FCC Test Report

Report No.: RF170411E14B

FCC ID: ZMYHGW500SN2A4Q

Test Model: HGW-500SN2A4-Q

Received Date: Oct. 30, 2017

Test Date: Nov. 18 to 21, 2017

Issued Date: Dec. 21, 2017

Applicant: MitraStar Technology Corporation

Address: No. 6, Innovation Rd II, Science-Based Industrial, Hsin-Chu, Taiwan

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

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

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

FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RF170411E14B	Original release.	Dec. 21, 2017

1 Certificate of Conformity

Product: Base Port2 , Adaptador Wifi+ Dual

Brand: MitraStar

Test Model: HGW-500SN2A4-Q

Sample Status: ENGINEERING SAMPLE

Applicant: MitraStar Technology Corporation

Test Date: Nov. 18 to 21, 2017

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10: 2013

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

Prepared by : Mary Ko , **Date:** Dec. 21, 2017
Mary Ko / Specialist

Approved by : , **Date:** Dec. 21, 2017
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 -10.69dB at 0.36875MHz.
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, 4874.00MHz, 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 i-pex(MHF) 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) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Base Port2 , Adaptador Wifi+ Dual
Brand	MitraStar
Test Model	HGW-500SN2A4-Q
FW version	WAS: ES_100WZA0b2_adapt_0418 IS: GL_s00.00_g002_100WZA0b4
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 12V from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode only
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11a/b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz, 5.745 ~5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 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:**996.099mW **5.18 ~ 5.24GHz:** **Master Mode** **CDD Mode:** 275.729mW **Beamforming Mode:** 242.761mW **Client Mode** **CDD Mode:** 173.739mW **Beamforming Mode:** 173.325mW **5.745 ~ 5.825GHz:** **CDD Mode:** 611.422mW **Beamforming Mode:** 611.422mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ-45 cable (Unshielded, 1.5m)

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz
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 as following table:

No.	Brand	Model No.	Spec.
1	FRECOM	F12L30-120100SPAU	AC Input: 100-240Vac, 0.3A, 50/60Hz DC Output: 12V, 1A DC Output cable: Unshielded, 1.5m

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

Frequency range (MHz)	Directional Antenna Gain (dBi)
2412 ~ 2462	5.502 (3.8 for 1TX)
5180 ~ 5240	7.59
5260 ~ 5320	7.62
5500 ~ 5580 5660 ~ 5700	6.86
5745 ~ 5825	6.66

4. The EUT incorporates a MIMO function:

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	1TX	2RX
802.11g	6 ~ 54Mbps	1TX	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
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS 0~8 Nss=1	4TX	4RX
	MCS 0~8 Nss=2	4TX	4RX
	MCS 0~9 Nss=3	4TX	4RX
	MCS 0~8 Nss=4	4TX	4RX
802.11ac (VHT40)	MCS 0~9 Nss=1	4TX	4RX
	MCS 0~9 Nss=2	4TX	4RX
	MCS 0~9 Nss=3	4TX	4RX
	MCS 0~9 Nss=4	4TX	4RX
802.11ac (VHT80)	MCS 0~9 Nss=1	4TX	4RX
	MCS 0~9 Nss=2	4TX	4RX
	MCS 0~9 Nss=3	4TX	4RX
	MCS 0~9 Nss=4	4TX	4RX

Note:
1. All of modulation mode support beamforming function except 2.4GHz and 802.11a modulation mode.

5. The power setting are list as below:

Modulation Mode	Frequency (MHz)	Power Setting
802.11b	2412	42
	2437	56
	2462	40
802.11g	2412	47
	2437	59
	2462	43
802.11n(HT20)	2412	43/43
	2437	60/60
	2462	41/41
802.11n(HT40)	2422	43/43
	2437	49/49
	2452	39/39

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)
802.11n (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.

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.

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

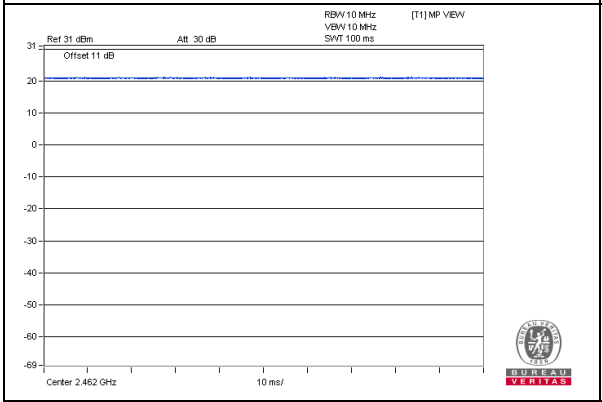
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	24deg. C, 69%RH	120Vac, 60Hz	Andy Ho
RE<1G	24deg. C, 68%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

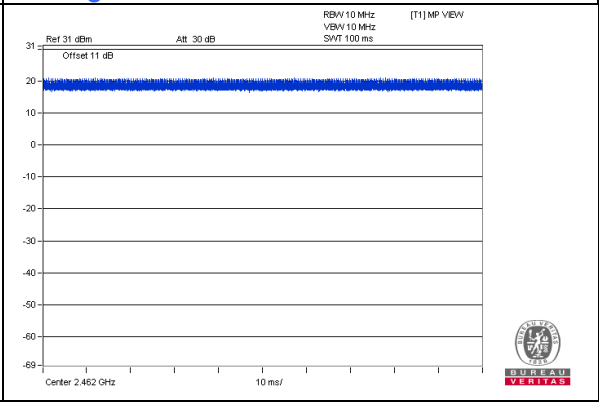
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %, duty factor is not required.

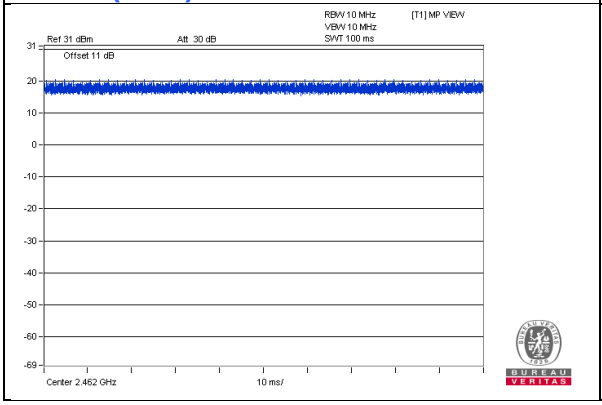
802.11b



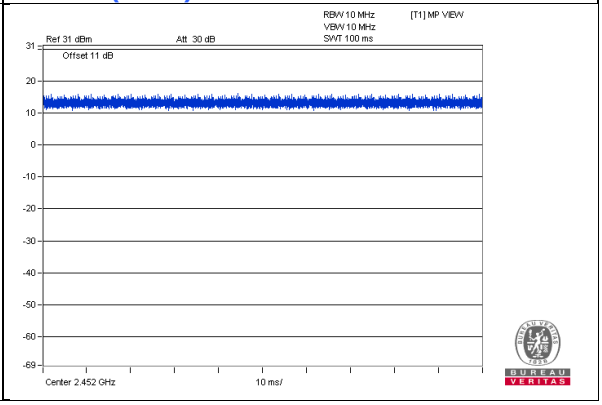
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

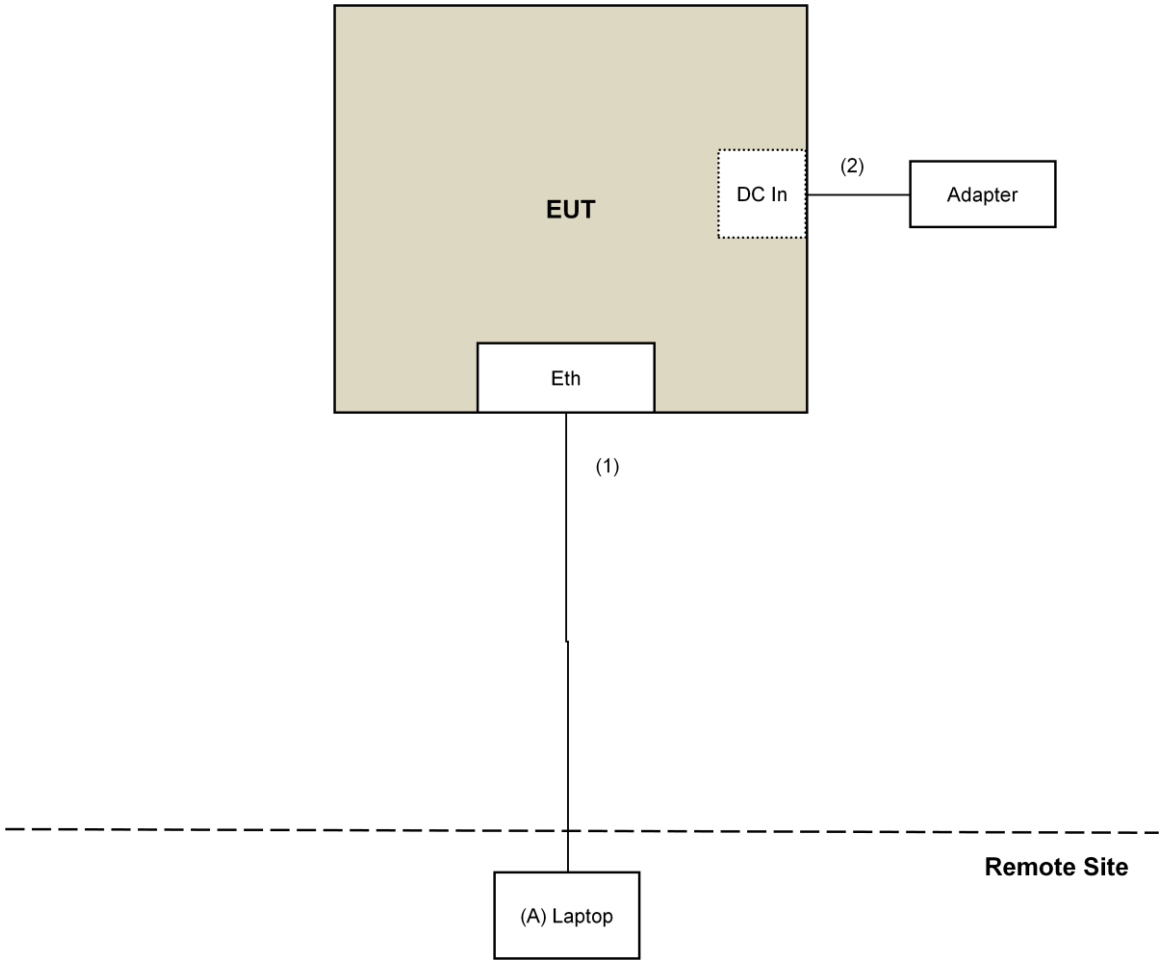
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	DC Cable	1	1.5	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
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 09, 2017	Nov. 08, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Dec. 13, 2016	Dec. 12, 2017
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. 27, 2016	Dec. 26, 2017
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045SE	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
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. Loop antenna was used for all emissions below 30 MHz.
5. The CANADA Site Registration No. is 20331-2
6. Tested Date: Nov. 18 to 21, 2017

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:

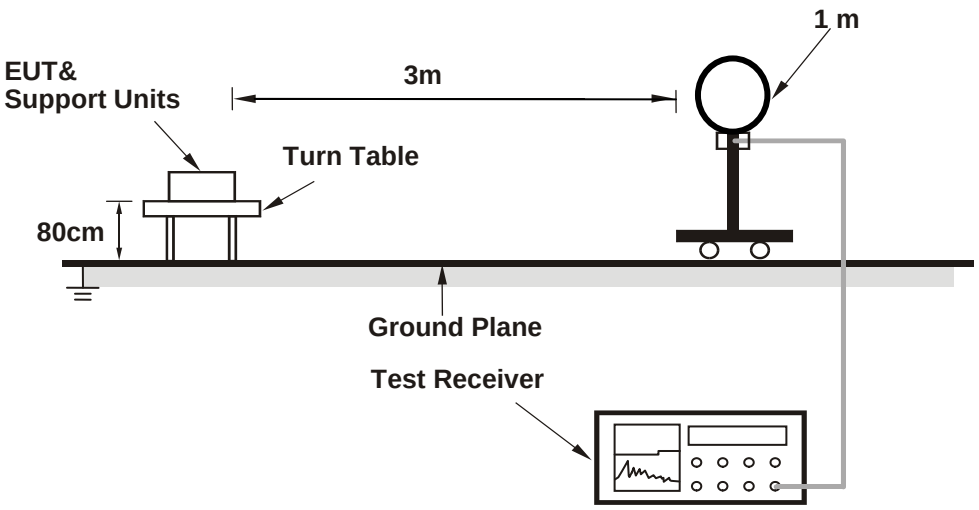
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

