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Test Model: DCH-G601

Received Date: Mar. 07, 2018

Test Date: Mar. 10 to 22, 2018

Issued Date: Apr. 24, 2018

Applicant: D-Link Corporation

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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**FCC Registration /
Designation Number:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF180307E03A	Original release.	Apr. 24, 2018

1 Certificate of Conformity

Product: LTE Bluetooth Hub

Brand: D-Link

Test Model: DCH-G601

Sample Status: ENGINEERING SAMPLE

Applicant: D-Link Corporation

Test Date: Mar. 10 to 22, 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 : Wendy Wu , **Date:** Apr. 24, 2018
Wendy Wu / Specialist

Approved by : May Chen , **Date:** Apr. 24, 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 -26.20dB at 0.20469MHz.
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 2483.50MHz, 2390.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	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) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 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	LTE Bluetooth Hub
Brand	D-Link
Test Model	DCH-G601
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5Vdc from power adapter or 3.7Vdc from battery
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 150Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 9
Output Power	134.896mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Cable Supplied	NA

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	3G/LTE
2	Bluetooth	3G/LTE

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

2. The EUT must be supplied with a power adapter or battery as following table:

Adapter		
Brand	Model No.	Spec.
Asian Power Device Inc	WB-10E05R	Input: 100-240Vac, 0.4A, 50/60Hz Output: 5Vdc, 2A DC output cable (Unshielded, 1.2m)
Battery		
Brand	Model No.	Spec.
GPI International Limited	NTA3555	3.7Vdc / 1490mAh

3. For the radiated emissions, the EUT was pre-tested under the following modes:

Test Mode	Description
Mode A	Power from adapter
Mode B	Power from battery

From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

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

WLAN & Bluetooth

Ant No.	Model	Antenna Gain (dBi)	Frequency rang (GHz)	Antenna type	Connector type
1	290-20327	1.6	2.4~2.4835	PIFA	NA
2	C037-511302-A	4.55	2.4~2.4835	PIFA	NA

Note: Ant No. 2 was selected as representative antenna for the final test.

WWAN

Ant No.	Model	Antenna Gain (dBi)	Frequency rang	Antenna type	Connector type	*Cable Length (mm)
1	290-328	0.15	699~894MHz	PCB	i-pex(MHF)	88.7
		5.58	1.71~2.16GHz			
2	290-329	0.39	699~894MHz	PCB	i-pex(MHF)	43.7
		4.38	1.71~2.16GHz			

5. 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
802.11n (HT40)	MCS 0~7	1TX	1RX

6. 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		

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

Radiated Emission Test (Above 1GHz):

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

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

Radiated Emission Test (Below 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	11	DSSS	DBPSK	1

Power Line Conducted Emission Test:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	11	DSSS	DBPSK	1

Antenna Port Conducted Measurement:

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

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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE $\geq$ 1G	23deg. C, 68%RH	120Vac, 60Hz	Andy Ho
RE<1G	24deg. C, 69%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

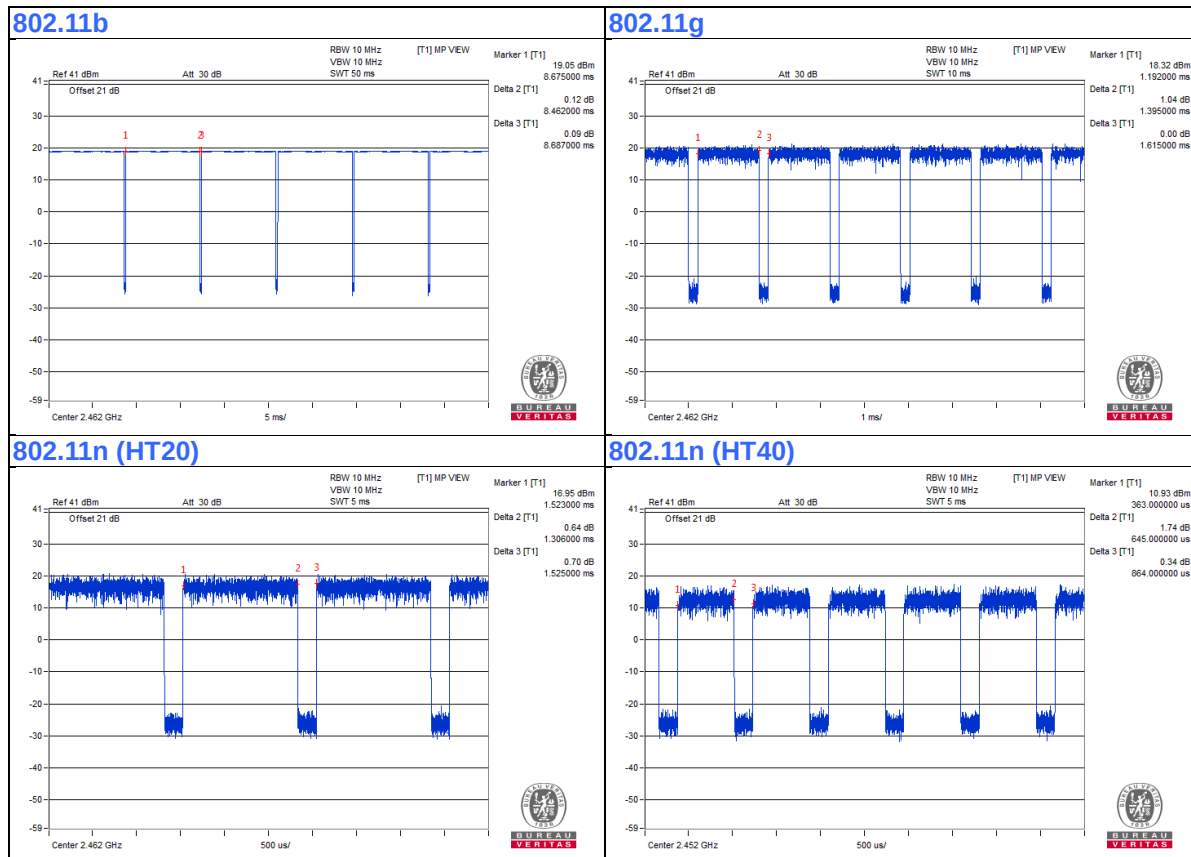
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = $8.462/8.687 = 0.974$, Duty factor = $10 * \log(1/0.974) = 0.11$

802.11g: Duty cycle = $1.395/1.615 = 0.864$, Duty factor = $10 * \log(1/0.864) = 0.64$

802.11n (HT20): Duty cycle = $1.306/1.525 = 0.856$, Duty factor = $10 * \log(1/0.856) = 0.67$

802.11n (HT40): Duty cycle = $0.645/0.864 = 0.747$, Duty factor = $10 * \log(1/0.747) = 1.27$



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.

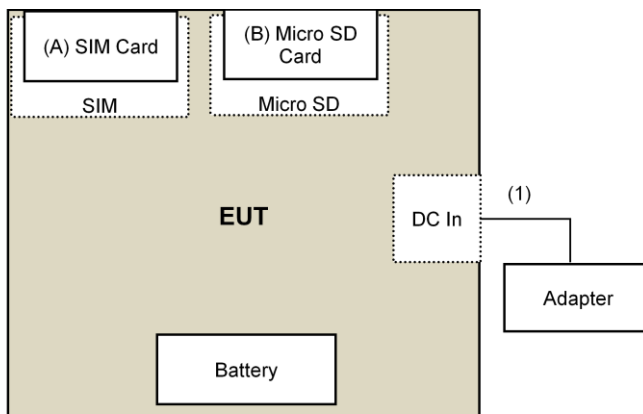
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	SIM Card	NA	NA	NA	NA	Provided by Lab
B.	MicroSD Card	Transcend	8GB	NA	NA	Provided by Lab

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.	DC Cable	1	1.2	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 DTS Meas Guidance v04
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 Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
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	5D-FB	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 09, 2017	Nov. 08, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCi	EMC12630SE	980385	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCi	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSv40	100964	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

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. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Mar. 10 to 20, 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. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average 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:

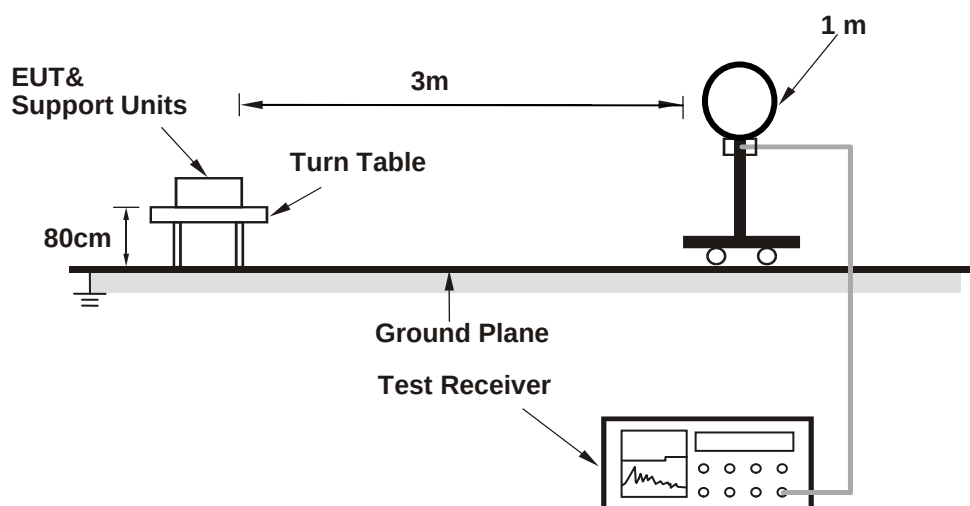
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

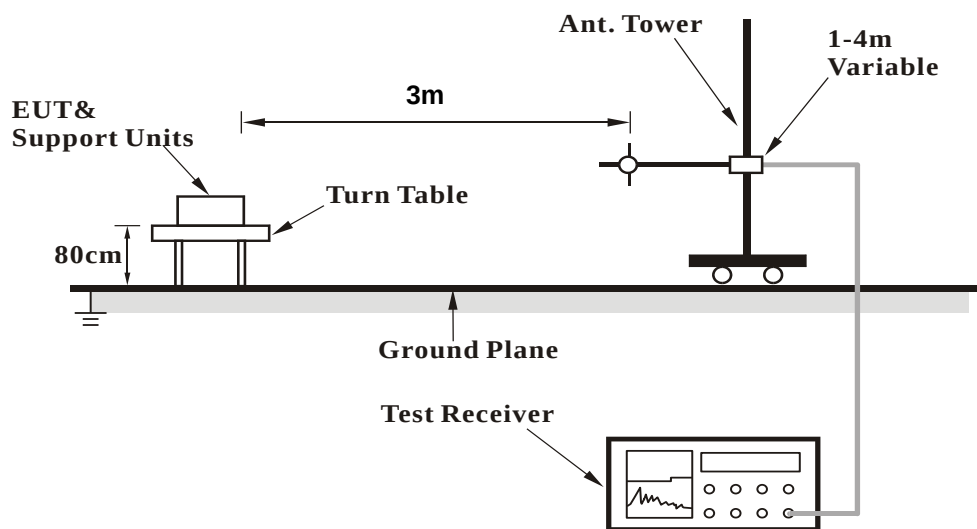
No deviation.

