

FCC Test Report

Report No.: RF180627E05

FCC ID: Q87-03367

Test Model: WHW01P

Series Model: VLP01P, A01P

Received Date: June 27, 2018

Test Date: July 04 to 18, 2018

Issued Date: Aug. 23, 2018

Applicant: Linksys LLC

Address: 121 Theory Drive, Irvine, CA 92617, USA

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin
Chu Hsien 307, Taiwan R.O.C.

**FCC Registration /
Designation Number:** 723255 / TW2022 for Test Location (1)
736135 / TW0004 for Test Location (2)



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Release Control Record

Issue No.	Description	Date Issued
RF180627E05	Original release.	Aug. 23, 2018

1 Certificate of Conformity

Product: Velop Plug-In
Brand: Linksys
Test Model: WHW01P
Series Model: VLP01P, A01P
Sample Status: ENGINEERING SAMPLE
Applicant: Linksys LLC
Test Date: July 04 to 18, 2018
Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : Mary Ko , **Date:** Aug. 23, 2018
Mary Ko / Specialist

Approved by : May Chen , **Date:** Aug. 23, 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 -3.04dB at 0.61875MHz.
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, 4924.00MHz.
15.247(d)	Antenna Port Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is U.FL not a standard connector.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (\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

Product	Velop Plug-In
Brand	Linksys
Test Model	WHW01P
Series Model	VLP01P, A01P
Driver version	1.1.6.189558
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	AC100~240V
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	2.4GHz: 2.412 ~ 2.462GHz 5GHz: 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 5GHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	2.4GHz: CDD Mode: 526.359mW Beamforming Mode: 416.62mW 5GHz: CDD Mode: 5.18 ~ 5.24GHz: 403.327mW 5.745 ~ 5.825GHz: 520.715mW Beamforming Mode: 5.18 ~ 5.24GHz: 403.327mW 5.745 ~ 5.825GHz: 520.715mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA

Note:

- The EUT has below model names, which are identical to each other in all aspects except for the following information:

Brand Name	Model Name	Difference
Linksys	WHW01P	for marketing requirement
	VLP01P	
	A01P	

From the above models, model: **WHW01P** was selected as representative model for the test and its data was recorded in this report.

2. There are WLAN, Bluetooth technology used for the EUT. The EUT has below radios as following table:

Radio 1	Radio 2
WLAN (2.4GHz+5GHz)	Bluetooth

3. Simultaneously transmission condition.

Condition	Technology		
1	WLAN 2.4GHz	WLAN 5GHz	Bluetooth

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

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

WLAN						
Ant. No.	Chain No.	Ant. Net Gain (dBi)	Freq. range (GHz)	Ant. Type	Connector Type	Cable Length (mm)
1 (Left)	Chain 0	2.41	2.4~2.4835	Dipole	U.FL	53
		3.15	5.15~5.85			
2 (Right)	Chain 1	3.2	2.4~2.4835	Dipole	U.FL	77
		3.9	5.15~5.85			
Bluetooth						
Ant. No.	Ant. Net Gain (dBi)	Freq. range (GHz)	Ant. Type	Connector Type	Cable Length (mm)	
3	2.13	2.402~2.480	IFA	U.FL	53	

5. The EUT incorporates a MIMO function.

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

Note:

1. All of modulation mode support beamforming function except 802.11b/g/a modulation mode.
2. The EUT support Beamforming and non-beamforming mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.
3. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

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), VHT20:

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), VHT40:

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 \geq 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane (below 1GHz) & X-plane (above 1GHz)**.

Radiated Emission Test (Above 1GHz):

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

CDD Mode					
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, 2, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 2, 6, 10, 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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

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.

CDD Mode					
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, 2, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 2, 6, 10, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
Beamforming Mode (output power only)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	1, 2, 6, 10, 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	20deg. C, 64%RH	120Vac, 60Hz	Frank chuang
RE<1G	22deg. C, 68%RH	120Vac, 60Hz	Frank chuang
PLC	25deg. C, 69%RH	120Vac, 60Hz	Cody Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

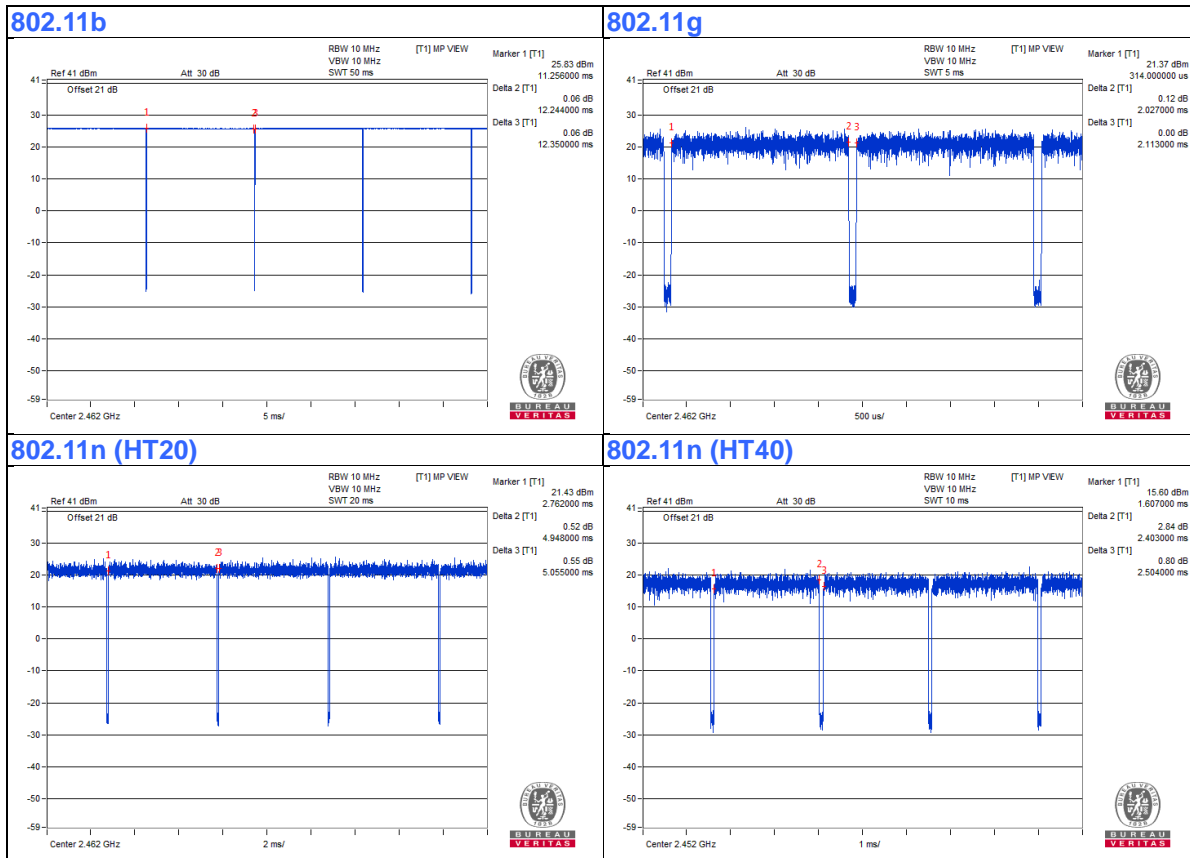
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $12.244/12.35 = 0.991$

802.11g: Duty cycle = $2.027/2.113 = 0.959$, Duty factor = $10 * \log(1/0.959) = 0.18$

802.11n (HT20): Duty cycle = $4.948/5.055 = 0.979$, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11n (HT40): Duty cycle = $2.403/2.504 = 0.96$, Duty factor = $10 * \log(1/0.96) = 0.18$

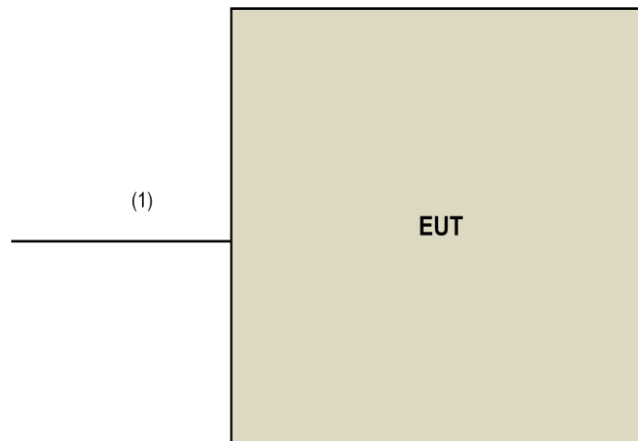


3.4 Description of Support Units

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	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Console Cable	1	0.05	No	0	Supplied by client(for RF Setup)

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 DTS Meas Guidance v04
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 30dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 Test Instruments

For Below 1GHz test:

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	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-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	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-2	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The 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: July 04, 2018

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-03	May 10, 2018	May 09, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150318	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	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
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	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 test was performed in 966 Chamber No. 4.
3. The CANADA Site Registration No. is 20331-2
4. Tested Date: July 18, 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:

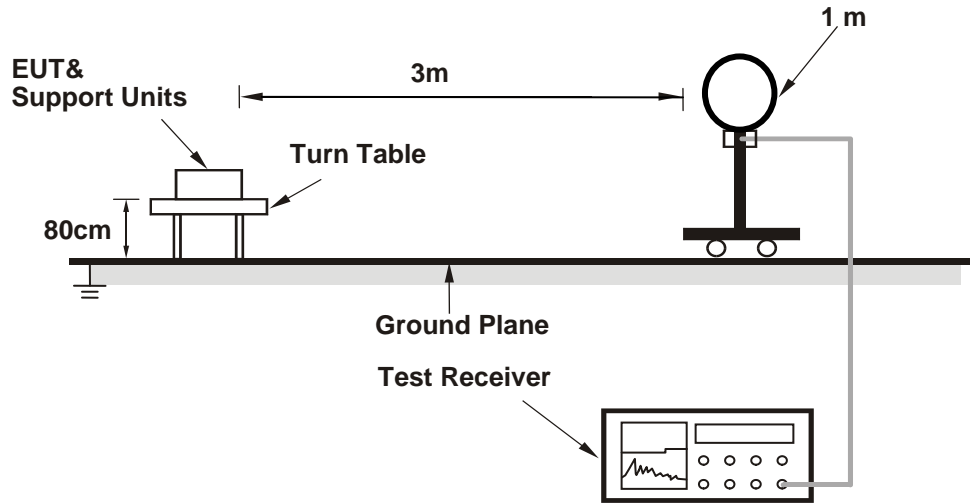
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

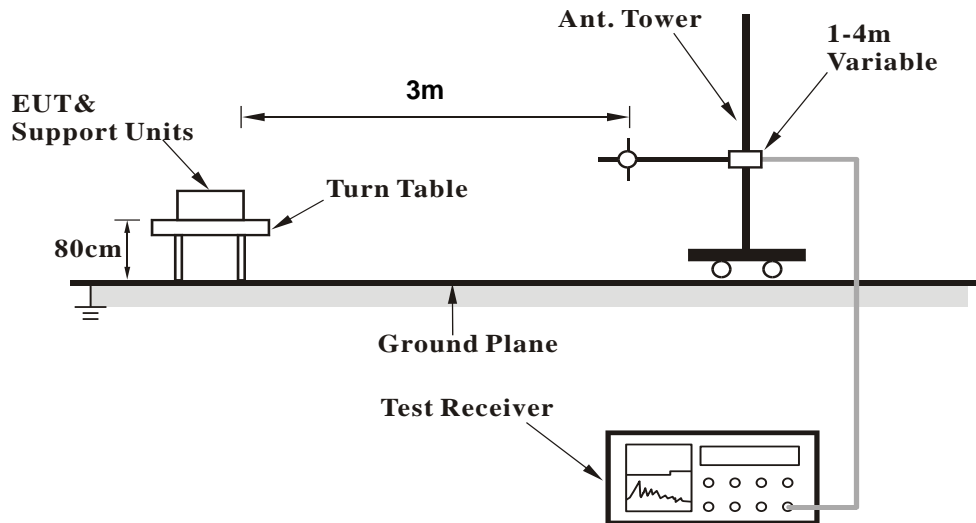
No deviation.

