FCC Test Report

Report No.:	RF191125C08-2
FCC ID:	I4L-LAVIEHAAX200
Test Model:	PC-HA97GRAW
Received Date:	Nov. 25, 2019
Test Date:	Dec. 09, 2019 ~ Jan. 05, 2020
Issued Date:	Jan. 17, 2020
Applicant:	Micro-Star International Co., Ltd.
Address:	No. 69, Lide St., Zhonghe Dist., 235 New Taipei City Taiwan
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 (1):	No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
Test Location (2):	B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan
FCC Registration / Designation Number:	788550 / TW0003 427177 / TW0011

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Release Control Record

Issue No.	Description	Date Issued
RF191125C08-2	Original Release	Jan. 17, 2020

1 Certificate of Conformity

Product:	AIO PC
Brand:	NEC
Test Model:	PC-HA97GRAW
Sample Status:	Mass product
Applicant:	Micro-Star International Co., Ltd.
Test Date:	Dec. 09, 2019 ~ Jan. 05, 2020
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 : _____ , **Date:** Jan. 17, 2020

Gina Liu / Specialist

Approved by : _____ , **Date:** Jan. 17, 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 -13.22 dB at 0.15 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.13 dB at 2485.8 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) 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	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AIO PC
Brand	NEC
Test Model	PC-HA97GRAW
Status of EUT	Mass product
Power Supply Rating	20.0 Vdc (adapter)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
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 300.0 Mbps 802.11ax: up to 573.5 Mbps
Operating Frequency	2412 ~ 2472 MHz
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20), 802.11ax (HE20) 9 for 802.11n (HT40), 802.11ax (HE40)
Output Power	476.320 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 two completed transmitters and two receivers.

Modulation Mode	Tx Function
802.11b	1TX
802.11g	1TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ax (HE20)	2TX
802.11ax (HE40)	2TX

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	NEC	ADP-90XD E	I/P: 100-240 Vac, 50-60 Hz, 1.5 A O/P: 20 Vdc, 4.5 A
Keyboard	NEC	KG-1027	3 Vdc, 30 mA
Mouse	NEC	MG-1023	3 Vdc, 50 mA
USB Dongle (for Mouse use)	NEC	RG-1026	5 Vdc, 100 mA
WLAN Module	Intel	AX200NGW	--

3. The antennas information is listed as below.

Antenna Type	Manufacturer	Parts Number	Antenna Gain (dBi)			
			BT / WLAN 2.4 GHz	WLAN 5.15-5.35 GHz	WLAN 5.47-5.725 GHz	WLAN 5.725-5.85 GHz
PIFA	VSO	Tx1 Antenna: 821-101-01211350	-0.36	-0.97	-0.06	-0.22
		Tx2 Antenna: 821-101-01211360	1.52	0.32	-0.19	-0.19

4. 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

13 channels are provided for 802.11b, 802.11g, 802.11n (HT20) and 802.11ax (HE20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	8	2447
2	2417	9	2452
3	2422	10	2457
4	2427	11	2462
5	2432	12	2467
6	2437	13	2472
7	2442		

9 channels are provided for 802.11n (HT40) and 802.11ax (HE40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

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)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	13.5
-	802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	MCS0
-	802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	MCS0

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)
-	802.11ax (HE40)	3 to 11	11	OFDMA	BPSK	MCS0

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)
-	802.11ax (HE40)	3 to 11	11	OFDMA	BPSK	MCS0

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)
-	802.11b	1 to 13	1, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 11, 12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	3, 9, 10, 11	OFDM	BPSK	13.5
	802.11ax (HE20)	1 to 13	1, 11, 12, 13	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 11	3, 9, 10, 11	OFDMA	BPSK	MCS0

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)
-	802.11b	1 to 13	1, 6, 11, 12, 13	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11, 12, 13	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 11	3, 6, 9, 10, 11	OFDM	BPSK	13.5
	802.11ax (HE20)	1 to 13	1, 6, 11, 12, 13	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 11	3, 6, 9, 10, 11	OFDMA	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Wayne Lin

3.3 Duty Cycle of Test Signal

802.11b: Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11g: Duty cycle = 2.081/2.131 = 0.977, Duty factor = 10 * log(1/0.977) = 0.10

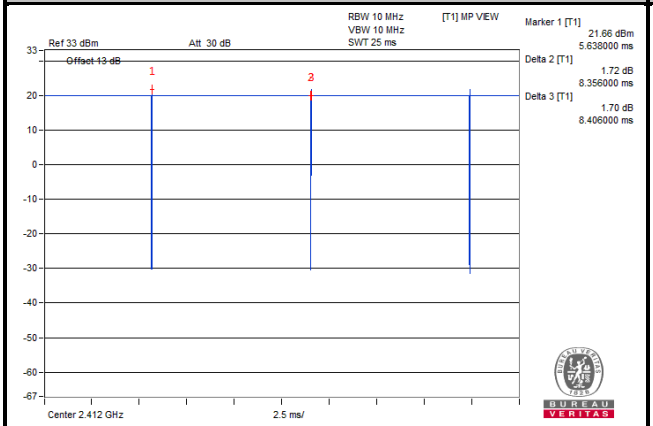
802.11n (HT20): Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11n (HT40): Duty cycle of test signal is ≥ 98 %, duty factor is not required.

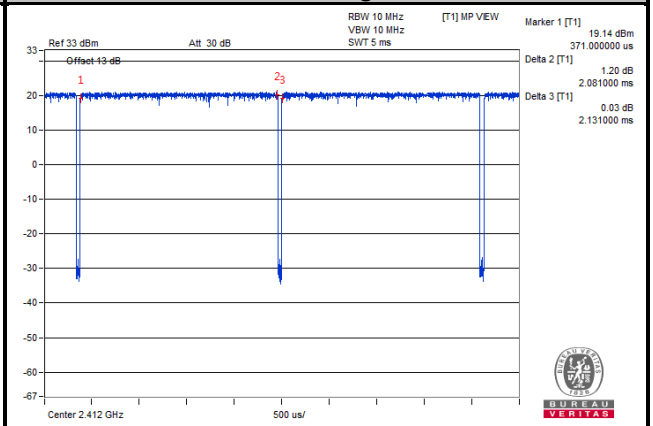
802.11ax (HE20): Duty cycle of test signal is ≥ 98 %, duty factor is not required.

802.11ax (HE40): Duty cycle of test signal is ≥ 98 %, duty factor is not required.

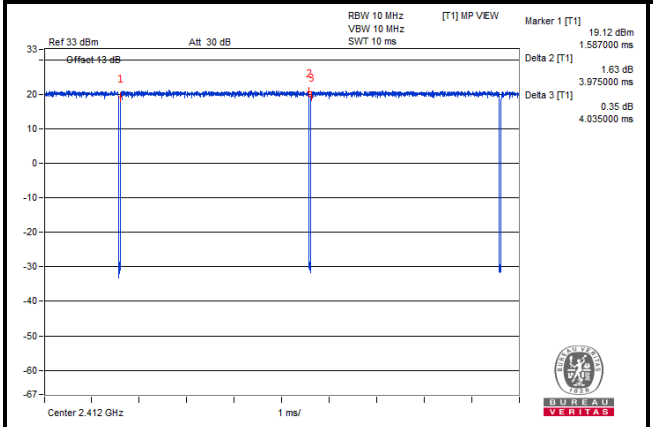
802.11b



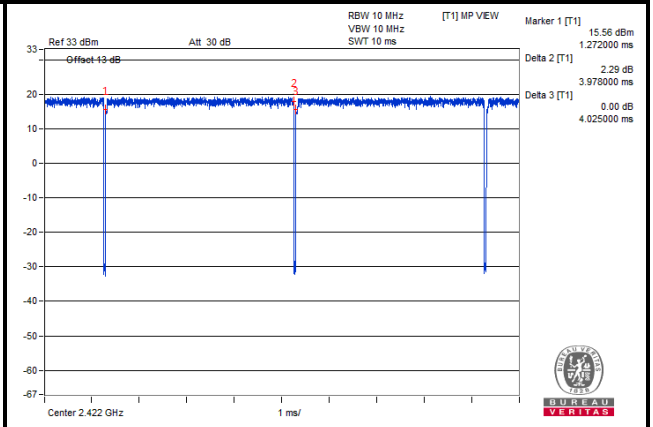
802.11g



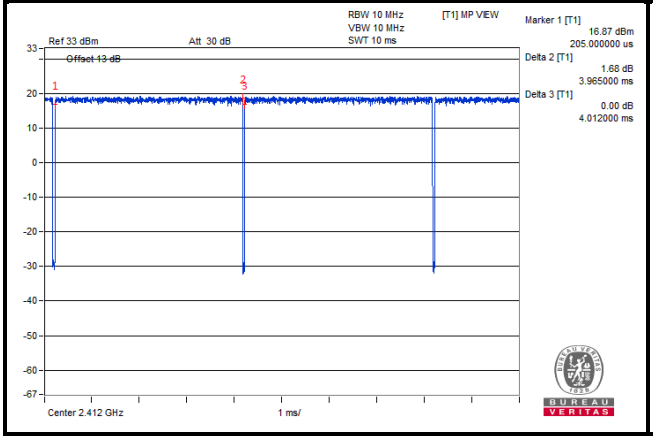
802.11n (HT20)



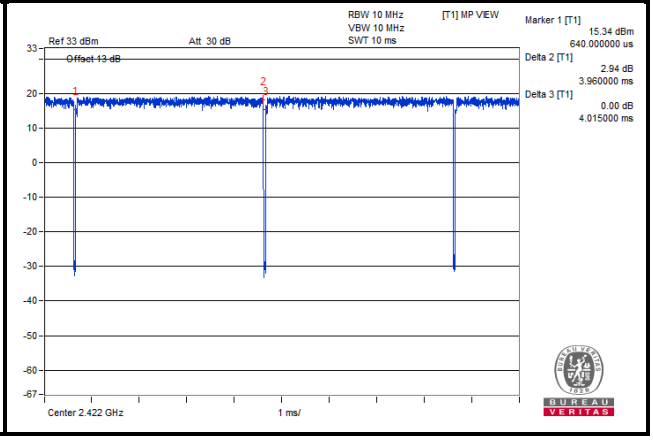
802.11n (HT40)



802.11ax (HE20)



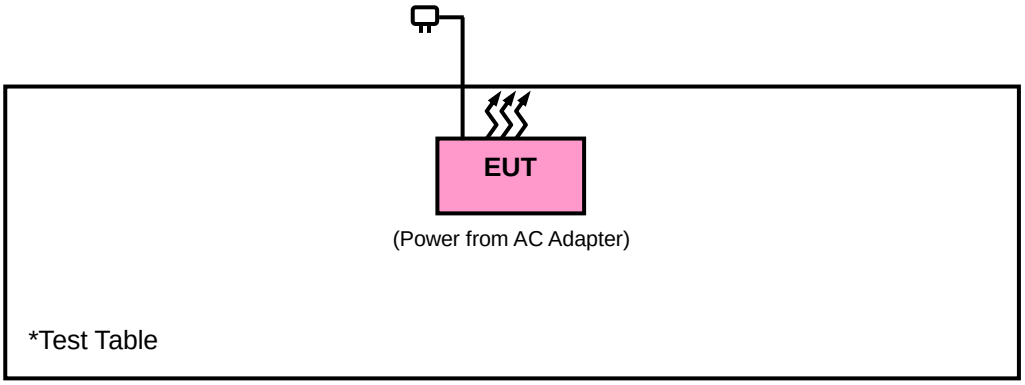
802.11ax (HE40)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

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:

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 20 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 Agilent Technologies	N9038A	MY52260177	Aug. 26, 2019	Aug. 25, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 15, 2019	Apr. 14, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSW26	102023	Oct. 08, 2019	Oct. 07, 2020
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 24, 2019	Nov. 23, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 15, 2019	Apr. 14, 2020
Loop Antenna	EM-6879	269	Sep. 16, 2019	Sep. 15, 2020
Preamplifier Agilent	310N	187226	Jun. 18, 2019	Jun. 17, 2020
Preamplifier Agilent	83017A	MY39501357	Jun. 18, 2019	Jun. 17, 2020
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 15, 2019	Jul. 14, 2020
Peak Power Analyzer KEYSIGHT (Support 8TX and 160MHz Bandwidth)	8990B	MY51000485	Jan. 14, 2019	Jan. 13, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 18, 2019	Jun. 17, 2020
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 18, 2019	Jun. 17, 2020
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	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 HsinTien Chamber 1.

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:

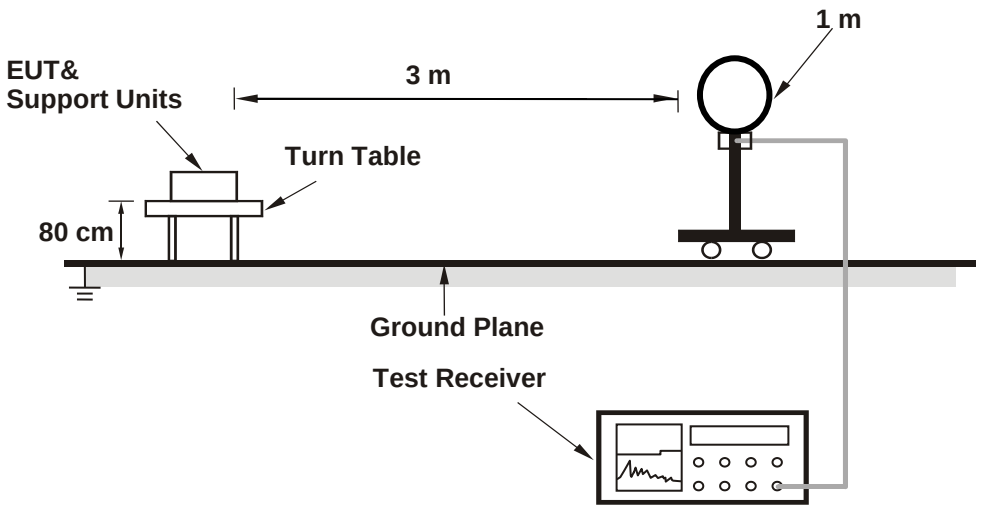
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) 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 = 10 Hz; 11n (HT40): RBW = 1 MHz, VBW = 10 Hz;
   11ax (HE20): RBW = 1 MHz, VBW = 10 Hz ; 11ax (HE40): RBW = 1 MHz, VBW = 10 Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

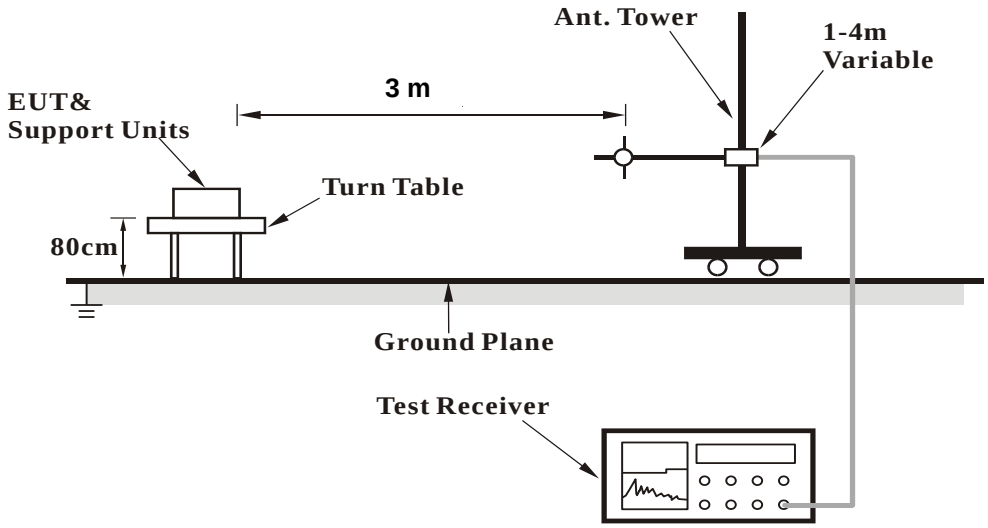
No deviation.