4.1.5 Test Setup

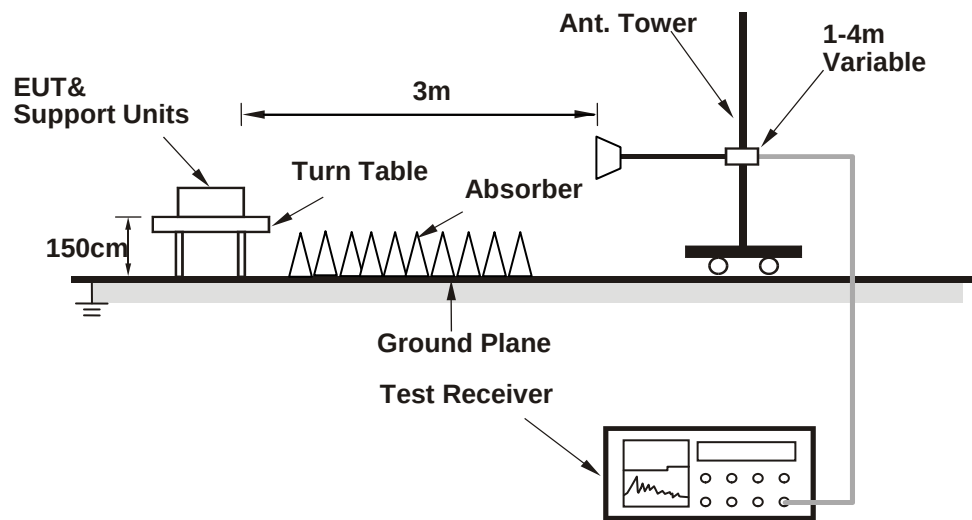
For Radiated emission below 30MHz



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

- Connected the EUT with the Laptop which is placed on remote site.
- Controlling software (HyperTerminal pasteDchg601.txt command) 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)
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	2386.60	53.1 PK	74.0	-20.9	1.38 H	79	55.1	-2.0
2	2386.60	43.4 AV	54.0	-10.6	1.38 H	79	45.4	-2.0
3	*2412.00	101.6 PK			1.38 H	79	103.7	-2.1
4	*2412.00	99.2 AV			1.38 H	79	101.3	-2.1
5	4824.00	43.4 PK	74.0	-30.6	1.46 H	188	40.7	2.7
6	4824.00	39.3 AV	54.0	-14.7	1.46 H	188	36.6	2.7
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	2386.60	54.7 PK	74.0	-19.3	3.47 V	208	56.7	-2.0
2	2386.60	44.5 AV	54.0	-9.5	3.47 V	208	46.5	-2.0
3	*2412.00	103.6 PK			3.47 V	208	105.7	-2.1
4	*2412.00	100.5 AV			3.47 V	208	102.6	-2.1
5	4824.00	45.0 PK	74.0	-29.0	2.11 V	165	42.3	2.7
6	4824.00	41.1 AV	54.0	-12.9	2.11 V	165	38.4	2.7

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 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	51.6 PK	74.0	-22.4	1.39 H	89	53.6	-2.0
2	2390.00	38.6 AV	54.0	-15.4	1.39 H	89	40.6	-2.0
3	*2437.00	100.5 PK			1.39 H	89	102.8	-2.3
4	*2437.00	98.3 AV			1.39 H	89	100.6	-2.3
5	2483.50	53.1 PK	74.0	-20.9	1.39 H	89	55.3	-2.2
6	2483.50	40.8 AV	54.0	-13.2	1.39 H	89	43.0	-2.2
7	4874.00	43.8 PK	74.0	-30.2	1.50 H	184	40.9	2.9
8	4874.00	39.1 AV	54.0	-14.9	1.50 H	184	36.2	2.9
9	7311.00	43.6 PK	74.0	-30.4	1.53 H	184	34.3	9.3
10	7311.00	30.5 AV	54.0	-23.5	1.53 H	184	21.2	9.3

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	53.3 PK	74.0	-20.7	2.85 V	223	55.3	-2.0
2	2390.00	40.8 AV	54.0	-13.2	2.85 V	223	42.8	-2.0
3	*2437.00	102.5 PK			2.85 V	223	104.8	-2.3
4	*2437.00	99.6 AV			2.85 V	223	101.9	-2.3
5	2483.50	53.4 PK	74.0	-20.6	2.85 V	223	55.6	-2.2
6	2483.50	41.1 AV	54.0	-12.9	2.85 V	223	43.3	-2.2
7	4874.00	44.9 PK	74.0	-29.1	2.05 V	174	42.0	2.9
8	4874.00	40.8 AV	54.0	-13.2	2.05 V	174	37.9	2.9
9	7311.00	44.1 PK	74.0	-29.9	1.62 V	191	34.8	9.3
10	7311.00	32.5 AV	54.0	-21.5	1.62 V	191	23.2	9.3

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)
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	*2462.00	102.1 PK			1.41 H	78	104.4	-2.3
2	*2462.00	99.6 AV			1.41 H	78	101.9	-2.3
3	2488.60	54.4 PK	74.0	-19.6	1.41 H	78	56.6	-2.2
4	2488.60	42.6 AV	54.0	-11.4	1.41 H	78	44.8	-2.2
5	4924.00	43.6 PK	74.0	-30.4	1.50 H	179	40.6	3.0
6	4924.00	39.3 AV	54.0	-14.7	1.50 H	179	36.3	3.0
7	7386.00	43.4 PK	74.0	-30.6	1.51 H	184	33.7	9.7
8	7386.00	30.2 AV	54.0	-23.8	1.51 H	184	20.5	9.7
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	*2462.00	104.1 PK			3.70 V	208	106.4	-2.3
2	*2462.00	100.9 AV			3.70 V	208	103.2	-2.3
3	2488.60	55.1 PK	74.0	-18.9	3.70 V	208	57.3	-2.2
4	2488.60	43.6 AV	54.0	-10.4	3.70 V	208	45.8	-2.2
5	4924.00	44.5 PK	74.0	-29.5	2.10 V	159	41.5	3.0
6	4924.00	40.6 AV	54.0	-13.4	2.10 V	159	37.6	3.0
7	7386.00	43.7 PK	74.0	-30.3	1.61 V	179	34.0	9.7
8	7386.00	32.1 AV	54.0	-21.9	1.61 V	179	22.4	9.7

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.

802.11g

CHANNEL	TX Channel 1	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	69.8 PK	74.0	-4.2	1.37 H	84	71.8	-2.0
2	2390.00	52.1 AV	54.0	-1.9	1.37 H	84	54.1	-2.0
3	*2412.00	103.6 PK			1.37 H	84	105.7	-2.1
4	*2412.00	94.7 AV			1.37 H	84	96.8	-2.1
5	4824.00	42.1 PK	74.0	-31.9	1.40 H	195	39.4	2.7
6	4824.00	38.4 AV	54.0	-15.6	1.40 H	195	35.7	2.7
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	72.1 PK	74.0	-1.9	3.16 V	215	74.1	-2.0
2	2390.00	53.9 AV	54.0	-0.1	3.16 V	215	55.9	-2.0
3	*2412.00	105.6 PK			3.16 V	215	107.7	-2.1
4	*2412.00	96.0 AV			3.16 V	215	98.1	-2.1
5	4824.00	44.4 PK	74.0	-29.6	2.03 V	189	41.7	2.7
6	4824.00	40.6 AV	54.0	-13.4	2.03 V	189	37.9	2.7

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 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	52.3 PK	74.0	-21.7	1.41 H	90	54.3	-2.0
2	2390.00	41.1 AV	54.0	-12.9	1.41 H	90	43.1	-2.0
3	*2437.00	104.1 PK			1.41 H	90	106.4	-2.3
4	*2437.00	95.3 AV			1.41 H	90	97.6	-2.3
5	2483.50	51.8 PK	74.0	-22.2	1.41 H	90	54.0	-2.2
6	2483.50	40.2 AV	54.0	-13.8	1.41 H	90	42.4	-2.2
7	4874.00	44.1 PK	74.0	-29.9	1.45 H	185	41.2	2.9
8	4874.00	38.6 AV	54.0	-15.4	1.45 H	185	35.7	2.9
9	7311.00	43.9 PK	74.0	-30.1	1.51 H	175	34.6	9.3
10	7311.00	30.9 AV	54.0	-23.1	1.51 H	175	21.6	9.3

