FCC Test Report

Report No.:	RF181026E06
FCC ID:	TLZ-CU345
Test Model:	AW-CU345
Received Date:	Oct. 26, 2018
Test Date:	Nov. 07 to 12, 2018
Issued Date:	Dec. 03, 2018
Applicant:	AzureWave Technologies, Inc.
Address:	8F., No.94, Baozhong Rd. , Xindian Dist., New Taipei City , Taiwan 231
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
RF181026E06	Original release.	Dec. 03, 2018

1 Certificate of Conformity

Product:	IEEE 802.11 b/g/n + Bluetooth 5.0 LE WLAN/BT Microcontroller Module
Brand:	AzureWave
Test Model:	AW-CU345
Sample Status:	ENGINEERING SAMPLE
Applicant:	AzureWave Technologies, Inc.
Test Date:	Nov. 07 to 12, 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 : Mary Ko , **Date:** Dec. 03, 2018

Mary Ko / Specialist

Approved by : , **Date:** Dec. 03, 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	PASS	Meet the requirement of limit. Minimum passing margin is -12.67dB at 0.21250MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390.00MHz, 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.
-	Occupied Bandwidth Measurement	-	Reference only

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	1.84 dB
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	5.19 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	IEEE 802.11 b/g/n + Bluetooth 5.0 LE WLAN/BT Microcontroller Module
Brand	AzureWave
Test Model	AW-CU345
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 72.2Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11
Output Power	351.56mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The Flash chip of EUT has two models, please refer to the following table:

No.	Brand	Model No.
1	Winbond	W25Q32 series
2	GigaDevice	GD25Q32 series
From the above chips, **No. 1** was selected as representative model for the test except radiated emission below 1GHz and its data was recorded in this report.		

2. The antenna provided to the EUT, please refer to the following table:

Brand	Model	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
LYNwave	ALX18M-052AA2	2.81	2.4~2.5	PIFA	NA
*WLAN (2.4GHz) + BT: timely shared coexistence.					

3. The EUT incorporates a SISO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX	1RX
802.11g	6 ~ 54Mbps	1TX	1RX
802.11n (HT20)	MCS 0~7	1TX	1RX

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

3.2 **Description of Test Modes**

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

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
1	√	√	√	√	Chip No. 1
2	-	√	-	-	Chip No. 2

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**.** The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.
2. "-"means no effect.

Radiated Emission Test (Above 1GHz):

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

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

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

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.

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:

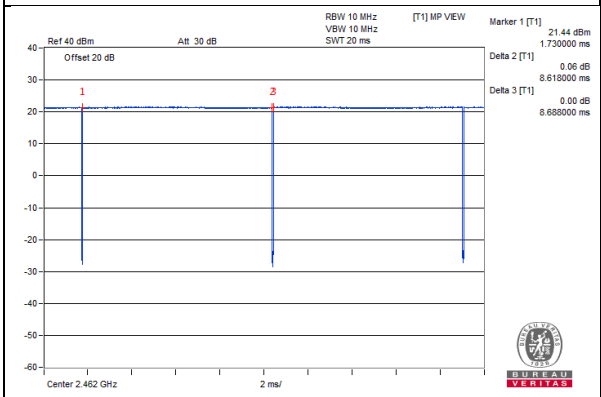
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (System)	TESTED BY
RE≥1G	22deg. C, 66%RH	120Vac, 60Hz	Frank Chuang
RE<1G	23deg. C, 70%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 **Duty Cycle of Test Signal**

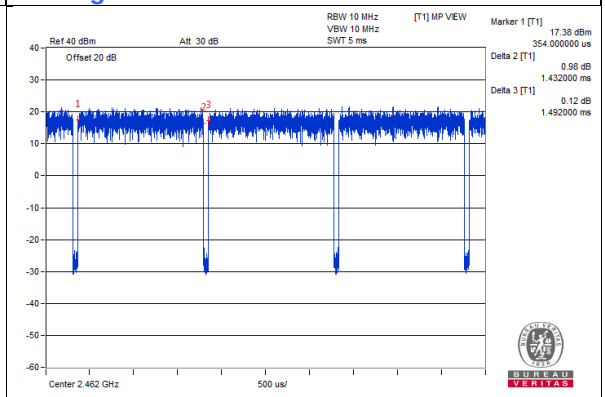
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 8.618/8.688 = 0.992
802.11g: Duty cycle = 1.432/1.492 = 0.96, Duty factor = 10 * log(1/0.96) = 0.18
802.11n (HT20): Duty cycle = 1.338/1.399 = 0.956, Duty factor = 10 * log(1/0.956) = 0.19

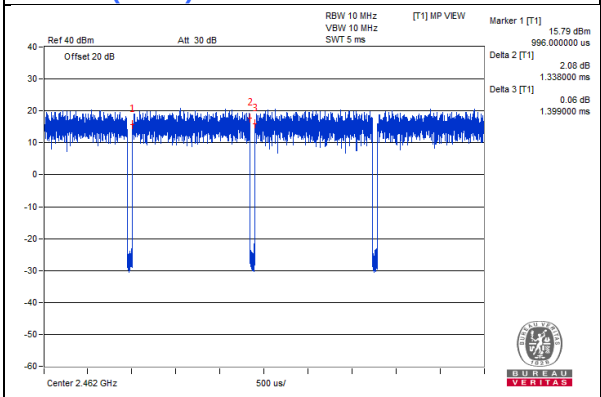
802.11b



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.

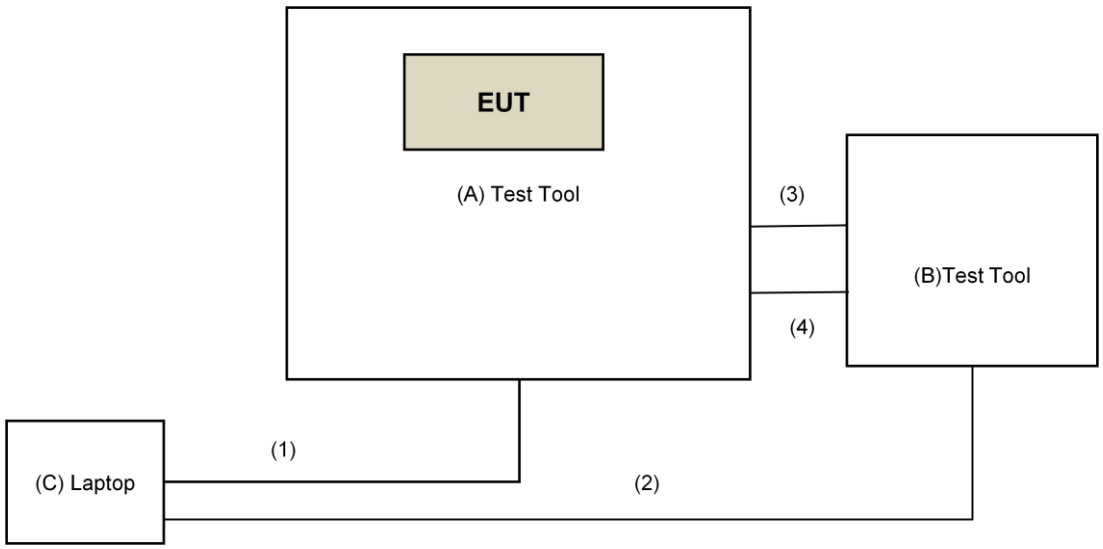
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Test Tool	AzureWave	NA	NA	NA	Supplied by client
B.	Test Tool	AzureWave	NA	NA	NA	Supplied by client
C.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1	Yes	0	Supplied by client
2.	USB Cable	1	1.8	Yes	0	Provided by Lab
3.	Signal Cable	1	0.1	No	0	Supplied by client
4.	Signal Cable	1	0.1	No	0	Supplied by client

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the 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
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: Nov. 07 to 12, 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:

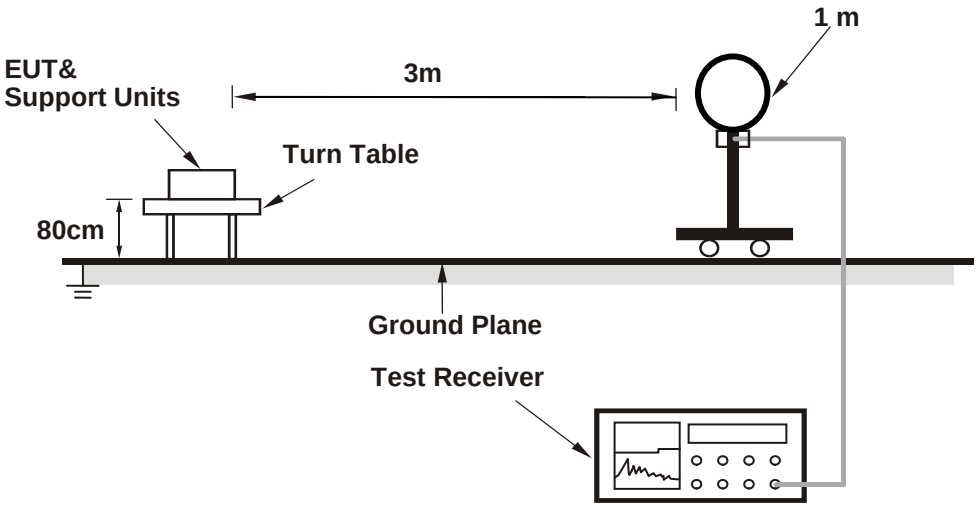
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