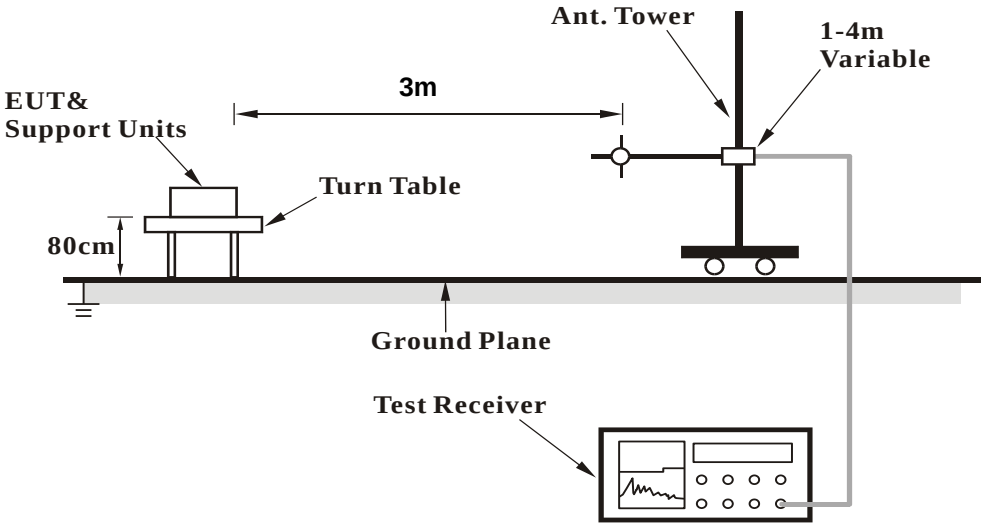
No deviation.

4.1.5 Test Setup

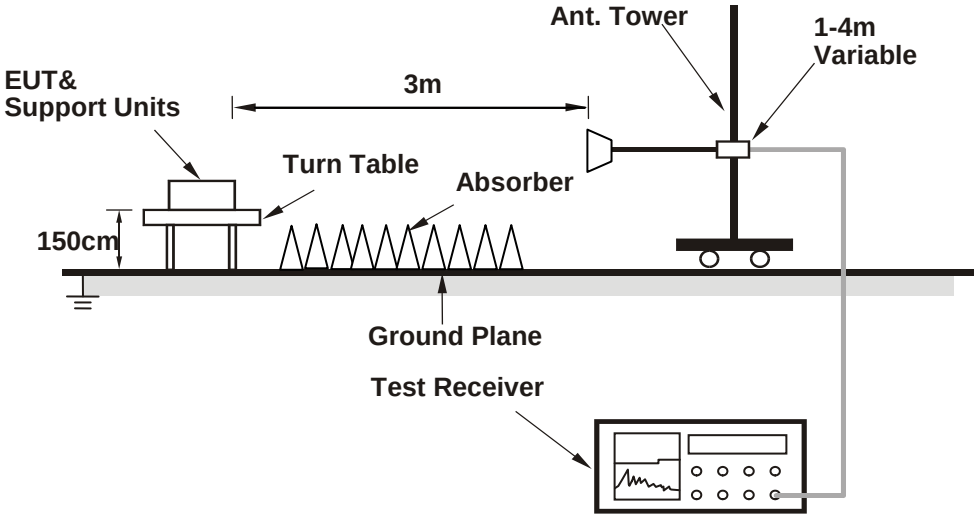
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Conditions

a. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (MP_Test.exe Ver1.3.8.0) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data：

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	2386.40	56.8 PK	74.0	-17.2	1.48 H	131	58.1	-1.3
2	2386.40	46.8 AV	54.0	-7.2	1.48 H	131	48.1	-1.3
3	*2412.00	107.9 PK			1.48 H	131	109.0	-1.1
4	*2412.00	100.9 AV			1.48 H	131	102.0	-1.1
5	4824.00	46.1 PK	74.0	-27.9	1.22 H	281	42.9	3.2
6	4824.00	45.6 AV	54.0	-8.4	1.22 H	281	42.4	3.2
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	2386.40	60.9 PK	74.0	-13.1	3.44 V	318	62.2	-1.3
2	2386.40	53.7 AV	54.0	-0.3	3.44 V	318	55.0	-1.3
3	*2412.00	115.7 PK			3.44 V	318	116.8	-1.1
4	*2412.00	108.9 AV			3.44 V	318	110.0	-1.1
5	4824.00	52.2 PK	74.0	-21.8	2.71 V	344	49.0	3.2
6	4824.00	51.0 AV	54.0	-3.0	2.71 V	344	47.8	3.2

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2367.30	54.6 PK	74.0	-19.4	1.43 H	143	56.0	-1.4
2	2367.30	42.4 AV	54.0	-11.6	1.43 H	143	43.8	-1.4
3	*2437.00	109.3 PK			1.43 H	143	110.5	-1.2
4	*2437.00	106.8 AV			1.43 H	143	108.0	-1.2
5	2484.50	56.1 PK	74.0	-17.9	1.43 H	143	57.1	-1.0
6	2484.50	45.6 AV	54.0	-8.4	1.43 H	143	46.6	-1.0
7	4874.00	50.1 PK	74.0	-23.9	1.26 H	274	46.8	3.3
8	4874.00	48.5 AV	54.0	-5.5	1.26 H	274	45.2	3.3
9	7311.00	48.5 PK	74.0	-25.5	3.88 H	47	38.7	9.8
10	7311.00	41.7 AV	54.0	-12.3	3.88 H	47	31.9	9.8
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	2367.30	58.7 PK	74.0	-15.3	2.17 V	327	60.1	-1.4
2	2367.30	49.3 AV	54.0	-4.7	2.17 V	327	50.7	-1.4
3	*2437.00	117.1 PK			2.17 V	327	118.3	-1.2
4	*2437.00	114.8 AV			2.17 V	327	116.0	-1.2
5	2484.50	60.2 PK	74.0	-13.8	2.17 V	327	61.2	-1.0
6	2484.50	52.5 AV	54.0	-1.5	2.17 V	327	53.5	-1.0
7	4874.00	56.2 PK	74.0	-17.8	2.52 V	335	52.9	3.3
8	**4874.00**	**53.9 AV**	**54.0**	**-0.1**	**2.52 V**	**335**	**50.6**	**3.3**
9	7311.00	54.8 PK	74.0	-19.2	3.45 V	158	45.0	9.8
10	7311.00	51.1 AV	54.0	-2.9	3.45 V	158	41.3	9.8

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 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.7 PK			1.49 H	132	103.8	-1.1
2	*2462.00	100.2 AV			1.49 H	132	101.3	-1.1
3	2487.80	56.5 PK	74.0	-17.5	1.49 H	132	57.5	-1.0
4	2487.80	46.5 AV	54.0	-7.5	1.49 H	132	47.5	-1.0
5	4924.00	50.9 PK	74.0	-23.1	2.26 H	141	47.4	3.5
6	4924.00	49.3 AV	54.0	-4.7	2.26 H	141	45.8	3.5
7	7386.00	48.5 PK	74.0	-25.5	3.87 H	55	38.6	9.9
8	7386.00	41.9 AV	54.0	-12.1	3.87 H	55	32.0	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	110.5 PK			2.96 V	312	111.6	-1.1
2	*2462.00	108.2 AV			2.96 V	312	109.3	-1.1
3	2487.80	60.6 PK	74.0	-13.4	2.96 V	312	61.6	-1.0
4	2487.80	53.4 AV	54.0	-0.6	2.96 V	312	54.4	-1.0
5	4924.00	55.3 PK	74.0	-18.7	2.63 V	341	51.8	3.5
6	**4924.00**	**53.9 AV**	**54.0**	**-0.1**	**2.63 V**	**341**	**50.4**	**3.5**
7	7386.00	50.3 PK	74.0	-23.7	3.54 V	175	40.4	9.9
8	7386.00	44.6 AV	54.0	-9.4	3.54 V	175	34.7	9.9

REMARKS:

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

802.11g

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	64.9 PK	74.0	-9.1	1.51 H	127	66.2	-1.3
2	2390.00	46.8 AV	54.0	-7.2	1.51 H	127	48.1	-1.3
3	*2412.00	103.9 PK			1.51 H	127	105.0	-1.1
4	*2412.00	94.4 AV			1.51 H	127	95.5	-1.1
5	4824.00	54.2 PK	74.0	-19.8	2.99 H	286	51.0	3.2
6	4824.00	40.4 AV	54.0	-13.6	2.99 H	286	37.2	3.2
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	69.0 PK	74.0	-5.0	1.50 V	309	70.3	-1.3
2	2390.00	53.7 AV	54.0	-0.3	1.50 V	309	55.0	-1.3
3	*2412.00	111.7 PK			1.50 V	309	112.8	-1.1
4	*2412.00	102.4 AV			1.50 V	309	103.5	-1.1
5	4824.00	43.3 PK	74.0	-30.7	3.72 V	336	40.1	3.2
6	4824.00	32.4 AV	54.0	-21.6	3.72 V	336	29.2	3.2

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.2 PK	74.0	-12.8	1.53 H	125	62.5	-1.3
2	2390.00	43.8 AV	54.0	-10.2	1.53 H	125	45.1	-1.3
3	*2437.00	108.9 PK			1.53 H	125	110.1	-1.2
4	*2437.00	99.2 AV			1.53 H	125	100.4	-1.2
5	2483.50	65.4 PK	74.0	-8.6	1.53 H	125	66.4	-1.0
6	2483.50	47.0 AV	54.0	-7.0	1.53 H	125	48.0	-1.0
7	4874.00	54.1 PK	74.0	-19.9	2.98 H	295	50.8	3.3
8	4874.00	40.3 AV	54.0	-13.7	2.98 H	295	37.0	3.3
9	7311.00	42.7 PK	74.0	-31.3	1.54 H	278	32.9	9.8
10	7311.00	33.1 AV	54.0	-20.9	1.54 H	278	23.3	9.8
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	65.3 PK	74.0	-8.7	2.65 V	315	66.6	-1.3
2	2390.00	50.7 AV	54.0	-3.3	2.65 V	315	52.0	-1.3
3	*2437.00	116.7 PK			2.65 V	315	117.9	-1.2
4	*2437.00	107.2 AV			2.65 V	315	108.4	-1.2
5	2483.50	69.5 PK	74.0	-4.5	2.65 V	315	70.5	-1.0
6	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.65 V**	**315**	**54.9**	**-1.0**
7	4874.00	57.1 PK	74.0	-16.9	1.18 V	90	53.8	3.3
8	4874.00	43.1 AV	54.0	-10.9	1.18 V	90	39.8	3.3
9	7311.00	44.4 PK	74.0	-29.6	1.46 V	149	34.6	9.8
10	7311.00	34.6 AV	54.0	-19.4	1.46 V	149	24.8	9.8

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 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.3 PK			1.54 H	132	104.4	-1.1
2	*2462.00	93.3 AV			1.54 H	132	94.4	-1.1
3	2483.50	67.4 PK	74.0	-6.6	1.54 H	132	68.4	-1.0
4	2483.50	46.9 AV	54.0	-7.1	1.54 H	132	47.9	-1.0
5	4924.00	54.2 PK	74.0	-19.8	2.95 H	301	50.7	3.5
6	4924.00	40.2 AV	54.0	-13.8	2.95 H	301	36.7	3.5
7	7386.00	43.3 PK	74.0	-30.7	1.58 H	268	33.4	9.9
8	7386.00	33.6 AV	54.0	-20.4	1.58 H	268	23.7	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.1 PK			1.50 V	302	112.2	-1.1
2	*2462.00	101.3 AV			1.50 V	302	102.4	-1.1
3	2483.50	71.5 PK	74.0	-2.5	1.50 V	302	72.5	-1.0
4	2483.50	53.8 AV	54.0	-0.2	1.50 V	302	54.8	-1.0
5	4924.00	56.5 PK	74.0	-17.5	1.22 V	92	53.0	3.5
6	4924.00	42.7 AV	54.0	-11.3	1.22 V	92	39.2	3.5
7	7386.00	45.0 PK	74.0	-29.0	1.45 V	159	35.1	9.9
8	7386.00	35.0 AV	54.0	-19.0	1.45 V	159	25.1	9.9