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	2.80 V	264	57.1	-2.0
2	2390.00	43.2 AV	54.0	-10.8	2.80 V	264	45.2	-2.0
3	*2437.00	106.1 PK			2.80 V	264	108.4	-2.3
4	*2437.00	96.6 AV			2.80 V	264	98.9	-2.3
5	2483.50	53.7 PK	74.0	-20.3	2.80 V	264	55.9	-2.2
6	2483.50	42.2 AV	54.0	-11.8	2.80 V	264	44.4	-2.2
7	4874.00	45.2 PK	74.0	-28.8	2.04 V	179	42.3	2.9
8	4874.00	40.5 AV	54.0	-13.5	2.04 V	179	37.6	2.9
9	7311.00	44.0 PK	74.0	-30.0	1.64 V	180	34.7	9.3
10	7311.00	32.6 AV	54.0	-21.4	1.64 V	180	23.3	9.3

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)
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	*2462.00	103.3 PK			1.38 H	103	105.6	-2.3
2	*2462.00	94.9 AV			1.38 H	103	97.2	-2.3
3	2483.50	71.4 PK	74.0	-2.6	1.38 H	103	73.6	-2.2
4	2483.50	52.3 AV	54.0	-1.7	1.38 H	103	54.5	-2.2
5	4924.00	42.6 PK	74.0	-31.4	1.43 H	192	39.6	3.0
6	4924.00	38.4 AV	54.0	-15.6	1.43 H	192	35.4	3.0
7	7386.00	43.7 PK	74.0	-30.3	1.49 H	165	34.0	9.7
8	7386.00	30.5 AV	54.0	-23.5	1.49 H	165	20.8	9.7
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	*2462.00	105.3 PK			2.69 V	327	107.6	-2.3
2	*2462.00	96.2 AV			2.69 V	327	98.5	-2.3
3	2483.50	73.5 PK	74.0	-0.5	2.69 V	327	75.7	-2.2
4	2483.50	53.8 AV	54.0	-0.2	2.69 V	327	56.0	-2.2
5	4924.00	44.0 PK	74.0	-30.0	2.05 V	186	41.0	3.0
6	4924.00	40.2 AV	54.0	-13.8	2.05 V	186	37.2	3.0
7	7386.00	43.8 PK	74.0	-30.2	1.59 V	176	34.1	9.7
8	7386.00	32.5 AV	54.0	-21.5	1.59 V	176	22.8	9.7

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.

802.11n (HT20)

CHANNEL	TX Channel 1	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	69.8 PK	74.0	-4.2	1.43 H	105	71.8	-2.0
2	2390.00	52.1 AV	54.0	-1.9	1.43 H	105	54.1	-2.0
3	*2412.00	102.7 PK			1.43 H	105	104.8	-2.1
4	*2412.00	93.8 AV			1.43 H	105	95.9	-2.1
5	4824.00	41.6 PK	74.0	-32.4	1.48 H	180	38.9	2.7
6	4824.00	37.9 AV	54.0	-16.1	1.48 H	180	35.2	2.7
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	71.8 PK	74.0	-2.2	2.52 V	324	73.8	-2.0
2	2390.00	53.9 AV	54.0	-0.1	2.52 V	324	55.9	-2.0
3	*2412.00	104.7 PK			2.52 V	324	106.8	-2.1
4	*2412.00	95.1 AV			2.52 V	324	97.2	-2.1
5	4824.00	44.6 PK	74.0	-29.4	2.05 V	177	41.9	2.7
6	4824.00	40.8 AV	54.0	-13.2	2.05 V	177	38.1	2.7

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 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	53.2 PK	74.0	-20.8	1.38 H	118	55.2	-2.0
2	2390.00	41.1 AV	54.0	-12.9	1.38 H	118	43.1	-2.0
3	*2437.00	103.9 PK			1.38 H	118	106.2	-2.3
4	*2437.00	95.0 AV			1.38 H	118	97.3	-2.3
5	2483.50	51.6 PK	74.0	-22.4	1.38 H	118	53.8	-2.2
6	2483.50	40.3 AV	54.0	-13.7	1.38 H	118	42.5	-2.2
7	4874.00	42.2 PK	74.0	-31.8	1.42 H	184	39.3	2.9
8	4874.00	38.3 AV	54.0	-15.7	1.42 H	184	35.4	2.9
9	7311.00	44.2 PK	74.0	-29.8	1.46 H	174	34.9	9.3
10	7311.00	31.3 AV	54.0	-22.7	1.46 H	174	22.0	9.3

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	55.0 PK	74.0	-19.0	2.50 V	327	57.0	-2.0
2	2390.00	43.3 AV	54.0	-10.7	2.50 V	327	45.3	-2.0
3	*2437.00	105.9 PK			2.50 V	327	108.2	-2.3
4	*2437.00	96.3 AV			2.50 V	327	98.6	-2.3
5	2483.50	54.6 PK	74.0	-19.4	2.50 V	327	56.8	-2.2
6	2483.50	42.5 AV	54.0	-11.5	2.50 V	327	44.7	-2.2
7	4874.00	46.4 PK	74.0	-27.6	2.00 V	167	43.5	2.9
8	4874.00	40.5 AV	54.0	-13.5	2.00 V	167	37.6	2.9
9	7311.00	44.3 PK	74.0	-29.7	1.70 V	181	35.0	9.3
10	7311.00	33.0 AV	54.0	-21.0	1.70 V	181	23.7	9.3

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)
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	*2462.00	102.5 PK			1.42 H	104	104.8	-2.3
2	*2462.00	93.7 AV			1.42 H	104	96.0	-2.3
3	2483.50	69.4 PK	74.0	-4.6	1.42 H	104	71.6	-2.2
4	2483.50	51.6 AV	54.0	-2.4	1.42 H	104	53.8	-2.2
5	4924.00	42.8 PK	74.0	-31.2	1.43 H	183	39.8	3.0
6	4924.00	38.8 AV	54.0	-15.2	1.43 H	183	35.8	3.0
7	7386.00	44.0 PK	74.0	-30.0	1.49 H	175	34.3	9.7
8	7386.00	30.7 AV	54.0	-23.3	1.49 H	175	21.0	9.7
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	*2462.00	104.5 PK			2.37 V	327	106.8	-2.3
2	*2462.00	95.0 AV			2.37 V	327	97.3	-2.3
3	2483.50	71.7 PK	74.0	-2.3	2.37 V	327	73.9	-2.2
4	2483.50	53.8 AV	54.0	-0.2	2.37 V	327	56.0	-2.2
5	4924.00	44.6 PK	74.0	-29.4	2.00 V	179	41.6	3.0
6	4924.00	40.5 AV	54.0	-13.5	2.00 V	179	37.5	3.0
7	7386.00	43.7 PK	74.0	-30.3	1.66 V	189	34.0	9.7
8	7386.00	32.5 AV	54.0	-21.5	1.66 V	189	22.8	9.7

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.

802.11n (HT40)

CHANNEL	TX Channel 3	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	68.0 PK	74.0	-6.0	1.50 H	120	70.0	-2.0
2	2390.00	51.7 AV	54.0	-2.3	1.50 H	120	53.7	-2.0
3	*2422.00	96.9 PK			1.50 H	120	99.1	-2.2
4	*2422.00	87.6 AV			1.50 H	120	89.8	-2.2
5	4844.00	42.4 PK	74.0	-31.6	1.44 H	188	39.7	2.7
6	4844.00	38.4 AV	54.0	-15.6	1.44 H	188	35.7	2.7
7	7266.00	43.4 PK	74.0	-30.6	1.50 H	180	34.3	9.1
8	7266.00	30.3 AV	54.0	-23.7	1.50 H	180	21.2	9.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	72.6 PK	74.0	-1.4	3.16 V	329	74.6	-2.0
2	2390.00	53.9 AV	54.0	-0.1	3.16 V	329	55.9	-2.0
3	*2422.00	100.6 PK			3.16 V	329	102.8	-2.2
4	*2422.00	91.2 AV			3.16 V	329	93.4	-2.2
5	4844.00	45.7 PK	74.0	-28.3	2.03 V	138	43.0	2.7
6	4844.00	40.1 AV	54.0	-13.9	2.03 V	138	37.4	2.7
7	7266.00	44.4 PK	74.0	-29.6	1.67 V	165	35.3	9.1
8	7266.00	33.1 AV	54.0	-20.9	1.67 V	165	24.0	9.1

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. 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	61.2 PK	74.0	-12.8	1.51 H	132	63.2	-2.0
2	2390.00	44.4 AV	54.0	-9.6	1.51 H	132	46.4	-2.0
3	*2437.00	100.2 PK			1.51 H	132	102.5	-2.3
4	*2437.00	92.2 AV			1.51 H	132	94.5	-2.3
5	2483.50	57.4 PK	74.0	-16.6	1.51 H	132	59.6	-2.2
6	2483.50	42.6 AV	54.0	-11.4	1.51 H	132	44.8	-2.2
7	4874.00	42.3 PK	74.0	-31.7	1.41 H	193	39.4	2.9
8	4874.00	38.3 AV	54.0	-15.7	1.41 H	193	35.4	2.9
9	7311.00	43.7 PK	74.0	-30.3	1.48 H	167	34.4	9.3
10	7311.00	30.4 AV	54.0	-23.6	1.48 H	167	21.1	9.3

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.0 PK	74.0	-10.0	3.88 V	208	66.0	-2.0
2	2390.00	47.4 AV	54.0	-6.6	3.88 V	208	49.4	-2.0
3	*2437.00	102.2 PK			3.88 V	208	104.5	-2.3
4	*2437.00	93.5 AV			3.88 V	208	95.8	-2.3
5	2483.50	58.7 PK	74.0	-15.3	3.88 V	208	60.9	-2.2
6	2483.50	45.0 AV	54.0	-9.0	3.88 V	208	47.2	-2.2
7	4874.00	46.0 PK	74.0	-28.0	1.99 V	153	43.1	2.9
8	4874.00	40.4 AV	54.0	-13.6	1.99 V	153	37.5	2.9
9	7311.00	44.4 PK	74.0	-29.6	1.68 V	181	35.1	9.3
10	7311.00	33.3 AV	54.0	-20.7	1.68 V	181	24.0	9.3

