FCC Test Report

Report No.:	RF191202C09
FCC ID:	KA2COVR1900A1
Test Model:	COVR-1900
Series Model:	COVR-1902
Received Date:	Dec. 02, 2019
Test Date:	Dec. 25, 2019 ~ Jan. 02, 2020
Issued Date:	Jan. 07, 2020
Applicant:	D-Link Corporation
Address:	17595 Mt. Herrmann, Fountain Valley, California, United States, 92708
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF191202C09	Original Release	Jan. 07, 2020

1 Certificate of Conformity

Product:	AC1900 Dual Band Whole Home Mesh Wi-Fi System
Brand:	D-Link
Test Model:	COVR-1900
Series Model:	COVR-1902
Sample Status:	Engineering Sample
Applicant:	D-Link Corporation
Test Date:	Dec. 25, 2019 ~ Jan. 02, 2019
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 RF characteristics under the conditions specified in this report.

Prepared by : Shelly Hsueh , **Date:** Jan. 07, 2020

Shelly Hsueh / Specialist

Approved by : , **Date:** Jan. 07, 2020

Dylan Chiou / Senior Project Engineer

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 -14.96 dB at 0.45455 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.5 dB at 2483.5 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
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) connector not a standard connector.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC1900 Dual Band Whole Home Mesh Wi-Fi System
Brand	D-Link
Test Model	COVR-1900
Series Model	COVR-1902
Model Difference	bundle kit, no physical differences
Status of EUT	Engineering Sample
Power Supply Rating	12 Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 600 Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20/VHT20) 7 for 802.11n (HT40/VHT40)
Output Power	CDD Mode:627.115 mW Beamforming Mode: 428.787 mW
Antenna Type	Refer to Note as below
Antenna Connector	i-pex(MHF)
Accessory Device	Refer to Note as below
Data Cable Supplied	Refer to Note as below

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 3 completed transmitters and 3 receivers.

Modulation Mode	CDD Mode	Beamforming Mode
802.11b	Support	Not Support
802.11g	Support	Not Support
802.11n (HT20/VHT20)	Support	Support
802.11n (HT40/VHT40)	Support	Support

* The bandwidth and modulation are similar for HT20/HT40 on 802.11n mode and VHT20/VHT40 on 802.11n mode. Therefore the investigated worst case is the representative mode in test report. (Final test mode refer section 3.2.1)

2. All models are listed as below.

Brand	Model	Difference
D-Link	COVR-1900	bundle kit, no physical differences
	COVR-1902	
* Above samples had been pre-tested and the worst case was found on model: COVR-1900. Therefore, only this COVR-1900 was as a representative for the final test and recorded in this report.		

3. The antenna information is listed as below.

Antenna No.	RF Chain No.	Brand	Model	Antenna Gain (dBi)		Antenna Type	Connecter Type
				2.4G	5G		
1	WiFi Chain 0	Airgain	N2420DG-T10L-PK1-G180U	4.0	4.3	Dipole	i-pex (MHF)
2	WiFi Chain 1		N2420DG-T10L-PK1-B190U	4.0	4.0		
3	WiFi Chain 2		N2420DG-T10L-PK1-A200U	3.5	5.1		

4. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter 1	Asian Power Devices Inc.	WB-18Q12R	I/P: 100-240 Vac, 50/60 Hz, 0.6 A O/P: 12 Vdc, 1.5 A 1.2M/0core
Adapter 2	AMIGO	AMS200-12015000FU (US) AMS200-12015000FB (UK) AMS200-12015000FV (EU) AMS200-12015000FS (AU)	I/P: 100-240 Vac, 50/60 Hz, 0.8 A O/P: 12 Vdc, 1.5 A 1.2M/0core
Adapter 3	Asian Power Devices Inc.	WB-18Q12FU (US) WB-18Q12FK (UK) WB-18Q12FG (EU) WB-18Q12FN (AU)	I/P: 100-240 Vac, 50/60 Hz, 0.6 A O/P: 12 Vdc, 1.5 A 1.2M/0core

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

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40/VHT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
1	√	√	√	√	EUT + Adapter 1
2	-	√	-	-	EUT + Adapter 2
3	-	√	-	-	EUT + Adapter 3

Where **RE≥1G:** Radiated Emission above 1 GHz **RE<1G:** Radiated Emission below 1 GHz
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**
NOTE: For radiated emission (below 1GHz) and power line conducted emission test items, the worst maximum power was selected..
NOTE: "-"means no effect.

Radiated Emission Test (Above 1 GHz):

☒ 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
1	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
1	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
1	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
1	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1 GHz):

☒ 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
1, 2, 3	802.11b	1 to 11	6	OFDM	BPSK	1.0

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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
1	802.11b	1 to 11	6	OFDM	BPSK	1.0

Bandedge Measurement:

☒ 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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
1	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
1	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
1	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	6.5
1	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	13.5

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.

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
1	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
1	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
1	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
1	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

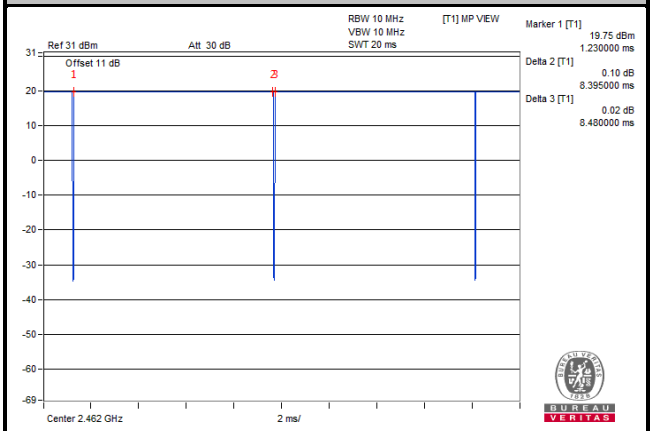
Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gary Lin
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gary Lin
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Alan Wu
APCM	25 deg. C, 65 % RH	12 Vdc	Alan Wu

3.3 Duty Cycle of Test Signal

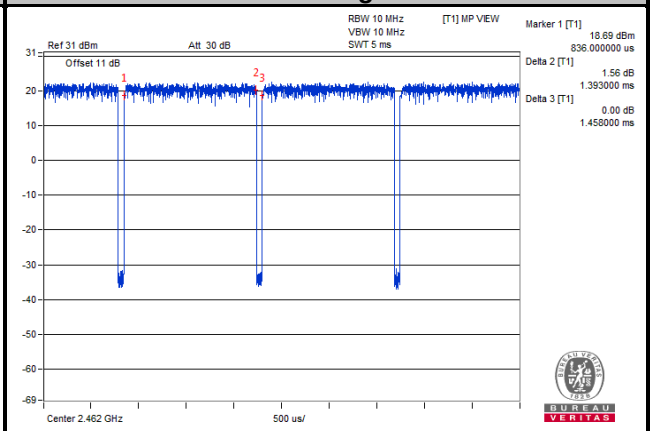
Duty cycle of test signal is ≥ 98 %, duty factor is not required.
Duty cycle of test signal is < 98 %, duty factor shall be considered.

802.11b: Duty cycle = 8.395/8.48 = 0.99
802.11g: Duty cycle = 1.393/1.458 = 0.955, Duty factor = 10 * log(1/0.955) = 0.20
802.11n (HT20): Duty cycle = 1.306/1.376 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23
802.11n (HT40): Duty cycle = 0.644/0.714 = 0.902, Duty factor = 10 * log(1/0.902) = 0.45

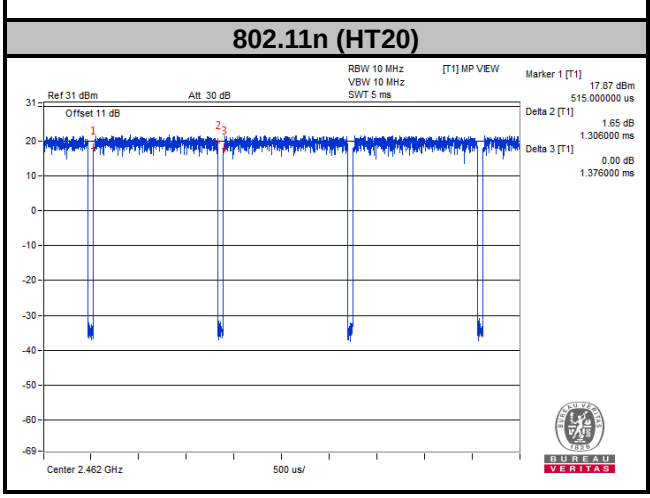
802.11b



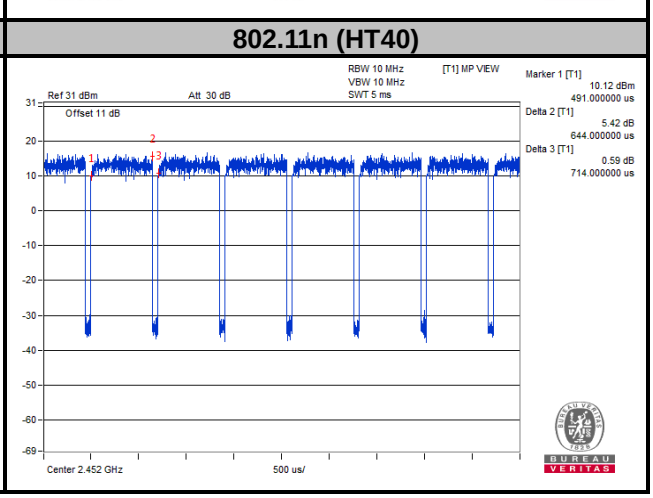
802.11g



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.

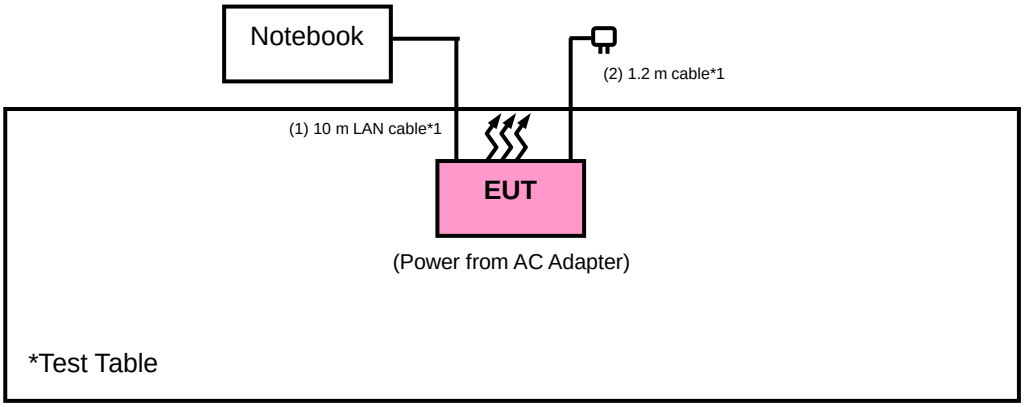
No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Notebook	DELL	E5420	BPQ8MQ1	N/A

No.	Signal Cable Description of The Above Support Units
1.	10 m LAN cable*1
2.	1.2 m cable*1

Note:

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards and References

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

Test Standard:

FCC Part 15, Subpart C (15.247)
ANSI C63.10-2013

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

References Test Guidance:

KDB 558074 D01 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

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 30 dB 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 1000 MHz, 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 20 dB under any condition of modulation.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Loop Antenna EMCI	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jul. 11, 2019	Jul. 10, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 19, 2019	Feb. 18, 2020
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 19, 2019	Jan. 18, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jul. 11, 2019	Jul. 10, 2020
RF signal cable Woken	8D-FB	Cable-CH9-01	Jul. 30, 2019	Jul. 29, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 15, 2019	Jul. 14, 2020

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 HwaYa Chamber 9.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

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 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

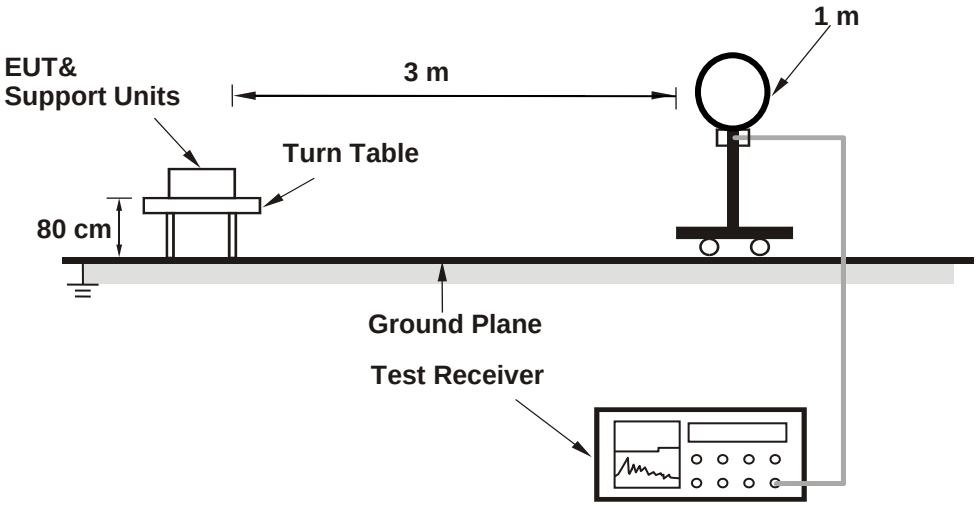
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (11b: RBW = 1 MHz, VBW =10 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
   11n (HT20): RBW = 1 MHz, VBW = 1 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 3 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

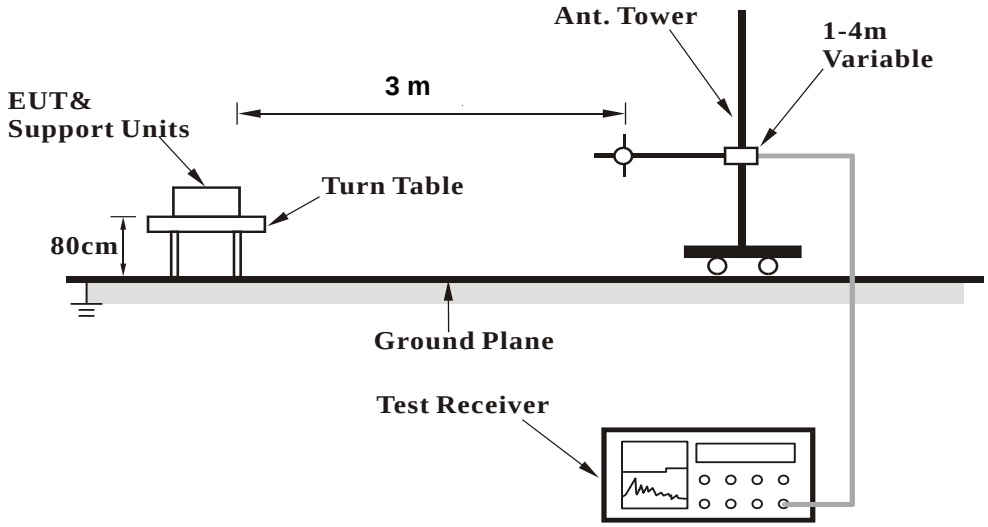
No deviation.

4.1.5 Test Set Up

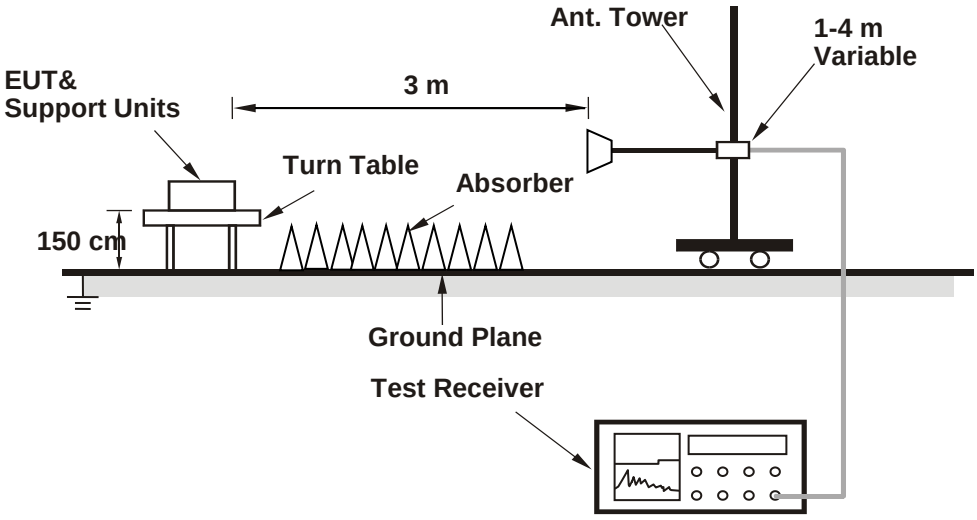
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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 a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data：