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	62.3 PK	74.0	-11.7	1.42 H	124	63.6	-1.3
2	2390.00	46.6 AV	54.0	-7.4	1.42 H	124	47.9	-1.3
3	*2412.00	105.0 PK			1.42 H	124	106.1	-1.1
4	*2412.00	94.9 AV			1.42 H	124	96.0	-1.1
5	4824.00	53.8 PK	74.0	-20.2	3.00 H	304	50.6	3.2
6	4824.00	39.9 AV	54.0	-14.1	3.00 H	304	36.7	3.2
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	66.4 PK	74.0	-7.6	1.01 V	303	67.7	-1.3
2	2390.00	53.5 AV	54.0	-0.5	1.01 V	303	54.8	-1.3
3	*2412.00	112.8 PK			1.01 V	303	113.9	-1.1
4	*2412.00	102.9 AV			1.01 V	303	104.0	-1.1
5	4824.00	57.1 PK	74.0	-16.9	1.11 V	95	53.9	3.2
6	4824.00	42.8 AV	54.0	-11.2	1.11 V	95	39.6	3.2

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.0 PK	74.0	-9.0	1.45 H	112	66.3	-1.3
2	2390.00	42.2 AV	54.0	-11.8	1.45 H	112	43.5	-1.3
3	*2437.00	109.7 PK			1.45 H	112	110.9	-1.2
4	*2437.00	99.7 AV			1.45 H	112	100.9	-1.2
5	2483.50	68.5 PK	74.0	-5.5	1.45 H	112	69.5	-1.0
6	2483.50	46.6 AV	54.0	-7.4	1.45 H	112	47.6	-1.0
7	4874.00	54.2 PK	74.0	-19.8	3.00 H	292	50.9	3.3
8	4874.00	40.2 AV	54.0	-13.8	3.00 H	292	36.9	3.3
9	7311.00	43.1 PK	74.0	-30.9	1.56 H	271	33.3	9.8
10	7311.00	33.4 AV	54.0	-20.6	1.56 H	271	23.6	9.8
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	69.1 PK	74.0	-4.9	1.08 V	290	70.4	-1.3
2	2390.00	49.1 AV	54.0	-4.9	1.08 V	290	50.4	-1.3
3	*2437.00	117.5 PK			1.08 V	290	118.7	-1.2
4	*2437.00	107.7 AV			1.08 V	290	108.9	-1.2
5	2483.50	72.6 PK	74.0	-1.4	1.08 V	290	73.6	-1.0
6	2483.50	53.5 AV	54.0	-0.5	1.08 V	290	54.5	-1.0
7	4874.00	57.4 PK	74.0	-16.6	1.15 V	87	54.1	3.3
8	4874.00	43.1 AV	54.0	-10.9	1.15 V	87	39.8	3.3
9	7311.00	44.5 PK	74.0	-29.5	1.49 V	158	34.7	9.8
10	7311.00	34.6 AV	54.0	-19.4	1.49 V	158	24.8	9.8

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 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	103.9 PK			1.47 H	119	105.0	-1.1
2	*2462.00	93.5 AV			1.47 H	119	94.6	-1.1
3	2483.50	64.2 PK	74.0	-9.8	1.47 H	119	65.2	-1.0
4	2483.50	46.9 AV	54.0	-7.1	1.47 H	119	47.9	-1.0
5	4924.00	54.1 PK	74.0	-19.9	2.98 H	278	50.6	3.5
6	4924.00	39.8 AV	54.0	-14.2	2.98 H	278	36.3	3.5
7	7386.00	43.2 PK	74.0	-30.8	1.54 H	282	33.3	9.9
8	7386.00	33.6 AV	54.0	-20.4	1.54 H	282	23.7	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	111.7 PK			1.19 V	303	112.8	-1.1
2	*2462.00	101.5 AV			1.19 V	303	102.6	-1.1
3	2483.50	68.3 PK	74.0	-5.7	1.19 V	303	69.3	-1.0
4	2483.50	53.8 AV	54.0	-0.2	1.19 V	303	54.8	-1.0
5	4924.00	57.5 PK	74.0	-16.5	1.11 V	74	54.0	3.5
6	4924.00	43.4 AV	54.0	-10.6	1.11 V	74	39.9	3.5
7	7386.00	44.9 PK	74.0	-29.1	1.43 V	145	35.0	9.9
8	7386.00	34.9 AV	54.0	-19.1	1.43 V	145	25.0	9.9

REMARKS:

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

802.11n (HT40)

CHANNEL	TX Channel 3	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.9 PK	74.0	-12.1	1.48 H	116	63.2	-1.3
2	2390.00	46.8 AV	54.0	-7.2	1.48 H	116	48.1	-1.3
3	*2422.00	100.7 PK			1.48 H	116	102.0	-1.3
4	*2422.00	91.1 AV			1.48 H	116	92.4	-1.3
5	4844.00	54.3 PK	74.0	-19.7	3.10 H	284	51.0	3.3
6	4844.00	40.2 AV	54.0	-13.8	3.10 H	284	36.9	3.3
7	7266.00	43.3 PK	74.0	-30.7	1.62 H	257	33.5	9.8
8	7266.00	33.3 AV	54.0	-20.7	1.62 H	257	23.5	9.8
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	66.0 PK	74.0	-8.0	1.31 V	303	67.3	-1.3
2	2390.00	53.7 AV	54.0	-0.3	1.31 V	303	55.0	-1.3
3	*2422.00	108.5 PK			1.31 V	303	109.8	-1.3
4	*2422.00	99.1 AV			1.31 V	303	100.4	-1.3
5	4844.00	56.9 PK	74.0	-17.1	1.13 V	87	53.6	3.3
6	4844.00	42.8 AV	54.0	-11.2	1.13 V	87	39.5	3.3
7	7266.00	44.7 PK	74.0	-29.3	1.45 V	158	34.9	9.8
8	7266.00	35.1 AV	54.0	-18.9	1.45 V	158	25.3	9.8

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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.4 PK	74.0	-15.6	1.51 H	110	59.7	-1.3
2	2390.00	45.2 AV	54.0	-8.8	1.51 H	110	46.5	-1.3
3	*2437.00	101.5 PK			1.51 H	110	102.7	-1.2
4	*2437.00	93.0 AV			1.51 H	110	94.2	-1.2
5	2483.50	63.1 PK	74.0	-10.9	1.51 H	110	64.1	-1.0
6	2483.50	46.6 AV	54.0	-7.4	1.51 H	110	47.6	-1.0
7	4874.00	54.6 PK	74.0	-19.4	3.06 H	283	51.3	3.3
8	4874.00	40.6 AV	54.0	-13.4	3.06 H	283	37.3	3.3
9	7311.00	42.8 PK	74.0	-31.2	1.59 H	264	33.0	9.8
10	7311.00	33.0 AV	54.0	-21.0	1.59 H	264	23.2	9.8
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	62.5 PK	74.0	-11.5	2.17 V	324	63.8	-1.3
2	2390.00	52.1 AV	54.0	-1.9	2.17 V	324	53.4	-1.3
3	*2437.00	109.3 PK			2.17 V	324	110.5	-1.2
4	*2437.00	101.0 AV			2.17 V	324	102.2	-1.2
5	2483.50	67.2 PK	74.0	-6.8	2.17 V	324	68.2	-1.0
6	2483.50	53.5 AV	54.0	-0.5	2.17 V	324	54.5	-1.0
7	4874.00	57.3 PK	74.0	-16.7	1.18 V	77	54.0	3.3
8	4874.00	43.2 AV	54.0	-10.8	1.18 V	77	39.9	3.3
9	7311.00	44.5 PK	74.0	-29.5	1.48 V	164	34.7	9.8
10	7311.00	34.8 AV	54.0	-19.2	1.48 V	164	25.0	9.8

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 9	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	97.7 PK			2.06 H	360	98.8	-1.1
2	*2452.00	88.6 AV			2.06 H	360	89.7	-1.1
3	2483.50	58.2 PK	74.0	-15.8	2.06 H	360	59.2	-1.0
4	2483.50	46.1 AV	54.0	-7.9	2.06 H	360	47.1	-1.0
5	4904.00	55.0 PK	74.0	-19.0	3.09 H	293	51.5	3.5
6	4904.00	41.0 AV	54.0	-13.0	3.09 H	293	37.5	3.5
7	7356.00	43.2 PK	74.0	-30.8	1.55 H	280	33.3	9.9
8	7356.00	33.3 AV	54.0	-20.7	1.55 H	280	23.4	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	105.8 PK			1.50 V	306	106.9	-1.1
2	*2452.00	96.4 AV			1.50 V	306	97.5	-1.1
3	2483.50	65.3 PK	74.0	-8.7	1.50 V	306	66.3	-1.0
4	2483.50	53.6 AV	54.0	-0.4	1.50 V	306	54.6	-1.0
5	4904.00	57.4 PK	74.0	-16.6	1.14 V	81	53.9	3.5
6	4904.00	43.0 AV	54.0	-11.0	1.14 V	81	39.5	3.5
7	7356.00	44.3 PK	74.0	-29.7	1.44 V	173	34.4	9.9
8	7356.00	34.4 AV	54.0	-19.6	1.44 V	173	24.5	9.9

REMARKS:

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

Below 1GHz Data:

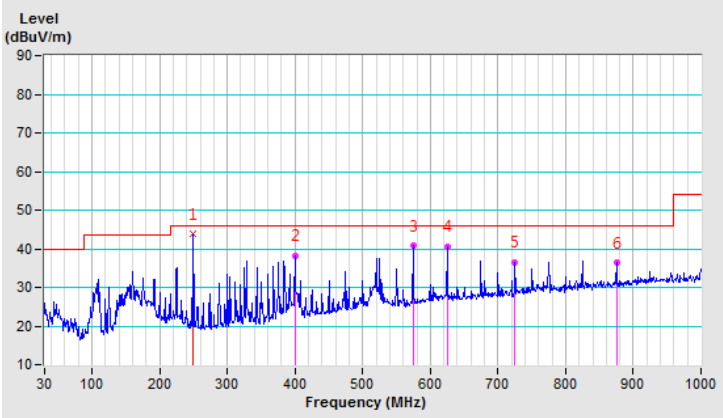
802.11n (HT20)

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	250.00	43.8 QP	46.0	-2.2	1.00 H	83	53.0	-9.2
2	400.03	38.1 QP	46.0	-7.9	1.00 H	315	43.1	-5.0
3	574.99	40.7 QP	46.0	-5.3	1.50 H	324	41.8	-1.1
4	625.00	40.7 QP	46.0	-5.3	1.50 H	45	40.5	0.2
5	724.98	36.4 QP	46.0	-9.6	2.50 H	188	35.2	1.2
6	874.99	36.3 QP	46.0	-9.7	1.50 H	44	32.5	3.8

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

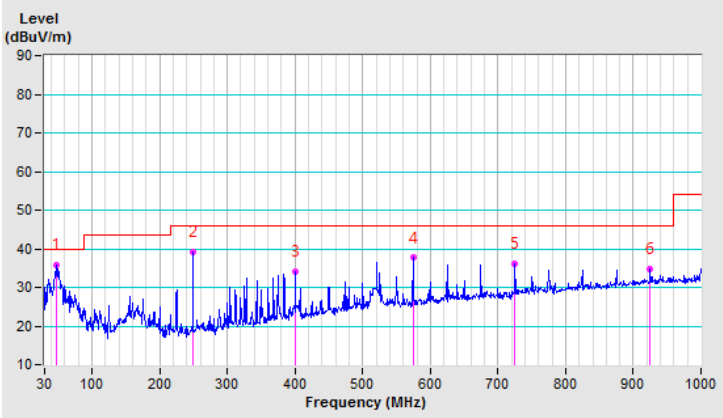


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	47.82	35.7 QP	40.0	-4.3	1.00 V	166	43.5	-7.8
2	250.00	39.1 QP	46.0	-6.9	2.00 V	0	48.4	-9.3
3	400.01	34.0 QP	46.0	-12.0	1.00 V	115	39.0	-5.0
4	574.99	37.7 QP	46.0	-8.3	1.00 V	284	38.8	-1.1
5	725.00	36.2 QP	46.0	-9.8	1.50 V	360	35.0	1.2
6	924.99	34.9 QP	46.0	-11.1	1.50 V	352	30.4	4.5

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, 20167	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 Shielded Room No. 1.
3 Tested Date: Nov. 21, 2017

4.2.3 Test Procedures

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

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

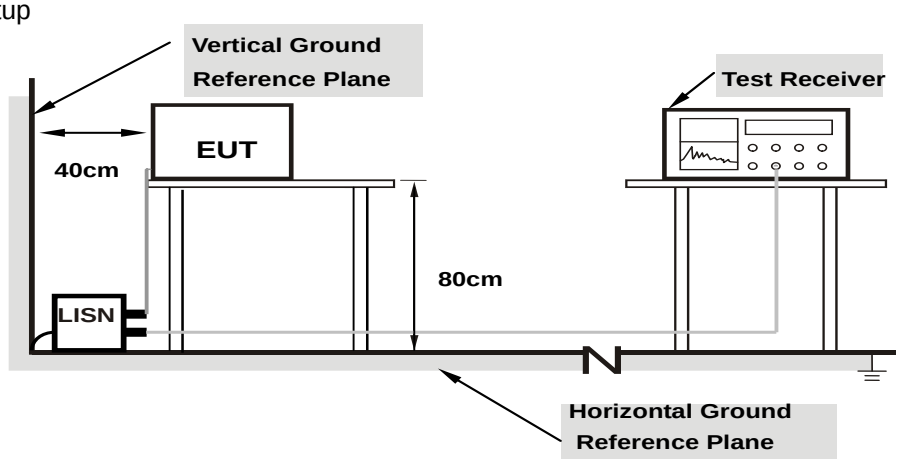
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Conditions

Same as 4.1.6.