4.1.5 Test Setup

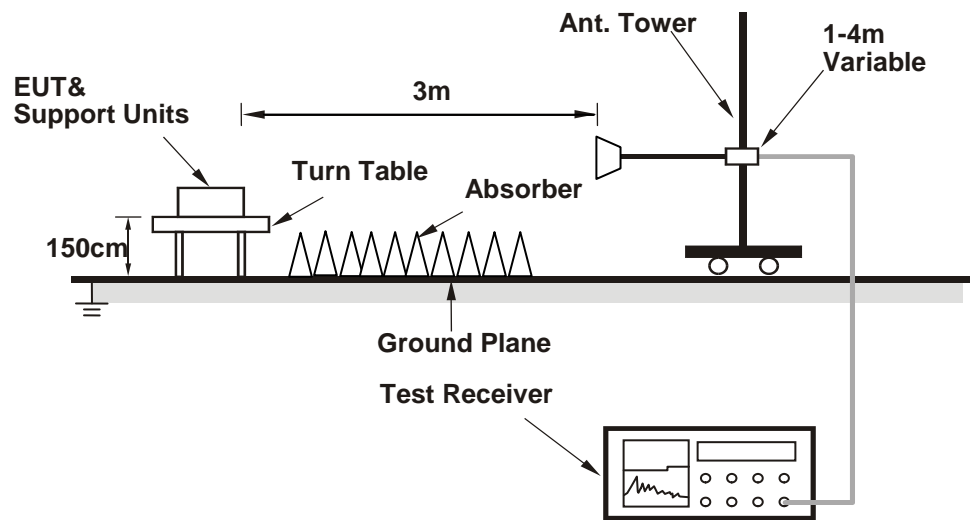
For Radiated emission below 30MHz



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

- a. Placed the EUT on the testing table.
- a. Controlling software (QDART_1.0.38) 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	2390.00	58.3 PK	74.0	-15.7	2.42 H	98	60.5	-2.2
2	2390.00	49.5 AV	54.0	-4.5	2.42 H	98	51.7	-2.2
3	*2412.00	113.3 PK			2.42 H	98	115.7	-2.4
4	*2412.00	111.0 AV			2.42 H	98	113.4	-2.4
5	4824.00	48.6 PK	74.0	-25.4	2.23 H	142	46.8	1.8
6	4824.00	47.4 AV	54.0	-6.6	2.23 H	142	45.6	1.8

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	56.4 PK	74.0	-17.6	1.00 V	302	58.6	-2.2
2	2390.00	46.0 AV	54.0	-8.0	1.00 V	302	48.2	-2.2
3	*2412.00	105.9 PK			1.00 V	302	108.3	-2.4
4	*2412.00	103.4 AV			1.00 V	302	105.8	-2.4
5	4824.00	54.2 PK	74.0	-19.8	1.09 V	310	52.4	1.8
6	4824.00	53.4 AV	54.0	-0.6	1.09 V	310	51.6	1.8

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	58.2 PK	74.0	-15.8	2.67 H	97	60.4	-2.2
2	2390.00	50.4 AV	54.0	-3.6	2.67 H	97	52.6	-2.2
3	*2437.00	113.3 PK			2.67 H	97	115.9	-2.6
4	*2437.00	111.1 AV			2.67 H	97	113.7	-2.6
5	2483.50	56.7 PK	74.0	-17.3	2.67 H	97	59.1	-2.4
6	2483.50	46.6 AV	54.0	-7.4	2.67 H	97	49.0	-2.4
7	4874.00	48.7 PK	74.0	-25.3	2.29 H	142	46.7	2.0
8	4874.00	47.7 AV	54.0	-6.3	2.29 H	142	45.7	2.0
9	7311.00	48.6 PK	74.0	-25.4	1.12 H	289	40.2	8.4
10	7311.00	42.3 AV	54.0	-11.7	1.12 H	289	33.9	8.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	56.7 PK	74.0	-17.3	1.05 V	317	58.9	-2.2
2	2390.00	46.1 AV	54.0	-7.9	1.05 V	317	48.3	-2.2
3	*2437.00	105.7 PK			1.05 V	317	108.3	-2.6
4	*2437.00	103.2 AV			1.05 V	317	105.8	-2.6
5	2483.50	52.4 PK	74.0	-21.6	1.05 V	317	54.8	-2.4
6	2483.50	42.1 AV	54.0	-11.9	1.05 V	317	44.5	-2.4
7	4874.00	54.3 PK	74.0	-19.7	1.02 V	313	52.3	2.0
8	4874.00	53.5 AV	54.0	-0.5	1.02 V	313	51.5	2.0
9	7311.00	47.6 PK	74.0	-26.4	1.06 V	223	39.2	8.4
10	7311.00	41.2 AV	54.0	-12.8	1.06 V	223	32.8	8.4

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. 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	111.9 PK			2.93 H	99	114.5	-2.6
2	*2462.00	109.8 AV			2.93 H	99	112.4	-2.6
3	2483.50	57.5 PK	74.0	-16.5	2.93 H	99	59.9	-2.4
4	2483.50	49.8 AV	54.0	-4.2	2.93 H	99	52.2	-2.4
5	4924.00	49.0 PK	74.0	-25.0	2.27 H	149	47.0	2.0
6	4924.00	48.2 AV	54.0	-5.8	2.27 H	149	46.2	2.0
7	7386.00	49.0 PK	74.0	-25.0	1.11 H	300	40.4	8.6
8	7386.00	42.7 AV	54.0	-11.3	1.11 H	300	34.1	8.6

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	*2462.00	107.0 PK			1.00 V	314	109.6	-2.6
2	*2462.00	104.7 AV			1.00 V	314	107.3	-2.6
3	2483.50	57.2 PK	74.0	-16.8	1.00 V	314	59.6	-2.4
4	2483.50	46.5 AV	54.0	-7.5	1.00 V	314	48.9	-2.4
5	4924.00	54.6 PK	74.0	-19.4	1.05 V	292	52.6	2.0
6	4924.00	53.9 AV	54.0	-0.1	1.05 V	292	51.9	2.0
7	7386.00	47.7 PK	74.0	-26.3	1.07 V	209	39.1	8.6
8	7386.00	41.2 AV	54.0	-12.8	1.07 V	209	32.6	8.6

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.

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	66.3 PK	74.0	-7.7	2.45 H	94	68.5	-2.2
2	2390.00	52.6 AV	54.0	-1.4	2.45 H	94	54.8	-2.2
3	*2412.00	112.2 PK			2.45 H	94	114.6	-2.4
4	*2412.00	102.5 AV			2.45 H	94	104.9	-2.4
5	4824.00	43.1 PK	74.0	-30.9	2.63 H	205	41.3	1.8
6	4824.00	29.4 AV	54.0	-24.6	2.63 H	205	27.6	1.8

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	62.1 PK	74.0	-11.9	1.00 V	301	64.3	-2.2
2	2390.00	48.1 AV	54.0	-5.9	1.00 V	301	50.3	-2.2
3	*2412.00	107.3 PK			1.00 V	301	109.7	-2.4
4	*2412.00	97.1 AV			1.00 V	301	99.5	-2.4
5	4824.00	44.2 PK	74.0	-29.8	1.05 V	313	42.4	1.8
6	4824.00	32.2 AV	54.0	-21.8	1.05 V	313	30.4	1.8

REMARKS:

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

CHANNEL	TX Channel 2	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	68.9 PK	74.0	-5.1	2.03 H	106	71.1	-2.2
2	2390.00	53.6 AV	54.0	-0.4	2.03 H	106	55.8	-2.2
3	*2417.00	115.7 PK			2.03 H	106	118.1	-2.4
4	*2417.00	104.1 AV			2.03 H	106	106.5	-2.4
5	4834.00	44.5 PK	74.0	-29.5	2.57 H	191	42.7	1.8
6	4834.00	31.4 AV	54.0	-22.6	2.57 H	191	29.6	1.8
7	7251.00	43.3 PK	74.0	-30.7	1.57 H	360	35.2	8.1
8	7251.00	31.5 AV	54.0	-22.5	1.57 H	360	23.4	8.1

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	63.8 PK	74.0	-10.2	1.03 V	289	66.0	-2.2
2	2390.00	49.4 AV	54.0	-4.6	1.03 V	289	51.6	-2.2
3	*2417.00	109.4 PK			1.03 V	289	111.8	-2.4
4	*2417.00	99.2 AV			1.03 V	289	101.6	-2.4
5	4834.00	46.8 PK	74.0	-27.2	1.07 V	307	45.0	1.8
6	4834.00	35.6 AV	54.0	-18.4	1.07 V	307	33.8	1.8
7	7251.00	45.2 PK	74.0	-28.8	1.29 V	219	37.1	8.1
8	7251.00	33.7 AV	54.0	-20.3	1.29 V	219	25.6	8.1

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	67.1 PK	74.0	-6.9	2.64 H	100	69.3	-2.2
2	2390.00	52.8 AV	54.0	-1.2	2.64 H	100	55.0	-2.2
3	*2437.00	115.3 PK			2.64 H	100	117.9	-2.6
4	*2437.00	104.9 AV			2.64 H	100	107.5	-2.6
5	2483.50	62.9 PK	74.0	-11.1	2.64 H	100	65.3	-2.4
6	2483.50	49.0 AV	54.0	-5.0	2.64 H	100	51.4	-2.4
7	4874.00	46.2 PK	74.0	-27.8	2.61 H	206	44.2	2.0
8	4874.00	32.8 AV	54.0	-21.2	2.61 H	206	30.8	2.0
9	7311.00	43.5 PK	74.0	-30.5	1.58 H	357	35.1	8.4
10	7311.00	31.8 AV	54.0	-22.2	1.58 H	357	23.4	8.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.7 PK	74.0	-12.3	1.00 V	315	63.9	-2.2
2	2390.00	48.0 AV	54.0	-6.0	1.00 V	315	50.2	-2.2
3	*2437.00	110.2 PK			1.00 V	315	112.8	-2.6
4	*2437.00	99.8 AV			1.00 V	315	102.4	-2.6
5	2483.50	58.3 PK	74.0	-15.7	1.00 V	315	60.7	-2.4
6	2483.50	45.1 AV	54.0	-8.9	1.00 V	315	47.5	-2.4
7	4874.00	49.2 PK	74.0	-24.8	1.03 V	308	47.2	2.0
8	4874.00	37.1 AV	54.0	-16.9	1.03 V	308	35.1	2.0
9	7311.00	45.5 PK	74.0	-28.5	1.26 V	228	37.1	8.4
10	7311.00	33.8 AV	54.0	-20.2	1.26 V	228	25.4	8.4

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. 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	111.7 PK			2.55 H	97	114.3	-2.6
2	*2462.00	101.4 AV			2.55 H	97	104.0	-2.6
3	2483.50	70.8 PK	74.0	-3.2	2.55 H	97	73.2	-2.4
4	2483.50	53.8 AV	54.0	-0.2	2.55 H	97	56.2	-2.4
5	4924.00	42.6 PK	74.0	-31.4	2.62 H	212	40.6	2.0
6	4924.00	29.0 AV	54.0	-25.0	2.62 H	212	27.0	2.0
7	7386.00	43.6 PK	74.0	-30.4	1.55 H	360	35.0	8.6
8	7386.00	31.6 AV	54.0	-22.4	1.55 H	360	23.0	8.6

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	*2462.00	106.8 PK			1.00 V	308	109.4	-2.6
2	*2462.00	96.5 AV			1.00 V	308	99.1	-2.6
3	2483.50	66.4 PK	74.0	-7.6	1.00 V	308	68.8	-2.4
4	2483.50	49.5 AV	54.0	-4.5	1.00 V	308	51.9	-2.4
5	4924.00	44.0 PK	74.0	-30.0	1.00 V	298	42.0	2.0
6	4924.00	32.1 AV	54.0	-21.9	1.00 V	298	30.1	2.0
7	7386.00	43.7 PK	74.0	-30.3	1.26 V	226	35.1	8.6
8	7386.00	31.3 AV	54.0	-22.7	1.26 V	226	22.7	8.6

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.

