

FCC Test Report

Report No.: RF190220C23

FCC ID: KA2BA2820PA1

Test Model: DBA-2820P

Received Date: Apr. 24, 2018

Test Date: May 04 ~ Jul. 08, 2018
Mar. 08 ~ Mar. 19, 2019

Issued Date: Mar. 20, 2019

Applicant: D-Link Corporation

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

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**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF190220C23	Original release	Mar. 20, 2019

1 Certificate of Conformity

Product: Nuclias Cloud-Managed AC2600 Wave 2 Access Point

Brand: D-Link Corporation

Test Model: DBA-2820P

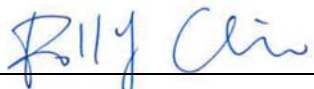
Sample Status: Engineering sample

Applicant: D-Link Corporation

Test Date: May 04 ~ Jul. 08, 2018
Mar. 08 ~ Mar. 19, 2019

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

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

Prepared by :  , **Date:** Mar. 20, 2019
Polly Chien / Specialist

Approved by :  , **Date:** Mar. 20, 2019
Bruce Chen / 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 -9.38dB at 0.31698MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.8dB at 482.92MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX 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) (\pm)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Nuclias Cloud-Managed AC2600 Wave 2 Access Point
Brand	D-Link Corporation
Test Model	DBA-2820P
Status of EUT	Engineering sample
Power Supply Rating	12Vdc (From adapter) 54Vdc (From PoE)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11.0/ 5.5/ 2.0/ 1.0Mbps 802.11g: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 600.0Mbps
Operating Frequency	2412 ~ 2462MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
Output Power	CDD Mode: 898.140mW Beamforming Mode: 621.015mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Data Cable Supplied	NA

Note:

1. This report is issued as a supplementary report to BV CPS report no. RF180424C01. The differences compared to the original report are changing the outer casing, model, product name and updating FW. Therefore, test item for conducted, radiated emissions below 1GHz and radiated emissions above 1GHz on 802.11b: CH 6 had been re-tested and the other test data was kept.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Band	Modulation Mode	Beamforming Mode	TX Function
2.4GHz	802.11b	Not Support	4TX
	802.11g	Not Support	4TX
	802.11n (HT20)	Support	4TX
	802.11n (HT40)	Support	4TX

3. The EUT uses following antennas.

Ant. No.	Type	Connector	Ant. Gain (dBi)	
			2.4GHz	5GHz
0, 1, 2, 3	PIFA	I-PEX	3	4

*The antenna is cross-polarized antenna.

4. The EUT consumes power from the following Adapters and PoE.

Adapter 1	
Brand	Channel Well Technology
Model	2ABL030F NJ
Input Power	100-240Vac~, 50/60Hz 1.0A
Output Power	12.0Vdc / 2.5A
Power Cord	1.2m non-shielded power cord without core

Adapter 2	
Brand	Asian Power Devices Inc.
Model	WA-30J12R
Input Power	100-240Vac~, 50-60Hz, 0.9A Max
Output Power	12Vdc / 2.5A
Power Cord	1.2m non-shielded power cord without core

PoE (Support unit)	
Brand	LEADER ELECTRONICS INC.
Model	NU90-J540167-I1
Input Power	100-240Vac~, 50-60Hz, 1.2A
Output Power	54Vdc / 1.67A

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11ac (20MHz):

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

7 channels are provided for 802.11ac (40MHz):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE \geq 1G	RE $<$ 1G	PLC	APCM	
A	√	√	√	√	Power from adapter 1
B	-	√	√	-	Power from adapter 2
C	-	√	√	-	Power from PoE

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

Note:

- The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
- "-": Means no effect.

Radiated Emission Test (Above 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Radiated Emission Test (Below 1GHz):

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C	802.11b	1 to 11	6	DSSS	DBPSK	1.0

Power Line Conducted Emission Test:

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

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
A, B, C	802.11b	1 to 11	6	DSSS	DBPSK	1.0

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)
A	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
A	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
A	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	7.2
A	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	15.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 70%RH, 23deg. C, 68%RH	120Vac, 60Hz	Luis Lee, Willy Cheng
RE<1G	25deg. C, 67%RH, 23deg. C, 68%RH	120Vac, 60Hz	Adair Peng
	23deg. C, 68%RH	54Vdc	Willy Cheng
PLC	25deg. C, 75%RH	120Vac, 60Hz	Jones Chang
	22deg. C, 66%RH	54Vdc	Adair Peng
APCM	25deg. C, 60%RH	120Vac, 60Hz	Alan Wu

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is > 98 %, duty factor is not required.

