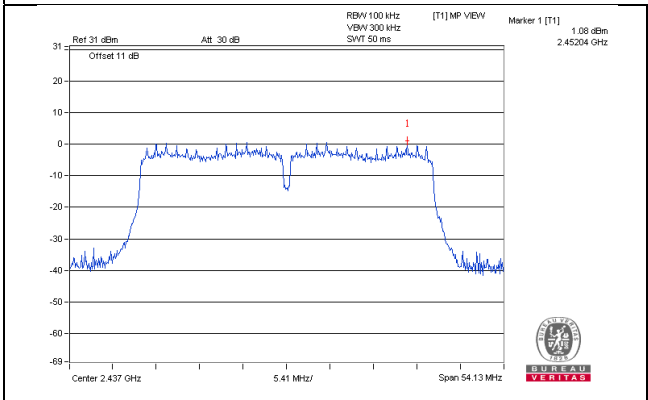
802.11n (HT40)_CHAIN 1

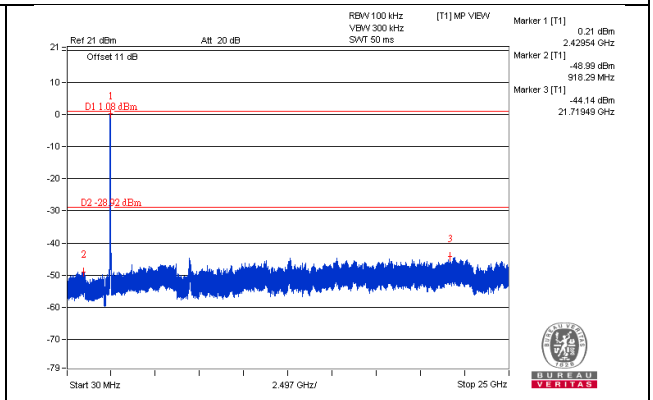
CH 3



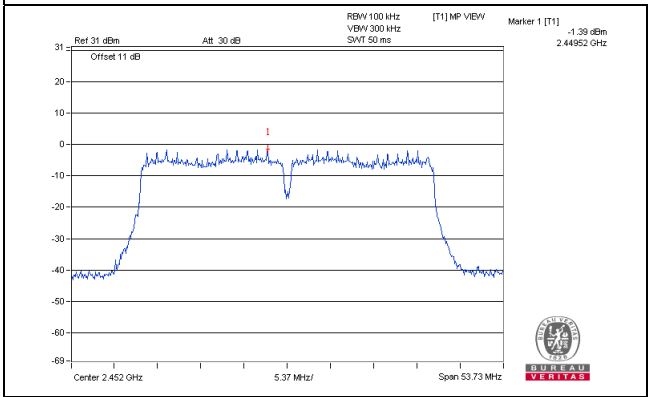


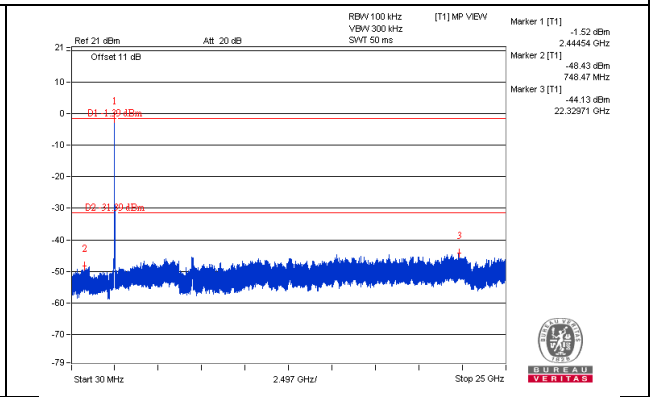
CH 6



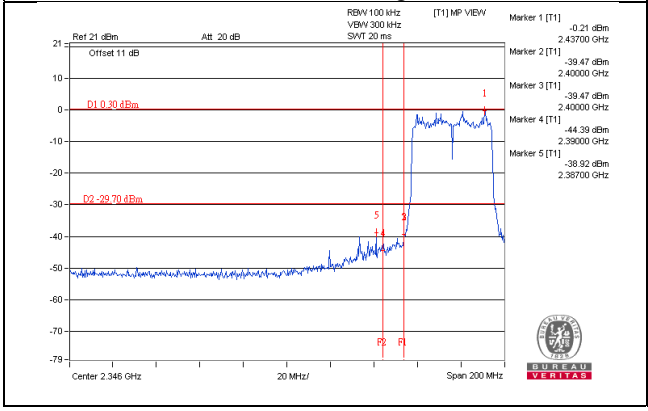


CH 9

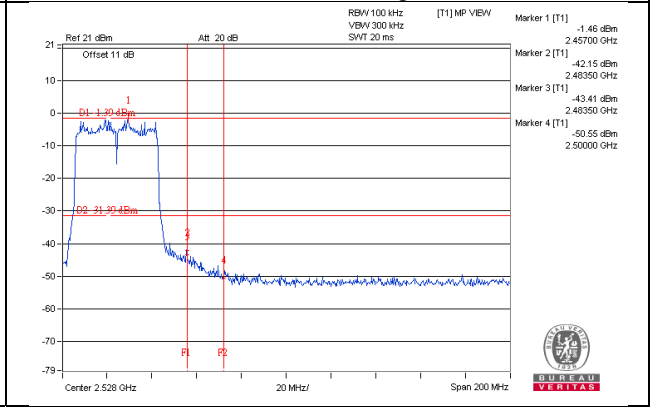




CH 3 Band edge



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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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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