FCC Test Report

Report No.:	RF180323C16
FCC ID:	2APRXH2C
Test Model:	H2C
Series Model:	H3C (refer to item 3.1 for more details)
Received Date:	Mar. 23, 2018
Test Date:	Apr. 02 ~ Apr. 18, 2018
Issued Date:	Apr. 25, 2018
Applicant:	Western Digital Technologies, Inc
Address:	3355 Michelson Dr #100, Irvine, CA 92612
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 (1):	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
Test Location (2):	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
FCC Registration/ Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF180323C16	Original release.	Apr. 25, 2018

1 Certificate of Conformity

Product:	ibi Wireless
Brand:	SanDisk
Test Model:	H2C
Series Model:	H3C (refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	Western Digital Technologies, Inc
Test Date:	Apr. 02 ~ Apr. 18, 2018
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 RF characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Apr. 25, 2018
Polly Chien / Specialist

Approved by : _____ , **Date:** Apr. 25, 2018
Bruce Chen / 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 -7.96dB at 0.15000MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -3.0 dB at 2483.50MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	3.89 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.77 dB
	6GHz ~ 40GHz	5.48 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	ibi Wireless
Brand	SanDisk
Test Model	H2C
Series Model	H3C
Model Difference	Refer to Note
Status of EUT	Engineering sample
Power Supply Rating	12dc (Adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	53.827mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter
Data Cable Supplied	NA

Note:

1. All models are listed as below. Model H2C is the representative for final test.

Model	HDD Capacity	AC adapter	Interface	Remark
H2C	1TB	12V / 1.5A	USB & DC in	H3C & H2C share identical PCB, with H3C being the de-populated version without USB port. H2C/ H3C are available with 1GB/ 512MB RAM, respectively.
	2TB			
	4TB			
H3C	500GB	12V / 1.0A	DC in	

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

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

3. The following antennas were provided to the EUT.

Ant. Type	PCB		
Connecter Type	NA		
Antenna Gain (dBi)			
Item	2.4G	5G Band 1	5G Band 4
Ant. 1	**2.14**	0.97	1.36
Ant. 2	0.78	**3.19**	**2.32**

* The maximum antenna gain is chosen for final test.

4. The EUT consumes power from the following Adapters

For H3C

Adapter 1	
Brand	Ktec
Model	KSAS0181200100HU
Input Power	100-240Vac, 50/60Hz, 0.5A
Output Power	12Vdc, 1.0A
Power Line	1.5m cable without core attached on adapter

Adapter 2	
Brand	Ktec
Model	KSAS0181200100D5
Input Power	100-240Vac, 50/60Hz, 0.5A
Output Power	12Vdc, 1.0A
Power Line	1.5m cable without core attached on adapter

For H2C

Adapter 3	
Brand	Ktec
Model	KSA-24W-120150D5
Input Power	120-240Vac, 50/60Hz, 0.6A
Output Power	12Vdc, 1.5A
Power Line	1.8m cable with 1 core attached on adapter

Adapter 4	
Brand	Asian Power Devices Inc.
Model	WB-18R12R
Input Power	120-240Vac, 50/60Hz, 0.6A Max.
Output Power	12Vdc, 1.5A
Power Line	1.75m cable without core attached on adapter

Adapter 5	
Brand	Asian Power Devices Inc.
Model	WB-18R12FU
Input Power	120-240Vac, 50/60Hz, 0.6A Max.
Output Power	12Vdc, 1.5A
Power Line	1.75m cable without core attached on adapter

Adapter 6	
Brand	Ktec
Model	KSA-24W-120150HU
Input Power	120-240Vac 50/60Hz 0.6A
Output Power	12Vdc 1.5A
Power Line	1.8m cable without core attached on adapter

* Adapter 1 & 2, 3 & 6, 4 & 5 are identical with each other except for their Plug Type difference, therefore adapter 4 was the worst case, therefore chosen for final tests and presented in the test report.

5. WLAN 2.4GHz, 5GHz and BT LE technology cannot transmit at same time.

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11g	1 to 11	6	OFDM	BPSK	6.0

6dB Bandwidth, Power Spectral Density and Conducted Out of Band Emission Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Conducted Output Power Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

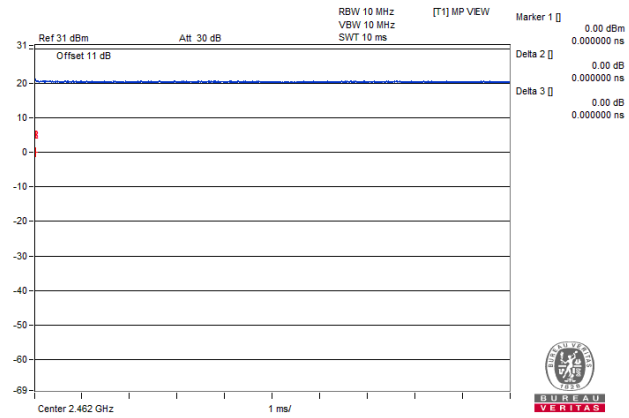
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 77% RH	120Vac, 60Hz	James Wei
RE<1G	22 deg. C, 79% RH	120Vac, 60Hz	James Wei
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Jones Chang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Frank Chiu

3.3 Duty Cycle of Test Signal

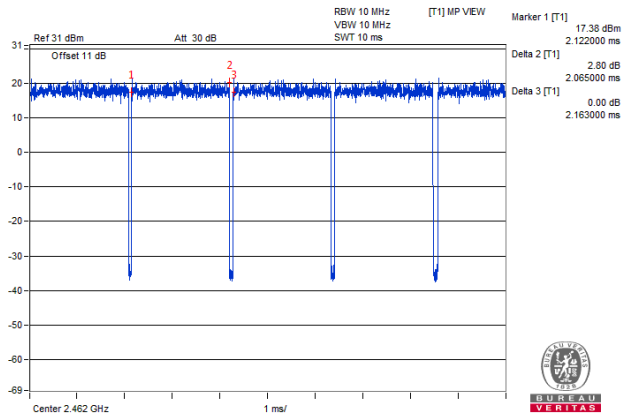
Duty cycle of test signal is > 98%, duty factor is not required
Duty cycle of test signal is < 98 %, duty factor is required

802.11b: Duty cycle of test signal is 100 %, duty factor is not required.
802.11g: Duty cycle = 2.065/2.163 = 0.955, Duty factor = 10 * log(1/0.955) = 0.20
802.11n (HT20): Duty cycle = 1.917/1.992 = 0.962, Duty factor = 10 * log(1/0.962) = 0.17
802.11n (HT40): Duty cycle = 0.940/1.040 = 0.904, Duty factor = 10 * log(1/0.904) = 0.44

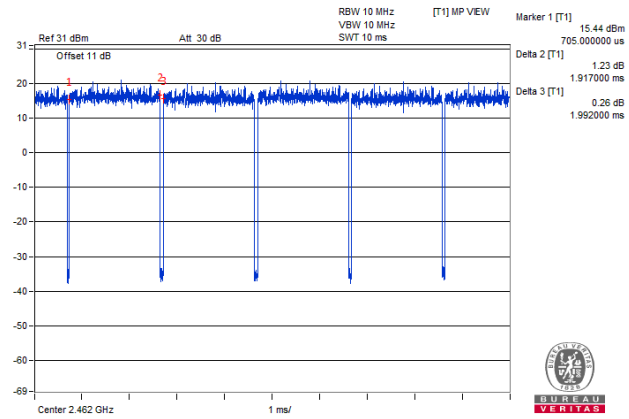
802.11b



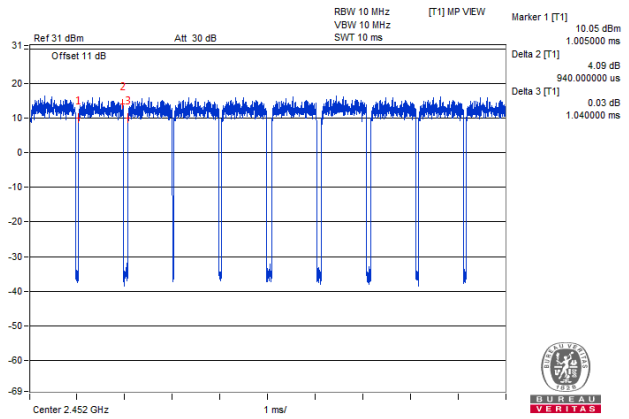
802.11g



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.	USB Flash	HP	v250W	01	NA	For PLC & APCM test
	USB Flash	HP	v250w	NA	NA	For RE test

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)
KDB 558074 D01 DTS Meas Guidance v04
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 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
HP Preamplifier	8447D	2432A03504	Feb. 21, 2018	Feb. 20, 2019
HP Preamplifier	8449B	3008A01201	Feb. 22, 2018	Feb. 21, 2019
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 21, 2018	Feb. 20, 2019
Agilent TEST RECEIVER	N9038A	MY51210129	Feb. 06, 2018	Feb. 05, 2019
Schwarzbeck Antenna	VULB 9168	139	Nov. 29, 2017	Nov. 28, 2018
Schwarzbeck Antenna	VHBA 9123	480	May 19, 2017	May 18, 2019
Schwarzbeck Horn Antenna	BBHA-9170	212	Dec. 01, 2017	Nov. 30, 2018
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Dec. 01, 2017	Nov. 30, 2018
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Loop Antenna EMCI	LPA600	270	Aug. 11, 2017	Aug. 10, 2019
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF104	CABLE-CH6	Aug. 14, 2017	Aug. 13, 2018
SUHNER RF cable With 3dB PAD	SF102	Cable-CH8-3.6m	Aug. 14, 2017	Aug. 13, 2018
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	May 31, 2017	May 30, 2018
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 26, 2017	Jul. 25, 2018
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
EMCO Horn Antenna	3115	00028257	Nov. 30, 2017	Nov. 29, 2018
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018

Note:
1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3 (PLC & APCM test) and in Lin Kou Chamber No. 6 (RE test).
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
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. Parallel, perpendicular, and ground-parallel orientations 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:

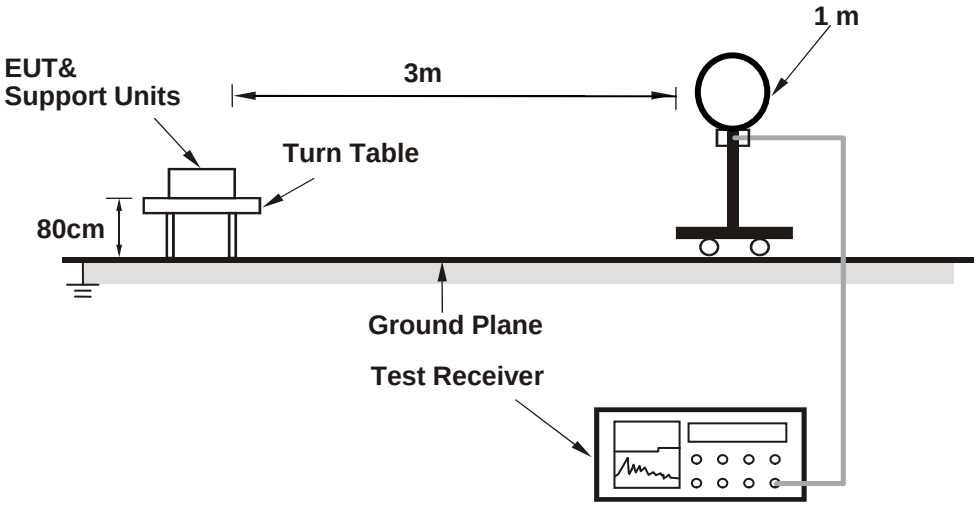
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