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
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	*2452.00	98.2 PK			1.53 H	133	100.5	-2.3
2	*2452.00	89.7 AV			1.53 H	133	92.0	-2.3
3	2483.50	70.9 PK	74.0	-3.1	1.53 H	133	73.1	-2.2
4	2483.50	51.9 AV	54.0	-2.1	1.53 H	133	54.1	-2.2
5	4904.00	42.6 PK	74.0	-31.4	1.47 H	181	39.7	2.9
6	4904.00	38.5 AV	54.0	-15.5	1.47 H	181	35.6	2.9
7	7356.00	44.4 PK	74.0	-29.6	1.50 H	185	34.7	9.7
8	7356.00	31.0 AV	54.0	-23.0	1.50 H	185	21.3	9.7
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	*2452.00	100.2 PK			3.36 V	235	102.5	-2.3
2	*2452.00	91.0 AV			3.36 V	235	93.3	-2.3
3	2483.50	72.1 PK	74.0	-1.9	3.36 V	235	74.3	-2.2
4	2483.50	53.9 AV	54.0	-0.1	3.36 V	235	56.1	-2.2
5	4904.00	47.1 PK	74.0	-26.9	2.06 V	152	44.2	2.9
6	4904.00	41.0 AV	54.0	-13.0	2.06 V	152	38.1	2.9
7	7356.00	44.9 PK	74.0	-29.1	1.69 V	180	35.2	9.7
8	7356.00	33.3 AV	54.0	-20.7	1.69 V	180	23.6	9.7

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.

Below 1GHz Data:

802.11b

CHANNEL	TX Channel 11	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	77.53	28.8 QP	40.0	-11.2	1.20 H	34	40.6	-11.8
2	137.67	26.8 QP	43.5	-16.7	1.14 H	213	35.2	-8.4
3	304.51	27.3 QP	46.0	-18.7	2.50 H	294	34.4	-7.1
4	334.58	34.3 QP	46.0	-11.7	1.50 H	61	40.5	-6.2
5	348.16	40.3 QP	46.0	-5.7	1.04 H	219	46.3	-6.0
6	911.73	35.0 QP	46.0	-11.0	1.97 H	264	30.3	4.7
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	40.67	27.3 QP	40.0	-12.7	2.80 V	311	35.4	-8.1
2	76.56	28.2 QP	40.0	-11.8	2.51 V	304	39.7	-11.5
3	352.04	37.0 QP	46.0	-9.0	1.50 V	231	42.9	-5.9
4	465.53	30.8 QP	46.0	-15.2	2.49 V	33	33.6	-2.8
5	796.30	31.0 QP	46.0	-15.0	1.02 V	110	28.0	3.0
6	888.45	32.6 QP	46.0	-13.4	2.27 V	63	28.4	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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Nov. 01, 2017	Oct. 31, 2018
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 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
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: Mar. 22, 2018

4.2.3 Test Procedures

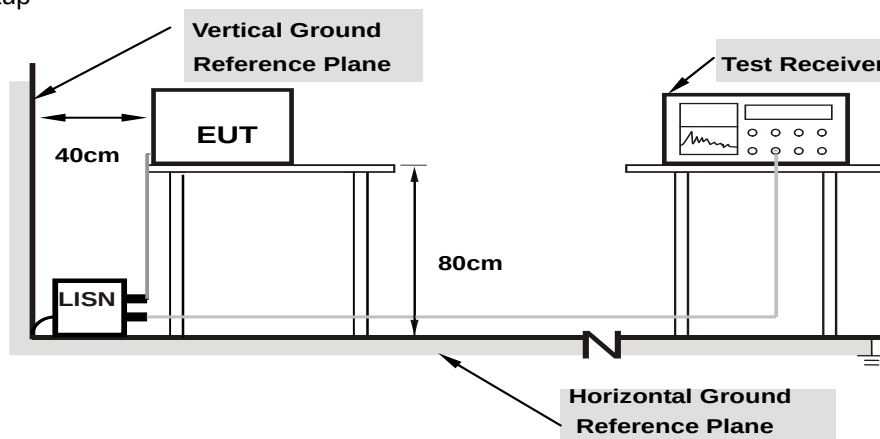
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

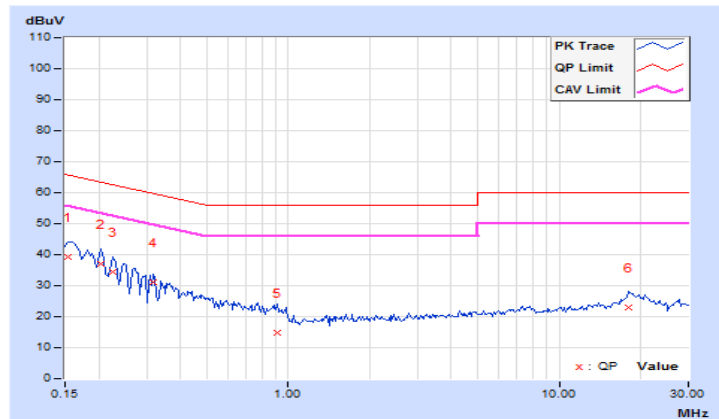
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.05	29.20	15.81	39.25	25.86	65.79	55.79	-26.54	-29.93
2	0.20469	10.07	27.15	16.51	37.22	26.58	63.42	53.42	-26.20	-26.84
3	0.22422	10.08	24.49	13.24	34.57	23.32	62.66	52.66	-28.09	-29.34
4	0.31797	10.10	20.95	10.58	31.05	20.68	59.76	49.76	-28.71	-29.08
5	0.91172	10.16	4.52	-7.40	14.68	2.76	56.00	46.00	-41.32	-43.24
6	17.93750	11.25	11.60	5.13	22.85	16.38	60.00	50.00	-37.15	-33.62

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.

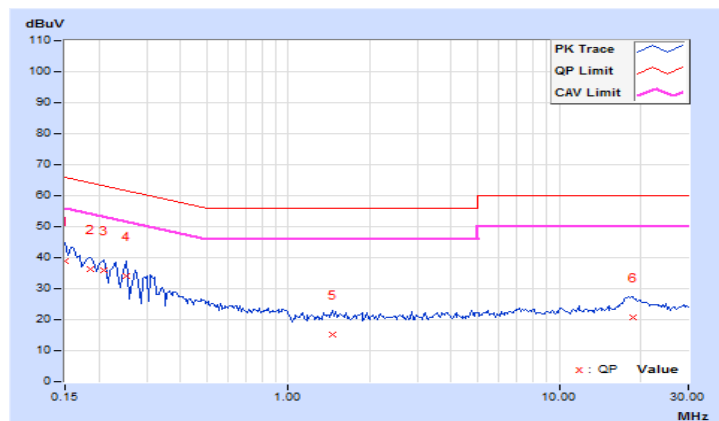


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	9.95	29.06	14.06	39.01	24.01	66.00	56.00	-26.99	-31.99
2	0.18516	9.97	26.30	14.25	36.27	24.22	64.25	54.25	-27.98	-30.03
3	0.20859	9.97	26.14	14.01	36.11	23.98	63.26	53.26	-27.15	-29.28
4	0.25156	9.98	24.10	12.97	34.08	22.95	61.71	51.71	-27.63	-28.76
5	1.45313	10.07	5.18	-1.37	15.25	8.70	56.00	46.00	-40.75	-37.30
6	18.70313	11.09	9.52	4.26	20.61	15.35	60.00	50.00	-39.39	-34.65

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.

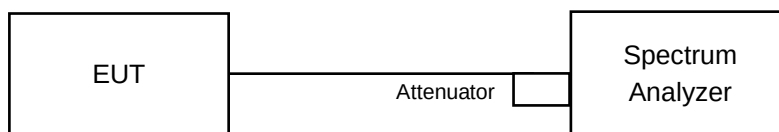


4.3 6dB Bandwidth Measurement

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

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.09	0.5	PASS
6	2437	10.10	0.5	PASS
11	2462	10.08	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.19	0.5	PASS
6	2437	15.16	0.5	PASS
11	2462	15.11	0.5	PASS

802.11n (HT20)

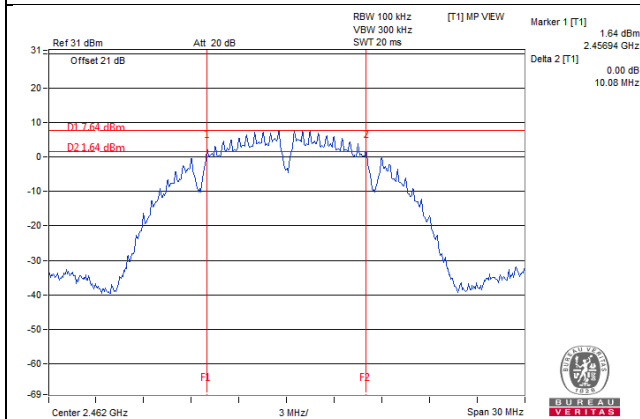
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.18	0.5	PASS
6	2437	15.17	0.5	PASS
11	2462	15.17	0.5	PASS

802.11n (HT40)

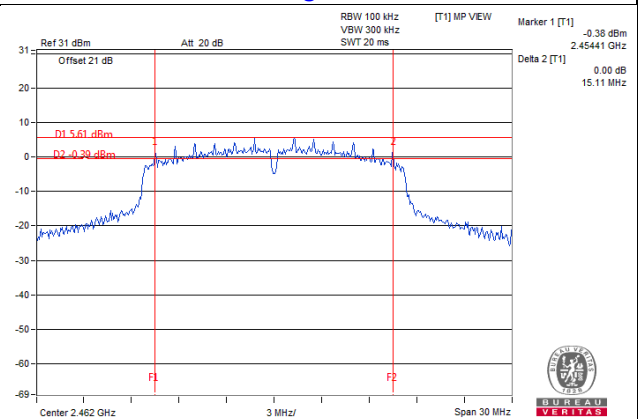
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	33.89	0.5	PASS
6	2437	33.89	0.5	PASS
9	2452	33.90	0.5	PASS