4.1.5 Test Set Up

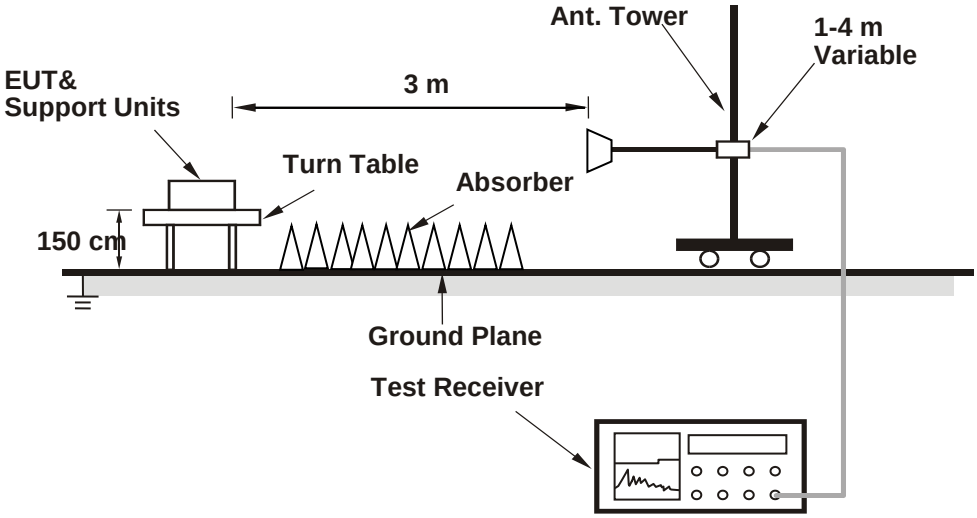
<Radiated Emission below 30 MHz>



<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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.92	44.09	39.59	54	-9.91	4.5	152	217	Average
2389.92	52.52	48.02	74	-21.48	4.5	152	217	Peak
2412	105.35	100.8			4.55	152	217	Average
2412	107.82	103.27			4.55	152	217	Peak
4824	42.13	31.84	54	-11.87	10.29	190	315	Average
4824	48.32	38.03	74	-25.68	10.29	190	315	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	43.21	38.71	54	-10.79	4.5	104	47	Average
2389.83	52.3	47.8	74	-21.7	4.5	104	47	Peak
2412	103.87	99.32			4.55	104	47	Average
2412	106.24	101.69			4.55	104	47	Peak
4824	41.41	31.12	54	-12.59	10.29	167	124	Average
4824	47.98	37.69	74	-26.02	10.29	167	124	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.57	41.64	37.15	54	-12.36	4.49	150	204	Average
2388.57	52.29	47.8	74	-21.71	4.49	150	204	Peak
2437	106.11	101.52			4.59	150	204	Average
2437	108.48	103.89			4.59	150	204	Peak
2483.52	42.37	37.71	54	-11.63	4.66	150	204	Average
2483.52	52.64	47.98	74	-21.36	4.66	150	204	Peak
4874	42.86	32.65	54	-11.14	10.21	138	104	Average
4874	49.12	38.91	74	-24.88	10.21	138	104	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2385.33	41.81	37.34	54	-12.19	4.47	104	47	Average
2385.33	51.95	47.48	74	-22.05	4.47	104	47	Peak
2437	104.99	100.4			4.59	104	47	Average
2437	107.49	102.9			4.59	104	47	Peak
2485.76	42.3	37.64	54	-11.7	4.66	104	47	Average
2485.76	52.37	47.71	74	-21.63	4.66	104	47	Peak
4874	41.57	31.36	54	-12.43	10.21	151	128	Average
4874	47.74	37.53	74	-26.26	10.21	151	128	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	105.11	100.49			4.62	104	217	Average
2462	107.5	102.88			4.62	104	217	Peak
2483.88	44.76	40.1	54	-9.24	4.66	104	217	Average
2483.88	54.3	49.64	74	-19.7	4.66	104	217	Peak
4924	42.23	31.98	54	-11.77	10.25	107	59	Average
4924	48.35	38.1	74	-25.65	10.25	107	59	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	103.67	99.05			4.62	104	47	Average
2462	106.1	101.48			4.62	104	47	Peak
2484.44	43.35	38.69	54	-10.65	4.66	104	47	Average
2484.44	53.22	48.56	74	-20.78	4.66	104	47	Peak
4924	42.67	32.42	54	-11.33	10.25	129	36	Average
4924	48.94	38.69	74	-25.06	10.25	129	36	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	104.34	99.71			4.63	111	220	Average
2467	106.86	102.23			4.63	111	220	Peak
2485.56	48.4	43.74	54	-5.6	4.66	111	220	Average
2485.56	55.52	50.86	74	-18.48	4.66	111	220	Peak
4934	42.76	32.5	54	-11.24	10.26	135	283	Average
4934	49.16	38.9	74	-24.84	10.26	135	283	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	102.77	98.14			4.63	104	47	Average
2467	105.22	100.59			4.63	104	47	Peak
2485.8	46.74	42.08	54	-7.26	4.66	104	47	Average
2485.8	54.88	50.22	74	-19.12	4.66	104	47	Peak
4934	42.07	31.81	54	-11.93	10.26	121	167	Average
4934	48.39	38.13	74	-25.61	10.26	121	167	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	101.29	96.65			4.64	111	220	Average
2472	103.62	98.98			4.64	111	220	Peak
2485.76	49.72	45.06	54	-4.28	4.66	111	220	Average
2485.76	56.66	52	74	-17.34	4.66	111	220	Peak
4944	43.71	33.36	54	-10.29	10.35	183	312	Average
4944	49.87	39.52	74	-24.13	10.35	183	312	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	100.16	95.52			4.64	104	55	Average
2472	102.5	97.86			4.64	104	55	Peak
2485.44	47.74	43.08	54	-6.26	4.66	104	55	Average
2485.44	55.09	50.43	74	-18.91	4.66	104	55	Peak
4944	42.06	31.71	54	-11.94	10.35	148	210	Average
4944	48.35	38	74	-25.65	10.35	148	210	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	43.41	38.92	54	-10.59	4.49	152	217	Average
2389.74	53.19	48.7	74	-20.81	4.49	152	217	Peak
2412	102.1	97.55			4.55	152	217	Average
2412	109.6	105.05			4.55	152	217	Peak
4824	41.39	31.1	54	-12.61	10.29	131	67	Average
4824	47.58	37.29	74	-26.42	10.29	131	67	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	42.74	38.25	54	-11.26	4.49	104	47	Average
2389.74	52.21	47.72	74	-21.79	4.49	104	47	Peak
2412	100.71	96.16			4.55	104	47	Average
2412	107.87	103.32			4.55	104	47	Peak
4824	42.82	32.53	54	-11.18	10.29	134	195	Average
4824	49.15	38.86	74	-24.85	10.29	134	195	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.65	41.84	37.35	54	-12.16	4.49	150	204	Average
2389.65	51.88	47.39	74	-22.12	4.49	150	204	Peak
2437	105.75	101.16			4.59	150	204	Average
2437	112.97	108.38			4.59	150	204	Peak
2483.52	42.55	37.89	54	-11.45	4.66	150	204	Average
2483.52	52.36	47.7	74	-21.64	4.66	150	204	Peak
4874	41.25	31.04	54	-12.75	10.21	150	328	Average
4874	47.33	37.12	74	-26.67	10.21	150	328	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2387.94	41.89	37.4	54	-12.11	4.49	104	47	Average
2387.94	51.84	47.35	74	-22.16	4.49	104	47	Peak
2437	103.89	99.3			4.59	104	47	Average
2437	111.24	106.65			4.59	104	47	Peak
2485.4	42.44	37.78	54	-11.56	4.66	104	47	Average
2485.4	52.48	47.82	74	-21.52	4.66	104	47	Peak
4874	42.04	31.83	54	-11.96	10.21	129	34	Average
4874	48.25	38.04	74	-25.75	10.21	129	34	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	99.87	95.25			4.62	104	217	Average
2462	107.43	102.81			4.62	104	217	Peak
2483.8	43.35	38.69	54	-10.65	4.66	104	217	Average
2483.8	53.55	48.89	74	-20.45	4.66	104	217	Peak
4924	42.12	31.87	54	-11.88	10.25	162	216	Average
4924	48.44	38.19	74	-25.56	10.25	162	216	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	98.44	93.82			4.62	104	47	Average
2462	105.99	101.37			4.62	104	47	Peak
2486.28	42.64	37.98	54	-11.36	4.66	104	47	Average
2486.28	52.75	48.09	74	-21.25	4.66	104	47	Peak
4924	41.68	31.43	54	-12.32	10.25	102	137	Average
4924	47.94	37.69	74	-26.06	10.25	102	137	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	98.44	93.81			4.63	111	220	Average
2467	105.9	101.27			4.63	111	220	Peak
2483.52	45.95	41.29	54	-8.05	4.66	111	220	Average
2483.52	56.31	51.65	74	-17.69	4.66	111	220	Peak
4934	41.57	31.31	54	-12.43	10.26	185	226	Average
4934	47.77	37.51	74	-26.23	10.26	185	226	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	96.9	92.27			4.63	104	47	Average
2467	104.78	100.15			4.63	104	47	Peak
2483.52	44.44	39.78	54	-9.56	4.66	104	47	Average
2483.52	54.29	49.63	74	-19.71	4.66	104	47	Peak
4934	41.79	31.53	54	-12.21	10.26	178	211	Average
4934	47.95	37.69	74	-26.05	10.26	178	211	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	95.82	91.18			4.64	111	220	Average
2472	103.93	99.29			4.64	111	220	Peak
2483.52	48.2	43.54	54	-5.8	4.66	111	220	Average
2483.52	69.44	64.78	74	-4.56	4.66	111	220	Peak
4944	42.05	31.7	54	-11.95	10.35	190	262	Average
4944	48.21	37.86	74	-25.79	10.35	190	262	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	94.75	90.11			4.64	104	55	Average
2472	102.33	97.69			4.64	104	55	Peak
2483.52	46.47	41.81	54	-7.53	4.66	104	55	Average
2483.52	67.23	62.57	74	-6.77	4.66	104	55	Peak
4944	41.82	31.47	54	-12.18	10.35	123	165	Average
4944	48	37.65	74	-26	10.35	123	165	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.57	43.95	39.46	54	-10.05	4.49	122	230	Average
2388.57	53.67	49.18	74	-20.33	4.49	122	230	Peak
2412	101.57	97.02			4.55	122	230	Average
2412	109.45	104.9			4.55	122	230	Peak
4824	41.72	31.43	54	-12.28	10.29	185	57	Average
4824	48.49	38.2	74	-25.51	10.29	185	57	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.92	42.84	38.34	54	-11.16	4.5	119	185	Average
2389.92	52.38	47.88	74	-21.62	4.5	119	185	Peak
2412	101.57	97.02			4.55	119	185	Average
2412	109.5	104.95			4.55	119	185	Peak
4824	41.78	31.49	54	-12.22	10.29	155	354	Average
4824	48.41	38.12	74	-25.59	10.29	155	354	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.65	41.51	37.02	54	-12.49	4.49	122	230	Average
2389.65	52.71	48.22	74	-21.29	4.49	122	230	Peak
2437	103.62	99.03			4.59	122	230	Average
2437	111.3	106.71			4.59	122	230	Peak
2483.52	41.48	36.82	54	-12.52	4.66	122	230	Average
2483.52	52.24	47.58	74	-21.76	4.66	122	230	Peak
4874	41.75	31.54	54	-12.25	10.21	104	228	Average
4874	48.29	38.08	74	-25.71	10.21	104	228	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.56	40.89	36.4	54	-13.11	4.49	119	185	Average
2389.56	51.78	47.29	74	-22.22	4.49	119	185	Peak
2437	103.62	99.03			4.59	119	185	Average
2437	111.52	106.93			4.59	119	185	Peak
2485.88	41.87	37.21	54	-12.13	4.66	119	185	Average
2485.88	53.25	48.59	74	-20.75	4.66	119	185	Peak
4874	41.66	31.45	54	-12.34	10.21	166	208	Average
4874	47.77	37.56	74	-26.23	10.21	166	208	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	98.32	93.7			4.62	122	230	Average
2462	106.48	101.86			4.62	122	230	Peak
2483.72	43.06	38.4	54	-10.94	4.66	122	230	Average
2483.72	53	48.34	74	-21	4.66	122	230	Peak
4924	41.75	31.5	54	-12.25	10.25	121	4	Average
4924	48.22	37.97	74	-25.78	10.25	121	4	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	99.65	95.03			4.62	119	185	Average
2462	106.76	102.14			4.62	119	185	Peak
2484.16	43.45	38.79	54	-10.55	4.66	119	185	Average
2484.16	53.94	49.28	74	-20.06	4.66	119	185	Peak
4924	41.81	31.56	54	-12.19	10.25	121	145	Average
4924	48.06	37.81	74	-25.94	10.25	121	145	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	95.67	91.04			4.63	122	230	Average
2467	103.29	98.66			4.63	122	230	Peak
2483.52	45.67	41.01	54	-8.33	4.66	122	230	Average
2483.52	56.04	51.38	74	-17.96	4.66	122	230	Peak
4934	41.94	31.68	54	-12.06	10.26	157	199	Average
4934	49.3	39.04	74	-24.7	10.26	157	199	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	96.67	92.04			4.63	119	185	Average
2467	104.15	99.52			4.63	119	185	Peak
2483.64	46.46	41.8	54	-7.54	4.66	119	185	Average
2483.64	56.55	51.89	74	-17.45	4.66	119	185	Peak
4934	41.83	31.57	54	-12.17	10.26	135	339	Average
4934	48.56	38.3	74	-25.44	10.26	135	339	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	93.38	88.74			4.64	112	221	Average
2472	101.51	96.87			4.64	112	221	Peak
2483.52	44.32	39.66	54	-9.68	4.66	112	221	Average
2483.52	62.47	57.81	74	-11.53	4.66	112	221	Peak
4944	41.89	31.54	54	-12.11	10.35	157	78	Average
4944	48.33	37.98	74	-25.67	10.35	157	78	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	93.88	89.24			4.64	145	185	Average
2472	101.94	97.3			4.64	145	185	Peak
2483.52	46.05	41.39	54	-7.95	4.66	145	185	Average
2483.52	60.5	55.84	74	-13.5	4.66	145	185	Peak
4944	41.79	31.44	54	-12.21	10.35	154	148	Average
4944	48.54	38.19	74	-25.46	10.35	154	148	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	45.3	40.81	54	-8.7	4.49	122	230	Average
2389.74	54.79	50.3	74	-19.21	4.49	122	230	Peak
2422	98.06	93.5			4.56	122	230	Average
2422	106.08	101.52			4.56	122	230	Peak
2483.56	42.78	38.12	54	-11.22	4.66	122	230	Average
2483.56	52.7	48.04	74	-21.3	4.66	122	230	Peak
4844	41.82	31.59	54	-12.18	10.23	165	88	Average
4844	47.68	37.45	74	-26.32	10.23	165	88	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2383.71	44.04	39.57	54	-9.96	4.47	157	185	Average
2383.71	54.25	49.78	74	-19.75	4.47	157	185	Peak
2422	98.69	94.13			4.56	157	185	Average
2422	106.6	102.04			4.56	157	185	Peak
2493.68	42.34	37.67	54	-11.66	4.67	157	185	Average
2493.68	52.94	48.27	74	-21.06	4.67	157	185	Peak
4844	41.68	31.45	54	-12.32	10.23	134	336	Average
4844	47.64	37.41	74	-26.36	10.23	134	336	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	43.46	38.96	54	-10.54	4.5	122	230	Average
2389.83	53.52	49.02	74	-20.48	4.5	122	230	Peak
2437	97.21	92.62			4.59	122	230	Average
2437	105.11	100.52			4.59	122	230	Peak
2483.84	43.36	38.7	54	-10.64	4.66	122	230	Average
2483.84	55.19	50.53	74	-18.81	4.66	122	230	Peak
4874	41.76	31.55	54	-12.24	10.21	245	155	Average
4874	47.14	36.93	74	-26.86	10.21	245	155	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.47	42.61	38.12	54	-11.39	4.49	119	185	Average
2389.47	52.93	48.44	74	-21.07	4.49	119	185	Peak
2437	97.03	92.44			4.59	119	185	Average
2437	105.2	100.61			4.59	119	185	Peak
2483.64	44.15	39.49	54	-9.85	4.66	119	185	Average
2483.64	54.45	49.79	74	-19.55	4.66	119	185	Peak
4874	41.88	31.67	54	-12.12	10.21	348	88	Average
4874	46.94	36.73	74	-27.06	10.21	348	88	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.75	42.02	37.53	54	-11.98	4.49	100	221	Average
2388.75	51.67	47.18	74	-22.33	4.49	100	221	Peak
2452	98.03	93.43			4.60	100	221	Average
2452	105.73	101.13			4.60	100	221	Peak
2483.8	44.66	40	54	-9.34	4.66	100	221	Average
2483.8	55.46	50.8	74	-18.54	4.66	100	221	Peak
4904	41.79	31.65	54	-12.21	10.14	185	225	Average
4904	46.2	36.06	74	-27.8	10.14	185	225	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.47	41.59	37.1	54	-12.41	4.49	141	185	Average
2389.47	51.48	46.99	74	-22.52	4.49	141	185	Peak
2452	98.62	94.02			4.60	141	185	Average
2452	106.03	101.43			4.60	141	185	Peak
2483.56	44.05	39.39	54	-9.95	4.66	141	185	Average
2483.56	53.72	49.06	74	-20.28	4.66	141	185	Peak
4904	42.01	31.87	54	-11.99	10.14	138	334	Average
4904	47.49	37.35	74	-26.51	10.14	138	334	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 10	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.02	41.32	36.83	54	-12.68	4.49	100	220	Average
2389.02	51.31	46.82	74	-22.69	4.49	100	220	Peak
2457	91.01	86.39			4.62	100	220	Average
2457	98.56	93.94			4.62	100	220	Peak
2483.52	48.25	43.59	54	-5.75	4.66	100	220	Average
2483.52	60.18	55.52	74	-13.82	4.66	100	220	Peak
4914	41.68	31.53	54	-12.32	10.15	155	285	Average
4914	47.11	36.96	74	-26.89	10.15	155	285	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2386.32	41.38	36.89	54	-12.62	4.49	141	185	Average
2386.32	52.13	47.64	74	-21.87	4.49	141	185	Peak
2457	91.44	86.82			4.62	141	185	Average
2457	99.37	94.75			4.62	141	185	Peak
2483.52	48.41	43.75	54	-5.59	4.66	141	185	Average
2483.52	57.59	52.93	74	-16.41	4.66	141	185	Peak
4914	41.69	31.54	54	-12.31	10.15	164	166	Average
4914	47.79	37.64	74	-26.21	10.15	164	166	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2457 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.29	40.37	35.88	54	-13.63	4.49	100	220	Average
2389.29	51.25	46.76	74	-22.75	4.49	100	220	Peak
2462	93.65	89.03			4.62	100	220	Average
2462	100.73	96.11			4.62	100	220	Peak
2483.52	47.08	42.42	54	-6.92	4.66	100	220	Average
2483.52	65.31	60.65	74	-8.69	4.66	100	220	Peak
4924	41.78	31.53	54	-12.22	10.25	140	177	Average
4924	47.91	37.66	74	-26.09	10.25	140	177	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2387.22	40.26	35.77	54	-13.74	4.49	141	185	Average
2387.22	51.95	47.46	74	-22.05	4.49	141	185	Peak
2462	94.57	89.95			4.62	141	185	Average
2462	101.11	96.49			4.62	141	185	Peak
2483.64	47.9	43.24	54	-6.1	4.66	141	185	Average
2483.64	63.85	59.19	74	-10.15	4.66	141	185	Peak
4924	41.71	31.46	54	-12.29	10.25	135	55	Average
4924	47.53	37.28	74	-26.47	10.25	135	55	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE20)

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	44.15	39.65	54	-9.85	4.5	122	230	Average
2389.83	53.57	49.07	74	-20.43	4.5	122	230	Peak
2412	102.5	97.95			4.55	122	230	Average
2412	112.91	108.36			4.55	122	230	Peak
4824	41.77	31.48	54	-12.23	10.29	189	95	Average
4824	47.45	37.16	74	-26.55	10.29	189	95	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.92	43.36	38.86	54	-10.64	4.5	119	185	Average
2389.92	52.97	48.47	74	-21.03	4.5	119	185	Peak
2412	101.57	97.02			4.55	119	185	Average
2412	111.79	107.24			4.55	119	185	Peak
4824	41.93	31.64	54	-12.07	10.29	148	113	Average
4824	47.81	37.52	74	-26.19	10.29	148	113	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.74	41.83	37.34	54	-12.17	4.49	122	230	Average
2389.74	51.48	46.99	74	-22.52	4.49	122	230	Peak
2437	101.69	97.1			4.59	122	230	Average
2437	112.05	107.46			4.59	122	230	Peak
2492.2	42.21	37.54	54	-11.79	4.67	122	230	Average
2492.2	52.27	47.6	74	-21.73	4.67	122	230	Peak
4874	41.75	31.54	54	-12.25	10.21	164	36	Average
4874	47.6	37.39	74	-26.4	10.21	164	36	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.3	41.49	37	54	-12.51	4.49	119	185	Average
2388.3	51.63	47.14	74	-22.37	4.49	119	185	Peak
2437	101.31	96.72			4.59	119	185	Average
2437	110.69	106.1			4.59	119	185	Peak
2485.24	41.27	36.61	54	-12.73	4.66	119	185	Average
2485.24	52.2	47.54	74	-21.8	4.66	119	185	Peak
4874	41.72	31.51	54	-12.28	10.21	124	208	Average
4874	47.72	37.51	74	-26.28	10.21	124	208	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	98.8	94.18			4.62	122	230	Average
2462	108.65	104.03			4.62	122	230	Peak
2483.56	43.56	38.9	54	-10.44	4.66	122	230	Average
2483.56	54.17	49.51	74	-19.83	4.66	122	230	Peak
4924	41.74	31.49	54	-12.26	10.25	188	199	Average
4924	47.79	37.54	74	-26.21	10.25	188	199	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	99.34	94.72			4.62	119	185	Average
2462	109.22	104.6			4.62	119	185	Peak
2483.64	43.8	39.14	54	-10.2	4.66	119	185	Average
2483.64	53.95	49.29	74	-20.05	4.66	119	185	Peak
4924	41.7	31.45	54	-12.3	10.25	164	255	Average
4924	47.59	37.34	74	-26.41	10.25	164	255	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 12	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	95.53	90.9			4.63	122	230	Average
2467	105.1	100.47			4.63	122	230	Peak
2483.52	45.7	41.04	54	-8.3	4.66	122	230	Average
2483.52	55.62	50.96	74	-18.38	4.66	122	230	Peak
4934	41.72	31.46	54	-12.28	10.26	164	322	Average
4934	48.65	38.39	74	-25.35	10.26	164	322	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2467	95.49	90.86			4.63	119	185	Average
2467	106.12	101.49			4.63	119	185	Peak
2483.52	45.29	40.63	54	-8.71	4.66	119	185	Average
2483.52	57.16	52.5	74	-16.84	4.66	119	185	Peak
4934	41.85	31.59	54	-12.15	10.26	158	55	Average
4934	47.21	36.95	74	-26.79	10.26	158	55	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2467 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 13	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	93	88.36			4.64	112	221	Average
2472	103.08	98.44			4.64	112	221	Peak
2483.52	45.53	40.87	54	-8.47	4.66	112	221	Average
2483.52	61.85	57.19	74	-12.15	4.66	112	221	Peak
4944	41.72	31.37	54	-12.28	10.35	164	2	Average
4944	47.74	37.39	74	-26.26	10.35	164	2	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2472	97.28	92.64			4.64	145	185	Average
2472	104.96	100.32			4.64	145	185	Peak
2483.52	46.21	41.55	54	-7.79	4.66	145	185	Average
2483.52	62.66	58	74	-11.34	4.66	145	185	Peak
4944	41.88	31.53	54	-12.12	10.35	158	57	Average
4944	47	36.65	74	-27	10.35	158	57	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2472 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE40)

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	44.77	40.27	54	-9.23	4.5	122	230	Average
2389.83	56.11	51.61	74	-17.89	4.5	122	230	Peak
2422	98.65	94.09			4.56	122	230	Average
2422	108.49	103.93			4.56	122	230	Peak
2487.52	42.66	37.98	54	-11.34	4.68	122	230	Average
2487.52	52.35	47.67	74	-21.65	4.68	122	230	Peak
4844	41.97	31.74	54	-12.03	10.23	145	200	Average
4844	48.23	38	74	-25.77	10.23	145	200	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.92	43.26	38.76	54	-10.74	4.5	157	185	Average
2389.92	54.97	50.47	74	-19.03	4.5	157	185	Peak
2422	97.98	93.42			4.56	157	185	Average
2422	107.35	102.79			4.56	157	185	Peak
2497.2	42.41	37.74	54	-11.59	4.67	157	185	Average
2497.2	52.64	47.97	74	-21.36	4.67	157	185	Peak
4844	42.08	31.85	54	-11.92	10.23	140	339	Average
4844	47.14	36.91	74	-26.86	10.23	140	339	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	44.47	39.97	54	-9.53	4.5	120	230	Average
2389.83	54.96	50.46	74	-19.04	4.5	120	230	Peak
2437	97.58	92.99			4.59	122	230	Average
2437	107.81	103.22			4.59	122	230	Peak
2483.6	44.12	39.46	54	-9.88	4.66	120	230	Average
2483.6	54.43	49.77	74	-19.57	4.66	120	230	Peak
4874	41.94	31.73	54	-12.06	10.21	181	119	Average
4874	49.18	38.97	74	-24.82	10.21	181	119	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.57	43.22	38.73	54	-10.78	4.49	119	185	Average
2388.57	52.14	47.65	74	-21.86	4.49	119	185	Peak
2437	96.42	59.37			37.05	119	185	Average
2437	106.34	69.29			37.05	119	185	Peak
2484.08	45	40.34	54	-9	4.66	119	185	Average
2484.08	56.25	51.59	74	-17.75	4.66	119	185	Peak
4874	41.85	31.64	54	-12.15	10.21	157	209	Average
4874	47.44	37.23	74	-26.56	10.21	157	209	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.12	41.95	37.46	54	-12.05	4.49	100	221	Average
2388.12	52.7	48.21	74	-21.3	4.49	100	221	Peak
2452	98.61	94.01			4.60	100	221	Average
2452	108.89	104.29			4.60	100	221	Peak
2484.12	45.88	41.22	54	-8.12	4.66	100	221	Average
2484.12	56.18	51.52	74	-17.82	4.66	100	221	Peak
4904	41.7	31.56	54	-12.3	10.14	144	34	Average
4904	48.45	38.31	74	-25.55	10.14	144	34	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2386.14	40.37	35.88	54	-13.63	4.49	141	185	Average
2386.14	51.69	47.2	74	-22.31	4.49	141	185	Peak
2452	98.93	94.33			4.60	141	185	Average
2452	109.31	104.71			4.60	141	185	Peak
2483.72	45.75	41.09	54	-8.25	4.66	141	185	Average
2483.72	56.16	51.5	74	-17.84	4.66	141	185	Peak
4904	41.89	31.75	54	-12.11	10.14	157	77	Average
4904	47.61	37.47	74	-26.39	10.14	157	77	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 10	**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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2388.75	41.47	36.98	54	-12.53	4.49	100	220	Average
2388.75	51.72	47.23	74	-22.28	4.49	100	220	Peak
2457	90.83	86.21			4.62	100	220	Average
2457	100.92	96.3			4.62	100	220	Peak
2483.52	51.98	47.32	54	-2.02	4.66	100	220	Average
2483.52	61.49	56.83	74	-12.51	4.66	100	220	Peak
4914	41.95	31.8	54	-12.05	10.15	118	24	Average
4914	47.61	37.46	74	-26.39	10.15	118	24	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2389.83	40.32	35.82	54	-13.68	4.5	141	185	Average
2389.83	51.47	46.97	74	-22.53	4.5	141	185	Peak
2457	90.82	86.2			4.62	141	185	Average
2457	100.38	95.76			4.62	141	185	Peak
2483.52	50.63	45.97	54	-3.37	4.66	141	185	Average
2483.52	60.34	55.68	74	-13.66	4.66	141	185	Peak
4914	41.74	31.59	54	-12.26	10.15	154	225	Average
4914	47.75	37.6	74	-26.25	10.15	154	225	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2457 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2385.6	40.36	35.87	54	-13.64	4.49	100	220	Average
2385.6	51.5	47.01	74	-22.5	4.49	100	220	Peak
2462	92.47	87.85			4.62	100	220	Average
2462	99.16	94.54			4.62	100	220	Peak
2485.44	50.09	45.43	54	-3.91	4.66	100	220	Average
2485.44	68.16	63.5	74	-5.84	4.66	100	220	Peak
4924	41.91	31.66	54	-12.09	10.25	108	5	Average
4924	49.47	39.22	74	-24.53	10.25	108	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2380.56	40.22	35.75	54	-13.78	4.47	141	185	Average
2380.56	51.6	47.13	74	-22.4	4.47	141	185	Peak
2462	93.58	88.96			4.62	141	185	Average
2462	100.47	95.85			4.62	141	185	Peak
2485.8	52.87	48.21	54	-1.13	4.66	242	218	Average
2485.8	69.64	64.98	74	-4.36	4.66	242	218	Peak
4924	42.01	31.76	54	-11.99	10.25	154	166	Average
4924	47.6	37.35	74	-26.4	10.25	154	166	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

9 kHz ~ 30 MHz Data:

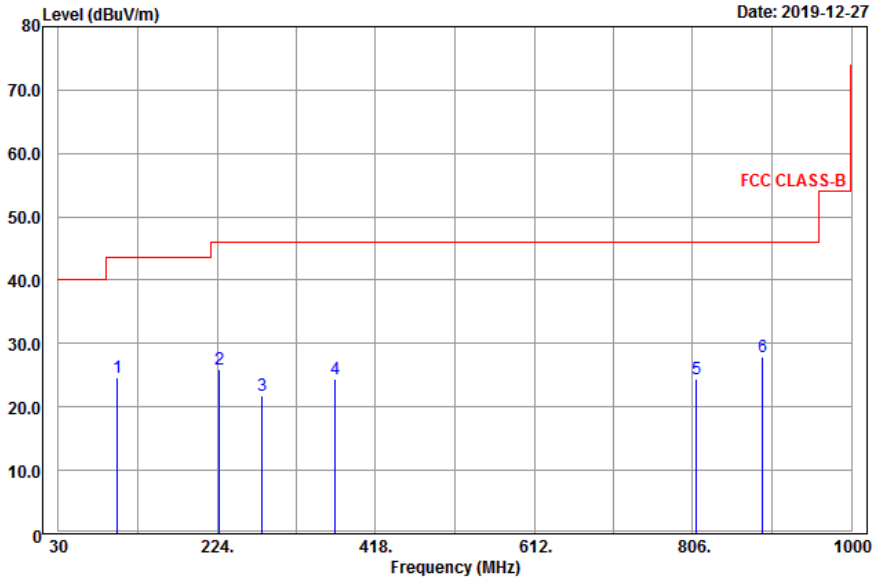
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

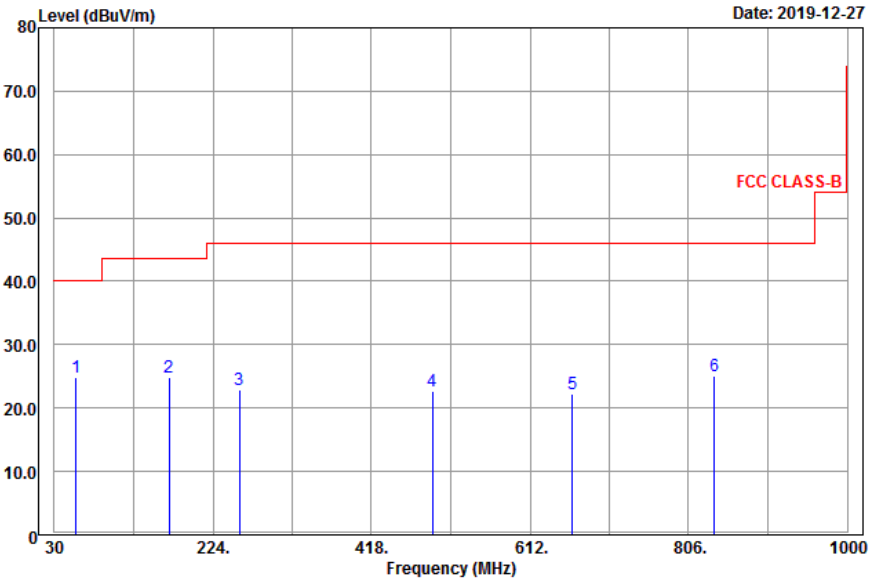
802.11ax (HE40)

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**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**	Karl Lee

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
102.36	24.6	41.75	43.5	-18.9	-17.15	105	24	Peak
226.56	25.99	43.52	46	-20.01	-17.53	165	252	Peak
278.94	21.77	38.21	46	-24.23	-16.44	198	85	Peak
368.6	24.38	38.8	46	-21.62	-14.42	164	185	Peak
811	24.49	31.95	46	-21.51	-7.46	111	74	Peak
891.5	27.95	34	46	-18.05	-6.05	105	185	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Limit (dBuV/m)**	**Margin (dB)**	**Factor (dB/m)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
56.19	24.76	40.39	40	-15.24	-15.63	119	32	Peak
170.4	24.89	45.17	43.5	-18.61	-20.28	148	188	Peak
256.8	22.81	39.52	46	-23.19	-16.71	164	202	Peak
492.5	22.62	35.07	46	-23.38	-12.45	149	125	Peak
664	22.33	32.13	46	-23.67	-9.8	160	320	Peak
837.6	25.01	31.99	46	-20.99	-6.98	174	176	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value.
2. The emission levels of other frequencies were very low against the limit.

