FCC Test Report (WLAN)

Report No.:	RF180904C09-6
FCC ID:	HD5-CN85L1N
Test Model:	CN85L1N
Received Date:	Sep. 04, 2018
Test Date:	Oct. 09 to 11, 2018
Issued Date:	Oct. 20, 2018
Applicant:	Honeywell International Inc.
Address:	9680 Old Bailes Road, Fort Mill, SC 29707 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
FCC Registration / Designation Number:	723255 / TW2022

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF180904C09-6	Original release.	Oct. 20, 2018

1 Certificate of Conformity

Product:	Mobile computer
Brand:	Honeywell
Test Model:	CN85L1N
Sample Status:	ENGINEERING SAMPLE
Applicant:	Honeywell International Inc.
Test Date:	Oct. 09 to 11, 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 EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Oct. 20, 2018

Wendy Wu / Specialist

Approved by : _____ , **Date:** Oct. 20, 2018

May Chen / 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	NA	Without AC power port of the EUT.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -2.3dB at 2483.50MHz and 2390MHz.
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 POGO pin 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) (±)
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.53 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT (WLAN)

Product	Mobile computer
Brand	Honeywell
Test Model	CN85L1N
Status of EUT	ENGINEERING SAMPLE
HW Version	V1.0
HW P/N	V2.0 (DVT)
SW Version	OS.02.001-HON.01.102
SW P/N	86.00.00-Debug(0368)
Power Supply Rating	3.85Vdc from battery
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20) mode in 2.4GHz
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz**: 2.412 ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz, 5.26 ~ 5.32GHz, 5.50 ~ 5.72GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 25 802.11n (HT40), 802.11ac (VHT40): 12 802.11ac (VHT80): 6
Output Power	**2.4GHz**: 448.641mW **5GHz:** **5.18 ~ 5.24GHz:** 83.746mW **5.26 ~ 5.32GHz:** 88.442mW **5.50 ~ 5.72GHz:** 93.321mW **5.745 ~ 5.825GHz:** 95.275mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Battery x 1, Touch pen x 1, Handstrap x 1
Data Cable Supplied	NA

Note:

1. EUT Configuration list:

Item
Scanner: N6703ER
with Keypad

2. There are WLAN, Bluetooth, Zigbee, NFC and WWAN technology used for the EUT. The EUT has three radios as following table:

Radio 1	Radio 2	Radio 3	Radio 4
WLAN+BT 1	Zigbee+BT 2	NFC	WWAN
Note: For Bluetooth technology the Radio 1 support BT 5.0 dual mode, the Radio 2 support BT-LE (4.2) single mode only.			

3. Simultaneously transmission condition.

Condition	Technology			
1	WLAN 2.4GHz	NFC	Zigbee	WWAN
2	WLAN 5GHz	NFC	Zigbee	WWAN
3	Bluetooth (Radio 1)	NFC	Zigbee	WWAN
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.				

4. The EUT needs to be supplied from battery, the information is as below table:

Brand	Model No.	Spec.
Inventus Power, Inc. / Honeywell	CW-BAT	3.85Vdc, 5800mAh, 22.3Wh

5. The antennas provided to the EUT, please refer to the following table:

Radio 1					
WLAN Antenna Spec. / Bluetooth Antenna No. 1 Spec.					
Chain No.	Antenna Gain include trace loss (dBi)	Frequency range (GHz)	Antenna type	Connector type	Trace loss (dB)
Chain 0	0.4	2.4~2.4835	PIFA	POGO pin	1.4
	1.62	5.15~5.25			2
	1.62	5.25~5.35			2
	1.15	5.47~5.725			2.4
	1.15	5.725~5.85			2.4
Chain 1	1.7	2.4~2.4835	PIFA	POGO pin	0.3
	1.3	5.15~5.25			0.9
	1.3	5.25~5.35			0.9
	2	5.47~5.725			0.9
	2	5.725~5.85			0.9
Radio 2					
Bluetooth Antenna No. 2 Spec. / Zigbee Antenna Spec.					
Antenna Gain include trace loss (dBi)	Frequency range (GHz)	Antenna type	Connector type	Trace loss (dB)	
-0.1	2.4~2.4835	PIFA	POGO pin	0.5	
Radio 3					
NFC Antenna Spec.					
Frequency range (MHz)	Antenna type	Connector type			
13~14	Loop	NA			

6. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
VHT20	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), VHT20:

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

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

Note: 1. No need to concern of Conducted Emission due to the EUT is powered by battery.
2. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane (below 1GHz) & Z-plane (above 1GHz)**.

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

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.

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

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

Test Condition:

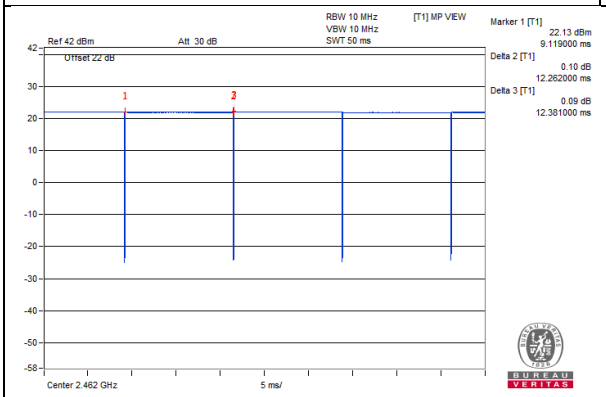
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 66%RH	DC 3.85V	Rey Chen
RE<1G	23deg. C, 68%RH	DC 3.85V	Frank Chuang
APCM	25deg. C, 60%RH	DC 3.85V	Anderson Chen

3.3 Duty Cycle of Test Signal

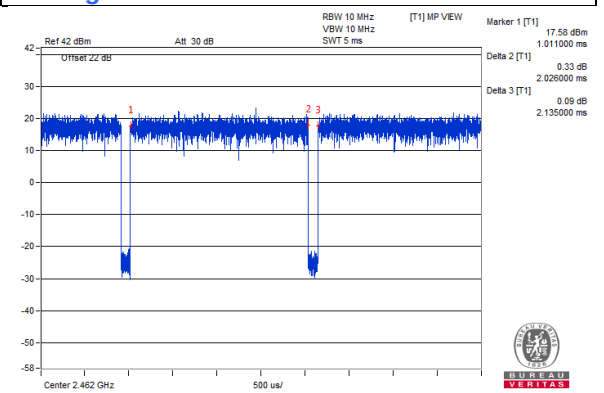
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.262 ms/12.381 ms = 0.99
802.11g: Duty cycle = 2.026 ms/2.135 ms = 0.949, Duty factor = 10 * log (1/Duty cycle) = 0.23
802.11n (HT20): Duty cycle = 1.889 ms/1.996 ms = 0.946, Duty factor = 10 * log (1/Duty cycle) = 0.24

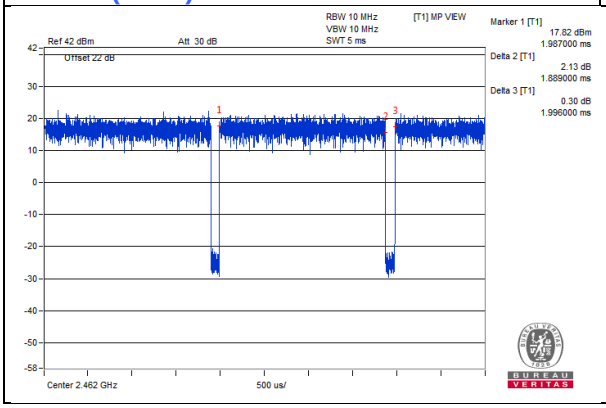
802.11b



802.11g



802.11n (HT20)



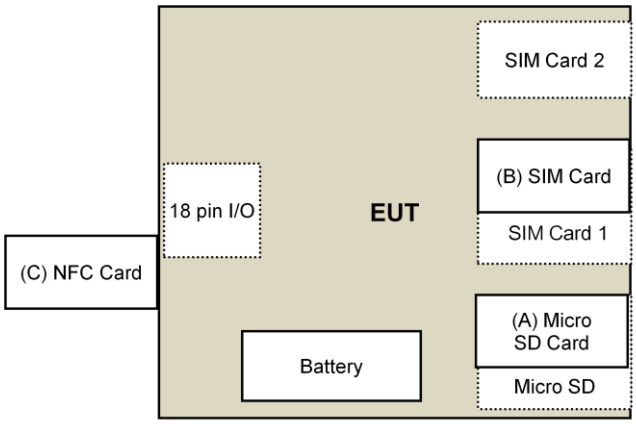
3.4 Description of Support Units

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.	MicroSD Card	Transcend	NA	NA	NA	Provided by Lab
B.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab
C.	NFC Card	UGSI	NA	NA	NA	Supplied by client

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

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 15.247 Meas Guidance v05
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 20dB below the highest level of the desired power:

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

Note:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2018	July 11, 2019
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-3-1	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-2	Mar. 20, 2018	Mar. 19, 2019
RF Cable	8D	966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 27, 2018	Sep. 26, 2019
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200	160922	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150317	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 23, 2018	July 22, 2019
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSV40	100964	June 20, 2018	June 19, 2019
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019

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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 3.
4. The CANADA Site Registration No. is 20331-1
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Oct. 09 to 11, 2018

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 detects 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:

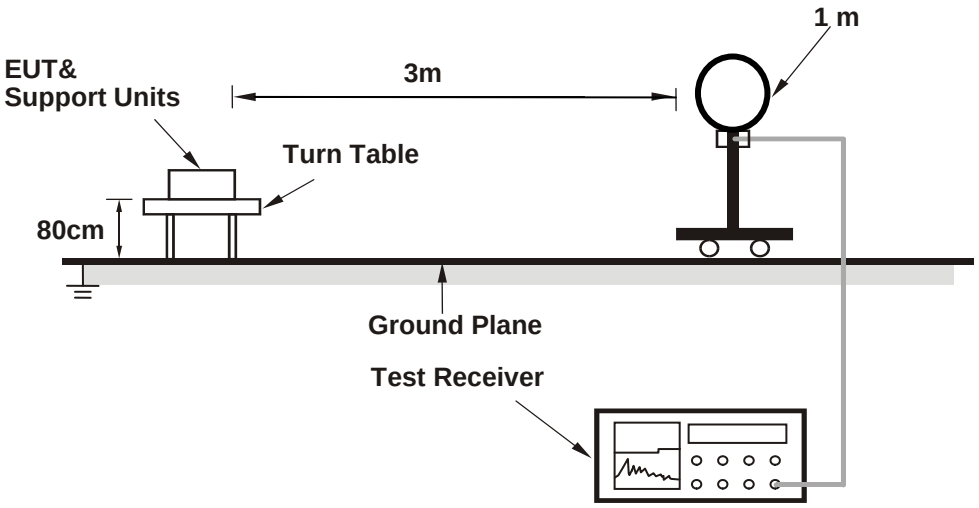
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