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	68.4 PK	74.0	-5.6	2.99 H	104	70.6	-2.2
2	2390.00	53.5 AV	54.0	-0.5	2.99 H	104	55.7	-2.2
3	*2412.00	112.8 PK			2.99 H	104	115.2	-2.4
4	*2412.00	101.5 AV			2.99 H	104	103.9	-2.4
5	4824.00	42.9 PK	74.0	-31.1	2.68 H	202	41.1	1.8
6	4824.00	29.3 AV	54.0	-24.7	2.68 H	202	27.5	1.8

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	66.8 PK	74.0	-7.2	1.00 V	300	69.0	-2.2
2	2390.00	49.8 AV	54.0	-4.2	1.00 V	300	52.0	-2.2
3	*2412.00	107.0 PK			1.00 V	300	109.4	-2.4
4	*2412.00	96.7 AV			1.00 V	300	99.1	-2.4
5	4824.00	43.8 PK	74.0	-30.2	1.00 V	292	42.0	1.8
6	4824.00	31.8 AV	54.0	-22.2	1.00 V	292	30.0	1.8

REMARKS:

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

CHANNEL	TX Channel 2	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	68.9 PK	74.0	-5.1	2.25 H	107	71.1	-2.2
2	2390.00	53.6 AV	54.0	-0.4	2.25 H	107	55.8	-2.2
3	*2417.00	113.5 PK			2.25 H	107	115.9	-2.4
4	*2417.00	103.6 AV			2.25 H	107	106.0	-2.4
5	4834.00	44.2 PK	74.0	-29.8	2.53 H	187	42.4	1.8
6	4834.00	31.2 AV	54.0	-22.8	2.53 H	187	29.4	1.8
7	7251.00	43.8 PK	74.0	-30.2	1.55 H	357	35.7	8.1
8	7251.00	31.8 AV	54.0	-22.2	1.55 H	357	23.7	8.1

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	64.1 PK	74.0	-9.9	1.00 V	287	66.3	-2.2
2	2390.00	49.6 AV	54.0	-4.4	1.00 V	287	51.8	-2.2
3	*2417.00	109.8 PK			1.00 V	287	112.2	-2.4
4	*2417.00	97.9 AV			1.00 V	287	100.3	-2.4
5	4834.00	46.8 PK	74.0	-27.2	1.00 V	298	45.0	1.8
6	4834.00	35.3 AV	54.0	-18.7	1.00 V	298	33.5	1.8
7	7251.00	45.7 PK	74.0	-28.3	1.23 V	237	37.6	8.1
8	7251.00	33.9 AV	54.0	-20.1	1.23 V	237	25.8	8.1

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	67.3 PK	74.0	-6.7	2.37 H	109	69.5	-2.2
2	2390.00	53.8 AV	54.0	-0.2	2.37 H	109	56.0	-2.2
3	*2437.00	115.1 PK			2.37 H	109	117.7	-2.6
4	*2437.00	103.6 AV			2.37 H	109	106.2	-2.6
5	2483.50	65.0 PK	74.0	-9.0	2.37 H	109	67.4	-2.4
6	2483.50	49.8 AV	54.0	-4.2	2.37 H	109	52.2	-2.4
7	4874.00	45.9 PK	74.0	-28.1	2.58 H	201	43.9	2.0
8	4874.00	32.4 AV	54.0	-21.6	2.58 H	201	30.4	2.0
9	7311.00	43.9 PK	74.0	-30.1	1.64 H	360	35.5	8.4
10	7311.00	32.2 AV	54.0	-21.8	1.64 H	360	23.8	8.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.3 PK	74.0	-7.7	1.01 V	309	68.5	-2.2
2	2390.00	49.4 AV	54.0	-4.6	1.01 V	309	51.6	-2.2
3	*2437.00	110.2 PK			1.01 V	309	112.8	-2.6
4	*2437.00	98.2 AV			1.01 V	309	100.8	-2.6
5	2483.50	60.2 PK	74.0	-13.8	1.01 V	309	62.6	-2.4
6	2483.50	44.8 AV	54.0	-9.2	1.01 V	309	47.2	-2.4
7	4874.00	49.2 PK	74.0	-24.8	1.08 V	317	47.2	2.0
8	4874.00	37.2 AV	54.0	-16.8	1.08 V	317	35.2	2.0
9	7311.00	45.5 PK	74.0	-28.5	1.24 V	229	37.1	8.4
10	7311.00	33.9 AV	54.0	-20.1	1.24 V	229	25.5	8.4

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. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 10	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	*2457.00	114.6 PK			2.20 H	117	117.2	-2.6
2	*2457.00	103.4 AV			2.20 H	117	106.0	-2.6
3	2483.50	70.1 PK	74.0	-3.9	2.20 H	117	72.5	-2.4
4	2483.50	53.9 AV	54.0	-0.1	2.20 H	117	56.3	-2.4
5	4914.00	44.6 PK	74.0	-29.4	2.55 H	206	42.6	2.0
6	4914.00	31.4 AV	54.0	-22.6	2.55 H	206	29.4	2.0
7	7371.00	43.6 PK	74.0	-30.4	1.55 H	360	35.0	8.6
8	7371.00	31.6 AV	54.0	-22.4	1.55 H	360	23.0	8.6

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	*2457.00	109.8 PK			1.00 V	291	112.4	-2.6
2	*2457.00	97.7 AV			1.00 V	291	100.3	-2.6
3	2483.50	63.8 PK	74.0	-10.2	1.00 V	291	66.2	-2.4
4	2483.50	49.3 AV	54.0	-4.7	1.00 V	291	51.7	-2.4
5	4914.00	48.1 PK	74.0	-25.9	1.04 V	300	46.1	2.0
6	4914.00	35.7 AV	54.0	-18.3	1.04 V	300	33.7	2.0
7	7371.00	45.2 PK	74.0	-28.8	1.30 V	232	36.6	8.6
8	7371.00	33.5 AV	54.0	-20.5	1.30 V	232	24.9	8.6

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 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	111.0 PK			2.58 H	102	113.6	-2.6
2	*2462.00	99.4 AV			2.58 H	102	102.0	-2.6
3	2483.50	68.4 PK	74.0	-5.6	2.58 H	102	70.8	-2.4
4	2483.50	53.0 AV	54.0	-1.0	2.58 H	102	55.4	-2.4
5	4924.00	41.9 PK	74.0	-32.1	2.61 H	221	39.9	2.0
6	4924.00	28.5 AV	54.0	-25.5	2.61 H	221	26.5	2.0
7	7386.00	44.3 PK	74.0	-29.7	1.58 H	360	35.7	8.6
8	7386.00	32.1 AV	54.0	-21.9	1.58 H	360	23.5	8.6

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	*2462.00	106.2 PK			1.04 V	328	108.8	-2.6
2	*2462.00	94.5 AV			1.04 V	328	97.1	-2.6
3	2483.50	66.7 PK	74.0	-7.3	1.04 V	328	69.1	-2.4
4	2483.50	49.5 AV	54.0	-4.5	1.04 V	328	51.9	-2.4
5	4924.00	43.4 PK	74.0	-30.6	1.00 V	313	41.4	2.0
6	4924.00	31.8 AV	54.0	-22.2	1.00 V	313	29.8	2.0
7	7386.00	44.2 PK	74.0	-29.8	1.21 V	224	35.6	8.6
8	7386.00	31.6 AV	54.0	-22.4	1.21 V	224	23.0	8.6

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.

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	67.1 PK	74.0	-6.9	1.24 H	107	69.3	-2.2
2	2390.00	53.3 AV	54.0	-0.7	1.24 H	107	55.5	-2.2
3	*2422.00	107.3 PK			1.24 H	107	109.8	-2.5
4	*2422.00	97.6 AV			1.24 H	107	100.1	-2.5
5	4844.00	42.6 PK	74.0	-31.4	2.68 H	199	40.8	1.8
6	4844.00	28.9 AV	54.0	-25.1	2.68 H	199	27.1	1.8
7	7266.00	44.3 PK	74.0	-29.7	1.49 H	360	36.1	8.2
8	7266.00	32.0 AV	54.0	-22.0	1.49 H	360	23.8	8.2

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	66.2 PK	74.0	-7.8	1.00 V	330	68.4	-2.2
2	2390.00	49.3 AV	54.0	-4.7	1.00 V	330	51.5	-2.2
3	*2422.00	102.1 PK			1.00 V	330	104.6	-2.5
4	*2422.00	92.8 AV			1.00 V	330	95.3	-2.5
5	4844.00	42.8 PK	74.0	-31.2	1.00 V	309	41.0	1.8
6	4844.00	29.2 AV	54.0	-24.8	1.00 V	309	27.4	1.8
7	7266.00	43.3 PK	74.0	-30.7	1.26 V	238	35.1	8.2
8	7266.00	30.9 AV	54.0	-23.1	1.26 V	238	22.7	8.2

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
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	66.8 PK	74.0	-7.2	2.96 H	102	69.0	-2.2
2	2390.00	52.7 AV	54.0	-1.3	2.96 H	102	54.9	-2.2
3	*2437.00	109.3 PK			2.96 H	102	111.9	-2.6
4	*2437.00	99.5 AV			2.96 H	102	102.1	-2.6
5	2483.50	62.8 PK	74.0	-11.2	2.96 H	102	65.2	-2.4
6	2483.50	47.5 AV	54.0	-6.5	2.96 H	102	49.9	-2.4
7	4874.00	42.7 PK	74.0	-31.3	2.60 H	218	40.7	2.0
8	4874.00	29.2 AV	54.0	-24.8	2.60 H	218	27.2	2.0
9	7311.00	43.1 PK	74.0	-30.9	1.50 H	360	34.7	8.4
10	7311.00	31.3 AV	54.0	-22.7	1.50 H	360	22.9	8.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.8 PK	74.0	-7.2	1.04 V	304	69.0	-2.2
2	2390.00	49.9 AV	54.0	-4.1	1.04 V	304	52.1	-2.2
3	*2437.00	104.1 PK			1.04 V	304	106.7	-2.6
4	*2437.00	94.8 AV			1.04 V	304	97.4	-2.6
5	2483.50	57.8 PK	74.0	-16.2	1.04 V	304	60.2	-2.4
6	2483.50	42.8 AV	54.0	-11.2	1.04 V	304	45.2	-2.4
7	4874.00	42.8 PK	74.0	-31.2	1.00 V	318	40.8	2.0
8	4874.00	29.3 AV	54.0	-24.7	1.00 V	318	27.3	2.0
9	7311.00	43.9 PK	74.0	-30.1	1.23 V	230	35.5	8.4
10	7311.00	31.2 AV	54.0	-22.8	1.23 V	230	22.8	8.4

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. 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	107.6 PK			3.32 H	100	110.2	-2.6
2	*2452.00	97.5 AV			3.32 H	100	100.1	-2.6
3	2483.50	70.0 PK	74.0	-4.0	3.32 H	100	72.4	-2.4
4	2483.50	53.1 AV	54.0	-0.9	3.32 H	100	55.5	-2.4
5	4904.00	42.5 PK	74.0	-31.5	2.64 H	205	40.5	2.0
6	4904.00	28.6 AV	54.0	-25.4	2.64 H	205	26.6	2.0
7	7356.00	43.3 PK	74.0	-30.7	1.56 H	360	34.7	8.6
8	7356.00	31.2 AV	54.0	-22.8	1.56 H	360	22.6	8.6

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	*2452.00	102.8 PK			1.02 V	319	105.4	-2.6
2	*2452.00	92.7 AV			1.02 V	319	95.3	-2.6
3	2483.50	65.9 PK	74.0	-8.1	1.02 V	319	68.3	-2.4
4	2483.50	49.1 AV	54.0	-4.9	1.02 V	319	51.5	-2.4
5	4904.00	42.7 PK	74.0	-31.3	1.00 V	319	40.7	2.0
6	4904.00	28.8 AV	54.0	-25.2	1.00 V	319	26.8	2.0
7	7356.00	43.6 PK	74.0	-30.4	1.26 V	248	35.0	8.6
8	7356.00	30.9 AV	54.0	-23.1	1.26 V	248	22.3	8.6

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.