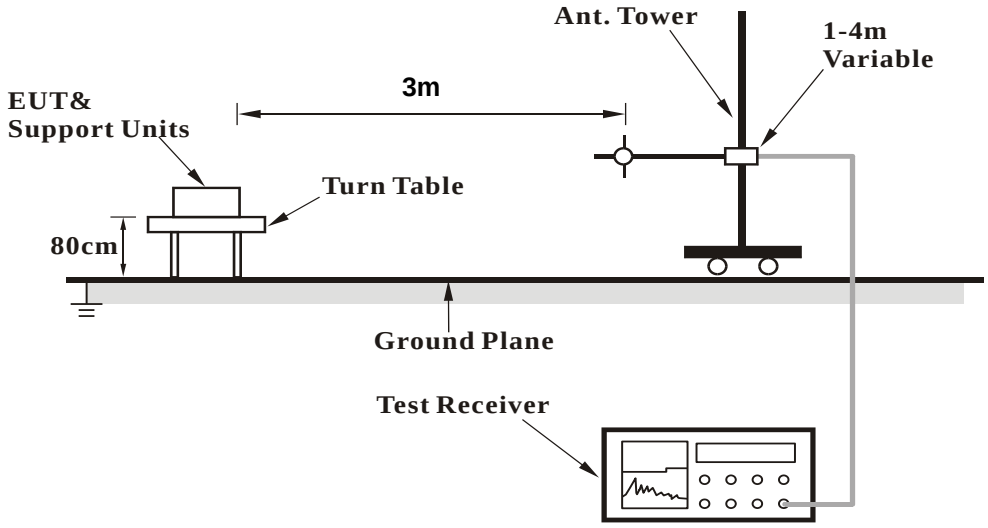
No deviation.

4.1.5 Test Setup

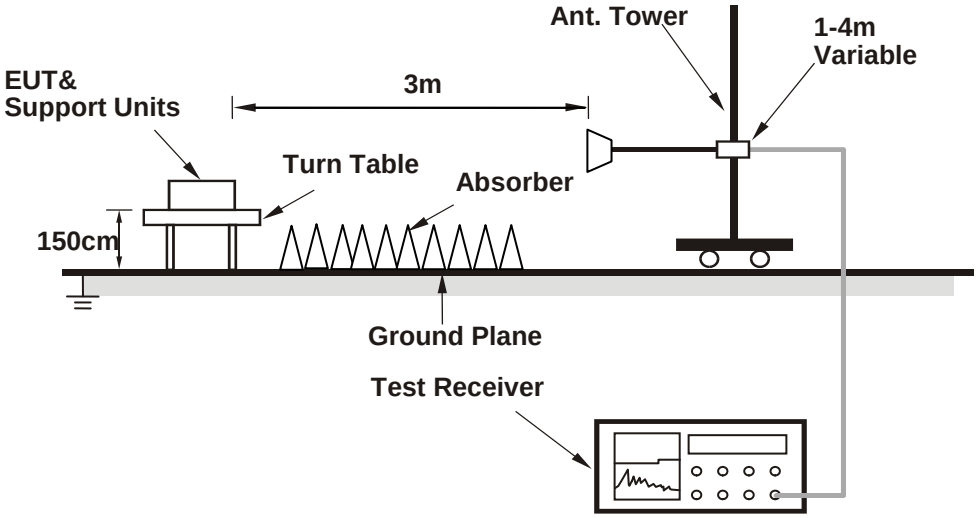
For Radiated emission below 30MHz



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 (Dut labtool (2.0.0.31)) has been activated to set the EUT on specific status.

4.1.7 Test Results (Mode 1)

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	65.5 PK	74.0	-8.5	1.24 H	319	68.2	-2.7
2	2390.00	53.5 AV	54.0	-0.5	1.24 H	319	56.2	-2.7
3	*2412.00	110.1 PK			1.24 H	319	112.8	-2.7
4	*2412.00	107.8 AV			1.24 H	319	110.5	-2.7
5	4824.00	54.4 PK	74.0	-19.6	1.49 H	242	52.8	1.6
6	4824.00	52.2 AV	54.0	-1.8	1.49 H	242	50.6	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	66.6 PK	74.0	-7.4	4.00 V	290	69.3	-2.7
2	2390.00	50.1 AV	54.0	-3.9	4.00 V	290	52.8	-2.7
3	*2412.00	107.4 PK			4.00 V	290	110.1	-2.7
4	*2412.00	104.9 AV			4.00 V	290	107.6	-2.7
5	4824.00	50.1 PK	74.0	-23.9	1.01 V	15	48.5	1.6
6	4824.00	47.8 AV	54.0	-6.2	1.01 V	15	46.2	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	55.8 PK	74.0	-18.2	1.22 H	314	58.5	-2.7
2	2390.00	43.5 AV	54.0	-10.5	1.22 H	314	46.2	-2.7
3	*2437.00	110.3 PK			1.22 H	314	113.3	-3.0
4	*2437.00	107.9 AV			1.22 H	314	110.9	-3.0
5	2483.50	58.5 PK	74.0	-15.5	1.22 H	314	61.5	-3.0
6	2483.50	43.4 AV	54.0	-10.6	1.22 H	314	46.4	-3.0
7	4874.00	52.3 PK	74.0	-21.7	1.51 H	238	50.7	1.6
8	4874.00	50.4 AV	54.0	-3.6	1.51 H	238	48.8	1.6
9	7311.00	57.5 PK	74.0	-16.5	1.05 H	280	49.8	7.7
10	7311.00	53.3 AV	54.0	-0.7	1.05 H	280	45.6	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	52.1 PK	74.0	-21.9	3.94 V	305	54.8	-2.7
2	2390.00	39.6 AV	54.0	-14.4	3.94 V	305	42.3	-2.7
3	*2437.00	107.1 PK			3.94 V	305	110.1	-3.0
4	*2437.00	104.8 AV			3.94 V	305	107.8	-3.0
5	2483.50	51.8 PK	74.0	-22.2	3.94 V	305	54.8	-3.0
6	2483.50	39.6 AV	54.0	-14.4	3.94 V	305	42.6	-3.0
7	4874.00	50.4 PK	74.0	-23.6	1.02 V	2	48.8	1.6
8	4874.00	48.1 AV	54.0	-5.9	1.02 V	2	46.5	1.6
9	7311.00	52.7 PK	74.0	-21.3	3.18 V	163	45.0	7.7
10	7311.00	49.6 AV	54.0	-4.4	3.18 V	163	41.9	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	108.4 PK			1.23 H	321	111.4	-3.0
2	*2462.00	106.1 AV			1.23 H	321	109.1	-3.0
3	2483.50	66.4 PK	74.0	-7.6	1.23 H	321	69.4	-3.0
4	2483.50	53.6 AV	54.0	-0.4	1.23 H	321	56.6	-3.0
5	4924.00	52.3 PK	74.0	-21.7	1.54 H	234	50.6	1.7
6	4924.00	50.2 AV	54.0	-3.8	1.54 H	234	48.5	1.7
7	7386.00	57.2 PK	74.0	-16.8	1.07 H	288	49.3	7.9
8	7386.00	52.9 AV	54.0	-1.1	1.07 H	288	45.0	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	105.5 PK			3.99 V	297	108.5	-3.0
2	*2462.00	103.4 AV			3.99 V	297	106.4	-3.0
3	2483.50	63.1 PK	74.0	-10.9	3.99 V	297	66.1	-3.0
4	2483.50	50.7 AV	54.0	-3.3	3.99 V	297	53.7	-3.0
5	4924.00	50.4 PK	74.0	-23.6	1.00 V	15	48.7	1.7
6	4924.00	48.2 AV	54.0	-5.8	1.00 V	15	46.5	1.7
7	7386.00	52.7 PK	74.0	-21.3	3.17 V	150	44.8	7.9
8	7386.00	49.8 AV	54.0	-4.2	3.17 V	150	41.9	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.