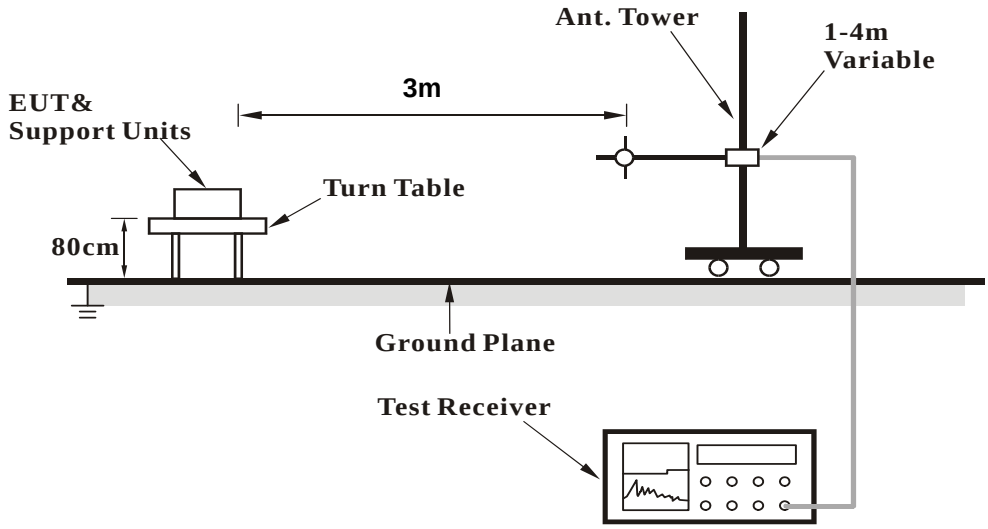
No deviation.

4.1.5 Test Set Up

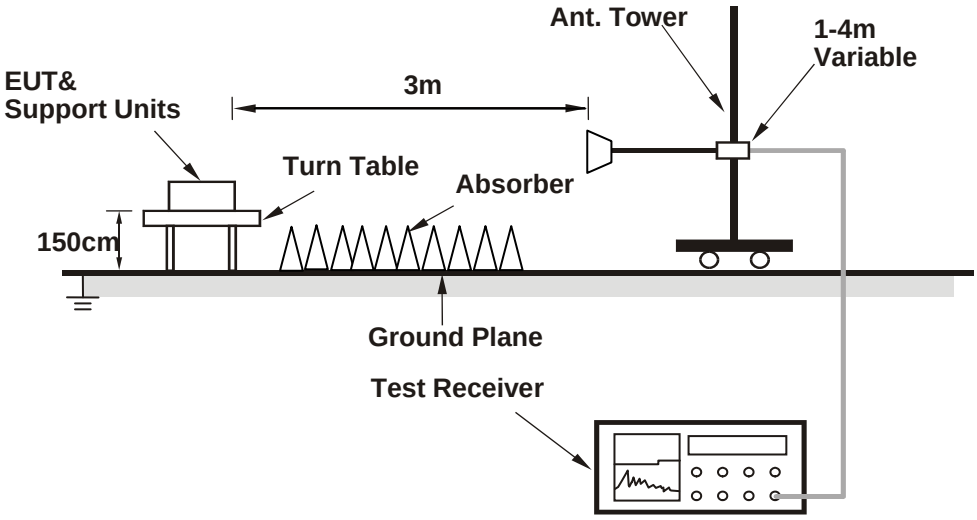
For Radiated emission below 30MHz



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

4.1.7 Test Results

Above 1GHz Data：

802.11b

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) 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	57.2 PK	74.0	-16.8	1.27 H	315	59.58	-2.38
2	2390.00	48.7 AV	54.0	-5.3	1.27 H	315	51.06	-2.38
3	*2412.00	108.2 PK			1.27 H	315	110.74	-2.51
4	*2412.00	104.9 AV			1.27 H	315	107.40	-2.51
5	4824.00	45.8 PK	74.0	-28.2	1.00 H	199	42.48	3.33
6	4824.00	39.3 AV	54.0	-14.7	1.00 H	199	35.95	3.33
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	55.5 PK	74.0	-18.5	2.66 V	269	57.85	-2.38
2	2390.00	44.9 AV	54.0	-9.1	2.66 V	269	47.30	-2.38
3	*2412.00	105.1 PK			2.66 V	269	107.58	-2.51
4	*2412.00	101.6 AV			2.66 V	269	104.06	-2.51
5	4824.00	44.0 PK	74.0	-30.0	1.00 V	56	40.68	3.33
6	4824.00	36.9 AV	54.0	-17.1	1.00 V	56	33.57	3.33

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) 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	108.0 PK			1.23 H	335	110.68	-2.64
2	*2437.00	104.6 AV			1.23 H	335	107.27	-2.64
3	4874.00	46.1 PK	74.0	-27.9	1.06 H	215	42.78	3.35
4	4874.00	39.6 AV	54.0	-14.4	1.06 H	215	36.29	3.35
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	105.2 PK			2.61 V	281	107.81	-2.64
2	*2437.00	101.1 AV			2.61 V	281	103.72	-2.64
3	4874.00	43.9 PK	74.0	-30.1	1.02 V	71	40.52	3.35
4	4874.00	36.3 AV	54.0	-17.7	1.02 V	71	32.93	3.35

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) 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	107.8 PK			1.55 H	315	110.30	-2.53
2	*2462.00	104.7 AV			1.55 H	315	107.23	-2.53
3	2483.50	57.6 PK	74.0	-16.4	1.55 H	315	59.81	-2.24
4	2483.50	48.5 AV	54.0	-5.5	1.55 H	315	50.75	-2.24
5	4924.00	47.5 PK	74.0	-26.5	1.00 H	221	44.28	3.24
6	4924.00	40.5 AV	54.0	-13.5	1.00 H	221	37.29	3.24
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	106.1 PK			2.71 V	266	108.63	-2.53
2	*2462.00	102.1 AV			2.71 V	266	104.66	-2.53
3	2483.50	54.9 PK	74.0	-19.1	2.71 V	266	57.13	-2.24
4	2483.50	44.6 AV	54.0	-9.4	2.71 V	266	46.83	-2.24
5	4924.00	44.4 PK	74.0	-29.7	1.00 V	55	41.11	3.24
6	4924.00	37.3 AV	54.0	-16.7	1.00 V	55	34.02	3.24

REMARKS:

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

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK) 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	66.1 PK	74.0	-7.9	1.75 H	311	68.46	-2.38
2	2390.00	48.8 AV	54.0	-5.3	1.75 H	311	51.13	-2.38
3	*2412.00	107.5 PK			1.75 H	311	109.98	-2.51
4	*2412.00	97.6 AV			1.75 H	311	100.06	-2.51
5	4824.00	41.6 PK	74.0	-32.4	1.00 H	27	38.26	3.33
6	4824.00	29.2 AV	54.0	-24.8	1.00 H	27	25.83	3.33
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	63.9 PK	74.0	-10.2	2.99 V	253	66.23	-2.38
2	2390.00	47.2 AV	54.0	-6.8	2.99 V	253	49.54	-2.38
3	*2412.00	103.9 PK			2.99 V	253	106.36	-2.51
4	*2412.00	93.7 AV			2.99 V	253	96.21	-2.51
5	4824.00	41.1 PK	74.0	-32.9	1.00 V	89	37.81	3.33
6	4824.00	28.7 AV	54.0	-25.3	1.00 V	89	25.41	3.33

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) 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	108.0 PK			1.41 H	330	110.60	-2.64
2	*2437.00	98.4 AV			1.41 H	330	100.99	-2.64
3	4874.00	42.2 PK	74.0	-31.8	1.00 H	29	38.81	3.35
4	4874.00	29.4 AV	54.0	-24.6	1.00 H	29	26.03	3.35
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	105.1 PK			3.00 V	251	107.75	-2.64
2	*2437.00	94.4 AV			3.00 V	251	97.02	-2.64
3	4874.00	41.6 PK	74.0	-32.5	1.00 V	99	38.20	3.35
4	4874.00	29.0 AV	54.0	-25.0	1.00 V	99	25.66	3.35

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) 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	106.0 PK			1.54 H	309	108.48	-2.53
2	*2462.00	95.7 AV			1.54 H	309	98.19	-2.53
3	2483.50	68.8 PK	74.0	-5.2	1.54 H	309	71.01	-2.24
4	2483.50	48.8 AV	54.0	-5.2	1.54 H	309	51.06	-2.24
5	4924.00	41.4 PK	74.0	-32.7	1.00 H	22	38.11	3.24
6	4924.00	28.9 AV	54.0	-25.1	1.00 H	22	25.70	3.24
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	102.4 PK			3.02 V	255	104.94	-2.53
2	*2462.00	91.7 AV			3.02 V	255	94.20	-2.53
3	2483.50	66.6 PK	74.0	-7.4	3.02 V	255	68.82	-2.24
4	2483.50	46.9 AV	54.0	-7.1	3.02 V	255	49.18	-2.24
5	4924.00	40.9 PK	74.0	-33.1	1.00 V	112	37.70	3.24
6	4924.00	28.5 AV	54.0	-25.5	1.00 V	112	25.27	3.24

REMARKS:

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

802.11n (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	67.7 PK	74.0	-6.3	1.00 H	242	70.12	-2.38
2	2390.00	49.8 AV	54.0	-4.2	1.00 H	242	52.16	-2.38
3	*2412.00	107.7 PK			1.00 H	242	110.19	-2.51
4	*2412.00	97.0 AV			1.00 H	242	99.47	-2.51
5	4824.00	46.3 PK	74.0	-27.7	1.21 H	244	43.01	3.33
6	4824.00	35.5 AV	54.0	-18.5	1.21 H	244	32.20	3.33
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	2.71 V	261	70.74	-2.38
2	2390.00	49.2 AV	54.0	-4.8	2.71 V	261	51.58	-2.38
3	*2412.00	106.6 PK			2.71 V	261	109.12	-2.51
4	*2412.00	96.3 AV			2.71 V	261	98.84	-2.51
5	4824.00	45.8 PK	74.0	-28.2	1.00 V	63	42.51	3.33
6	4824.00	35.2 AV	54.0	-18.8	1.00 V	63	31.88	3.33

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) 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	107.6 PK			1.73 H	275	110.22	-2.64
2	*2437.00	97.0 AV			1.73 H	275	99.59	-2.64
3	4874.00	46.7 PK	74.0	-27.3	1.25 H	262	43.33	3.35
4	4874.00	35.8 AV	54.0	-18.2	1.25 H	262	32.48	3.35
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	107.1 PK			2.61 V	259	109.72	-2.64
2	*2437.00	96.3 AV			2.61 V	259	98.98	-2.64
3	4874.00	46.1 PK	74.0	-27.9	1.00 V	72	42.77	3.35
4	4874.00	35.4 AV	54.0	-18.6	1.00 V	72	32.02	3.35