Below 1GHz Data:

802.11n (HT20)

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	120.94	25.9 QP	43.5	-17.6	1.50 H	66	35.5	-9.6
2	256.20	29.7 QP	46.0	-16.3	1.00 H	72	38.4	-8.7
3	303.39	32.0 QP	46.0	-14.0	1.00 H	51	39.0	-7.0
4	388.03	32.8 QP	46.0	-13.2	1.00 H	49	37.3	-4.5
5	420.74	33.2 QP	46.0	-12.8	1.00 H	37	36.8	-3.6
6	632.90	31.8 QP	46.0	-14.2	1.50 H	42	30.4	1.4

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	45.81	32.8 QP	40.0	-7.2	1.00 V	360	40.7	-7.9
2	132.34	24.3 QP	43.5	-19.2	1.00 V	101	33.2	-8.9
3	309.43	28.0 QP	46.0	-18.0	1.50 V	321	34.8	-6.8
4	383.88	30.0 QP	46.0	-16.0	1.00 V	336	34.6	-4.6
5	421.23	31.1 QP	46.0	-14.9	1.00 V	360	34.7	-3.6
6	637.97	31.3 QP	46.0	-14.7	1.00 V	206	29.9	1.4

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. 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	100375	May 15, 2018	May 14, 2019
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Aug. 31, 2017	Aug. 30, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV 216	10072	June 04, 2018	June 03, 2019
RF Cable	5D-FB	COACAB-002	Feb. 23, 2018	Feb. 22, 2019
10 dB PAD EMEC	STI02-2200-10	001	Mar. 16, 2018	Mar. 15, 2019
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2017	Sep. 21, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 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 Conducted Room C
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: July 04, 2018

4.2.3 Test Procedures

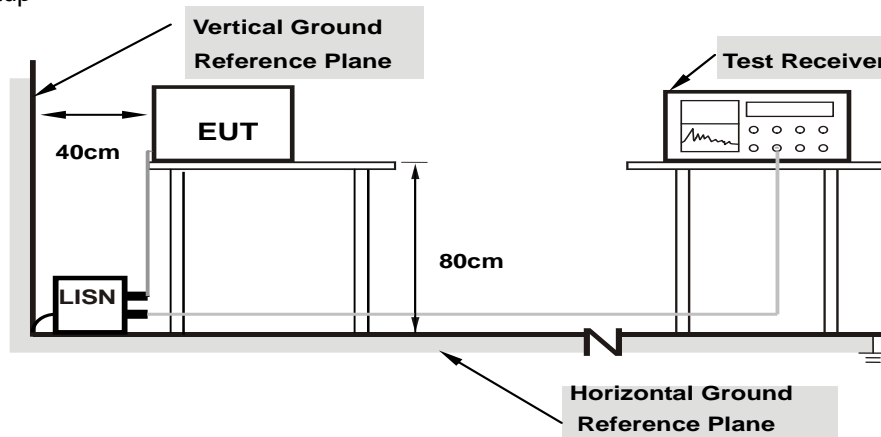
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

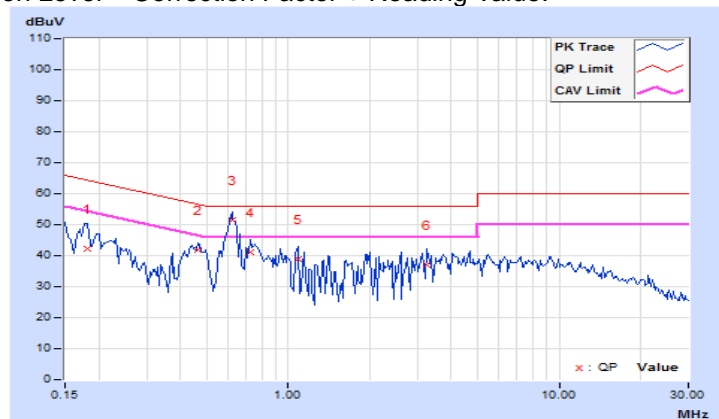
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	9.98	32.12	22.80	42.10	32.78	64.43	54.43	-22.33	-21.65
2	0.46641	10.00	31.83	25.15	41.83	35.15	56.58	46.58	-14.75	-11.43
3	0.61875	10.01	41.37	32.95	51.38	42.96	56.00	46.00	-4.62	-3.04
4	0.72813	10.02	31.00	22.87	41.02	32.89	56.00	46.00	-14.98	-13.11
5	1.08203	10.05	28.85	20.73	38.90	30.78	56.00	46.00	-17.10	-15.22
6	3.23828	10.15	27.01	16.83	37.16	26.98	56.00	46.00	-18.84	-19.02

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.

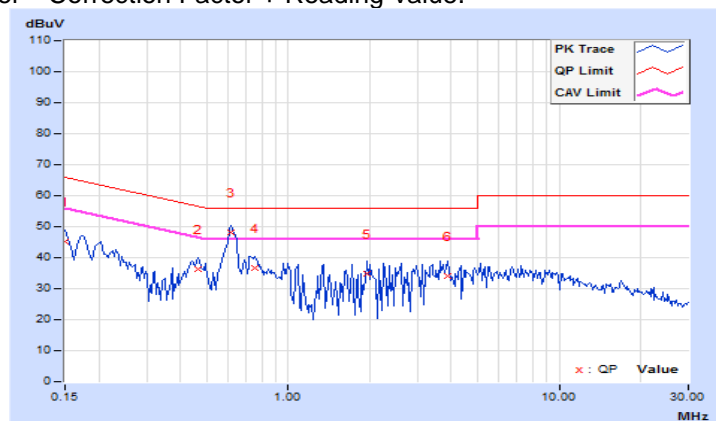


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [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	9.98	35.29	25.82	45.27	35.80	66.00	56.00	-20.73	-20.20
2	0.46250	10.02	26.26	17.80	36.28	27.82	56.65	46.65	-20.37	-18.83
3	0.61484	10.03	38.09	30.91	48.12	40.94	56.00	46.00	-7.88	-5.06
4	0.75547	10.04	26.50	18.18	36.54	28.22	56.00	46.00	-19.46	-17.78
5	1.94141	10.08	24.76	14.81	34.84	24.89	56.00	46.00	-21.16	-21.11
6	3.85547	10.21	23.79	13.26	34.00	23.47	56.00	46.00	-22.00	-22.53

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.

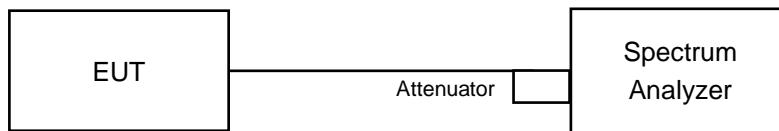


4.3 6dB Bandwidth Measurement

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.10	7.63	0.5	PASS
6	2437	8.10	8.60	0.5	PASS
11	2462	8.56	8.10	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.42	16.37	0.5	PASS
2	2417	16.41	16.31	0.5	Pass
6	2437	16.39	16.39	0.5	PASS
11	2462	16.40	16.38	0.5	PASS

802.11n (HT20)

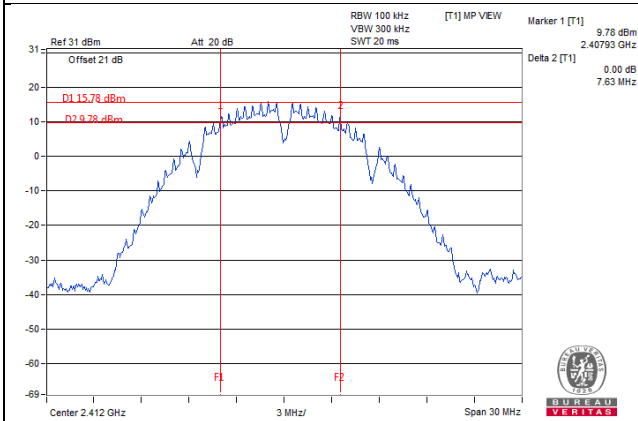
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.66	16.96	0.5	Pass
2	2417	17.65	17.19	0.5	Pass
6	2437	17.66	17.63	0.5	Pass
10	2457	17.63	17.63	0.5	Pass
11	2462	17.66	17.67	0.5	Pass

802.11n (HT40)

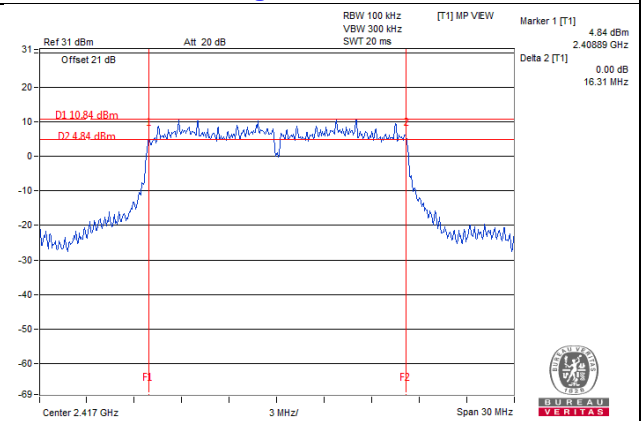
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.31	34.12	0.5	Pass
6	2437	35.25	34.08	0.5	Pass
9	2452	35.19	35.40	0.5	Pass