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	69.3 PK	74.0	-4.7	1.25 H	317	72.0	-2.7
2	2390.00	53.5 AV	54.0	-0.5	1.25 H	317	56.2	-2.7
3	*2412.00	108.3 PK			1.25 H	317	111.0	-2.7
4	*2412.00	98.0 AV			1.25 H	317	100.7	-2.7
5	4824.00	42.8 PK	74.0	-31.2	1.55 H	53	41.2	1.6
6	4824.00	34.5 AV	54.0	-19.5	1.55 H	53	32.9	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	66.5 PK	74.0	-7.5	3.98 V	293	69.2	-2.7
2	2390.00	50.3 AV	54.0	-3.7	3.98 V	293	53.0	-2.7
3	*2412.00	105.1 PK			3.98 V	293	107.8	-2.7
4	*2412.00	94.8 AV			3.98 V	293	97.5	-2.7
5	4824.00	43.5 PK	74.0	-30.5	1.80 V	215	41.9	1.6
6	4824.00	34.5 AV	54.0	-19.5	1.80 V	215	32.9	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	63.5 PK	74.0	-10.5	1.26 H	315	66.2	-2.7
2	2390.00	48.8 AV	54.0	-5.2	1.26 H	315	51.5	-2.7
3	*2437.00	113.0 PK			1.26 H	315	116.0	-3.0
4	*2437.00	103.5 AV			1.26 H	315	106.5	-3.0
5	2483.50	71.9 PK	74.0	-2.1	1.26 H	315	74.9	-3.0
6	2483.50	53.8 AV	54.0	-0.2	1.26 H	315	56.8	-3.0
7	4874.00	45.8 PK	74.0	-28.2	1.56 H	23	44.2	1.6
8	4874.00	36.6 AV	54.0	-17.4	1.56 H	23	35.0	1.6
9	7311.00	63.8 PK	74.0	-10.2	1.24 H	147	56.1	7.7
10	7311.00	49.3 AV	54.0	-4.7	1.24 H	147	41.6	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	59.7 PK	74.0	-14.3	3.96 V	287	62.4	-2.7
2	2390.00	44.1 AV	54.0	-9.9	3.96 V	287	46.8	-2.7
3	*2437.00	109.8 PK			3.96 V	287	112.8	-3.0
4	*2437.00	100.2 AV			3.96 V	287	103.2	-3.0
5	2483.50	66.3 PK	74.0	-7.7	3.96 V	287	69.3	-3.0
6	2483.50	49.9 AV	54.0	-4.1	3.96 V	287	52.9	-3.0
7	4874.00	43.3 PK	74.0	-30.7	1.76 V	208	41.7	1.6
8	4874.00	34.5 AV	54.0	-19.5	1.76 V	208	32.9	1.6
9	7311.00	57.2 PK	74.0	-16.8	1.21 V	262	49.5	7.7
10	7311.00	43.5 AV	54.0	-10.5	1.21 V	262	35.8	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	107.4 PK			1.24 H	316	110.4	-3.0
2	*2462.00	97.2 AV			1.24 H	316	100.2	-3.0
3	2483.50	69.4 PK	74.0	-4.6	1.24 H	316	72.4	-3.0
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.24 H**	**316**	**56.9**	**-3.0**
5	4924.00	42.7 PK	74.0	-31.3	1.52 H	38	41.0	1.7
6	4924.00	34.2 AV	54.0	-19.8	1.52 H	38	32.5	1.7
7	7386.00	57.0 PK	74.0	-17.0	1.20 H	133	49.1	7.9
8	7386.00	43.4 AV	54.0	-10.6	1.20 H	133	35.5	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	104.5 PK			3.95 V	289	107.5	-3.0
2	*2462.00	94.1 AV			3.95 V	289	97.1	-3.0
3	2483.50	65.8 PK	74.0	-8.2	3.95 V	289	68.8	-3.0
4	2483.50	49.9 AV	54.0	-4.1	3.95 V	289	52.9	-3.0
5	4924.00	43.1 PK	74.0	-30.9	1.72 V	218	41.4	1.7
6	4924.00	34.4 AV	54.0	-19.6	1.72 V	218	32.7	1.7
7	7386.00	56.8 PK	74.0	-17.2	1.23 V	266	48.9	7.9
8	7386.00	43.4 AV	54.0	-10.6	1.23 V	266	35.5	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	70.4 PK	74.0	-3.6	1.24 H	325	73.1	-2.7
2	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.24 H**	**325**	**56.6**	**-2.7**
3	*2412.00	105.8 PK			1.24 H	325	108.5	-2.7
4	*2412.00	96.6 AV			1.24 H	325	99.3	-2.7
5	4824.00	42.8 PK	74.0	-31.2	1.50 H	49	41.2	1.6
6	4824.00	34.1 AV	54.0	-19.9	1.50 H	49	32.5	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	66.1 PK	74.0	-7.9	3.99 V	311	68.8	-2.7
2	2390.00	49.8 AV	54.0	-4.2	3.99 V	311	52.5	-2.7
3	*2412.00	102.9 PK			3.99 V	311	105.6	-2.7
4	*2412.00	93.5 AV			3.99 V	311	96.2	-2.7
5	4824.00	43.8 PK	74.0	-30.2	1.78 V	222	42.2	1.6
6	4824.00	35.0 AV	54.0	-19.0	1.78 V	222	33.4	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	63.1 PK	74.0	-10.9	1.26 H	323	65.8	-2.7
2	2390.00	48.7 AV	54.0	-5.3	1.26 H	323	51.4	-2.7
3	*2437.00	111.8 PK			1.26 H	323	114.8	-3.0
4	*2437.00	102.5 AV			1.26 H	323	105.5	-3.0
5	2483.50	72.2 PK	74.0	-1.8	1.26 H	323	75.2	-3.0
6	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.26 H**	**323**	**56.9**	**-3.0**
7	4874.00	46.1 PK	74.0	-27.9	1.56 H	16	44.5	1.6
8	4874.00	36.7 AV	54.0	-17.3	1.56 H	16	35.1	1.6
9	7311.00	64.4 PK	74.0	-9.6	1.28 H	156	56.7	7.7
10	7311.00	49.7 AV	54.0	-4.3	1.28 H	156	42.0	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	59.8 PK	74.0	-14.2	3.93 V	296	62.5	-2.7
2	2390.00	44.2 AV	54.0	-9.8	3.93 V	296	46.9	-2.7
3	*2437.00	108.8 PK			3.93 V	296	111.8	-3.0
4	*2437.00	99.4 AV			3.93 V	296	102.4	-3.0
5	2483.50	65.8 PK	74.0	-8.2	3.93 V	296	68.8	-3.0
6	2483.50	49.8 AV	54.0	-4.2	3.93 V	296	52.8	-3.0
7	4874.00	43.0 PK	74.0	-31.0	1.82 V	202	41.4	1.6
8	4874.00	34.3 AV	54.0	-19.7	1.82 V	202	32.7	1.6
9	7311.00	57.0 PK	74.0	-17.0	1.25 V	264	49.3	7.7
10	7311.00	43.4 AV	54.0	-10.6	1.25 V	264	35.7	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	107.3 PK			1.22 H	322	110.3	-3.0
2	*2462.00	97.2 AV			1.22 H	322	100.2	-3.0
3	2483.50	69.9 PK	74.0	-4.1	1.22 H	322	72.9	-3.0
4	2483.50	53.8 AV	54.0	-0.2	1.22 H	322	56.8	-3.0
5	4924.00	42.3 PK	74.0	-31.7	1.50 H	39	40.6	1.7
6	4924.00	33.9 AV	54.0	-20.1	1.50 H	39	32.2	1.7
7	7386.00	56.9 PK	74.0	-17.1	1.25 H	123	49.0	7.9
8	7386.00	43.1 AV	54.0	-10.9	1.25 H	123	35.2	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	104.3 PK			3.93 V	299	107.3	-3.0
2	*2462.00	94.1 AV			3.93 V	299	97.1	-3.0
3	2483.50	66.3 PK	74.0	-7.7	3.93 V	299	69.3	-3.0
4	2483.50	50.1 AV	54.0	-3.9	3.93 V	299	53.1	-3.0
5	4924.00	43.0 PK	74.0	-31.0	1.79 V	195	41.3	1.7
6	4924.00	34.2 AV	54.0	-19.8	1.79 V	195	32.5	1.7
7	7386.00	56.8 PK	74.0	-17.2	1.15 V	270	48.9	7.9
8	7386.00	43.1 AV	54.0	-10.9	1.15 V	270	35.2	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.

Below 1GHz Data:

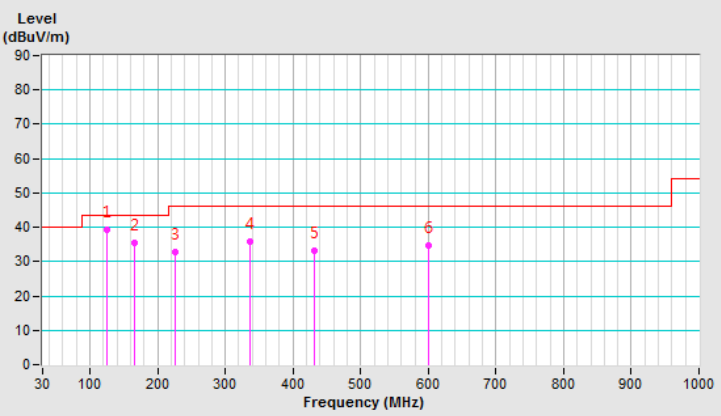
802.11g

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	125.06	39.2 QP	43.5	-4.3	2.00 H	302	48.5	-9.3
2	165.80	35.5 QP	43.5	-8.0	1.00 H	165	43.7	-8.2
3	225.94	32.9 QP	46.0	-13.1	3.00 H	142	43.6	-10.7
4	336.52	35.8 QP	46.0	-10.2	2.50 H	264	41.6	-5.8
5	431.58	33.1 QP	46.0	-12.9	1.50 H	178	36.3	-3.2
6	600.36	34.6 QP	46.0	-11.4	1.00 H	231	34.2	0.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

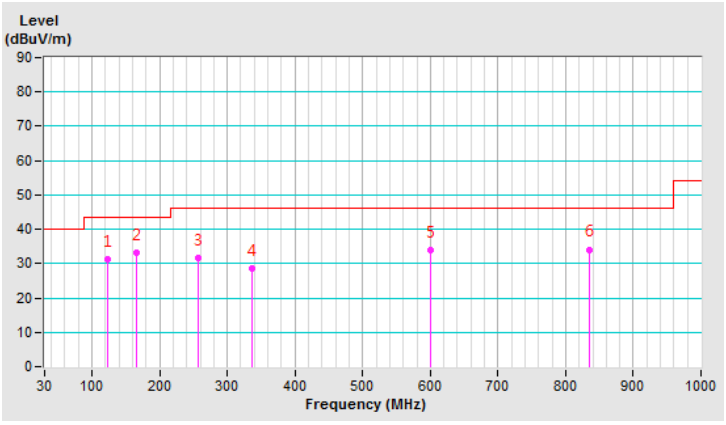


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	123.12	31.2 QP	43.5	-12.3	1.00 V	115	40.6	-9.4
2	165.80	33.1 QP	43.5	-10.4	1.00 V	302	41.3	-8.2
3	256.98	31.6 QP	46.0	-14.4	1.00 V	118	40.3	-8.7
4	336.52	28.7 QP	46.0	-17.3	1.50 V	172	34.5	-5.8
5	600.36	33.9 QP	46.0	-12.1	1.50 V	224	33.5	0.4
6	835.10	34.1 QP	46.0	-11.9	2.00 V	239	29.9	4.2

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.