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	ESR3	102412	Feb. 14, 2019	Feb. 13, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 30, 2019	Jan. 29, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2019	Aug. 12, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	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 2.
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

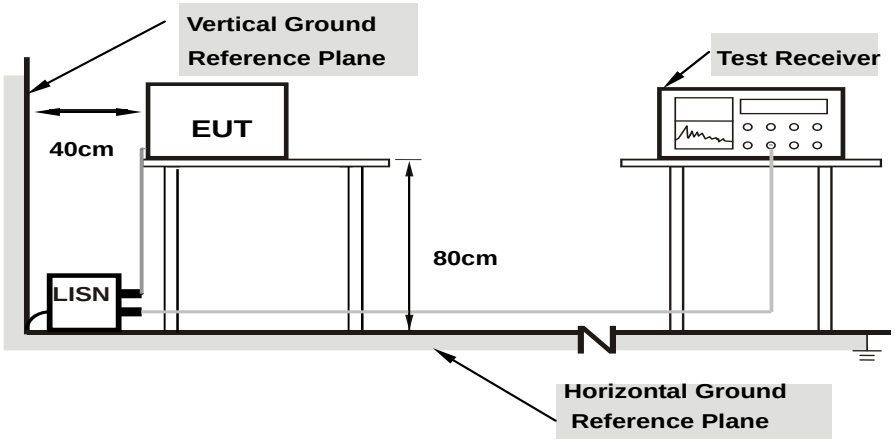
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

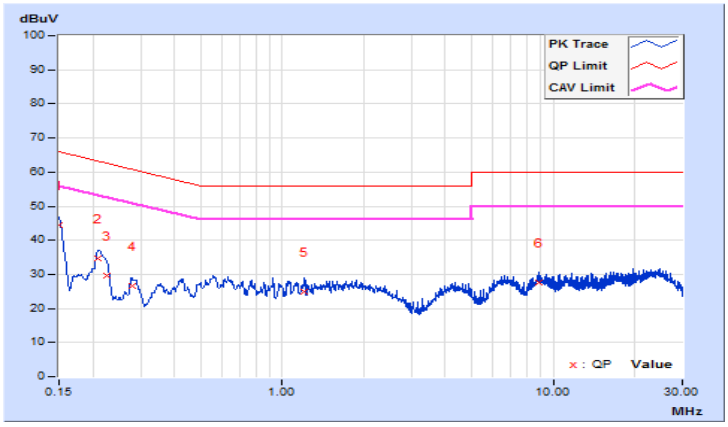
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Jisyong Wang	Test Date	2020/1/5

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	**0.15000**	**10.11**	**34.46**	**32.67**	**44.57**	**42.78**	**66.00**	**56.00**	**-21.43**	**-13.22**
2	0.20791	10.12	24.67	22.72	34.79	32.84	63.29	53.29	-28.50	-20.45
3	0.22425	10.12	19.46	18.08	29.58	28.20	62.66	52.66	-33.08	-24.46
4	0.27797	10.14	16.44	15.17	26.58	25.31	60.88	50.88	-34.30	-25.57
5	1.21200	10.23	14.66	12.68	24.89	22.91	56.00	46.00	-31.11	-23.09
6	8.86875	10.41	17.15	13.55	27.56	23.96	60.00	50.00	-32.44	-26.04

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

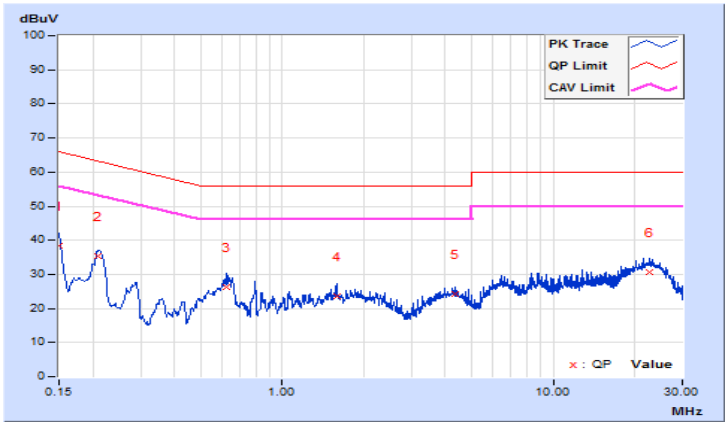


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25℃, 65%RH
Tested by	Jisyong Wang	Test Date	2020/1/5

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	0.15000	10.16	28.07	21.97	38.23	32.13	66.00	56.00	-27.77	-23.87
2	0.20846	10.18	25.14	23.79	35.32	33.97	63.27	53.27	-27.95	-19.30
3	0.62475	10.24	16.01	15.32	26.25	25.56	56.00	46.00	-29.75	-20.44
4	1.58775	10.30	13.29	12.03	23.59	22.33	56.00	46.00	-32.41	-23.67
5	4.36650	10.43	13.70	11.07	24.13	21.50	56.00	46.00	-31.87	-24.50
6	22.62975	10.72	19.78	15.61	30.50	26.33	60.00	50.00	-29.50	-23.67

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

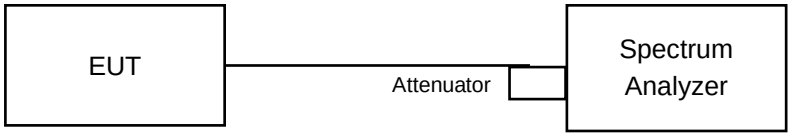


4.3 6 dB Bandwidth Measurement

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
1	2412	9.08	0.5	Pass
6	2437	9.07	0.5	Pass
11	2462	8.58	0.5	Pass
12	2467	9.07	0.5	Pass
13	2472	9.07	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.39	0.5	Pass
6	2437	16.37	0.5	Pass
11	2462	16.39	0.5	Pass
12	2467	16.38	0.5	Pass
13	2472	16.38	0.5	Pass

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.62	17.63	0.5	Pass
6	2437	17.65	17.65	0.5	Pass
11	2462	17.64	17.63	0.5	Pass
12	2467	17.63	17.62	0.5	Pass
13	2472	17.63	17.66	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.41	36.44	0.5	Pass
6	2437	36.42	36.44	0.5	Pass
9	2452	36.45	36.49	0.5	Pass
10	2457	36.45	36.44	0.5	Pass
11	2462	36.41	36.47	0.5	Pass

802.11ax (HE20)

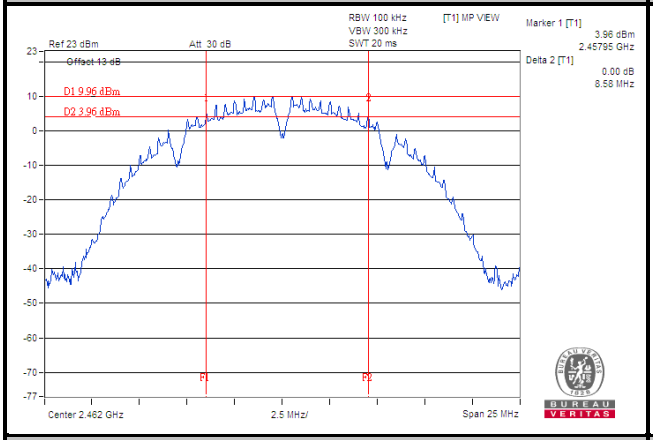
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.92	18.85	0.5	Pass
6	2437	18.90	18.89	0.5	Pass
11	2462	18.91	18.86	0.5	Pass
12	2467	18.92	18.87	0.5	Pass
13	2472	18.74	18.54	0.5	Pass

802.11ax (HE40)

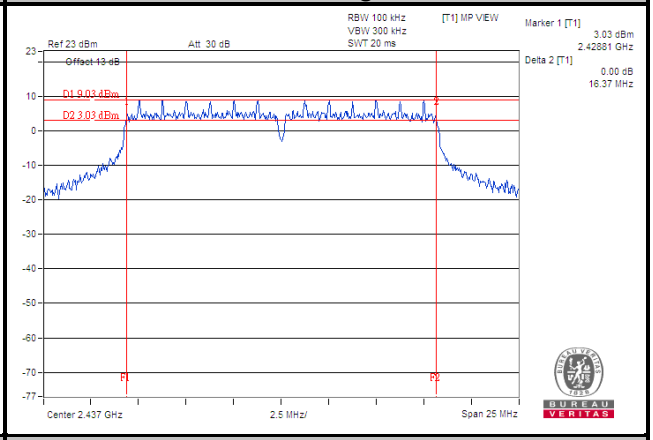
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	37.70	37.84	0.5	Pass
6	2437	37.84	37.92	0.5	Pass
9	2452	37.88	37.77	0.5	Pass
10	2457	38.04	37.91	0.5	Pass
11	2462	37.56	36.47	0.5	Pass

Spectrum Plot of Worst Value

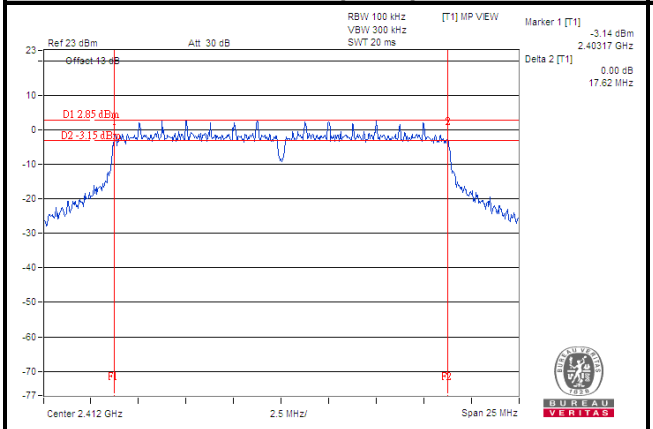
802.11b



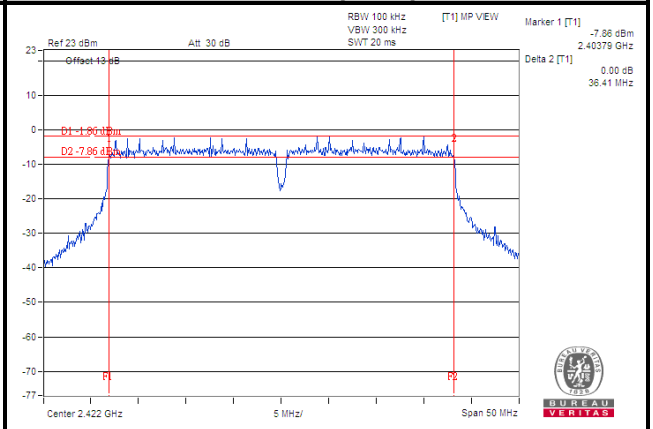
802.11g



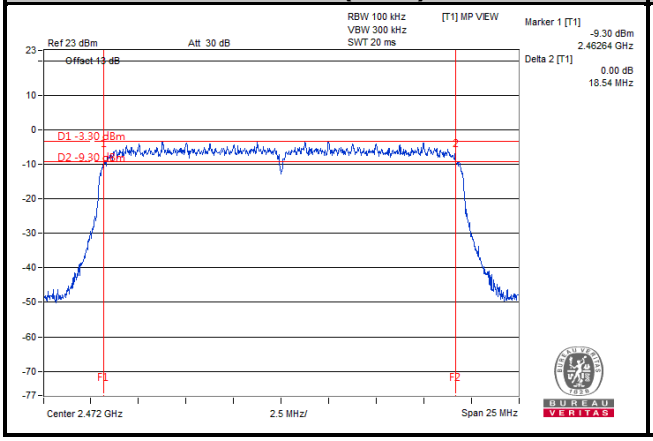
802.11n (HT20)



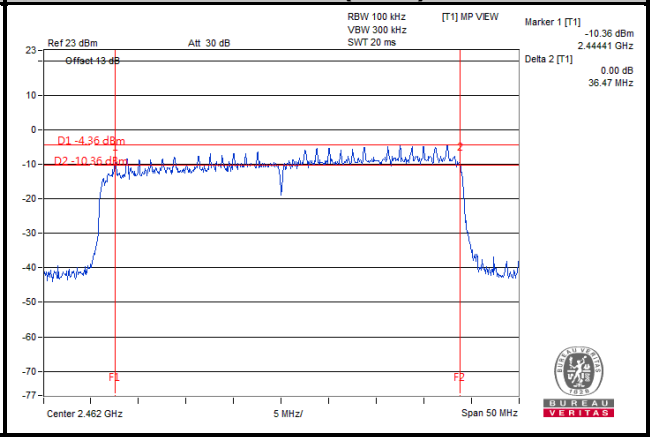
802.11n (HT40)



802.11ax (HE20)

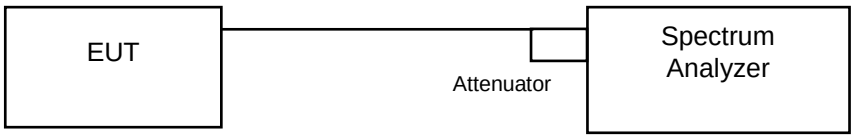


802.11ax (HE40)



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
1	2412	13.66	Pass
6	2437	13.56	Pass
11	2462	13.56	Pass
12	2467	13.56	Pass
13	2472	13.46	Pass

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	17.21	Pass
6	2437	17.40	Pass
11	2462	17.02	Pass
12	2467	17.02	Pass
13	2472	16.54	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	18.27	18.17	Pass
6	2437	18.26	18.08	Pass
11	2462	18.07	17.98	Pass
12	2467	18.07	18.08	Pass
13	2472	17.70	17.70	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	36.83	36.73	Pass
6	2437	36.83	36.74	Pass
9	2452	36.74	36.83	Pass
10	2457	36.83	36.73	Pass
11	2462	36.44	36.44	Pass

802.11ax (HE20)

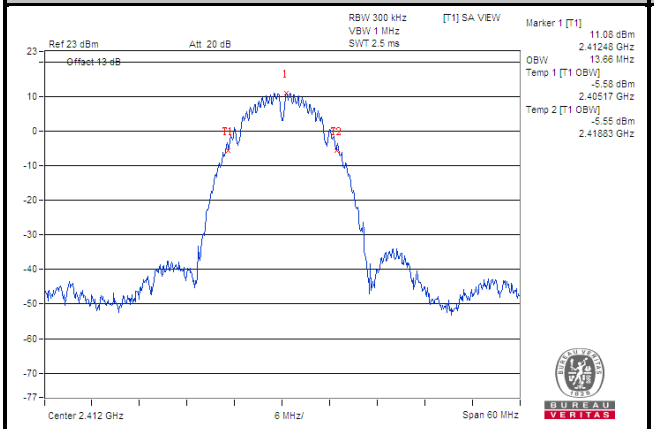
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	19.20	19.14	Pass
6	2437	19.20	19.14	Pass
11	2462	19.14	19.20	Pass
12	2467	19.20	19.14	Pass
13	2472	18.72	18.78	Pass

802.11ax (HE40)

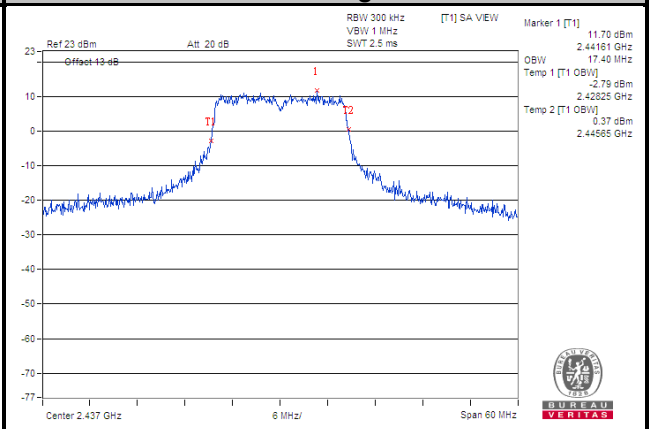
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	38.22	38.28	Pass
6	2437	38.22	38.16	Pass
9	2452	38.16	38.10	Pass
10	2457	38.22	38.22	Pass
11	2462	37.79	37.78	Pass

Spectrum Plot of Worst Value

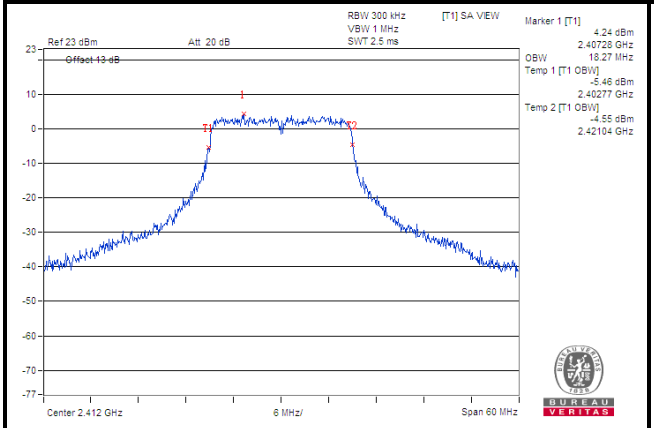
802.11b



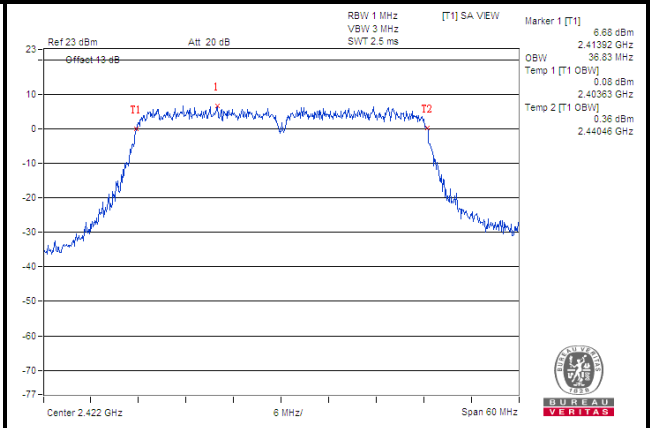
802.11g



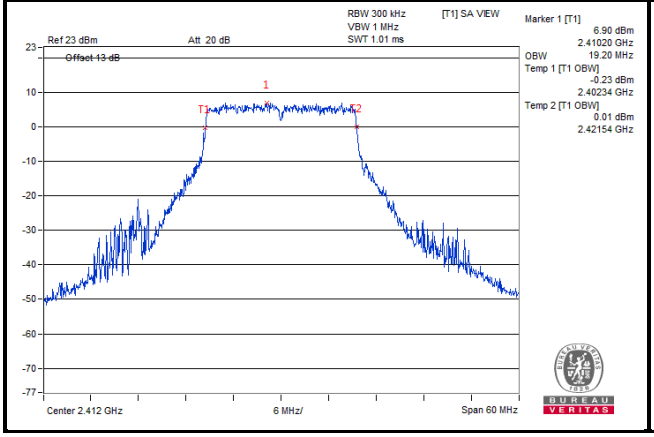
802.11n (HT20)



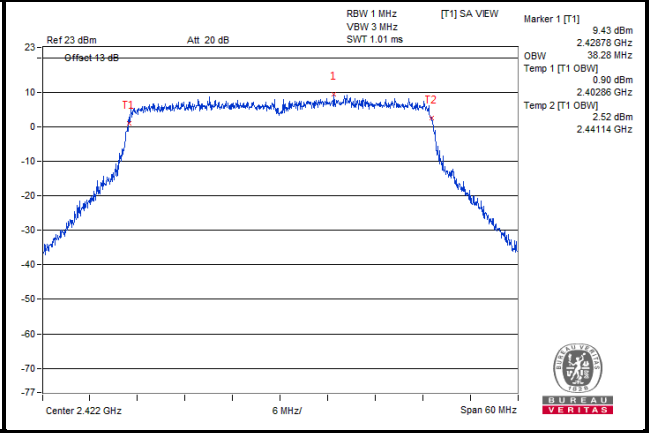
802.11n (HT40)



802.11ax (HE20)



802.11ax (HE40)



4.5 Conducted Output Power Measurement

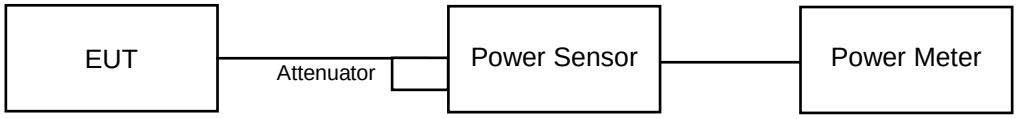
4.5.1 Limits of Conducted Output Power Measurement

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

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

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

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	153.109	21.85	30	Pass
6	2437	223.357	23.49	30	Pass
11	2462	128.529	21.09	30	Pass
12	2467	97.499	19.89	30	Pass
13	2472	51.88	17.15	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	168.655	22.27	30	Pass
6	2437	273.527	24.37	30	Pass
11	2462	108.143	20.34	30	Pass
12	2467	73.282	18.65	30	Pass
13	2472	149.279	21.74	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.87	20.92	245.775	23.91	30	Pass
6	2437	23.41	24.10	476.32	26.78	30	Pass
11	2462	19.38	19.73	180.668	22.57	30	Pass
12	2467	17.12	17.30	105.226	20.22	30	Pass
13	2472	18.67	17.55	130.506	21.16	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	20.42	19.81	205.873	23.14	30	Pass
6	2437	20.80	20.24	225.908	23.54	30	Pass
9	2452	19.99	20.40	209.418	23.21	30	Pass
10	2457	13.00	13.24	41.039	16.13	30	Pass
11	2462	20.26	19.92	204.345	23.10	30	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.94	20.98	249.479	23.97	30	Pass
6	2437	21.45	22.24	307.131	24.87	30	Pass
11	2462	19.32	19.53	175.250	22.44	30	Pass
12	2467	16.93	15.51	84.880	19.29	30	Pass
13	2472	18.12	18.80	140.721	21.48	30	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	21.94	19.43	244.015	23.87	30	Pass
6	2437	20.89	20.70	240.234	23.81	30	Pass
9	2452	20.52	20.88	235.182	23.71	30	Pass
10	2457	12.89	13.13	40.013	16.02	30	Pass
11	2462	16.81	19.41	135.270	21.31	30	Pass

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 = peak.
f. Sweep time = auto couple.
g. Trace mode = max hold.
h. Allow trace to fully stabilize.
i. Use the peak marker function to determine the maximum amplitude level within the RBW.

4.6.5 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

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-4.32	8	Pass
6	2437	-3.31	8	Pass
11	2462	-5.56	8	Pass
12	2467	-6.55	8	Pass
13	2472	-9.79	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-8.71	8	Pass
6	2437	-6.26	8	Pass
11	2462	-11.06	8	Pass
12	2467	-13.93	8	Pass
13	2472	-15.00	8	Pass

802.11n (HT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-12.31	3.01	-9.30	8	Pass
	6	2437	-9.29	3.01	-6.28	8	Pass
	11	2462	-13.48	3.01	-10.47	8	Pass
	12	2467	-15.31	3.01	-12.30	8	Pass
	13	2472	-20.60	3.01	-17.59	8	Pass
1	1	2412	-12.43	3.01	-9.42	8	Pass
	6	2437	-8.95	3.01	-5.94	8	Pass
	11	2462	-12.45	3.01	-9.44	8	Pass
	12	2467	-15.21	3.01	-12.20	8	Pass
	13	2472	-19.24	3.01	-16.23	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}]$ = 3.64 dBi < 6 dBi, so the limit no need to be reduced.
2. 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.

802.11n (HT40)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-17.84	3.01	-14.83	8	Pass
	6	2437	-17.31	3.01	-14.30	8	Pass
	9	2452	-18.48	3.01	-15.47	8	Pass
	10	2457	-24.26	3.01	-21.25	8	Pass
	11	2462	-22.35	3.01	-19.34	8	Pass
1	3	2422	-17.78	3.01	-14.77	8	Pass
	6	2437	-16.91	3.01	-13.90	8	Pass
	9	2452	-17.38	3.01	-14.37	8	Pass
	10	2457	-21.77	3.01	-18.76	8	Pass
	11	2462	-21.24	3.01	-18.23	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 3.64$ dBi < 6 dBi, so the limit no need to be reduced.
2. 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.

802.11ax (HE20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-11.93	3.01	-8.92	8	Pass
	6	2437	-11.24	3.01	-8.23	8	Pass
	11	2462	-13.06	3.01	-10.05	8	Pass
	12	2467	-15.29	3.01	-12.28	8	Pass
	13	2472	-19.10	3.01	-16.09	8	Pass
1	1	2412	-11.01	3.01	-8.00	8	Pass
	6	2437	-11.22	3.01	-8.21	8	Pass
	11	2462	-13.19	3.01	-10.18	8	Pass
	12	2467	-16.24	3.01	-13.23	8	Pass
	13	2472	-18.11	3.01	-15.10	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 3.64$ dBi < 6 dBi, so the limit no need to be reduced.
2. 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.

802.11ax (HE40)

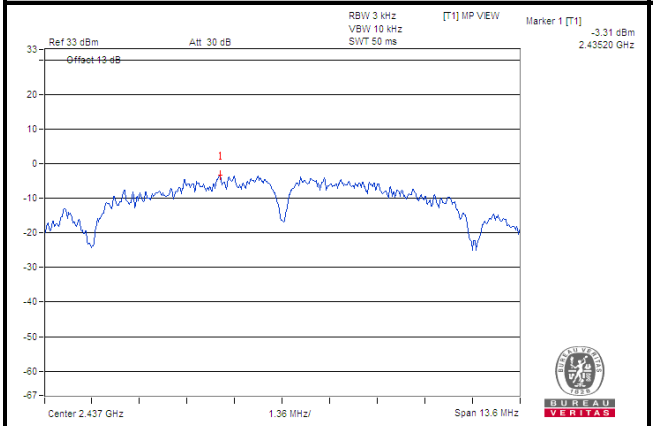
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-16.07	3.01	-13.06	8	Pass
	6	2437	-17.27	3.01	-14.26	8	Pass
	9	2452	-17.22	3.01	-14.21	8	Pass
	10	2457	-24.26	3.01	-21.25	8	Pass
	11	2462	-23.72	3.01	-20.71	8	Pass
1	3	2422	-17.72	3.01	-14.71	8	Pass
	6	2437	-16.88	3.01	-13.87	8	Pass
	9	2452	-16.73	3.01	-13.72	8	Pass
	10	2457	-23.81	3.01	-20.80	8	Pass
	11	2462	-19.96	3.01	-16.95	8	Pass

NOTE:

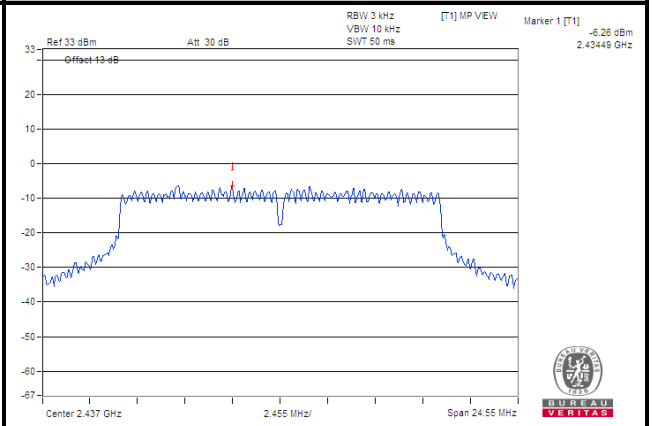
1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots. + 10^{GN/20})^2 / N_{ANT}] = 3.64$ dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density, Measure and add 10 log (N_{ANT}) dB.