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK) 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	106.8 PK			1.75 H	272	109.31	-2.53
2	*2462.00	95.6 AV			1.75 H	272	98.17	-2.53
3	2483.50	66.2 PK	74.0	-7.8	1.75 H	272	68.48	-2.24
4	**2483.50**	**51.0 AV**	**54.0**	**-3.0**	**1.75 H**	**272**	**53.24**	**-2.24**
5	4924.00	46.1 PK	74.0	-27.9	1.33 H	251	42.89	3.24
6	4924.00	35.3 AV	54.0	-18.7	1.33 H	251	32.08	3.24
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	105.9 PK			2.56 V	257	108.42	-2.53
2	*2462.00	94.4 AV			2.56 V	257	96.88	-2.53
3	2483.50	64.5 PK	74.0	-9.5	2.56 V	257	66.72	-2.24
4	2483.50	48.8 AV	54.0	-5.2	2.56 V	257	51.02	-2.24
5	4924.00	45.4 PK	74.0	-28.6	1.00 V	81	42.17	3.24
6	4924.00	34.8 AV	54.0	-19.2	1.00 V	81	31.59	3.24

REMARKS:

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

802.11n (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	65.3 PK	74.0	-8.8	1.44 H	248	67.63	-2.38
2	2390.00	50.4 AV	54.0	-3.6	1.44 H	248	52.80	-2.38
3	*2422.00	103.4 PK			1.44 H	248	105.93	-2.56
4	*2422.00	92.7 AV			1.44 H	248	95.23	-2.56
5	4844.00	44.7 PK	74.0	-29.3	1.21 H	243	41.36	3.38
6	4844.00	35.7 AV	54.0	-18.3	1.21 H	243	32.33	3.38
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	64.8 PK	74.0	-9.2	3.33 V	256	67.22	-2.38
2	2390.00	47.0 AV	54.0	-7.0	3.33 V	256	49.40	-2.38
3	*2422.00	102.3 PK			3.33 V	256	104.84	-2.56
4	*2422.00	91.9 AV			3.33 V	256	94.44	-2.56
5	4844.00	44.1 PK	74.0	-29.9	1.03 V	112	40.72	3.38
6	4844.00	35.0 AV	54.0	-19.0	1.03 V	112	31.61	3.38

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK) 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	103.5 PK			1.76 H	260	106.10	-2.64
2	*2437.00	93.1 AV			1.76 H	260	95.72	-2.64
3	4874.00	44.8 PK	74.0	-29.2	1.22 H	251	41.49	3.35
4	4874.00	35.8 AV	54.0	-18.3	1.22 H	251	32.40	3.35
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	102.4 PK			3.32 V	261	105.08	-2.64
2	*2437.00	92.2 AV			3.32 V	261	94.81	-2.64
3	4874.00	44.2 PK	74.0	-29.8	1.18 V	98	40.88	3.35
4	4874.00	35.1 AV	54.0	-18.9	1.18 V	98	31.73	3.35

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK) 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	99.8 PK			1.75 H	265	102.50	-2.68
2	*2452.00	90.5 AV			1.75 H	265	93.15	-2.68
3	2483.50	63.2 PK	74.0	-10.8	1.75 H	265	65.41	-2.24
4	2483.50	50.7 AV	54.0	-3.3	1.75 H	265	52.91	-2.24
5	4904.00	44.1 PK	74.0	-29.9	1.42 H	252	40.81	3.29
6	4904.00	35.1 AV	54.0	-18.9	1.42 H	252	31.77	3.29
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	98.6 PK			2.92 V	248	101.29	-2.68
2	*2452.00	88.6 AV			2.92 V	248	91.25	-2.68
3	2483.50	62.8 PK	74.0	-11.2	2.92 V	248	65.01	-2.24
4	2483.50	47.2 AV	54.0	-6.8	2.92 V	248	49.48	-2.24
5	4904.00	43.3 PK	74.0	-30.7	1.00 V	98	39.99	3.29
6	4904.00	34.2 AV	54.0	-19.8	1.00 V	98	30.89	3.29

REMARKS:

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

Below 1GHz Data: 802.11b

CHANNEL	TX Channel 6	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	45.76	24.3 QP	40.0	-15.7	2.27 H	72	31.67	-7.33
2	95.14	24.2 QP	43.5	-19.3	2.05 H	278	36.58	-12.42
3	506.12	28.2 QP	46.0	-17.9	1.21 H	102	28.92	-0.77
4	630.48	29.3 QP	46.0	-16.7	1.17 H	296	27.33	2.00
5	774.18	33.8 QP	46.0	-12.2	1.05 H	346	29.12	4.64
6	828.21	37.4 QP	46.0	-8.7	1.46 H	29	32.20	5.15
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	53.52	20.4 QP	40.0	-19.7	2.27 V	230	27.57	-7.22
2	162.16	20.1 QP	43.5	-23.5	2.01 V	323	26.87	-6.82
3	518.01	24.4 QP	46.0	-21.6	1.12 V	225	25.00	-0.62
4	688.10	30.9 QP	46.0	-15.2	1.02 V	4	28.38	2.47
5	784.13	34.8 QP	46.0	-11.2	2.24 V	335	30.35	4.44
6	886.90	35.0 QP	46.0	-11.0	1.17 V	337	29.34	5.62

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Tested date: Apr. 18, 2018

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

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

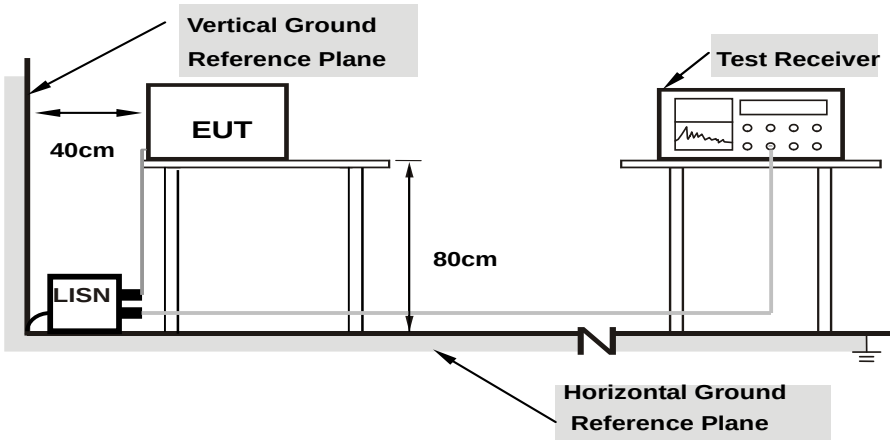
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: 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

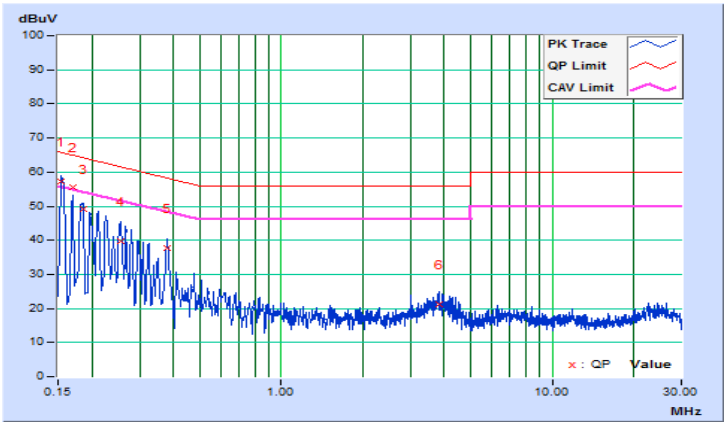
Worst-case data: 802.11b

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	0.15391	10.16	47.15	30.49	57.31	40.65	65.79	55.79	-8.48	-15.14
2	0.16955	10.16	45.34	31.41	55.50	41.57	64.98	54.98	-9.48	-13.41
3	0.18508	10.16	38.84	23.75	49.00	33.91	64.25	54.25	-15.25	-20.34
4	0.25557	10.17	29.70	16.03	39.87	26.20	61.57	51.57	-21.70	-25.37
5	0.38069	10.20	27.41	22.94	37.61	33.14	58.26	48.26	-20.65	-15.12
6	3.84132	10.34	10.91	0.76	21.25	11.10	56.00	46.00	-34.75	-34.90

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.

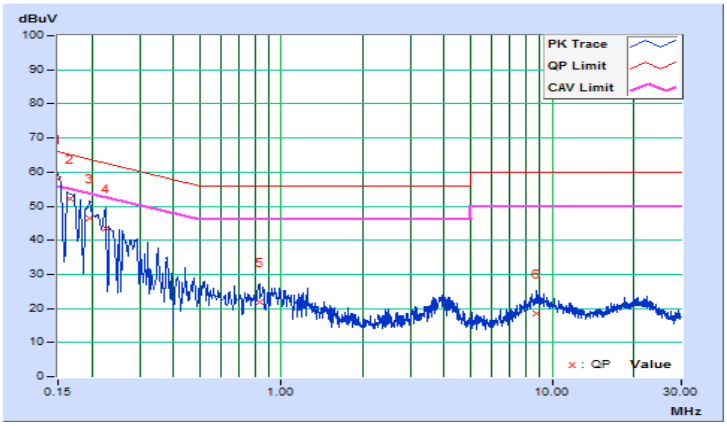


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	**0.15000**	**10.14**	**47.90**	**33.83**	**58.04**	**43.97**	**66.00**	**56.00**	**-7.96**	**-12.03**
2	0.16564	10.15	42.05	25.72	52.20	35.87	65.18	55.18	-12.98	-19.31
3	0.19665	10.16	36.19	20.78	46.35	30.94	63.75	53.75	-17.40	-22.81
4	0.22429	10.17	33.32	16.42	43.49	26.59	62.66	52.66	-19.17	-26.07
5	0.83034	10.20	11.54	5.22	21.74	15.42	56.00	46.00	-34.26	-30.58
6	8.72072	10.52	7.91	2.12	18.43	12.64	60.00	50.00	-41.57	-37.36

REMARKS:

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

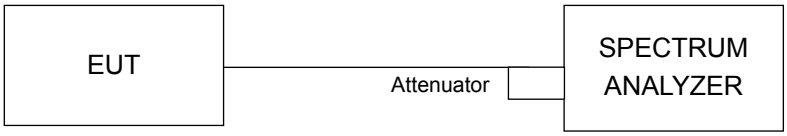


4.3 6dB Bandwidth Measurement

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 fromTest 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	9.09	0.5	Pass
6	2437	9.09	0.5	Pass
11	2462	9.08	0.5	Pass