4.1.8 Test Results (Mode 2)

Below 1GHz Data:

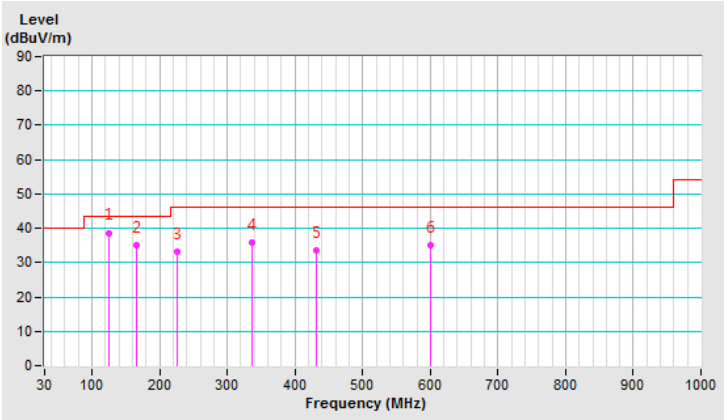
802.11g

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	125.06	38.7 QP	43.5	-4.8	1.50 H	134	48.0	-9.3
2	165.80	35.2 QP	43.5	-8.3	1.50 H	264	43.4	-8.2
3	225.94	33.3 QP	46.0	-12.7	3.00 H	241	44.0	-10.7
4	336.52	35.8 QP	46.0	-10.2	2.00 H	314	41.6	-5.8
5	431.58	33.5 QP	46.0	-12.5	1.50 H	225	36.7	-3.2
6	600.36	35.2 QP	46.0	-10.8	1.00 H	183	34.8	0.4

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – 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.

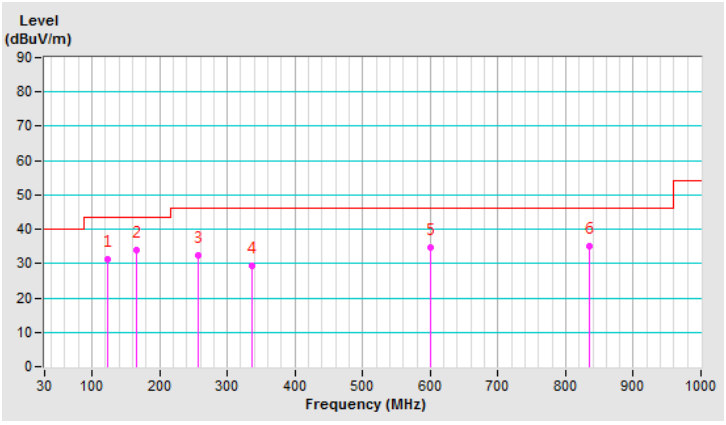


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	123.12	31.3 QP	43.5	-12.2	1.00 V	115	40.7	-9.4
2	165.80	33.9 QP	43.5	-9.6	1.00 V	143	42.1	-8.2
3	256.98	32.3 QP	46.0	-13.7	1.00 V	239	41.0	-8.7
4	336.52	29.5 QP	46.0	-16.5	1.50 V	178	35.3	-5.8
5	600.36	34.6 QP	46.0	-11.4	1.50 V	301	34.2	0.4
6	835.10	34.9 QP	46.0	-11.1	1.50 V	224	30.7	4.2

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 **Conducted Emission Measurement**

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	**MODEL NO.**	**SERIAL NO.**	**CALIBRATED DATE**	**CALIBRATED UNTIL**
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2018	Oct. 23, 2019
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 2017	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 04, 2018	June 03, 2019
50 ohms Terminator	N/A	3	Oct. 22, 2018	Oct. 21, 2019
RF Cable	5D-FB	COCCAB-001	Sep. 28, 2018	Sep. 27, 2019
Fixed attenuator EMCI	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:
1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Conduction 1.
3. Tested Date: Nov. 08, 2018

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.

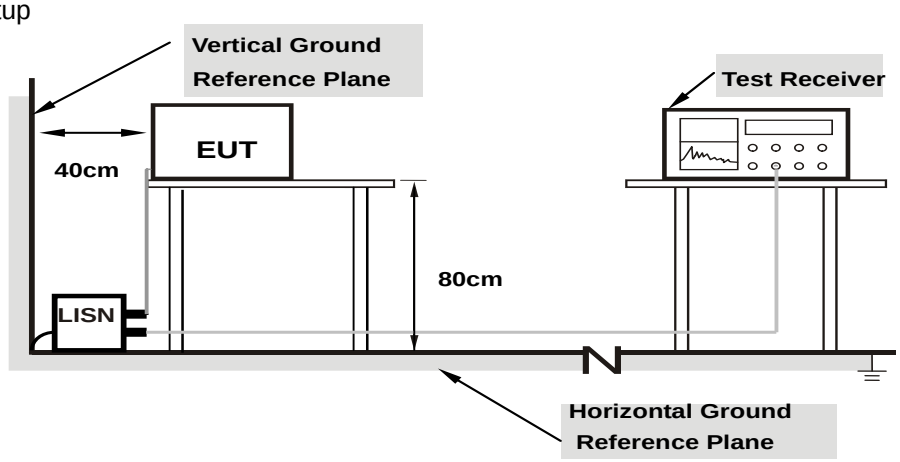
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

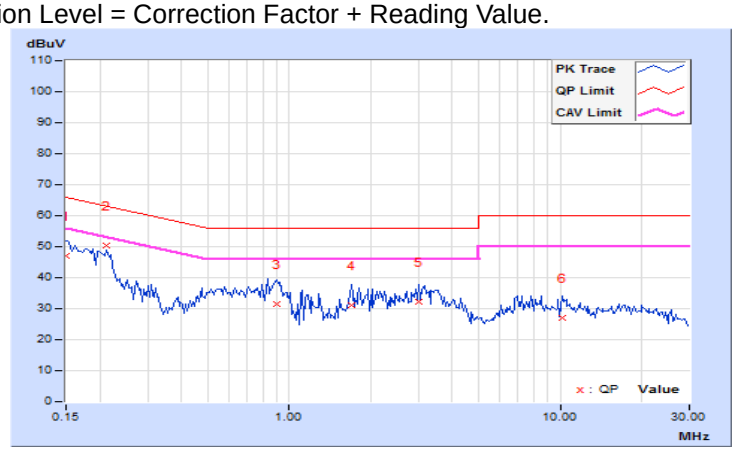
4.2.7 Test Results (Mode 1)

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	0.15000	10.02	36.93	18.36	46.95	28.38	66.00	56.00	-19.05	-27.62
2	**0.21250**	**10.04**	**40.40**	**19.40**	**50.44**	**29.44**	**63.11**	**53.11**	**-12.67**	**-23.67**
3	0.90391	10.10	21.49	9.18	31.59	19.28	56.00	46.00	-24.41	-26.72
4	1.69531	10.14	20.85	12.14	30.99	22.28	56.00	46.00	-25.01	-23.72
5	3.02734	10.21	22.01	14.94	32.22	25.15	56.00	46.00	-23.78	-20.85
6	10.14844	10.54	16.66	10.64	27.20	21.18	60.00	50.00	-32.80	-28.82

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.