Spectrum Plot of Worst Value

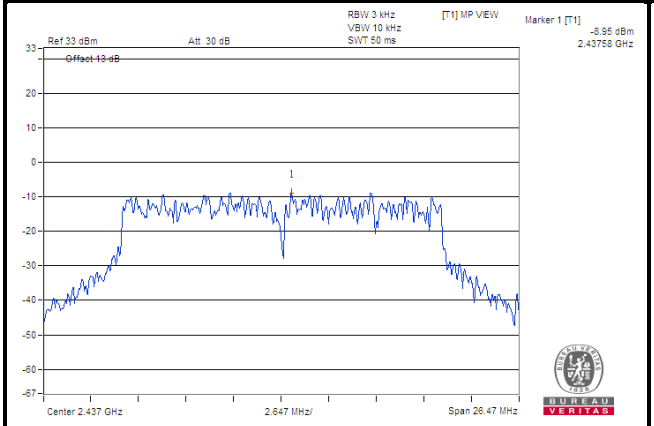
802.11b



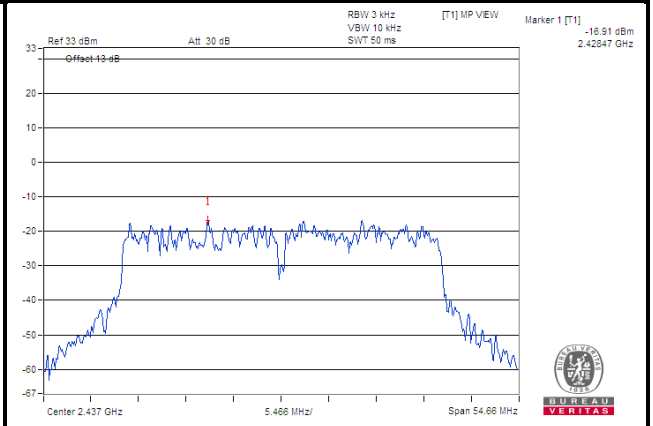
802.11g



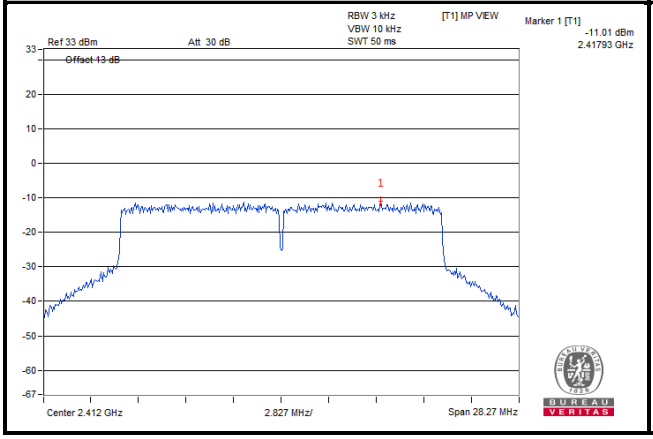
802.11n (HT20)



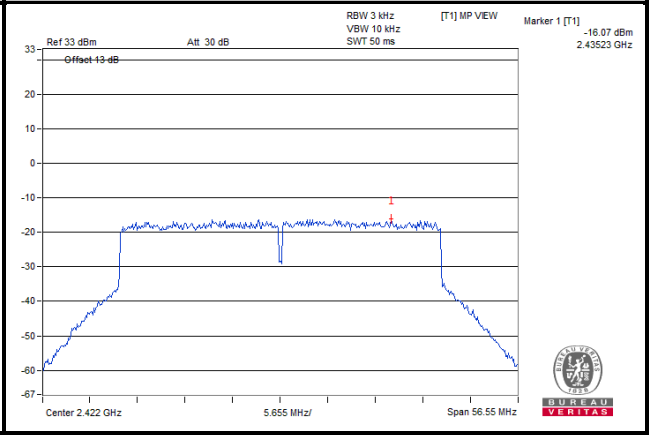
802.11n (HT40)



802.11ax (HE20)



802.11ax (HE40)

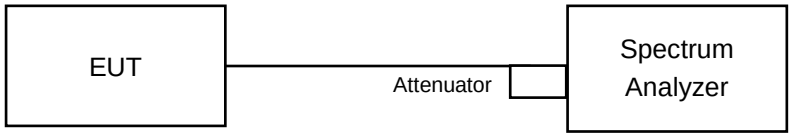


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

Below -20 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

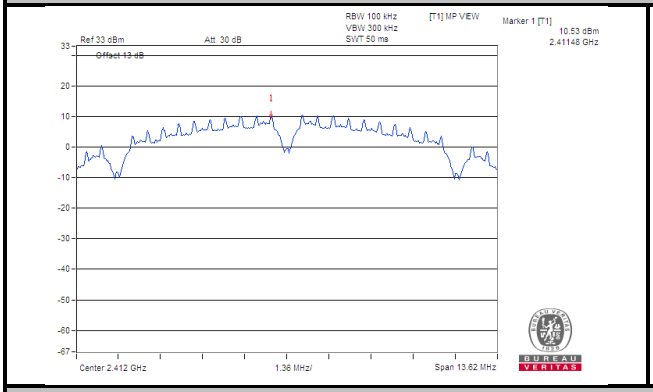
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