802.11g

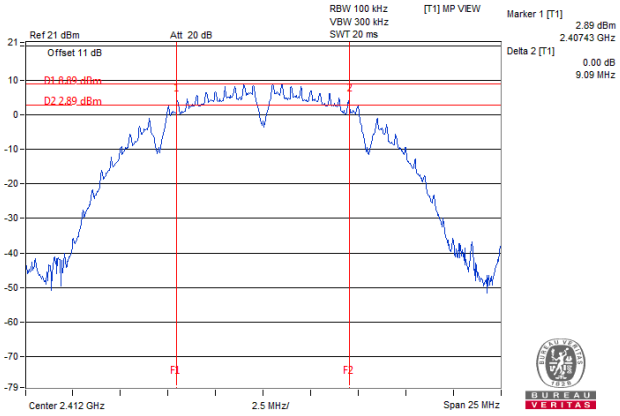
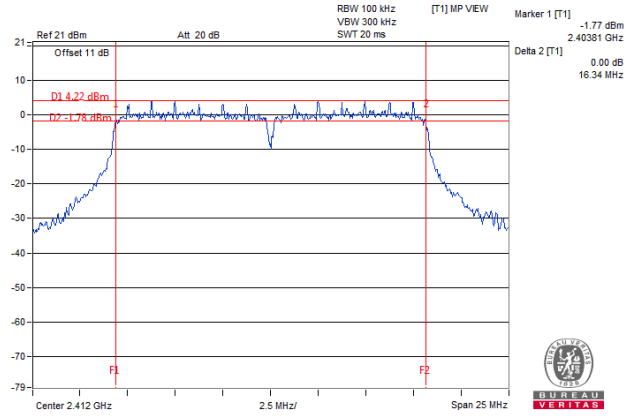
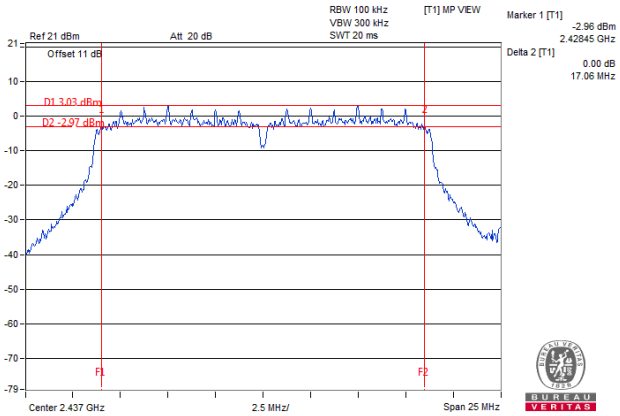
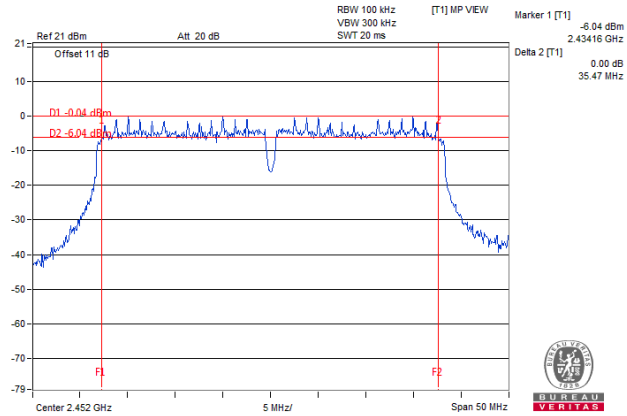
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.34	0.5	Pass
6	2437	16.34	0.5	Pass
11	2462	16.33	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.95	16.82	0.5	Pass
6	2437	17.06	16.96	0.5	Pass
11	2462	17.04	16.33	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.19	35.40	0.5	Pass
6	2437	35.26	35.43	0.5	Pass
9	2452	35.21	35.47	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

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

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)	Avg. Power (mW)	Avg. Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	53.088	17.25	30	Pass
6	2437	53.580	17.29	30	Pass
11	2462	**53.827**	17.31	30	Pass

802.11g

Channel	Frequency (MHz)	Avg. Power (mW)	Avg. Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	33.806	15.29	30	Pass
6	2437	34.041	15.32	30	Pass
11	2462	34.277	15.35	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	14.08	14.14	51.528	17.12	30	Pass
6	2437	14.09	14.18	51.827	17.15	30	Pass
11	2462	14.12	14.22	52.247	17.18	30	Pass

802.11n (HT40)

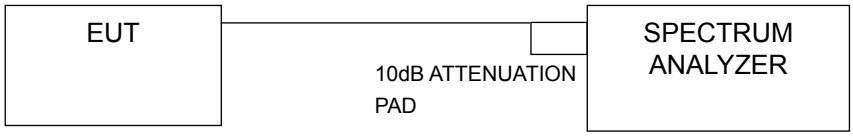
Chan.	Freq. (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	14.02	14.17	51.357	17.11	30	Pass
6	2437	14.06	14.19	51.710	17.14	30	Pass
9	2452	12.27	12.84	36.097	15.57	30	Pass

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 duty cycle ≥ 98%

a. Set instrument center frequency to DTS channel center frequency.
b. Set span to at least 1.5 times the OBW.
c. Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d. Set VBW ≥3 x RBW.
e. Detector = power averaging (RMS) or sample detector (when RMS not available).
f. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g. Sweep time = auto couple.
h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
i. Use the peak marker function to determine the maximum amplitude level.

For 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. Don't 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/10kHz)	Limit (dBm/3kHz)	Pass/Fail
1	2412	-10.41	8	Pass
6	2437	-10.70	8	Pass
11	2462	-11.03	8	Pass

802.11g

Channel	Freq. (MHz)	PSD w/o Duty Factor (dBm/10kHz)	Duty Factor (dB)	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-15.15	0.20	-14.95	8	Pass
6	2437	-15.12	0.20	-14.92	8	Pass
11	2462	-15.24	0.20	-15.04	8	Pass

Note: Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/10kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	1	2412	-16.43	3.01	0.17	-13.25	8.00	Pass
	6	2437	-17.41	3.01	0.17	-14.23	8.00	Pass
	11	2462	-16.58	3.01	0.17	-13.40	8.00	Pass
1	1	2412	-17.12	3.01	0.17	-13.94	8.00	Pass
	6	2437	-16.85	3.01	0.17	-13.67	8.00	Pass
	11	2462	-16.97	3.01	0.17	-13.79	8.00	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 = 2.14dBi + 10log(2) = 5.15dBi < 6dBi, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

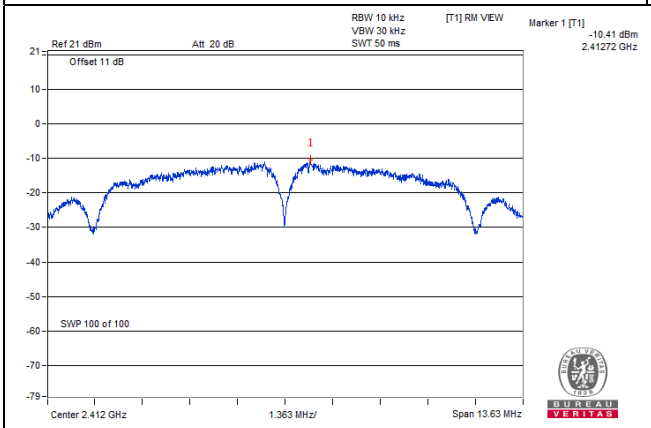
TX chain	Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/10kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD with Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	Pass / Fail
0	3	2422	-20.47	3.01	0.44	-17.02	8.00	Pass
	6	2437	-20.85	3.01	0.44	-17.40	8.00	Pass
	9	2452	-21.32	3.01	0.44	-17.87	8.00	Pass
1	3	2422	-20.89	3.01	0.44	-17.44	8.00	Pass
	6	2437	-20.89	3.01	0.44	-17.44	8.00	Pass
	9	2452	-20.94	3.01	0.44	-17.49	8.00	Pass

Note:

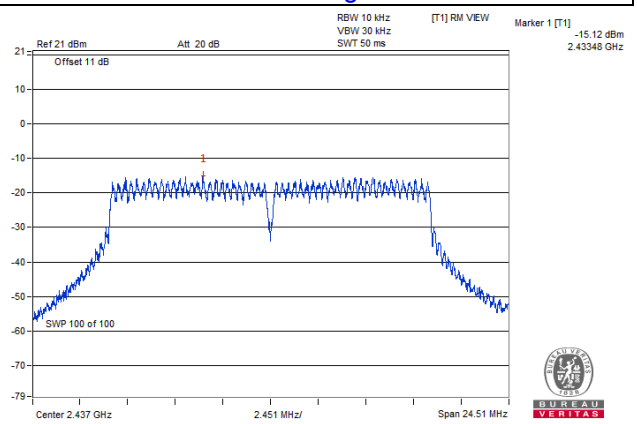
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 2.14dBi + 10log(2) = 5.15dBi < 6dBi, so the limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

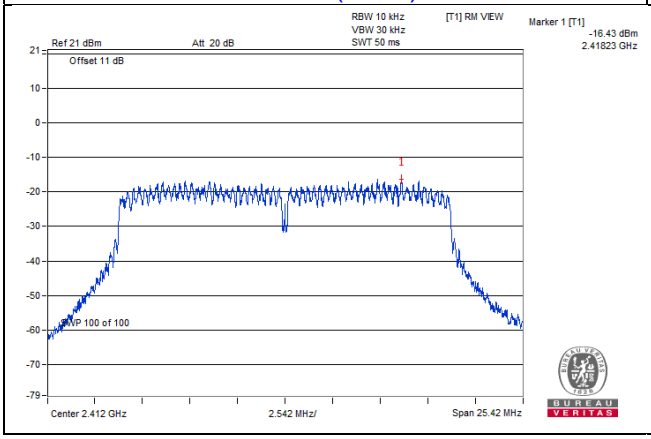
802.11b



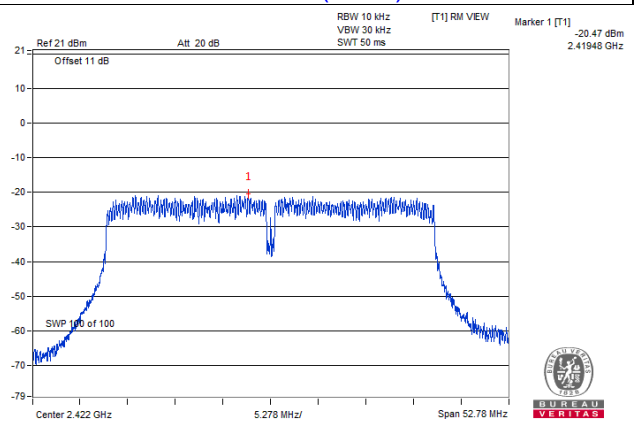
802.11g



802.11n (HT20)



802.11n (HT40)

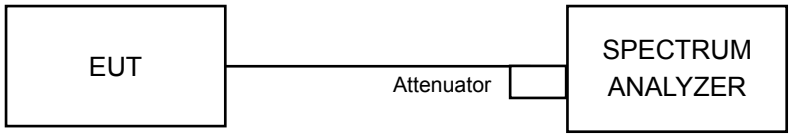


4.6 Conducted Out of Band Emission Measurement

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

a. Set the RBW = 100 kHz.
b. Set the VBW ≥ 300 kHz.
c. Detector = average.
d. Sweep time = auto couple.
e. Trace mode = max hold.
f. Allow trace to fully stabilize.
g. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

a. Set RBW = 100 kHz.
b. Set VBW ≥ 300 kHz.
c. Ensure that the number of measurement points ≥ span/RBW
d. According to measurement points to set differ measurement span.
e. Detector = average.
f. Trace Mode = max hold.
g. Sweep = auto couple.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