Spectrum Plot of Worst Value

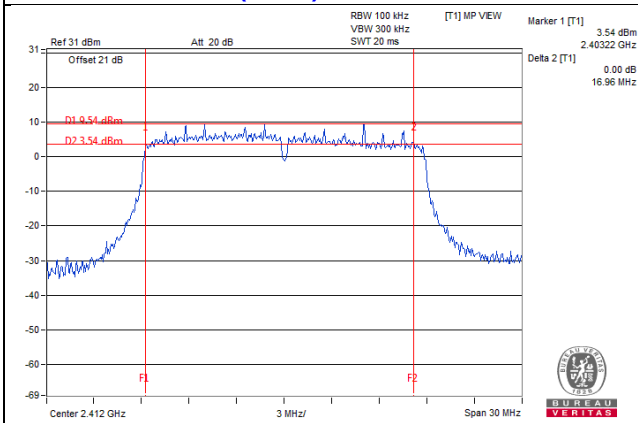
802.11b / Chain 1 : CH1



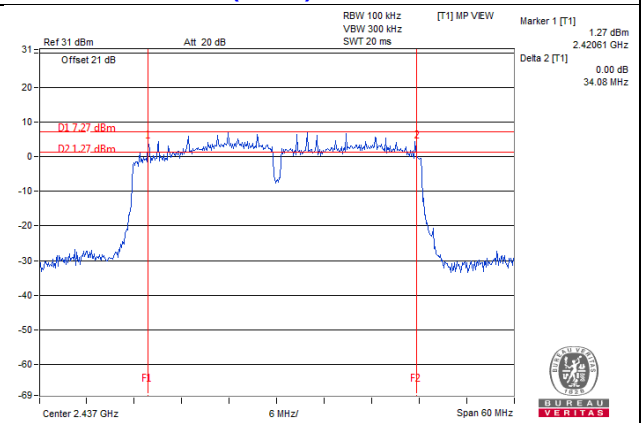
802.11g / Chain 1 : CH2



802.11n (HT20) / Chain 1 : CH1



802.11n (HT40) / Chain 1 : CH6



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

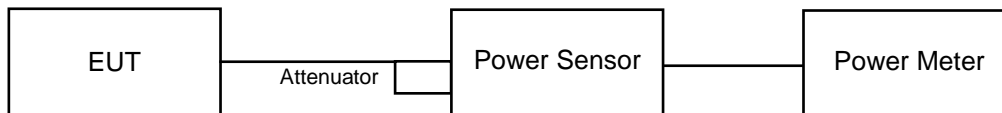
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.35	24.05	470.369	26.72	30.00	Pass
6	2437	23.86	24.52	526.359	27.21	30.00	Pass
11	2462	23.56	23.94	474.728	26.76	30.00	Pass

802.11g

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.63	19.92	190.008	22.79	30.00	Pass
2	2417	21.49	21.52	282.835	24.52	30.00	Pass
6	2437	22.78	22.96	387.368	25.88	30.00	Pass
11	2462	19.95	20.38	207.999	23.18	30.00	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.95	20.41	208.756	23.20	30.00	Pass
2	2417	21.33	21.42	274.507	24.39	30.00	Pass
6	2437	23.05	23.32	416.62	26.20	30.00	Pass
10	2457	22.10	22.41	336.362	25.27	30.00	Pass
11	2462	19.26	19.64	176.378	22.46	30.00	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.25	18.45	136.818	21.36	30.00	Pass
6	2437	20.23	20.54	218.679	23.40	30.00	Pass
9	2452	18.78	19.05	155.862	21.93	30.00	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	19.95	20.41	208.756	23.20	30.00	Pass
2	2417	21.33	21.42	274.507	24.39	30.00	Pass
6	2437	23.05	23.32	416.62	26.20	30.00	Pass
10	2457	22.10	22.41	336.362	25.27	30.00	Pass
11	2462	19.26	19.64	176.378	22.46	30.00	Pass

Note: 1. Directional gain = $10 \log[(10^{G_0/20} + 10^{G_1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

802.11n (HT40)

Chan.	Freq. (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.25	18.45	136.818	21.36	30.00	Pass
6	2437	20.23	20.54	218.679	23.40	30.00	Pass
9	2452	18.78	19.05	155.862	21.93	30.00	Pass

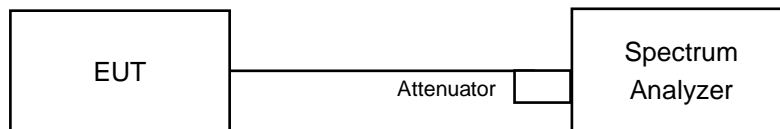
Note: 1. Directional gain = $10 \log[(10^{G_0/20} + 10^{G_1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

802.11b

- 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: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- d) Set VBW $\geq 3 \times \text{RBW}$.
- e) Detector = power averaging (RMS) or sample detector (when RMS not available).
- f) Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- 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.

802.11g, 802.11n (HT20), 802.11n (HT40)

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-7.85	3.01	-4.84	8.00	Pass
	6	2437	-6.72	3.01	-3.71	8.00	Pass
	11	2462	-7.22	3.01	-4.21	8.00	Pass
1	1	2412	-6.87	3.01	-3.86	8.00	Pass
	6	2437	-5.97	3.01	-2.96	8.00	Pass
	11	2462	-6.95	3.01	-3.94	8.00	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

802.11g

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-13.21	3.01	0.18	-10.02	8.00	Pass
	2	2417	-10.99	3.01	0.18	-7.80	8.00	Pass
	6	2437	-9.94	3.01	0.18	-6.75	8.00	Pass
	11	2462	-12.94	3.01	0.18	-9.75	8.00	Pass
1	1	2412	-12.54	3.01	0.18	-9.35	8.00	Pass
	2	2417	-11.35	3.01	0.18	-8.16	8.00	Pass
	6	2437	-8.82	3.01	0.18	-5.63	8.00	Pass
	11	2462	-11.95	3.01	0.18	-8.76	8.00	Pass

Note: 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-12.99	3.01	0.09	-9.89	8.00	Pass
	2	2417	-11.14	3.01	0.09	-8.04	8.00	Pass
	6	2437	-9.92	3.01	0.09	-6.82	8.00	Pass
	10	2457	-11.43	3.01	0.09	-8.33	8.00	Pass
	11	2462	-13.13	3.01	0.09	-10.03	8.00	Pass
1	1	2412	-12.29	3.01	0.09	-9.19	8.00	Pass
	2	2417	-10.30	3.01	0.09	-7.20	8.00	Pass
	6	2437	-9.32	3.01	0.09	-6.22	8.00	Pass
	10	2457	-9.80	3.01	0.09	-6.70	8.00	Pass
	11	2462	-12.98	3.01	0.09	-9.88	8.00	Pass

- Note:** 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
2. Refer to section 3.3 for duty cycle spectrum plot.

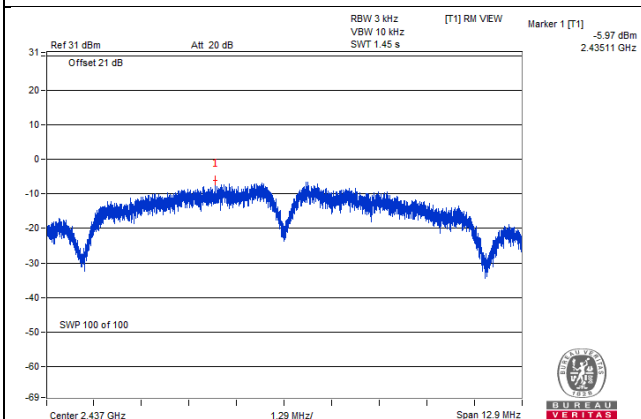
802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=2) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-17.46	3.01	0.18	-14.27	8.00	Pass
	6	2437	-15.35	3.01	0.18	-12.16	8.00	Pass
	9	2452	-16.89	3.01	0.18	-13.70	8.00	Pass
1	3	2422	-16.87	3.01	0.18	-13.68	8.00	Pass
	6	2437	-14.81	3.01	0.18	-11.62	8.00	Pass
	9	2452	-15.83	3.01	0.18	-12.64	8.00	Pass

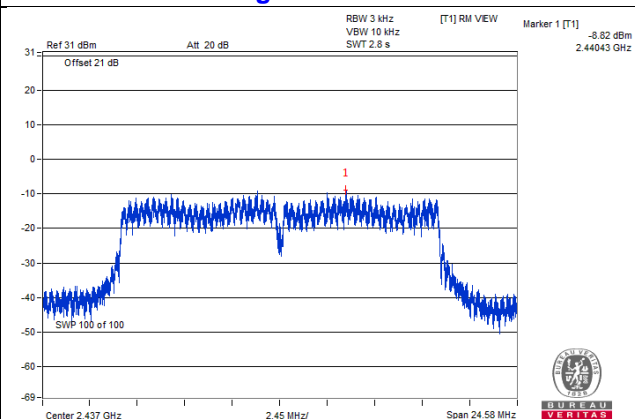
- Note:** 1. Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.82\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

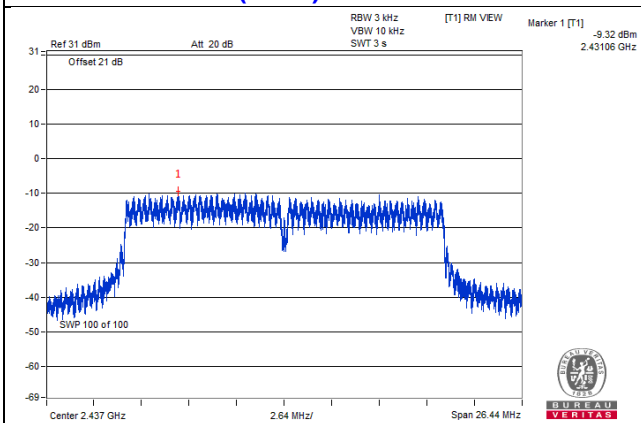
802.11b / Chain 1 : CH6



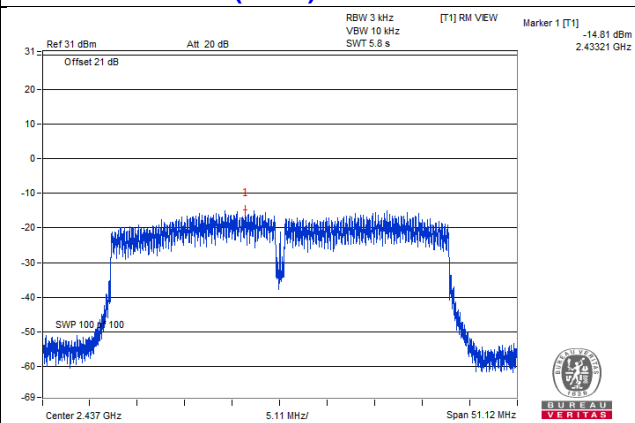
802.11g / Chain 1 : CH6



802.11n (HT20) / Chain 1 : CH6



802.11n (HT40) / Chain 1 : CH6

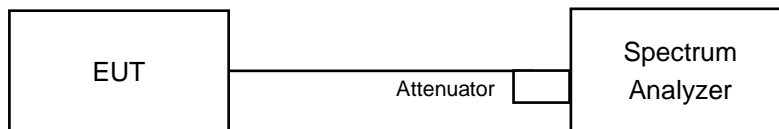


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW \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 OOBE

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.

4.6.5 Deviation from Test Standard

No deviation.