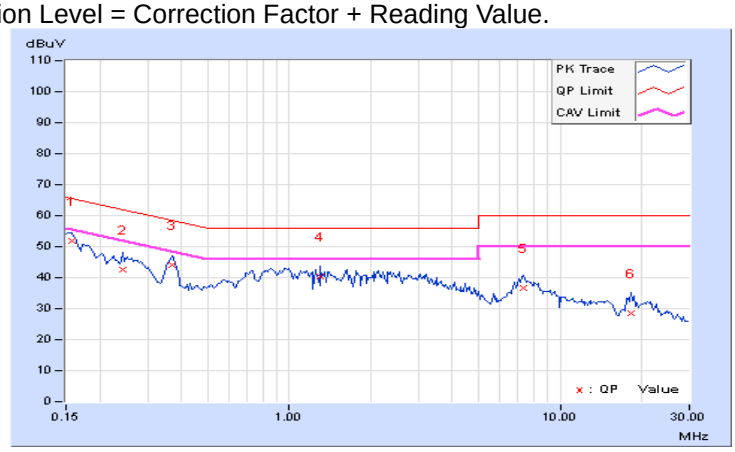
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.08	41.86	32.34	51.94	42.42	65.58	55.58	-13.64	-13.16
2	0.24375	10.08	32.38	20.90	42.46	30.98	61.97	51.97	-19.51	-20.99
3	**0.36875**	**10.11**	**34.04**	**27.73**	**44.15**	**37.84**	**58.53**	**48.53**	**-14.38**	**-10.69**
4	1.30078	10.17	30.14	21.40	40.31	31.57	56.00	46.00	-15.69	-14.43
5	7.27734	10.59	25.93	20.14	36.52	30.73	60.00	50.00	-23.48	-19.27
6	18.17578	11.45	16.97	10.22	28.42	21.67	60.00	50.00	-31.58	-28.33

REMARKS:

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

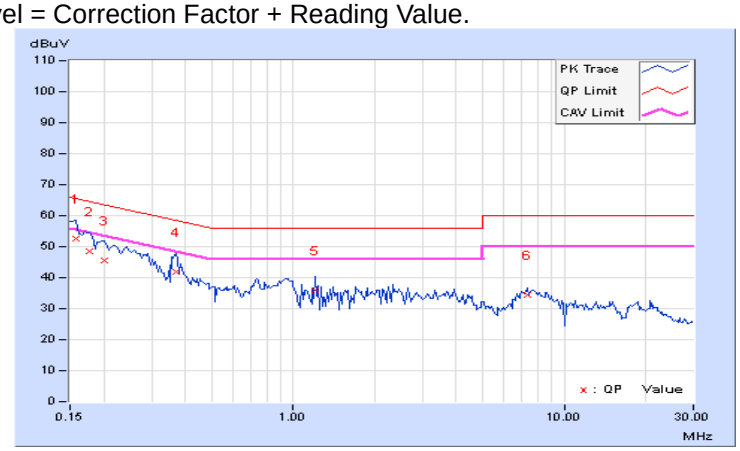


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.07	42.47	31.95	52.54	42.02	65.58	55.58	-13.04	-13.56
2	0.17734	10.06	38.51	28.28	48.57	38.34	64.61	54.61	-16.04	-16.27
3	0.20078	10.04	35.60	25.72	45.64	35.76	63.58	53.58	-17.94	-17.82
4	0.36875	10.11	31.86	23.61	41.97	33.72	58.53	48.53	-16.56	-14.81
5	1.21094	10.15	25.65	18.68	35.80	28.83	56.00	46.00	-20.20	-17.17
6	7.31641	10.51	23.76	18.25	34.27	28.76	60.00	50.00	-25.73	-21.24

REMARKS:

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

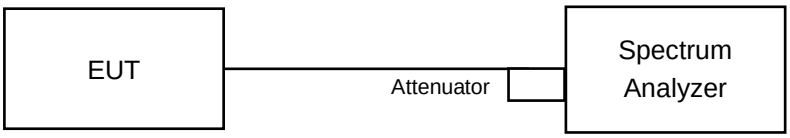


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	10.14	0.5	PASS
6	2437	10.15	0.5	PASS
11	2462	10.11	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.67	0.5	PASS
6	2437	16.65	0.5	PASS
11	2462	16.67	0.5	PASS

802.11n (HT20)

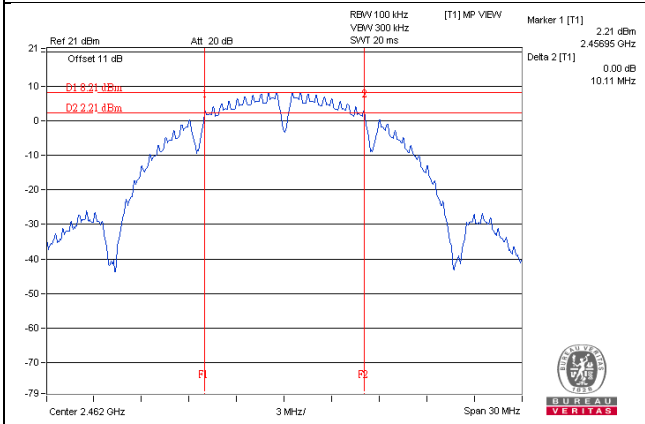
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.88	17.87	0.5	Pass
6	2437	17.90	17.91	0.5	Pass
11	2462	17.86	17.87	0.5	Pass

802.11n (HT40)

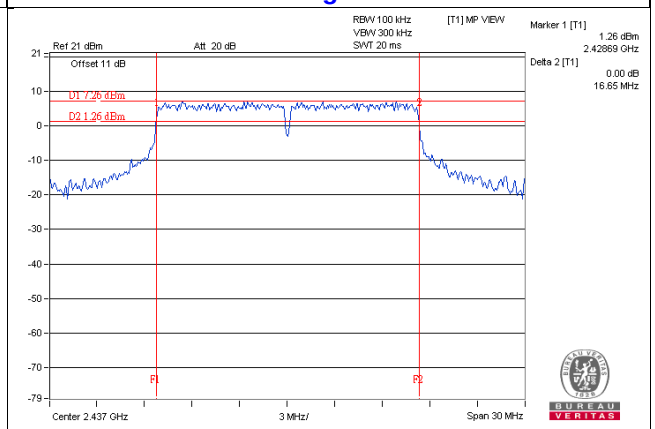
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.59	36.60	0.5	Pass
6	2437	36.59	36.63	0.5	Pass
9	2452	36.62	36.62	0.5	Pass

Spectrum Plot of Worst Value

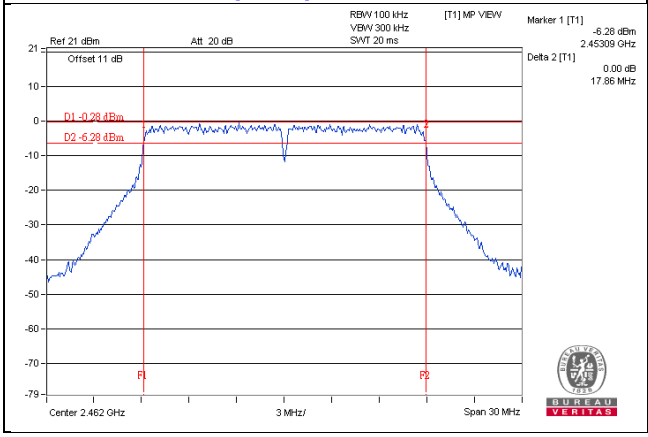
802.11b / CH11



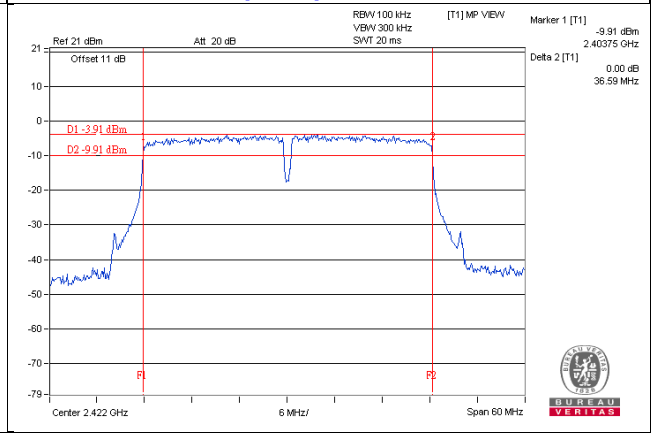
802.11g / CH6



802.11n (HT20) / Chain 0 : CH11



802.11n (HT40) / Chain 0 : CH3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

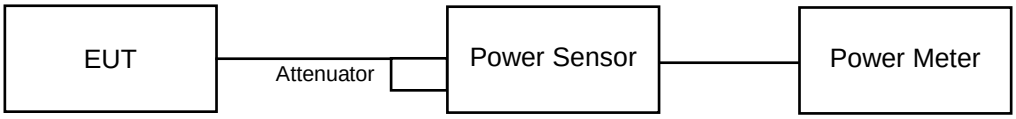
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

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

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

FOR PEAK POWER

802.11b

Chan.	Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	148.594	21.72	30	Pass
6	2437	394.457	25.96	30	Pass
11	2462	115.878	20.64	30	Pass

802.11g

Chan.	Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	316.957	25.01	30	Pass
6	2437	430.527	26.34	30	Pass
11	2462	265.461	24.24	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.15	23.96	455.424	26.58	30	Pass
6	2437	26.28	27.57	996.099	29.98	30	Pass
11	2462	23.43	23.53	445.717	26.49	30	Pass

Note: 1. Directional gain = 5.502dBi < 6dBi, so the power limit shall be not reduced.

802.11n (HT40)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	22.21	22.06	327.035	25.15	30	Pass
6	2437	24.81	23.67	535.5	27.29	30	Pass
9	2452	20.60	20.57	228.84	23.60	30	Pass

Note: 1. Directional gain = 5.502dBi < 6dBi, so the power limit shall be not reduced.

FOR AVERAGE POWER

802.11b

Chan.	Frequency (MHz)	Avg. Power (mW)	Avg. Power (dBm)
1	2412	92.683	19.67
6	2437	285.102	24.55
11	2462	71.945	18.57

802.11g

Chan.	Frequency (MHz)	Avg. Power (mW)	Avg. Power (dBm)
1	2412	57.148	17.57
6	2437	151.008	21.79
11	2462	36.728	15.65

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.40	14.40	62.216	17.94
6	2437	22.01	22.57	339.572	25.31
11	2462	14.68	14.56	57.952	17.63

802.11n (HT40)

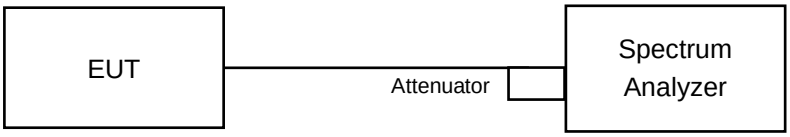
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	14.18	13.83	50.337	17.02
6	2437	17.44	16.02	95.457	19.80
9	2452	12.70	12.47	36.281	15.60

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-11.21	8.00	Pass
6	2437	-6.38	8.00	Pass
11	2462	-11.91	8.00	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-12.22	8.00	Pass
6	2437	-7.01	8.00	Pass
11	2462	-14.27	8.00	Pass

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-14.32	3.01	-11.31	8.00	Pass
	6	2437	-6.47	3.01	-3.46	8.00	Pass
	11	2462	-14.14	3.01	-11.13	8.00	Pass
1	1	2412	-15.01	3.01	-12.00	8.00	Pass
	6	2437	-6.84	3.01	-3.83	8.00	Pass
	11	2462	-14.98	3.01	-11.97	8.00	Pass

Note: 1. Directional gain = 5.502dBi < 6dBi, so the power density limit shall be not reduced.