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	57.2 PK	74.0	-16.8	1.78 H	107	25.3	31.9
2390.00	45.4 AV	54.0	-8.6	1.78 H	107	13.5	31.9
*2412.00	107.4 PK			1.88 H	91	75.5	31.9
*2412.00	103.6 AV			1.88 H	91	71.7	31.9
4824.00	48.9 PK	74.0	-25.1	1.86 H	68	45.1	3.8
4824.00	41.1 AV	54.0	-12.9	1.86 H	68	37.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	61.1 PK	74.0	-12.9	2.67 V	326	29.2	31.9
2390.00	52.8 AV	54.0	-1.2	2.67 V	326	20.9	31.9
*2412.00	116.2 PK			2.42 V	323	84.3	31.9
*2412.00	112.4 AV			2.42 V	323	80.5	31.9
4824.00	46.3 PK	74.0	-27.7	1.30 V	185	42.5	3.8
4824.00	36.6 AV	54.0	-17.4	1.30 V	185	32.8	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	57.4 PK	74.0	-16.6	1.93 H	102	25.5	31.9
2390.00	45.4 AV	54.0	-8.6	1.93 H	102	13.5	31.9
*2437.00	109.2 PK			1.82 H	93	77.3	31.9
*2437.00	105.4 AV			1.82 H	93	73.5	31.9
4874.00	52.4 PK	74.0	-21.6	1.89 H	73	48.6	3.8
4874.00	42.7 AV	54.0	-11.3	1.89 H	73	38.9	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	61.2 PK	74.0	-12.8	2.17 V	281	29.3	31.9
2390.00	52.7 AV	54.0	-1.3	2.17 V	281	20.8	31.9
*2437.00	117.9 PK			2.34 V	348	86.0	31.9
*2437.00	114.1 AV			2.34 V	348	82.2	31.9
4874.00	47.0 PK	74.0	-27.0	1.34 V	182	43.2	3.8
4874.00	38.1 AV	54.0	-15.9	1.34 V	182	34.3	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	104.6 PK			1.76 H	84	72.7	31.9
*2462.00	100.7 AV			1.76 H	84	68.8	31.9
2483.50	57.6 PK	74.0	-16.4	1.83 H	95	25.6	32.0
2483.50	45.7 AV	54.0	-8.3	1.83 H	95	13.7	32.0
4924.00	49.5 PK	74.0	-24.5	1.93 H	72	45.7	3.8
4924.00	38.6 AV	54.0	-15.4	1.93 H	72	34.8	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	113.5 PK			2.02 V	259	81.6	31.9
*2462.00	109.5 AV			2.02 V	259	77.6	31.9
2488.70	60.7 PK	74.0	-13.3	2.21 V	289	28.7	32.0
2488.70	53.1 AV	54.0	-0.9	2.21 V	289	21.1	32.0
4924.00	45.2 PK	74.0	-28.8	1.91 V	162	41.4	3.8
4924.00	34.2 AV	54.0	-19.8	1.91 V	162	30.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	59.2 PK	74.0	-14.8	1.47 H	299	27.3	31.9
2390.00	47.4 AV	54.0	-6.6	1.47 H	299	15.5	31.9
*2412.00	109.4 PK			1.59 H	292	77.5	31.9
*2412.00	99.4 AV			1.59 H	292	67.5	31.9
4824.00	45.1 PK	74.0	-28.9	1.63 H	194	41.3	3.8
4824.00	31.6 AV	54.0	-22.4	1.63 H	194	27.8	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	67.4 PK	74.0	-6.6	2.14 V	291	35.5	31.9
2390.00	53.3 AV	54.0	-0.7	2.14 V	291	21.4	31.9
*2412.00	116.4 PK			2.38 V	274	84.5	31.9
*2412.00	106.4 AV			2.38 V	274	74.5	31.9
4824.00	45.5 PK	74.0	-28.5	1.64 V	192	41.7	3.8
4824.00	32.0 AV	54.0	-22.0	1.64 V	192	28.2	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	115.5 PK			1.57 H	296	83.6	31.9
*2437.00	105.5 AV			1.57 H	296	73.6	31.9
2483.50	60.6 PK	74.0	-13.4	1.49 H	283	28.6	32.0
2483.50	47.9 AV	54.0	-6.1	1.49 H	283	15.9	32.0
4874.00	45.5 PK	74.0	-28.5	2.04 H	85	41.7	3.8
4874.00	32.2 AV	54.0	-21.8	2.04 H	85	28.4	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	122.8 PK			1.84 V	260	90.9	31.9
*2437.00	112.7 AV			1.84 V	260	80.8	31.9
2483.50	68.9 PK	74.0	-5.1	1.79 V	255	36.9	32.0
2483.50	53.1 AV	54.0	-0.9	1.79 V	255	21.1	32.0
4874.00	46.4 PK	74.0	-27.6	1.57 V	203	42.6	3.8
4874.00	33.1 AV	54.0	-20.9	1.57 V	203	29.3	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	108.6 PK			1.64 H	292	76.7	31.9
*2462.00	98.7 AV			1.64 H	292	66.8	31.9
2483.50	60.4 PK	74.0	-13.6	1.74 H	284	28.4	32.0
2483.50	47.6 AV	54.0	-6.4	1.74 H	284	15.6	32.0
4924.00	44.5 PK	74.0	-29.5	2.04 H	79	40.7	3.8
4924.00	31.0 AV	54.0	-23.0	2.04 H	79	27.2	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	115.4 PK			2.08 V	287	83.5	31.9
*2462.00	105.5 AV			2.08 V	287	73.6	31.9
2483.50	68.2 PK	74.0	-5.8	1.75 V	315	36.2	32.0
2483.50	52.7 AV	54.0	-1.3	1.75 V	315	20.7	32.0
4924.00	45.6 PK	74.0	-28.4	1.56 V	187	41.8	3.8
4924.00	32.3 AV	54.0	-21.7	1.56 V	187	28.5	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11n (HT20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	62.2 PK	74.0	-11.8	1.83 H	274	30.3	31.9
2390.00	47.5 AV	54.0	-6.5	1.83 H	274	15.6	31.9
*2412.00	109.7 PK			1.62 H	287	77.8	31.9
*2412.00	99.6 AV			1.62 H	287	67.7	31.9
4824.00	45.0 PK	74.0	-29.0	2.16 H	89	41.2	3.8
4824.00	31.4 AV	54.0	-22.6	2.16 H	89	27.6	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	66.7 PK	74.0	-7.3	2.18 V	303	34.8	31.9
2390.00	53.3 AV	54.0	-0.7	2.18 V	303	21.4	31.9
*2412.00	115.8 PK			2.15 V	264	83.9	31.9
*2412.00	105.8 AV			2.15 V	264	73.9	31.9
4824.00	45.6 PK	74.0	-28.4	1.73 V	205	41.8	3.8
4824.00	32.2 AV	54.0	-21.8	1.73 V	205	28.4	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	115.1 PK			1.67 H	294	83.2	31.9
*2437.00	105.0 AV			1.67 H	294	73.1	31.9
2483.50	62.7 PK	74.0	-11.3	1.54 H	288	30.7	32.0
2483.50	48.2 AV	54.0	-5.8	1.54 H	288	16.2	32.0
4874.00	45.6 PK	74.0	-28.4	2.08 H	81	41.8	3.8
4874.00	32.1 AV	54.0	-21.9	2.08 H	81	28.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2437.00	122.3 PK			1.85 V	259	90.4	31.9
*2437.00	112.1 AV			1.85 V	259	80.2	31.9
2483.50	70.5 PK	74.0	-3.5	2.45 V	270	38.5	32.0
2483.50	52.8 AV	54.0	-1.2	2.45 V	270	20.8	32.0
4874.00	46.6 PK	74.0	-27.4	1.73 V	206	42.8	3.8
4874.00	33.3 AV	54.0	-20.7	1.73 V	206	29.5	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	108.8 PK			1.73 H	297	76.9	31.9
*2462.00	98.9 AV			1.73 H	297	67.0	31.9
2483.50	61.6 PK	74.0	-12.4	1.66 H	291	29.6	32.0
2483.50	47.7 AV	54.0	-6.3	1.66 H	291	15.7	32.0
4924.00	44.4 PK	74.0	-29.6	1.98 H	67	40.6	3.8
4924.00	31.1 AV	54.0	-22.9	1.98 H	67	27.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2462.00	115.7 PK			2.15 V	260	83.8	31.9
*2462.00	105.8 AV			2.15 V	260	73.9	31.9
2483.50	68.8 PK	74.0	-5.2	2.44 V	267	36.8	32.0
2483.50	52.9 AV	54.0	-1.1	2.44 V	267	20.9	32.0
4924.00	45.4 PK	74.0	-28.6	1.68 V	202	41.6	3.8
4924.00	31.8 AV	54.0	-22.2	1.68 V	202	28.0	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	58.6 PK	74.0	-15.4	1.76 H	83	26.7	31.9
2390.00	46.3 AV	54.0	-7.7	1.76 H	83	14.4	31.9
*2422.00	98.3 PK			1.84 H	88	66.4	31.9
*2422.00	88.5 AV			1.84 H	88	56.6	31.9
4844.00	44.5 PK	74.0	-29.5	1.97 H	78	40.8	3.7
4844.00	30.6 AV	54.0	-23.4	1.97 H	78	26.9	3.7
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	64.8 PK	74.0	-9.2	2.75 V	328	32.9	31.9
2390.00	53.3 AV	54.0	-0.7	2.75 V	328	21.4	31.9
*2422.00	106.7 PK			2.03 V	279	74.8	31.9
*2422.00	97.0 AV			2.03 V	279	65.1	31.9
4844.00	45.1 PK	74.0	-28.9	1.47 V	193	41.4	3.7
4844.00	31.0 AV	54.0	-23.0	1.47 V	193	27.3	3.7

Remarks:

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

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	58.4 PK	74.0	-15.6	1.71 H	86	26.5	31.9
2390.00	46.5 AV	54.0	-7.5	1.71 H	86	14.6	31.9
*2437.00	104.7 PK			1.79 H	95	72.8	31.9
*2437.00	94.3 AV			1.79 H	95	62.4	31.9
4874.00	45.0 PK	74.0	-29.0	2.07 H	62	41.2	3.8
4874.00	31.1 AV	54.0	-22.9	2.07 H	62	27.3	3.8
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
2390.00	65.3 PK	74.0	-8.7	1.88 V	262	33.4	31.9
2390.00	53.1 AV	54.0	-0.9	1.88 V	262	21.2	31.9
*2437.00	114.1 PK			1.58 V	250	82.2	31.9
*2437.00	102.7 AV			1.58 V	250	70.8	31.9
4874.00	45.4 PK	74.0	-28.6	1.46 V	183	41.6	3.8
4874.00	31.3 AV	54.0	-22.7	1.46 V	183	27.5	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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2452.00	100.3 PK			1.74 H	81	68.4	31.9
*2452.00	90.0 AV			1.74 H	81	58.1	31.9
2483.50	60.3 PK	74.0	-13.7	1.67 H	73	28.3	32.0
2483.50	46.8 AV	54.0	-7.2	1.67 H	73	14.8	32.0
4904.00	44.4 PK	74.0	-29.6	1.93 H	72	40.7	3.7
4904.00	30.3 AV	54.0	-23.7	1.93 H	72	26.6	3.7
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
*2452.00	108.8 PK			2.19 V	271	76.9	31.9
*2452.00	98.4 AV			2.19 V	271	66.5	31.9
2483.50	66.8 PK	74.0	-7.2	2.02 V	271	34.8	32.0
2483.50	**53.5 AV**	**54.0**	**-0.5**	**2.02 V**	**271**	**21.5**	**32.0**
4904.00	45.1 PK	74.0	-28.9	1.53 V	186	41.4	3.7
4904.00	31.0 AV	54.0	-23.0	1.53 V	186	27.3	3.7

Remarks:

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

9 kHz ~ 30 MHz Data:

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

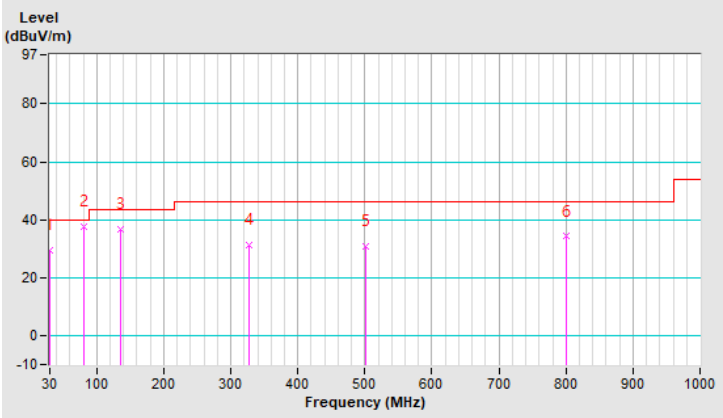
30 MHz ~ 1 GHz Worst-Case Data:

Mode 1

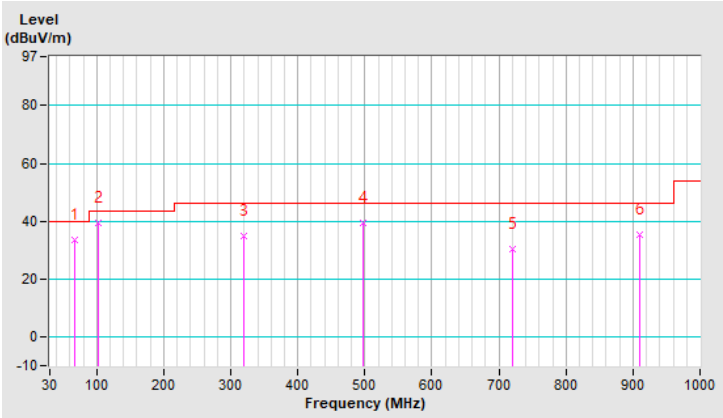
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
30.97	29.3 QP	40.0	-10.7	1.00 H	17	41.1	-11.8
80.44	**37.7 QP**	**40.0**	**-2.3**	**1.50 H**	**15**	**51.6**	**-13.9**
135.73	36.5 QP	43.5	-7.0	1.25 H	22	46.6	-10.1
327.79	31.2 QP	46.0	-14.8	1.25 H	220	38.5	-7.3
500.45	30.8 QP	46.0	-15.2	1.50 H	208	34.6	-3.8
800.18	34.2 QP	46.0	-11.8	1.00 H	163	32.7	1.5
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
66.86	33.5 QP	40.0	-6.5	1.00 V	51	44.4	-10.9
101.78	39.2 QP	43.5	-4.3	1.50 V	217	52.8	-13.6
320.03	34.9 QP	46.0	-11.1	1.25 V	223	42.4	-7.5
497.54	39.4 QP	46.0	-6.6	1.00 V	126	43.4	-4.0
719.67	30.4 QP	46.0	-15.6	1.25 V	189	30.7	-0.3
909.79	35.2 QP	46.0	-10.8	1.00 V	114	31.4	3.8

Remarks:

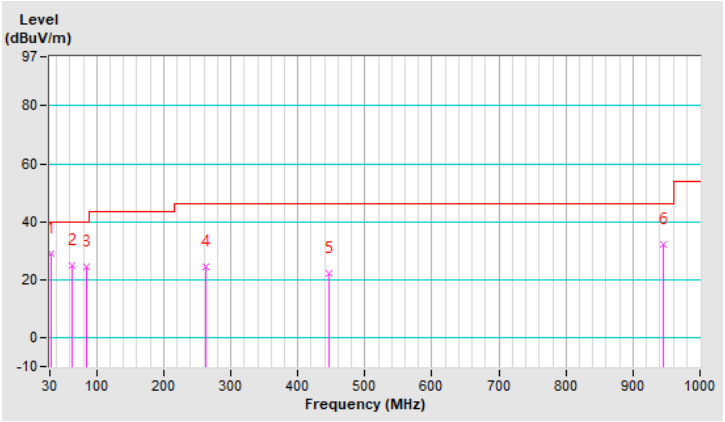
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

Mode 2

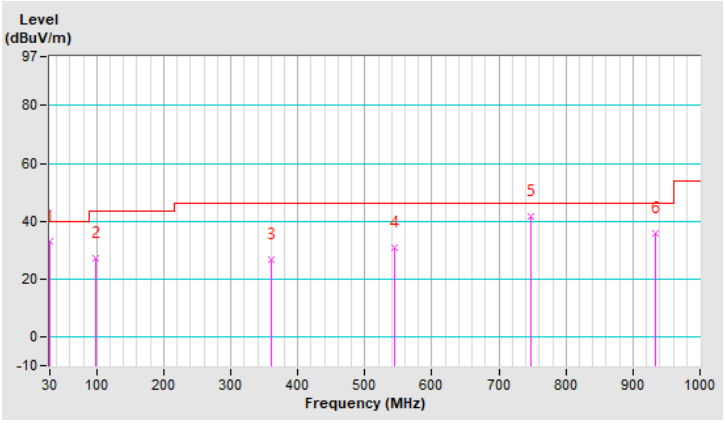
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
31.94	28.8 QP	40.0	-11.2	1.50 H	181	40.2	-11.4
62.98	25.0 QP	40.0	-15.0	1.00 H	105	35.6	-10.6
84.32	24.6 QP	40.0	-15.4	1.25 H	208	39.3	-14.7
262.80	24.4 QP	46.0	-21.6	1.25 H	184	33.8	-9.4
447.10	22.4 QP	46.0	-23.6	1.00 H	185	26.9	-4.5
945.68	32.1 QP	46.0	-13.9	1.25 H	153	27.7	4.4
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
30.00	33.0 QP	40.0	-7.0	1.25 V	181	44.3	-11.3
97.90	27.1 QP	43.5	-16.4	1.25 V	321	41.3	-14.2
359.80	26.9 QP	46.0	-19.1	1.50 V	46	33.5	-6.6
544.10	30.8 QP	46.0	-15.2	1.00 V	30	33.7	-2.9
747.80	41.7 QP	46.0	-4.3	1.00 V	17	41.0	0.7
934.04	36.0 QP	46.0	-10.0	1.50 V	96	31.8	4.2

Remarks:

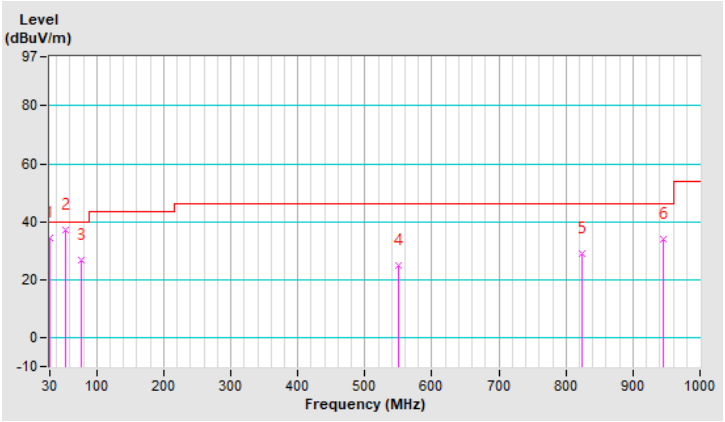
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

Mode 3

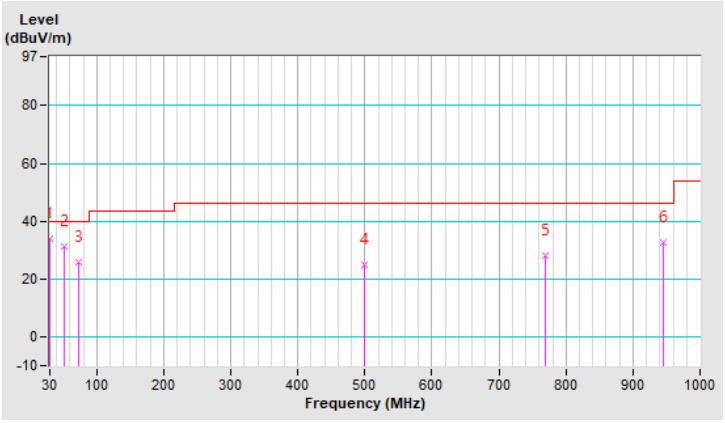
802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Gary Lin

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
30.00	34.6 QP	40.0	-5.4	1.00 H	17	45.9	-11.3
53.28	37.0 QP	40.0	-3.0	1.25 H	21	46.8	-9.8
76.56	26.5 QP	40.0	-13.5	1.00 H	160	39.7	-13.2
549.92	24.9 QP	46.0	-21.1	1.50 H	271	27.8	-2.9
823.46	29.1 QP	46.0	-16.9	1.25 H	303	27.3	1.8
945.68	33.8 QP	46.0	-12.2	1.50 H	260	29.4	4.4
Antenna Polarity & Test Distance: Vertical at 3 m							
Frequency (MHz)	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Read Level (dBuV)**	**Factor (dB/m)**
30.00	33.8 QP	40.0	-6.2	1.50 V	167	45.1	-11.3
51.34	31.4 QP	40.0	-8.6	1.25 V	165	41.1	-9.7
72.68	26.0 QP	40.0	-14.0	1.00 V	160	38.1	-12.1
499.48	24.7 QP	46.0	-21.3	1.25 V	291	28.5	-3.8
769.14	28.2 QP	46.0	-17.8	1.00 V	12	26.9	1.3
945.68	32.6 QP	46.0	-13.4	1.50 V	345	28.2	4.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH3-Z5	101826	Feb. 21, 2019	Feb. 20, 2020
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ENV216	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	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 test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

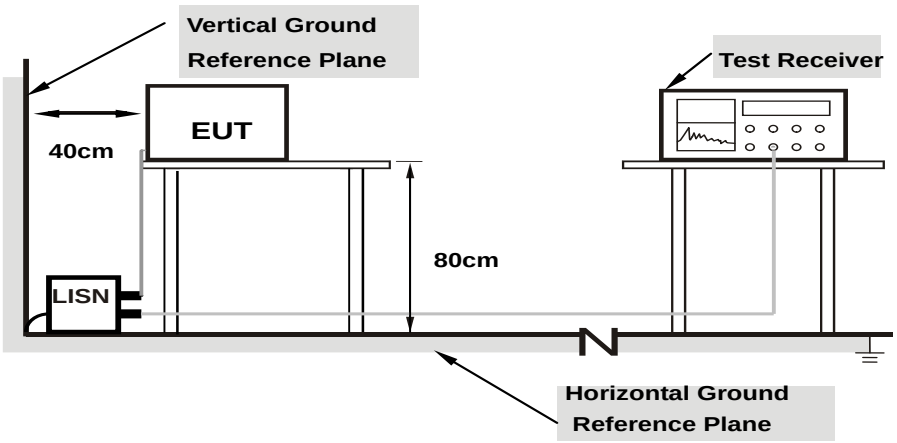
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling 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 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

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

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

a. Placed the EUT on a testing table.
b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.2.7 Test Results