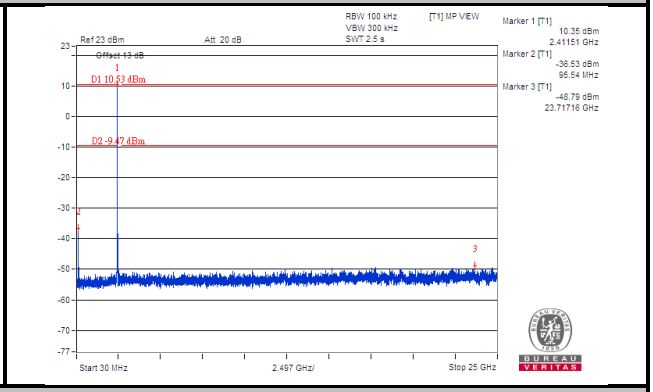
4.7.7 Test Results

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

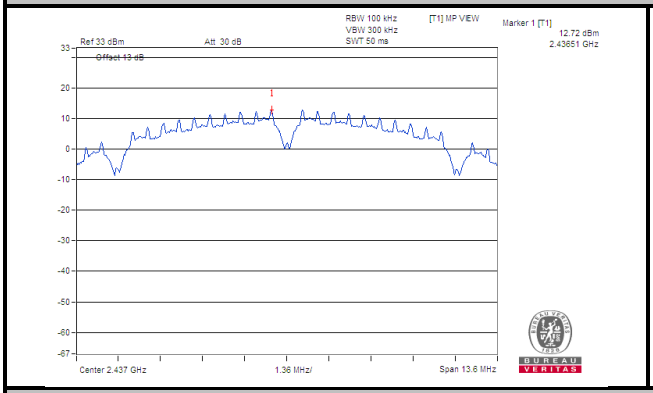
802.11b

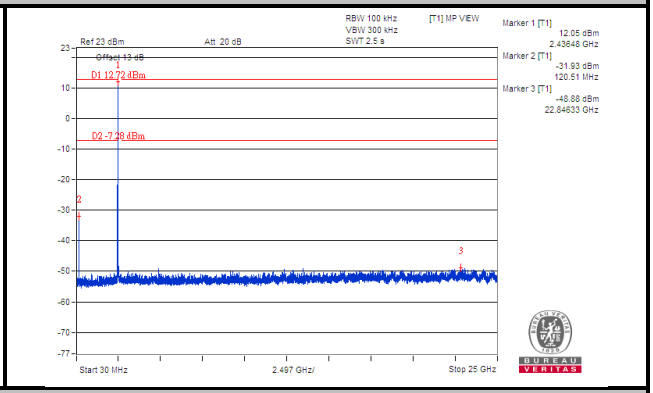
Ch 1



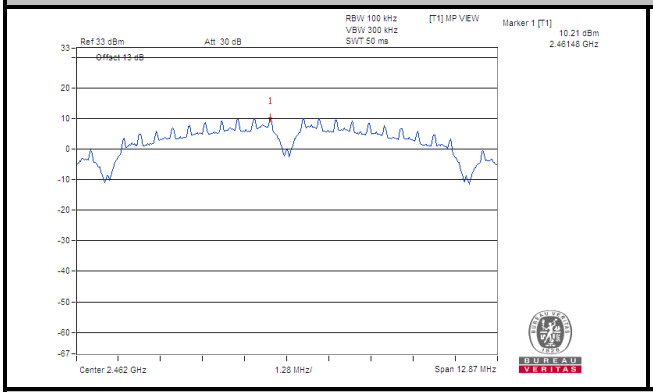


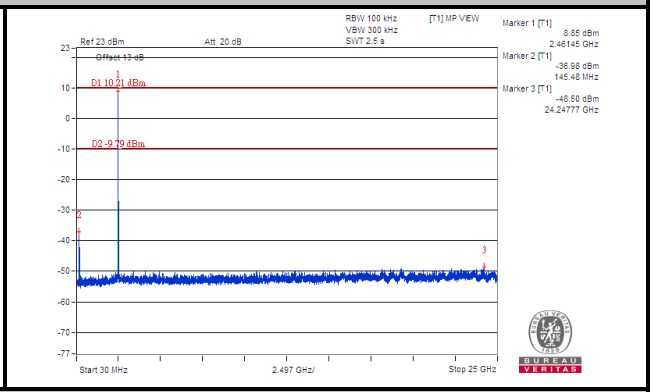
Ch 6



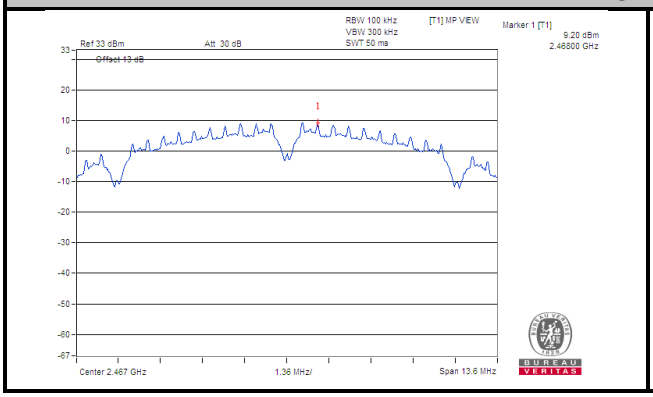


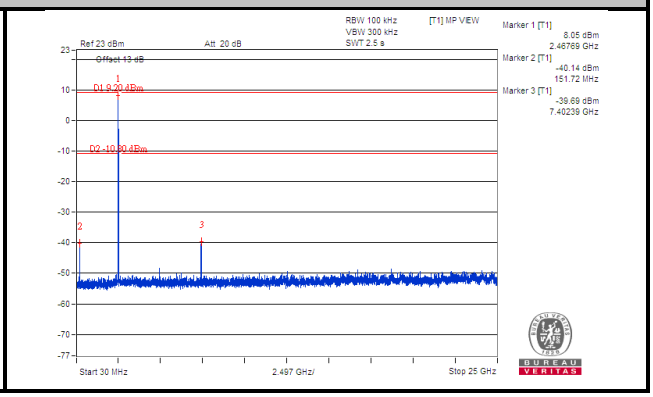
Ch 11



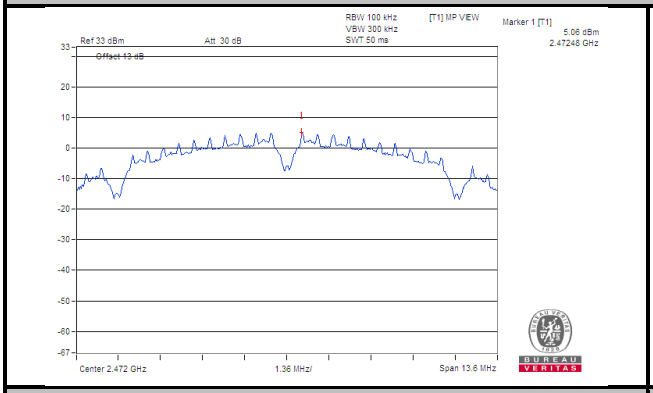


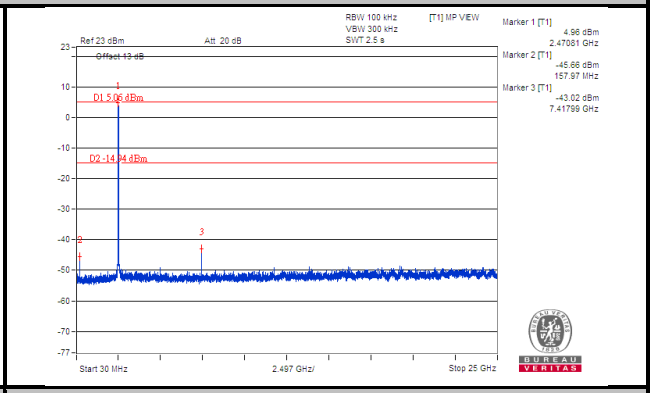
Ch 12



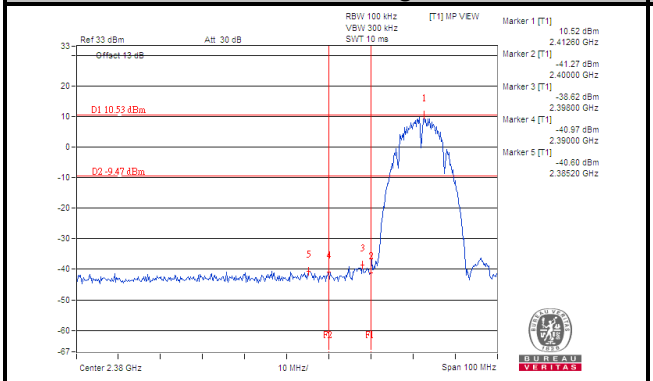


Ch 13

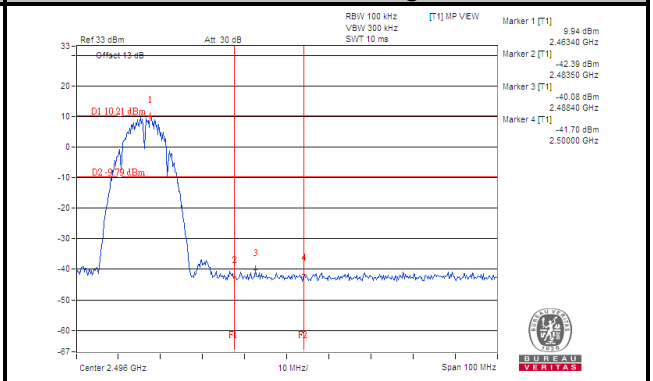




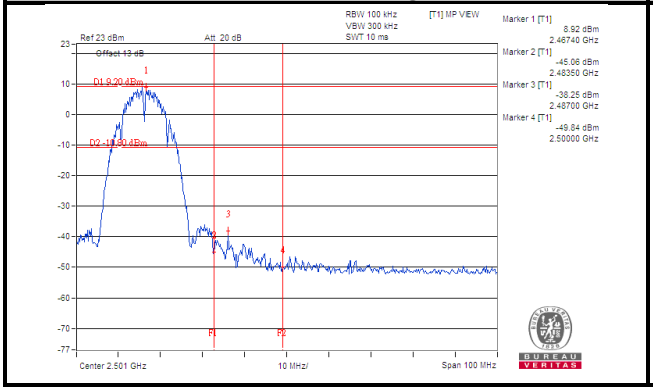
Ch 1 Band Edge



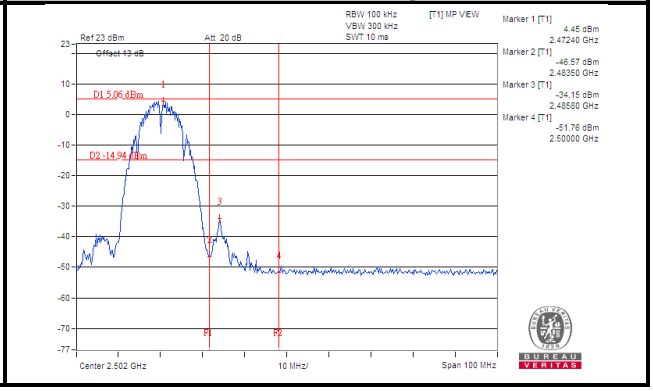
Ch 11 Band Edge



Ch 12 Band Edge

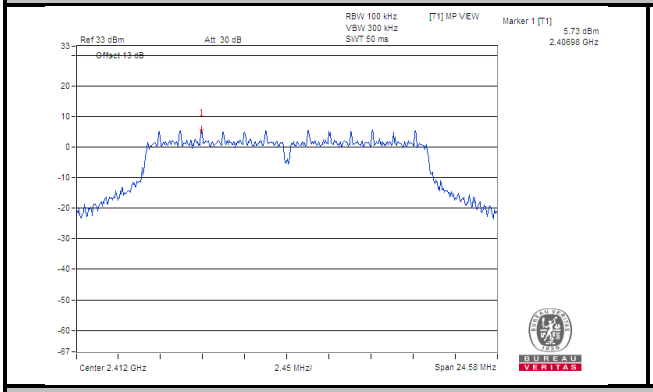


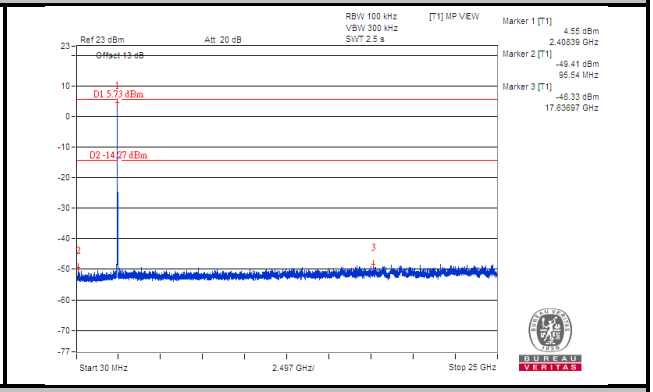
Ch 13 Band Edge



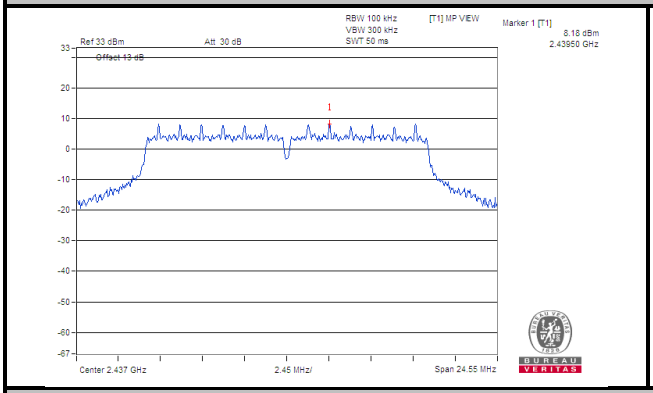
802.11g

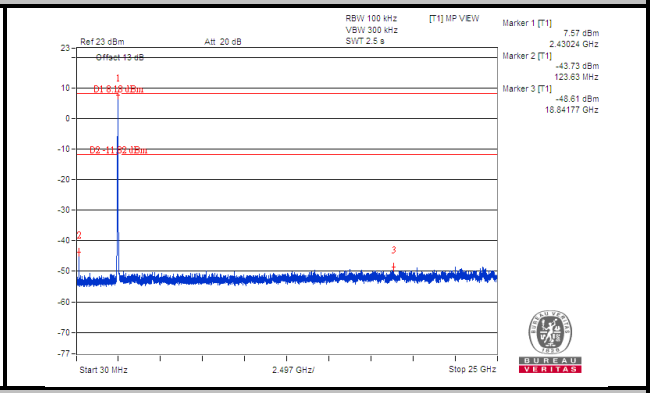
Ch 1



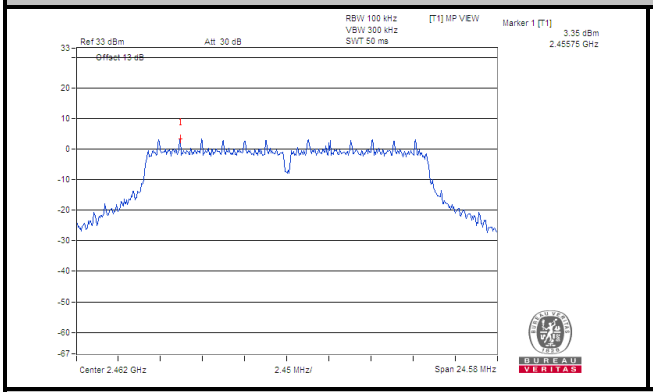


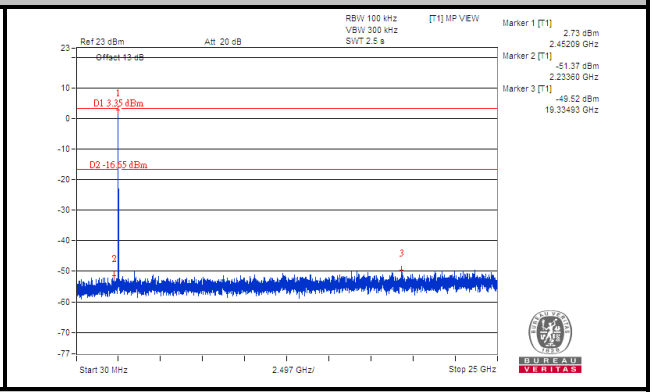
Ch 6



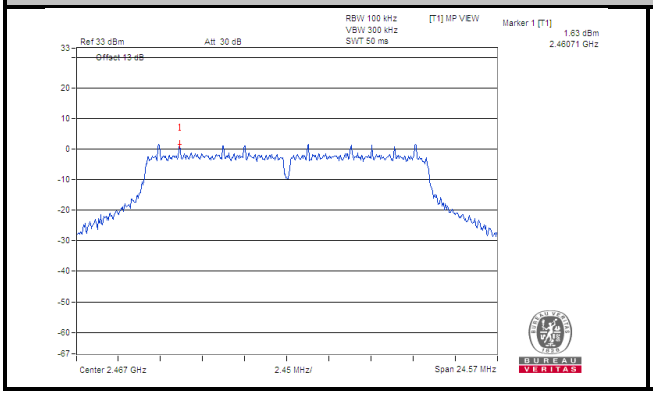


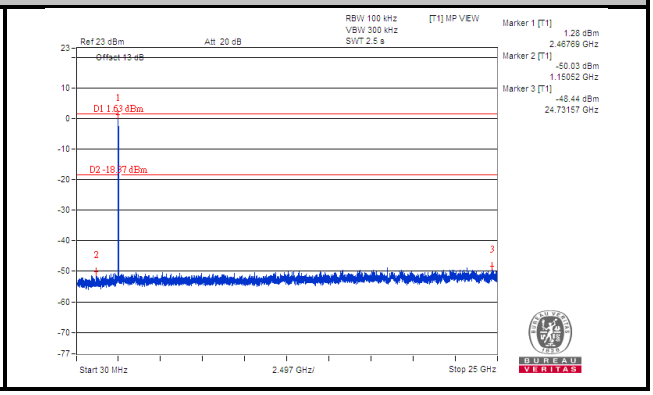
Ch 11



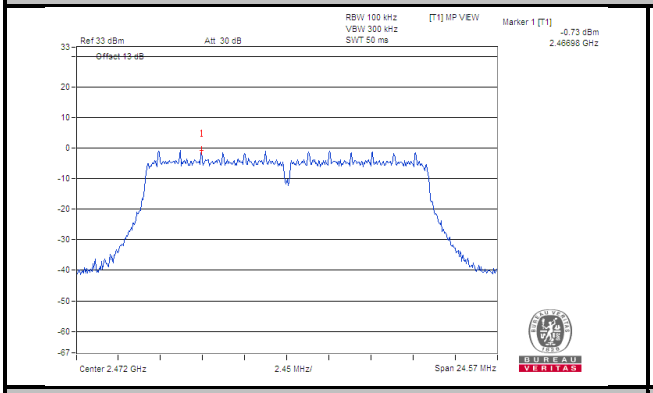


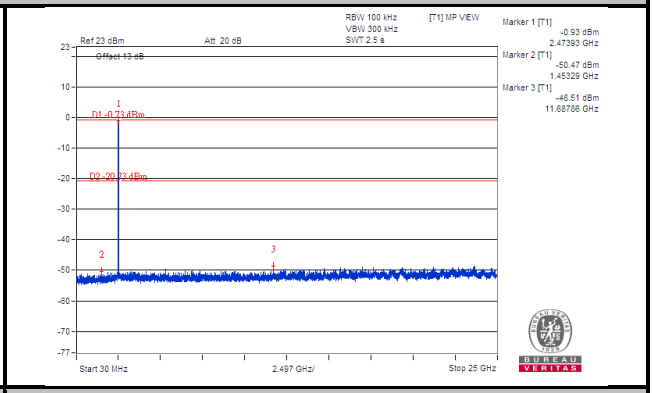
Ch 12



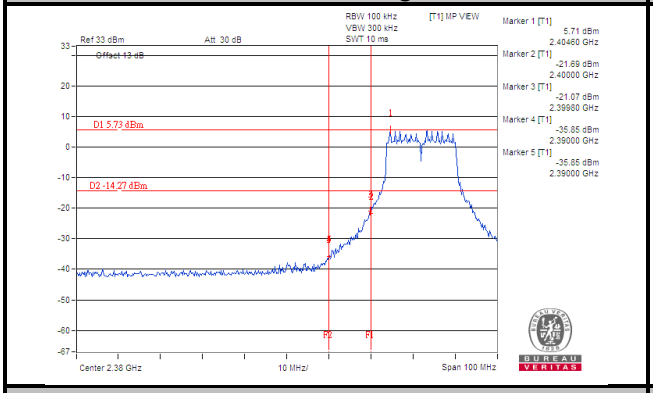


Ch 13

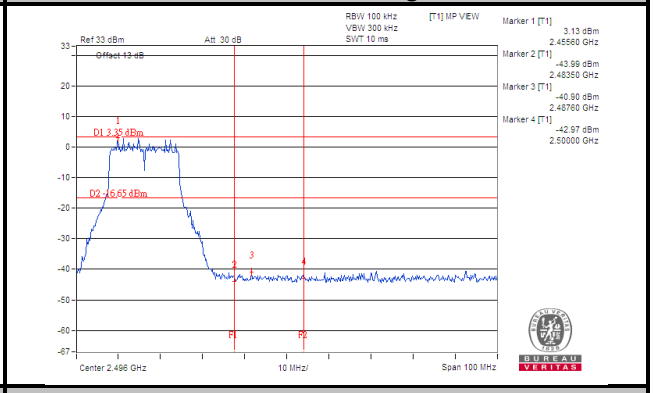




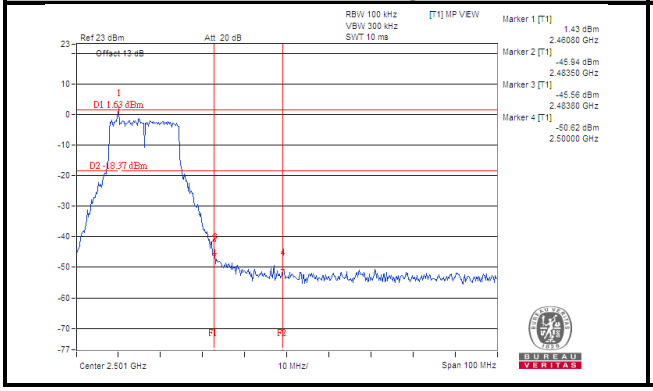
Ch 1 Band Edge



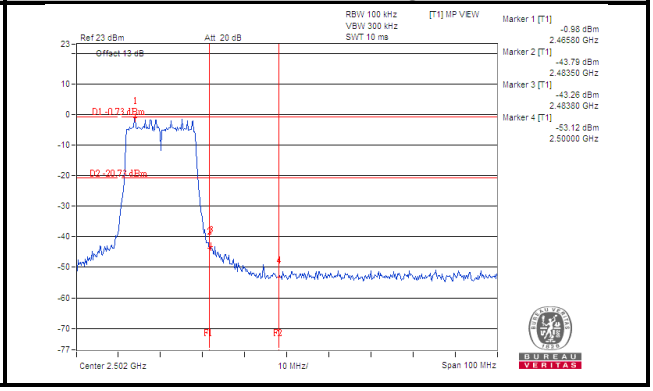
Ch 11 Band Edge



Ch 12 Band Edge



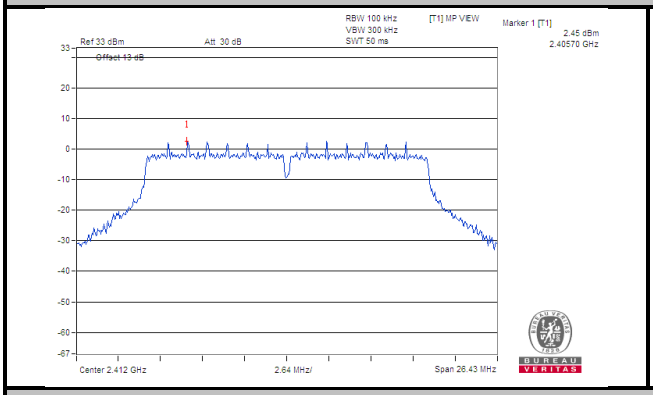
Ch 13 Band Edge

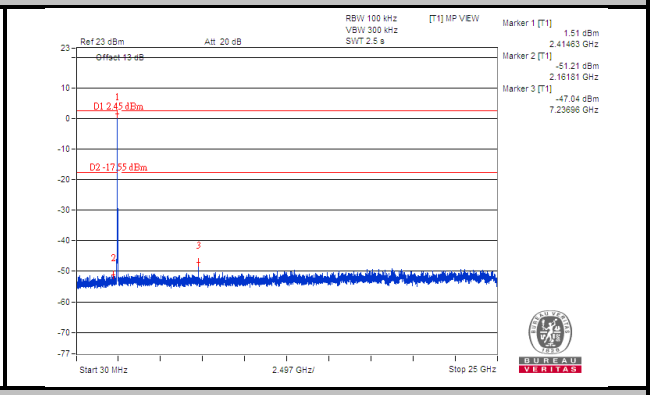


802.11n (HT20)