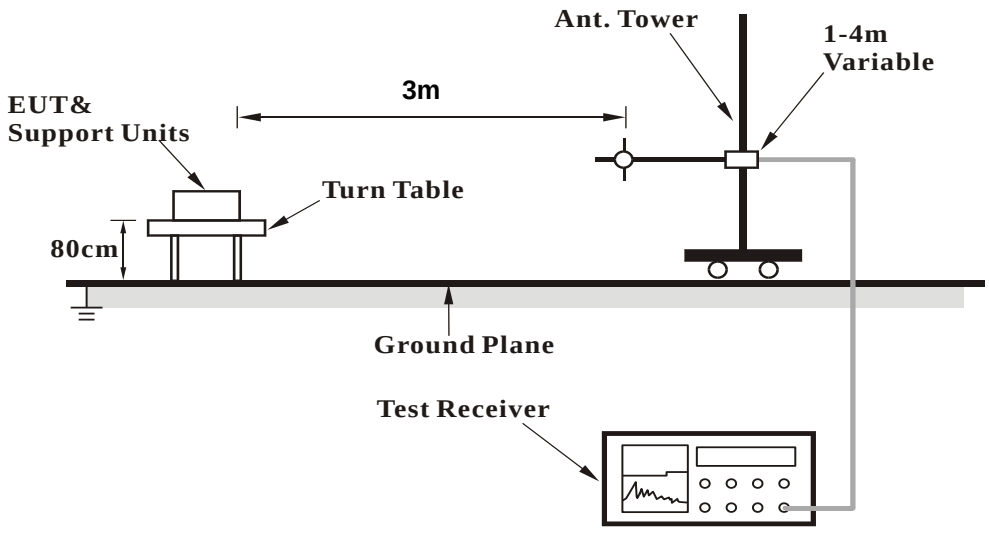
No deviation.

4.1.5 Test Setup

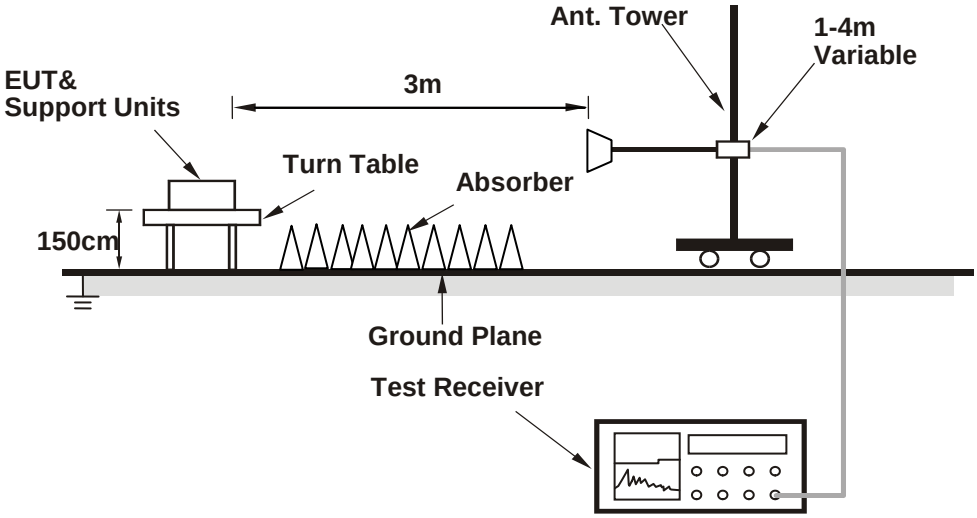
For Radiated emission below 30MHz



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. Placed the EUT on the testing table.
b. Controlling software (QRCT_V3.0.298.0) has been activated to set the EUT on specific status.

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	54.8 PK	74.0	-19.2	2.61 H	239	57.5	-2.7
2	2390.00	41.7 AV	54.0	-12.3	2.61 H	239	44.4	-2.7
3	*2412.00	109.1 PK			2.61 H	239	111.8	-2.7
4	*2412.00	106.8 AV			2.61 H	239	109.5	-2.7
5	4824.00	43.6 PK	74.0	-30.4	1.92 H	136	42.0	1.6
6	4824.00	35.7 AV	54.0	-18.3	1.92 H	136	34.1	1.6
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	55.6 PK	74.0	-18.4	1.18 V	67	58.3	-2.7
2	2390.00	42.7 AV	54.0	-11.3	1.18 V	67	45.4	-2.7
3	*2412.00	110.3 PK			1.18 V	67	113.0	-2.7
4	*2412.00	108.0 AV			1.18 V	67	110.7	-2.7
5	4824.00	47.6 PK	74.0	-26.4	1.43 V	197	46.0	1.6
6	4824.00	38.1 AV	54.0	-15.9	1.43 V	197	36.5	1.6

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) – 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	2390.00	54.3 PK	74.0	-19.7	2.70 H	252	57.0	-2.7
2	2390.00	40.8 AV	54.0	-13.2	2.70 H	252	43.5	-2.7
3	*2437.00	109.0 PK			2.70 H	252	112.0	-3.0
4	*2437.00	106.4 AV			2.70 H	252	109.4	-3.0
5	2483.50	54.0 PK	74.0	-20.0	2.70 H	252	57.0	-3.0
6	2483.50	41.6 AV	54.0	-12.4	2.70 H	252	44.6	-3.0
7	4874.00	43.2 PK	74.0	-30.8	1.88 H	132	41.6	1.6
8	4874.00	35.6 AV	54.0	-18.4	1.88 H	132	34.0	1.6
9	7311.00	46.3 PK	74.0	-27.7	1.24 H	268	38.6	7.7
10	7311.00	34.3 AV	54.0	-19.7	1.24 H	268	26.6	7.7
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	55.1 PK	74.0	-18.9	1.46 V	62	57.8	-2.7
2	2390.00	41.8 AV	54.0	-12.2	1.46 V	62	44.5	-2.7
3	*2437.00	110.2 PK			1.46 V	62	113.2	-3.0
4	*2437.00	107.6 AV			1.46 V	62	110.6	-3.0
5	2483.50	54.8 PK	74.0	-19.2	1.46 V	62	57.8	-3.0
6	2483.50	42.6 AV	54.0	-11.4	1.46 V	62	45.6	-3.0
7	4874.00	47.5 PK	74.0	-26.5	1.38 V	203	45.9	1.6
8	4874.00	38.2 AV	54.0	-15.8	1.38 V	203	36.6	1.6
9	7311.00	45.8 PK	74.0	-28.2	2.31 V	148	38.1	7.7
10	7311.00	33.7 AV	54.0	-20.3	2.31 V	148	26.0	7.7

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	109.0 PK			2.64 H	237	112.0	-3.0
2	*2462.00	106.7 AV			2.64 H	237	109.7	-3.0
3	2483.50	55.1 PK	74.0	-18.9	2.64 H	237	58.1	-3.0
4	2483.50	42.8 AV	54.0	-11.2	2.64 H	237	45.8	-3.0
5	4924.00	43.0 PK	74.0	-31.0	1.92 H	132	41.3	1.7
6	4924.00	35.5 AV	54.0	-18.5	1.92 H	132	33.8	1.7
7	7386.00	46.1 PK	74.0	-27.9	1.20 H	277	38.2	7.9
8	7386.00	33.9 AV	54.0	-20.1	1.20 H	277	26.0	7.9
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	110.2 PK			1.48 V	69	113.2	-3.0
2	*2462.00	107.9 AV			1.48 V	69	110.9	-3.0
3	2483.50	55.5 PK	74.0	-18.5	1.48 V	69	58.5	-3.0
4	2483.50	43.8 AV	54.0	-10.2	1.48 V	69	46.8	-3.0
5	4924.00	47.3 PK	74.0	-26.7	1.34 V	191	45.6	1.7
6	4924.00	38.2 AV	54.0	-15.8	1.34 V	191	36.5	1.7
7	7386.00	45.8 PK	74.0	-28.2	2.27 V	150	37.9	7.9
8	7386.00	33.5 AV	54.0	-20.5	2.27 V	150	25.6	7.9

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	67.8 PK	74.0	-6.2	2.61 H	232	70.5	-2.7
2	2390.00	50.3 AV	54.0	-3.7	2.61 H	232	53.0	-2.7
3	*2412.00	107.8 PK			2.61 H	232	110.5	-2.7
4	*2412.00	97.3 AV			2.61 H	232	100.0	-2.7
5	4824.00	42.4 PK	74.0	-31.6	1.03 H	78	40.8	1.6
6	4824.00	30.5 AV	54.0	-23.5	1.03 H	78	28.9	1.6
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	68.6 PK	74.0	-5.4	1.51 V	83	71.3	-2.7
2	**2390.00**	**51.7 AV**	**54.0**	**-2.3**	**1.51 V**	**83**	**54.4**	**-2.7**
3	*2412.00	109.0 PK			1.51 V	83	111.7	-2.7
4	*2412.00	98.5 AV			1.51 V	83	101.2	-2.7
5	4824.00	42.6 PK	74.0	-31.4	1.07 V	360	41.0	1.6
6	4824.00	30.4 AV	54.0	-23.6	1.07 V	360	28.8	1.6

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) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	53.6 PK	74.0	-20.4	2.63 H	233	56.3	-2.7
2	2390.00	41.5 AV	54.0	-12.5	2.63 H	233	44.2	-2.7
3	*2437.00	108.1 PK			2.63 H	233	111.1	-3.0
4	*2437.00	98.3 AV			2.63 H	233	101.3	-3.0
5	2483.50	54.8 PK	74.0	-19.2	2.63 H	233	57.8	-3.0
6	2483.50	41.6 AV	54.0	-12.4	2.63 H	233	44.6	-3.0
7	4874.00	42.4 PK	74.0	-31.6	1.04 H	87	40.8	1.6
8	4874.00	30.5 AV	54.0	-23.5	1.04 H	87	28.9	1.6
9	7311.00	44.4 PK	74.0	-29.6	2.21 H	221	36.7	7.7
10	7311.00	32.5 AV	54.0	-21.5	2.21 H	221	24.8	7.7
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	54.4 PK	74.0	-19.6	1.49 V	73	57.1	-2.7
2	2390.00	42.5 AV	54.0	-11.5	1.49 V	73	45.2	-2.7
3	*2437.00	109.3 PK			1.49 V	73	112.3	-3.0
4	*2437.00	99.5 AV			1.49 V	73	102.5	-3.0
5	2483.50	55.6 PK	74.0	-18.4	1.49 V	73	58.6	-3.0
6	2483.50	42.6 AV	54.0	-11.4	1.49 V	73	45.6	-3.0
7	4874.00	42.8 PK	74.0	-31.2	1.05 V	348	41.2	1.6
8	4874.00	30.9 AV	54.0	-23.1	1.05 V	348	29.3	1.6
9	7311.00	44.3 PK	74.0	-29.7	1.63 V	235	36.6	7.7
10	7311.00	32.2 AV	54.0	-21.8	1.63 V	235	24.5	7.7