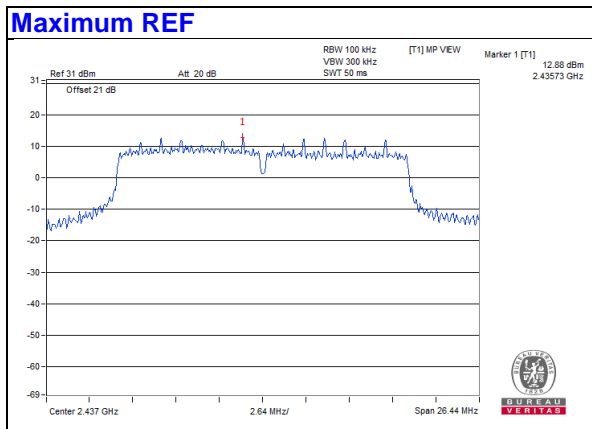
4.6.6 EUT Operating Condition

Same as Item 4.3.6

4.6.7 Test Results

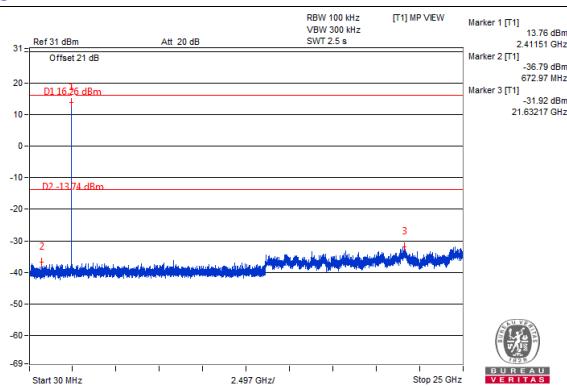
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with

802.11b

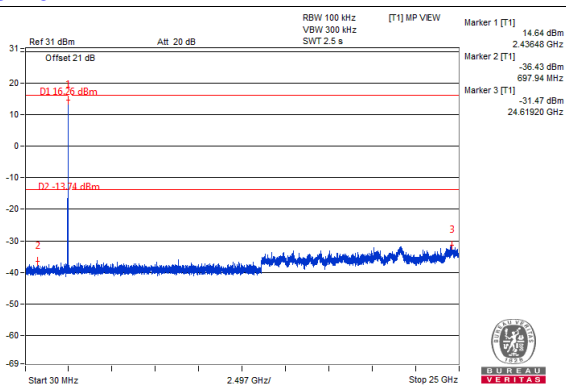


Chain 0

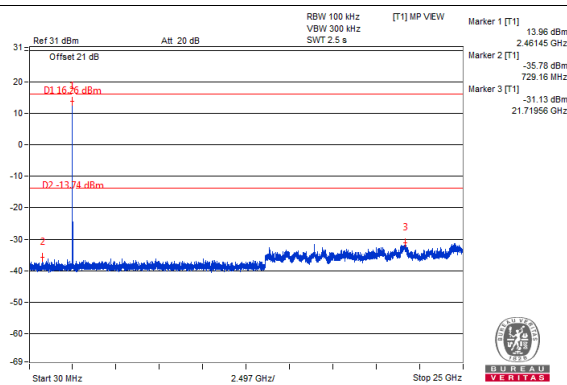
CH 1



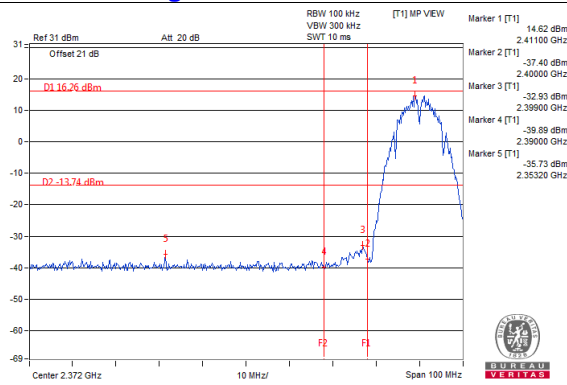
CH 6



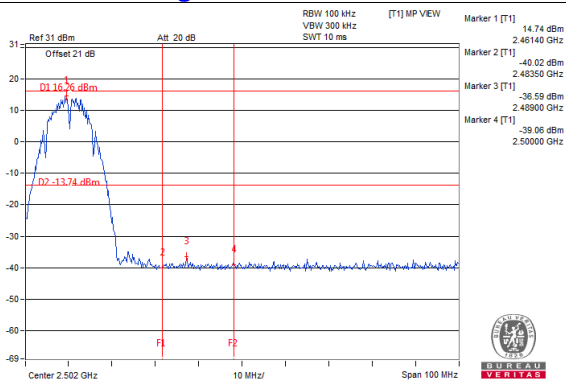
CH 11



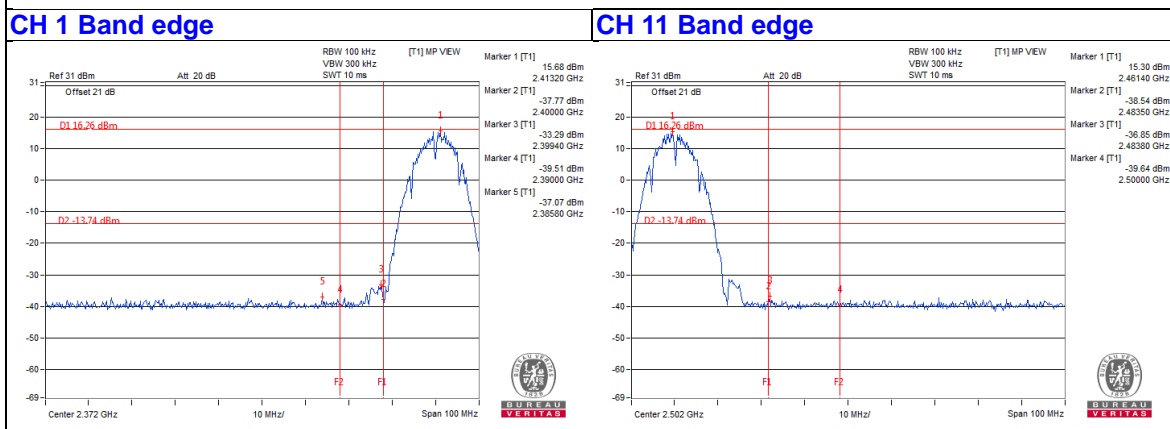
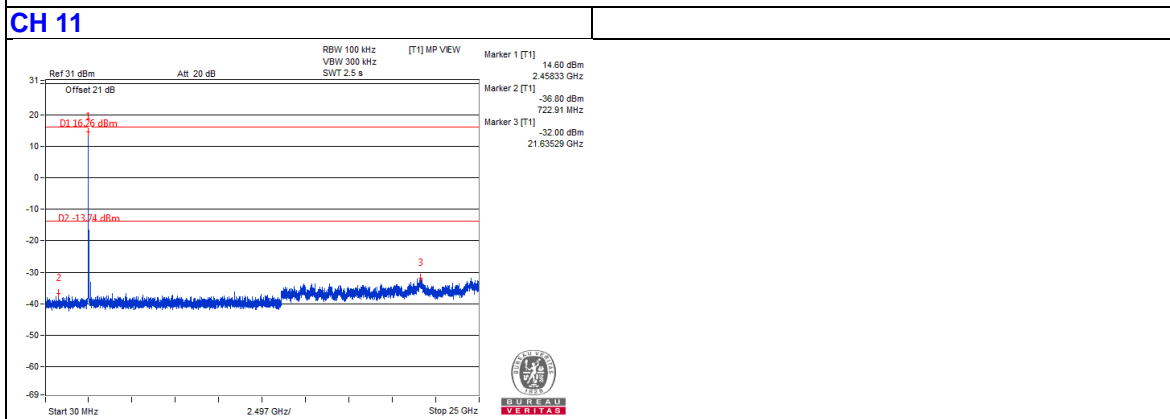
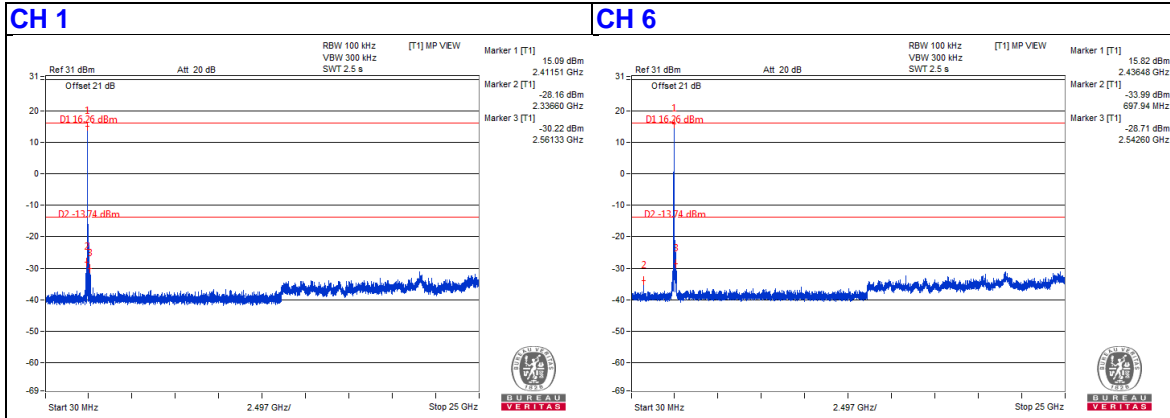
CH 1 Band edge