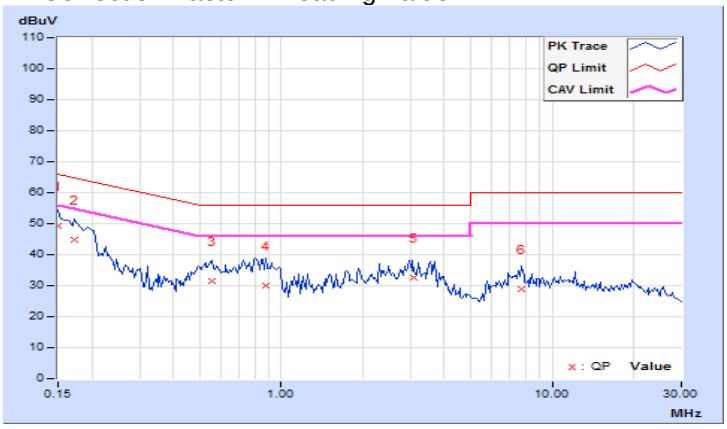


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	9.93	39.21	19.46	49.14	29.39	66.00	56.00	-16.86	-26.61
2	0.17344	9.93	34.76	14.11	44.69	24.04	64.79	54.79	-20.10	-30.75
3	0.55625	9.97	21.54	10.12	31.51	20.09	56.00	46.00	-24.49	-25.91
4	0.88047	9.98	20.07	9.01	30.05	18.99	56.00	46.00	-25.95	-27.01
5	3.06641	10.08	22.68	15.51	32.76	25.59	56.00	46.00	-23.24	-20.41
6	7.66797	10.28	18.57	12.25	28.85	22.53	60.00	50.00	-31.15	-27.47

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.

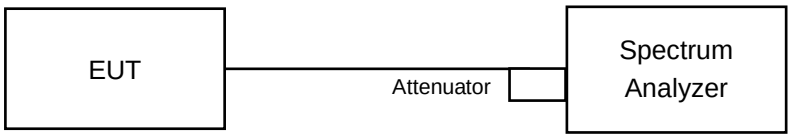


4.3 **6dB Bandwidth Measurement**

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 (Mode 1)

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.15	0.5	PASS
6	2437	10.13	0.5	PASS
11	2462	10.13	0.5	PASS

802.11g

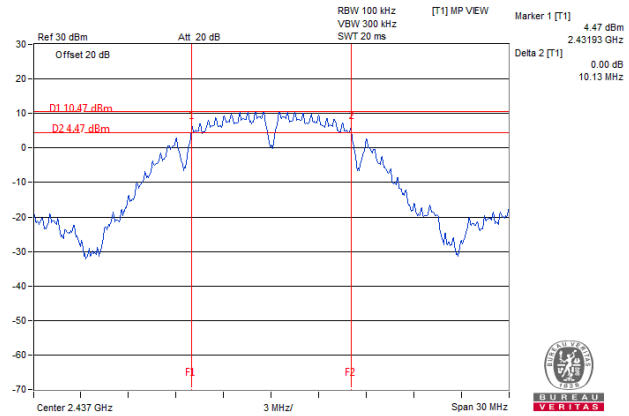
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.42	0.5	PASS
6	2437	16.36	0.5	PASS
11	2462	16.40	0.5	PASS

802.11n (HT20)

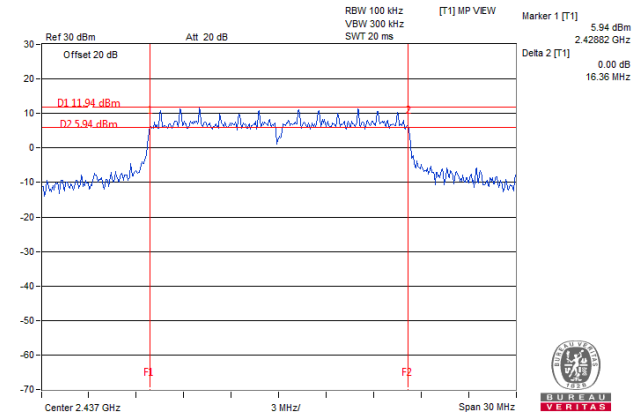
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.66	0.5	Pass
6	2437	17.67	0.5	Pass
11	2462	17.69	0.5	Pass

Spectrum Plot of Worst Value

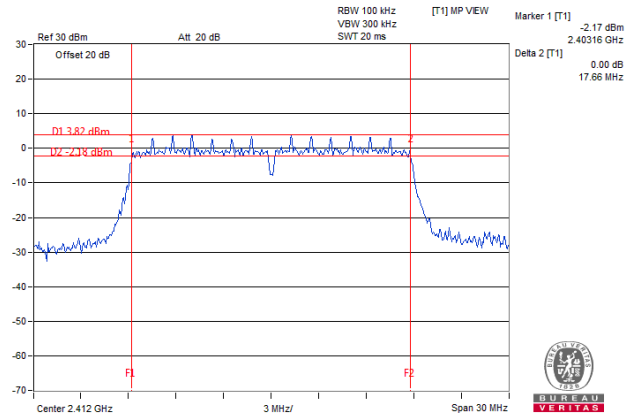
802.11b / CH6



802.11g / CH6

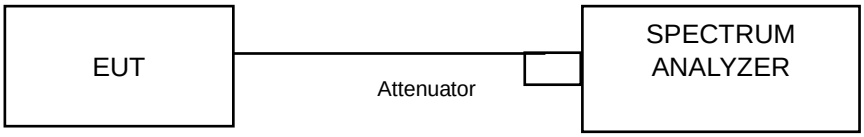


802.11n (HT20) / CH1



4.1 Occupied Bandwidth Measurement

4.1.1 Test Setup



4.1.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.1.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.1.4 Deviation from Test Standard

No deviation.

4.1.5 EUT Operating Conditions

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

4.1.6 Test Results (Mode 1)

802.11b

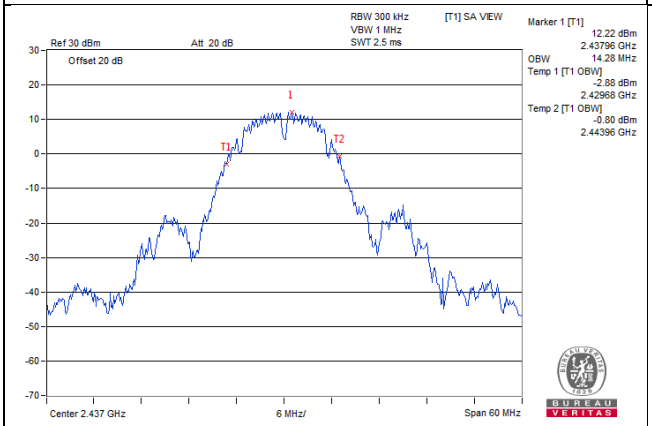
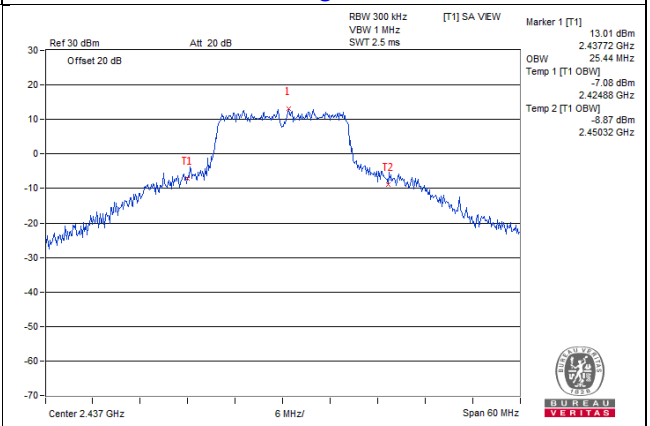
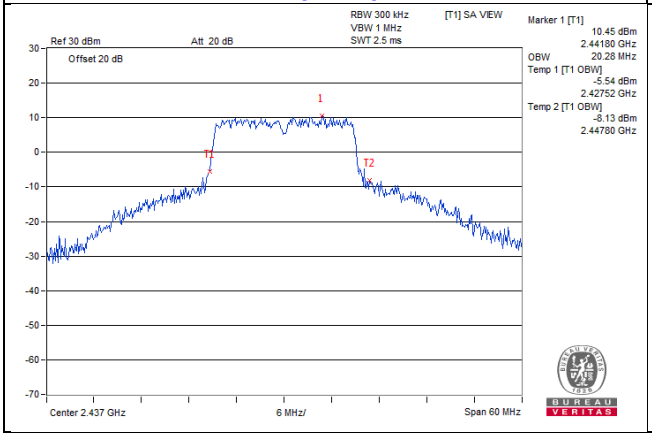
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	14.16
6	2437	14.28
11	2462	14.04

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	16.92
6	2437	25.44
11	2462	16.92

802.11n (HT20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	18.00
6	2437	20.28
11	2462	18.00

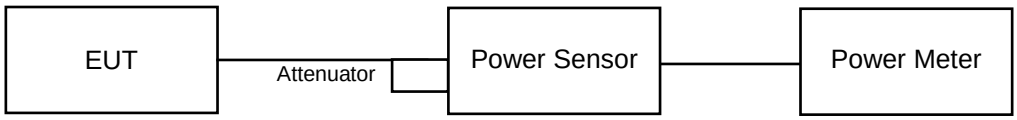
Spectrum Plot of Worst Value	
802.11b / CH6	**802.11g / CH6**
	
802.11n (HT20) / CH6	
	

4.2 **Conducted Output Power Measurement**

4.2.1 Limits of Conducted Output Power Measurement

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

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 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.

4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Conditions

Same as Item 4.3.6.