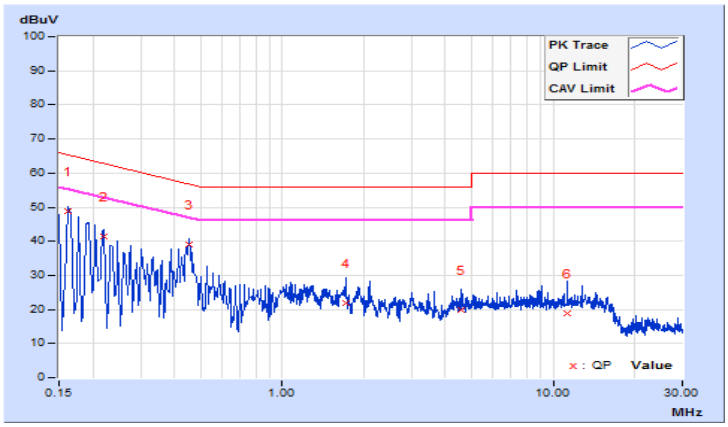
Mode 1

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16173	9.67	39.18	26.09	48.85	35.76	65.37	55.37	-16.52	-19.61
2	0.21908	9.66	31.85	18.86	41.51	28.52	62.85	52.85	-21.34	-24.33
3	**0.45455**	**9.69**	**29.34**	**22.14**	**39.03**	**31.83**	**56.79**	**46.79**	**-17.76**	**-14.96**
4	1.71009	9.77	12.17	7.93	21.94	17.70	56.00	46.00	-34.06	-28.30
5	4.55657	9.85	9.87	3.12	19.72	12.97	56.00	46.00	-36.28	-33.03
6	11.23876	9.94	9.06	3.93	19.00	13.87	60.00	50.00	-41.00	-36.13

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

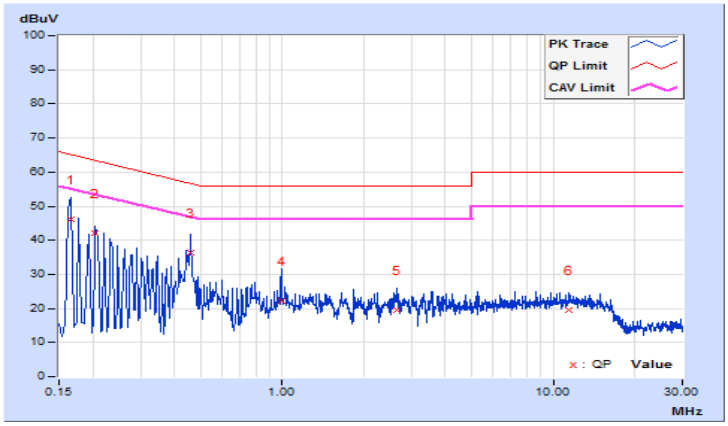


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.64	36.65	21.63	46.29	31.27	65.18	55.18	-18.89	-23.91
2	0.20474	9.64	32.58	18.57	42.22	28.21	63.42	53.42	-21.20	-25.21
3	0.45889	9.66	26.60	19.56	36.26	29.22	56.71	46.71	-20.45	-17.49
4	0.99065	9.70	12.44	6.80	22.14	16.50	56.00	46.00	-33.86	-29.50
5	2.66413	9.77	9.62	4.01	19.39	13.78	56.00	46.00	-36.61	-32.22
6	11.41080	9.93	9.57	4.66	19.50	14.59	60.00	50.00	-40.50	-35.41

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



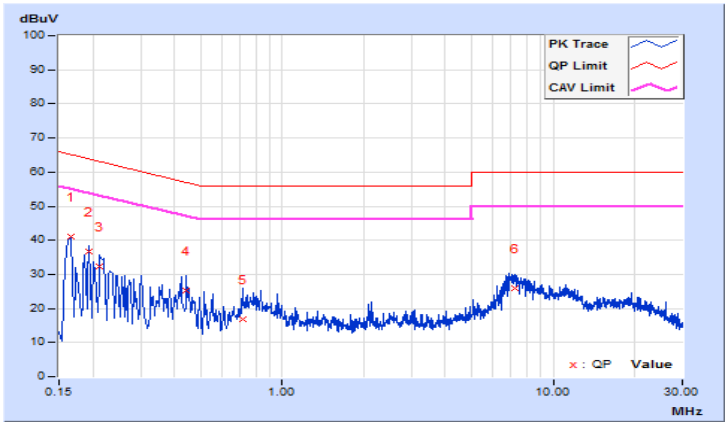
Mode 2

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16526	9.67	31.39	20.49	41.06	30.16	65.20	55.20	-24.14	-25.04
2	0.19301	9.66	27.18	15.14	36.84	24.80	63.91	53.91	-27.07	-29.11
3	0.21256	9.66	22.57	10.44	32.23	20.10	63.10	53.10	-30.87	-33.00
4	0.44325	9.69	15.70	8.66	25.39	18.35	57.00	47.00	-31.61	-28.65
5	0.71304	9.71	7.29	2.43	17.00	12.14	56.00	46.00	-39.00	-33.86
6	7.18800	9.89	15.93	7.17	25.82	17.06	60.00	50.00	-34.18	-32.94

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

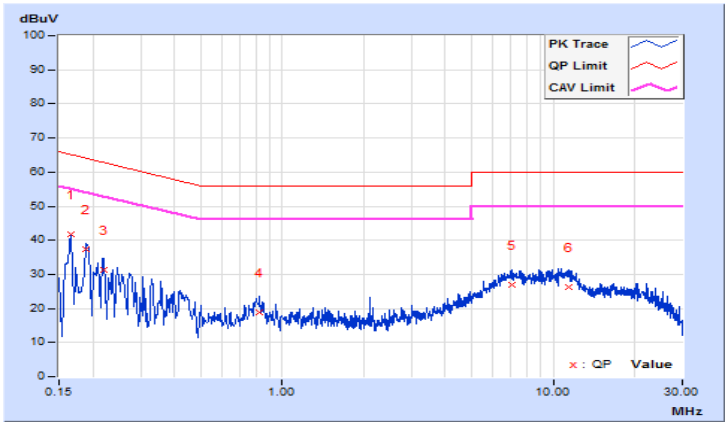


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16564	9.64	32.08	20.24	41.72	29.88	65.18	55.18	-23.46	-25.30
2	0.18910	9.64	27.75	16.09	37.39	25.73	64.08	54.08	-26.69	-28.35
3	0.21851	9.64	21.60	10.10	31.24	19.74	62.88	52.88	-31.64	-33.14
4	0.82643	9.69	9.02	3.99	18.71	13.68	56.00	46.00	-37.29	-32.32
5	7.03160	9.86	17.10	10.29	26.96	20.15	60.00	50.00	-33.04	-29.85
6	11.45772	9.93	16.30	9.41	26.23	19.34	60.00	50.00	-33.77	-30.66

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



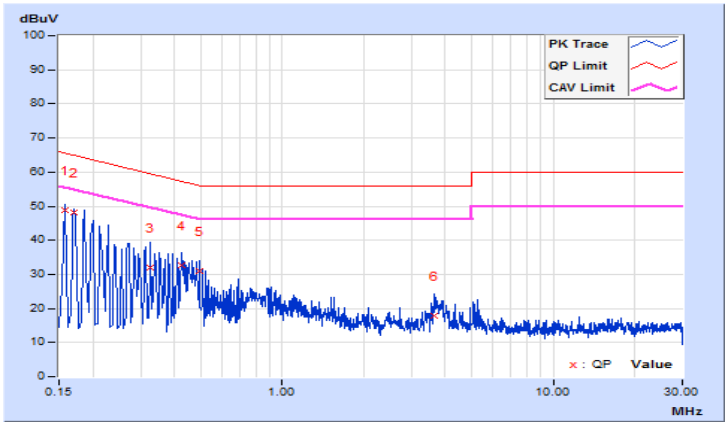
Mode 3

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	9.67	39.24	21.86	48.91	31.53	65.58	55.58	-16.67	-24.05
2	0.16955	9.67	38.53	23.26	48.20	32.93	64.98	54.98	-16.78	-22.05
3	0.32595	9.68	22.26	7.41	31.94	17.09	59.55	49.55	-27.61	-32.46
4	0.42761	9.69	22.98	10.55	32.67	20.24	57.30	47.30	-24.63	-27.06
5	0.49408	9.70	21.32	7.62	31.02	17.32	56.10	46.10	-25.08	-28.78
6	3.64554	9.83	8.10	1.23	17.93	11.06	56.00	46.00	-38.07	-34.94

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

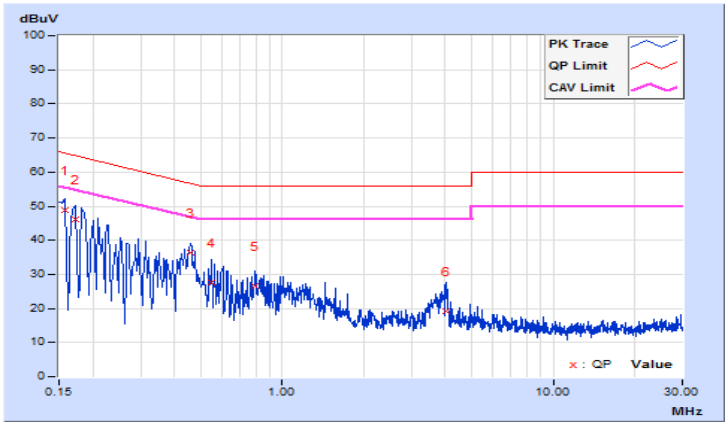


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 75%RH

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15782	9.64	39.25	22.20	48.89	31.84	65.58	55.58	-16.69	-23.74
2	0.17237	9.64	36.52	21.06	46.16	30.70	64.85	54.85	-18.69	-24.15
3	0.45816	9.66	26.72	16.95	36.38	26.61	56.73	46.73	-20.35	-20.12
4	0.54882	9.67	18.08	4.89	27.75	14.56	56.00	46.00	-28.25	-31.44
5	0.79124	9.69	16.93	8.60	26.62	18.29	56.00	46.00	-29.38	-27.71
6	4.01699	9.81	9.33	0.53	19.14	10.34	56.00	46.00	-36.86	-35.66

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

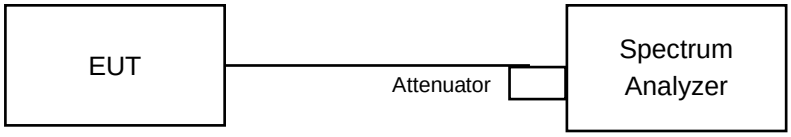


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB 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) = 100 kHz
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 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 Results

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	9.11	9.11	9.12	0.5	Pass
6	2437	9.11	9.09	10.08	0.5	Pass
11	2462	9.10	9.09	9.10	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	15.19	15.20	15.20	0.5	Pass
6	2437	15.20	15.19	15.76	0.5	Pass
11	2462	15.19	15.19	15.20	0.5	Pass

802.11n (HT20)

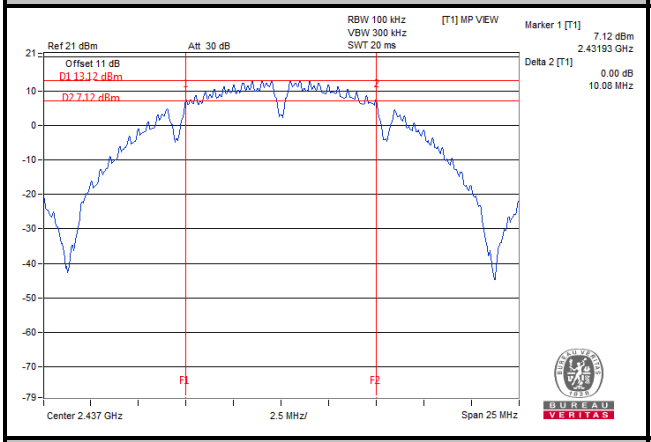
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	15.18	16.36	15.19	0.5	Pass
6	2437	15.19	15.19	15.19	0.5	Pass
11	2462	15.18	15.78	15.18	0.5	Pass

802.11n (HT40)

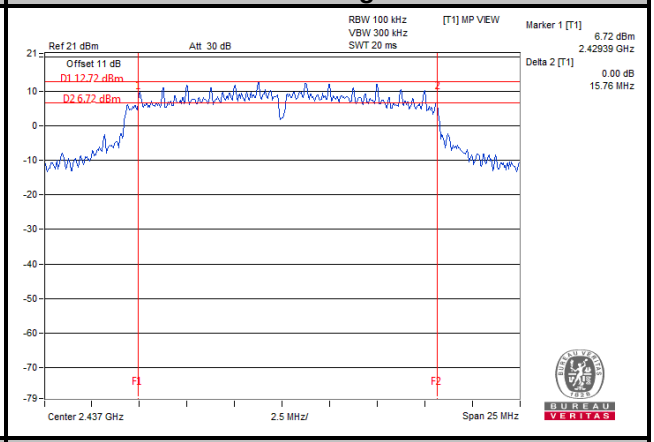
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
3	2422	35.19	35.26	35.25	0.5	Pass
6	2437	35.25	35.26	35.19	0.5	Pass
9	2452	35.25	35.27	35.25	0.5	Pass

Spectrum Plot of Worst Value

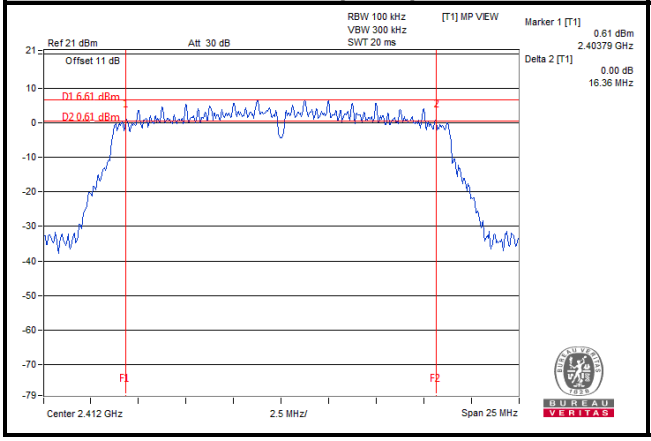
802.11b



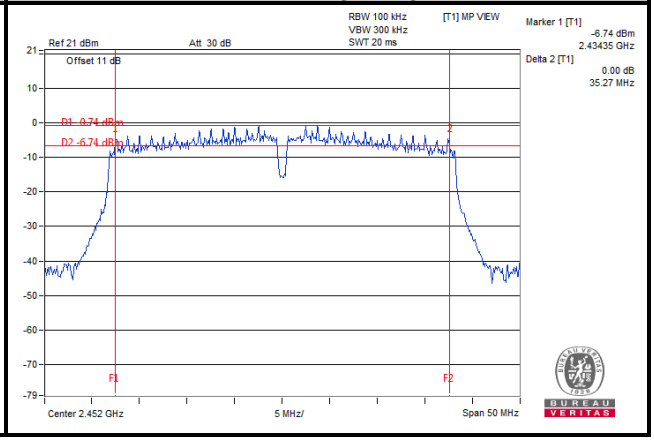
802.11g



802.11n (HT20)

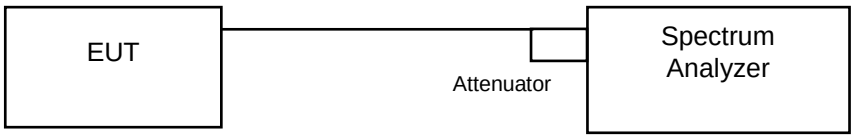


802.11n (HT40)



4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Deviation from Test Standard

No deviation.

4.4.5 EUT Operating Conditions

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

4.4.6 Test Results

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
1	2412	13.74	13.48	13.74	Pass
6	2437	15.24	14.52	14.88	Pass
11	2462	13.44	13.08	13.32	Pass

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
1	2412	16.68	16.56	16.44	Pass
6	2437	24.36	20.64	20.40	Pass
11	2462	16.68	16.56	16.44	Pass

802.11n (HT20)

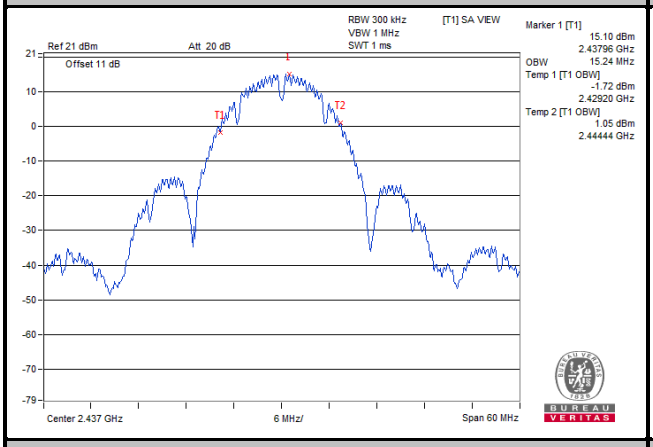
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
1	2412	17.64	17.64	17.64	Pass
6	2437	20.40	18.84	18.60	Pass
11	2462	17.64	17.64	17.64	Pass

802.11n (HT40)

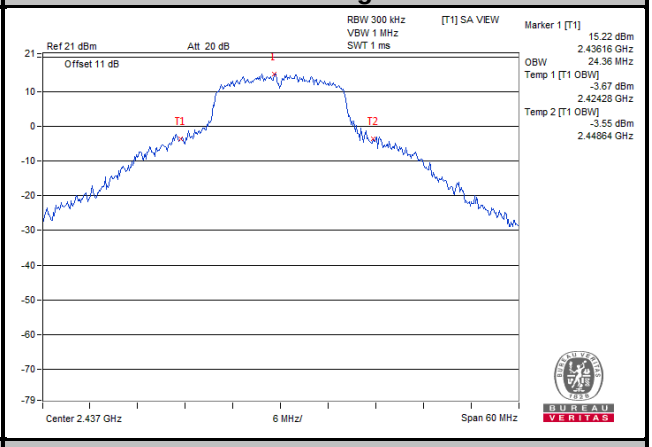
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			Pass / Fail
		Chain 0	Chain 1	Chain 2	
3	2422	36.26	36.36	36.24	Pass
6	2437	36.24	36.36	36.17	Pass
9	2452	36.12	36.36	36.12	Pass

Spectrum Plot of Worst Value

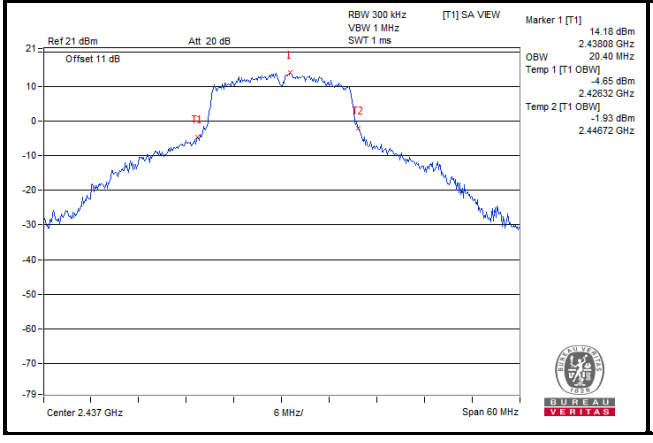
802.11b



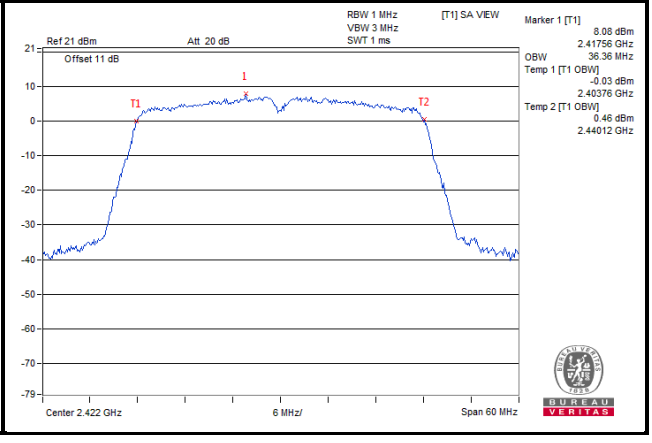
802.11g



802.11n (HT20)



802.11n (HT40)



4.5 Conducted Output Power Measurement

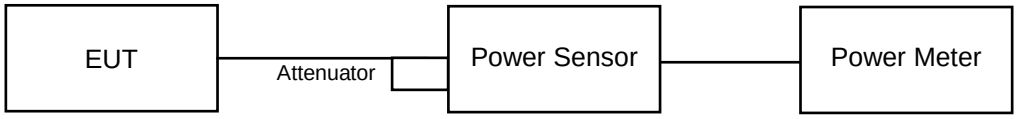
4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)
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 NANT ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20 MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

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

4.5.7 Test Results

CDD Mode

802.11b

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	19.88	19.93	19.10	276.959	24.42	30	Pass
6	2437	23.21	23.46	22.92	627.115	27.97	30	Pass
11	2462	17.10	17.59	17.06	159.514	22.03	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	16.42	16.67	15.90	129.21	21.11	30	Pass
6	2437	22.61	22.78	22.10	534.242	27.28	30	Pass
11	2462	16.53	16.93	16.45	138.452	21.41	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	15.79	16.27	15.48	115.613	20.63	30	Pass
6	2437	21.66	21.95	21.20	435.056	26.39	30	Pass
11	2462	15.12	15.73	15.03	101.762	20.08	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	12.31	12.72	12.02	51.651	17.13	30	Pass
6	2437	17.78	18.06	17.21	176.554	22.47	30	Pass
9	2452	12.66	13.20	12.22	56.015	17.48	30	Pass

Beamforming Mode

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	15.79	16.27	15.48	115.613	20.63	27.39	Pass
6	2437	21.60	21.89	21.13	428.787	26.32	27.39	Pass
11	2462	15.12	15.73	15.03	101.762	20.08	27.39	Pass

NOTE: Directional gain = 10 log[$(10^{4/20}+10^{4/20}+10^{3.5/20})^2/3$] = 8.61dBi > 6dBi , so the power limit shall be reduced to 30-(8.61-6) = 27.39dBm.