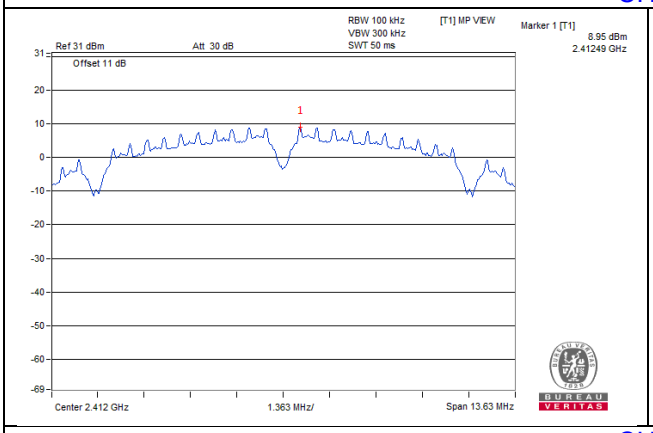
Same as Item 4.3.6

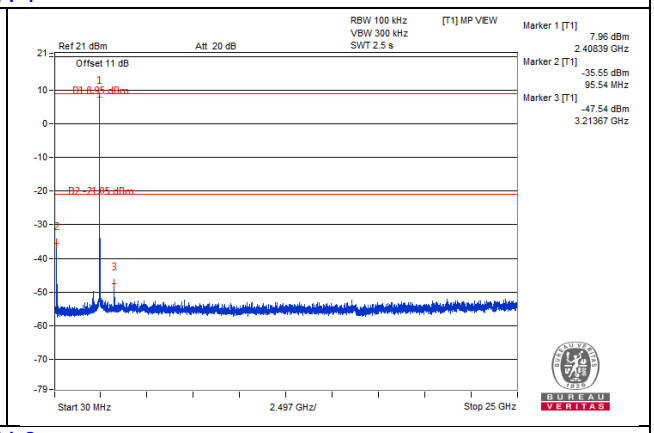
4.6.7 Test Results

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

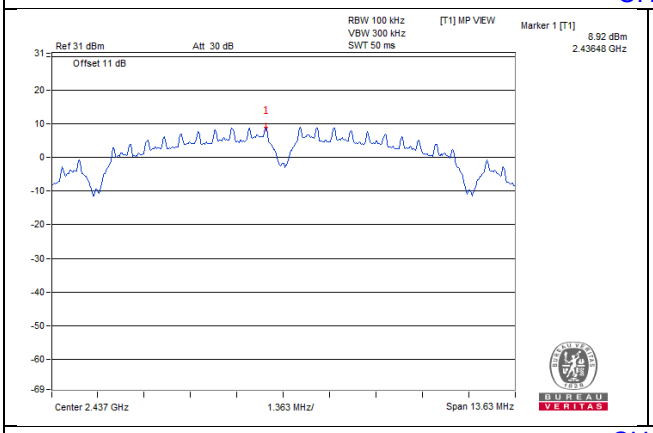
802.11b

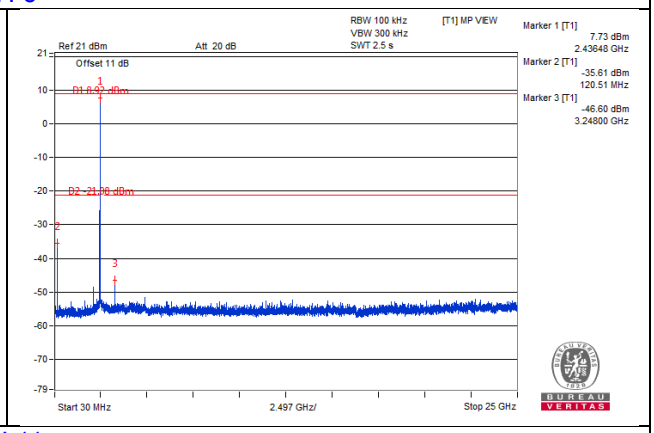
CH 1



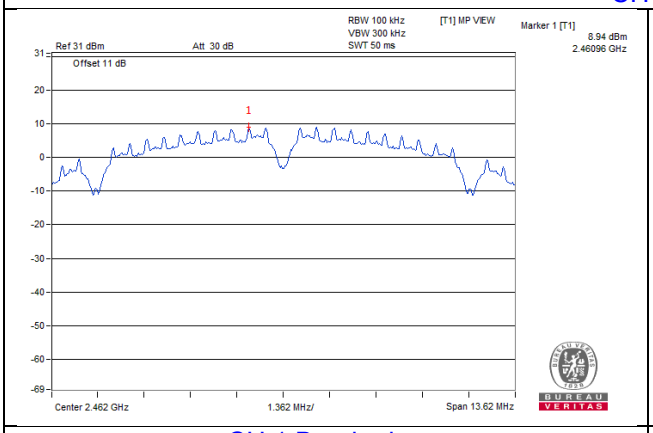


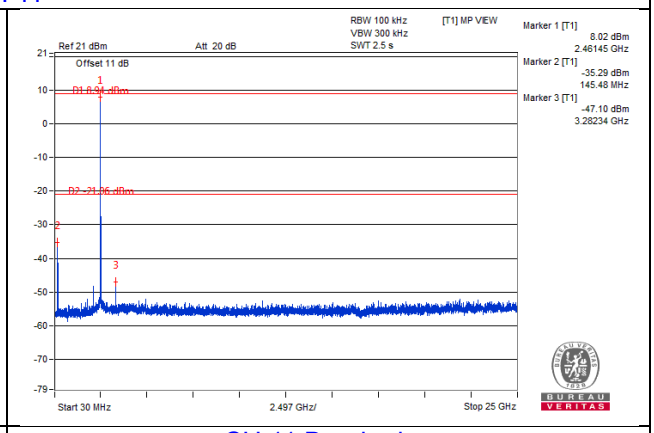
CH 6



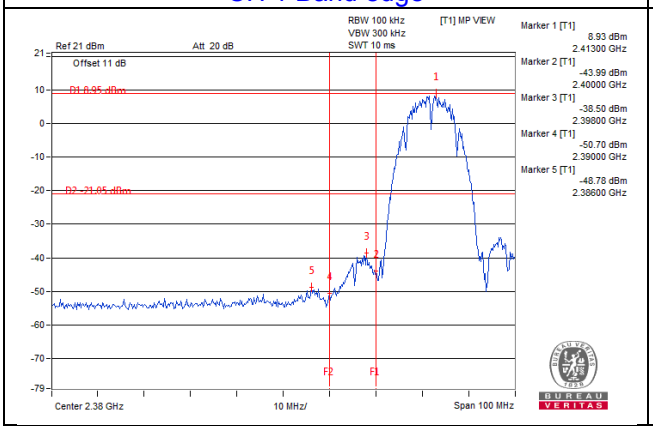


CH 11

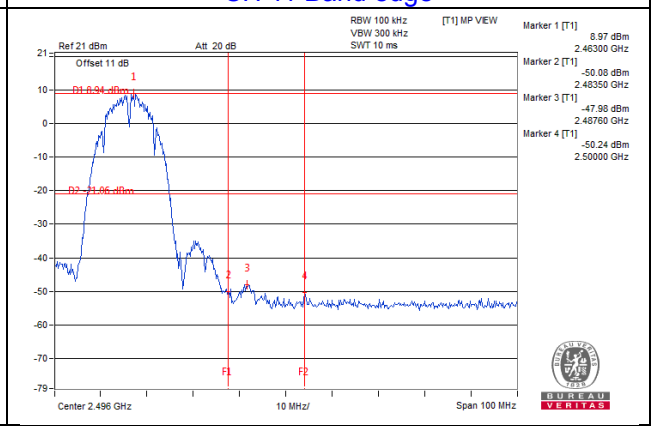




CH 1 Band edge

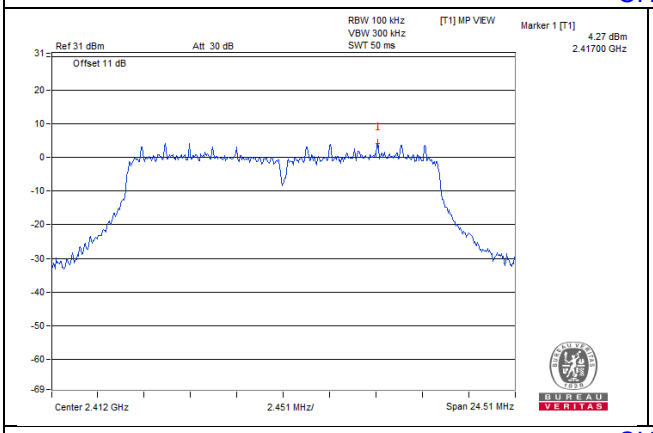


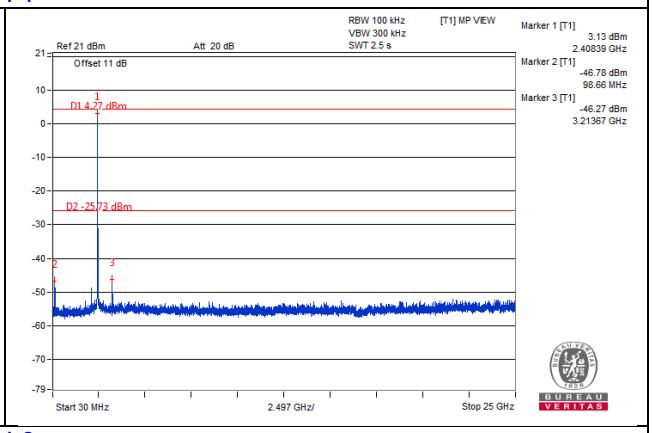
CH 11 Band edge



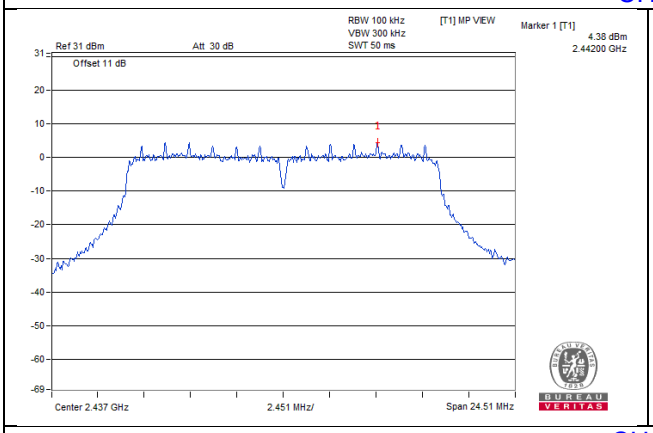
802.11g

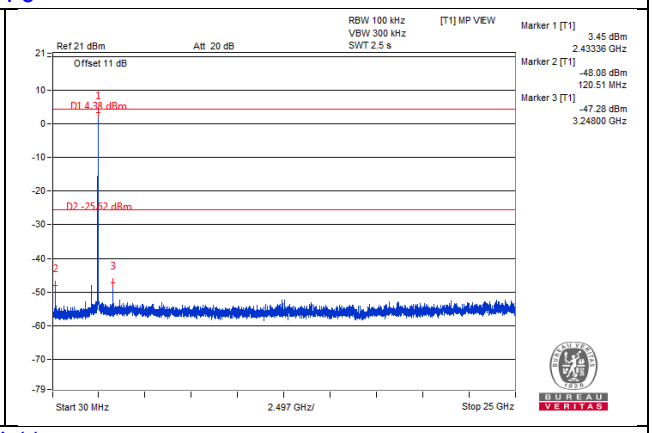
CH 1