4.2.7 Test Results (Mode 1)

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	182.39	22.61	30	Pass
6	2437	184.927	22.67	30	Pass
11	2462	171.791	22.35	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	216.272	23.35	30	Pass
6	2437	351.56	25.46	30	Pass
11	2462	209.411	23.21	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	198.153	22.97	30	Pass
6	2437	335.738	25.26	30	Pass
11	2462	192.309	22.84	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	107.895	20.33
6	2437	109.396	20.39
11	2462	100.693	20.03

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	42.073	16.24
6	2437	156.675	21.95
11	2462	37.67	15.76

802.11n (HT20)

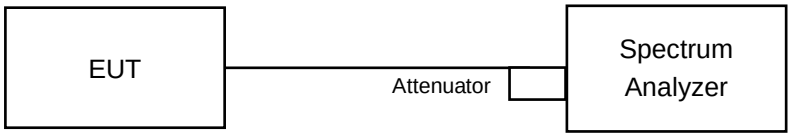
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	34.356	15.36
6	2437	103.753	20.16
11	2462	30.62	14.86

4.3 **Power Spectral Density Measurement**

4.3.1 Limits of Power Spectral Density Measurement

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

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 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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

Same as Item 4.3.6

4.3.7 Test Results (Mode 1)

802.11b

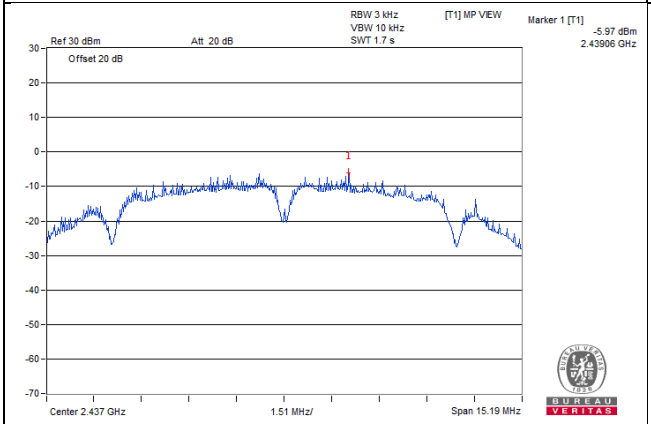
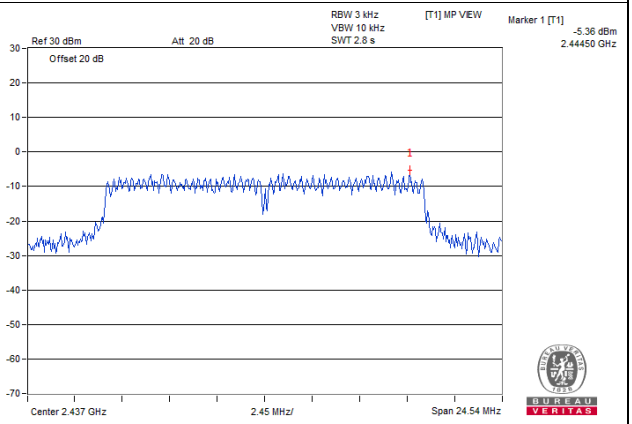
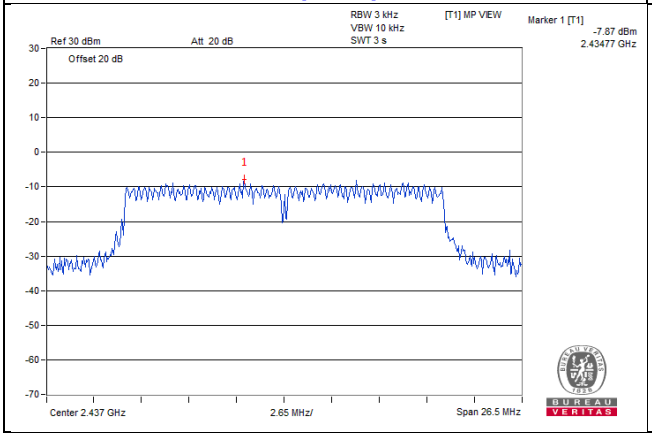
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-6.39	8.00	Pass
6	2437	-5.97	8.00	Pass
11	2462	-6.48	8.00	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-11.88	8.00	Pass
6	2437	-5.36	8.00	Pass
11	2462	-11.92	8.00	Pass

802.11n (HT20)

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-12.52	8.00	Pass
6	2437	-7.87	8.00	Pass
11	2462	-13.66	8.00	Pass

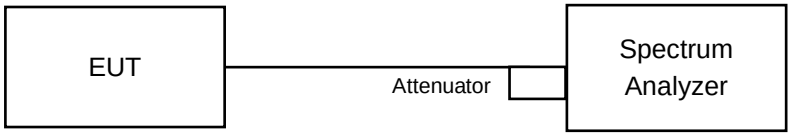
Spectrum Plot of Worst Value	
802.11b / CH6	**802.11g / CH6**
	
802.11n (HT20) / CH6	
	

4.4 **Conducted Out of Band Emission Measurement**

4.4.1 Limits of Conducted Out of Band Emission Measurement

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

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

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

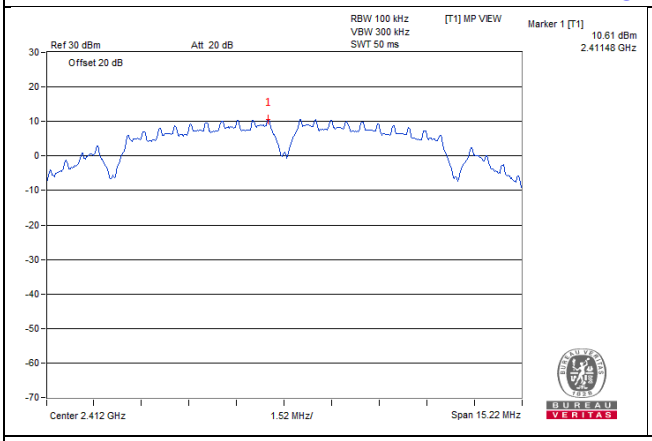
Same as Item 4.3.6

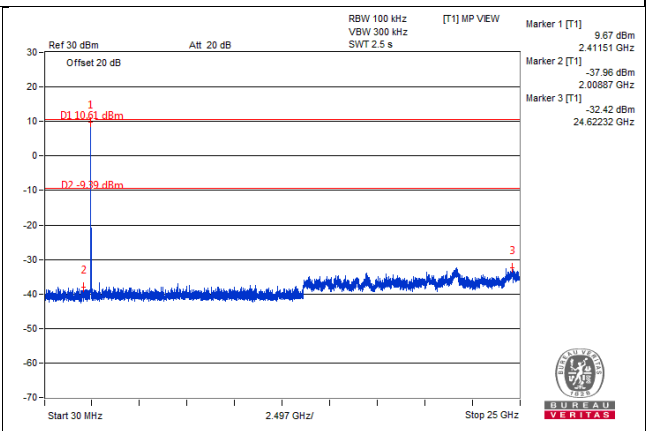
4.4.7 Test Results (Mode 1)

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.