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	109.2 PK			2.69 H	248	112.2	-3.0
2	*2462.00	97.6 AV			2.69 H	248	100.6	-3.0
3	2483.50	70.3 PK	74.0	-3.7	2.69 H	248	73.3	-3.0
4	2483.50	50.5 AV	54.0	-3.5	2.69 H	248	53.5	-3.0
5	4924.00	42.3 PK	74.0	-31.7	1.04 H	93	40.6	1.7
6	4924.00	30.1 AV	54.0	-23.9	1.04 H	93	28.4	1.7
7	7386.00	44.1 PK	74.0	-29.9	2.18 H	232	36.2	7.9
8	7386.00	32.0 AV	54.0	-22.0	2.18 H	232	24.1	7.9
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	110.4 PK			1.51 V	72	113.4	-3.0
2	*2462.00	98.8 AV			1.51 V	72	101.8	-3.0
3	2483.50	71.6 PK	74.0	-2.4	1.51 V	72	74.6	-3.0
4	**2483.50**	**51.7 AV**	**54.0**	**-2.3**	**1.51 V**	**72**	**54.7**	**-3.0**
5	4924.00	42.5 PK	74.0	-31.5	1.02 V	360	40.8	1.7
6	4924.00	30.4 AV	54.0	-23.6	1.02 V	360	28.7	1.7
7	7386.00	44.2 PK	74.0	-29.8	1.59 V	229	36.3	7.9
8	7386.00	32.1 AV	54.0	-21.9	1.59 V	229	24.2	7.9

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	68.1 PK	74.0	-5.9	2.58 H	247	70.8	-2.7
2	2390.00	50.4 AV	54.0	-3.6	2.58 H	247	53.1	-2.7
3	*2412.00	106.9 PK			2.58 H	247	109.6	-2.7
4	*2412.00	96.7 AV			2.58 H	247	99.4	-2.7
5	4824.00	41.7 PK	74.0	-32.3	1.00 H	79	40.1	1.6
6	4824.00	30.0 AV	54.0	-24.0	1.00 H	79	28.4	1.6
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	68.9 PK	74.0	-5.1	1.23 V	66	71.6	-2.7
2	**2390.00**	**51.7 AV**	**54.0**	**-2.3**	**1.23 V**	**66**	**54.3**	**-2.7**
3	*2412.00	108.1 PK			1.23 V	66	110.8	-2.7
4	*2412.00	97.9 AV			1.23 V	66	100.6	-2.7
5	4824.00	43.2 PK	74.0	-30.8	1.05 V	341	41.6	1.6
6	4824.00	31.3 AV	54.0	-22.7	1.05 V	341	29.7	1.6

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) – 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	2390.00	56.5 PK	74.0	-17.5	2.66 H	243	59.2	-2.7
2	2390.00	41.8 AV	54.0	-12.2	2.66 H	243	44.5	-2.7
3	*2437.00	107.9 PK			2.66 H	243	110.9	-3.0
4	*2437.00	98.0 AV			2.66 H	243	101.0	-3.0
5	2483.50	55.5 PK	74.0	-18.5	2.66 H	243	58.5	-3.0
6	2483.50	41.7 AV	54.0	-12.3	2.66 H	243	44.7	-3.0
7	4874.00	41.7 PK	74.0	-32.3	1.00 H	79	40.1	1.6
8	4874.00	30.0 AV	54.0	-24.0	1.00 H	79	28.4	1.6
9	7311.00	44.3 PK	74.0	-29.7	2.23 H	224	36.6	7.7
10	7311.00	32.6 AV	54.0	-21.4	2.23 H	224	24.9	7.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	57.3 PK	74.0	-16.7	1.23 V	67	60.0	-2.7
2	2390.00	42.8 AV	54.0	-11.2	1.23 V	67	45.5	-2.7
3	*2437.00	109.1 PK			1.23 V	67	112.1	-3.0
4	*2437.00	99.2 AV			1.23 V	67	102.2	-3.0
5	2483.50	56.3 PK	74.0	-17.7	1.23 V	67	59.3	-3.0
6	2483.50	42.7 AV	54.0	-11.3	1.23 V	67	45.7	-3.0
7	4874.00	42.9 PK	74.0	-31.1	1.01 V	352	41.3	1.6
8	4874.00	31.2 AV	54.0	-22.8	1.01 V	352	29.6	1.6
9	7311.00	44.6 PK	74.0	-29.4	1.66 V	249	36.9	7.7
10	7311.00	32.6 AV	54.0	-21.4	1.66 V	249	24.9	7.7

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	107.2 PK			2.68 H	238	110.2	-3.0
2	*2462.00	97.3 AV			2.68 H	238	100.3	-3.0
3	2483.50	69.0 PK	74.0	-5.0	2.68 H	238	72.0	-3.0
4	2483.50	50.6 AV	54.0	-3.4	2.68 H	238	53.6	-3.0
5	4924.00	41.7 PK	74.0	-32.3	1.00 H	79	40.0	1.7
6	4924.00	30.0 AV	54.0	-24.0	1.00 H	79	28.3	1.7
7	7386.00	44.3 PK	74.0	-29.7	2.23 H	224	36.4	7.9
8	7386.00	32.6 AV	54.0	-21.4	2.23 H	224	24.7	7.9
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	108.4 PK			1.22 V	67	111.4	-3.0
2	*2462.00	98.5 AV			1.22 V	67	101.5	-3.0
3	2483.50	69.8 PK	74.0	-4.2	1.22 V	67	72.8	-3.0
4	2483.50	51.6 AV	54.0	-2.4	1.22 V	67	54.6	-3.0
5	4924.00	42.9 PK	74.0	-31.1	1.02 V	360	41.2	1.7
6	4924.00	31.0 AV	54.0	-23.0	1.02 V	360	29.3	1.7
7	7386.00	44.7 PK	74.0	-29.3	1.66 V	244	36.8	7.9
8	7386.00	32.8 AV	54.0	-21.2	1.66 V	244	24.9	7.9

REMARKS:

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

Below 1GHz Data:

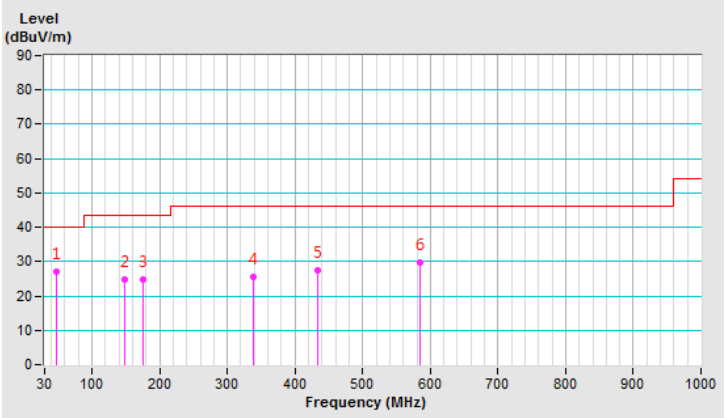
802.11g

CHANNEL	TX Channel 6	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	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	47.90	26.9 QP	40.0	-13.1	2.00 H	360	34.9	-8.0
2	148.34	24.9 QP	43.5	-18.6	3.00 H	168	32.5	-7.6
3	176.25	24.7 QP	43.5	-18.8	1.50 H	235	33.6	-8.9
4	338.99	25.5 QP	46.0	-20.5	1.00 H	48	31.3	-5.8
5	433.50	27.3 QP	46.0	-18.7	2.00 H	360	30.4	-3.1
6	585.23	29.8 QP	46.0	-16.2	1.00 H	4	29.9	-0.1

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) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

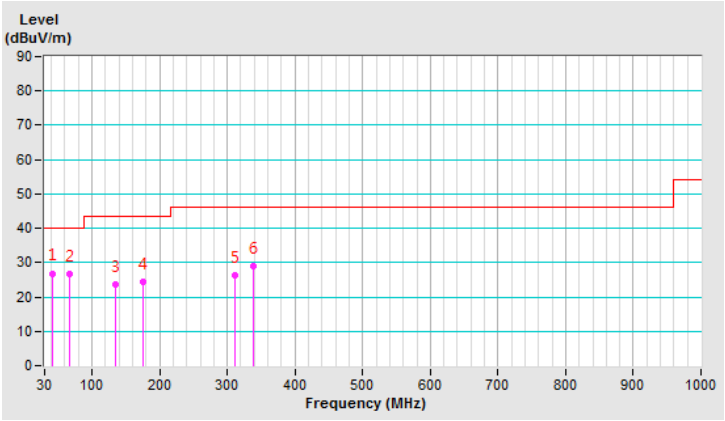


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	40.72	26.9 QP	40.0	-13.1	1.50 V	181	35.1	-8.2
2	67.78	26.7 QP	40.0	-13.3	1.00 V	264	36.3	-9.6
3	134.37	23.5 QP	43.5	-20.0	2.00 V	2	32.1	-8.6
4	176.30	24.5 QP	43.5	-19.0	1.00 V	88	33.4	-8.9
5	311.88	26.3 QP	46.0	-19.7	1.50 V	33	32.7	-6.4
6	339.02	28.9 QP	46.0	-17.1	1.50 V	309	34.7	-5.8

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

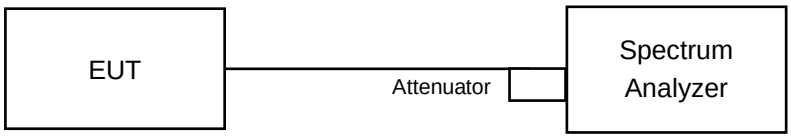


4.2 6dB Bandwidth Measurement

4.2.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 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