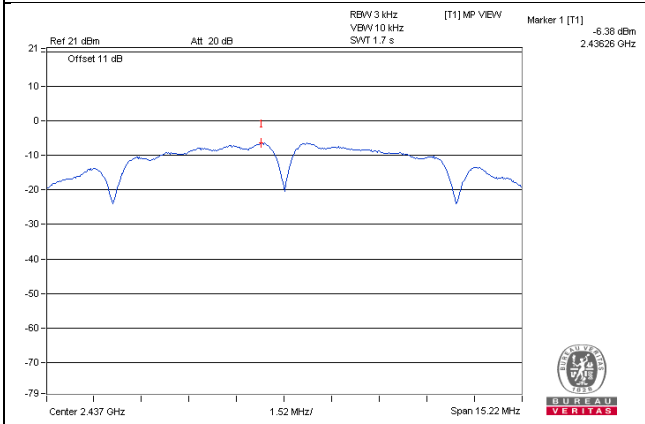
802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-16.71	3.01	-13.70	8.00	Pass
	6	2437	-12.61	3.01	-9.60	8.00	Pass
	9	2452	-17.57	3.01	-14.56	8.00	Pass
1	3	2422	-15.11	3.01	-12.10	8.00	Pass
	6	2437	-14.59	3.01	-11.58	8.00	Pass
	9	2452	-17.04	3.01	-14.03	8.00	Pass

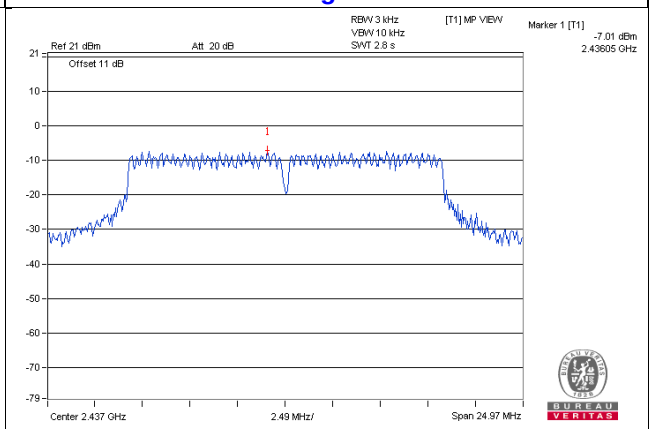
Note: 1. Directional gain = 5.502dBi < 6dBi, so the power density limit shall be not reduced.

Spectrum Plot of Worst Value

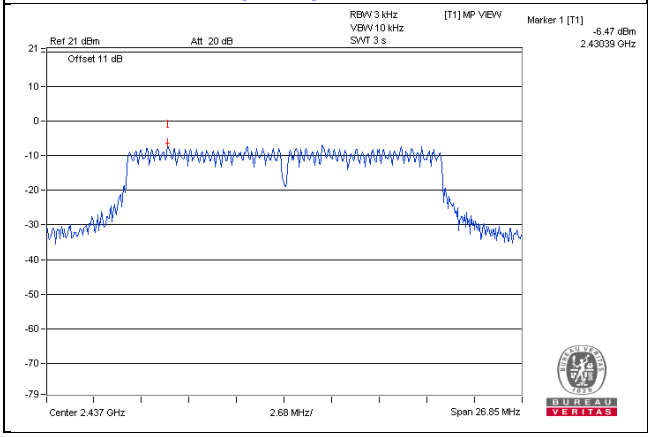
802.11b / CH6



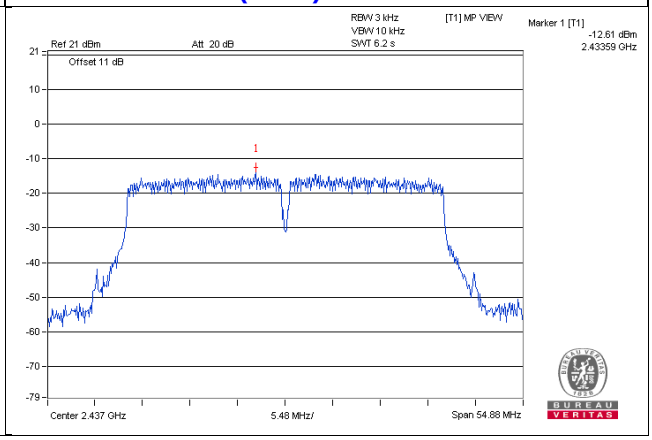
802.11g / CH6



802.11n (HT20) / Chain 0 : CH6



802.11n (HT40) / Chain 0 : CH6

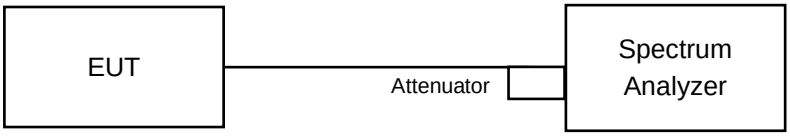


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below -20dB 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 ≥ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