Spectrum Plot of Worst Value

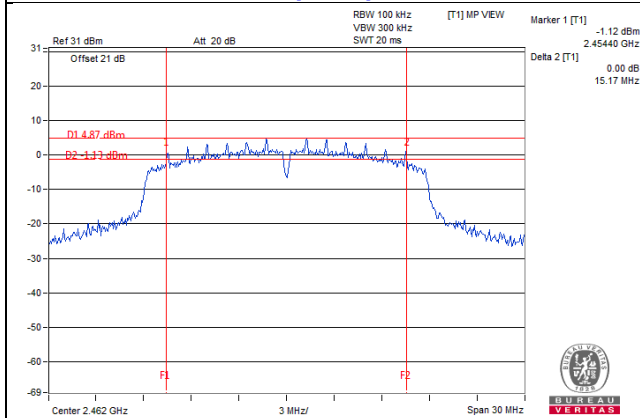
802.11b : CH11



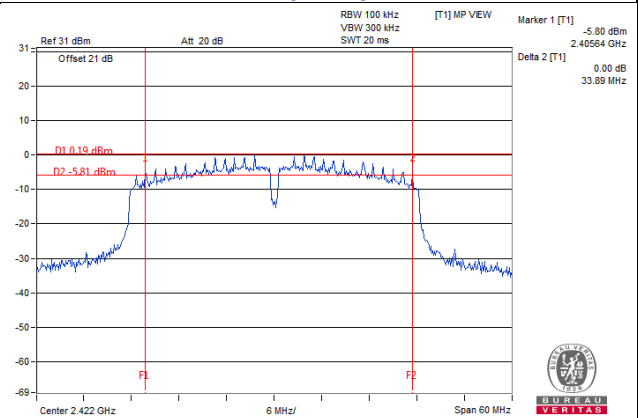
802.11g : CH11



802.11n (HT20) : CH11

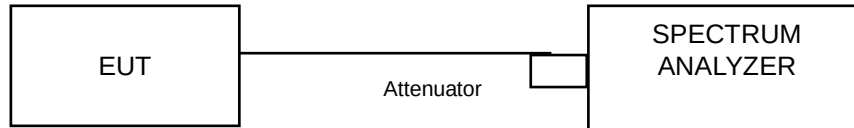


802.11n (HT40) : CH3



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 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.

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

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

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	14.52
6	2437	14.76
11	2462	14.76

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	16.92
6	2437	18.36
11	2462	17.40

802.11n (HT20)

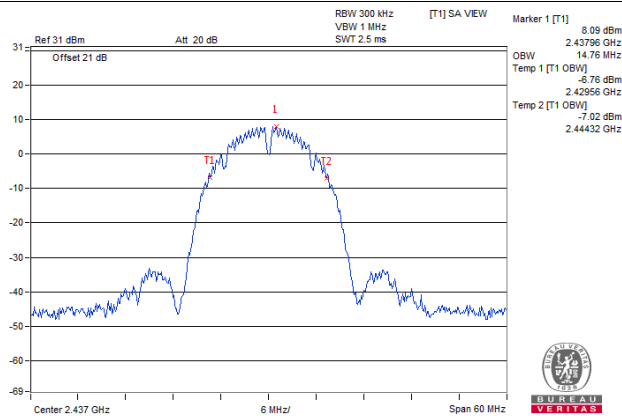
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
1	2412	18.00
6	2437	18.48
11	2462	17.88

802.11n (HT40)

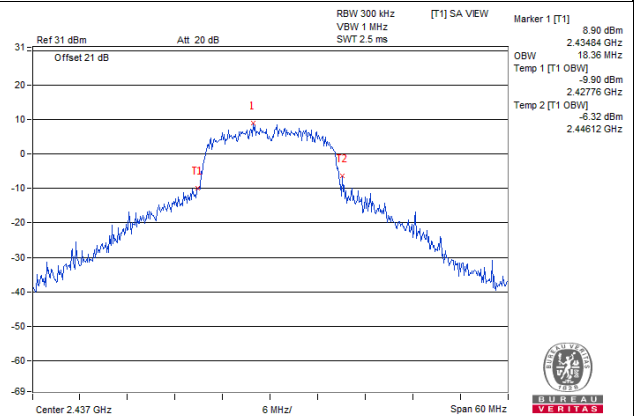
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
3	2422	36.24
6	2437	36.24
9	2452	36.24

Spectrum Plot of Worst Value

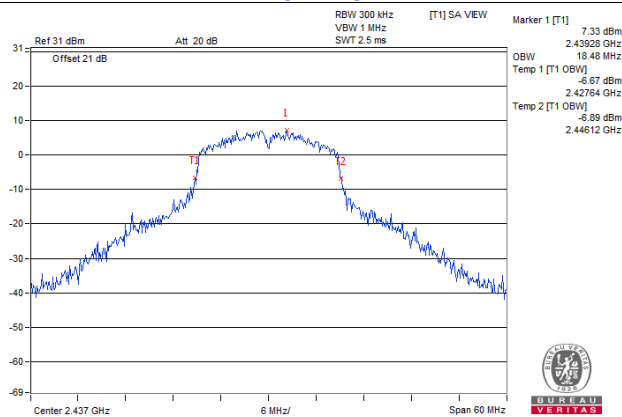
802.11b : CH6



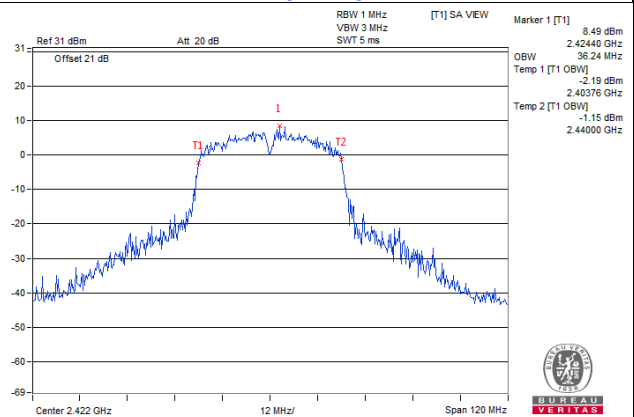
802.11g : CH6



802.11n (HT20) : CH6



802.11n (HT40) : CH3

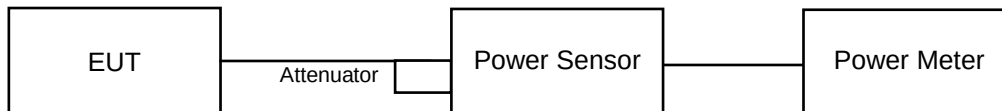


4.5 Conducted Output Power Measurement

4.5.1 Limits of Conducted Output Power Measurement

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

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 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.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as Item 4.3.6.

4.5.7 Test Results

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	77.983	18.92	30.00	Pass
6	2437	77.09	18.87	30.00	Pass
11	2462	76.033	18.81	30.00	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	126.183	21.01	30.00	Pass
6	2437	134.896	21.30	30.00	Pass
11	2462	127.35	21.05	30.00	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	123.88	20.93	30.00	Pass
6	2437	127.644	21.06	30.00	Pass
11	2462	129.122	21.11	30.00	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
3	2422	109.901	20.41	30.00	Pass
6	2437	122.18	20.87	30.00	Pass
9	2452	118.304	20.73	30.00	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	51.523	17.12
6	2437	50.699	17.05
11	2462	50.119	17.00

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	34.435	15.37
6	2437	48.195	16.83
11	2462	36.559	15.63

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	29.444	14.69
6	2437	40.832	16.11
11	2462	32.81	15.16

802.11n (HT40)

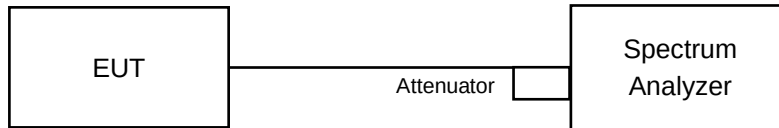
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
3	2422	19.498	12.90
6	2437	29.785	14.74
9	2452	22.336	13.49

4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-7.57	8	Pass
6	2437	-6.67	8	Pass
11	2462	-6.68	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-9.64	8	Pass
6	2437	-9.22	8	Pass
11	2462	-8.55	8	Pass

802.11n (HT20)

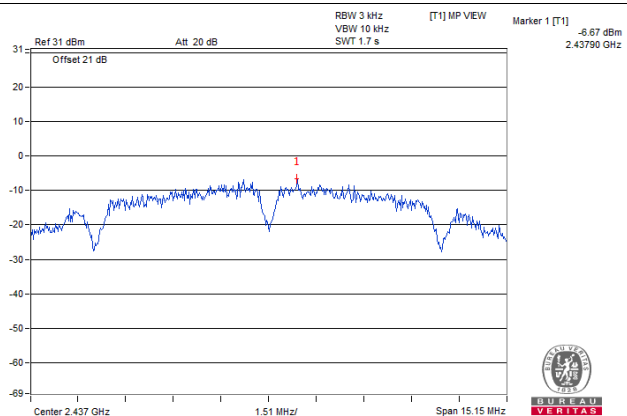
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-10.03	8	Pass
6	2437	-7.82	8	Pass
11	2462	-9.60	8	Pass

802.11n (HT40)