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

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

4.2.7 Test Result

802.11b

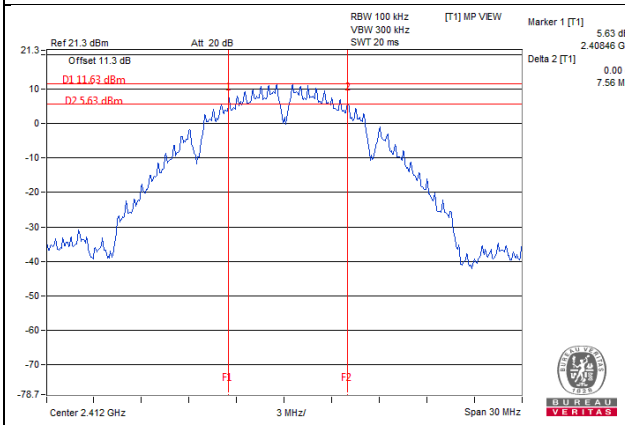
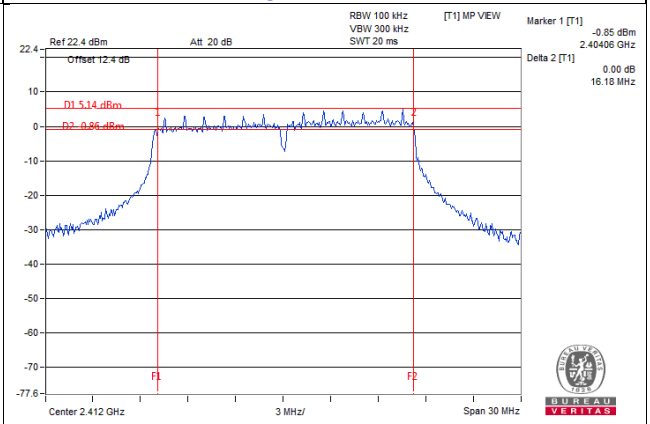
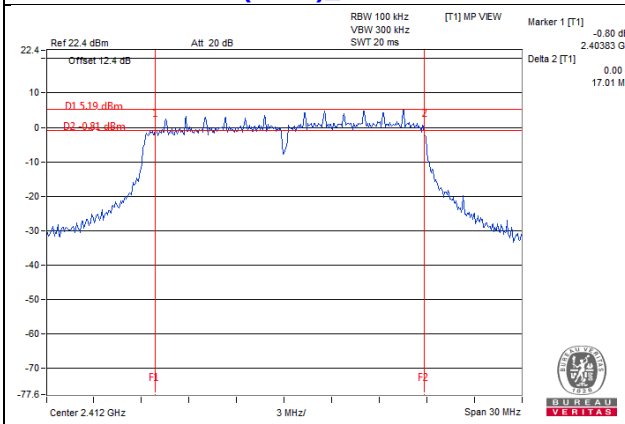
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	7.63	7.56	0.5	Pass
6	2437	7.59	8.06	0.5	Pass
11	2462	7.62	8.06	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.18	16.45	0.5	Pass
6	2437	16.43	16.43	0.5	Pass
11	2462	16.41	16.41	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.01	17.68	0.5	Pass
6	2437	17.66	17.69	0.5	Pass
11	2462	17.66	17.68	0.5	Pass

Spectrum Plot of Worst Value	
802.11b_Chain 1 / CH1	**802.11g_Chain 0 / CH1**
	
802.11n (HT20)_Chain 0 / CH1	
	

4.3 Conducted Output Power Measurement

4.3.1 Limits of Conducted Output Power Measurement

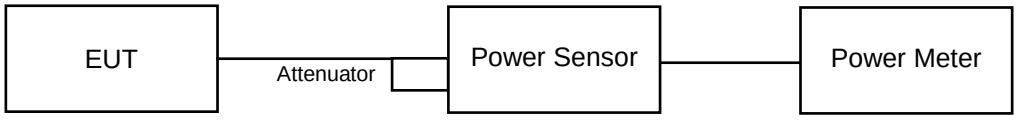
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedures

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

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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

Same as Item 4.2.6.

4.3.7 Test Results

FOR PEAK POWER

802.11b

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.43	21.76	324.953	25.12	30	Pass
6	2437	22.51	21.58	322.118	25.08	30	Pass
11	2462	22.65	21.68	331.308	25.20	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.35	21.68	319.022	25.04	30	Pass
6	2437	23.84	23.15	448.641	26.52	30	Pass
11	2462	23.68	23.08	436.582	26.40	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.38	21.64	318.863	25.04	30	Pass
6	2437	23.45	22.58	402.443	26.05	30	Pass
11	2462	23.26	22.15	375.895	25.75	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	19.56	19.02	170.164	22.31
6	2437	19.75	19.14	176.441	22.47
11	2462	19.98	19.04	179.709	22.55

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.23	14.62	62.316	17.95
6	2437	16.60	16.17	87.109	19.40
11	2462	16.39	15.51	79.114	18.98

802.11n (HT20)

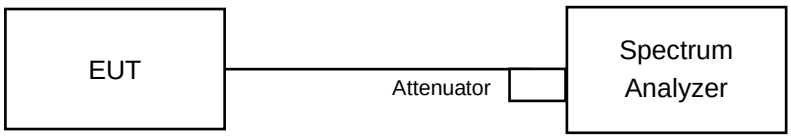
Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.1	14.67	61.66	17.90
6	2437	16.68	16.05	86.831	19.39
11	2462	16.13	15.74	78.517	18.95

4.4 Power Spectral Density Measurement

4.4.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

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 Procedure

a. Set analyzer center frequency to DTS channel center frequency.
b. Set the span to 1.5 times the DTS bandwidth.
c. Set the RBW to: 3 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × RBW.
e. Detector = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.2.6

4.4.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-1.27	3.01	1.74	8	Pass
	6	2437	-2.30	3.01	0.71	8	Pass
	11	2462	-2.19	3.01	0.82	8	Pass
1	1	2412	-2.34	3.01	0.67	8	Pass
	6	2437	-2.43	3.01	0.58	8	Pass
	11	2462	-3.10	3.01	-0.09	8	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 4.08dBi < 6dBi , so the power density limit shall not be reduced.

802.11g

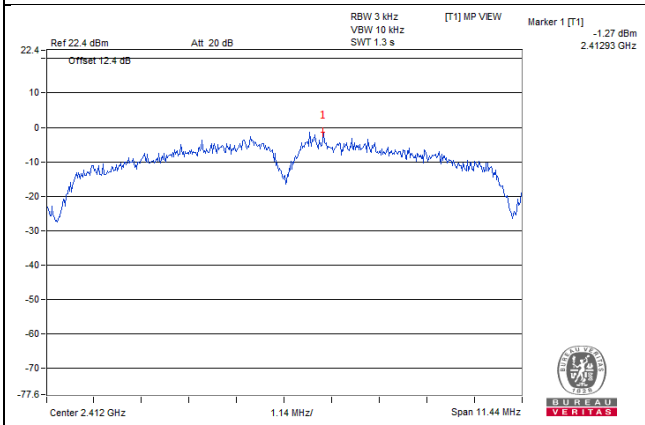
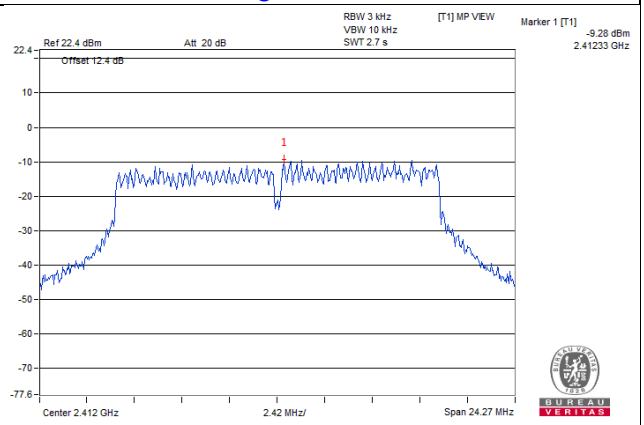
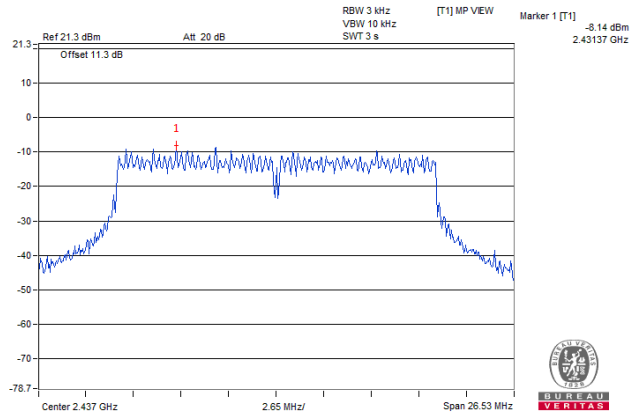
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-9.28	3.01	-6.27	8	Pass
	6	2437	-8.70	3.01	-5.69	8	Pass
	11	2462	-8.83	3.01	-5.82	8	Pass
1	1	2412	-9.79	3.01	-6.78	8	Pass
	6	2437	-8.85	3.01	-5.84	8	Pass
	11	2462	-9.41	3.01	-6.40	8	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 4.08dBi < 6dBi , so the power density limit shall not be reduced.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-9.32	3.01	-6.31	8	Pass
	6	2437	-8.82	3.01	-5.81	8	Pass
	11	2462	-9.04	3.01	-6.03	8	Pass
1	1	2412	-10.68	3.01	-7.67	8	Pass
	6	2437	-8.14	3.01	-5.13	8	Pass
	11	2462	-9.22	3.01	-6.21	8	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20})^2$ / 2] = 4.08dBi < 6dBi , so the power density limit shall not be reduced.