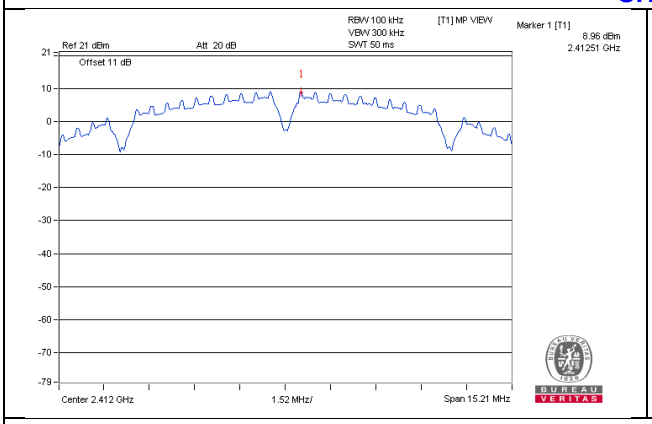
Same as Item 4.3.6

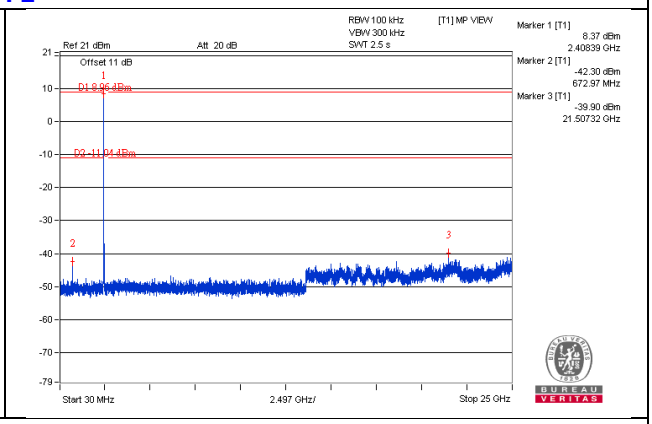
4.6.7 Test Results

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

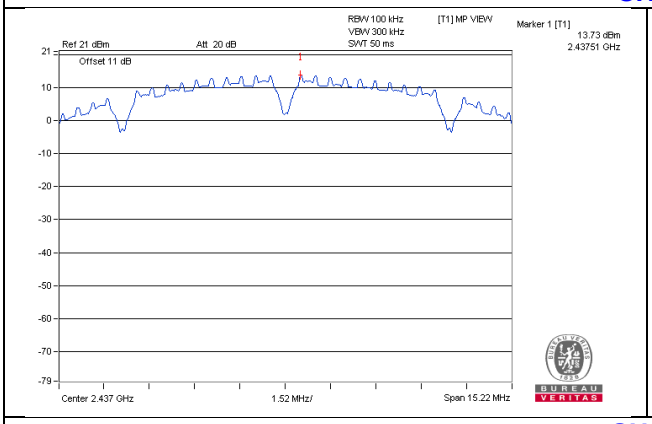
802.11b

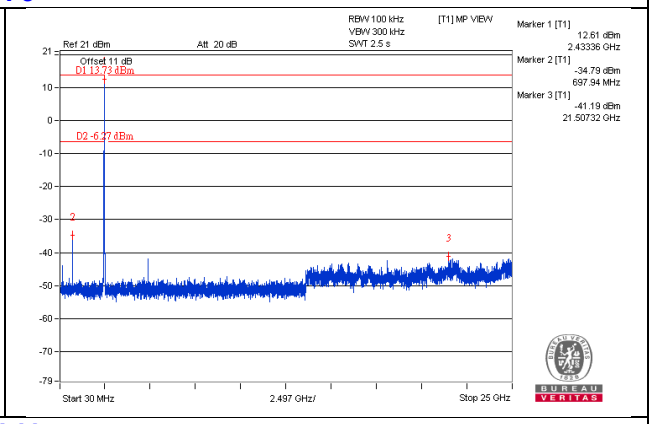
CH 1



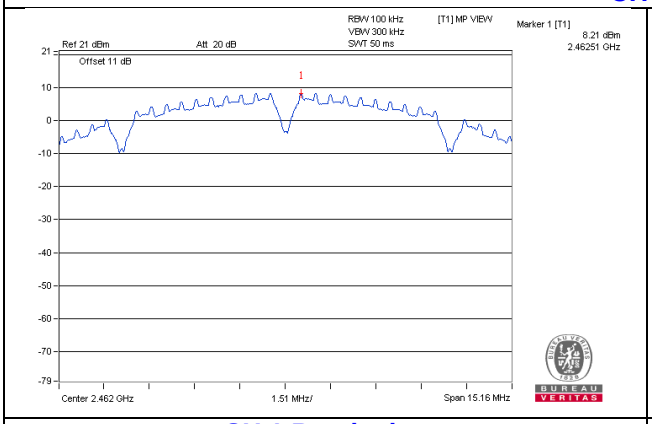


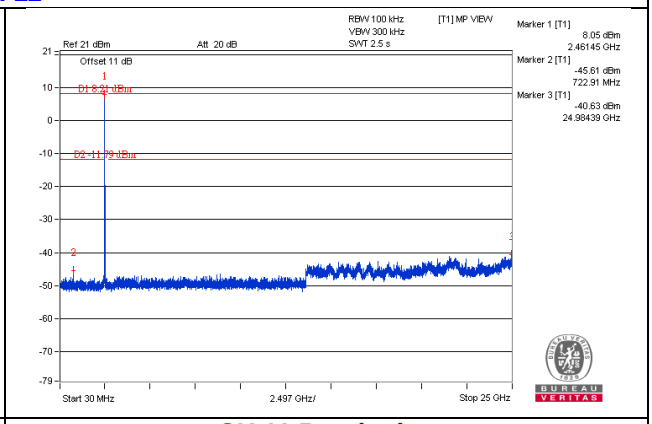
CH 6



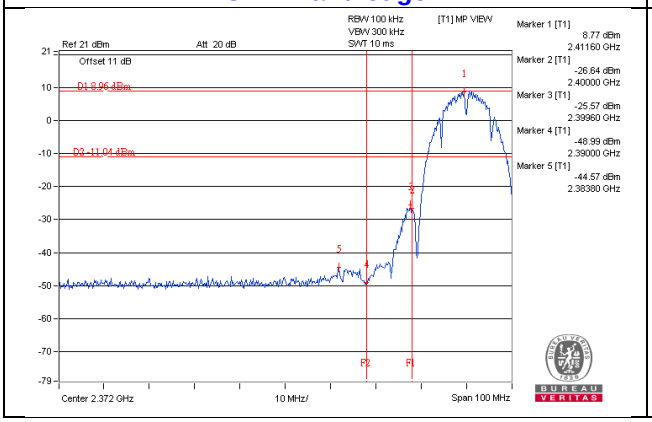


CH 11

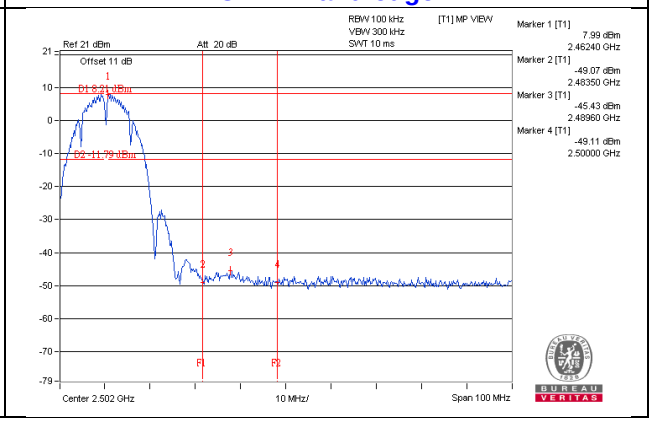




CH 1 Band edge

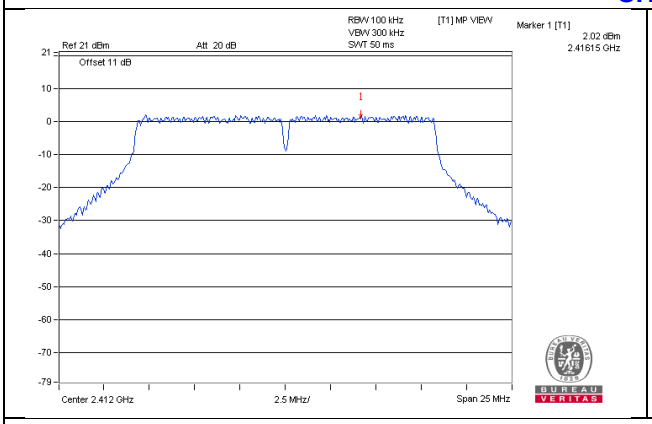


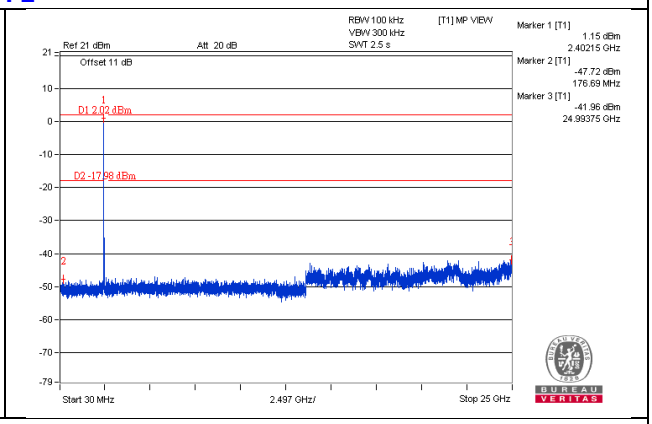
CH 11 Band edge



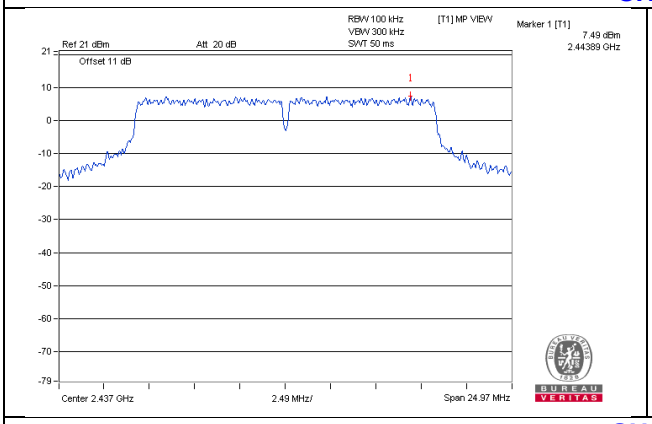
802.11g

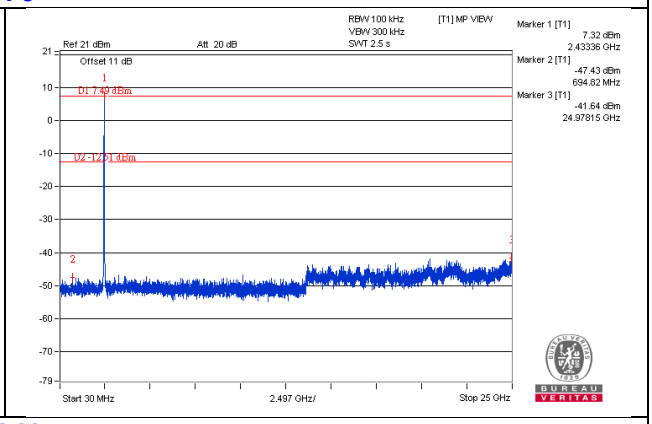
CH 1



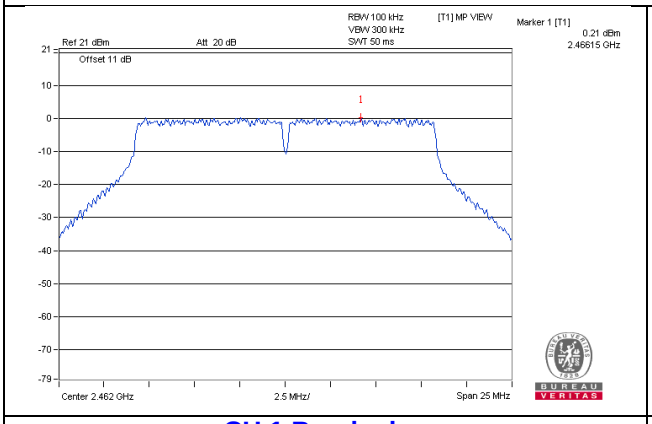


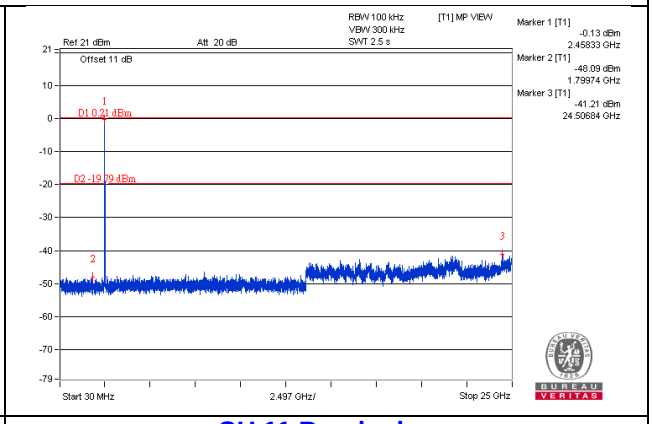
CH 6



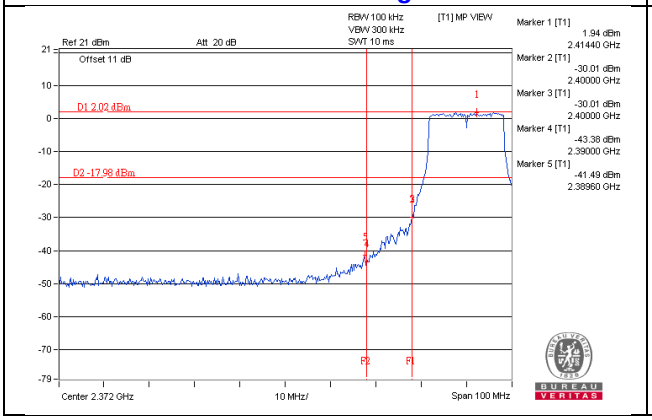


CH 11

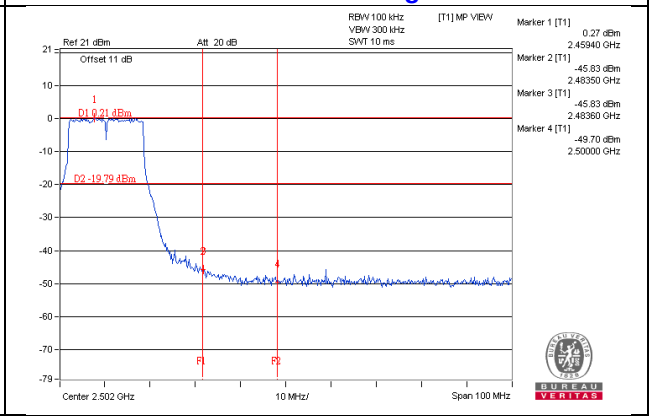




CH 1 Band edge