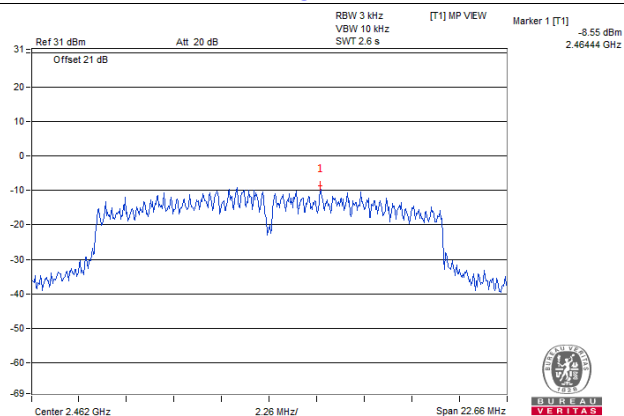
Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
3	2422	-14.67	8	Pass
6	2437	-13.33	8	Pass
9	2452	-14.43	8	Pass

Spectrum Plot of Worst Value

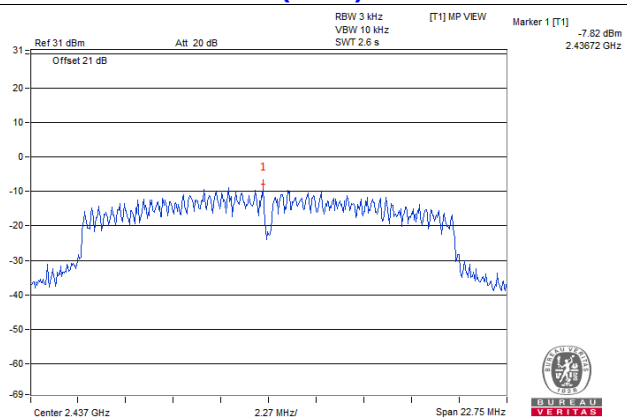
802.11b : CH6



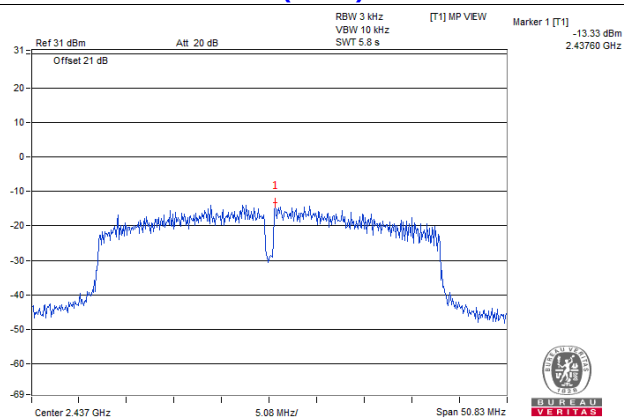
802.11g : CH11



802.11n (HT20) : CH6



802.11n (HT40) : CH6

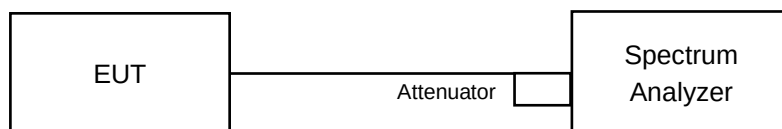


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

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

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

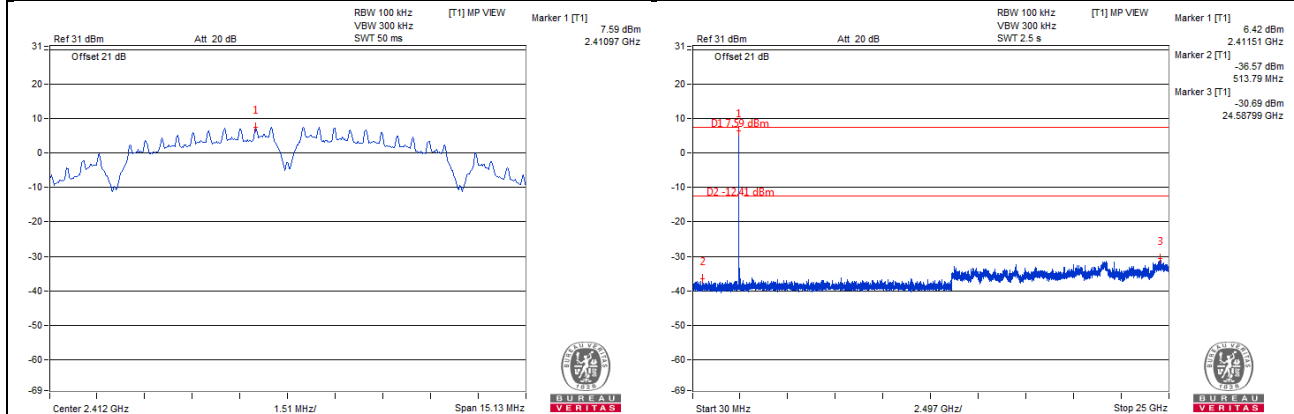
Same as Item 4.3.6

4.7.7 Test Results

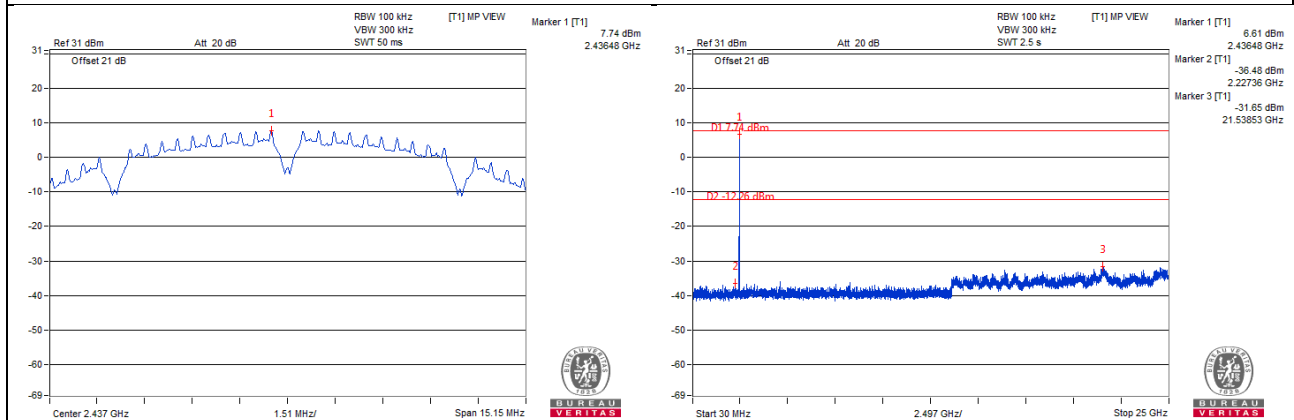
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

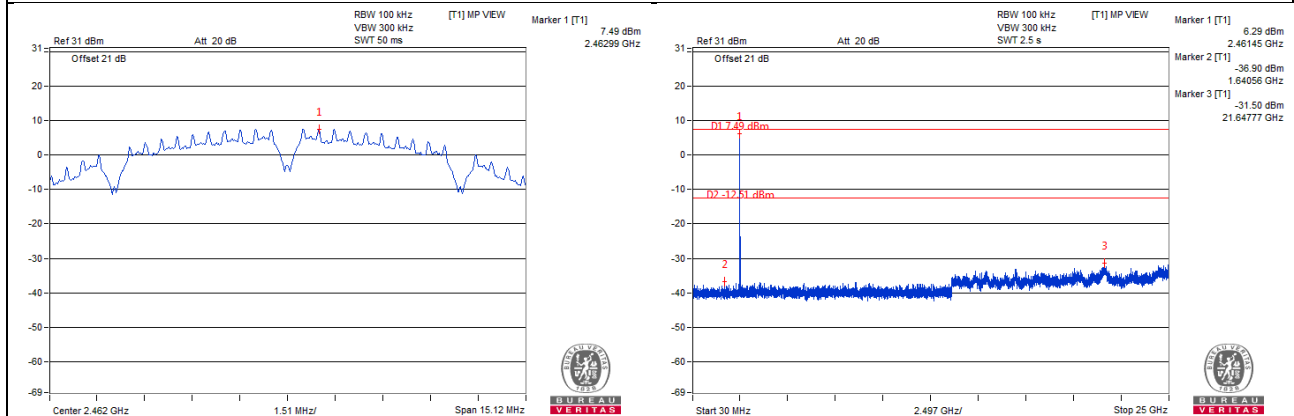
CH 1



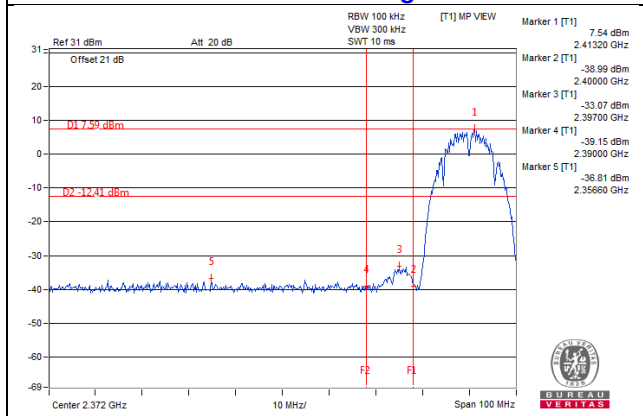
CH 6



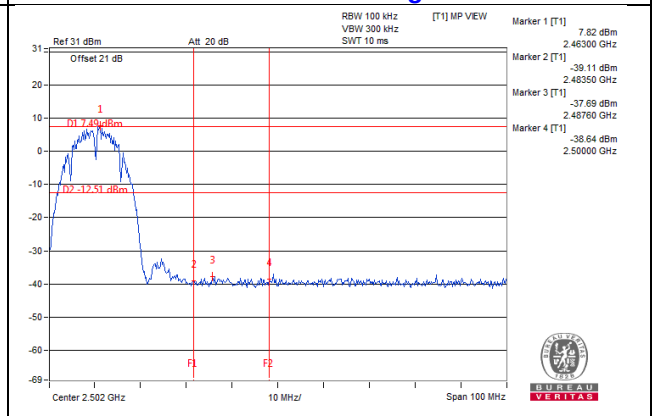
CH 11



CH 1 Band edge

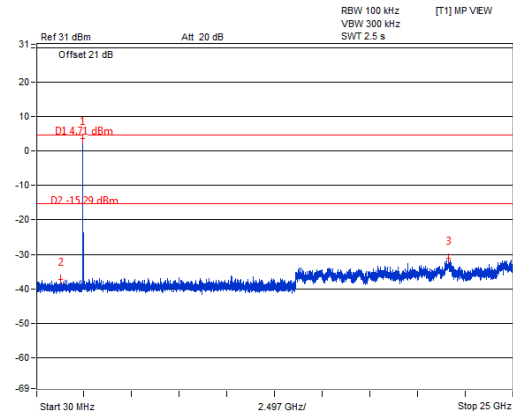
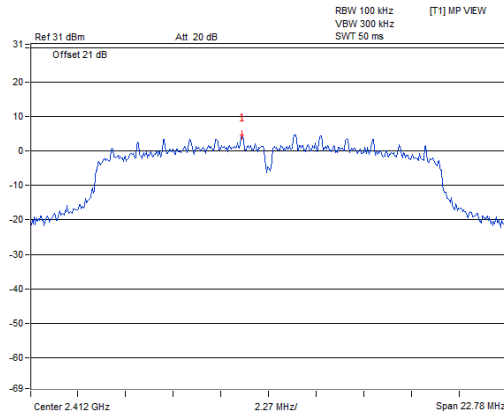