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	12.31	12.72	12.02	51.651	17.13	27.39	Pass
6	2437	17.78	18.06	17.21	176.554	22.47	27.39	Pass
9	2452	12.66	13.20	12.22	56.015	17.48	27.39	Pass

NOTE: Directional gain = 10 log[$(10^{4/20}+10^{4/20}+10^{3.5/20})^2/3$] = 8.61dBi > 6dBi , so the power limit shall be reduced to 30-(8.61-6) = 27.39dBm.

4.6 Power Spectral Density Measurement

4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

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

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 = rms.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Add[10 log (1 / *D*)], where *D* is the duty cycle, to the measured PSD to compute the average PSD during the actual transmission time
i. Allow trace to fully stabilize.
j. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11b

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=3) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-7.42	4.77	-2.65	5.39	Pass
	6	2437	-3.98	4.77	0.79	5.39	Pass
	11	2462	-9.94	4.77	-5.17	5.39	Pass
1	1	2412	-7.07	4.77	-2.30	5.39	Pass
	6	2437	-4.30	4.77	0.47	5.39	Pass
	11	2462	-10.13	4.77	-5.36	5.39	Pass
2	1	2412	-7.99	4.77	-3.22	5.39	Pass
	6	2437	-4.52	4.77	0.25	5.39	Pass
	11	2462	-10.50	4.77	-5.73	5.39	Pass

NOTE:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Measure and add 10 log (N_{ANT}) dB.

2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 8.61 dBi > 6 dBi, so the power density limit shall be reduced to 8-(8.61-6) = 5.39 dBm.

802.11g

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=3) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-12.31	4.77	0.20	-7.34	5.39	Pass
	6	2437	-6.01	4.77	0.20	-1.04	5.39	Pass
	11	2462	-11.84	4.77	0.20	-6.87	5.39	Pass
1	1	2412	-11.49	4.77	0.20	-6.52	5.39	Pass
	6	2437	-5.66	4.77	0.20	-0.69	5.39	Pass
	11	2462	-11.55	4.77	0.20	-6.58	5.39	Pass
2	1	2412	-13.03	4.77	0.20	-8.06	5.39	Pass
	6	2437	-5.89	4.77	0.20	-0.92	5.39	Pass
	11	2462	-12.67	4.77	0.20	-7.70	5.39	Pass

NOTE:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Measure and add 10 log (N_{ANT}) dB.

2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 8.61 dBi > 6 dBi, so the power density limit shall be reduced to 8-(8.61-6) = 5.39 dBm.

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

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=3) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-12.92	4.77	0.23	-7.92	5.39	Pass
	6	2437	-7.25	4.77	0.23	-2.25	5.39	Pass
	11	2462	-13.95	4.77	0.23	-8.95	5.39	Pass
1	1	2412	-11.90	4.77	0.23	-6.90	5.39	Pass
	6	2437	-7.22	4.77	0.23	-2.22	5.39	Pass
	11	2462	-12.50	4.77	0.23	-7.50	5.39	Pass
2	1	2412	-13.33	4.77	0.23	-8.33	5.39	Pass
	6	2437	-7.29	4.77	0.23	-2.29	5.39	Pass
	11	2462	-14.18	4.77	0.23	-9.18	5.39	Pass

NOTE:

1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Measure and add 10 log (N_{ANT}) dB.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 8.61 dBi > 6 dBi, so the power density limit shall be reduced to 8-(8.61-6) = 5.39 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

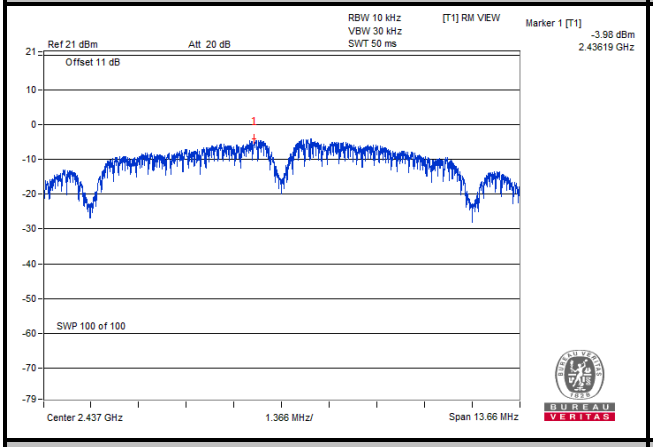
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=3) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-19.09	4.77	0.45	-13.87	5.39	Pass
	6	2437	-14.00	4.77	0.45	-8.78	5.39	Pass
	9	2452	-19.23	4.77	0.45	-14.01	5.39	Pass
1	3	2422	-19.90	4.77	0.45	-14.68	5.39	Pass
	6	2437	-14.37	4.77	0.45	-9.15	5.39	Pass
	9	2452	-19.77	4.77	0.45	-14.55	5.39	Pass
2	3	2422	-20.08	4.77	0.45	-14.86	5.39	Pass
	6	2437	-13.89	4.77	0.45	-8.67	5.39	Pass
	9	2452	-19.33	4.77	0.45	-14.11	5.39	Pass

NOTE:

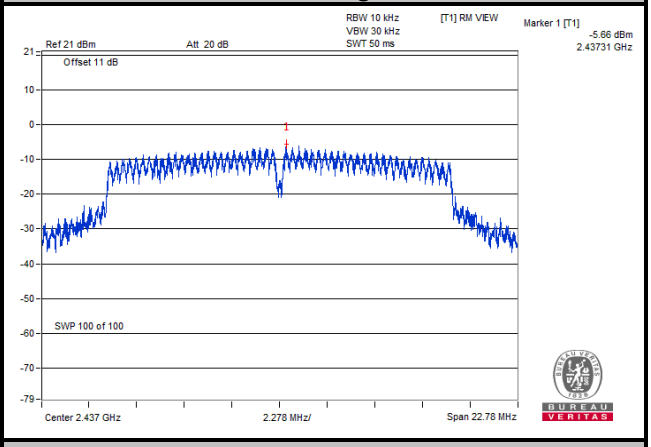
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density. Measure and add 10 log (N_{ANT}) dB.
2. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 8.61 dBi > 6 dBi, so the power density limit shall be reduced to 8-(8.61-6) = 5.39 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

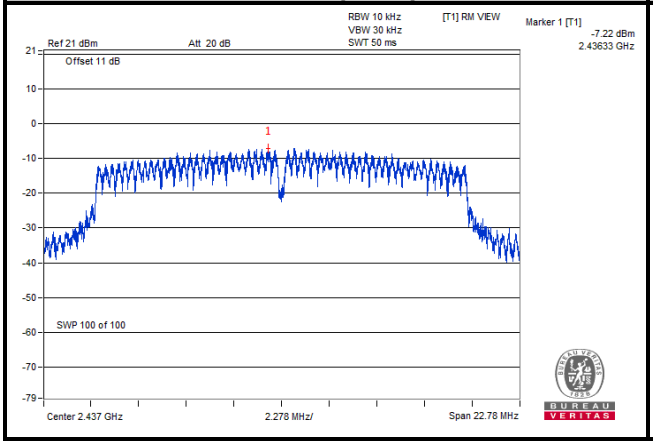
802.11b



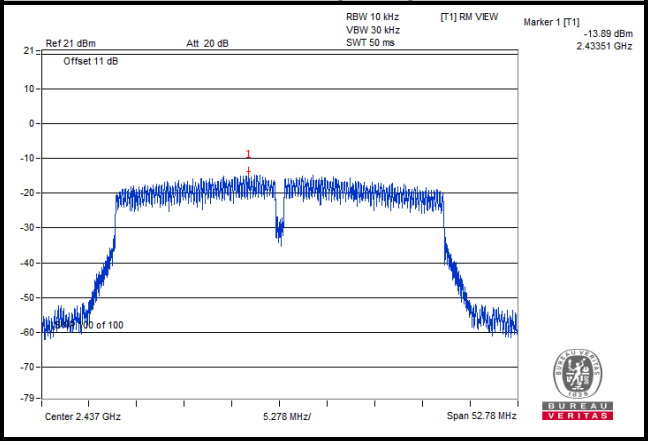
802.11g



802.11n (HT20)



802.11n (HT40)

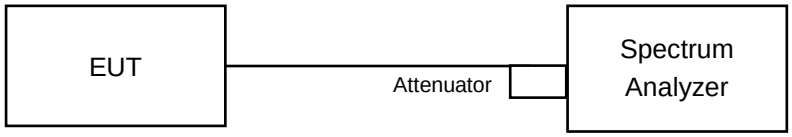


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

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

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW ≥ 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.

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

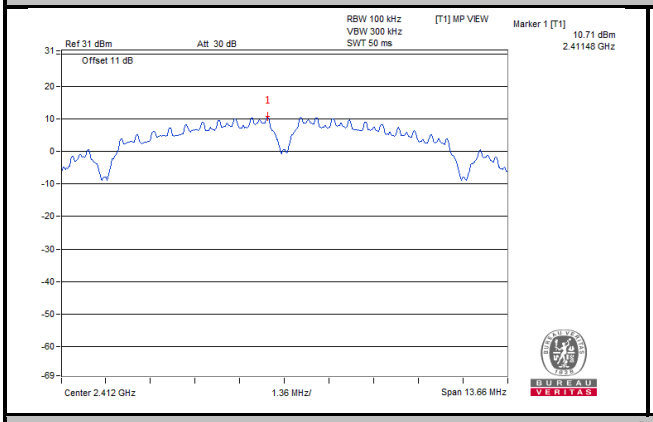
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

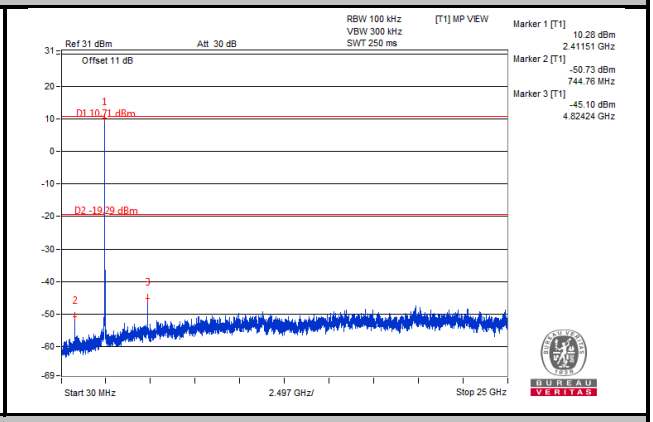
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 30 dB offset below D1. It shows compliance with the requirement.

802.11b

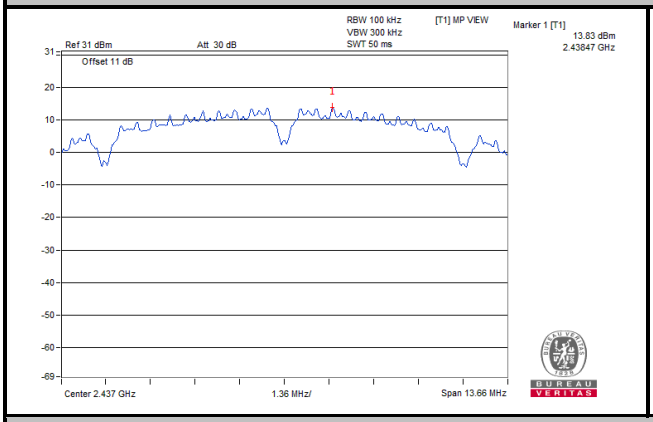
CHAIN 0

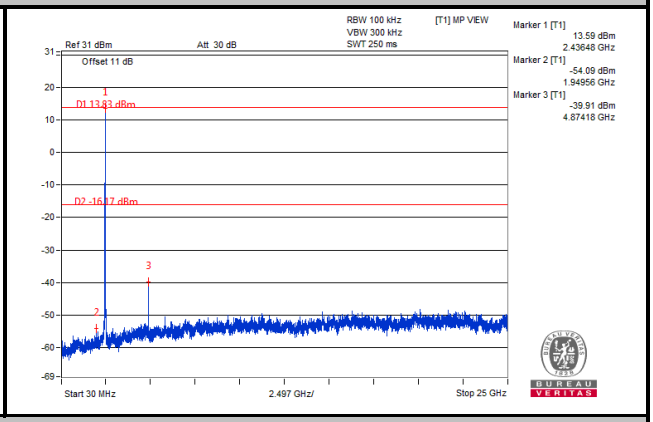
Ch 1





Ch 6





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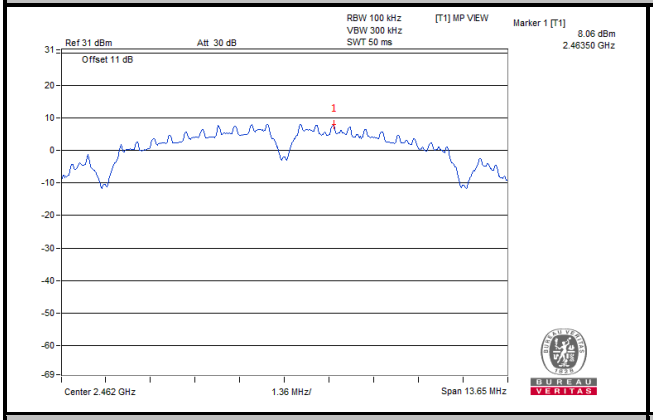

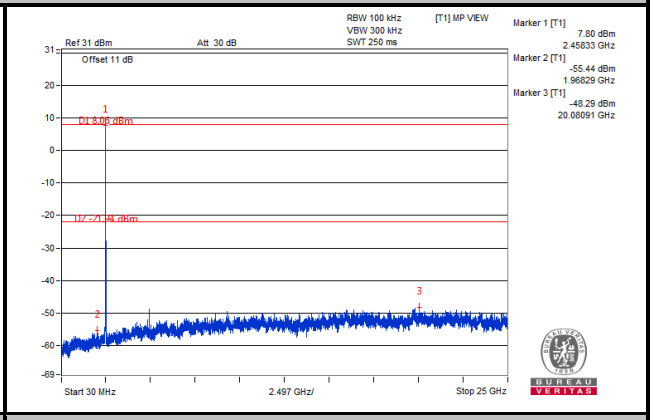

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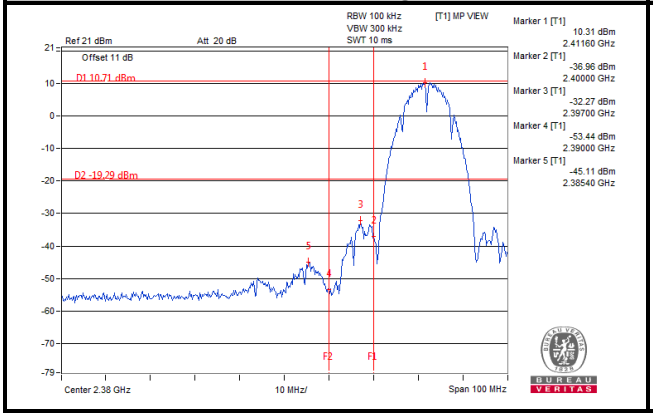

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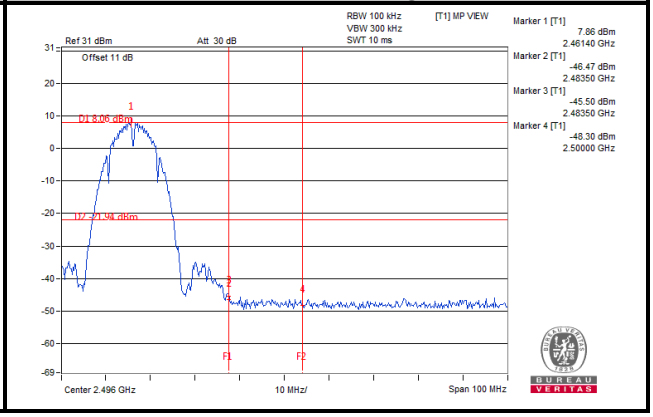

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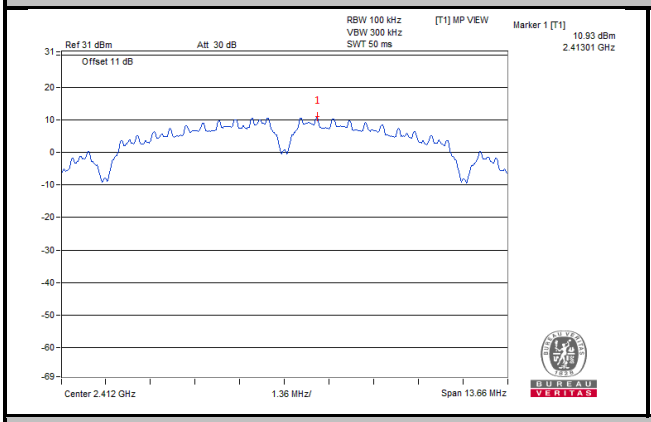

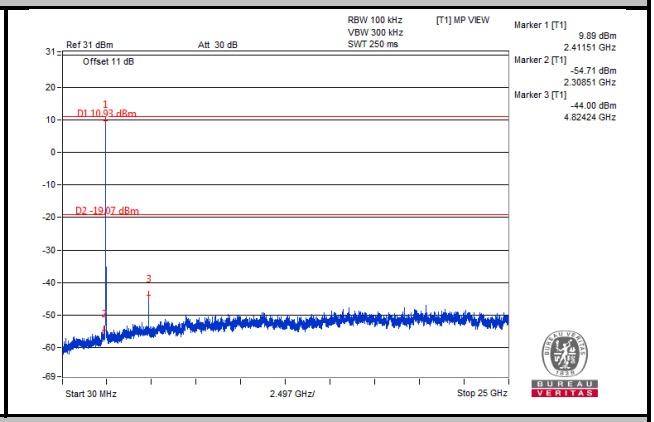

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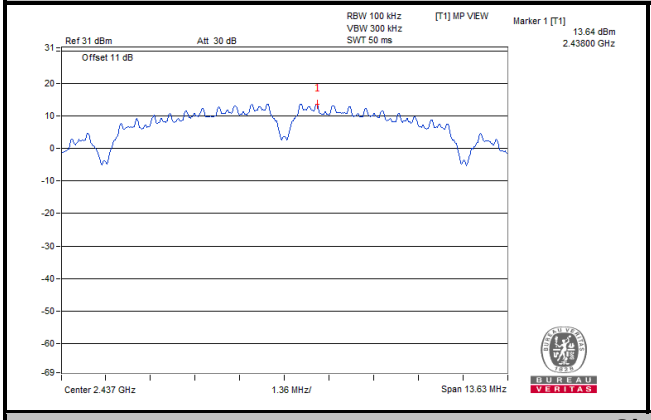