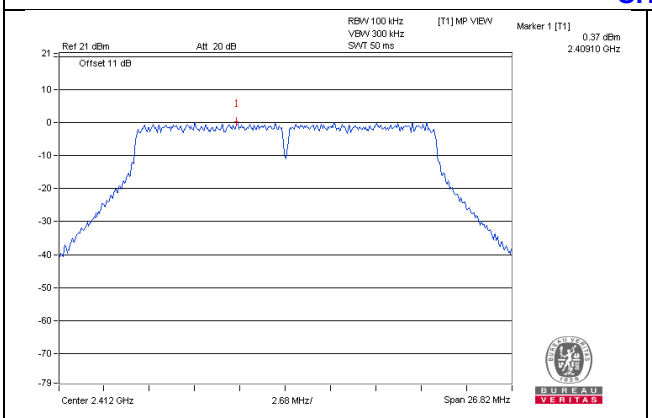


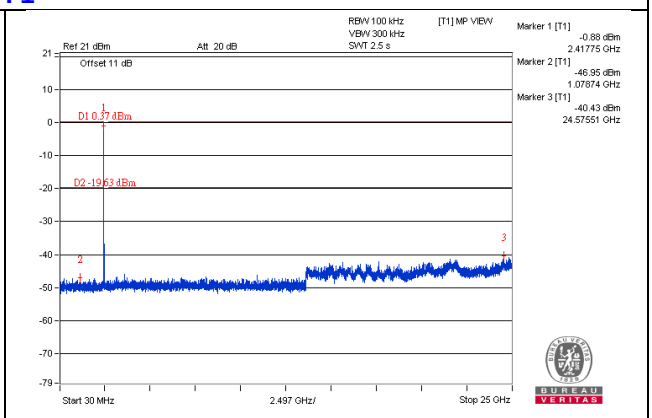
CH 11 Band edge



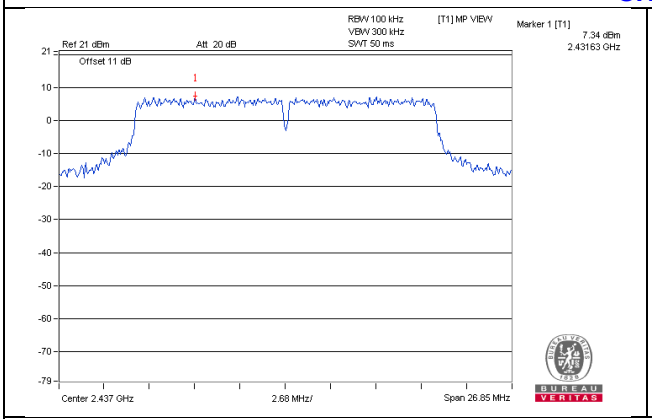
802.11n (HT20)
Chain 0

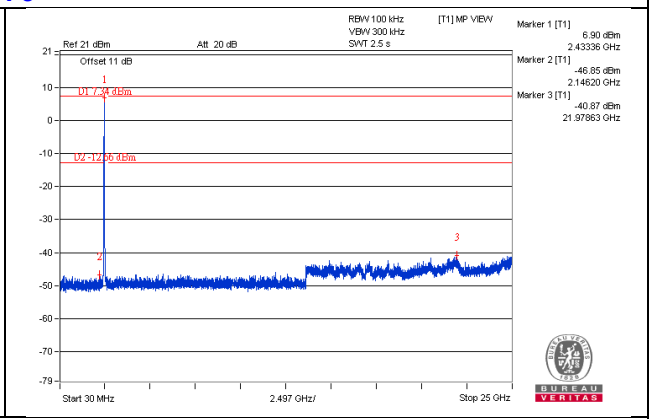
CH 1



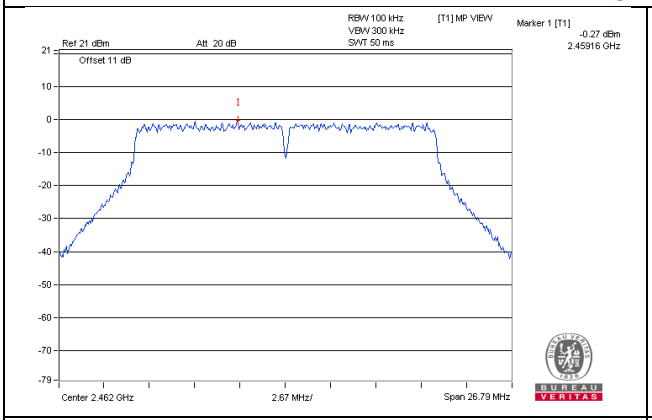


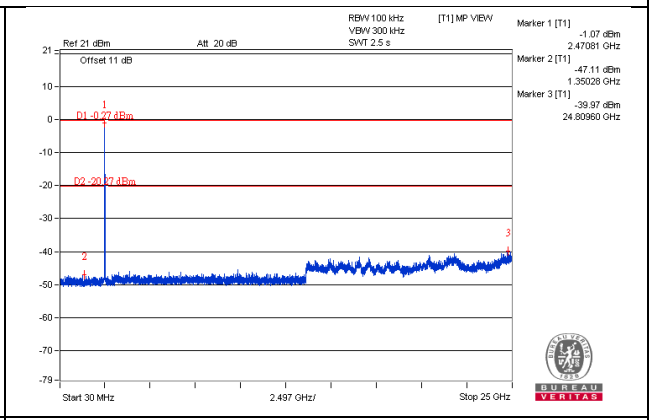
CH 6



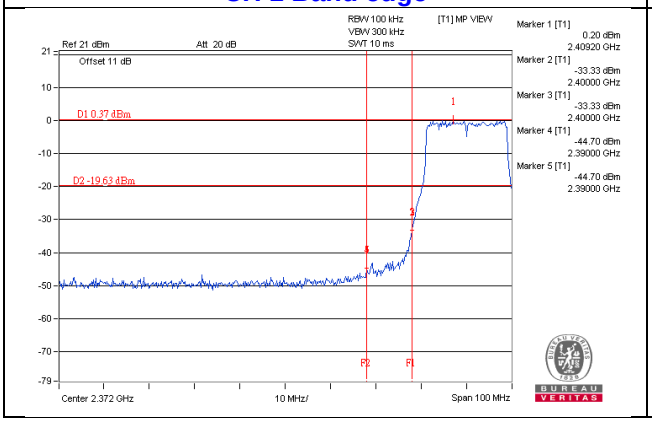


CH 11

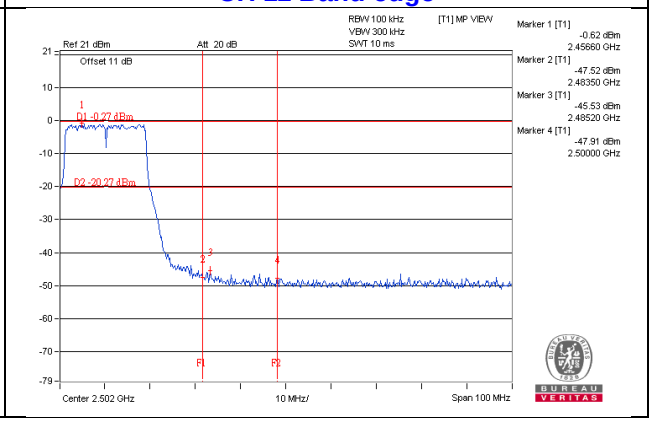




CH 1 Band edge

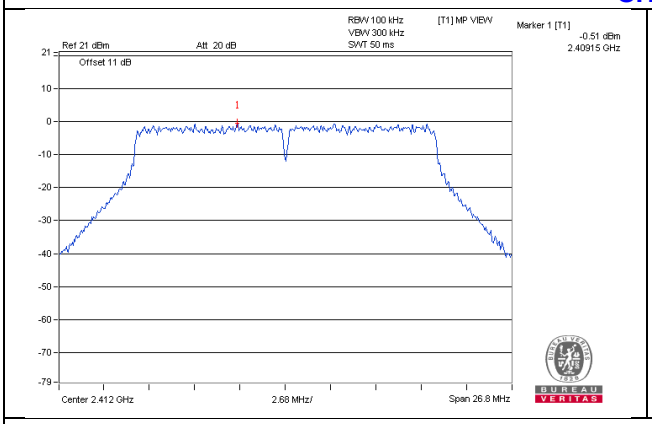


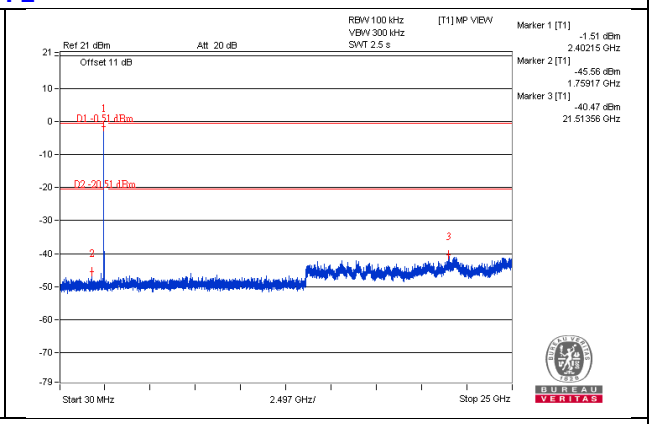
CH 11 Band edge



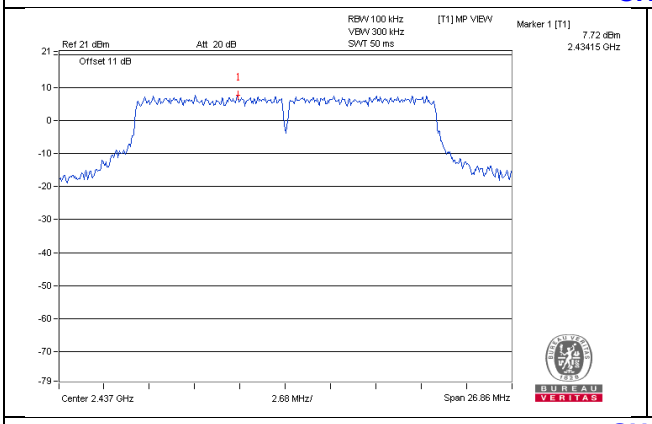
Chain 1

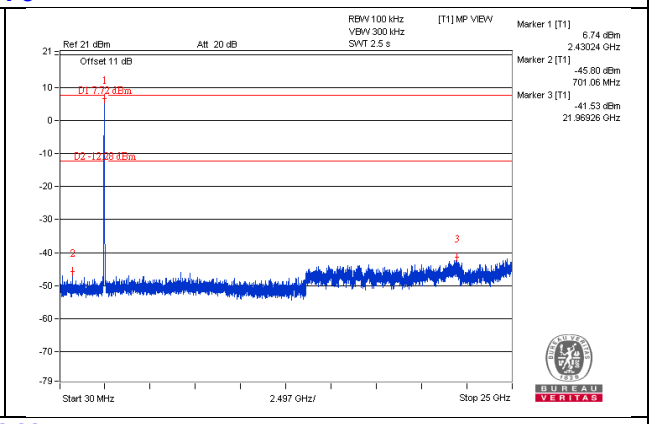
CH 1



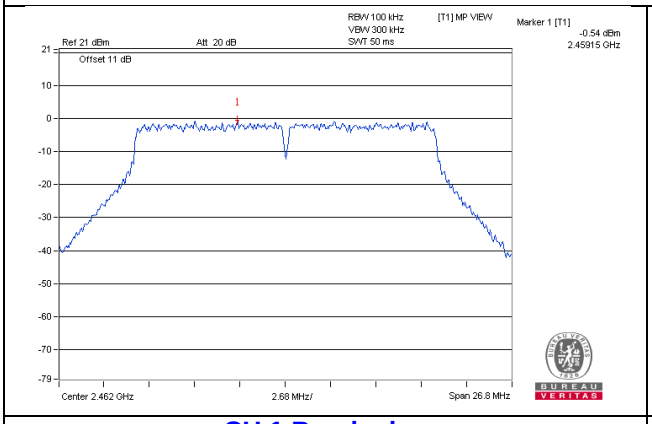


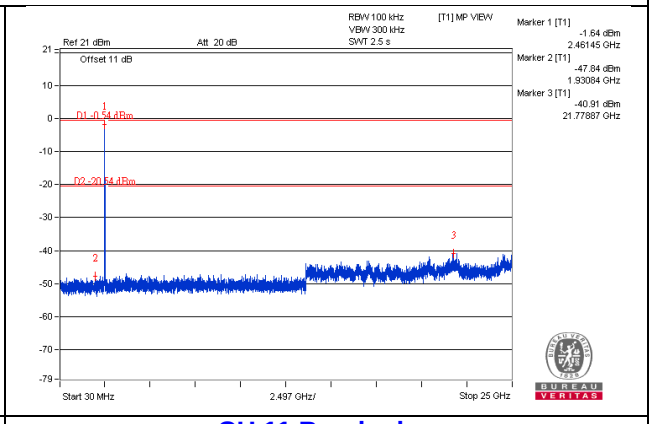
CH 6



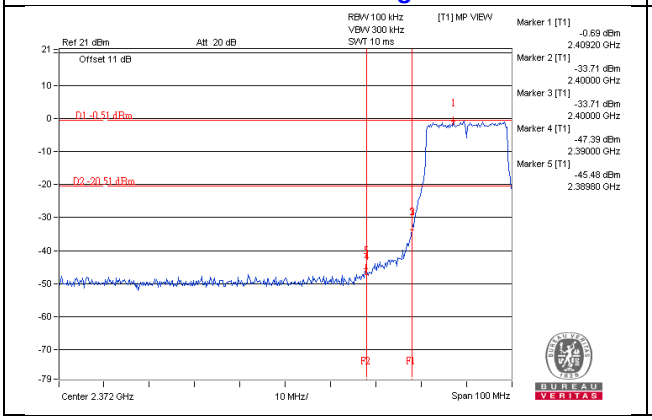


CH 11

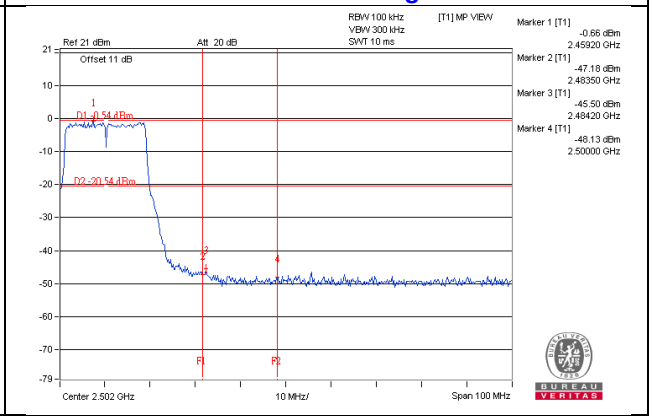




CH 1 Band edge

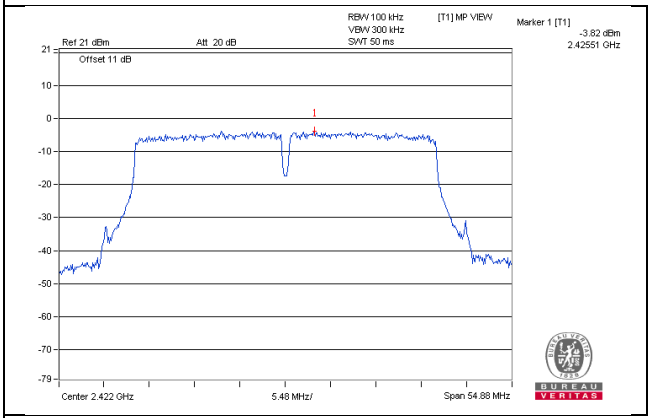


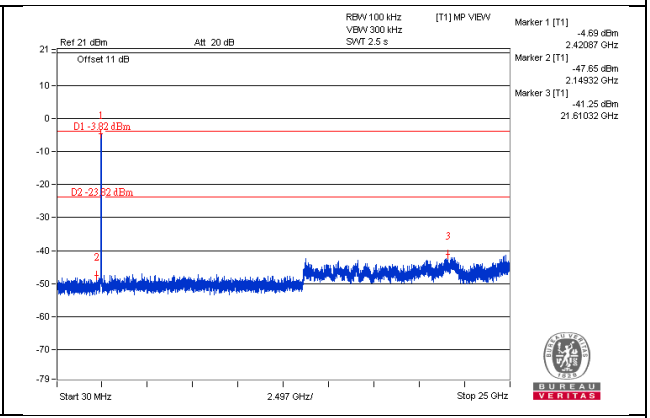