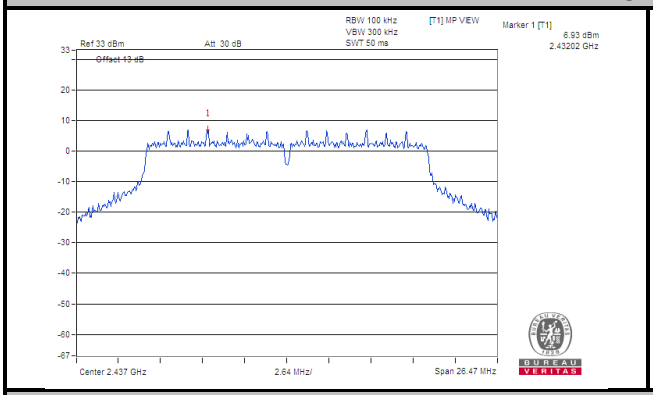
CHAIN 0

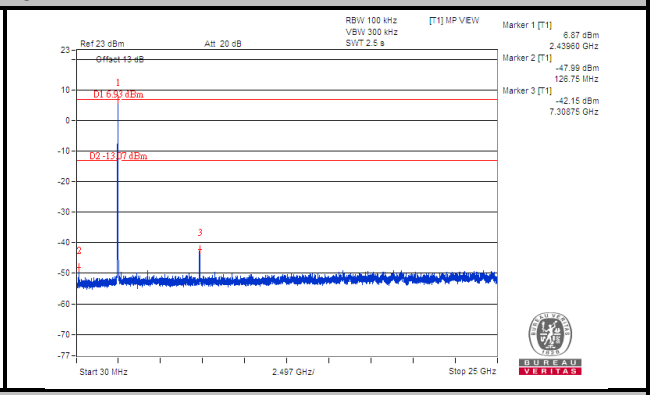
Ch 1



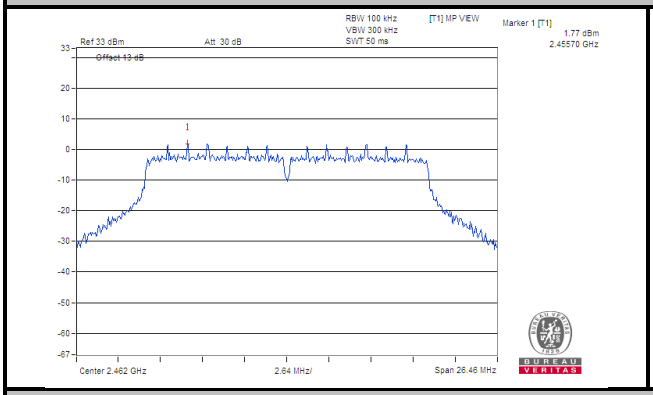


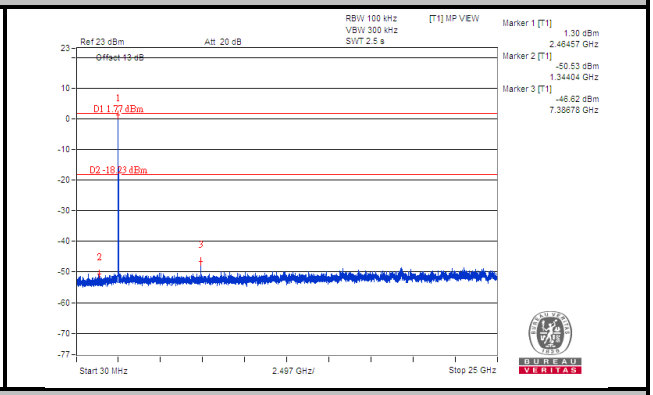
Ch 6



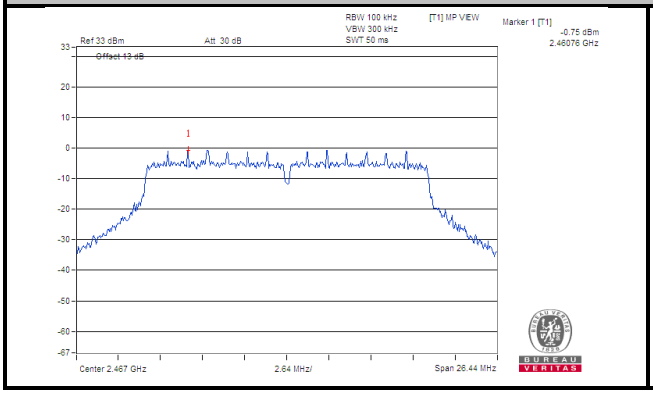


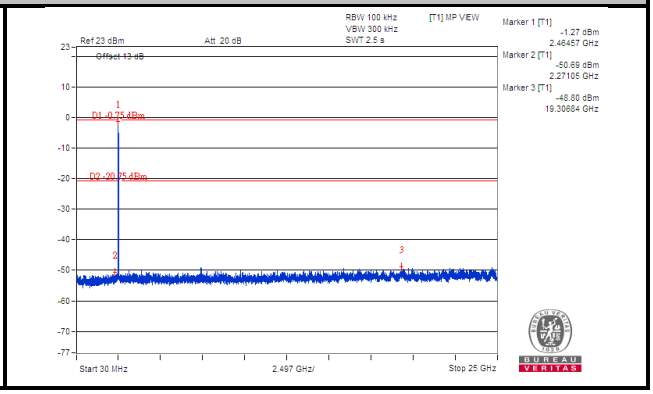
Ch 11



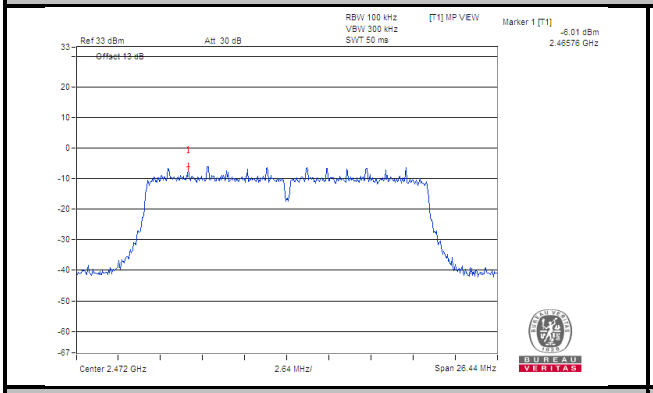


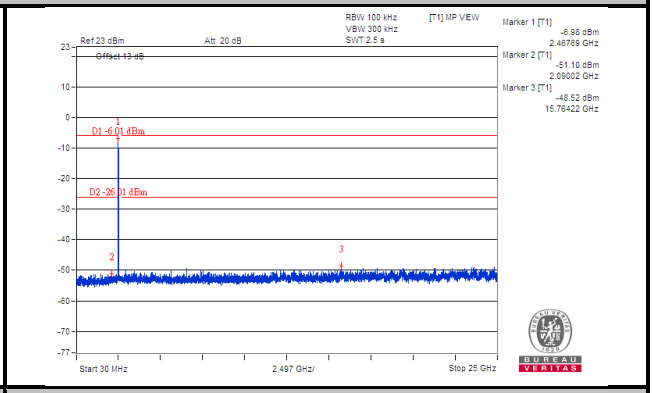
Ch 12



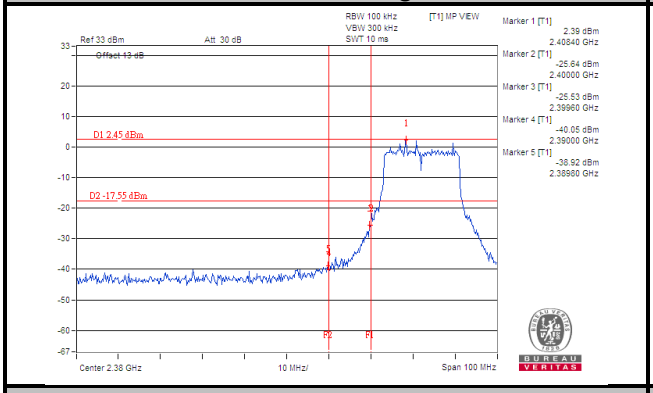


Ch 13

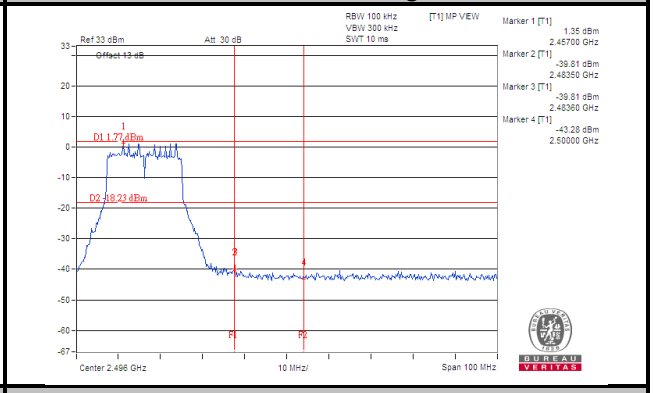




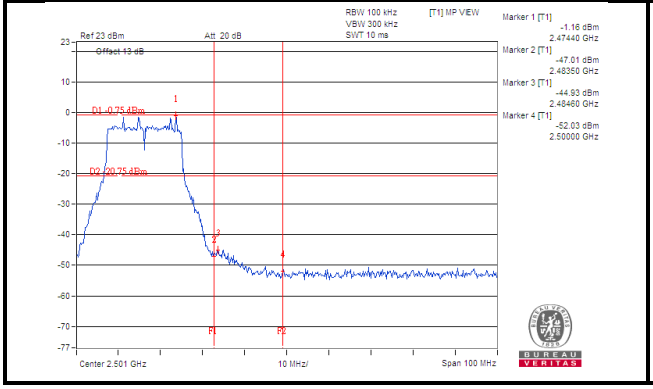
Ch 1 Band Edge



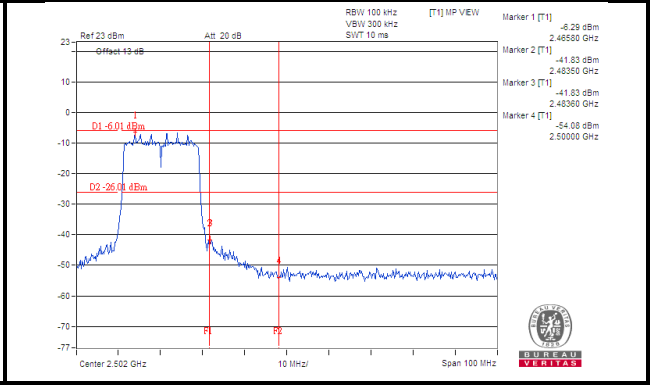
Ch 11 Band Edge



Ch 12 Band Edge

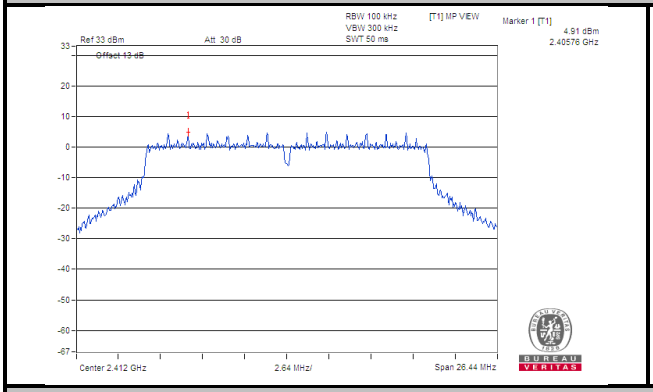


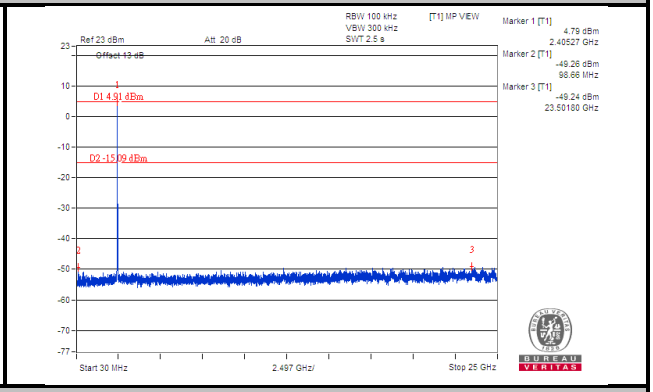
Ch 13 Band Edge



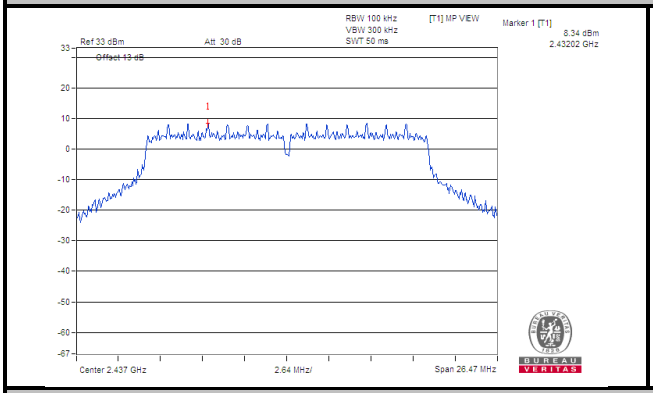
CHAIN 1

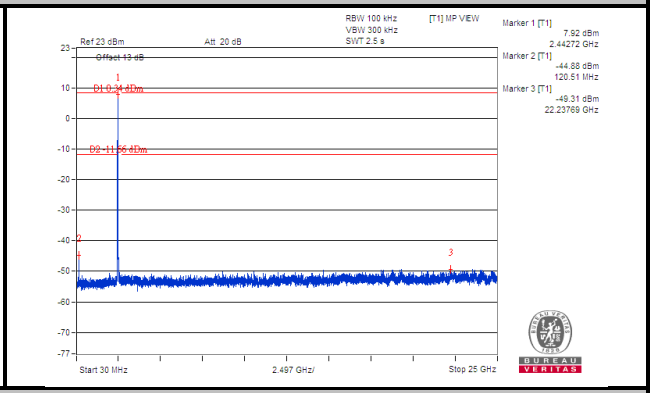
Ch 1



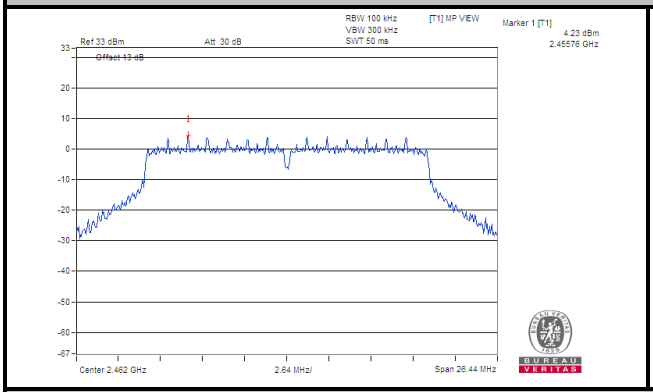


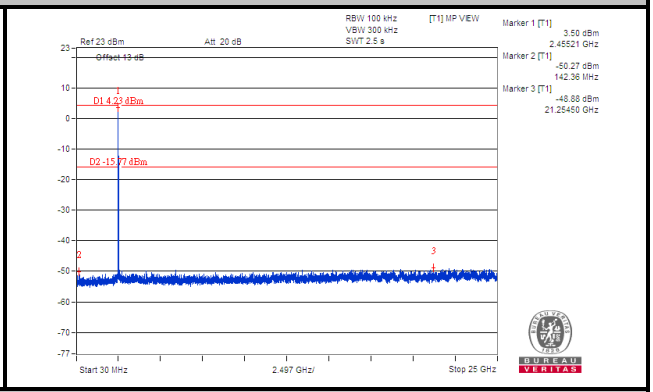
Ch 6



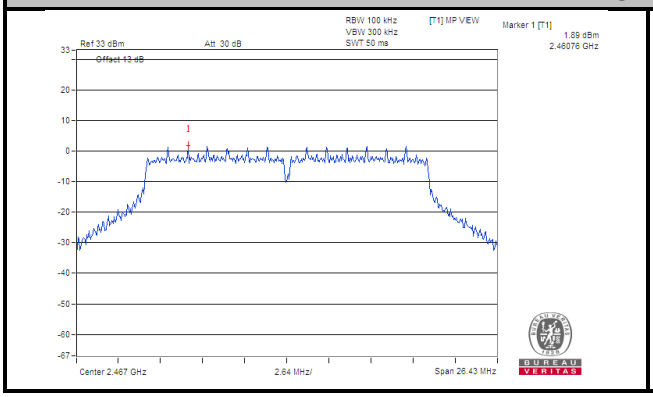


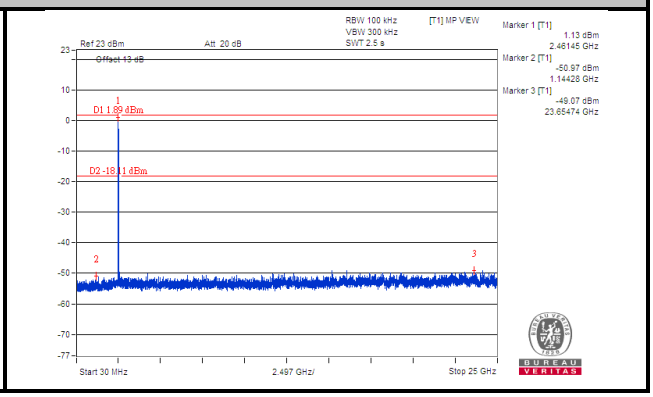
Ch 11



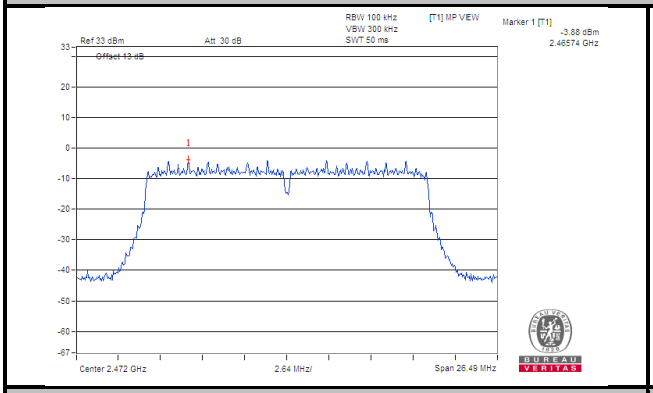


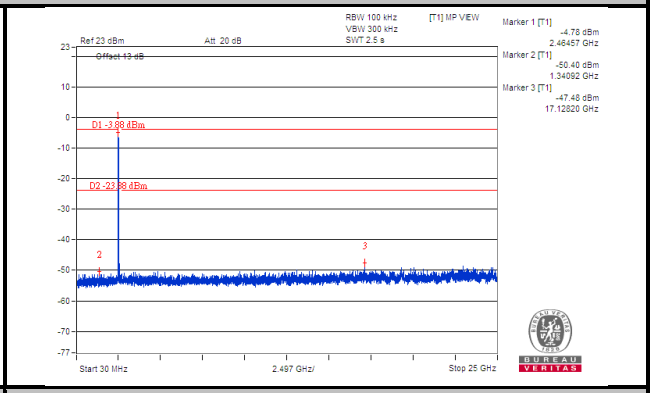
Ch 12



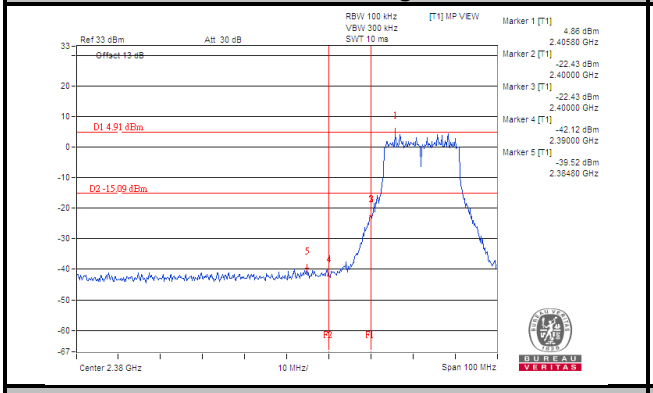


Ch 13

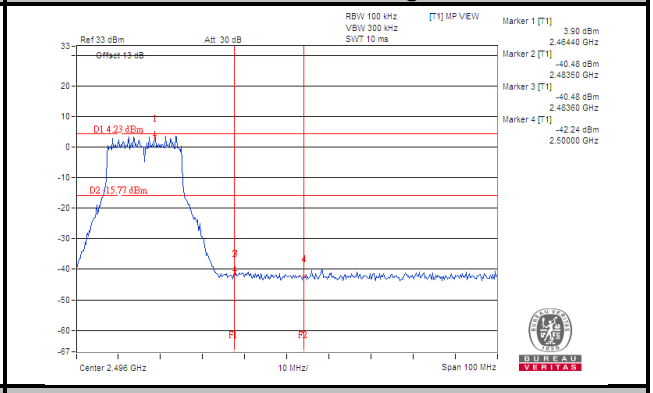




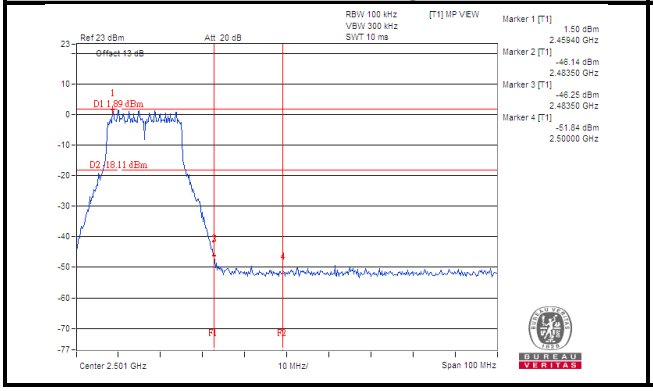
Ch 1 Band Edge



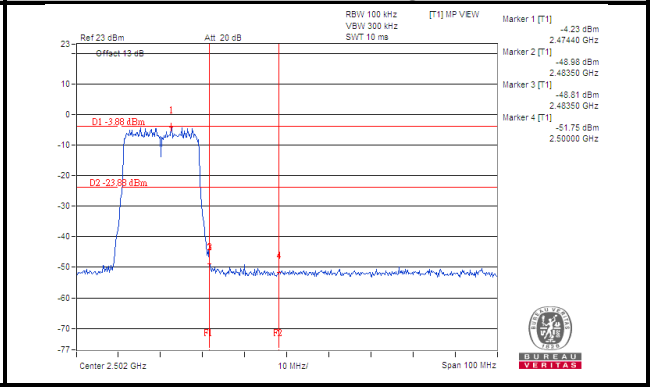
Ch 11 Band Edge



Ch 12 Band Edge



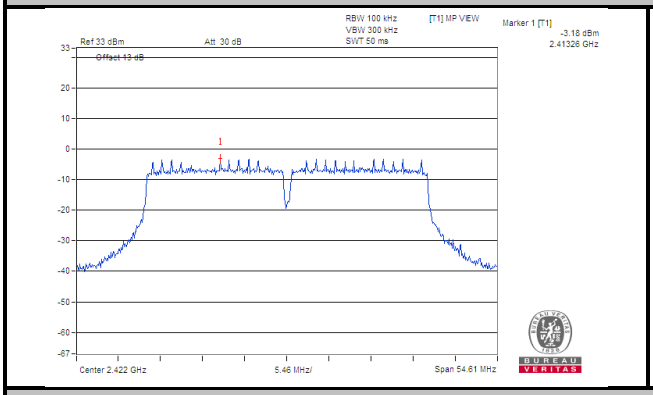
Ch 13 Band Edge

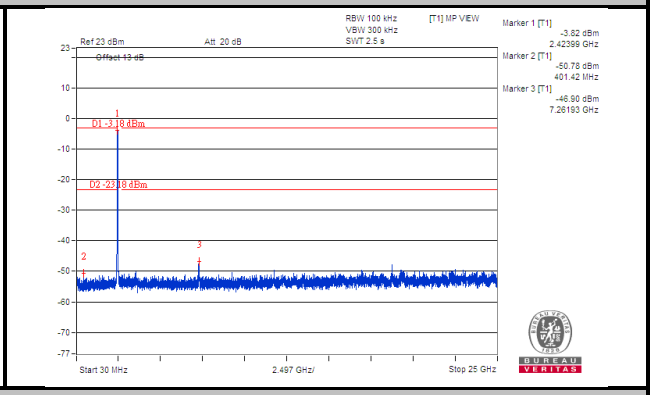


802.11n (HT40)

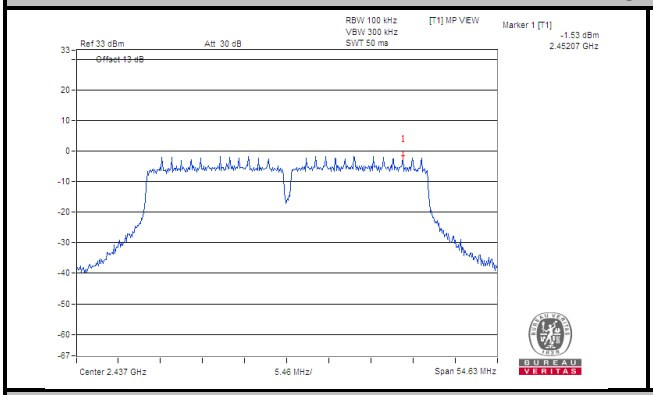
CHAIN 0

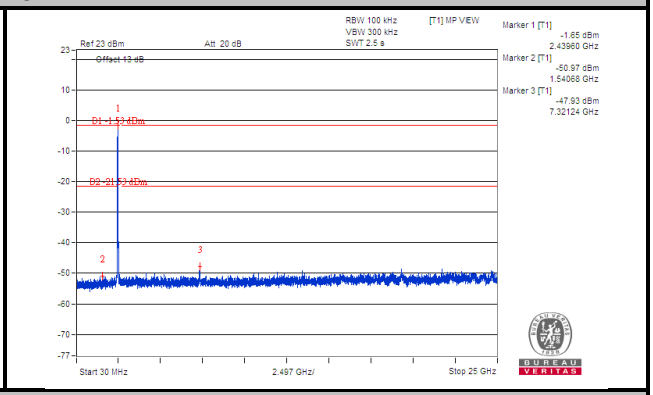
Ch 3



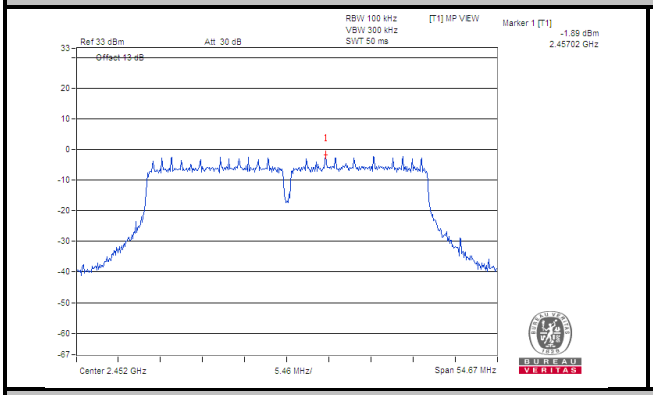


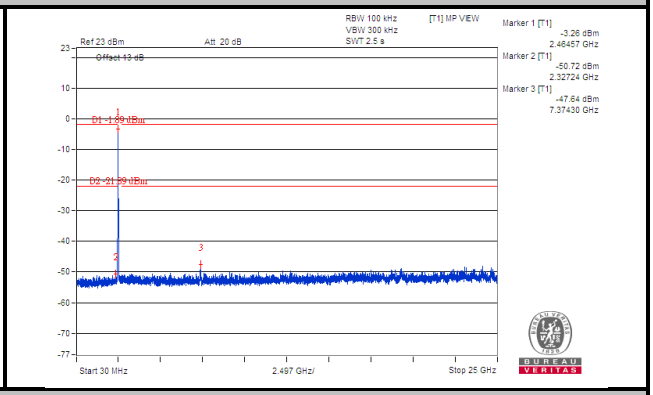
Ch 6



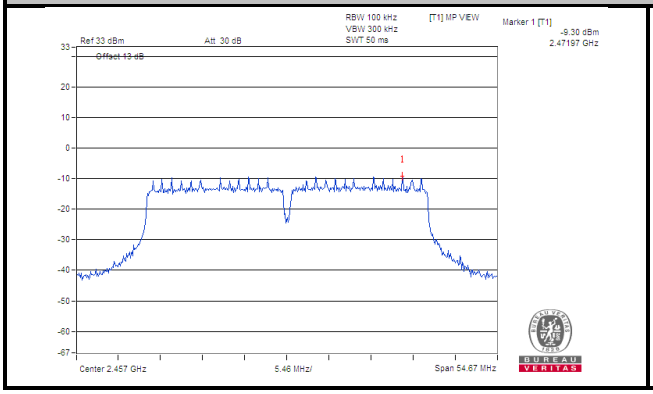


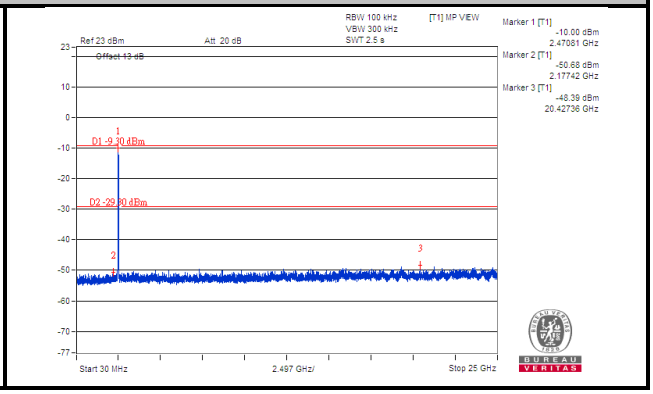
Ch 9





Ch 10





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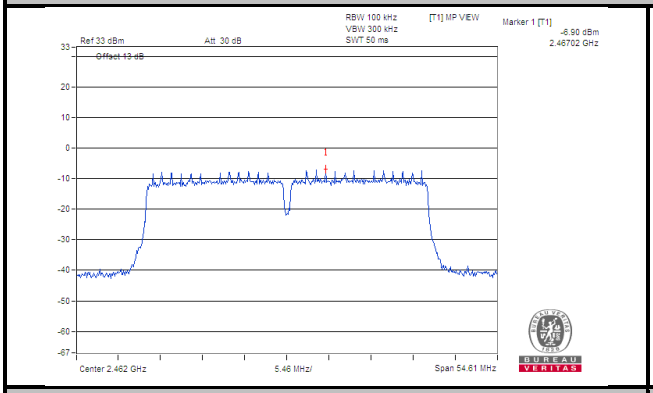
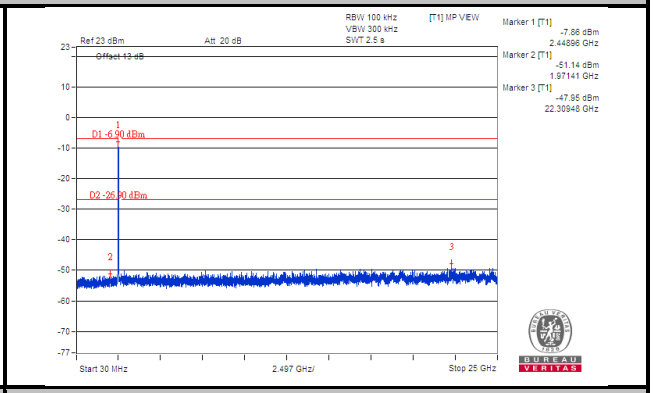
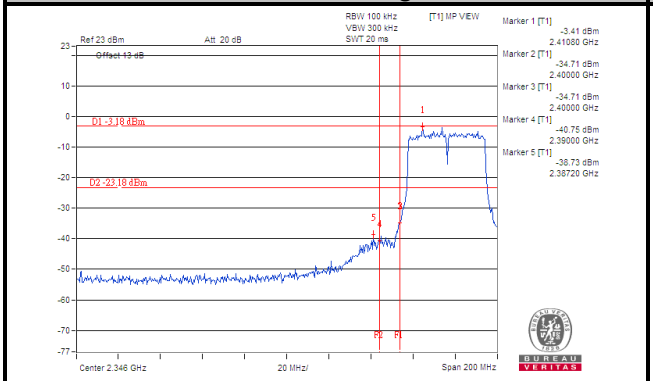
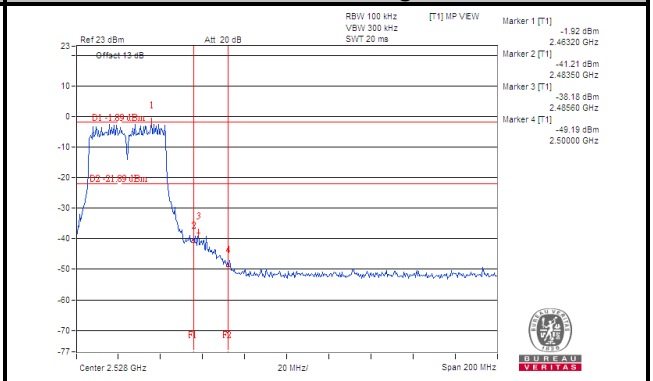




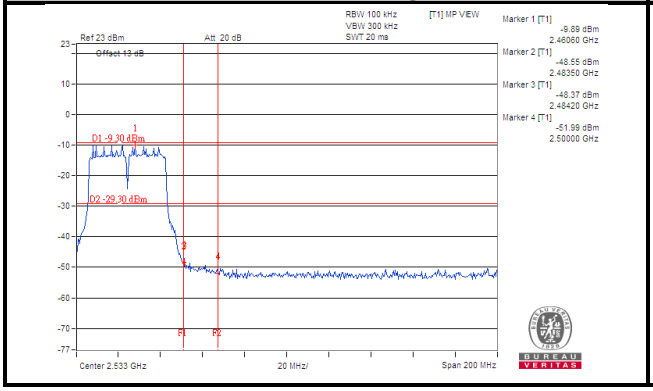
Ch 3 Band Edge



Ch 9 Band Edge



Ch 10 Band Edge



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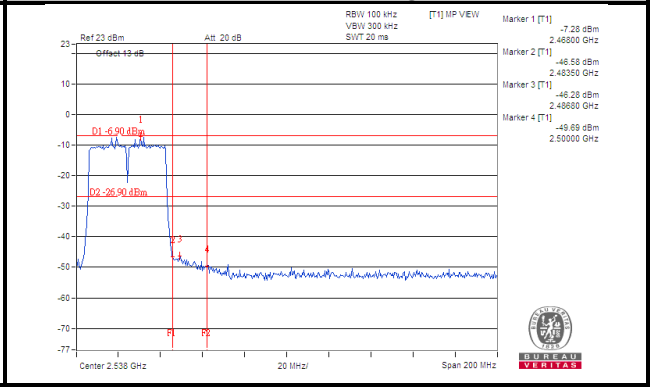
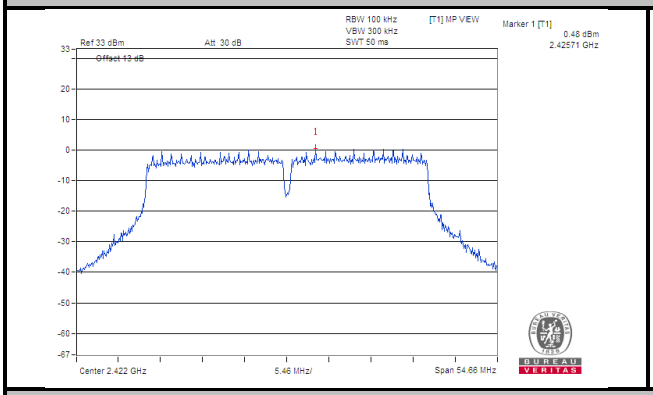
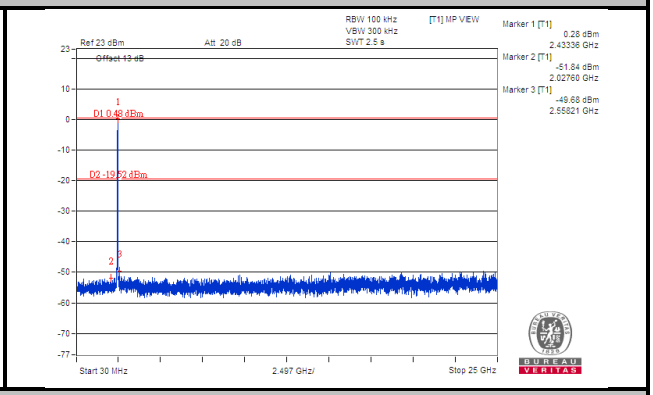


CHAIN 1

Ch 3





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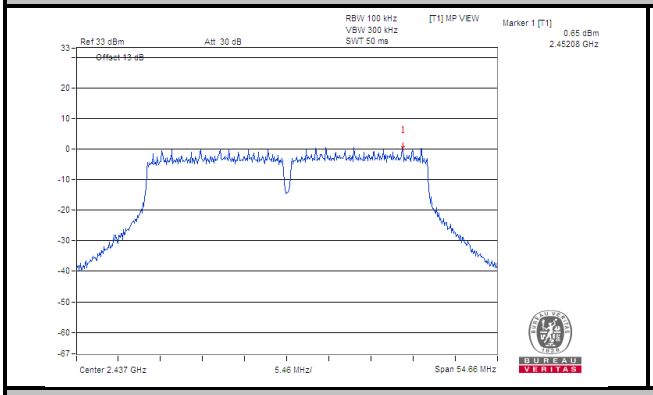
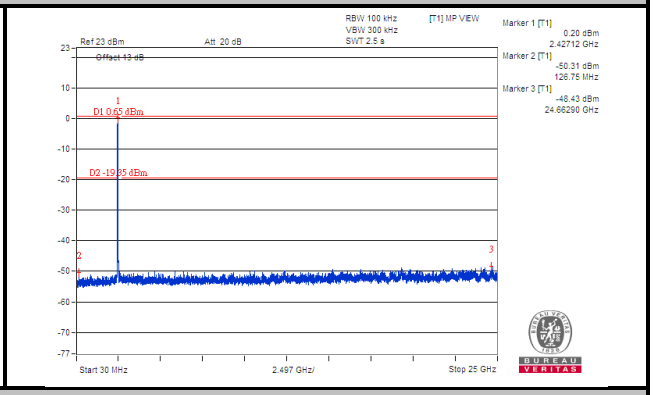
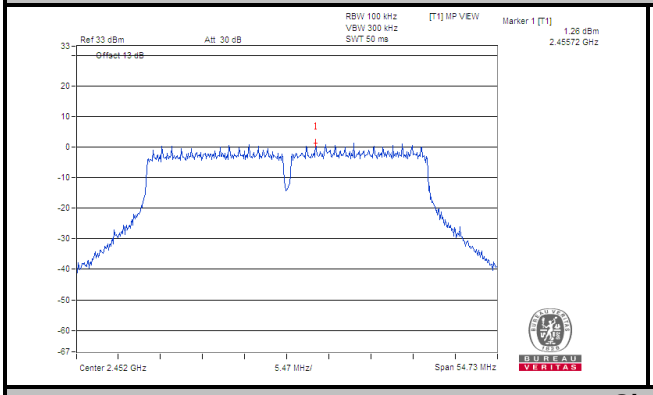
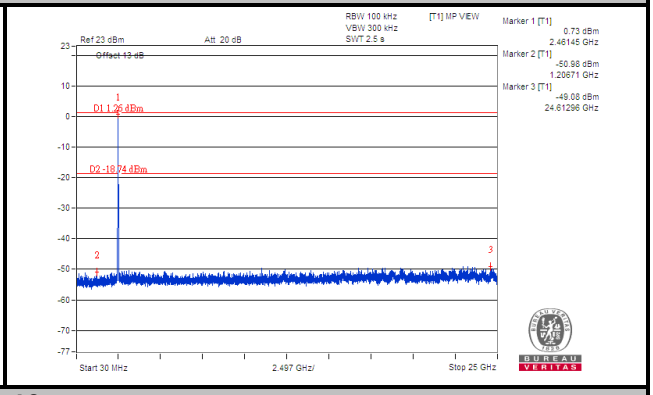


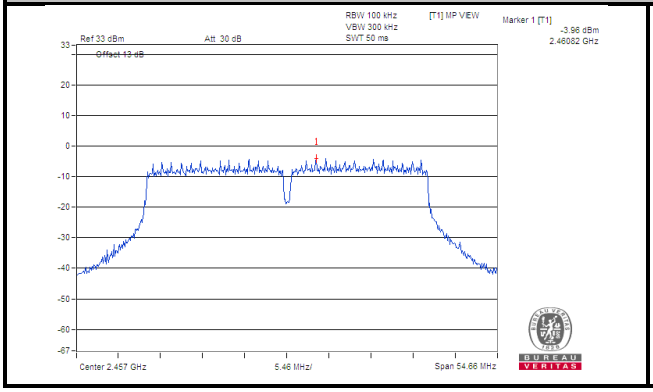


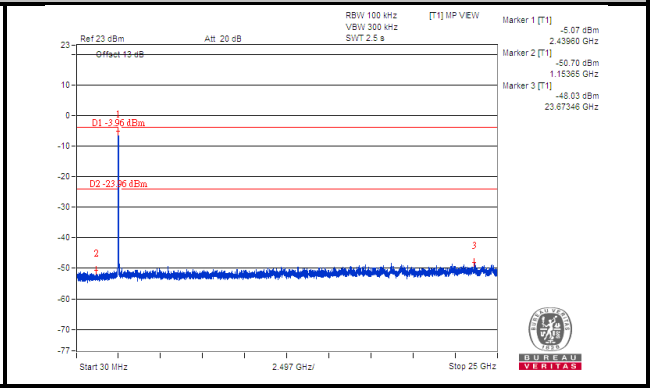
Ch 9





Ch 10





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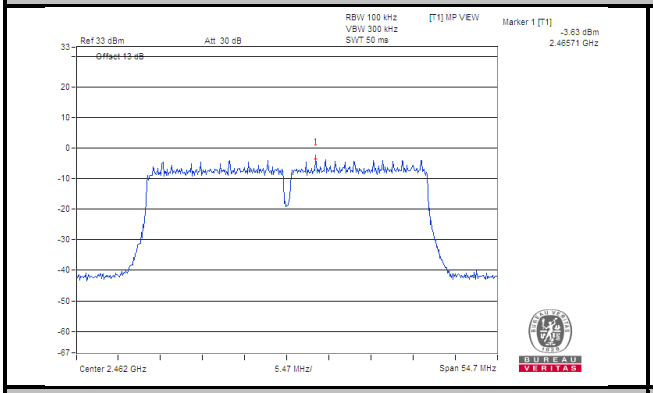
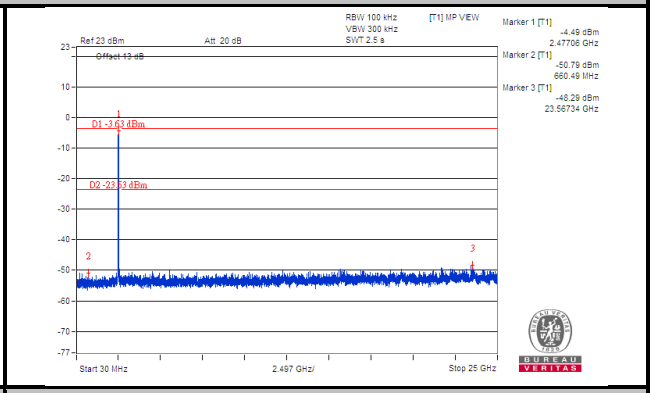
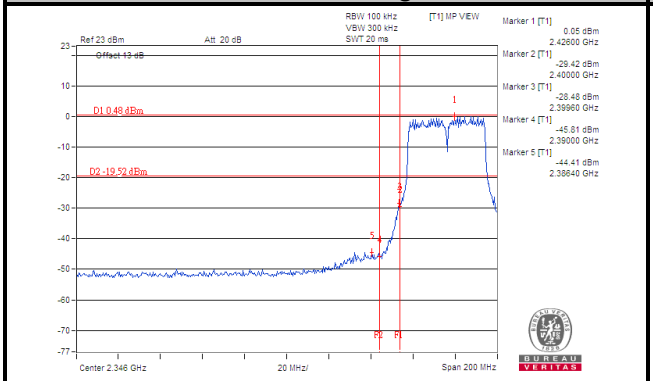
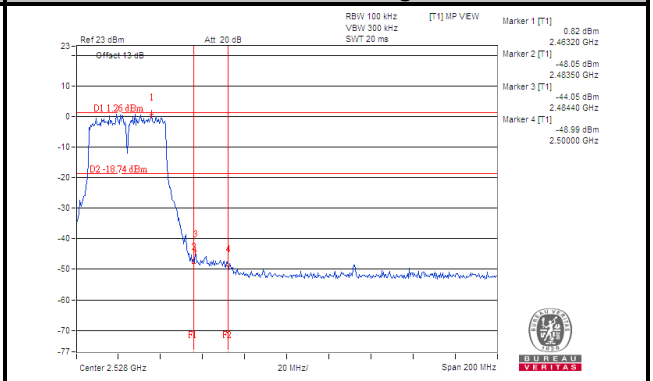