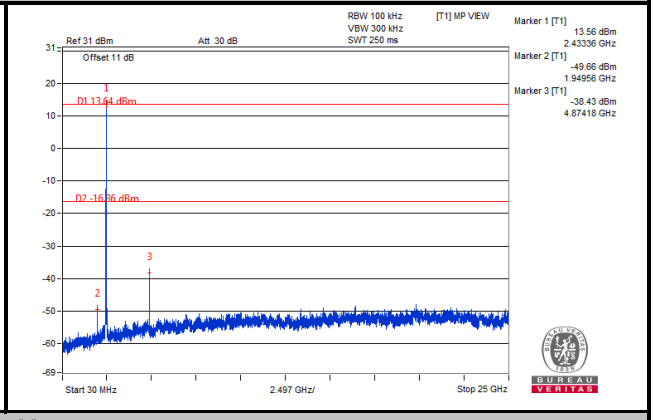

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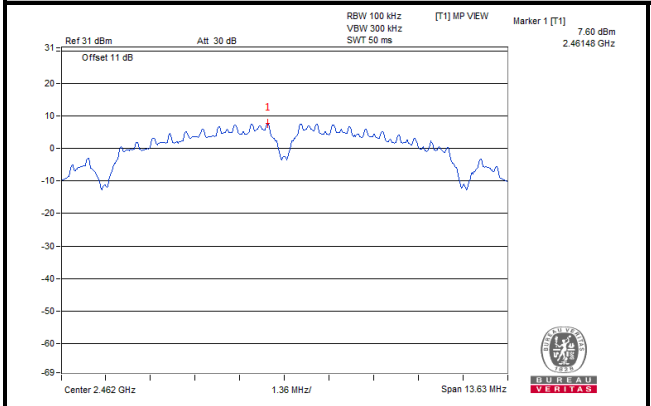

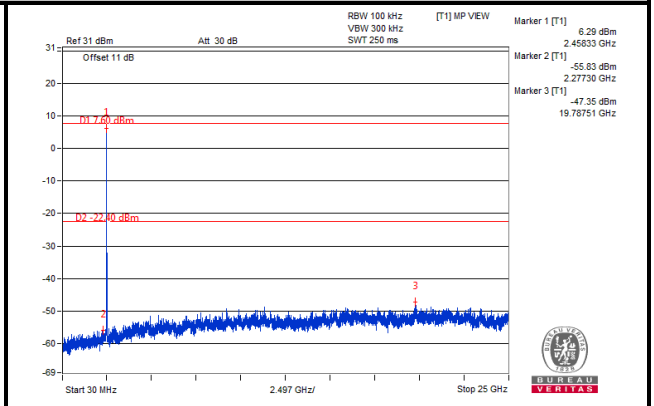

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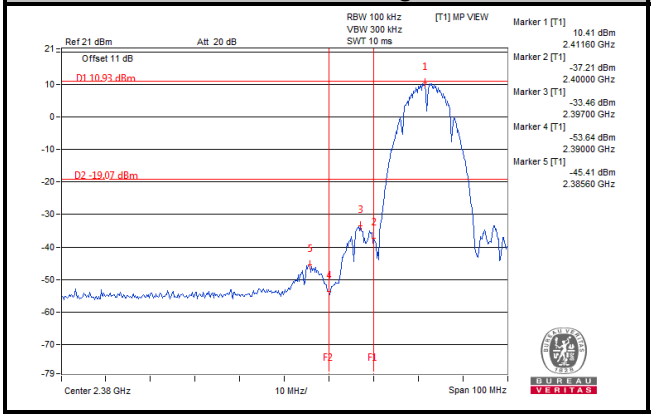

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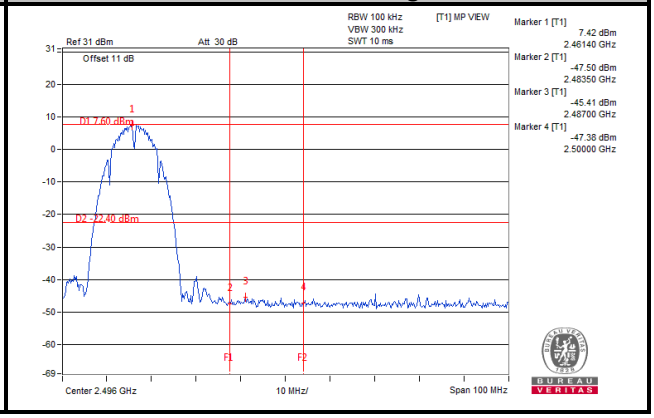

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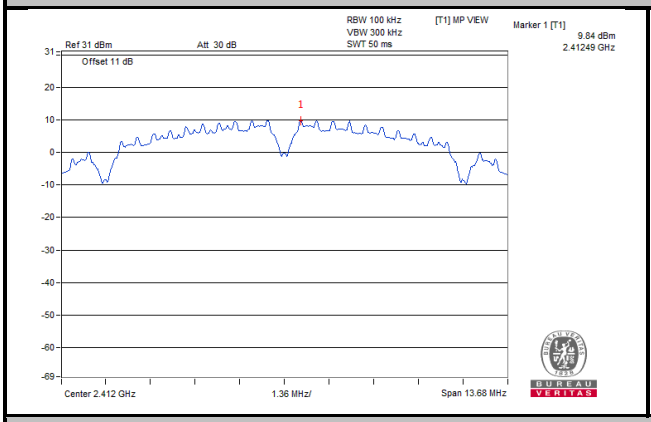

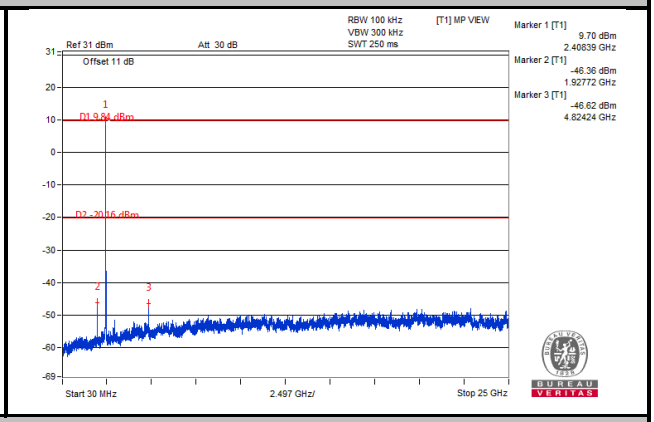

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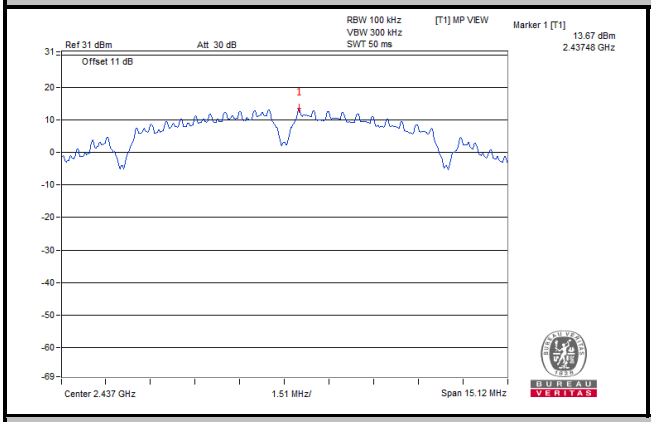

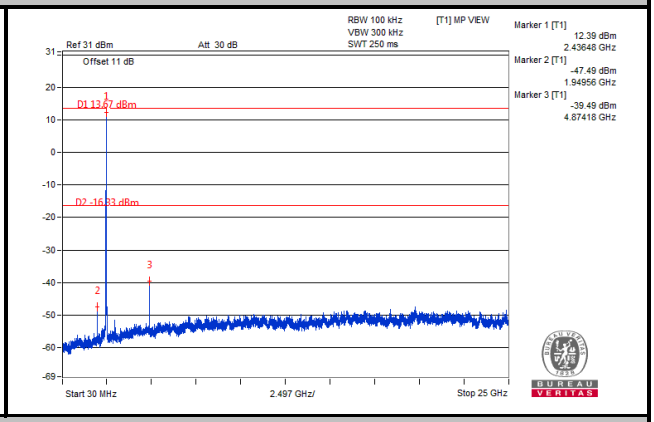

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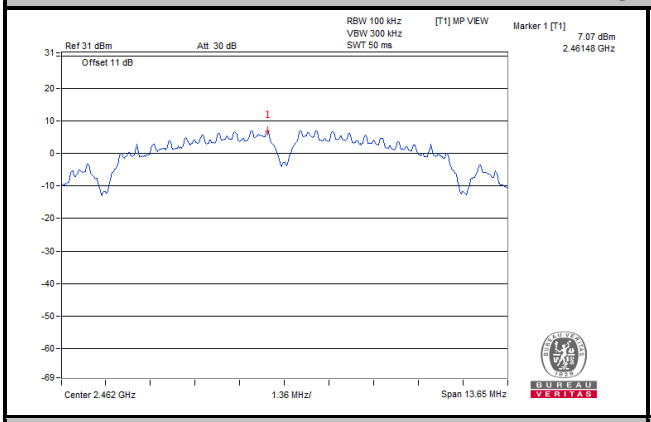
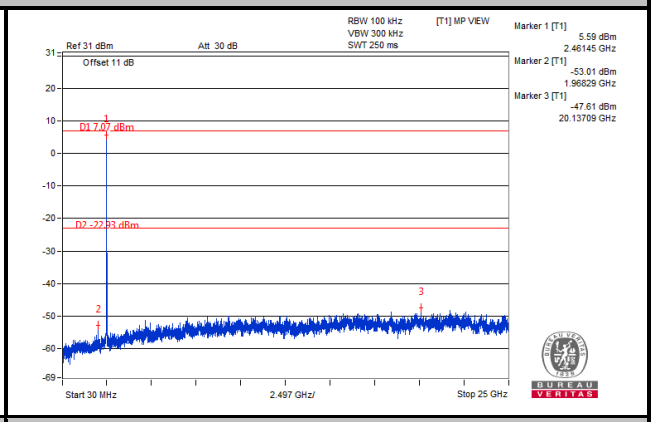
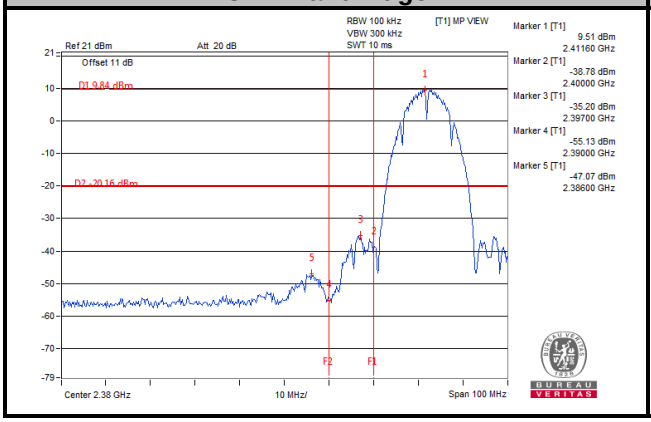




Ch 1 Band Edge



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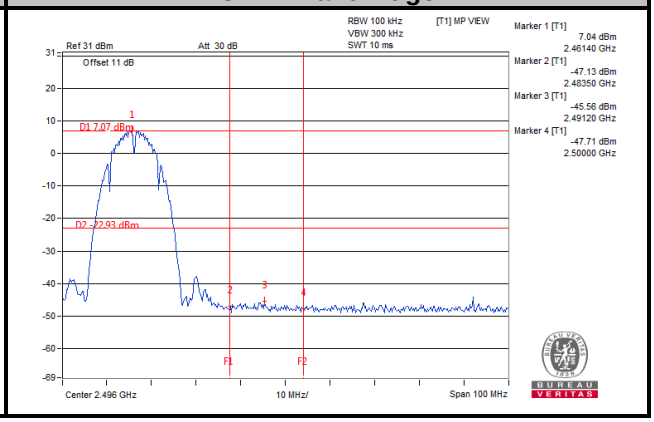

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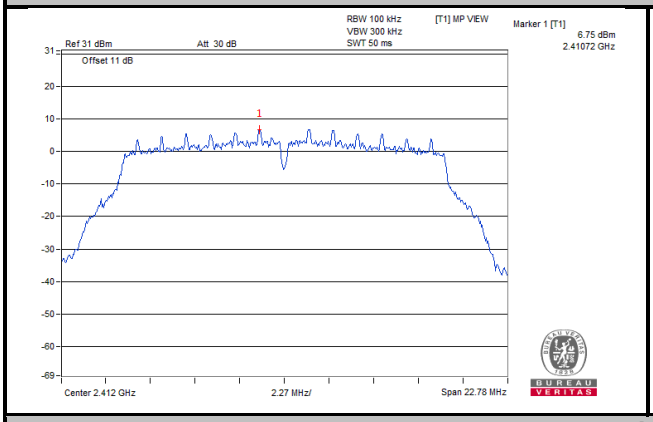
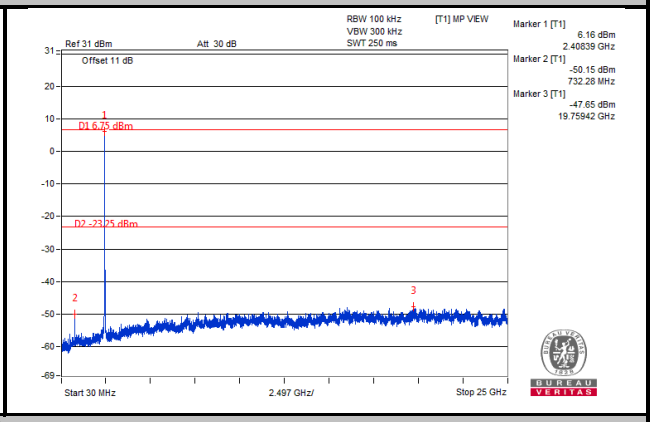
Ch 1





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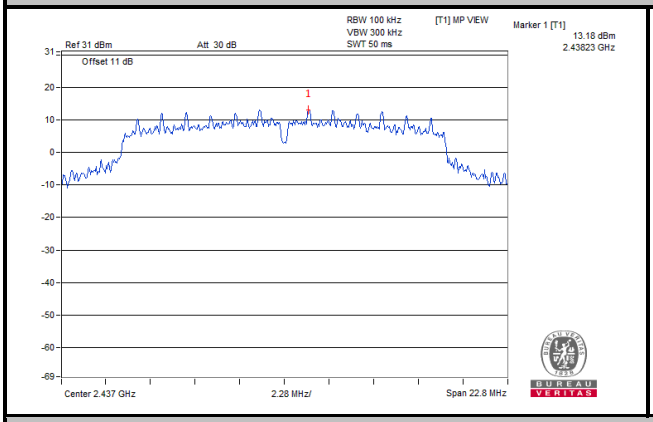

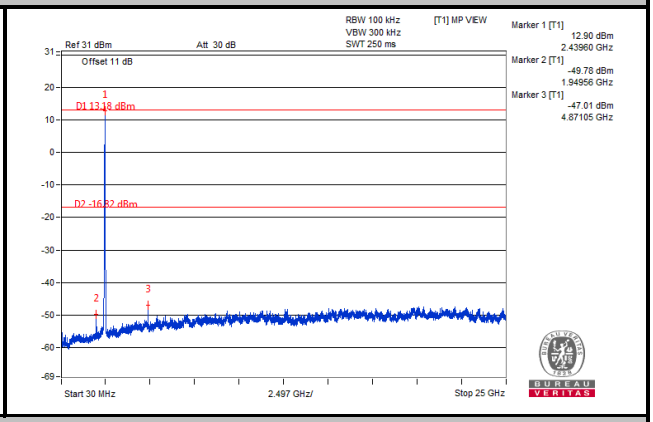

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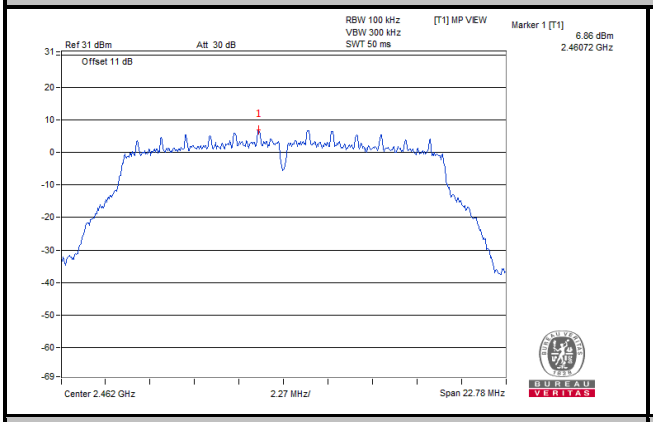

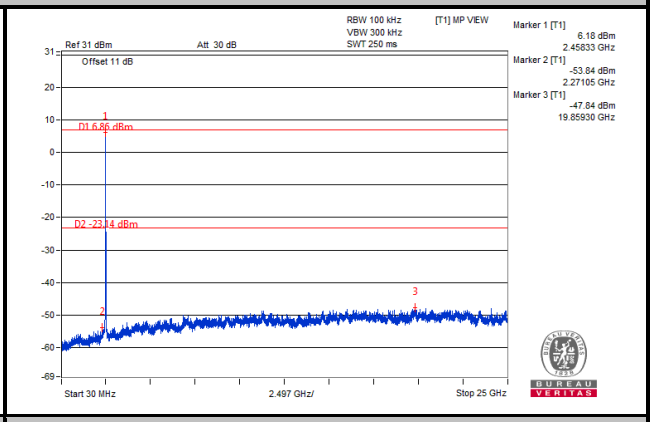

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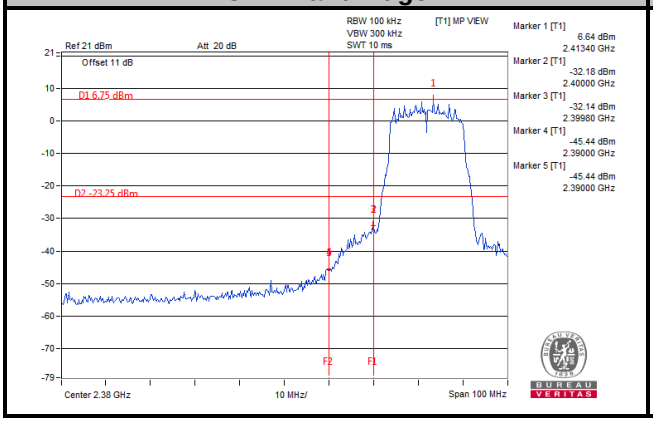

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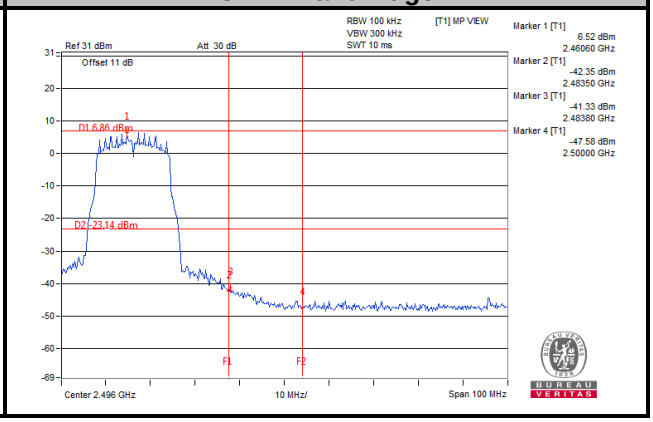