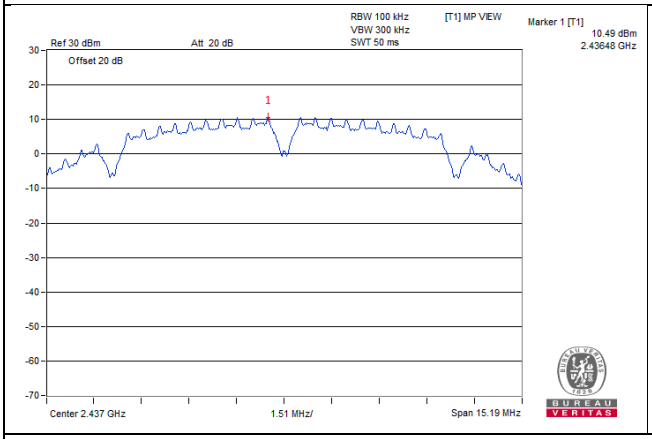
802.11b

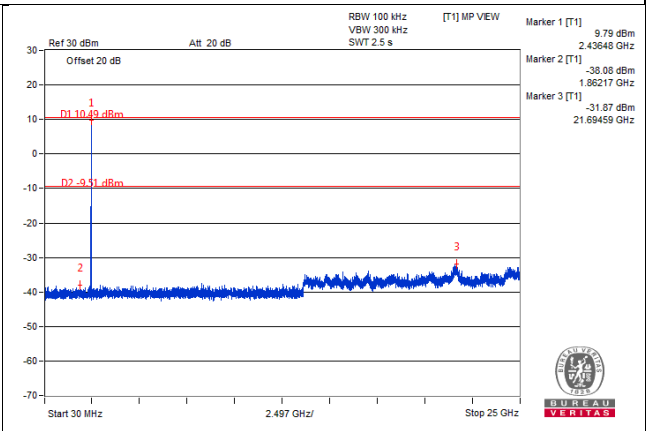
CH 1



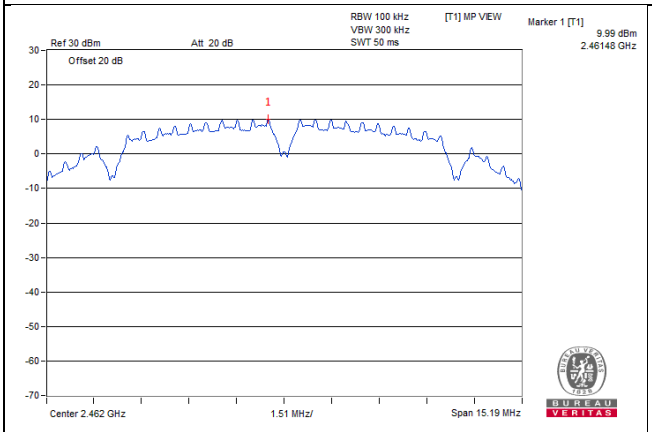


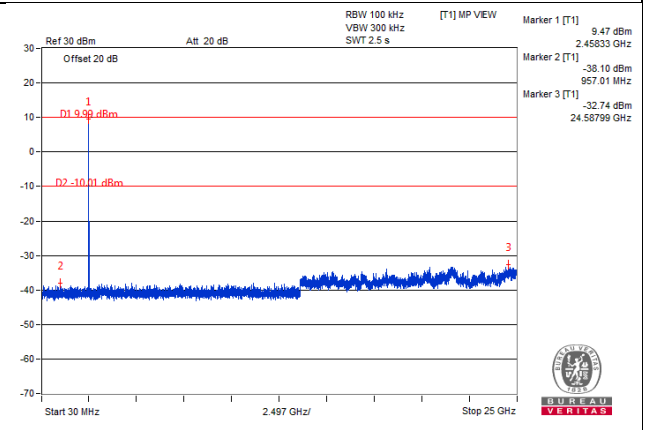
CH 6



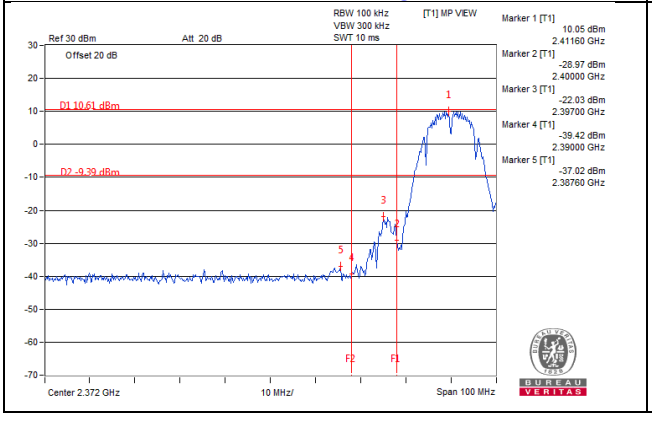


CH 11

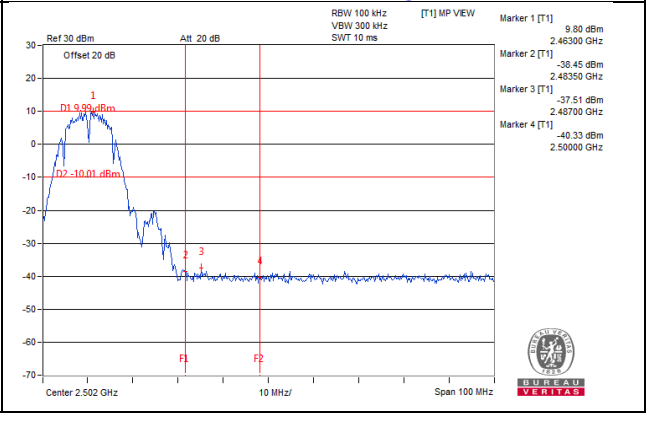




CH 1 Band edge

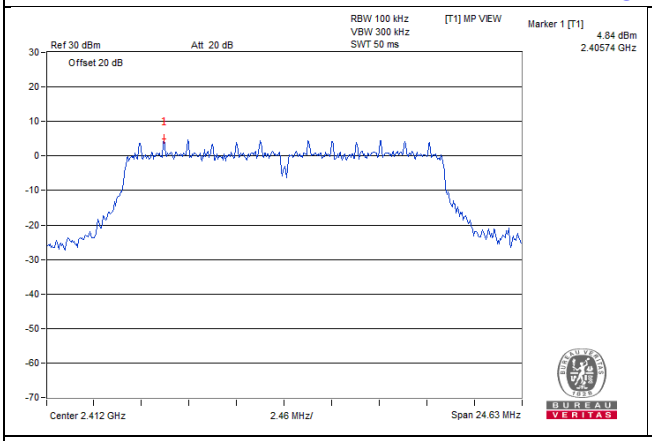


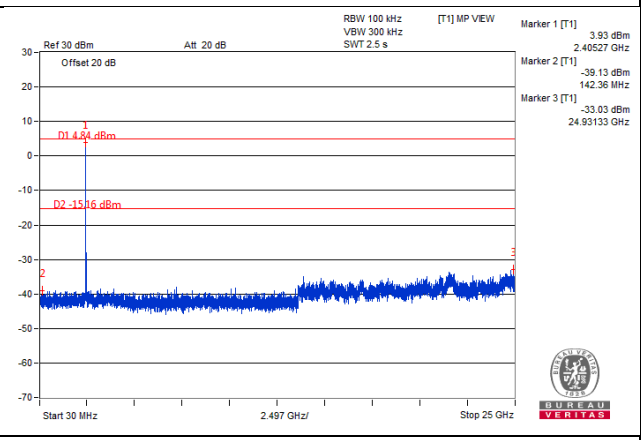
CH 11 Band edge



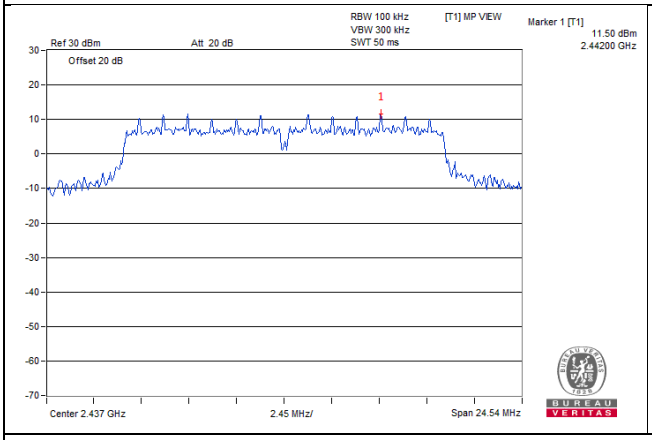
802.11g

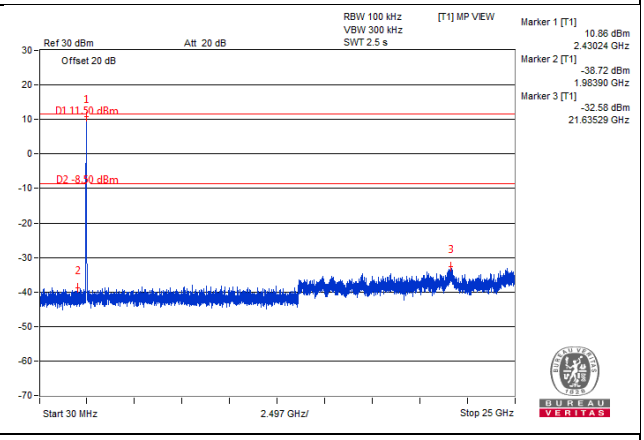
CH 1



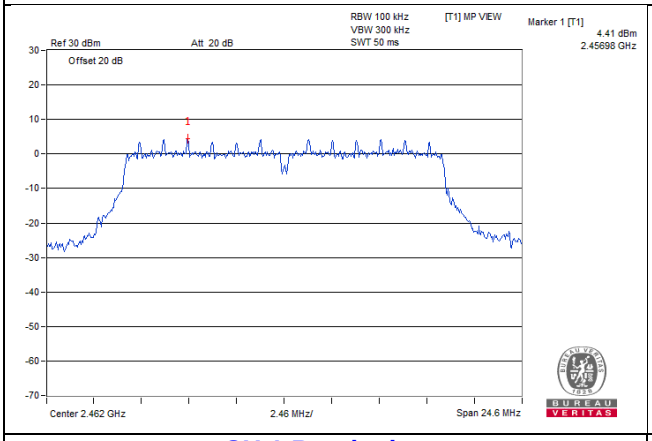


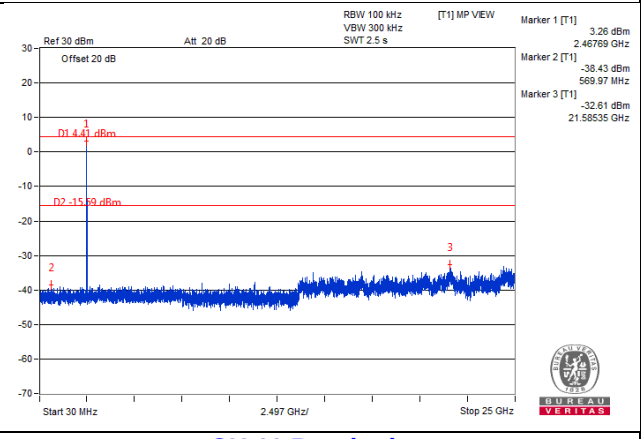
CH 6



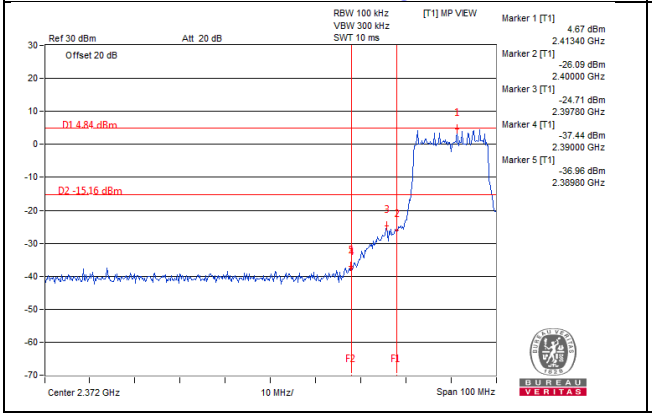


CH 11