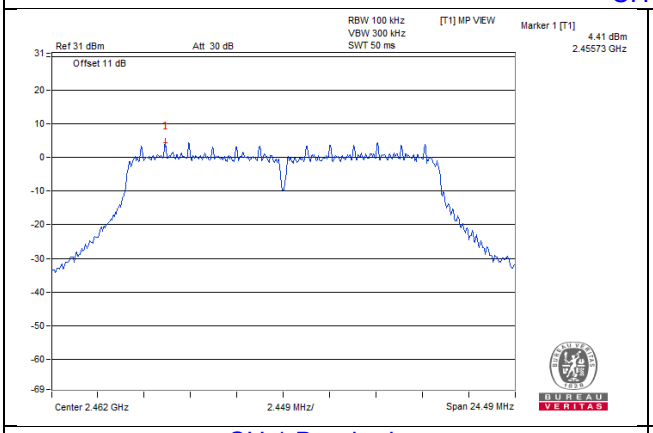


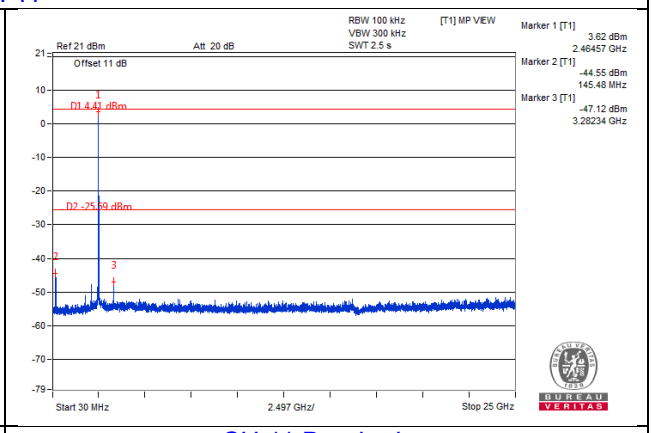
CH 6



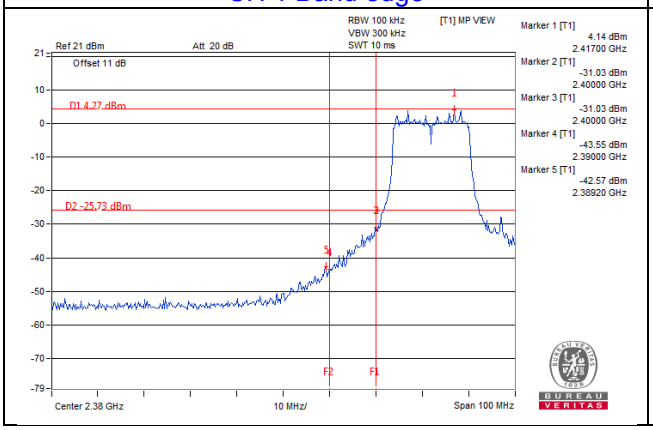


CH 11

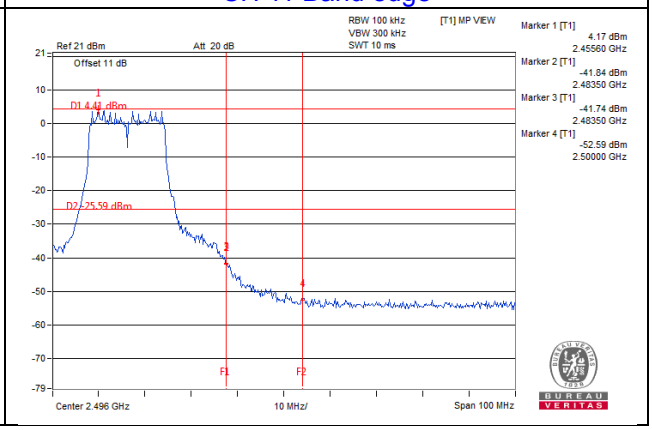




CH 1 Band edge

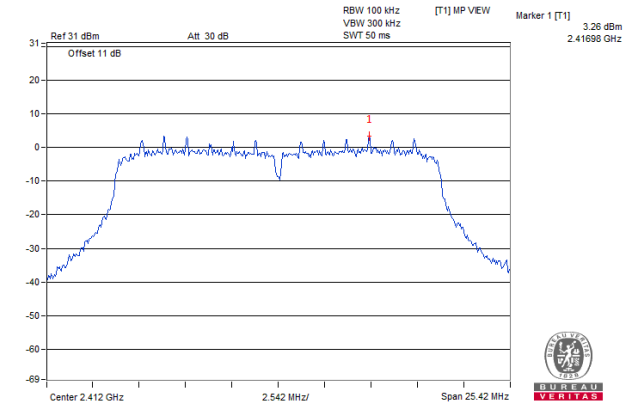


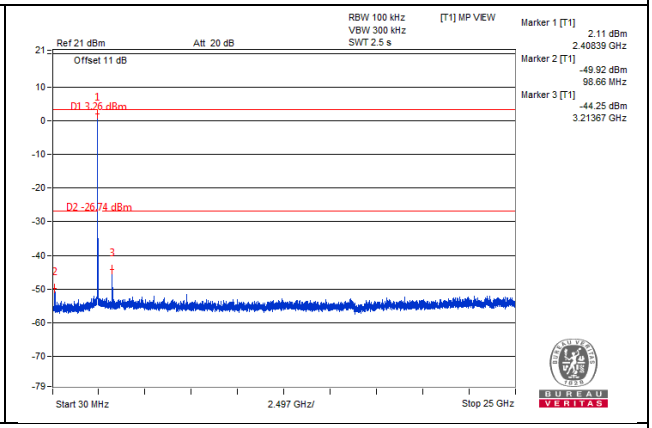
CH 11 Band edge



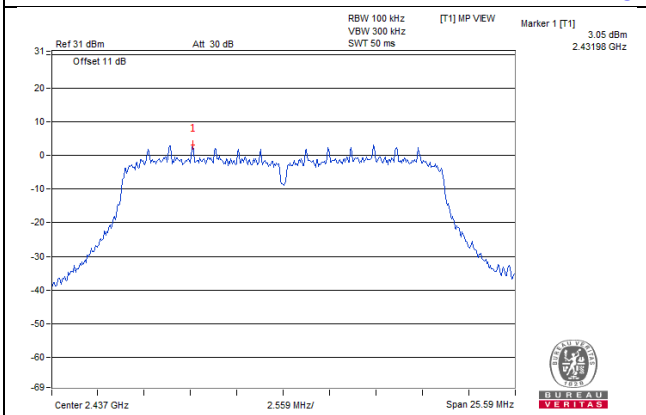
802.11n (HT20)
CHAIN 0

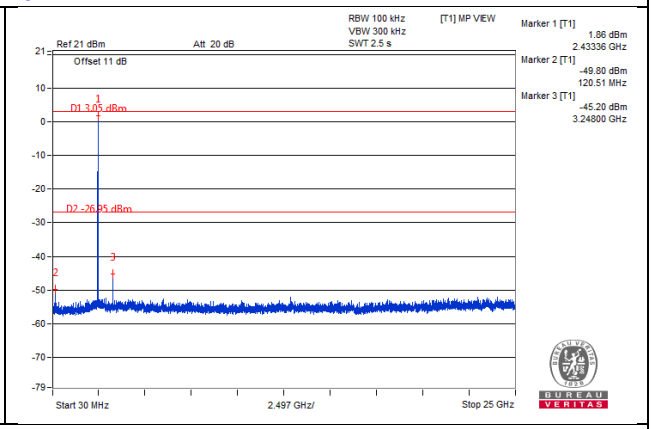
CH 1



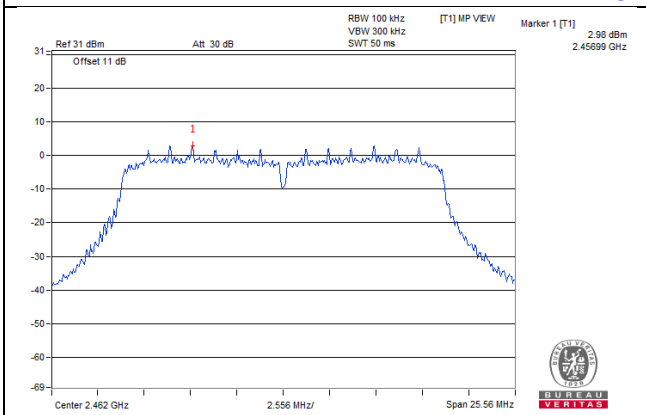


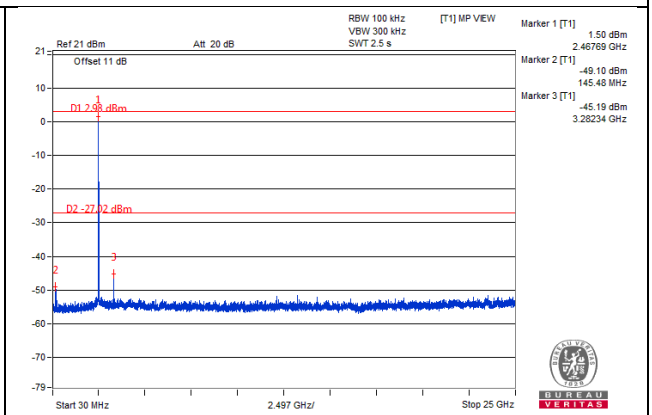
CH 6



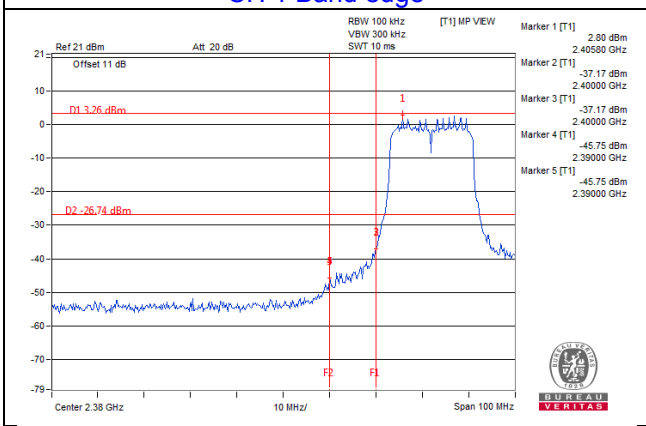


CH 11

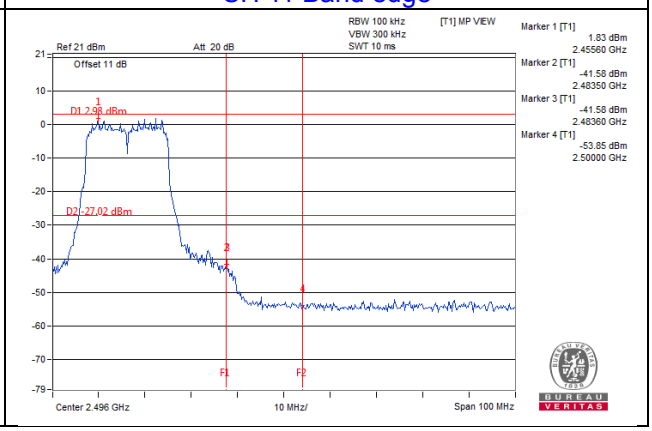




CH 1 Band edge

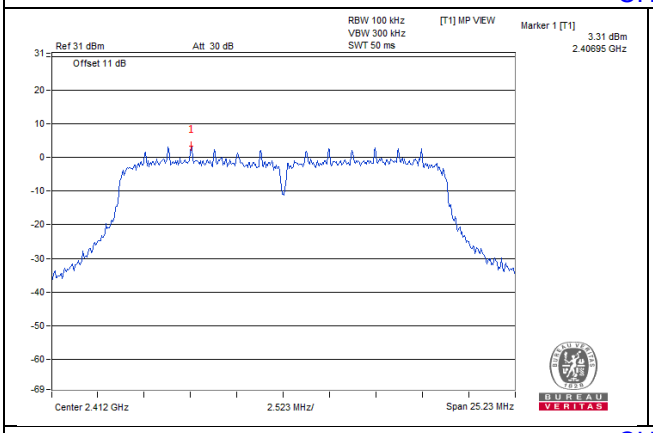