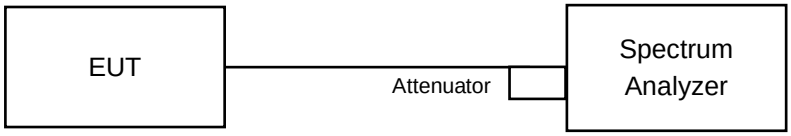
Spectrum Plot of Worst Value	
802.11b_Chain 0 / CH1	**802.11g_Chain 0 / CH6**
	
802.11n (HT20)_Chain 1 / CH6	
	

4.5 Conducted Out of Band Emission Measurement

4.5.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

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

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.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.2.6

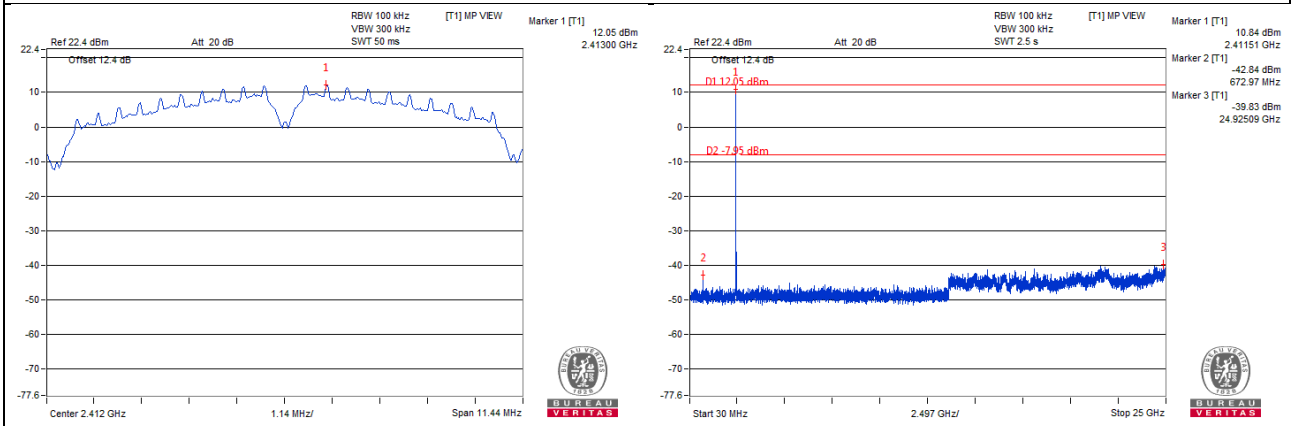
4.5.7 Test Results

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

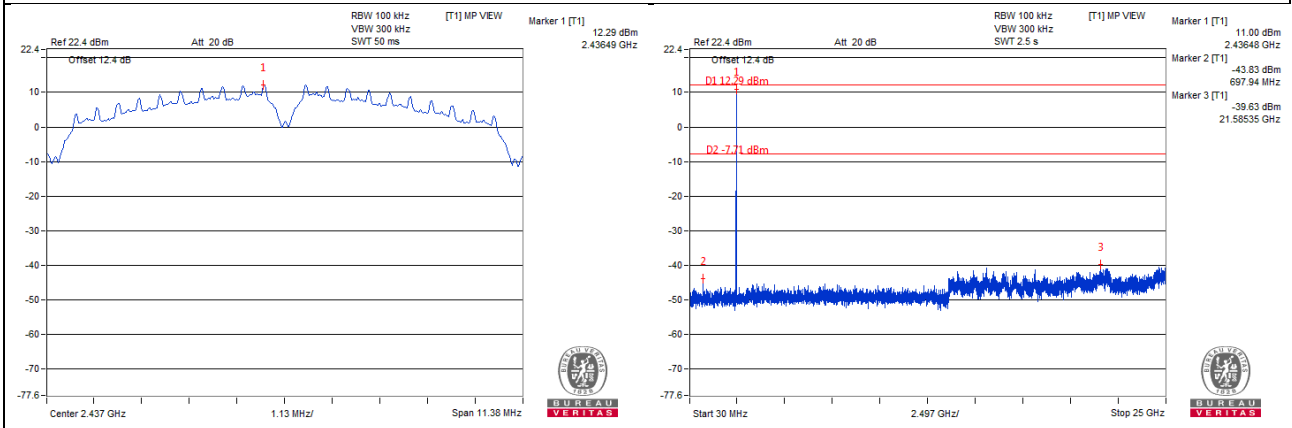
802.11b

Chain 0

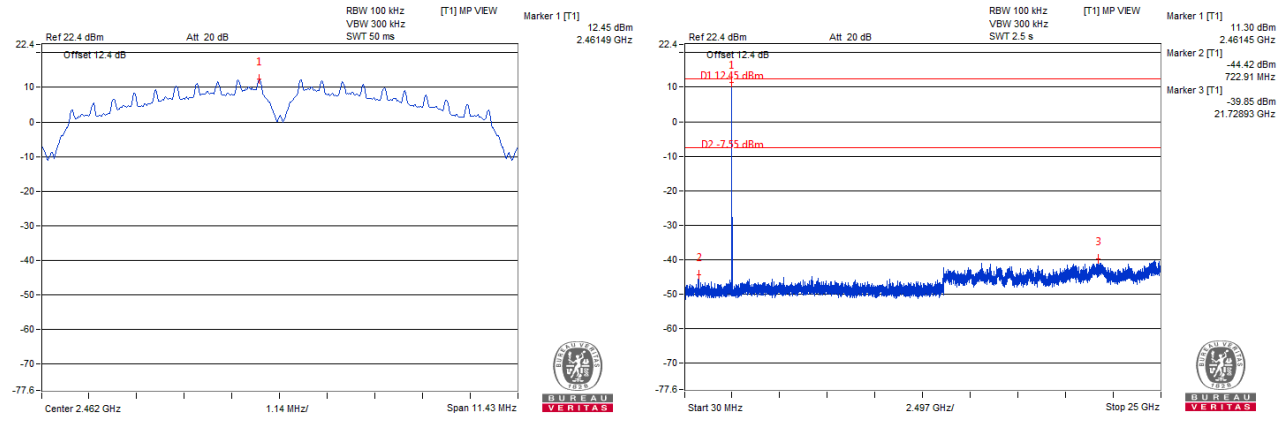
CH 1