CH 11 Band edge

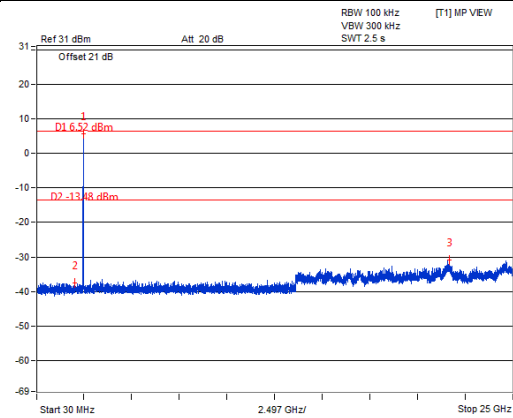
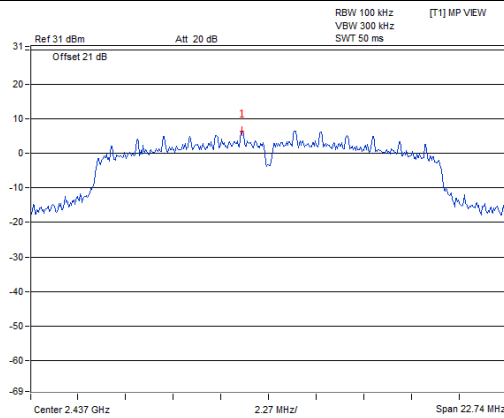


802.11g

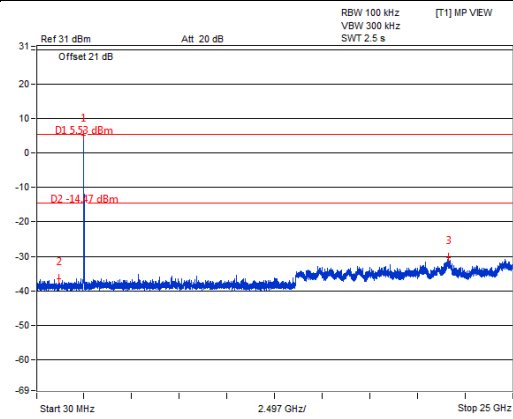
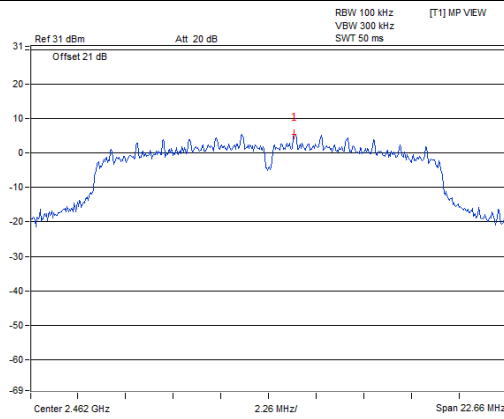
CH 1



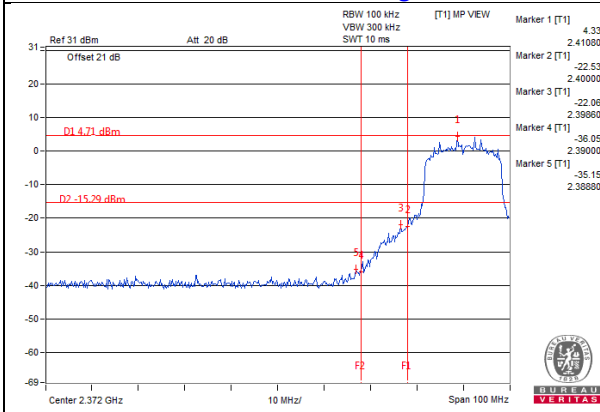
CH 6



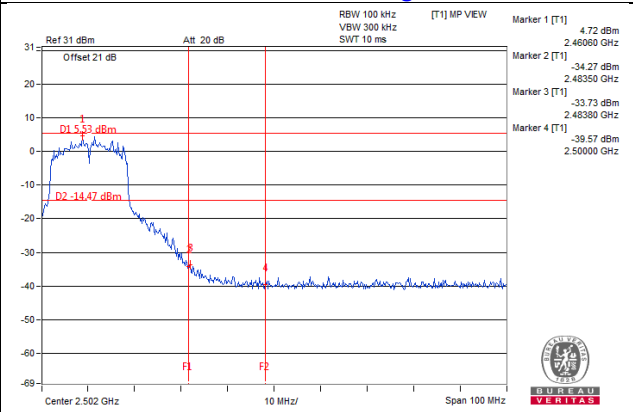
CH 11



CH 1 Band edge

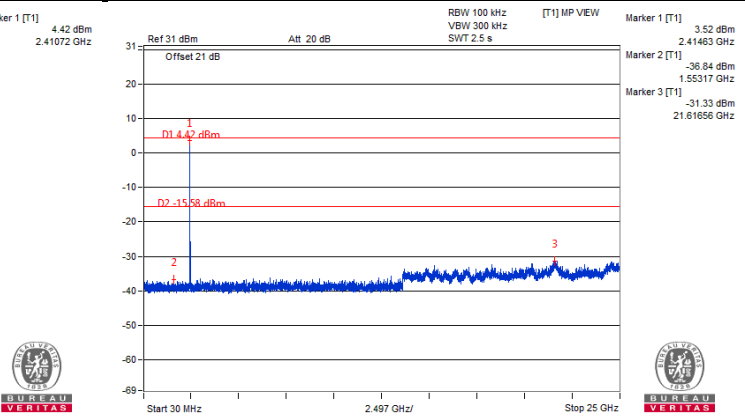
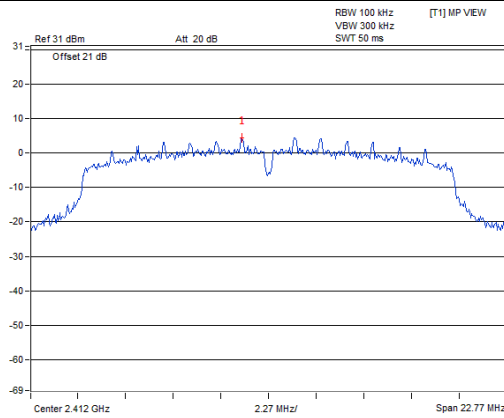


CH 11 Band edge

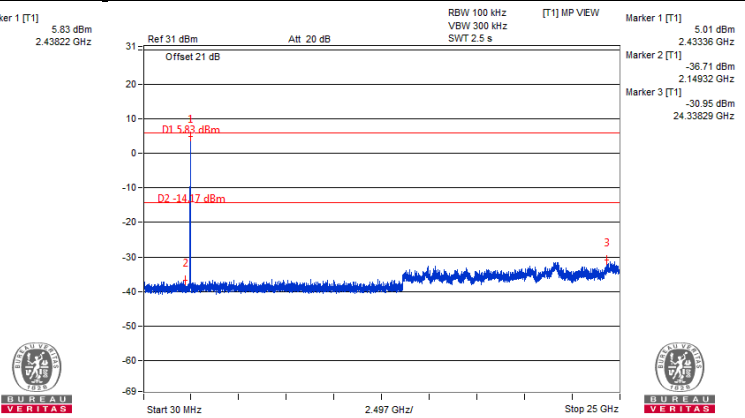
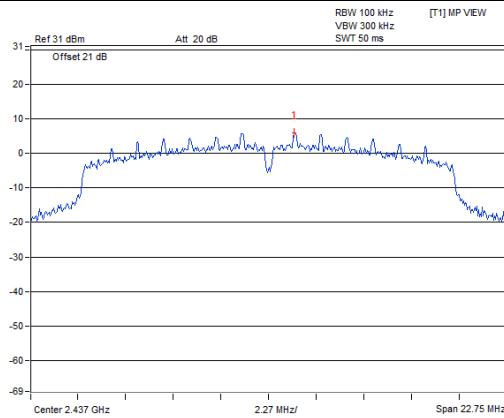


802.11n (HT20)