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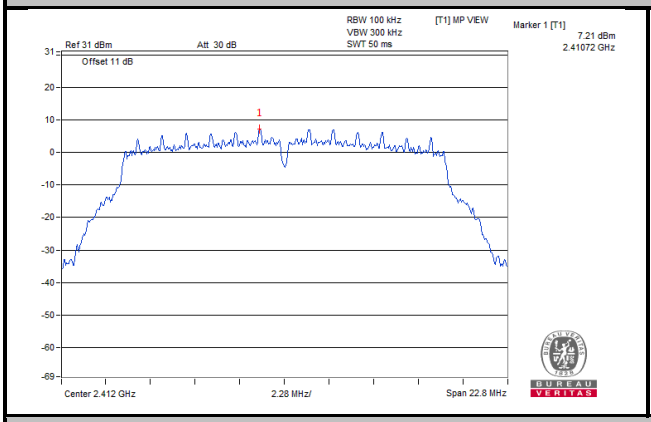
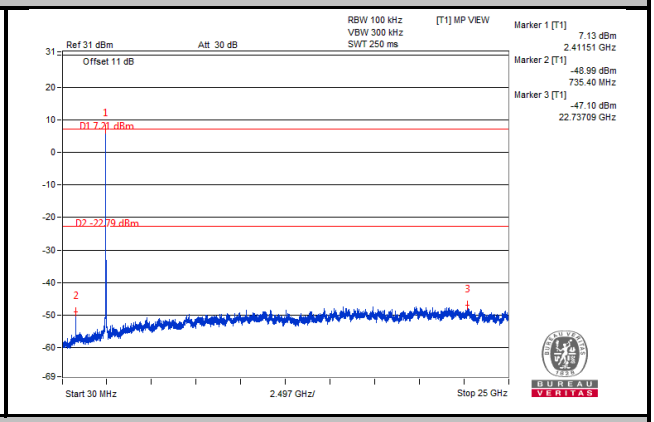
Ch 1





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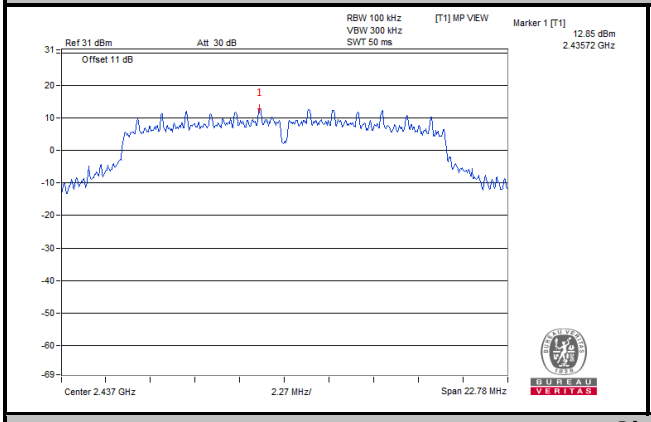

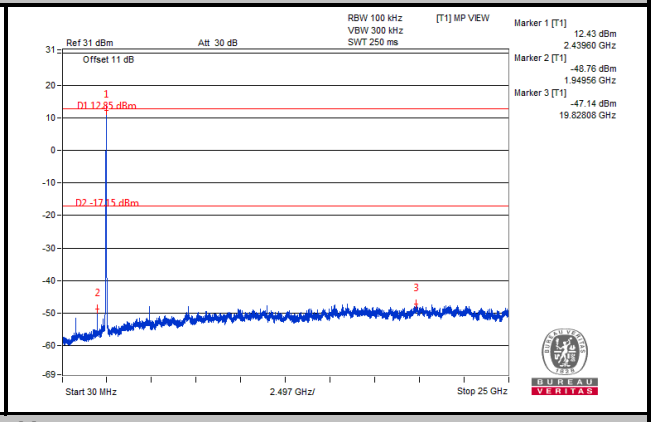

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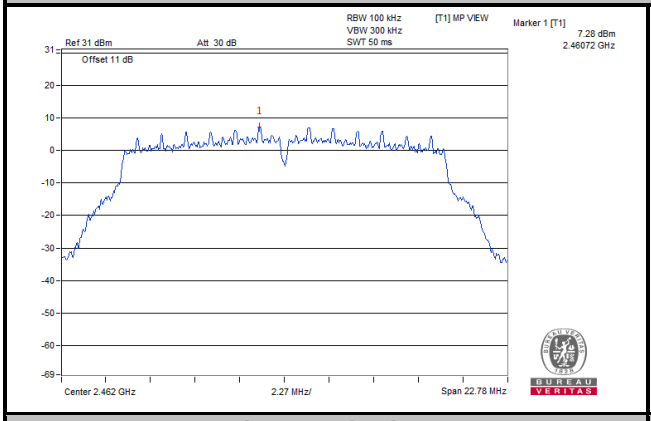
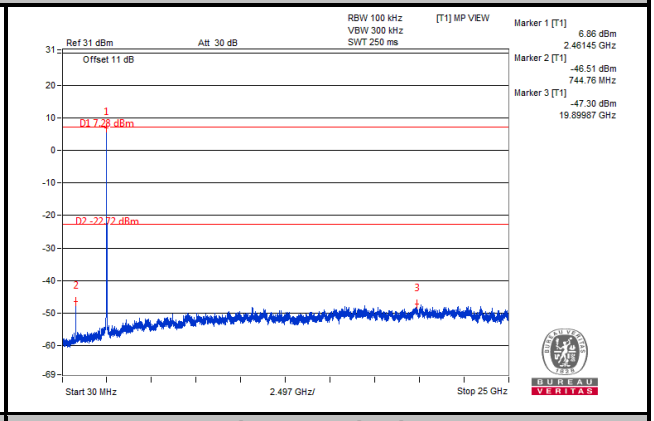
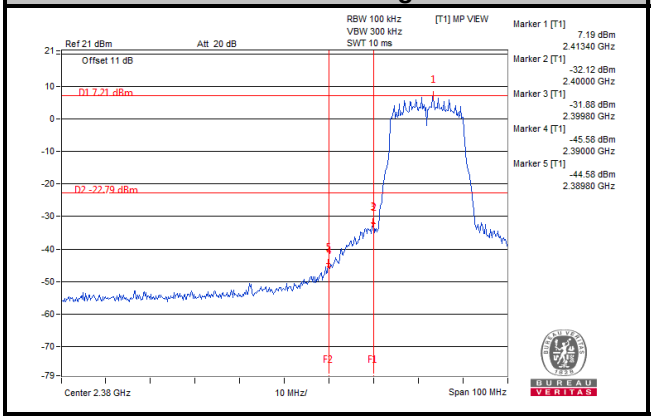




Ch 1 Band Edge



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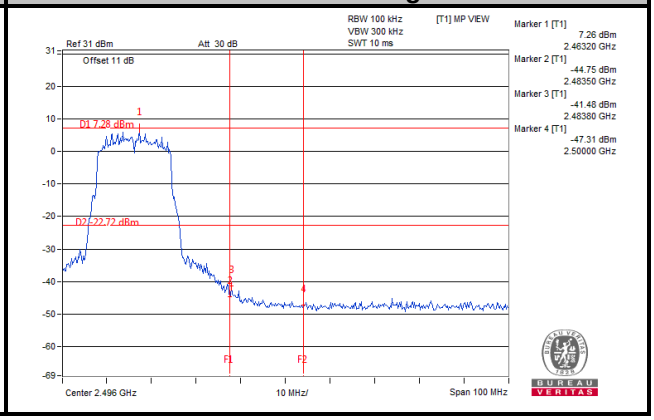

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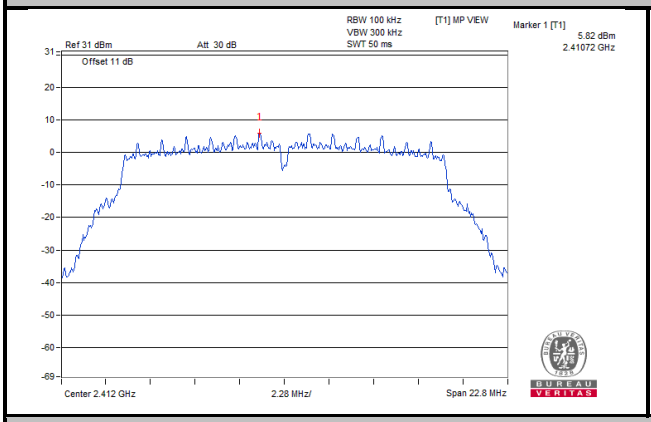
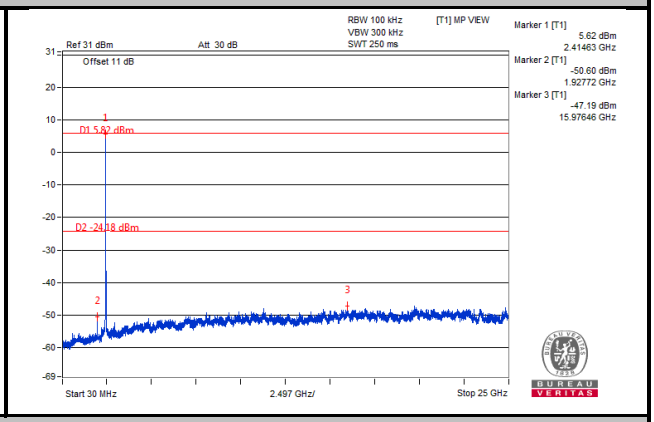
Ch 1





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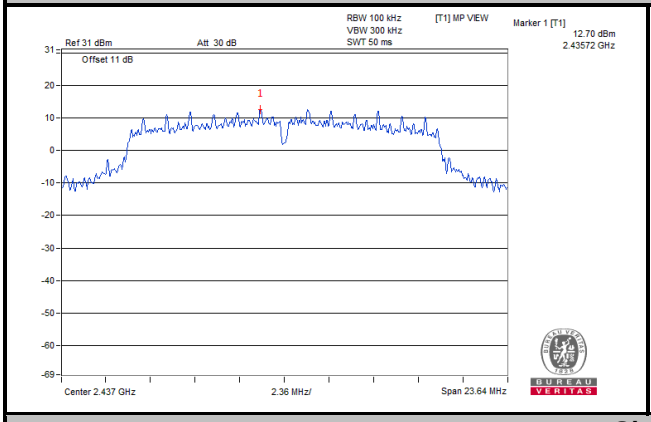

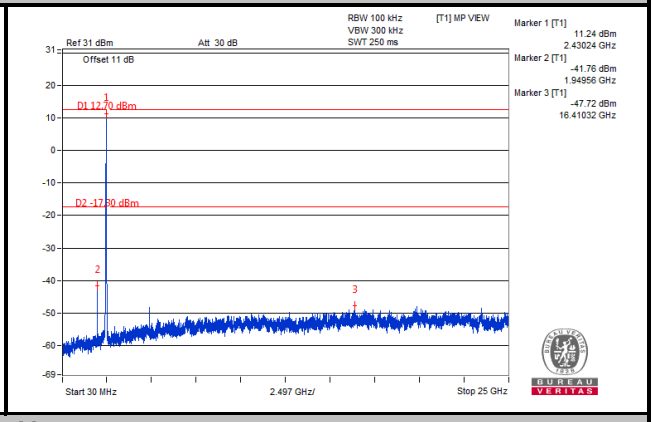

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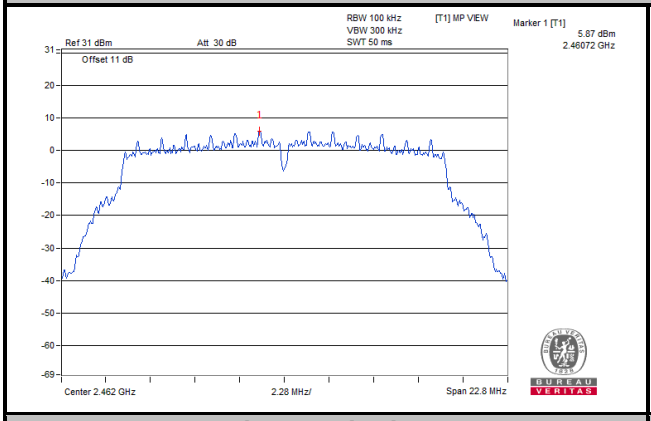
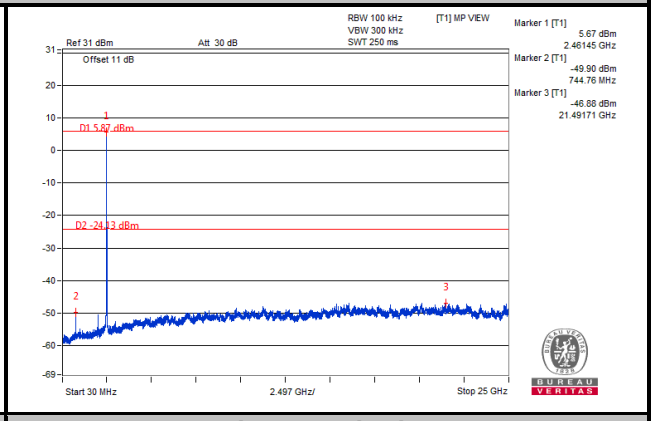
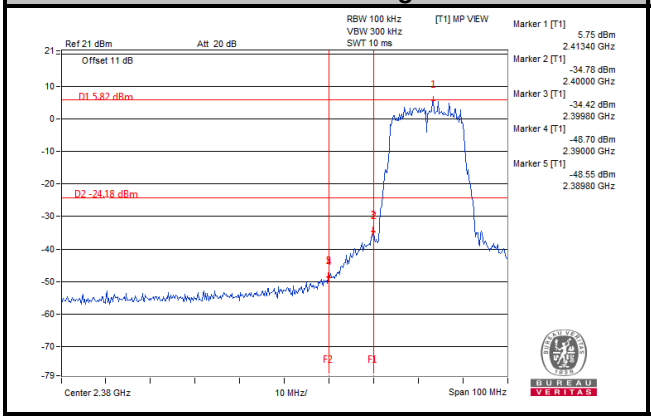




Ch 1 Band Edge



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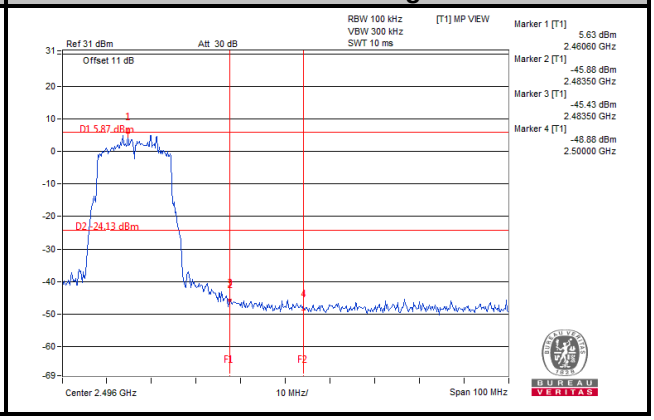

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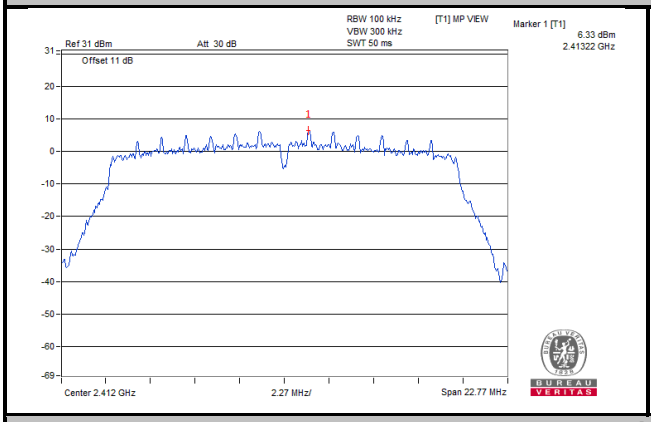

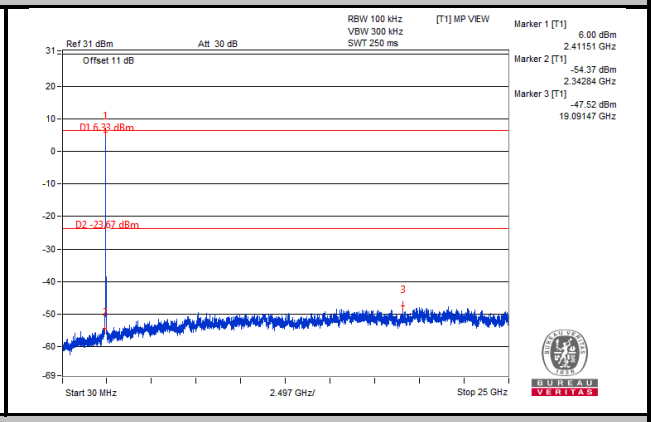

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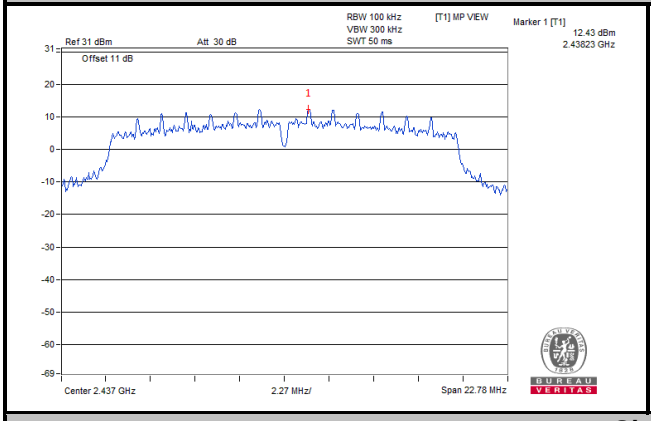

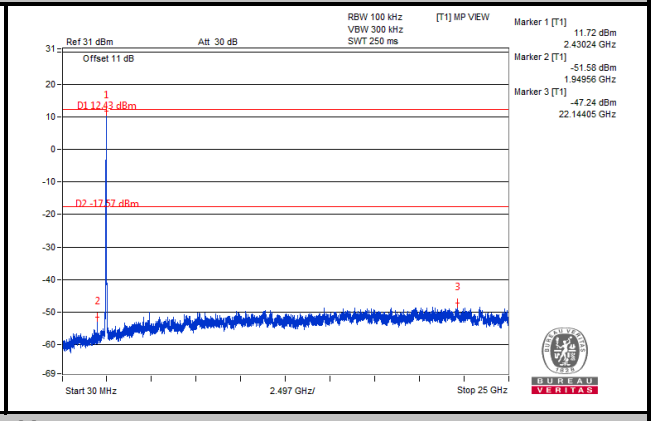

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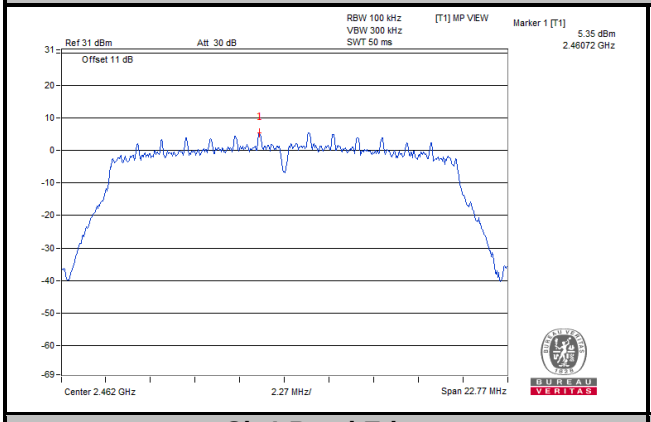
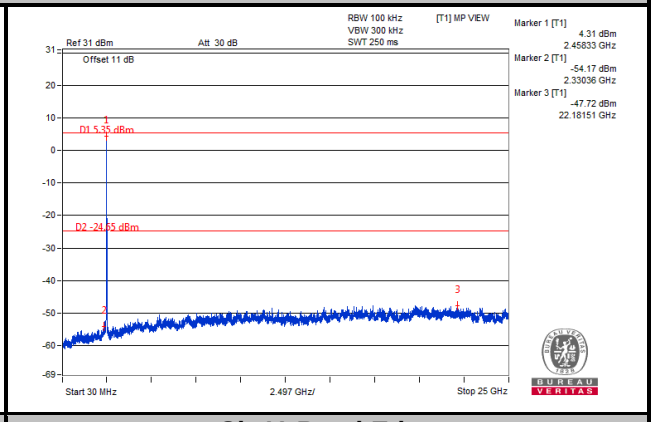
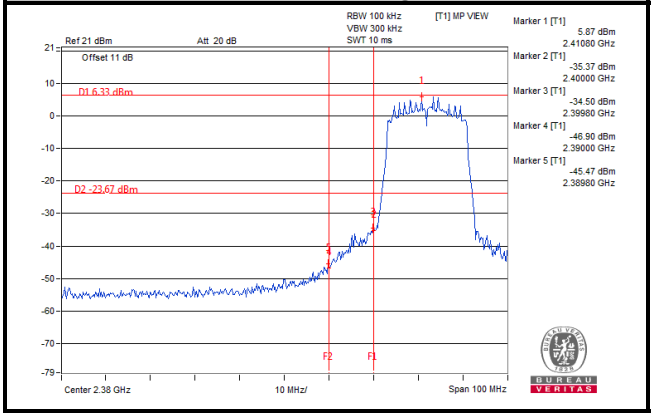