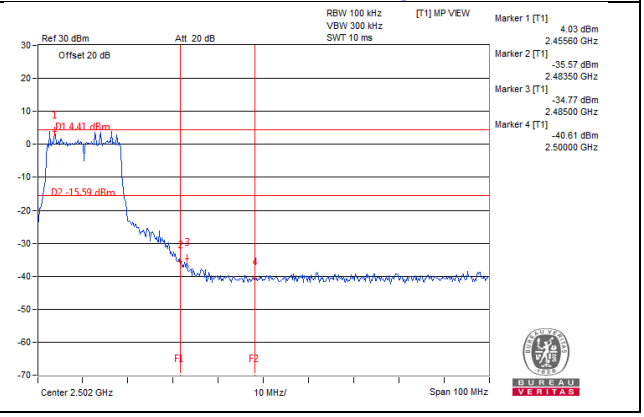




CH 1 Band edge

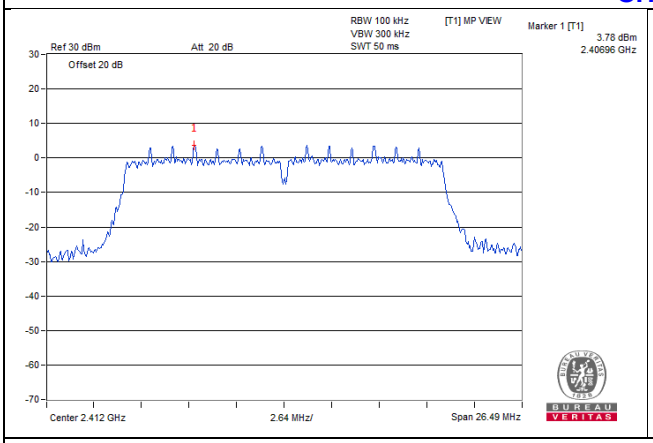


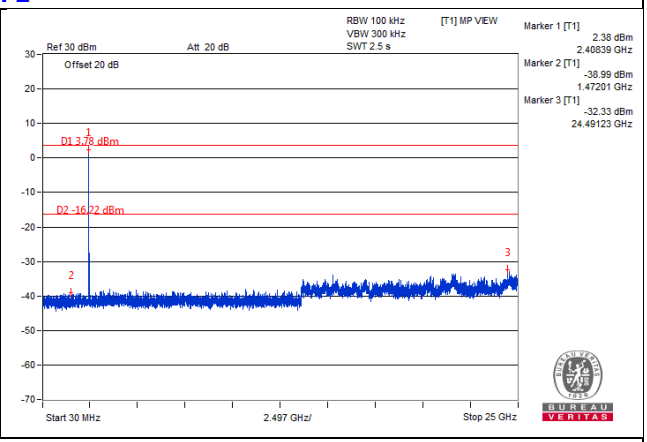
CH 11 Band edge



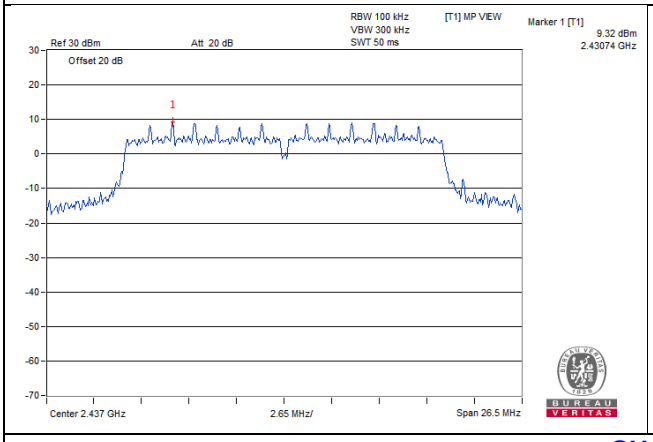
802.11n (HT20)

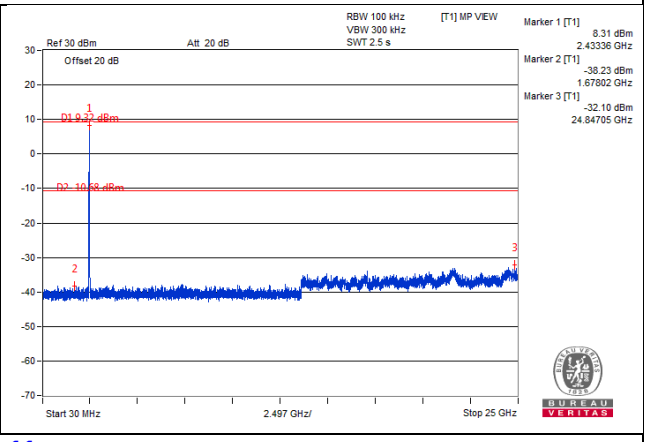
CH 1



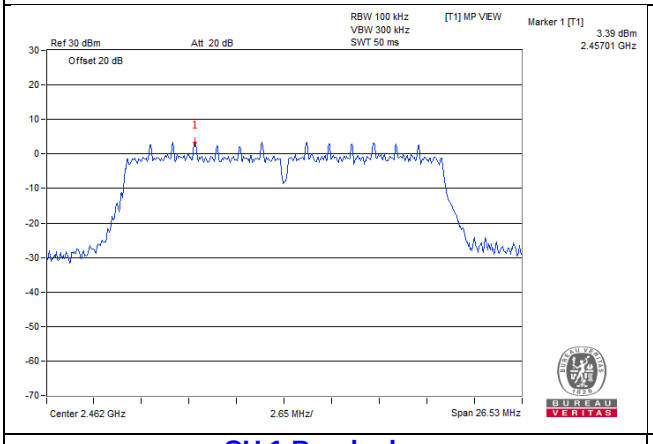


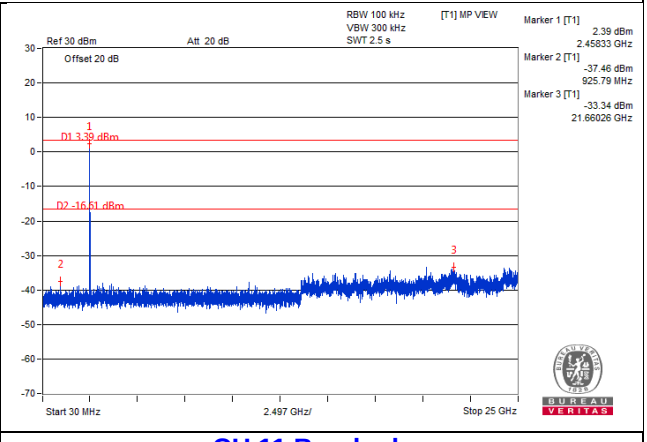
CH 6



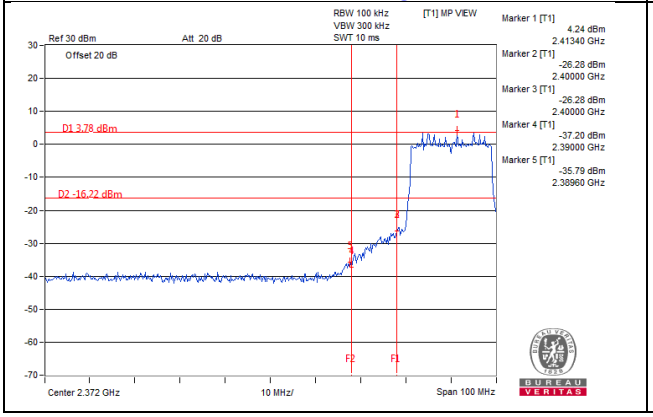


CH 11

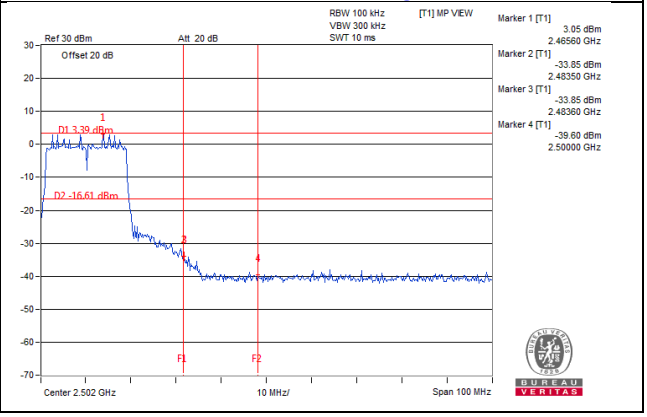




CH 1 Band edge



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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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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