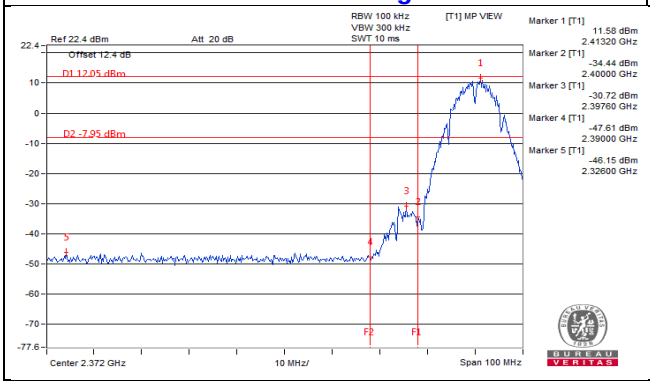
CH 6



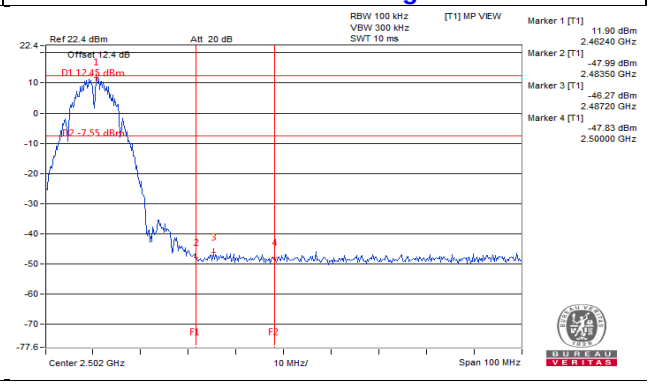
CH 11



CH 1 Band edge

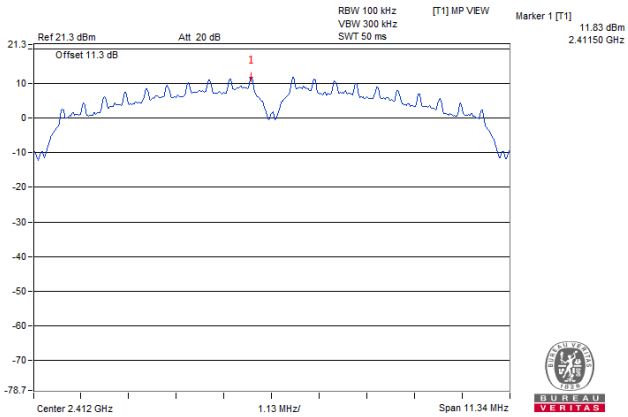


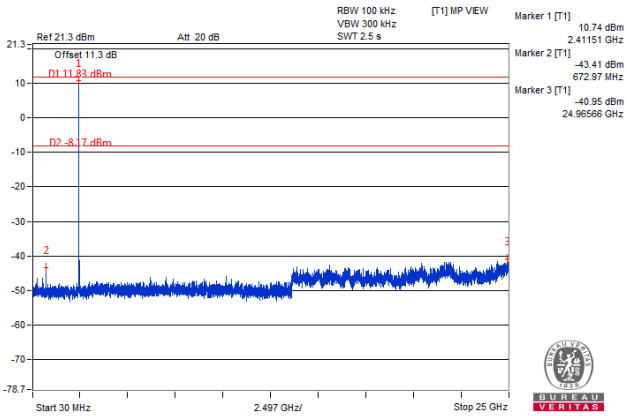
CH 11 Band edge



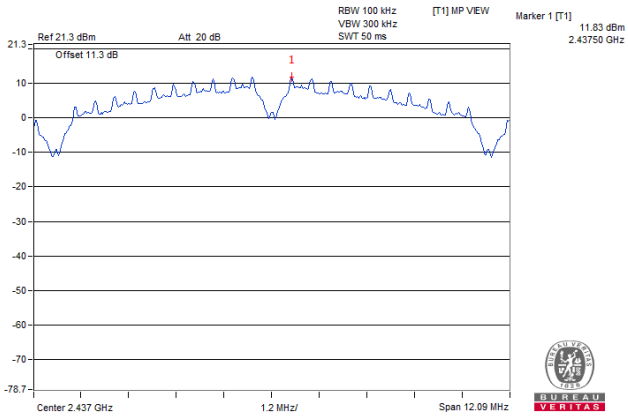
Chain 1

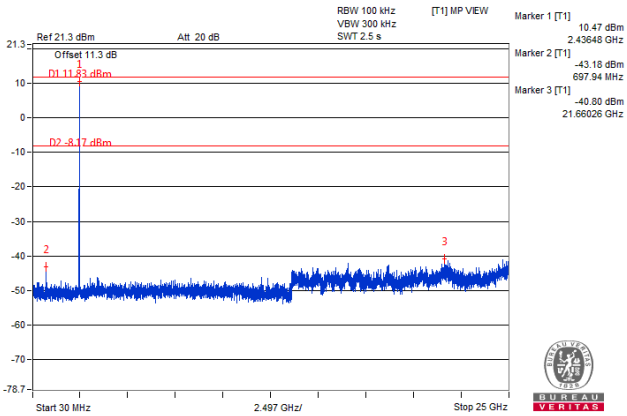
CH 1



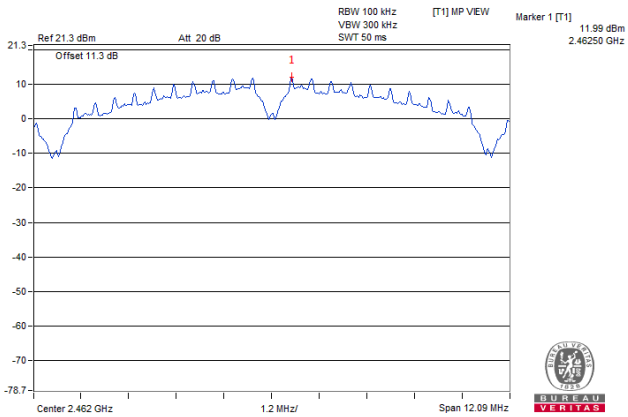


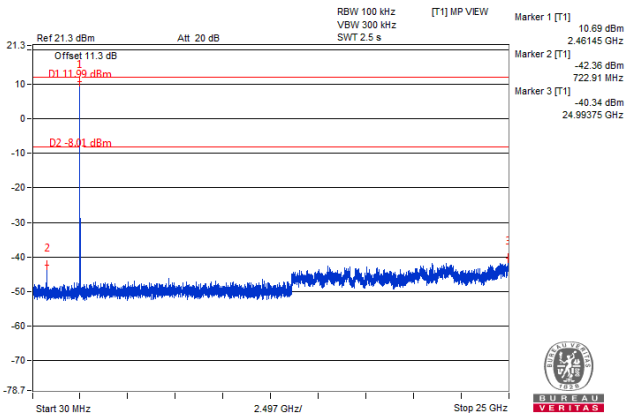
CH 6



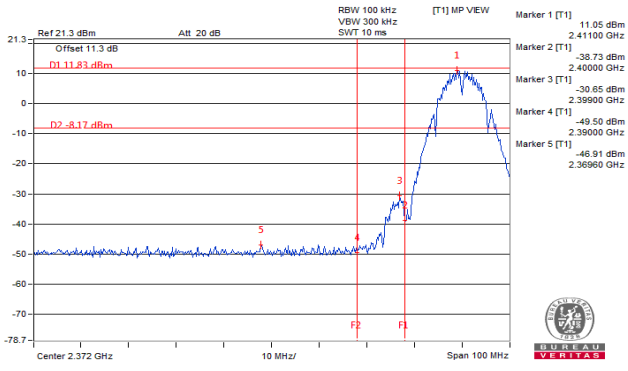


CH 11

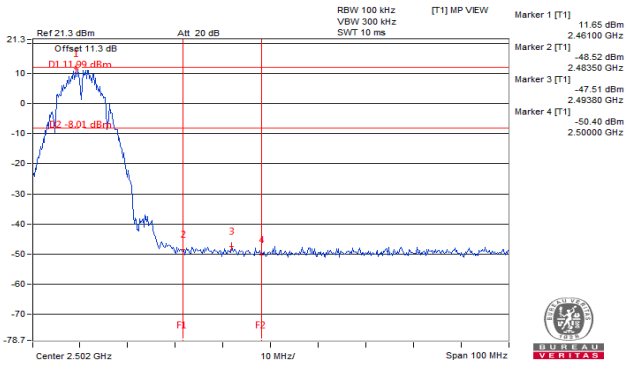




CH 1 Band edge

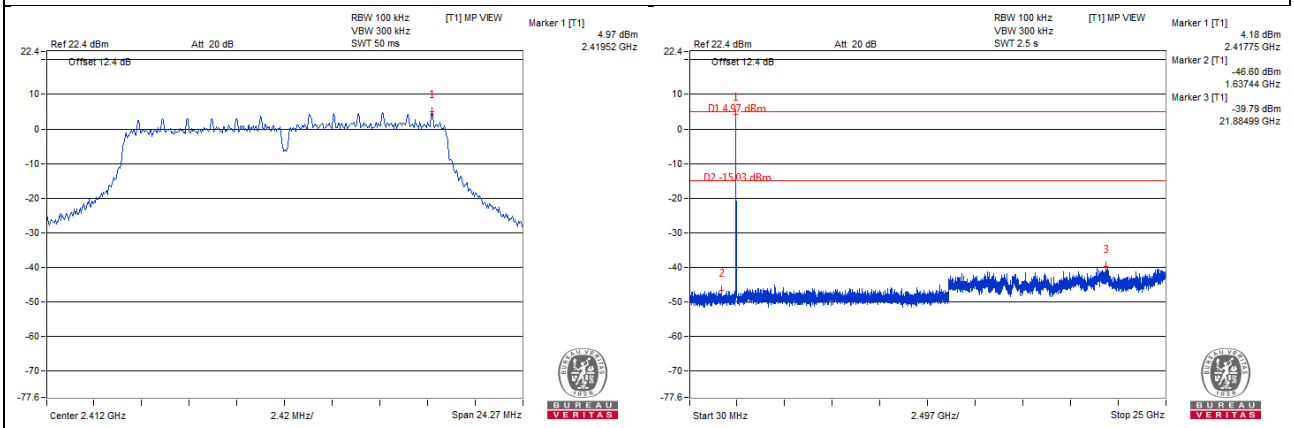


CH 11 Band edge

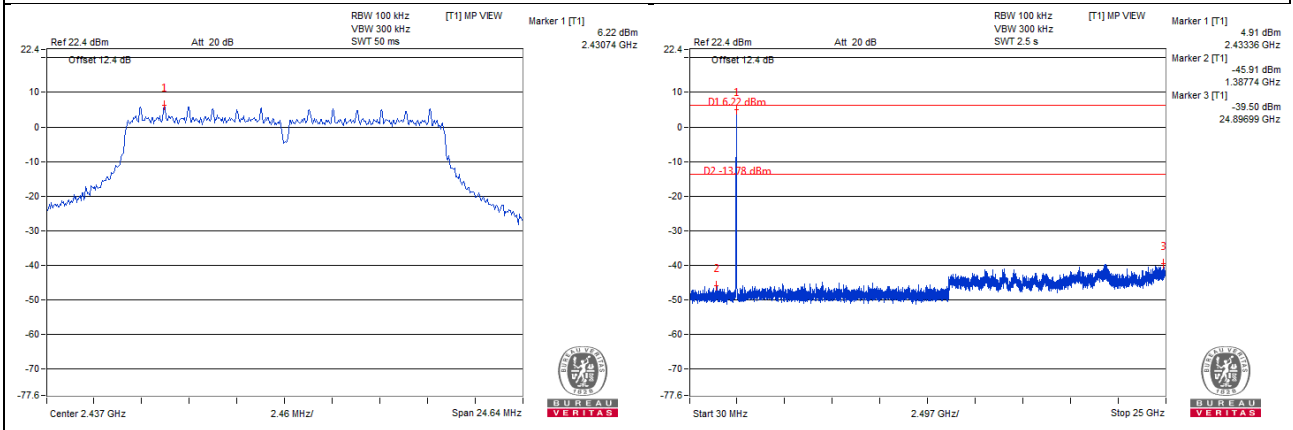


802.11g
Chain 0

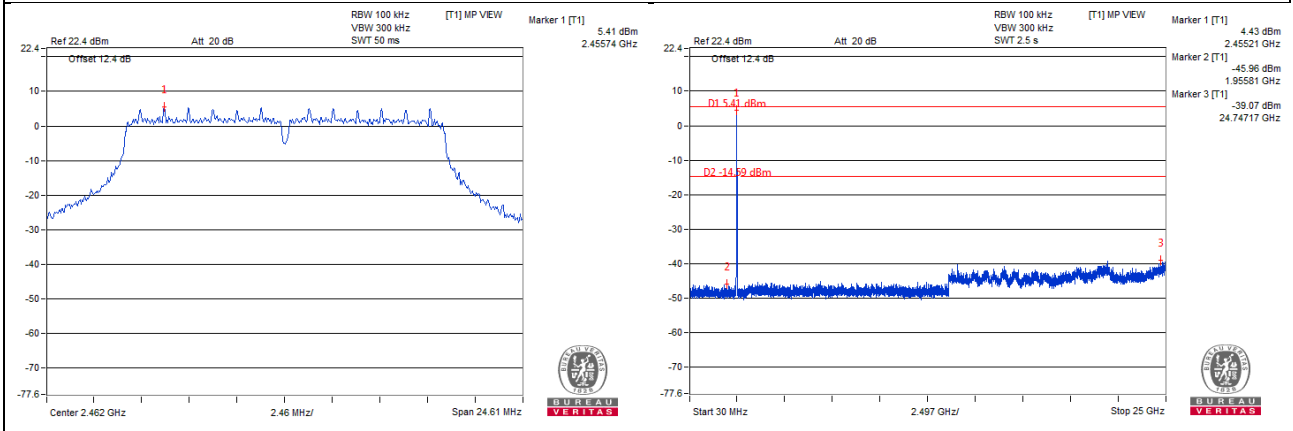