Ch 1 Band Edge



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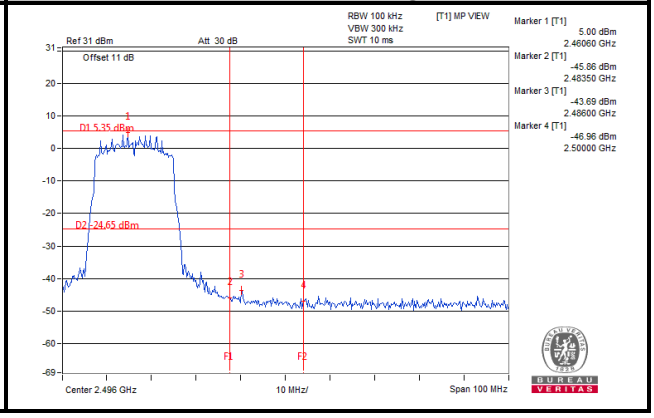
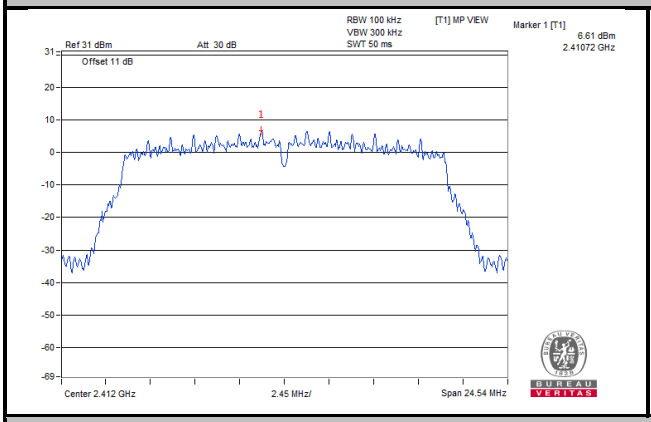
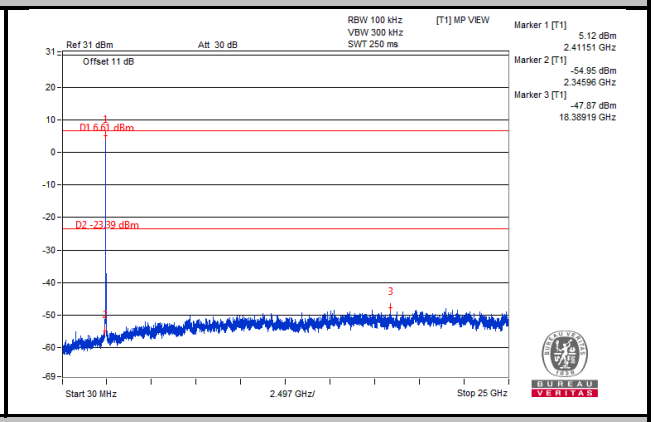


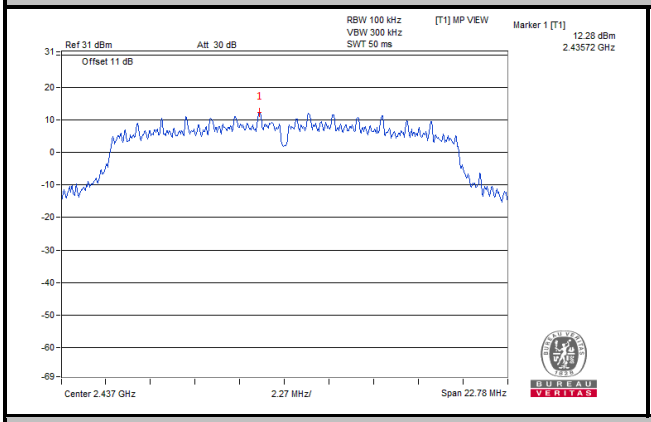
CHAIN 1

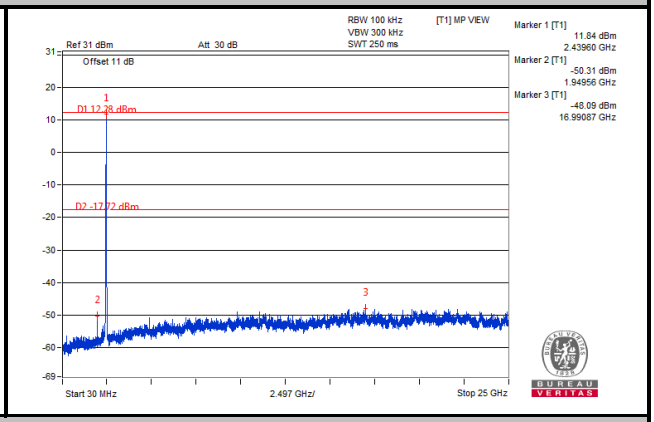
Ch 1





Ch 6





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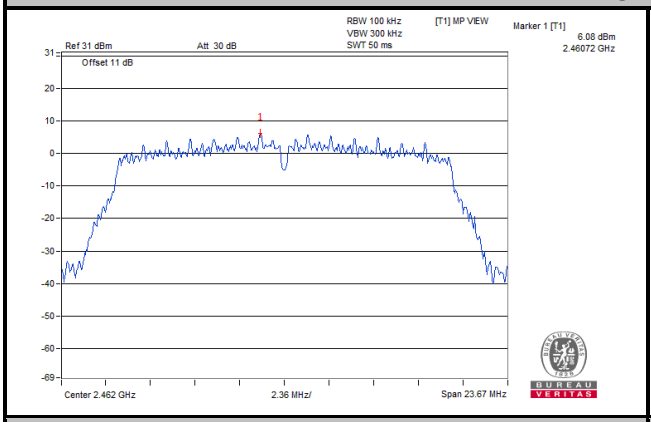
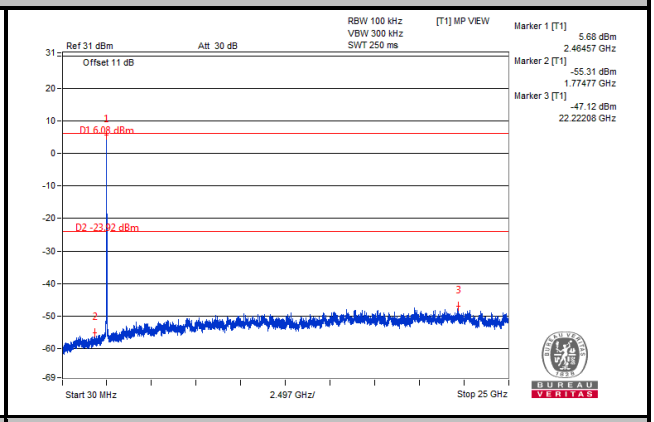
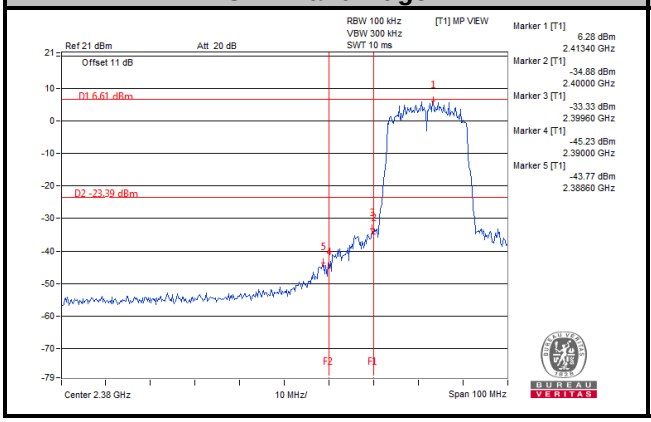
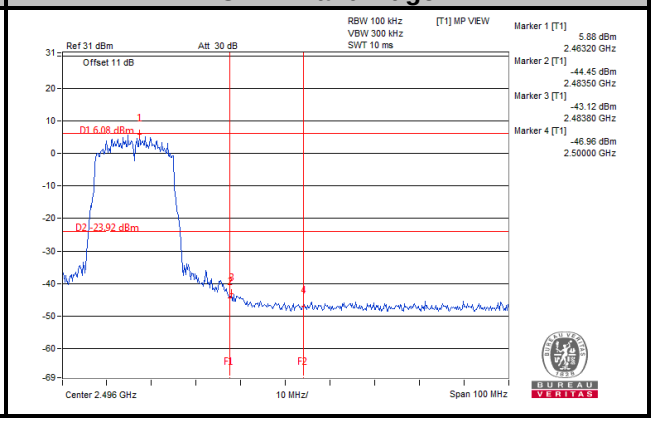




Ch 1 Band Edge

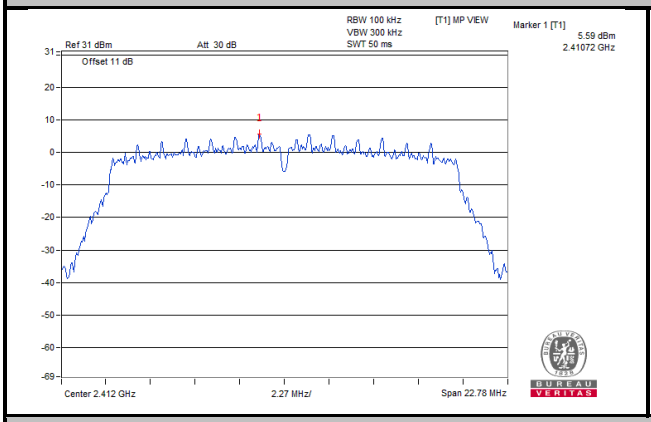


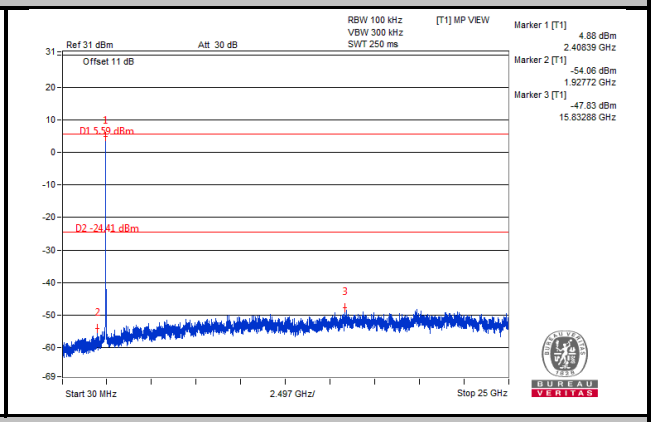
Ch 11 Band Edge



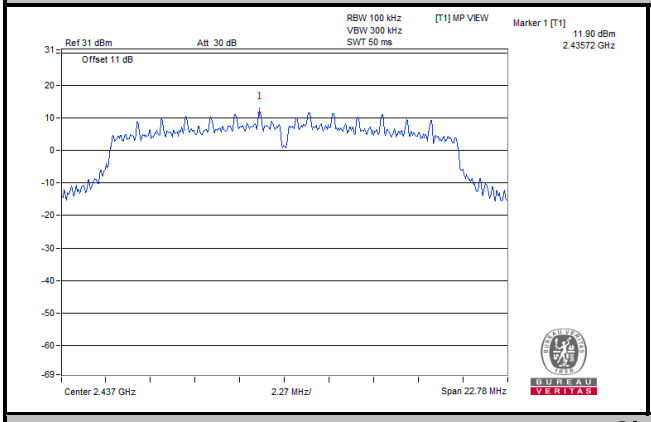
CHAIN 2

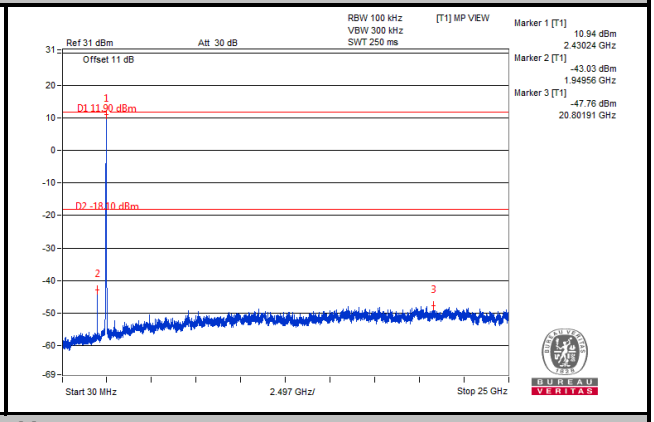
Ch 1



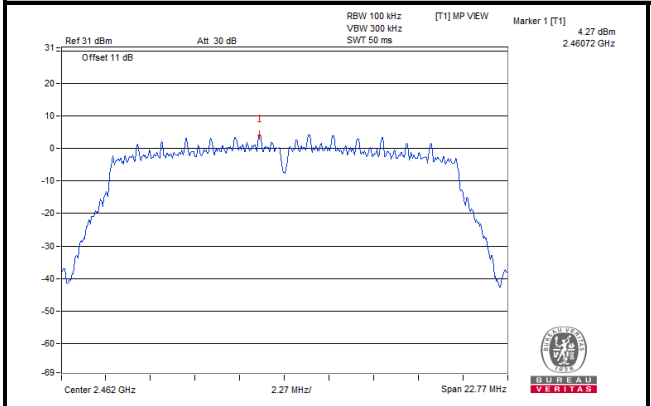


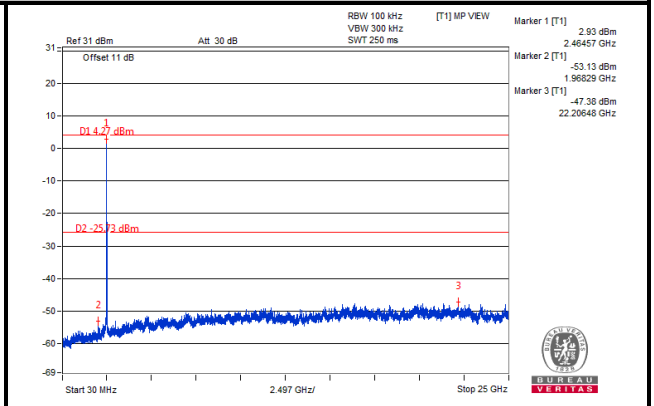
Ch 6



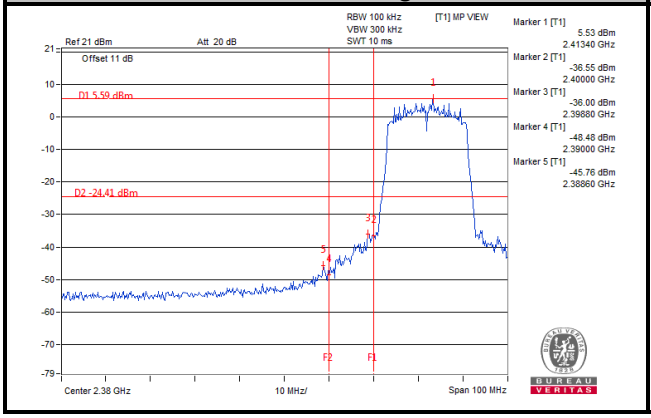


Ch 11





Ch 1 Band Edge



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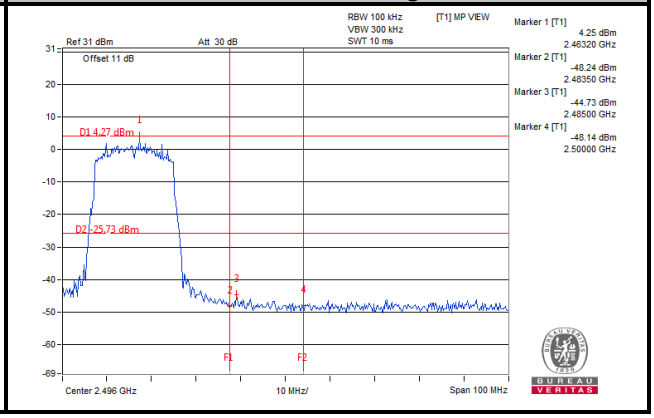
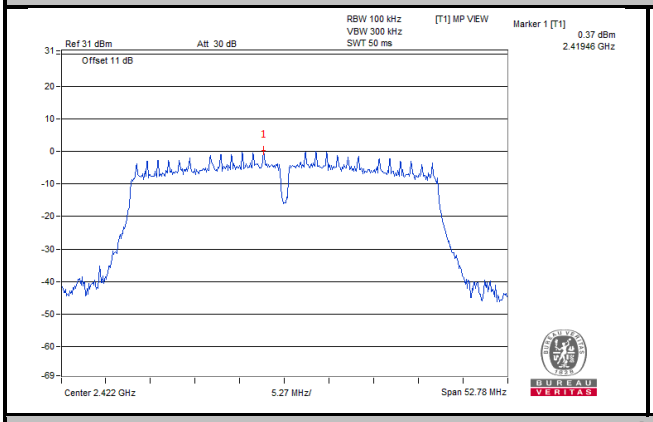
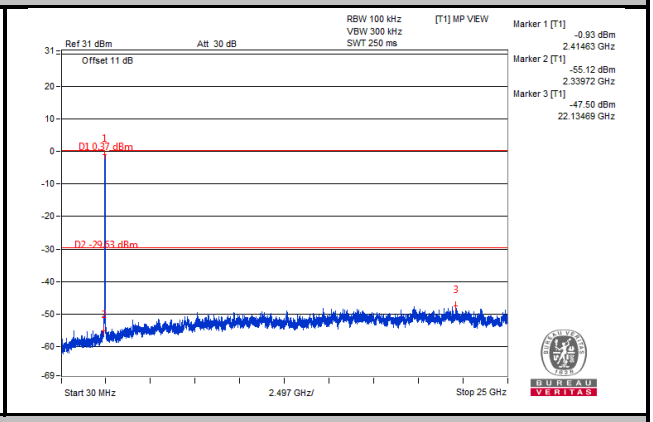


802.11n (HT40)