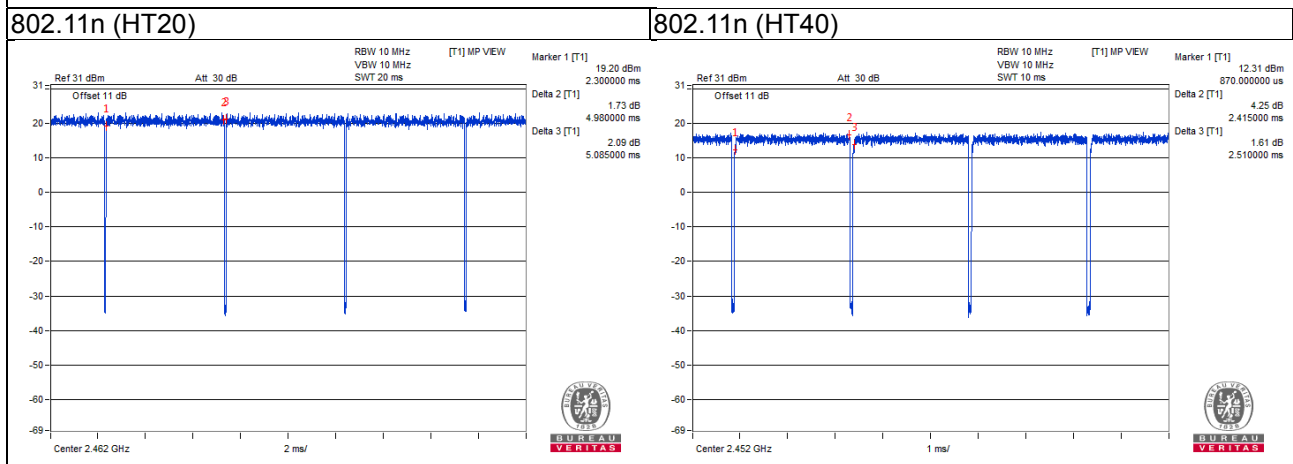
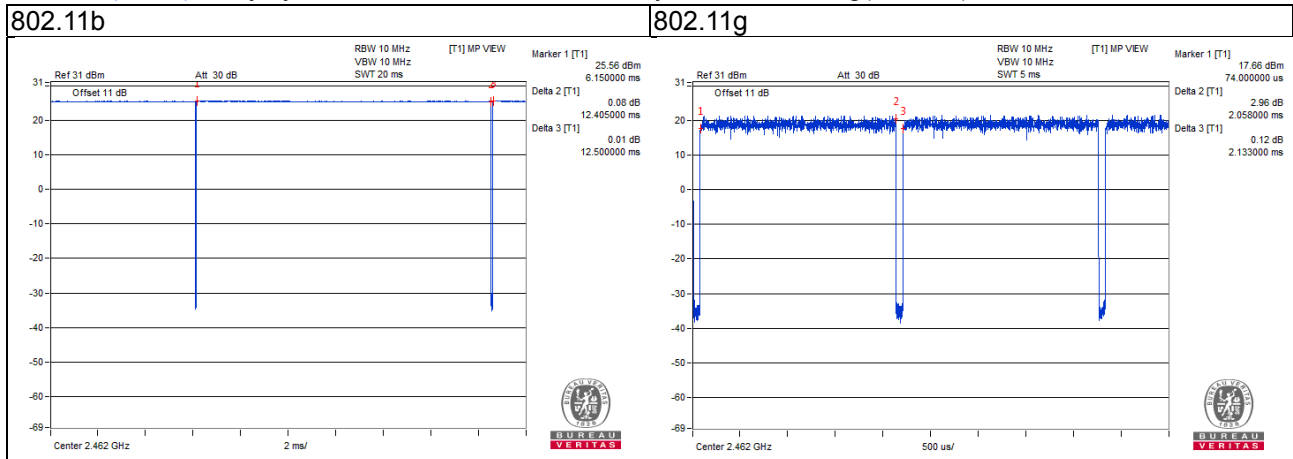
Duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = $12.405/12.500 = 0.992$

802.11g: Duty cycle = $2.058/2.133 = 0.965$, Duty factor = $10 * \log(1/0.965) = 0.16$

802.11n (HT20): Duty cycle = $4.980/5.85 = 0.979$, Duty factor = $10 * \log(1/0.979) = 0.09$

802.11n (HT40): Duty cycle = $2.415/2.510 = 0.962$, Duty factor = $10 * \log(1/0.962) = 0.17$



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	PoE	LEADER ELECTRONICS INC.	NU90-J540167-11	NA	NA	Provided by client