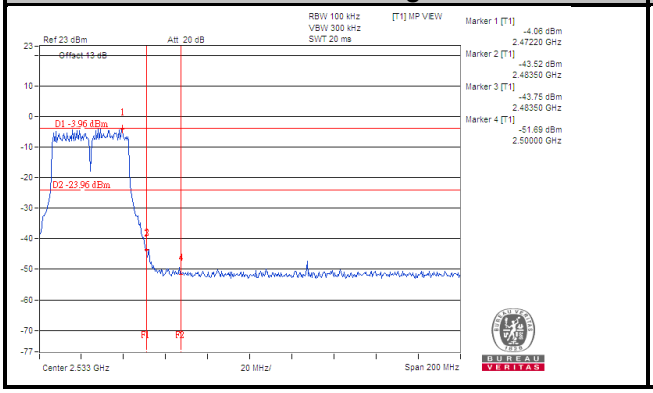
Ch 3 Band Edge



Ch 9 Band Edge



Ch 10 Band Edge



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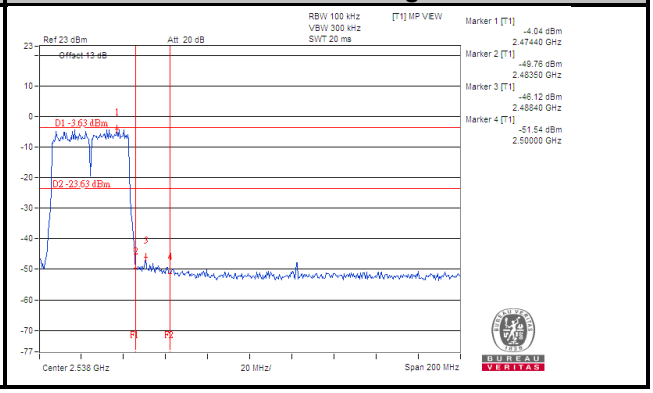

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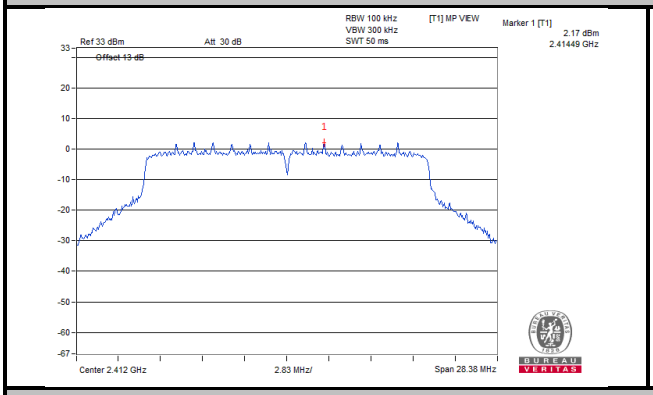
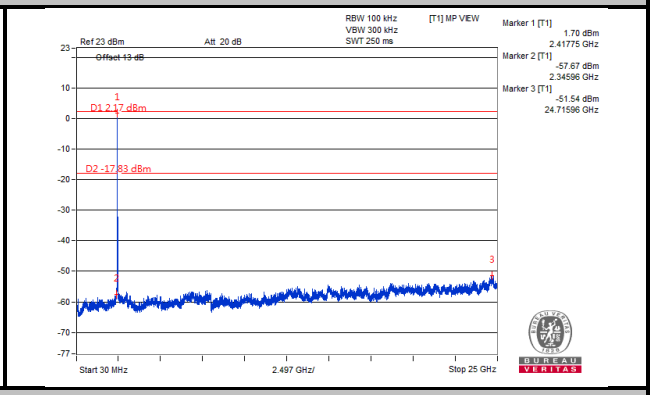
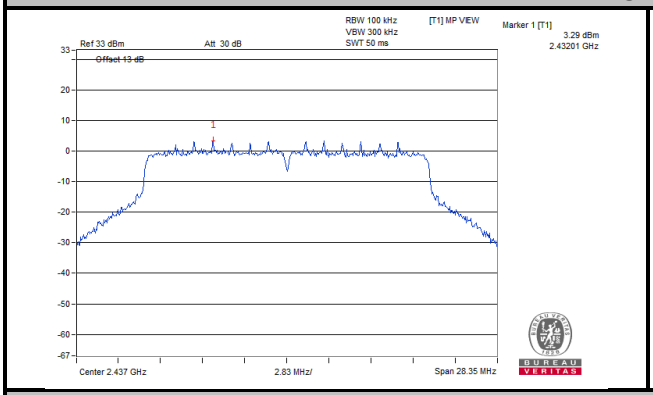
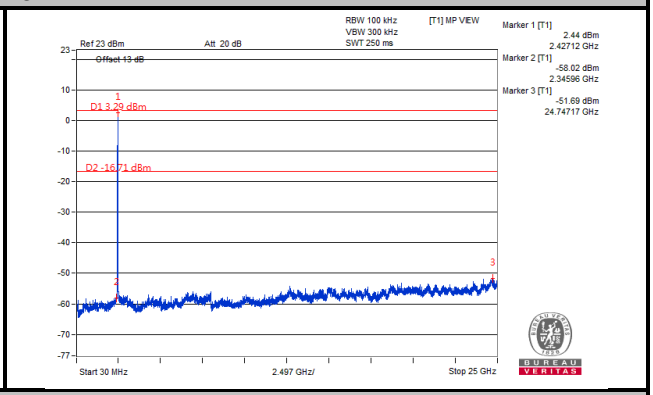
Ch 1