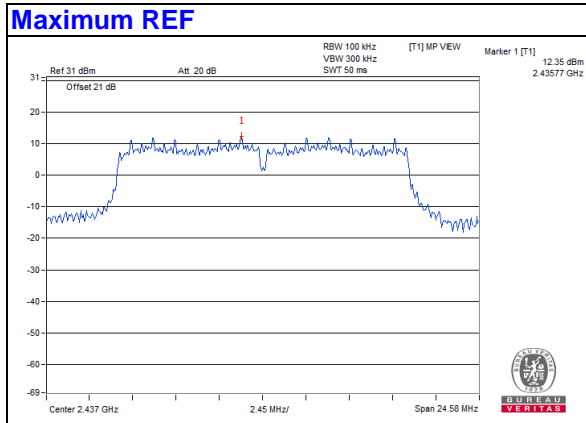
CH 11 Band edge



Chain 1

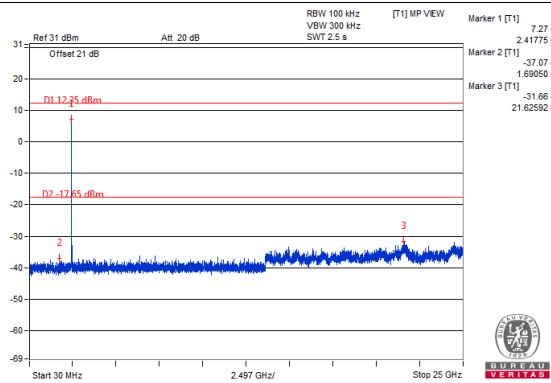


802.11g

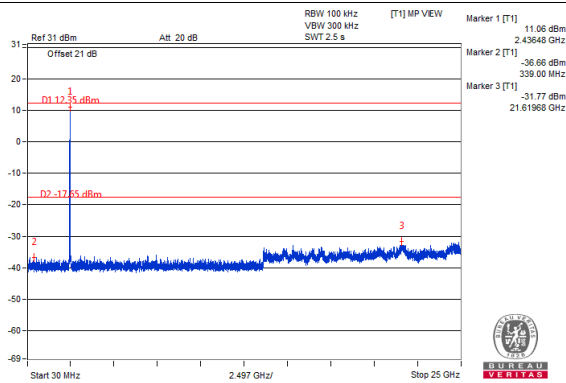


Chain 0

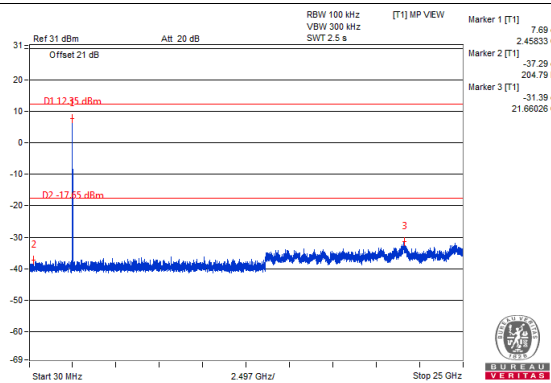
CH 1



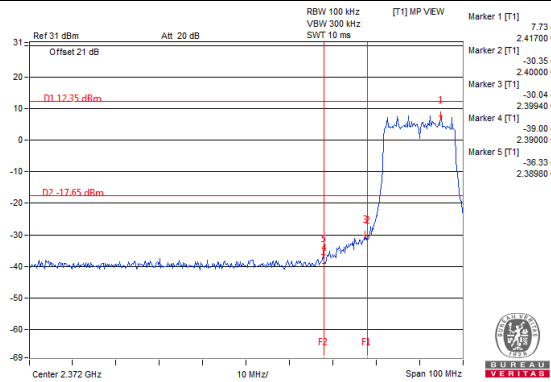
CH 6



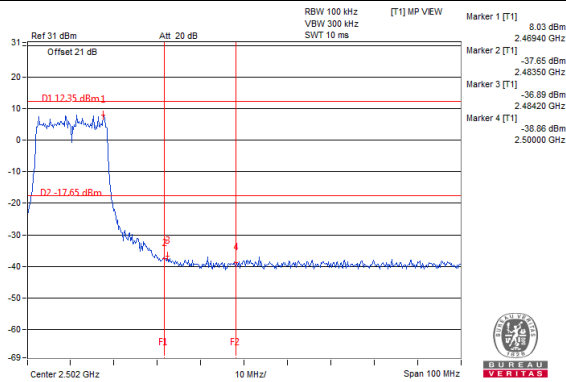
CH 11



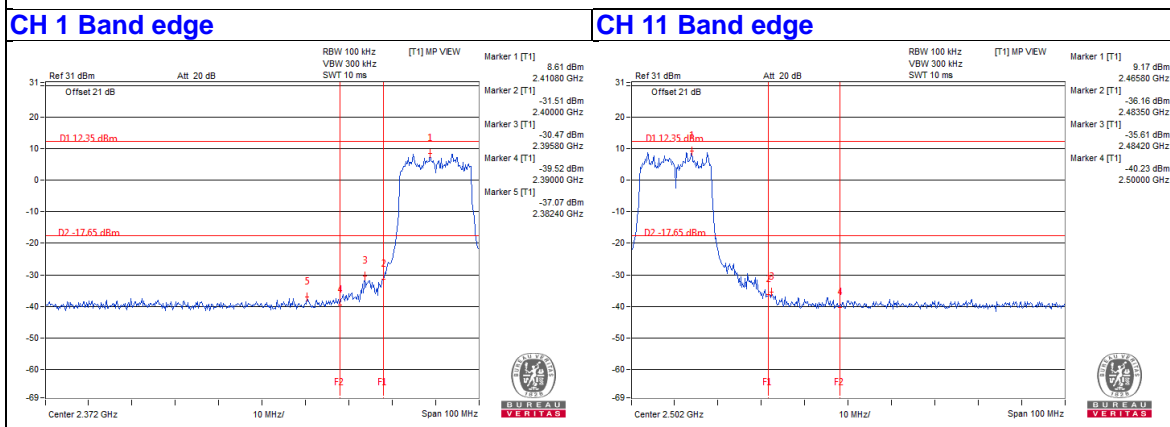
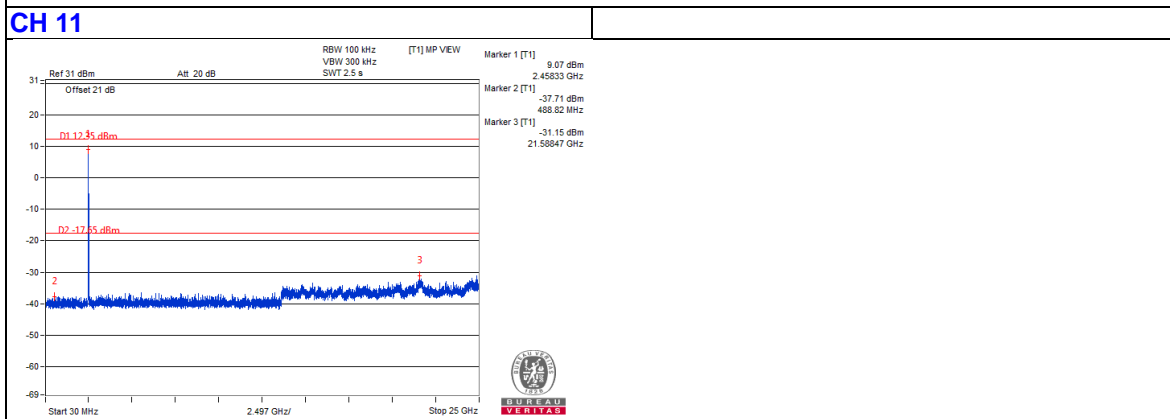
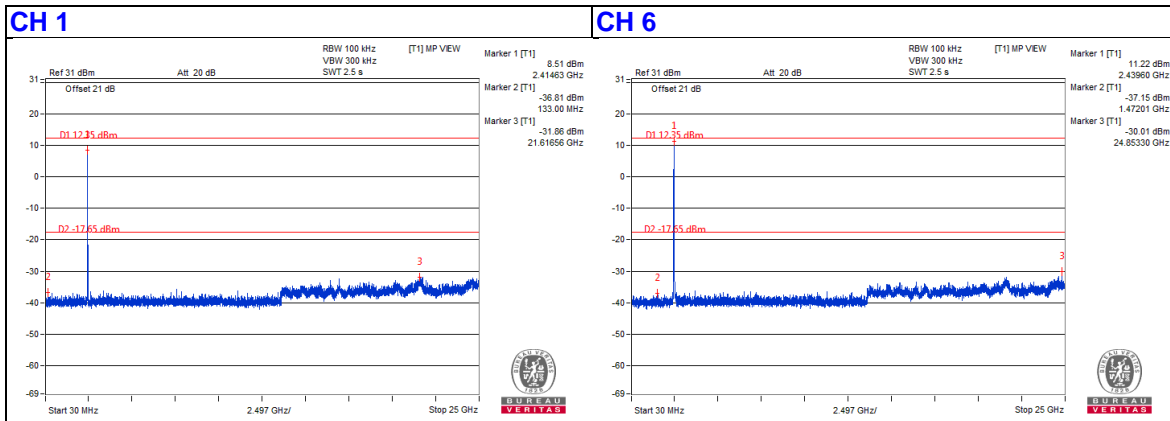
CH 1 Band edge



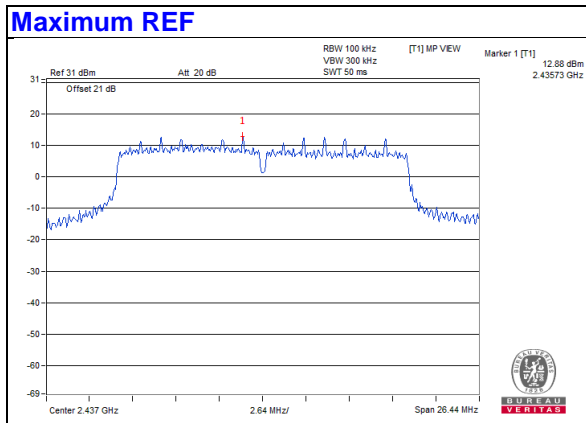
CH 11 Band edge



Chain 1

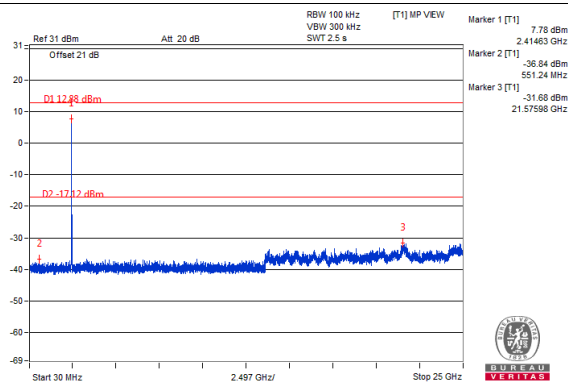


802.11n (HT20)