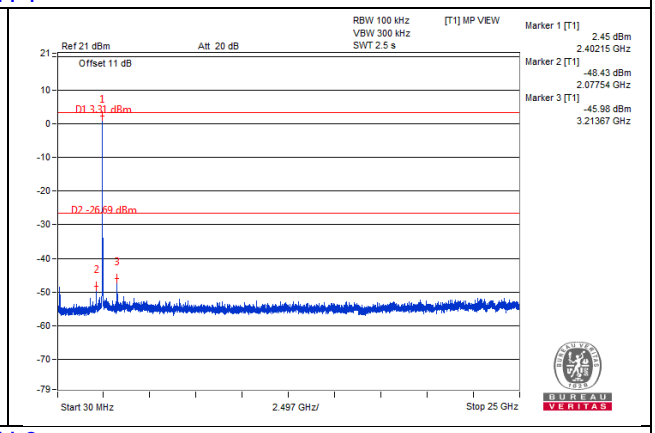
CH 11 Band edge



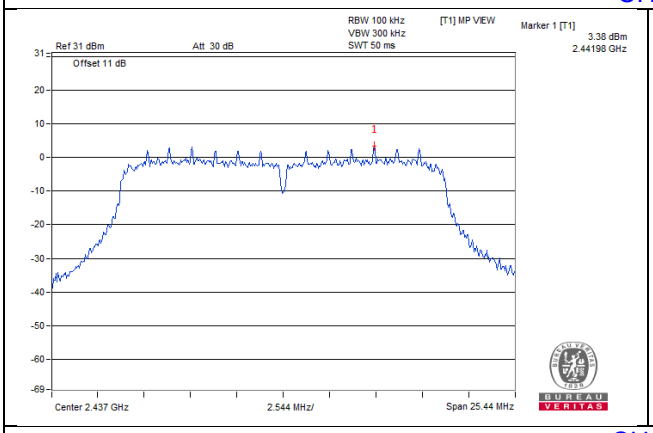
CHAIN 1

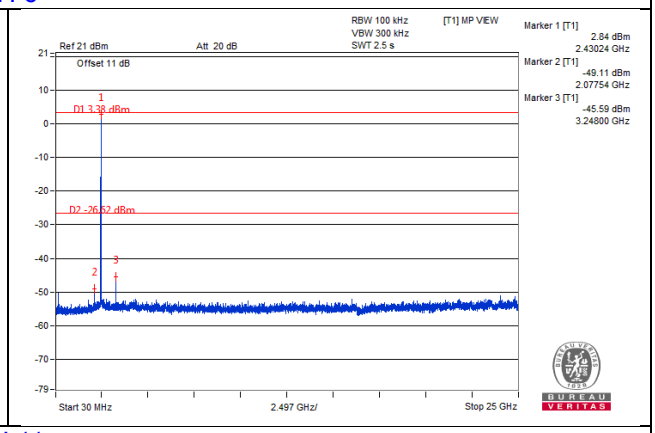
CH 1



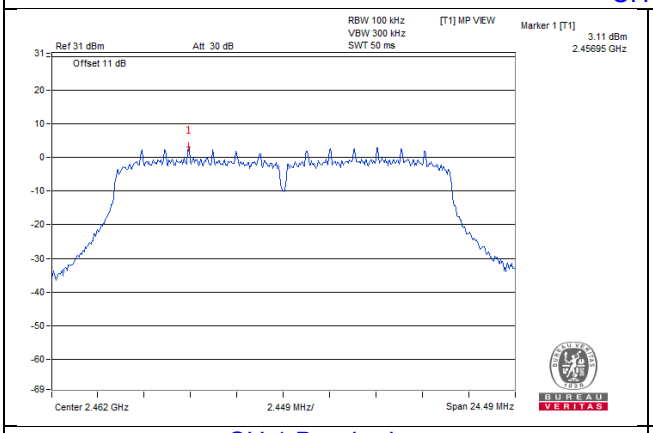


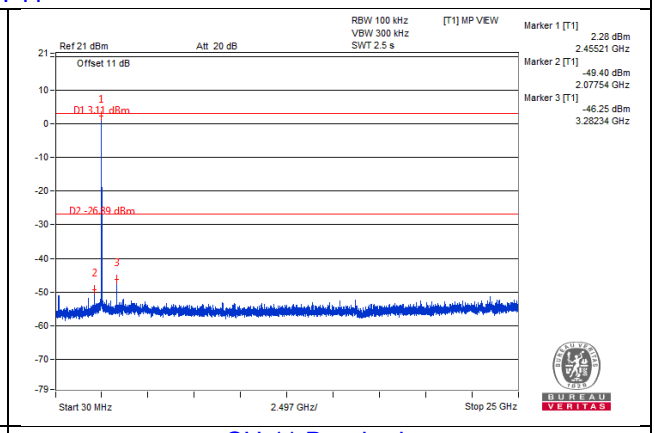
CH 6



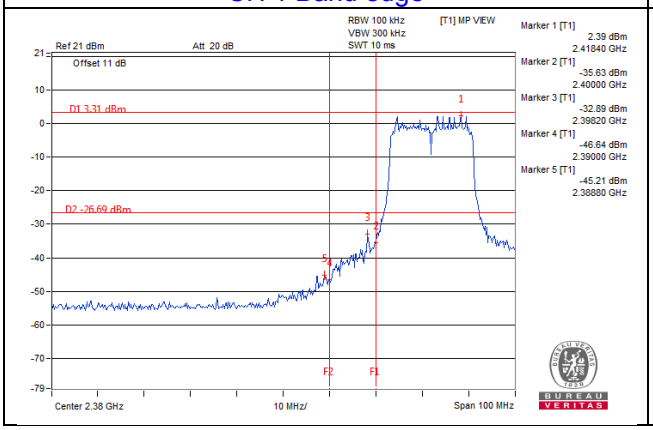


CH 11

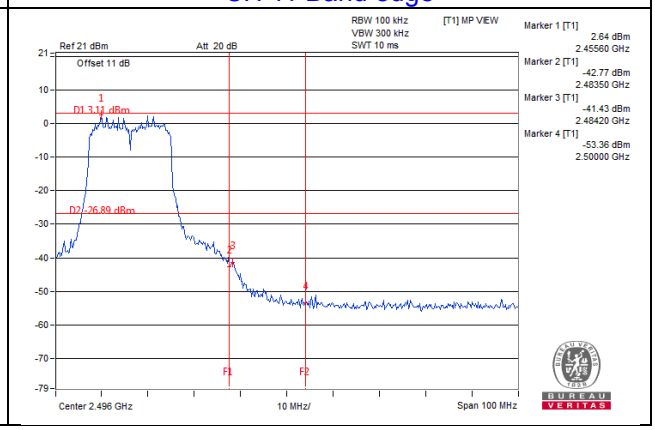




CH 1 Band edge

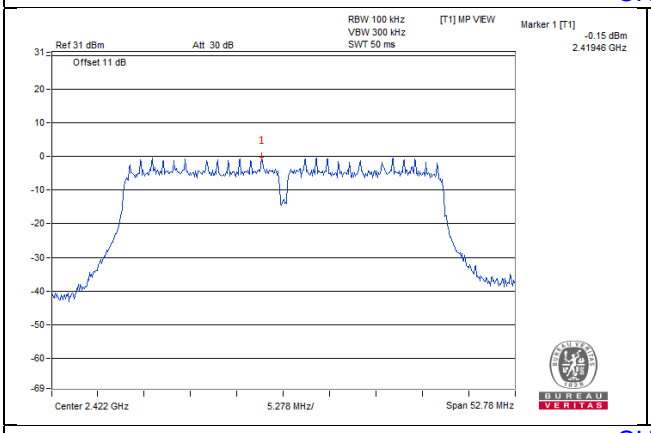


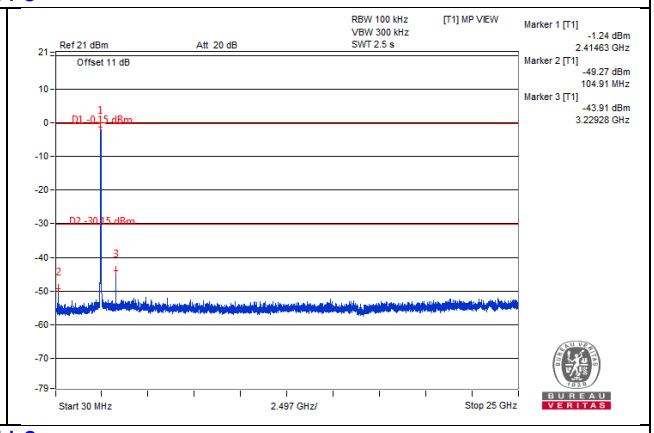
CH 11 Band edge



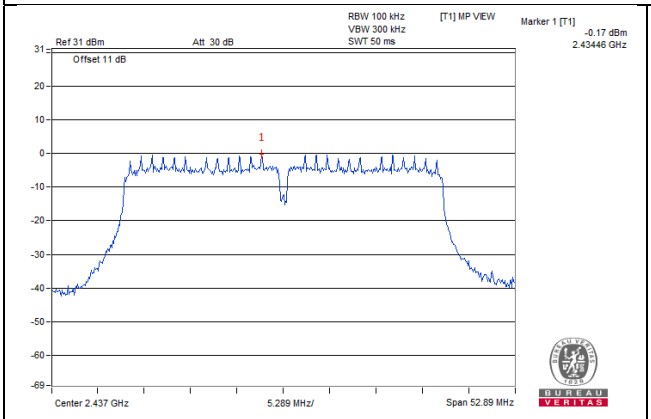
802.11n (HT40)
CHAIN 0

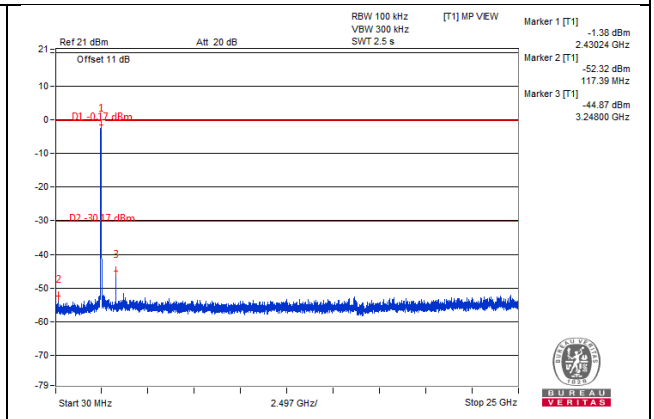
CH 3



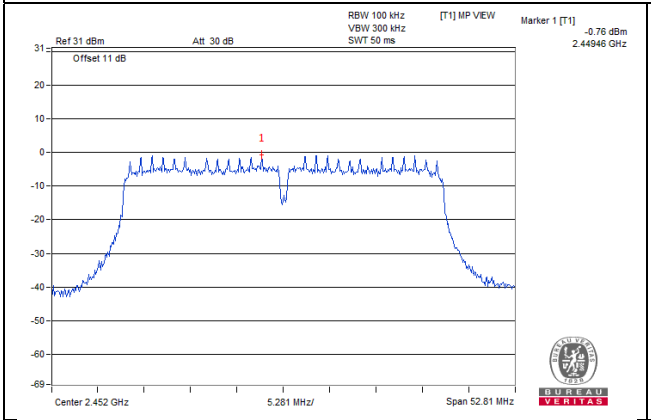


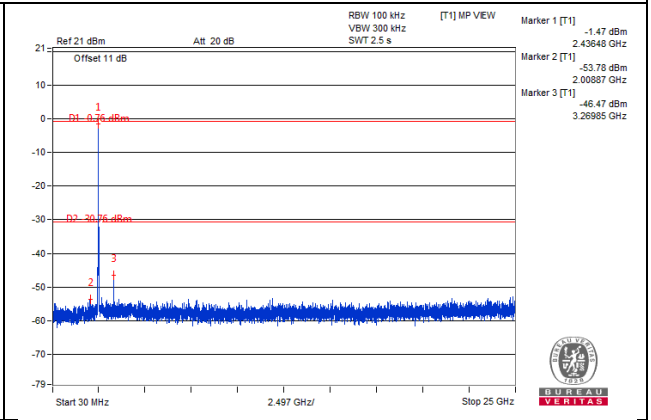
CH 6



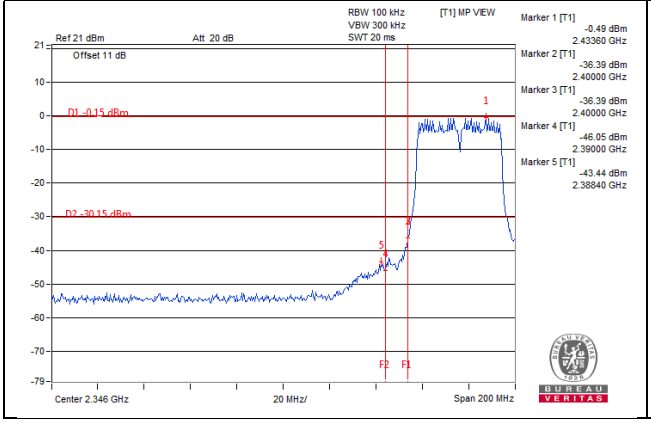