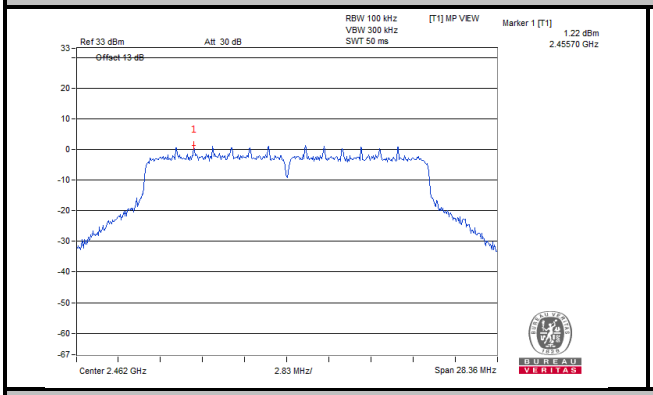


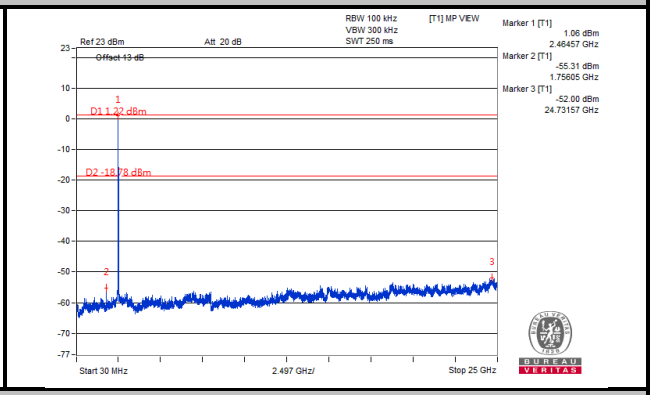
Ch 6



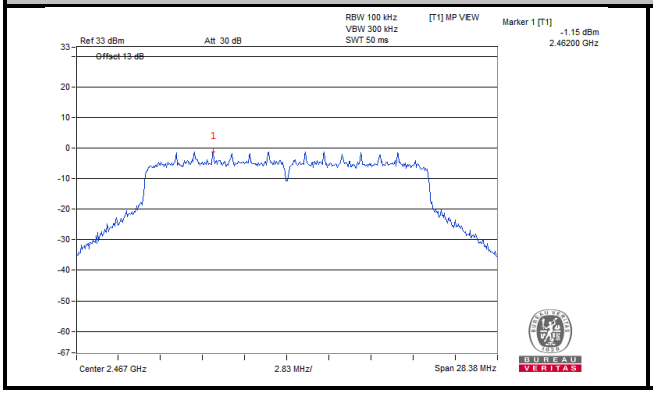


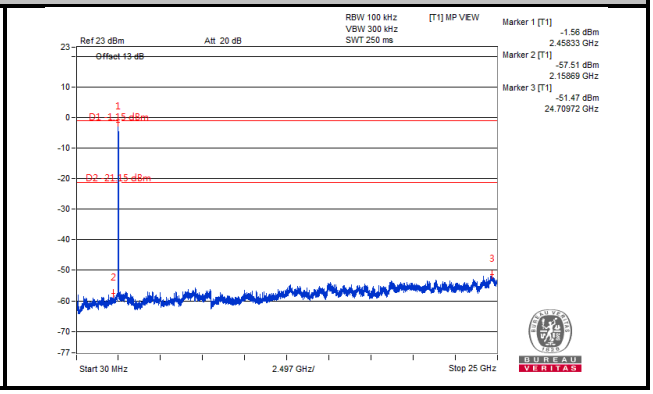
Ch 11



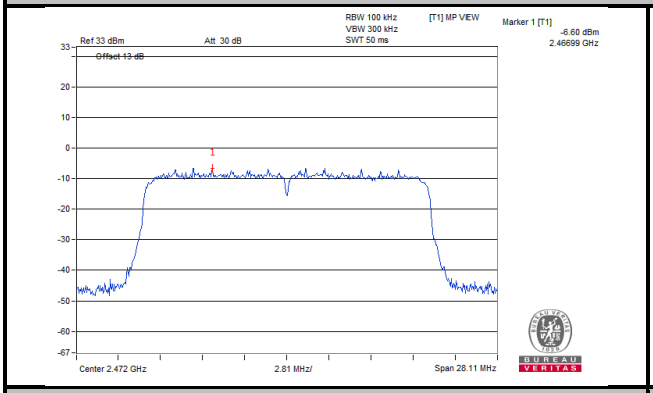


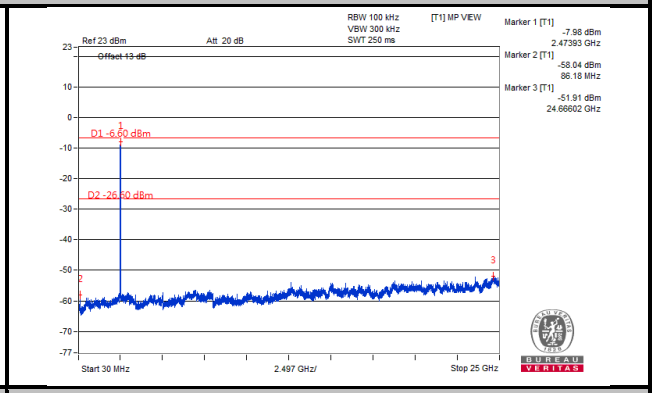
Ch 12



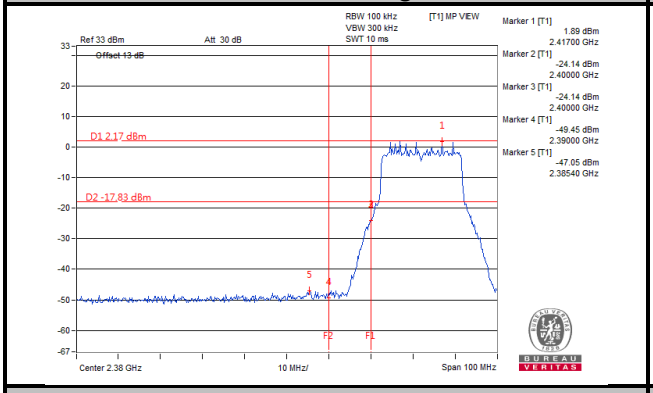


Ch 13

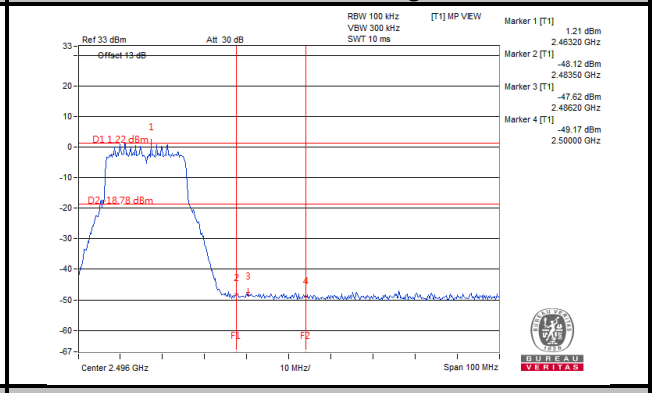




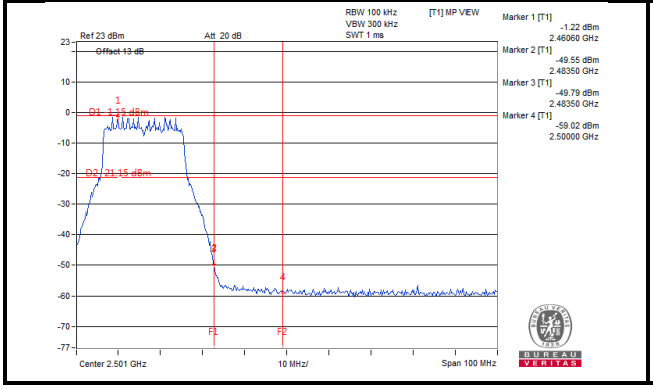
Ch 1 Band Edge



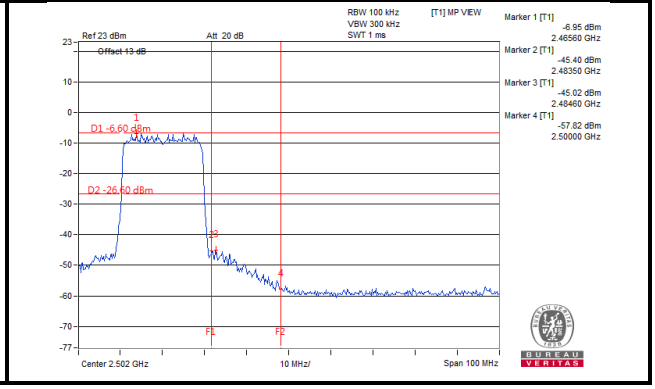
Ch 11 Band Edge



Ch 12 Band Edge

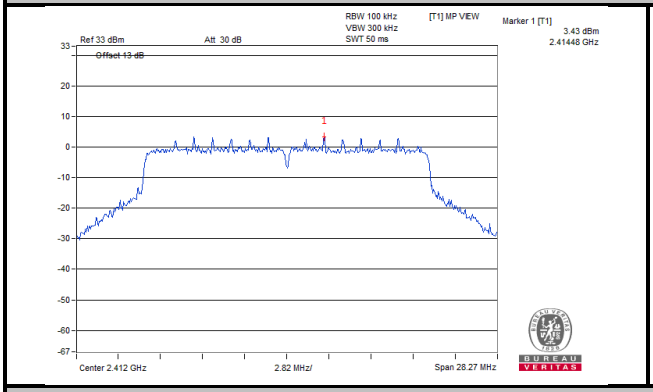


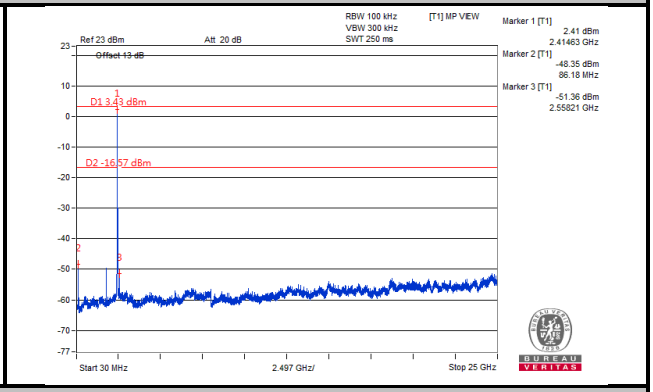
Ch 13 Band Edge



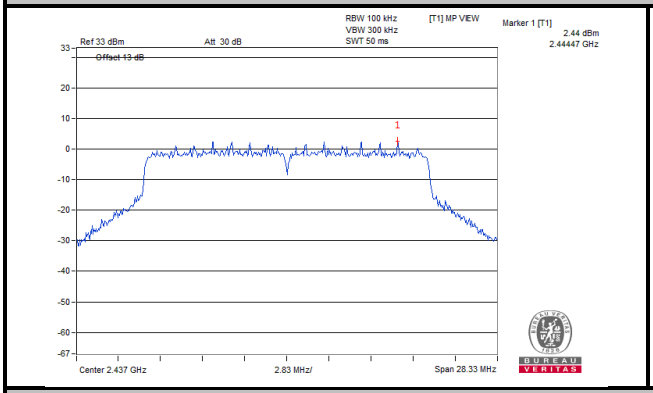
CHAIN 1

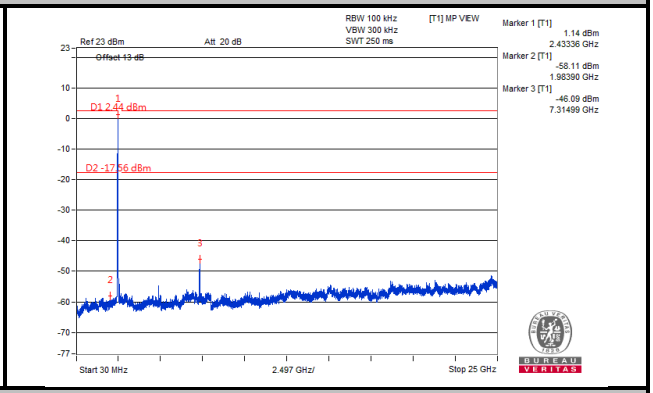
Ch 1



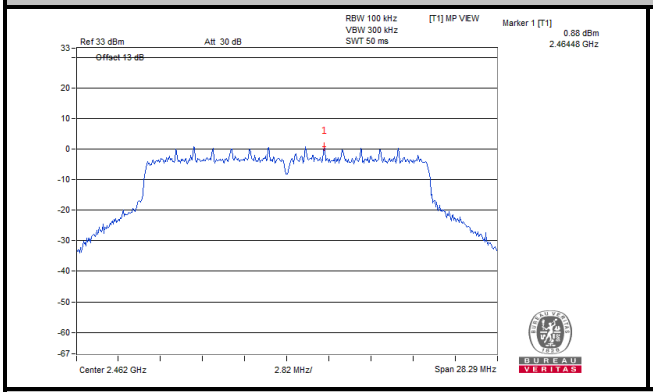


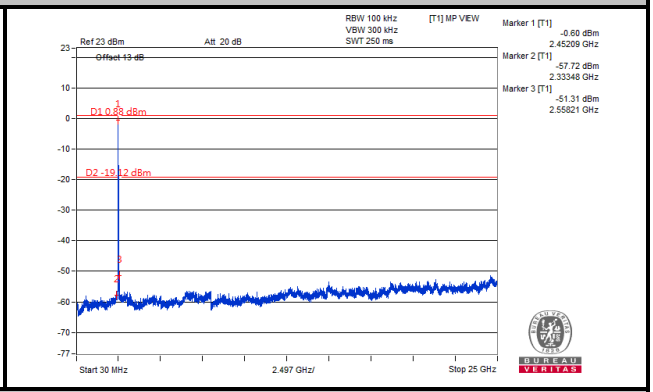
Ch 6



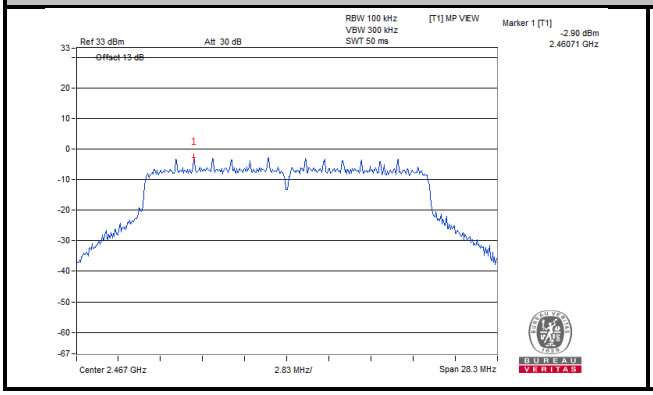


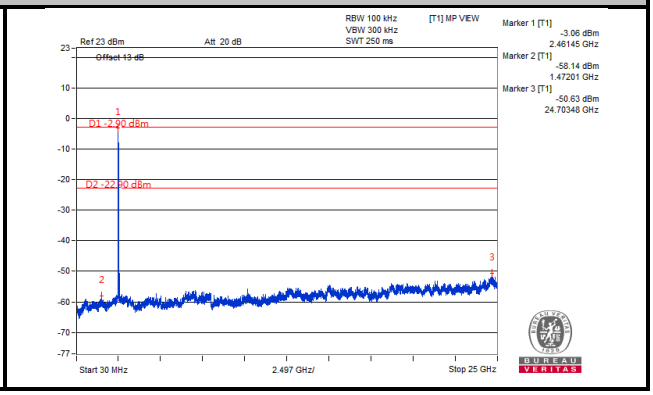
Ch 11



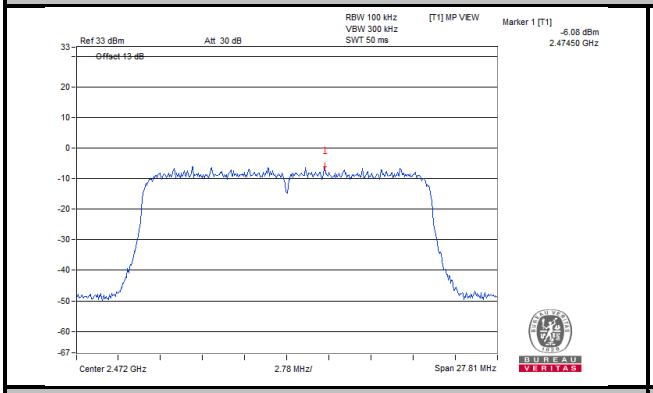


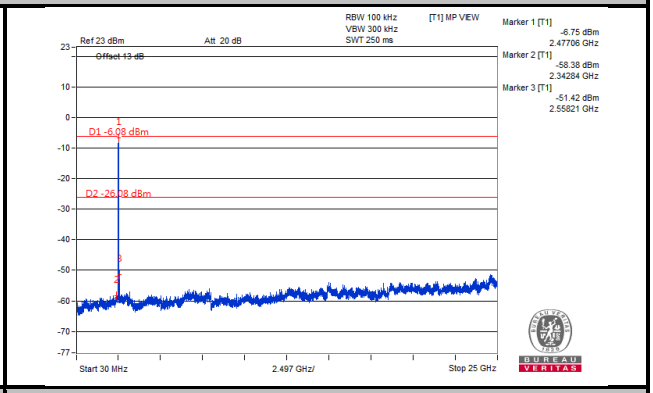
Ch 12



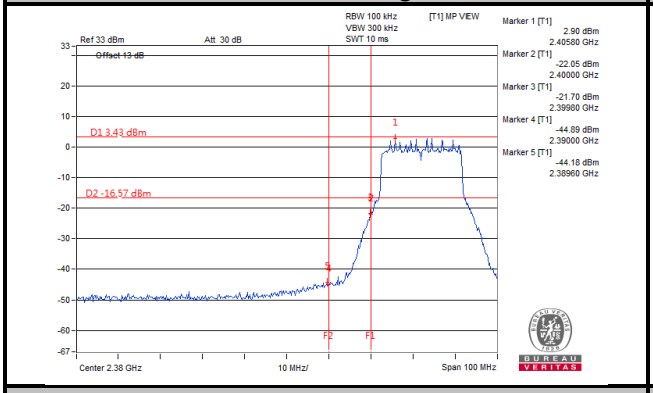


Ch 13

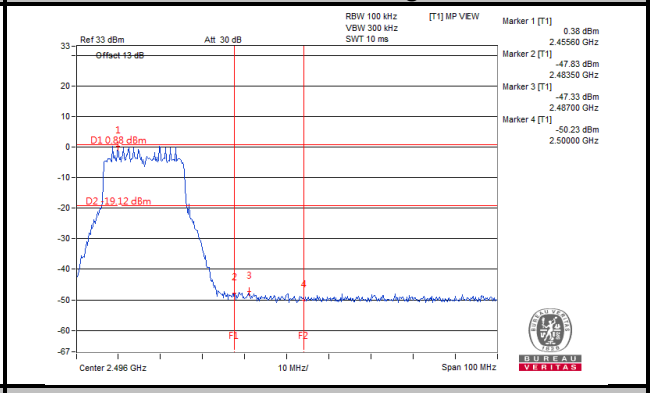




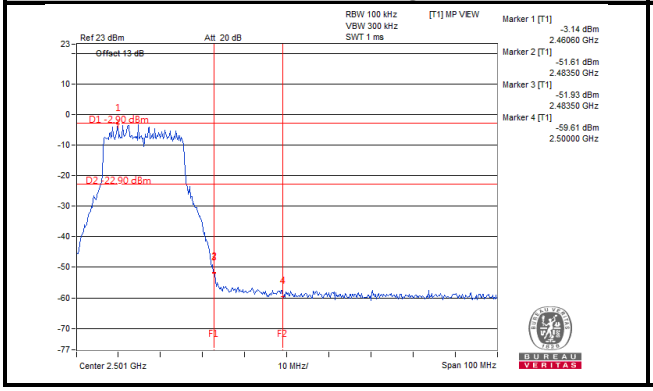
Ch 1 Band Edge



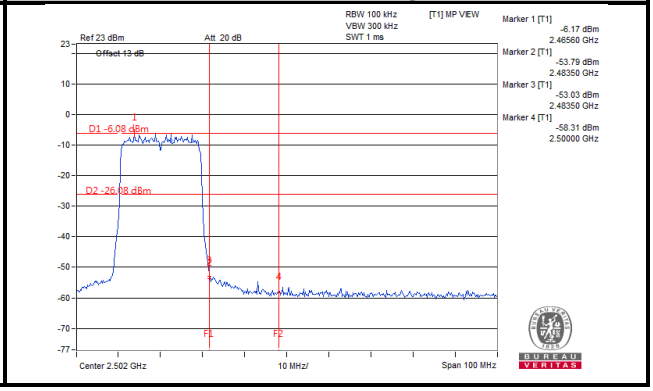
Ch 11 Band Edge



Ch 12 Band Edge



Ch 13 Band Edge



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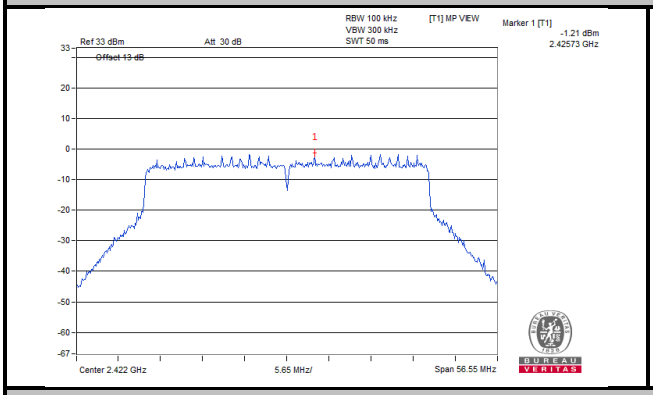
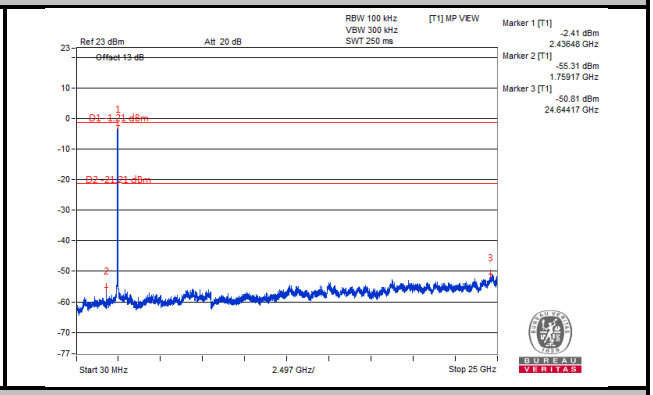
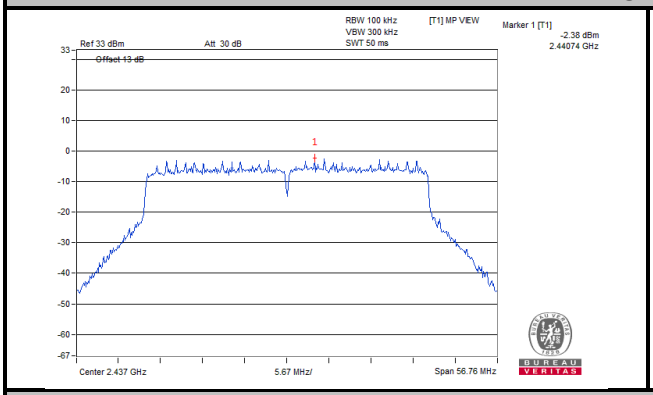
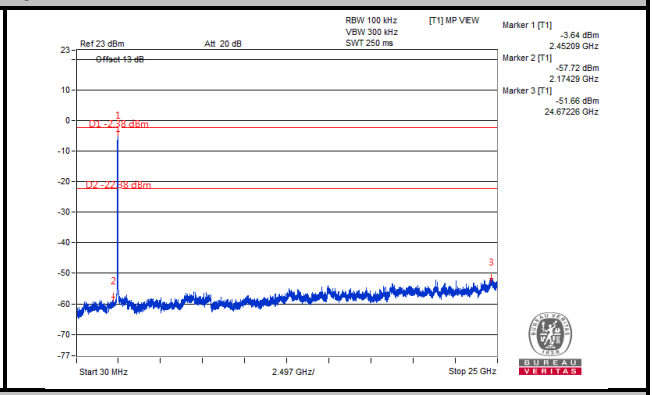
Ch 3



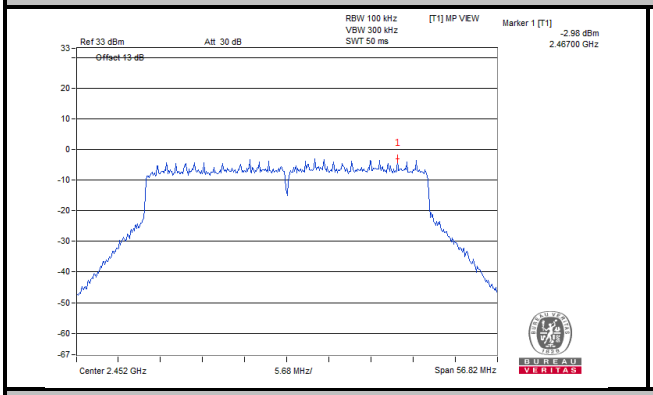


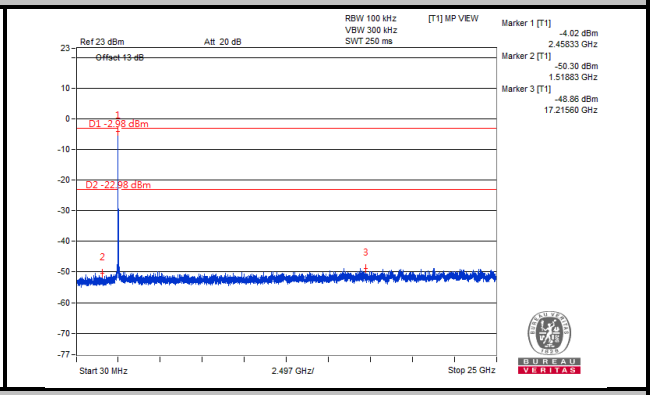
Ch 6



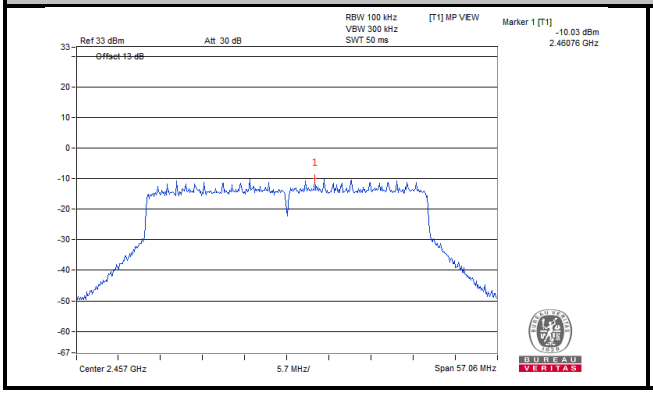


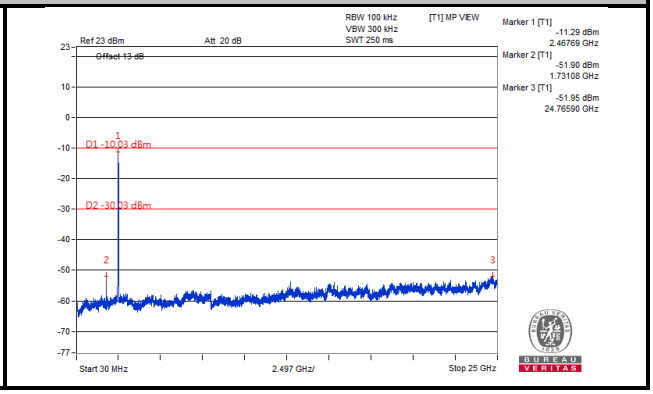
Ch 9



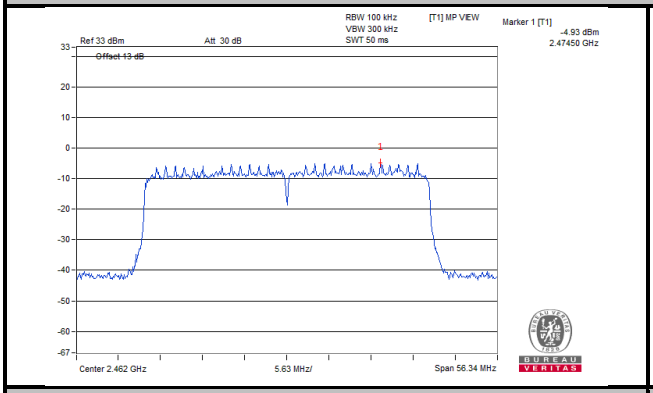


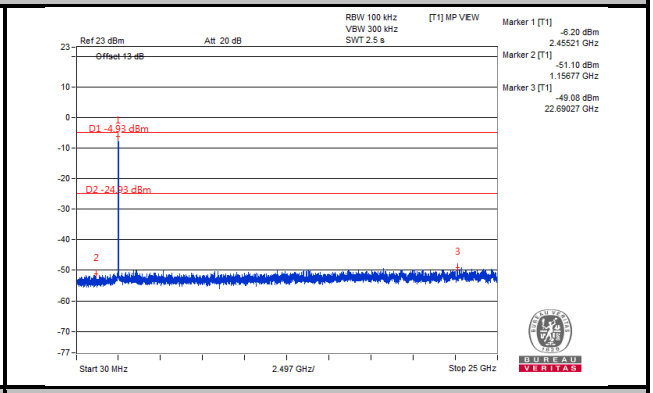
Ch 10



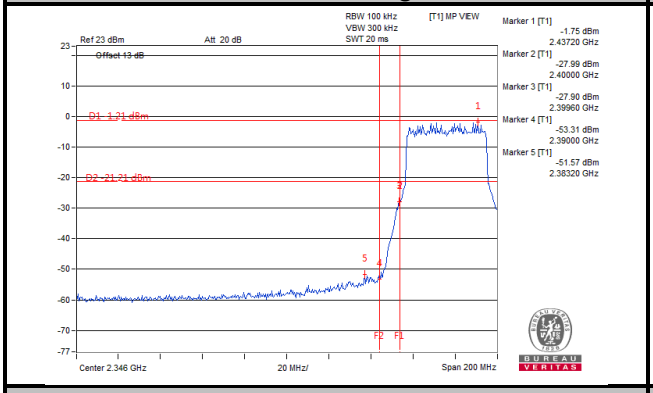


Ch 11

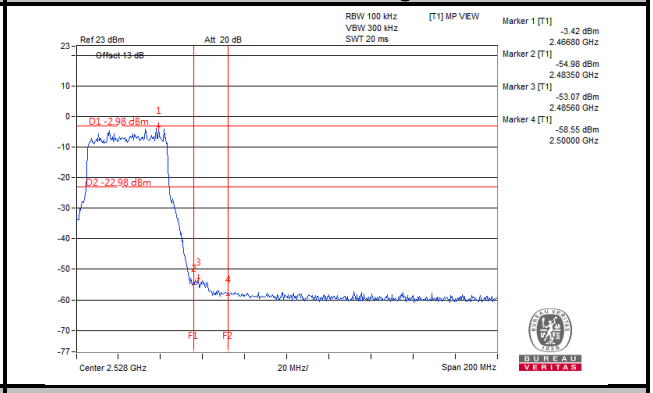




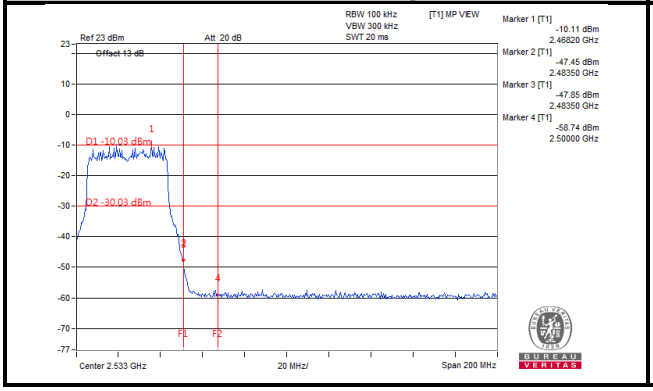
Ch 3 Band Edge



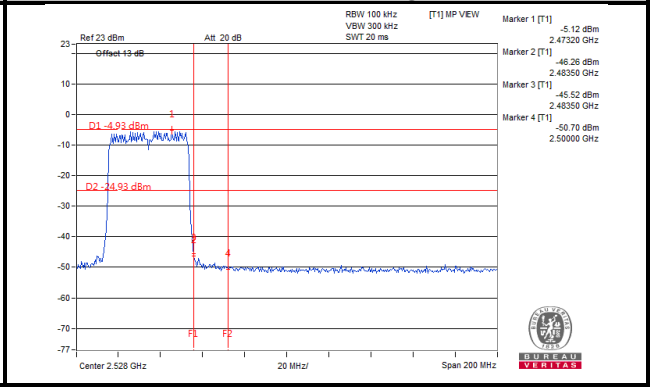
Ch 9 Band Edge



Ch 10 Band Edge

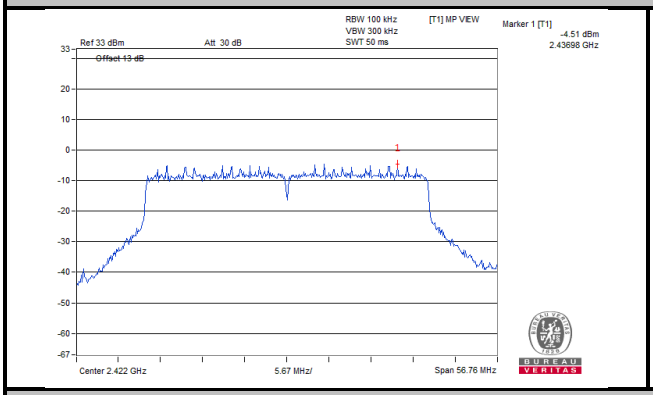


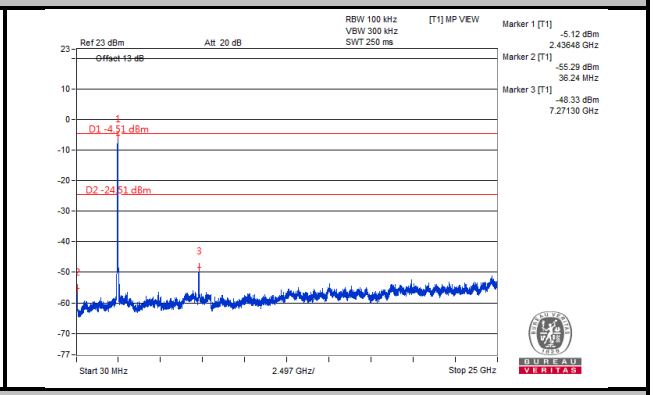
Ch 11 Band Edge



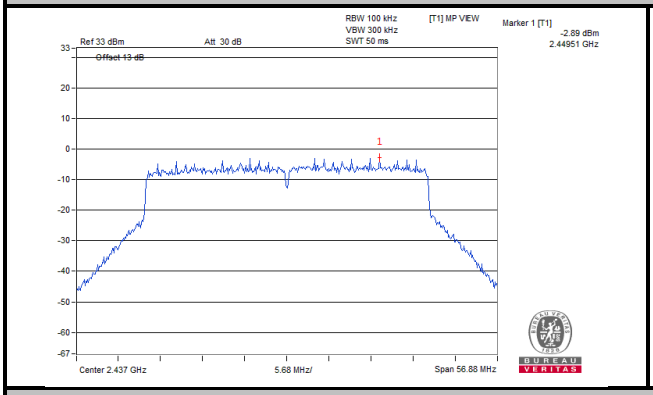
CHAIN 1

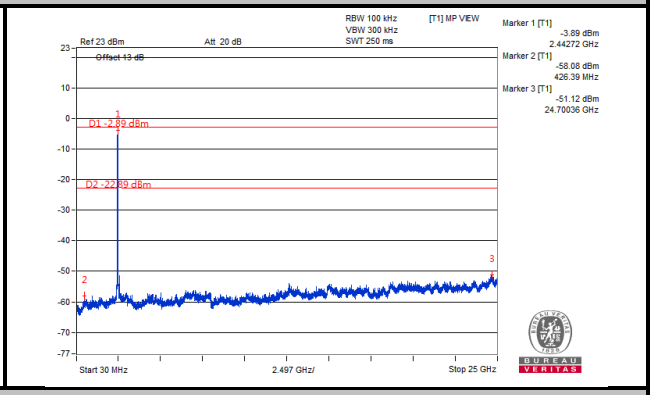
Ch 3



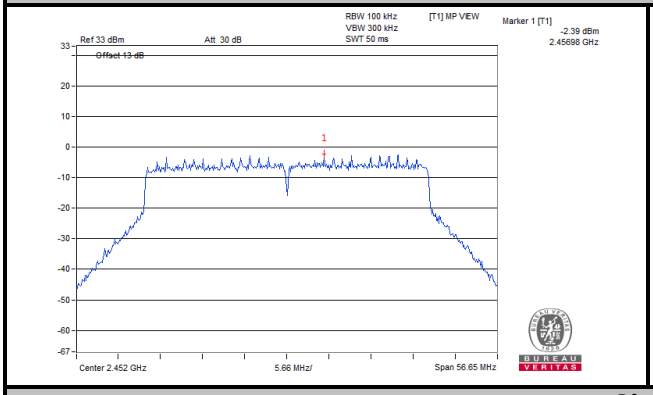


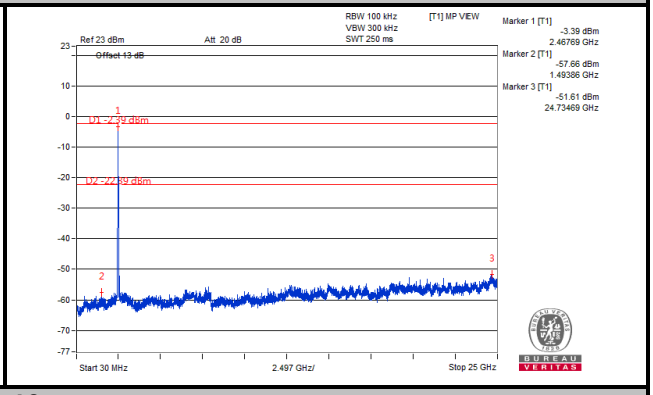
Ch 6



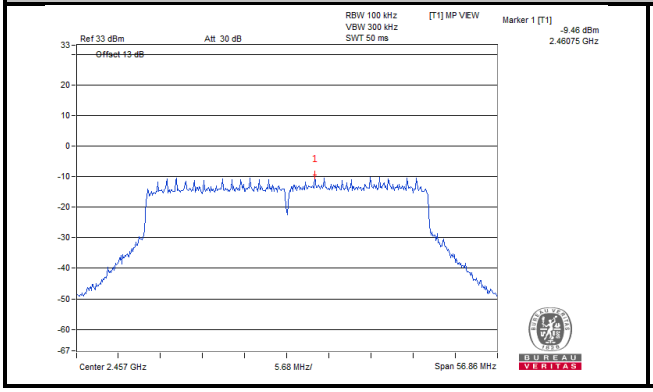


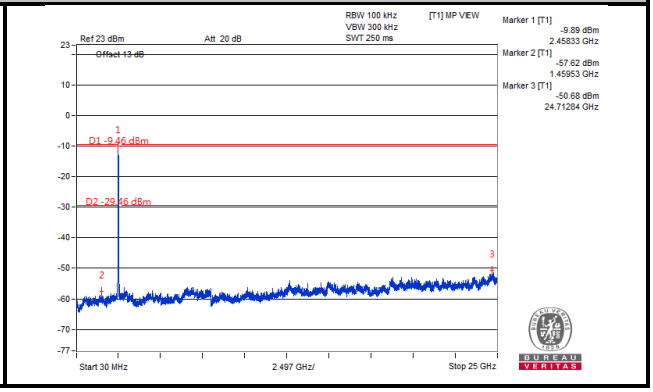
Ch 9



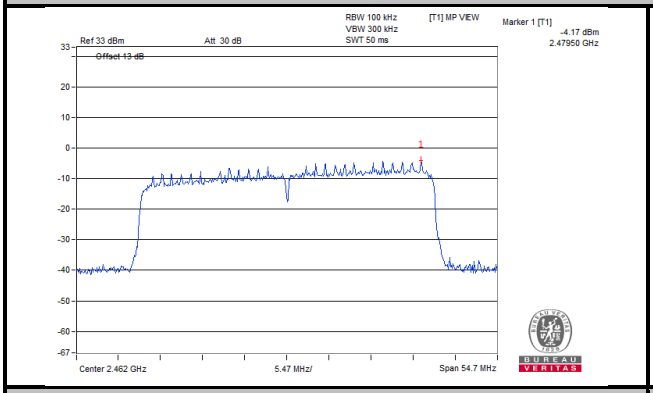


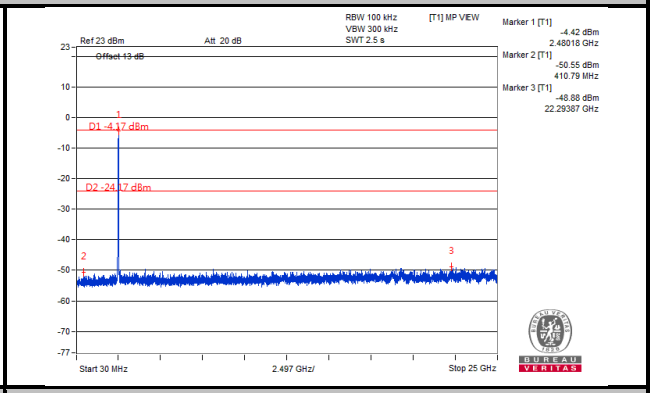
Ch 10



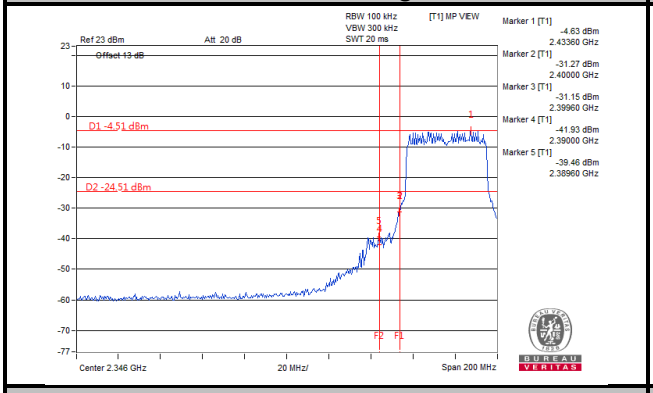


Ch 11

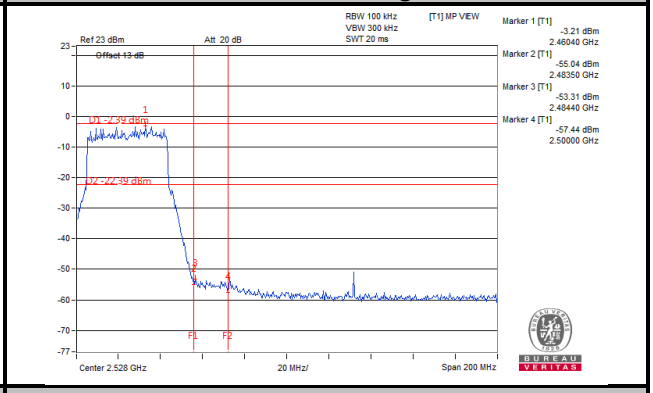




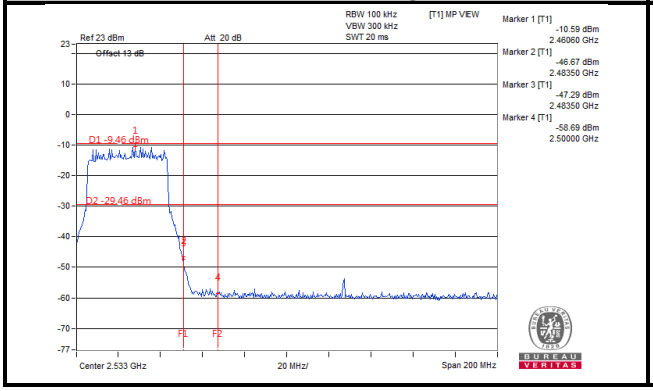
Ch 3 Band Edge



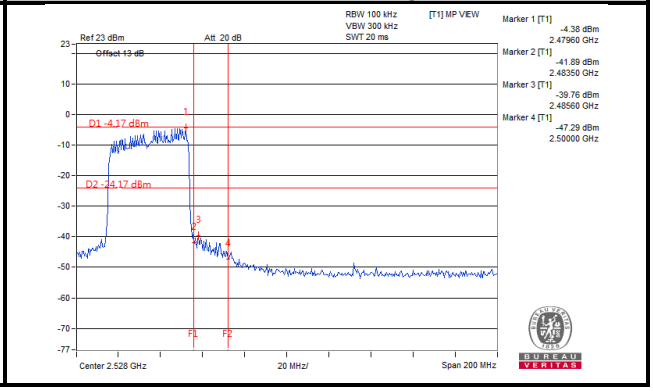
Ch 9 Band Edge



Ch 10 Band Edge



Ch 11 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.

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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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