CH 11 Band edge



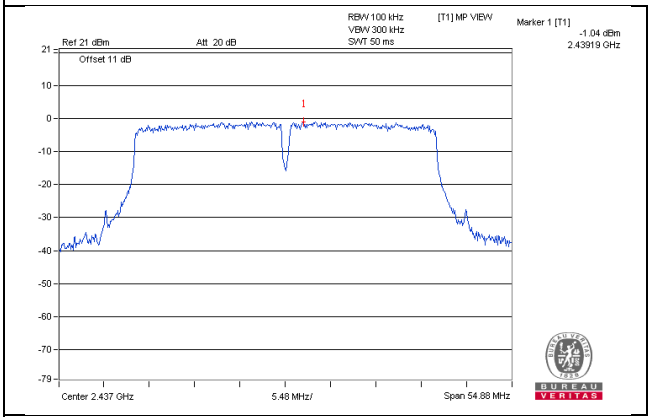
802.11n (HT40)
Chain 0

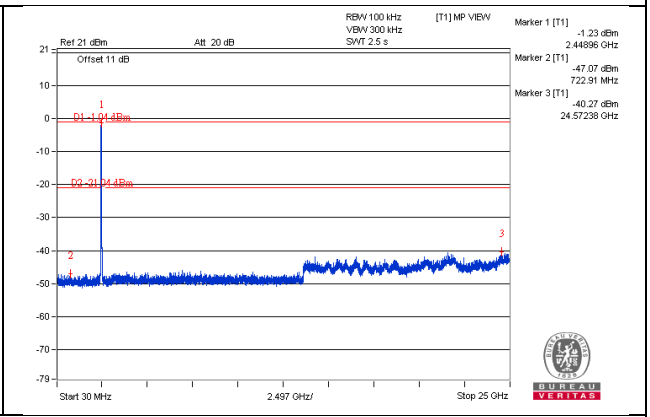
CH 3



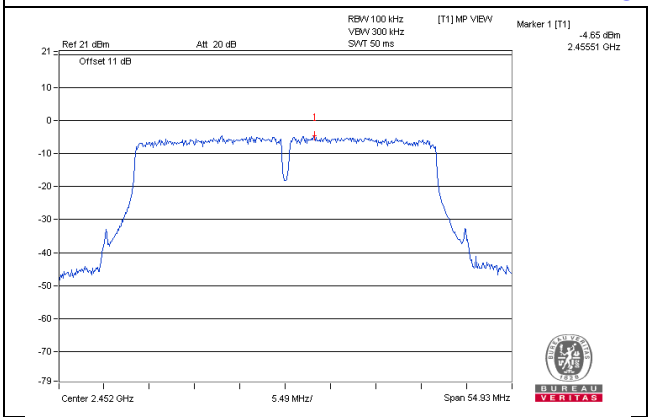


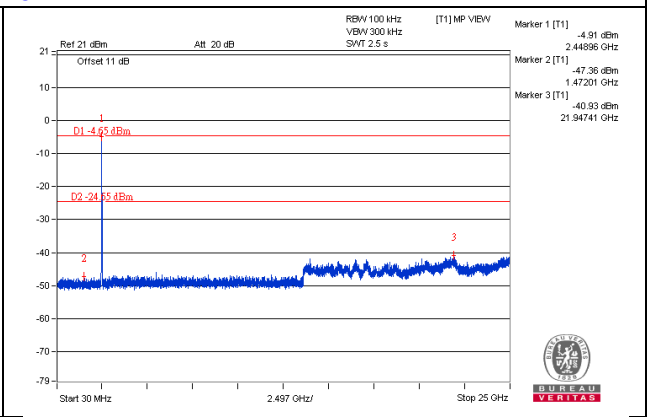
CH 6



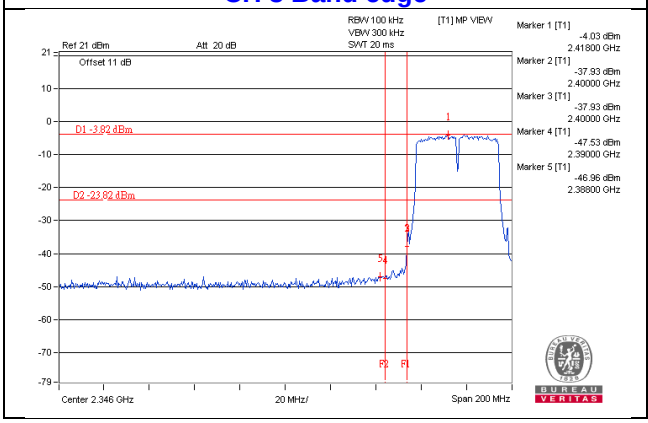


CH 9

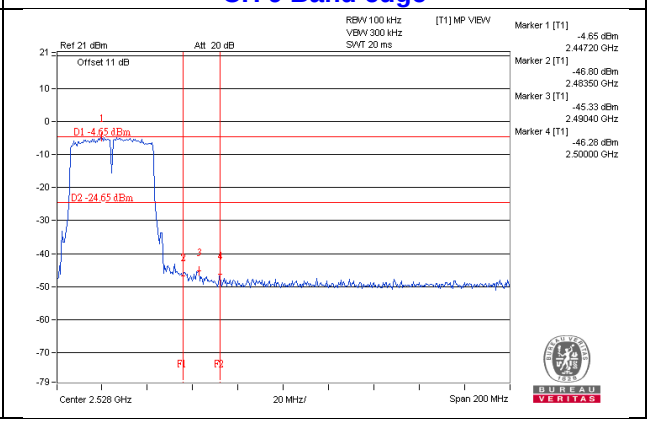




CH 3 Band edge

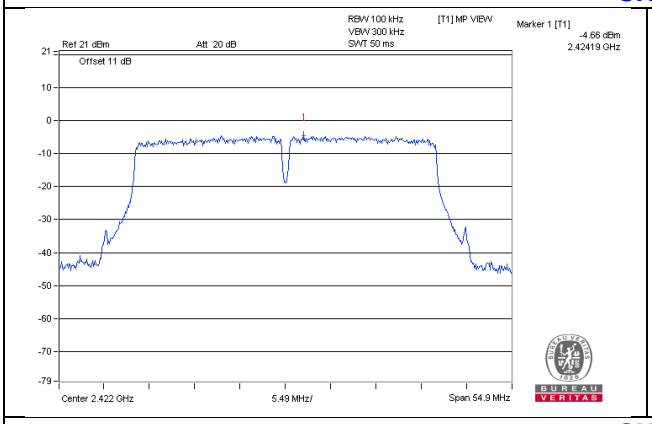


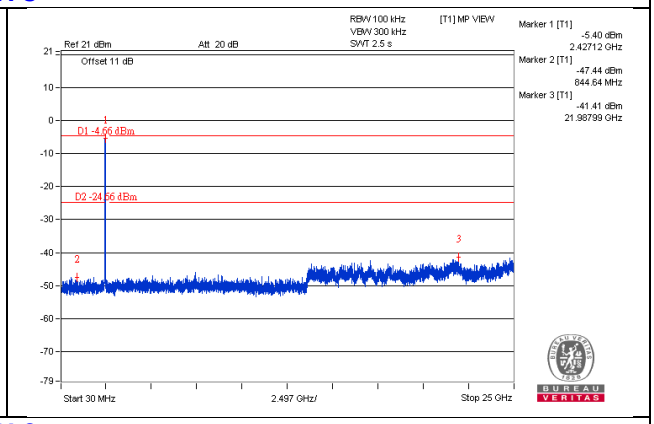
CH 9 Band edge



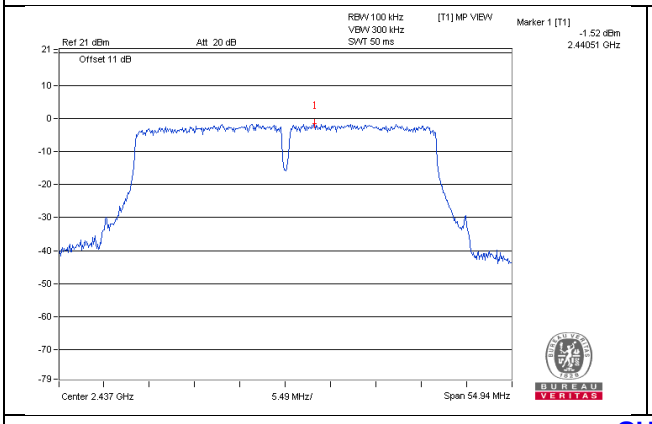
Chain 1

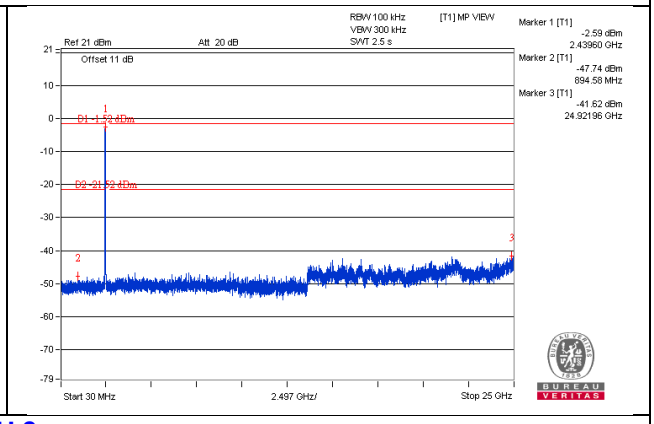
CH 3





CH 6





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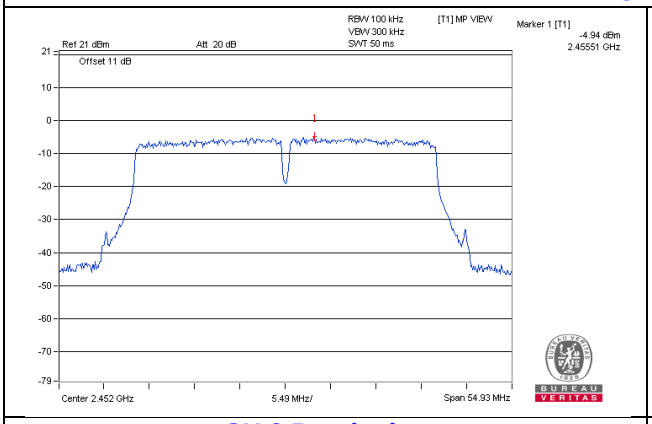
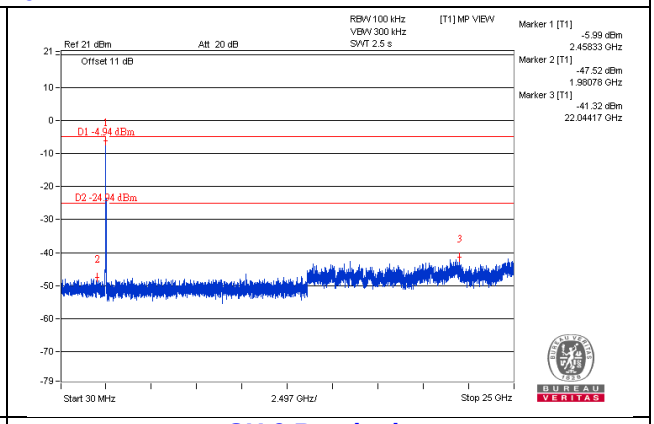
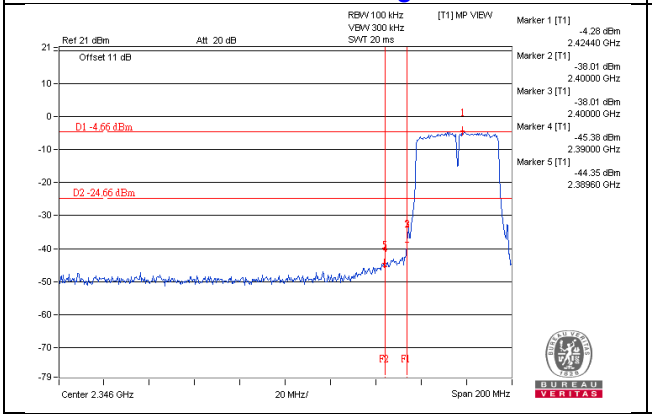
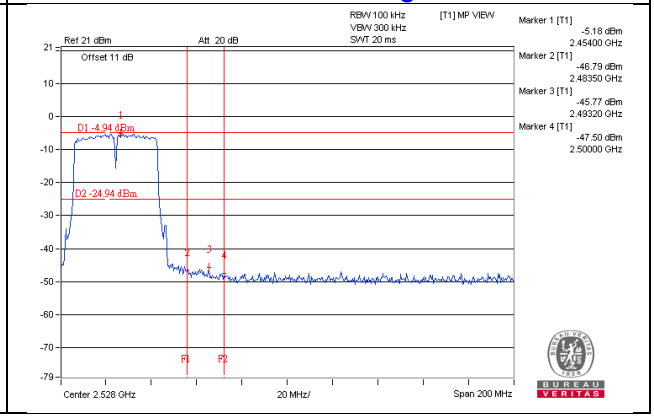




CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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