CH 1



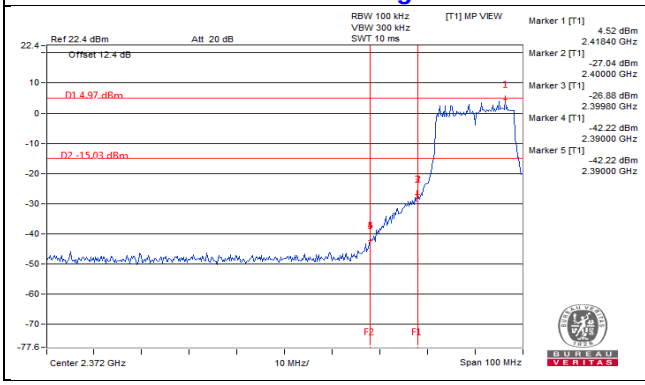
CH 6



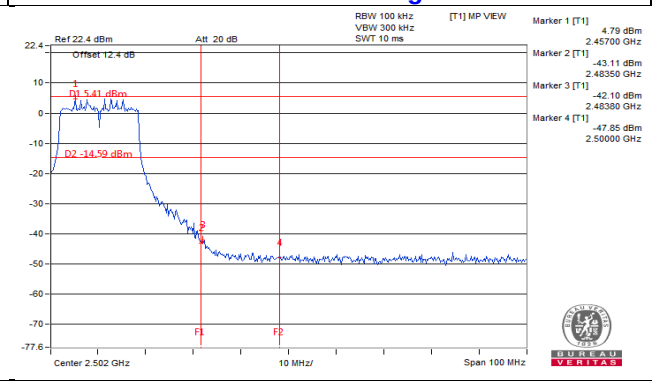
CH 11



CH 1 Band edge

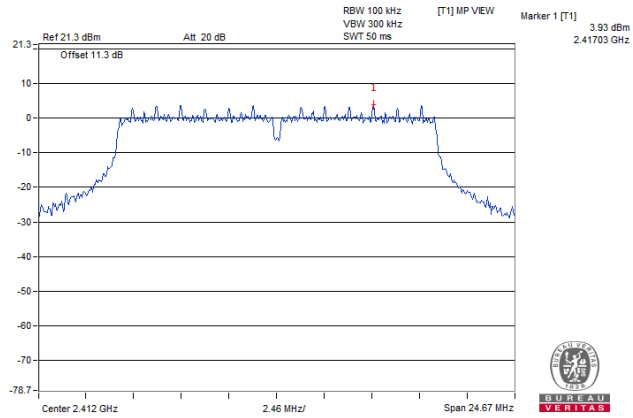


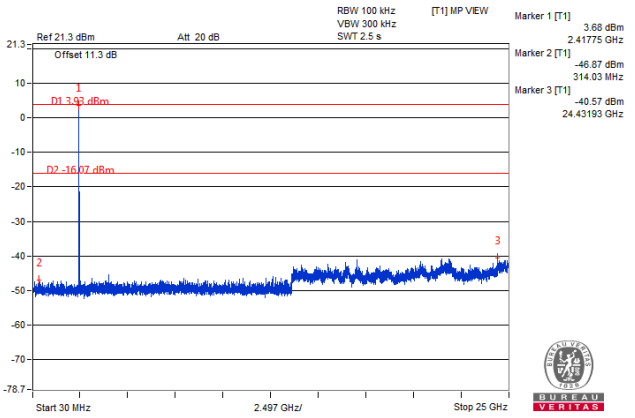
CH 11 Band edge



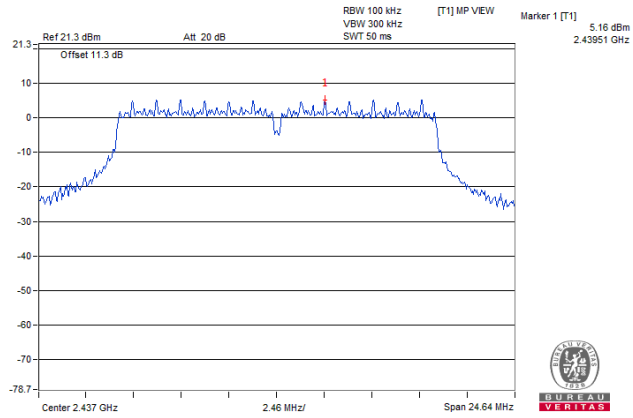
Chain 1

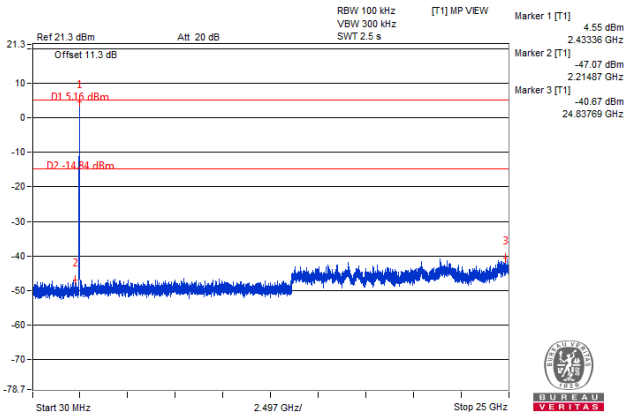
CH 1



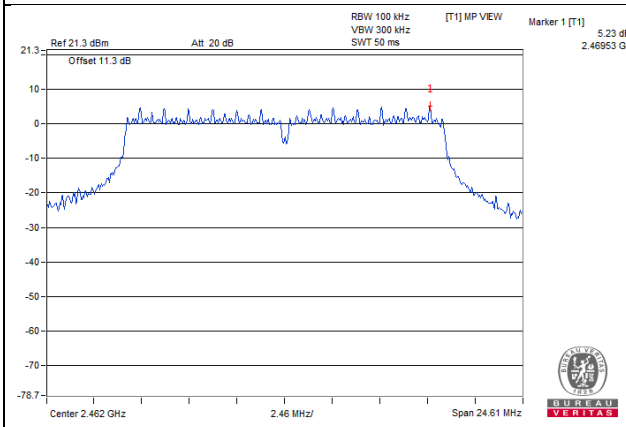


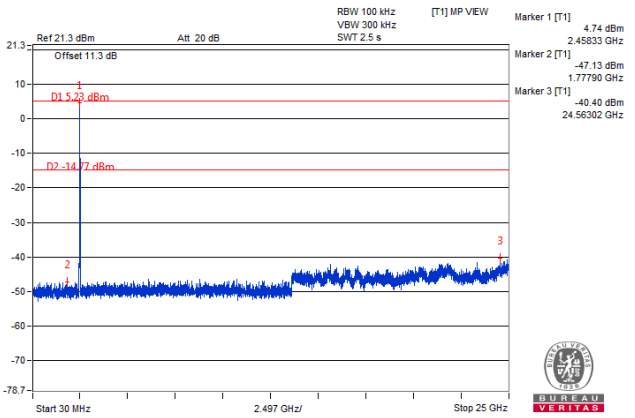
CH 6



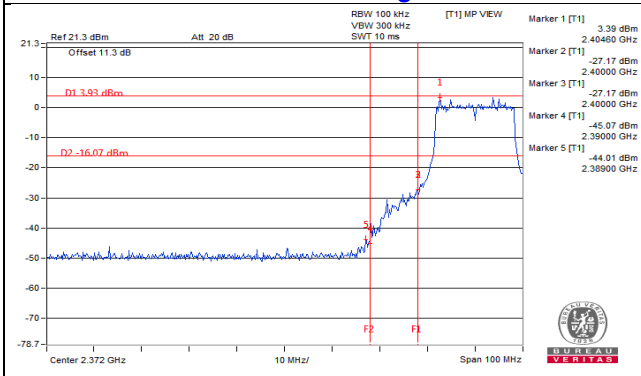


CH 11

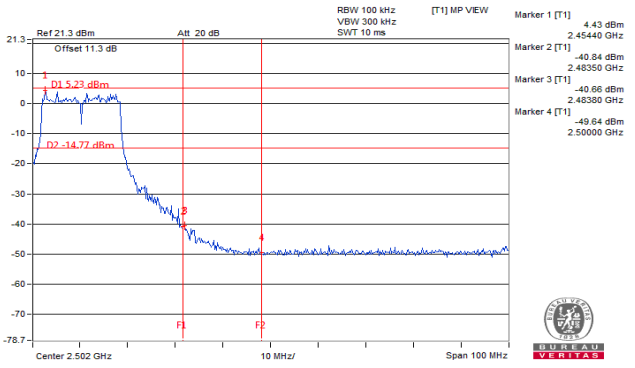




CH 1 Band edge



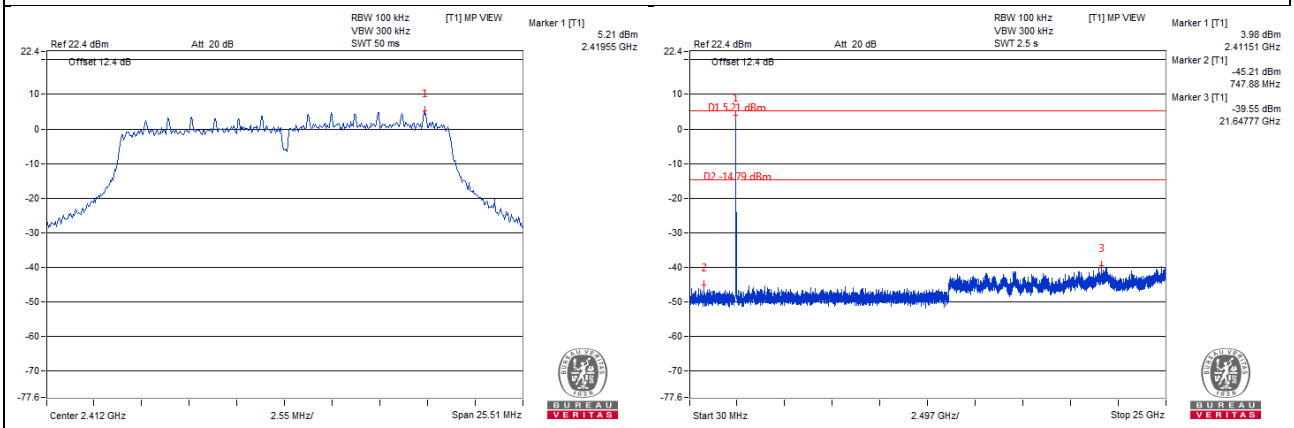
CH 11 Band edge



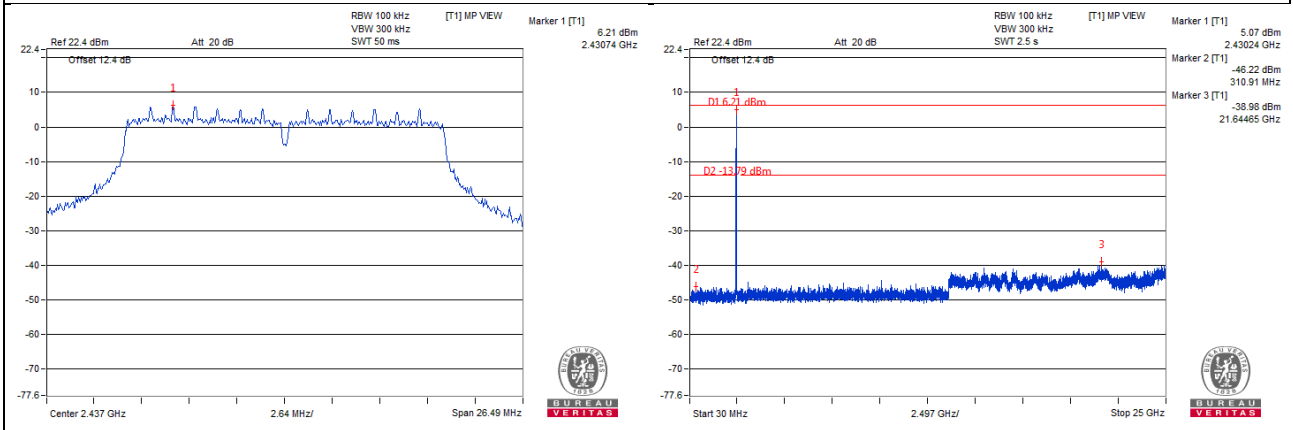
802.11n (HT20)