CH 9

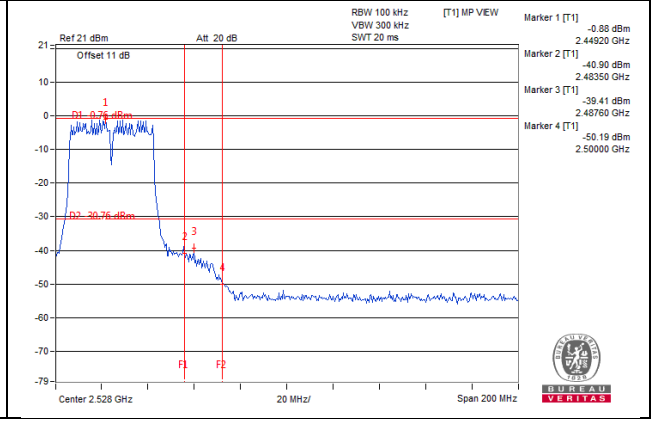




CH 3 Band edge

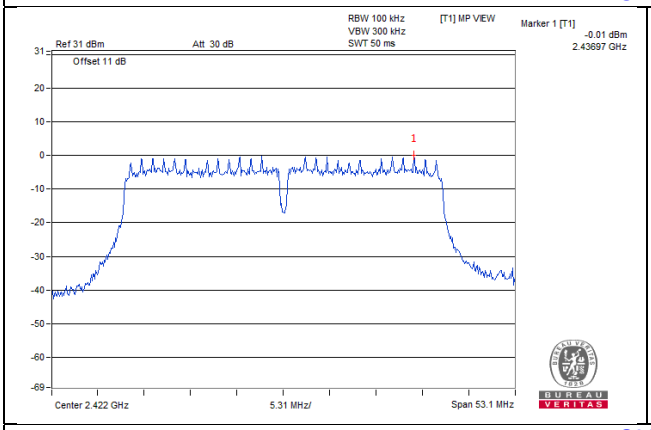


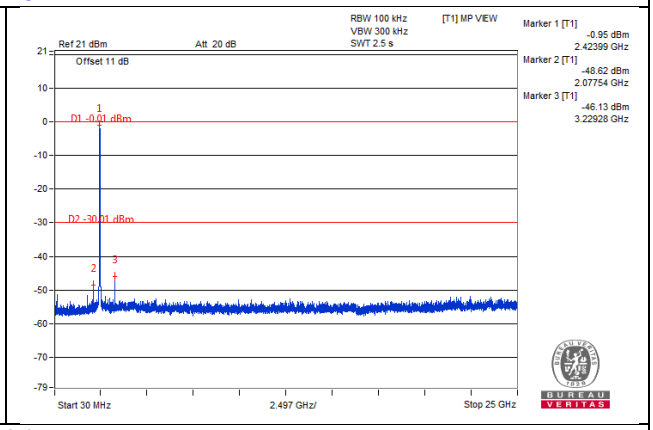
CH 9 Band edge



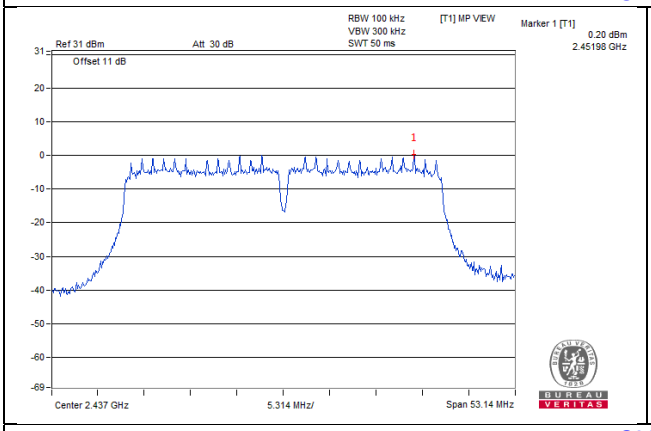
CHAIN 1

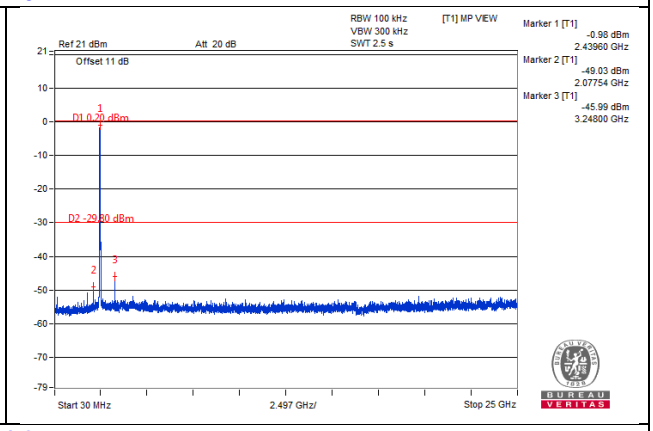
CH 3



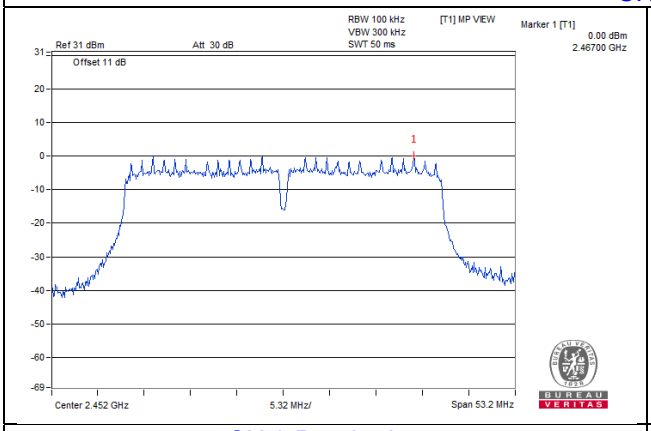


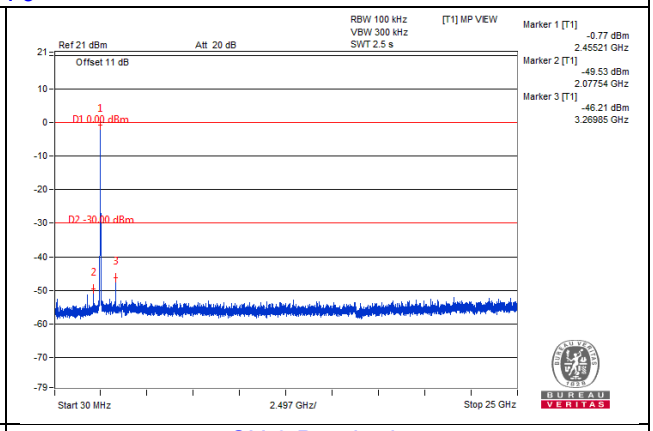
CH 6



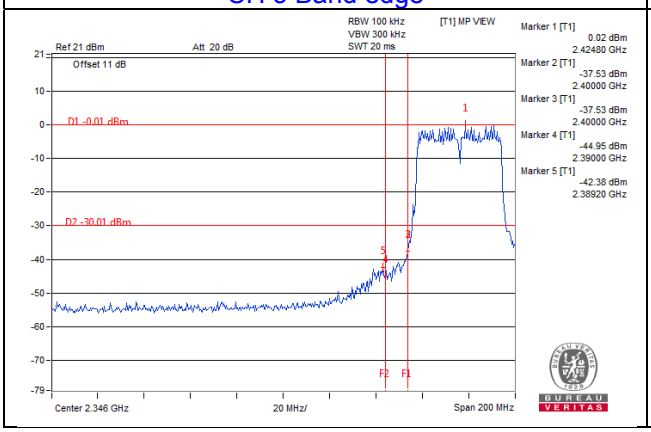


CH 9

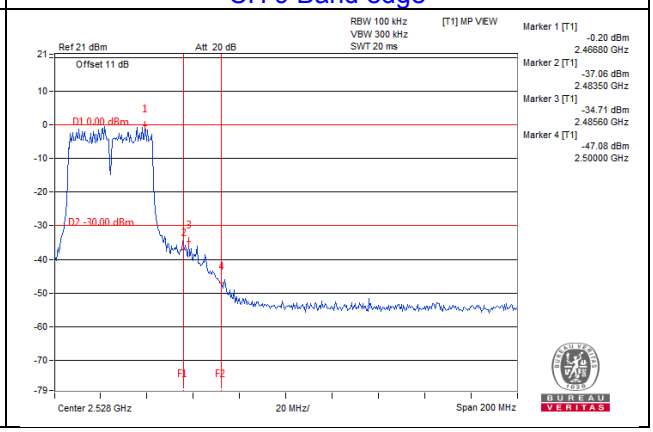




CH 3 Band edge



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 FCC recognized accredited test firms and 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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