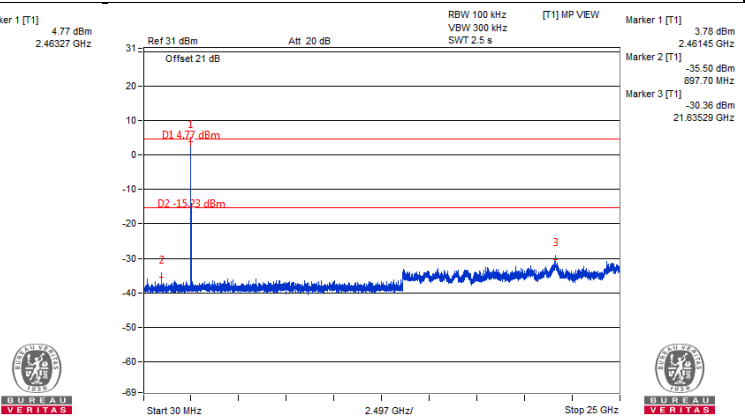
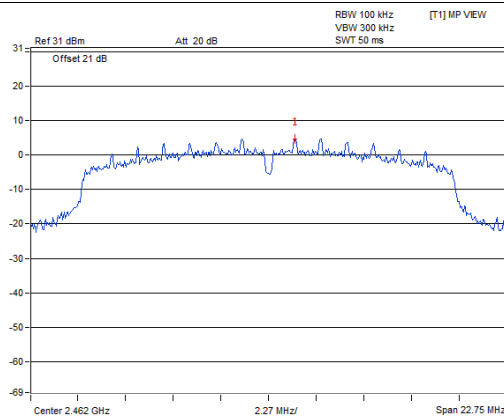
CH 1



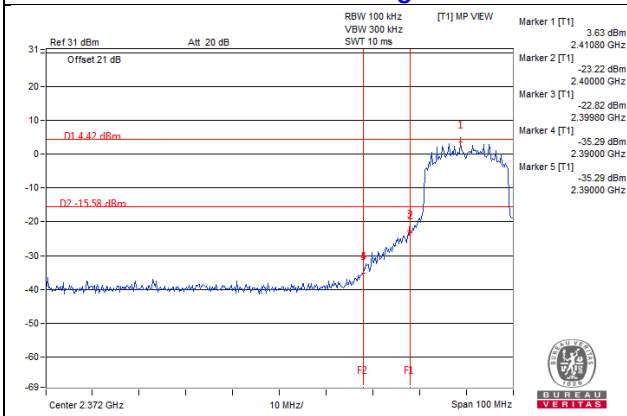
CH 6



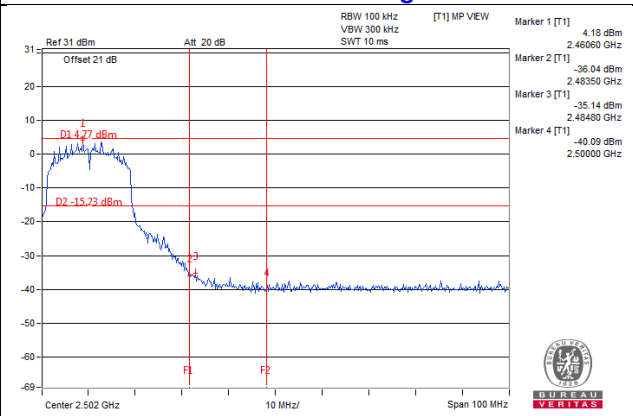
CH 11



CH 1 Band edge

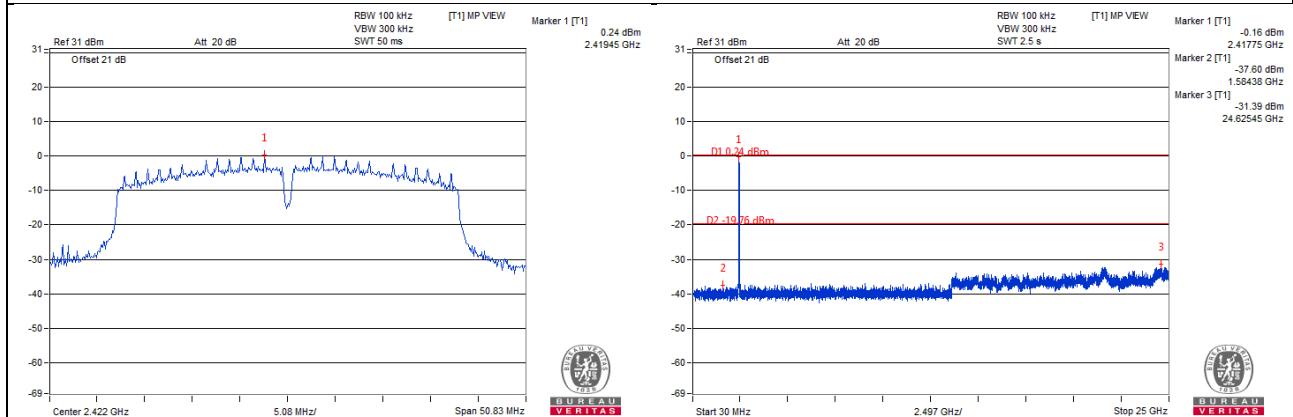


CH 11 Band edge

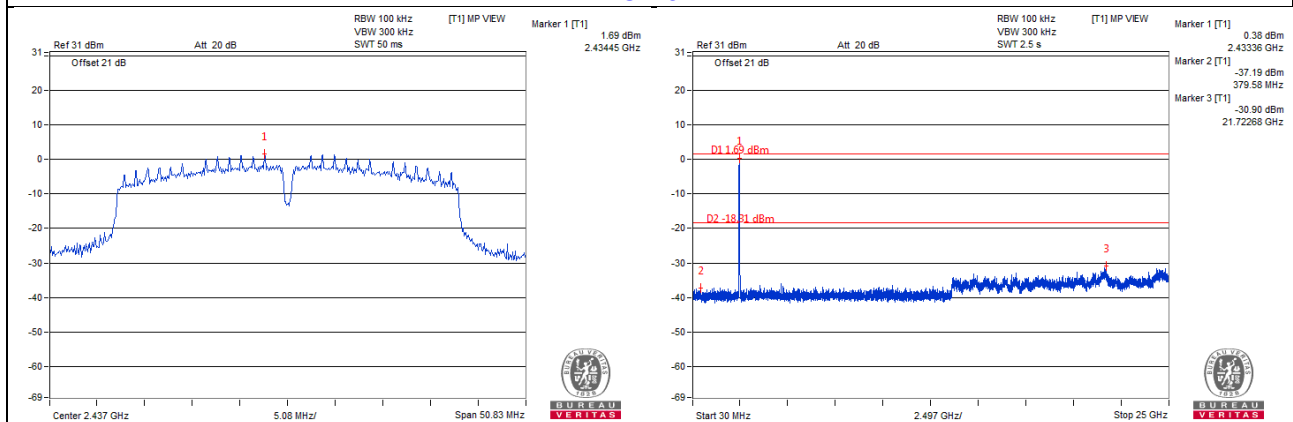


802.11n (HT40)

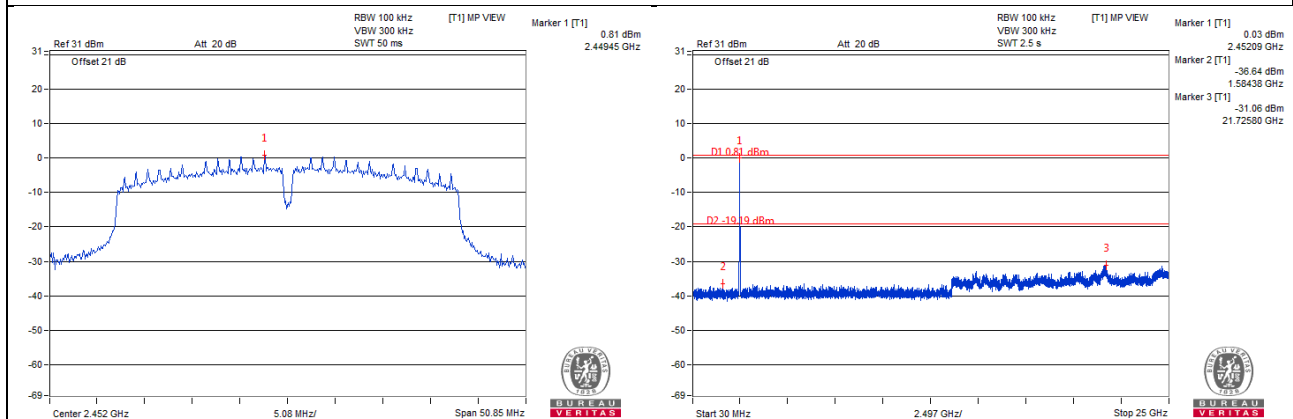
CH 3



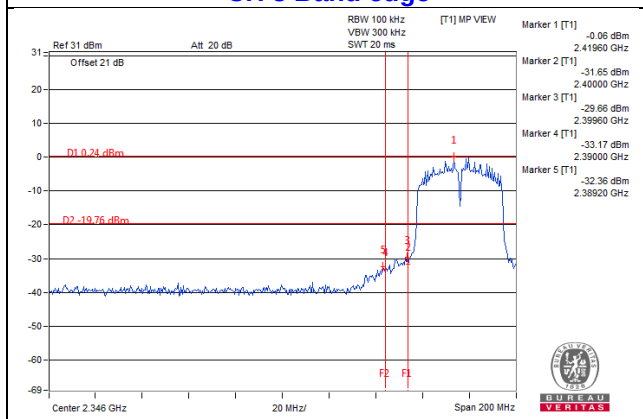
CH 6



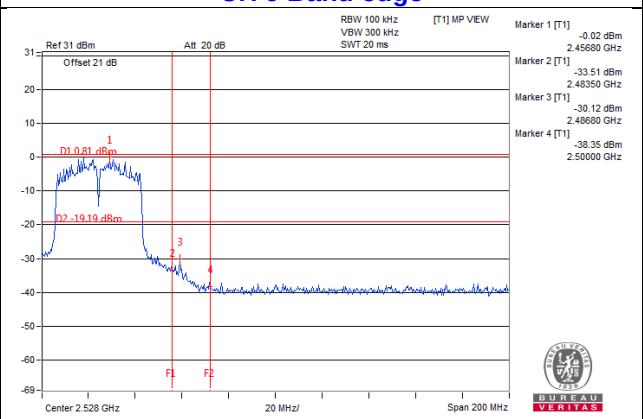
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited 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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