Chain 0

CH 1



CH 6



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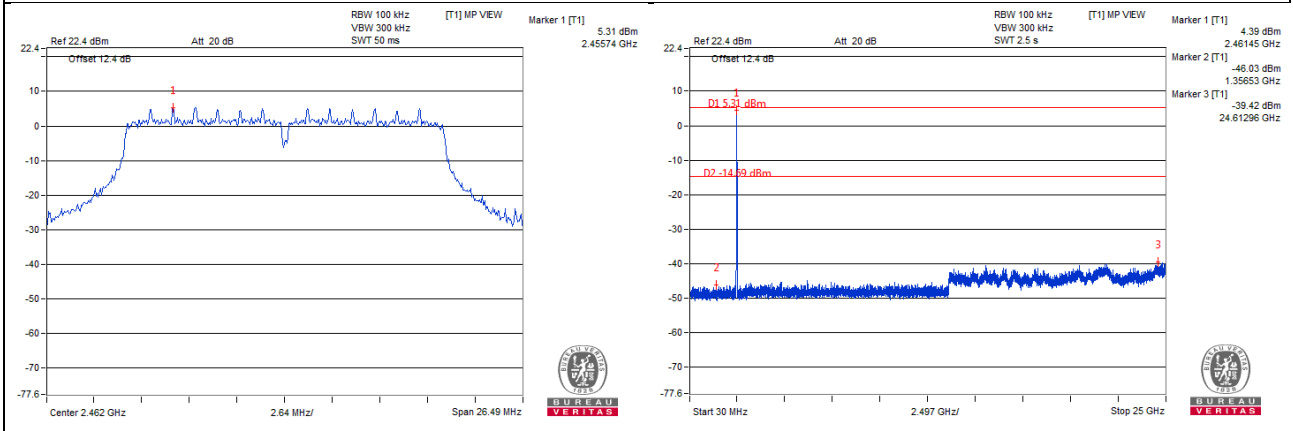
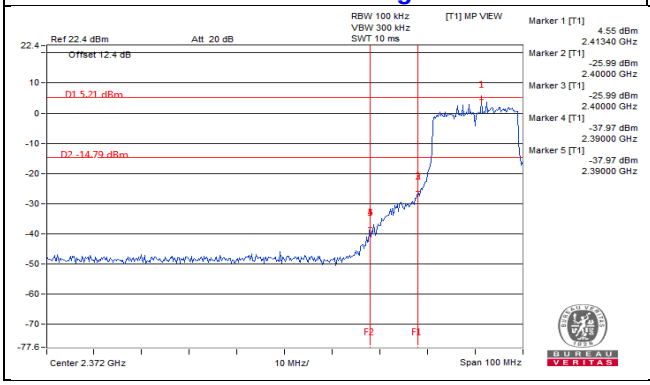
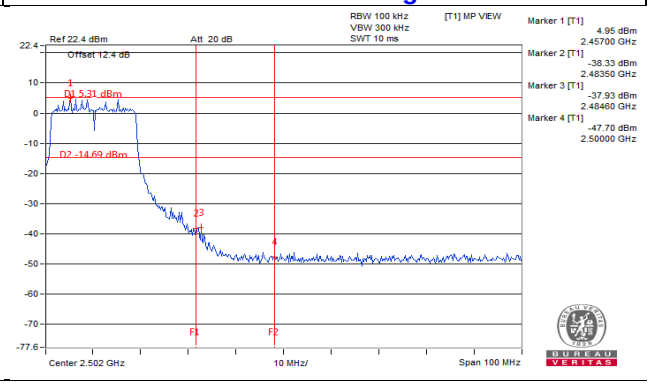


CH 1 Band edge

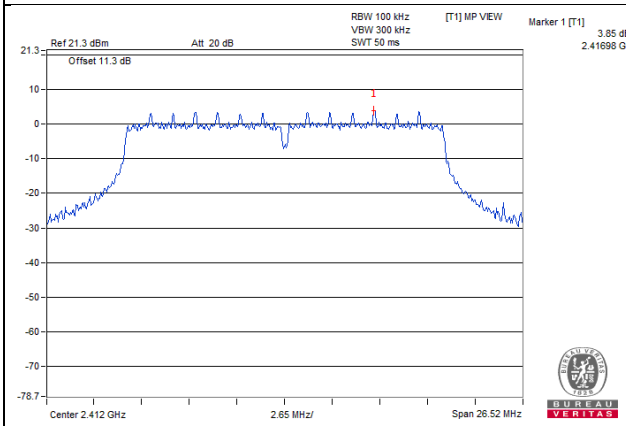


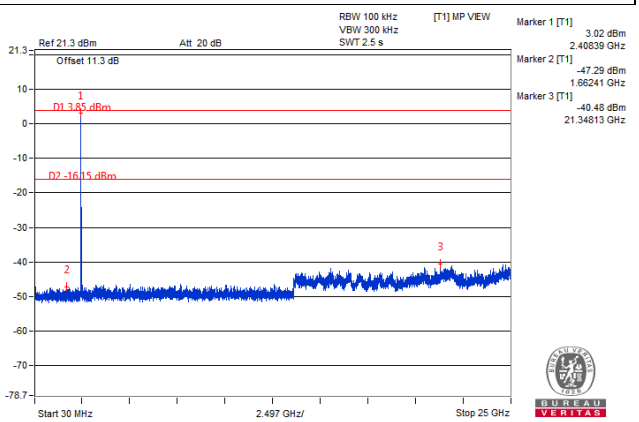
CH 11 Band edge



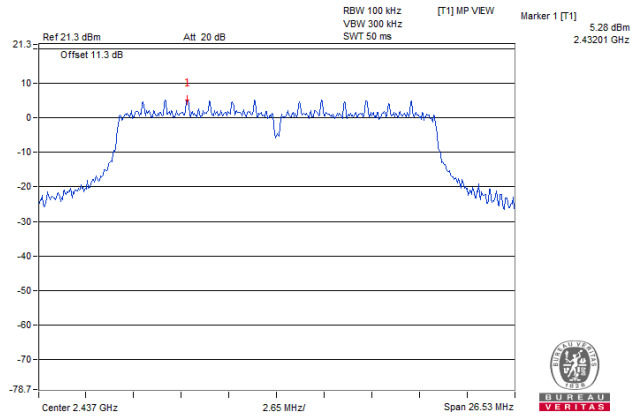
Chain 1

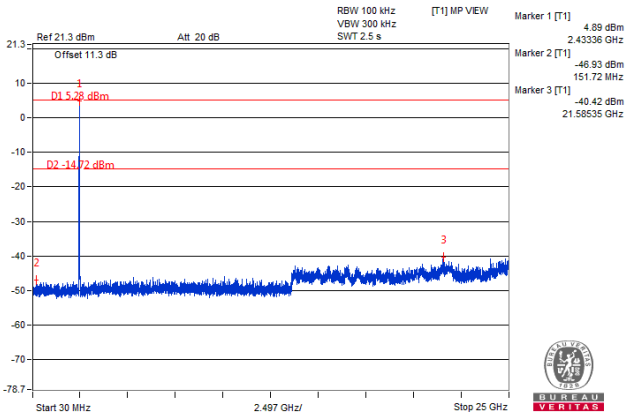
CH 1



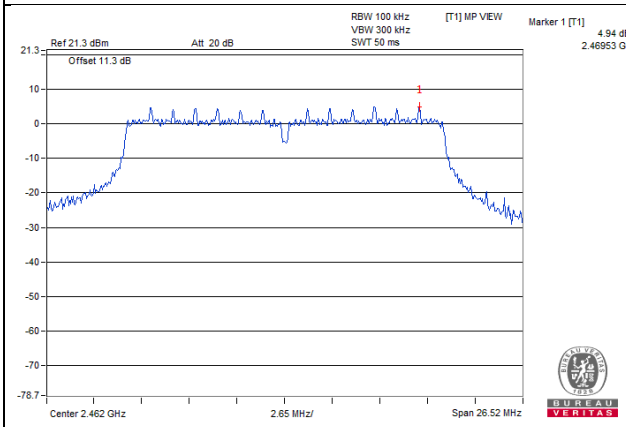


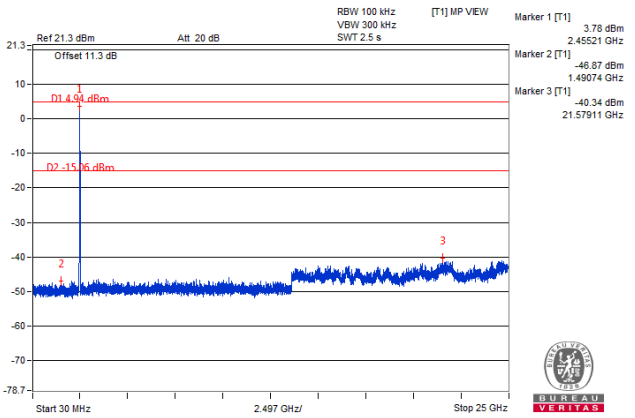
CH 6



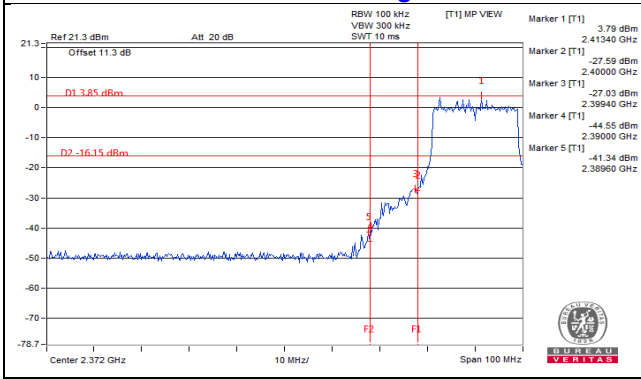


CH 11

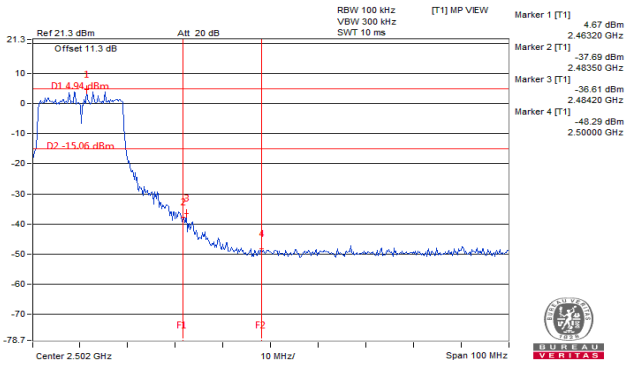




CH 1 Band edge



CH 11 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 according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

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

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