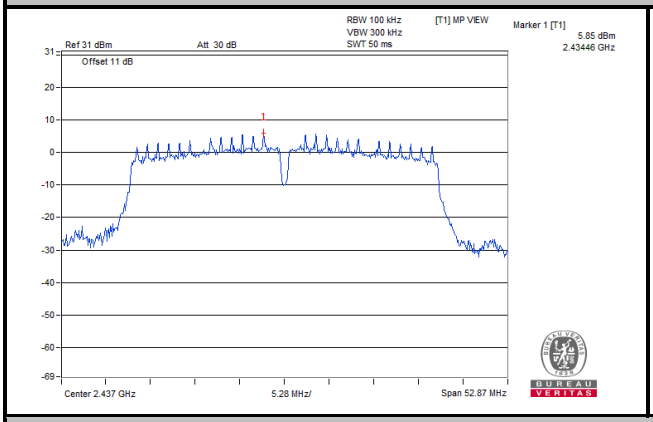
CHAIN 0

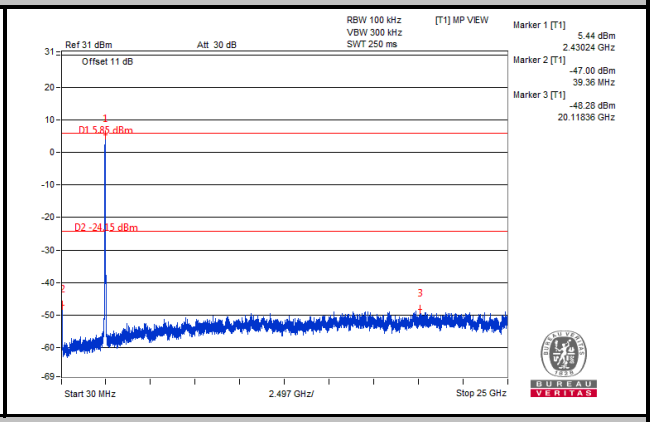
Ch 3



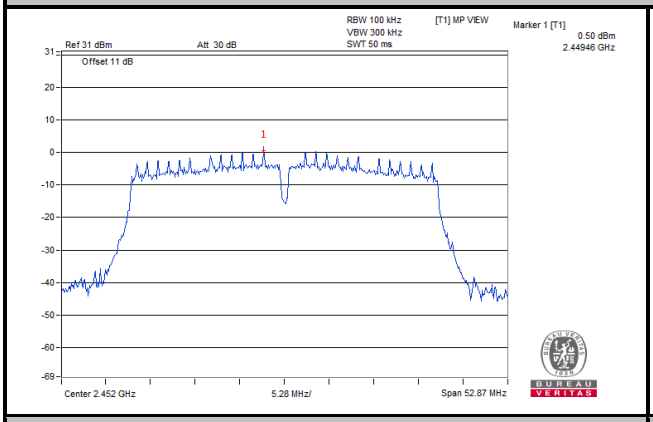


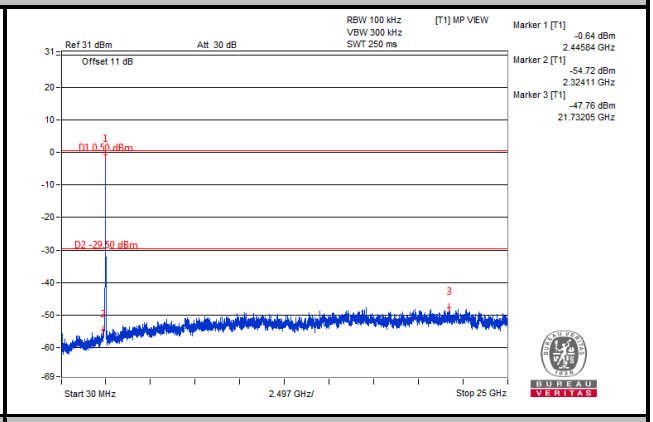
Ch 6



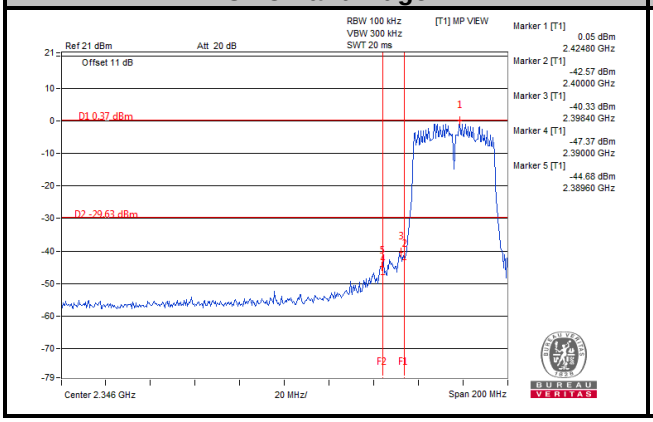


Ch 9

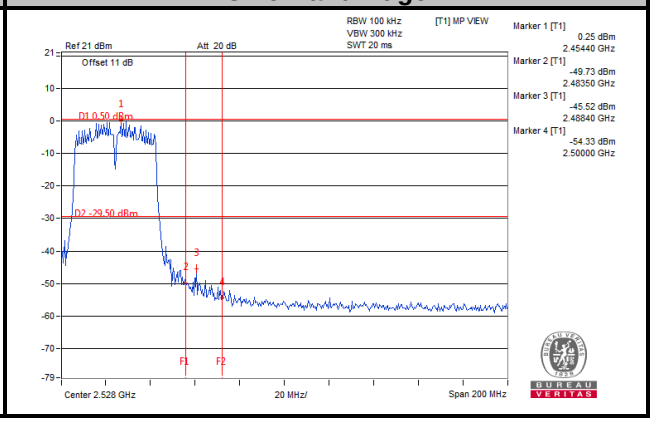




Ch 3 Band Edge

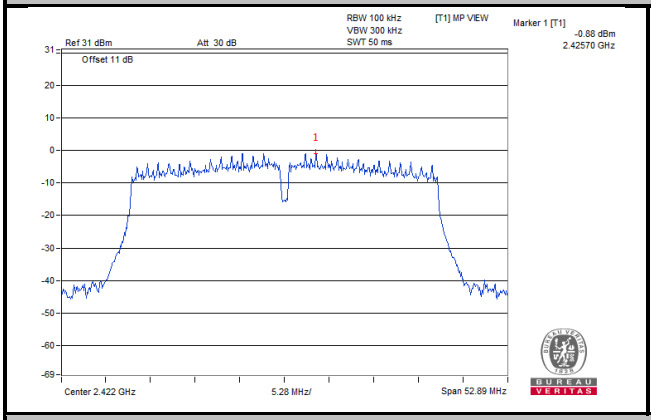


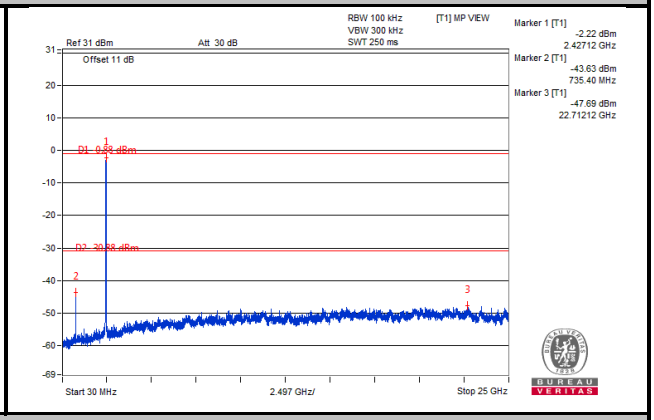
Ch 9 Band Edge



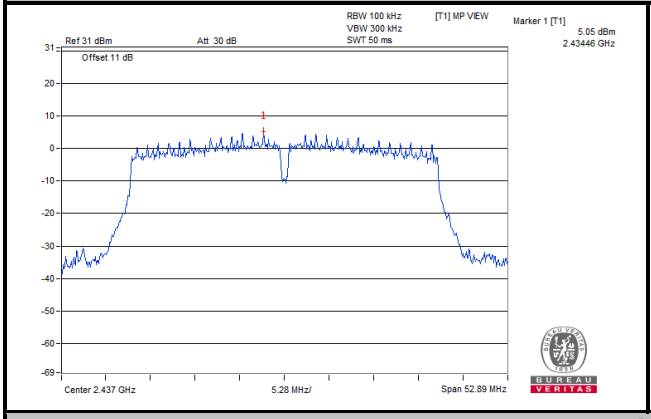
CHAIN 1

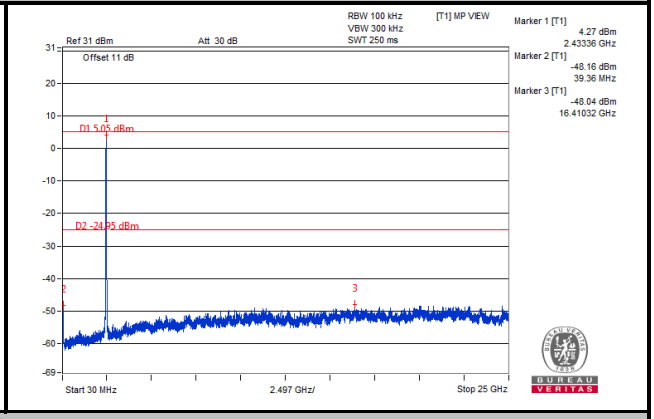
Ch 3



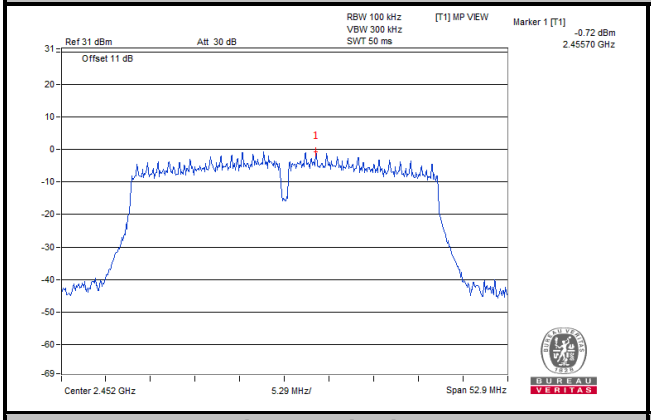


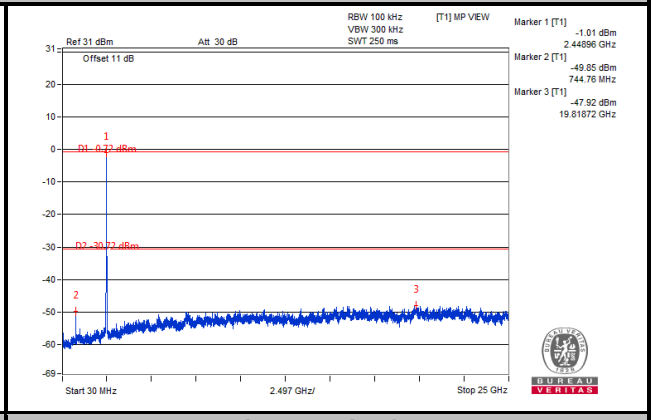
Ch 6



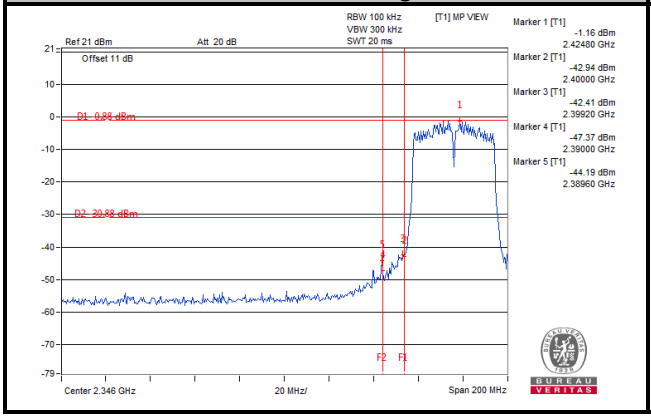


Ch 9

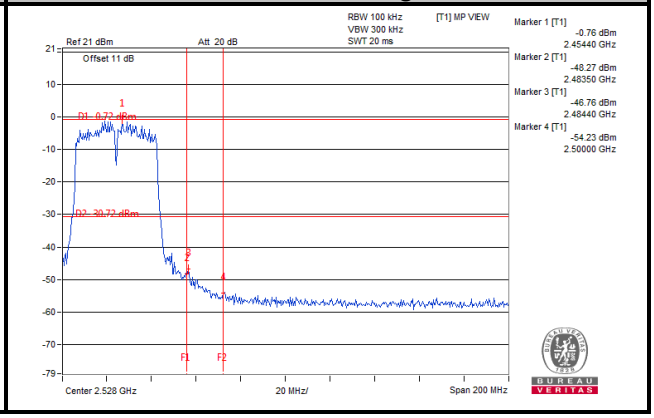




Ch 3 Band Edge

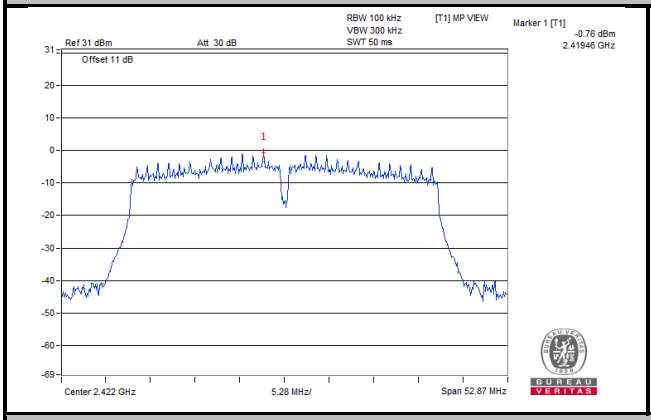


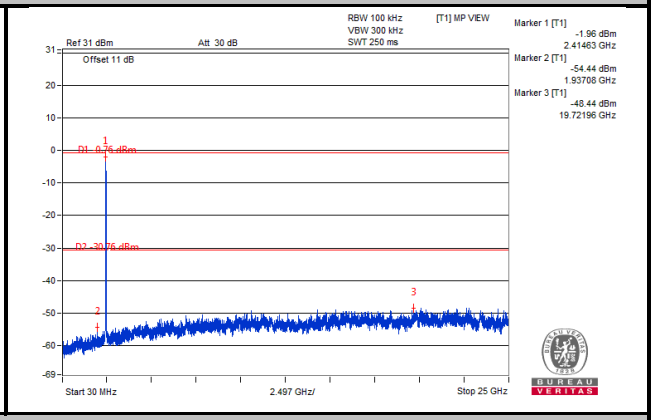
Ch 9 Band Edge



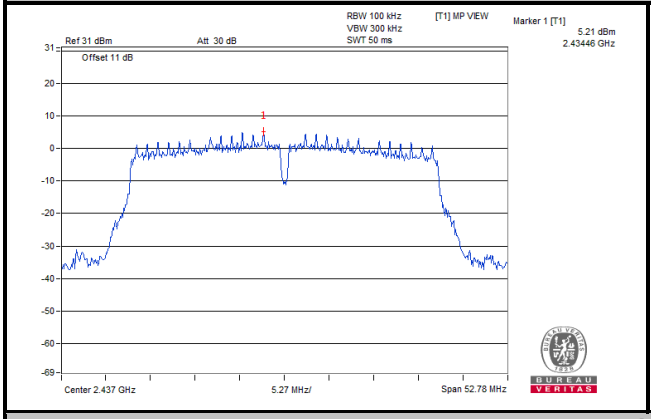
CHAIN 2

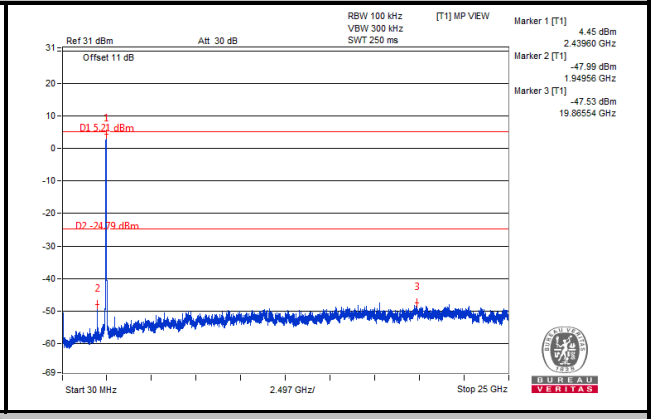
Ch 3



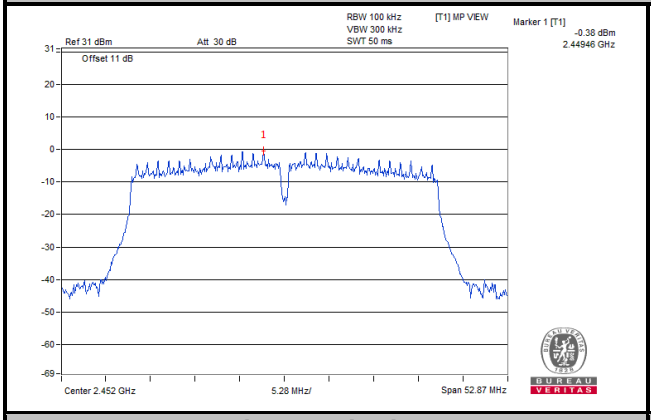


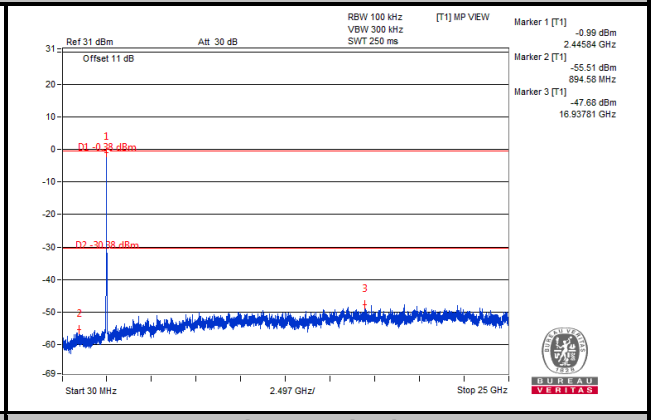
Ch 6



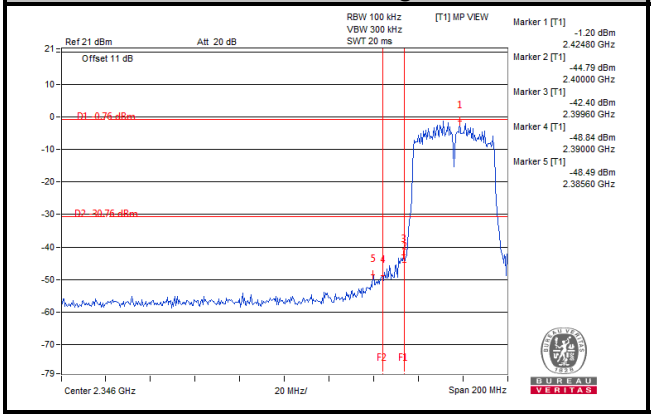


Ch 9

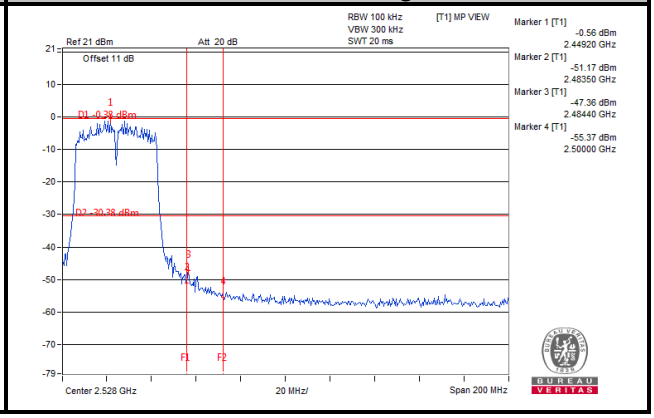




Ch 3 Band Edge



Ch 9 Band Edge



5 Pictures of Test Arrangements

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

Appendix – Information of 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:

Lin Kou 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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