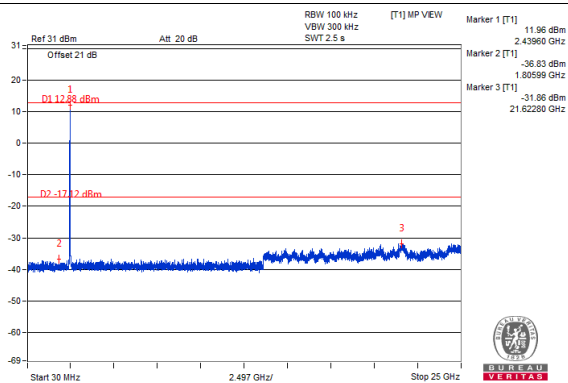


Chain 0

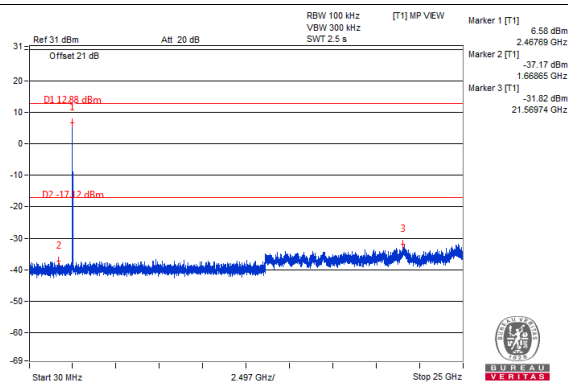
CH 1



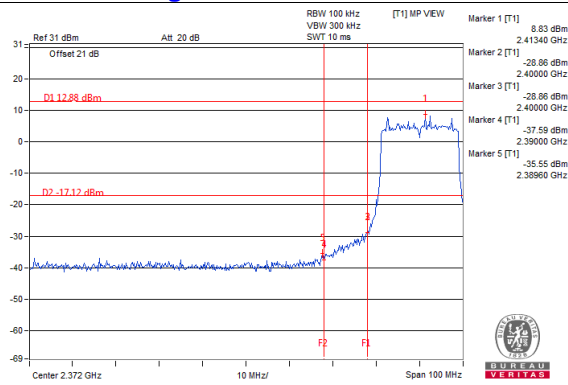
CH 6



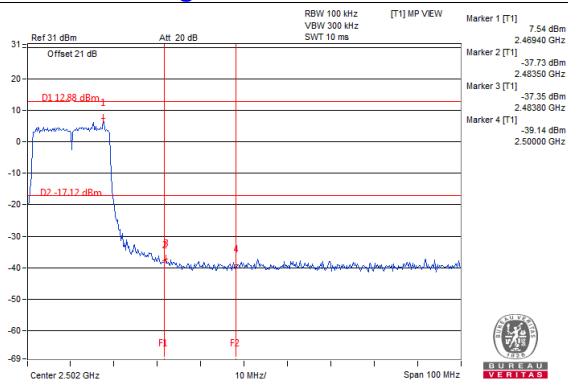
CH 11



CH 1 Band edge

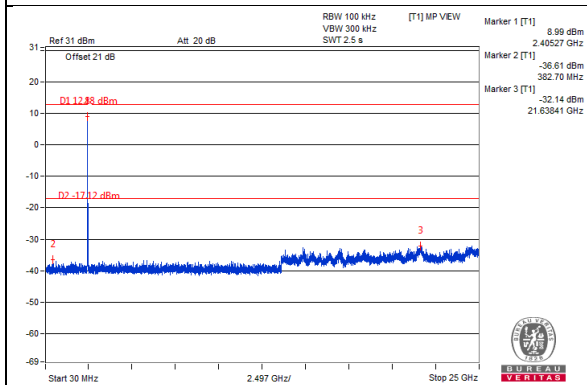


CH 11 Band edge

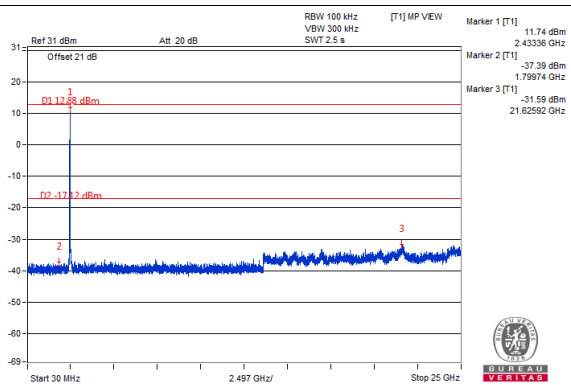


Chain 1

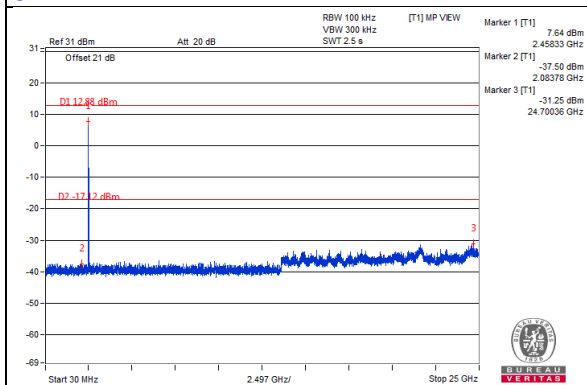
CH 1



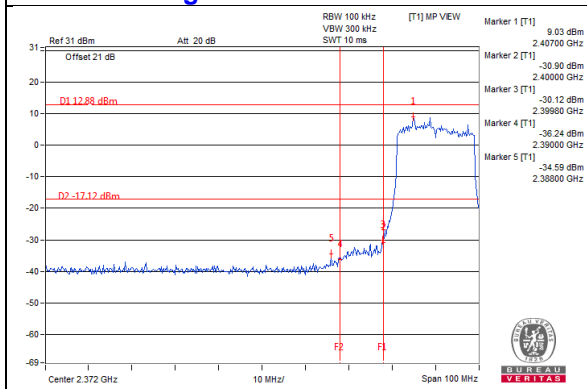
CH 6



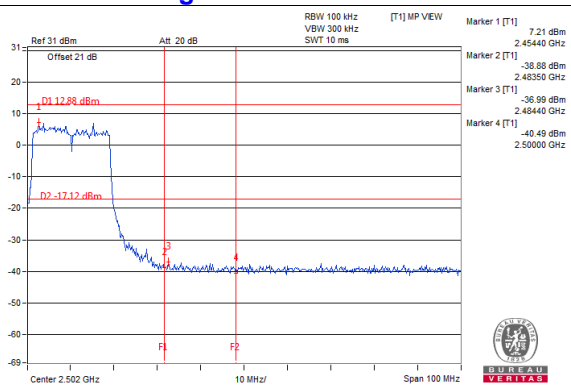
CH 11



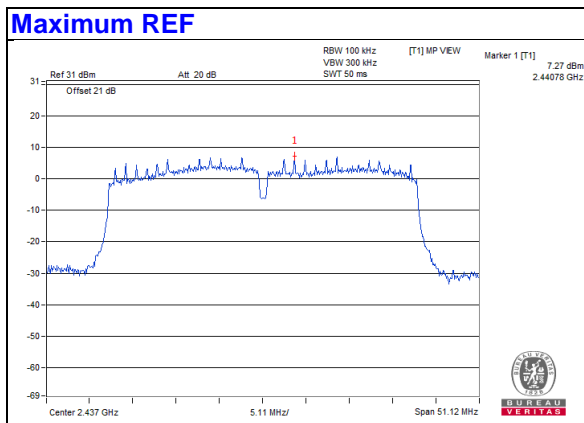
CH 1 Band edge



CH 11 Band edge

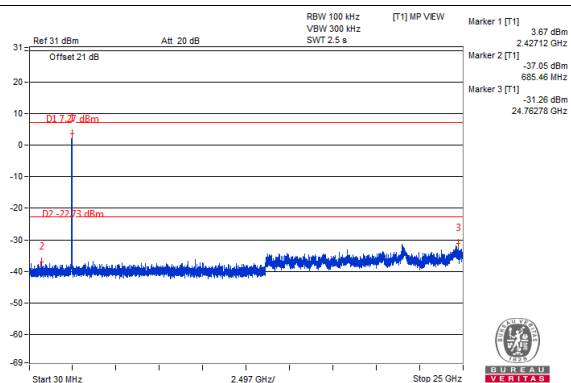


802.11n (HT40)

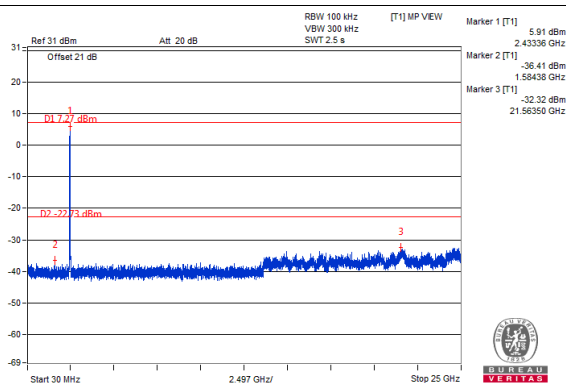


Chain 0

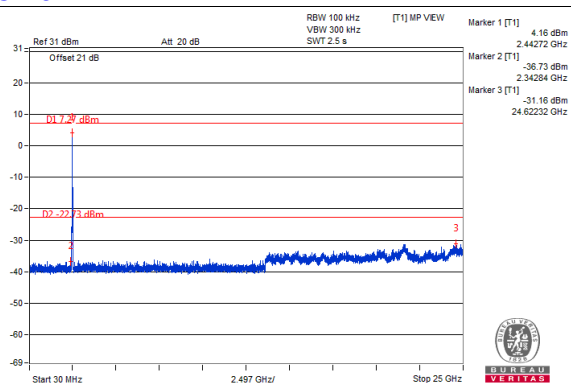
CH 3



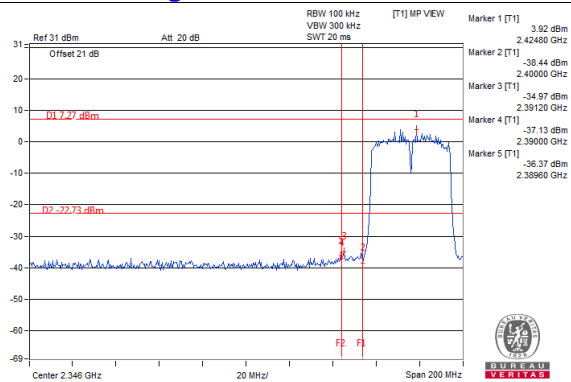
CH 6



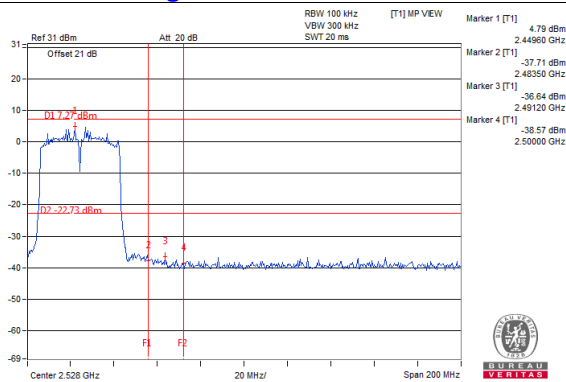
CH 9



CH 3 Band edge

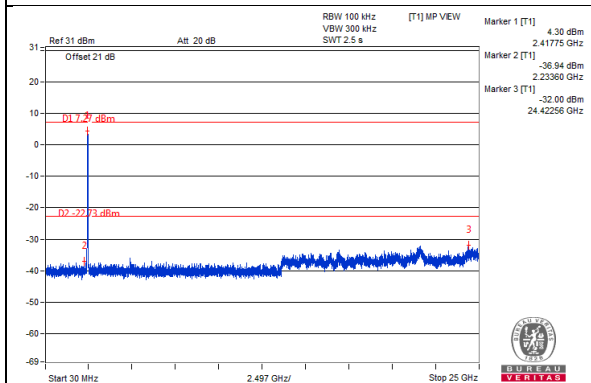


CH 9 Band edge

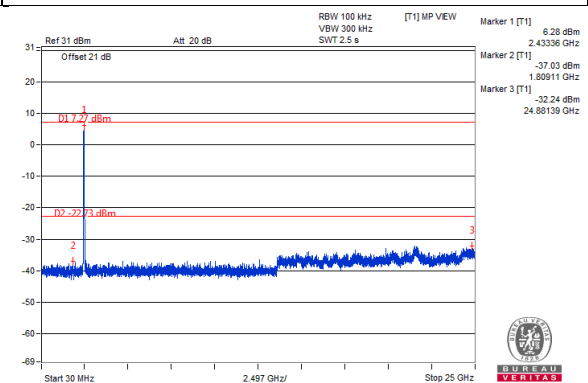


Chain 1

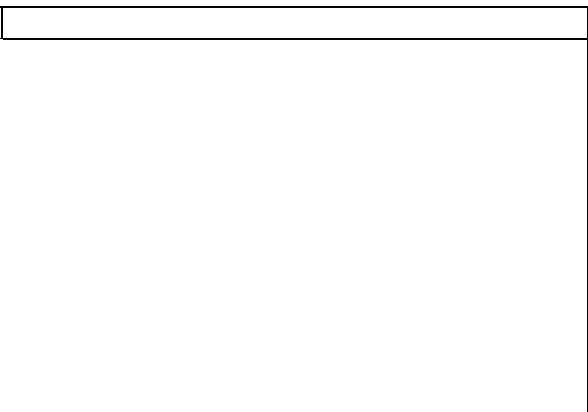
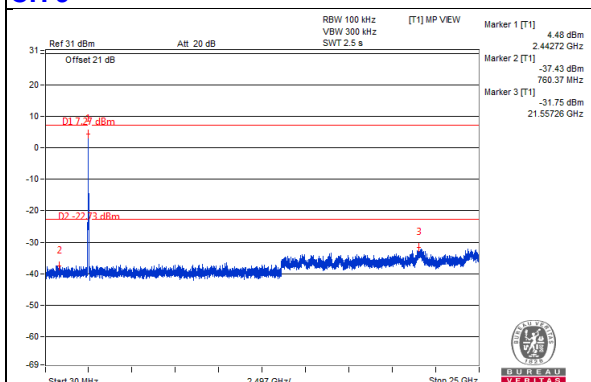
CH 3



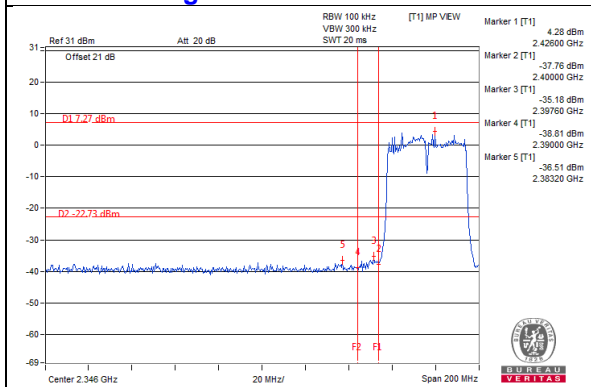
CH 6



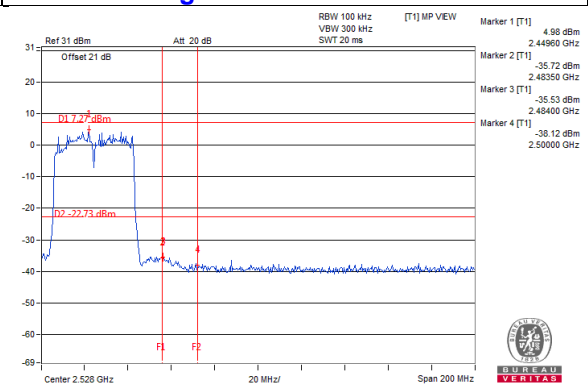
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

Linkou EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

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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