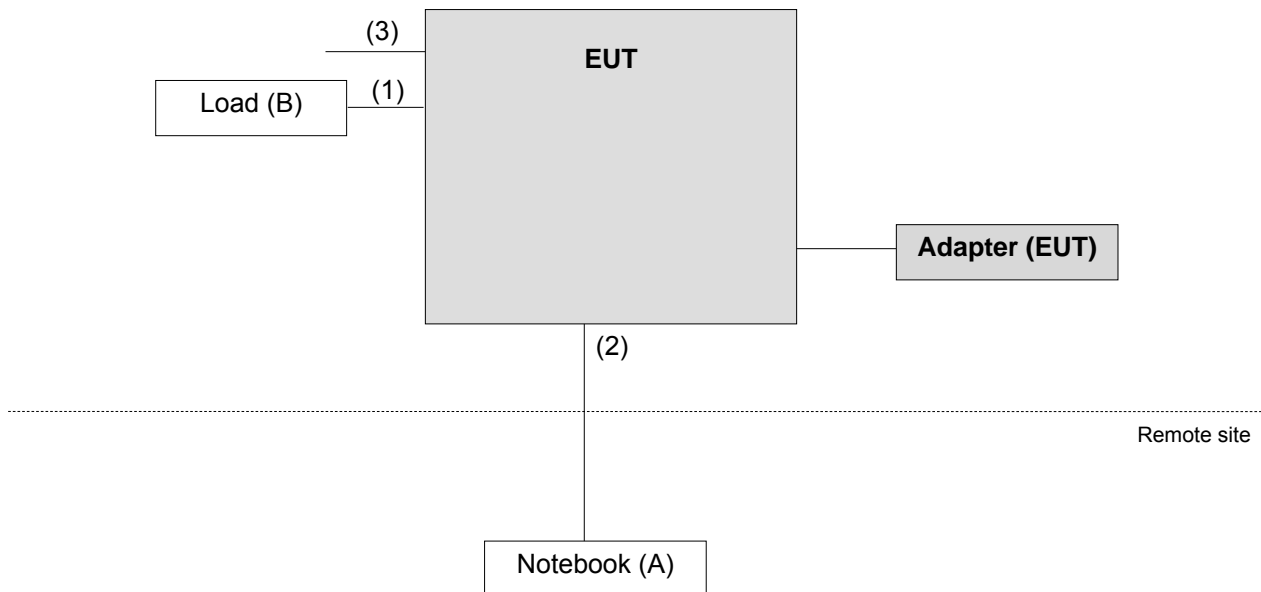
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

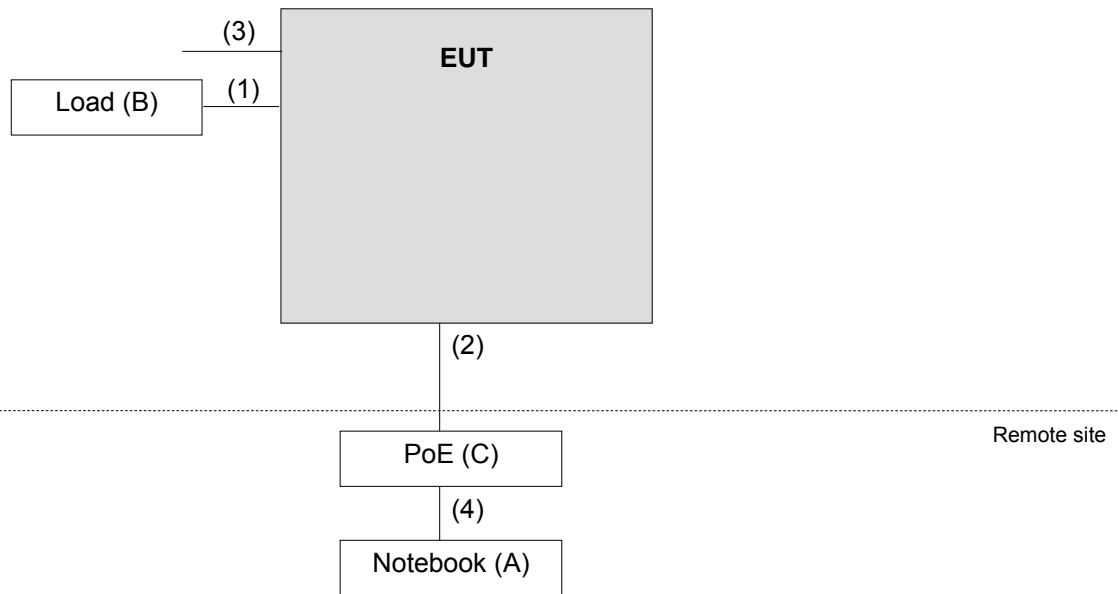
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 cable	1	1.5	N	0	Cat5e
2.	RJ45 cable	1	6	N	0	Cat5e
3.	RJ45 to console cable	1	1.2	N	0	Cat5e
4.	RJ45, Cat5e	1	1.8	N	0	-

3.4.1 Configuration of System under Test

Mode A, B



Mode C



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)
KDB 558074 D01 15.247 Meas Guidance v05r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

4 Test Types and Results (For 2.4GHz Band)

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

Note:

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

4.1.2 Test Instruments

Tested date: May 04 ~ Jul. 08, 2018

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 17, 2017	Oct. 16, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2017	Aug. 20, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2017	Aug. 20, 2018
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Sep.11, 2017	Sep. 10, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 3.

Tested date: Mar. 08 ~ Mar. 19, 2019

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 29, 2018	May 28, 2019
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna TESEQ	HLA 6121	45745	Jun. 14, 2018	Jun. 13, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM- SM-8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	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 Chamber 3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

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

For Radiated emission above 30MHz

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

Note:

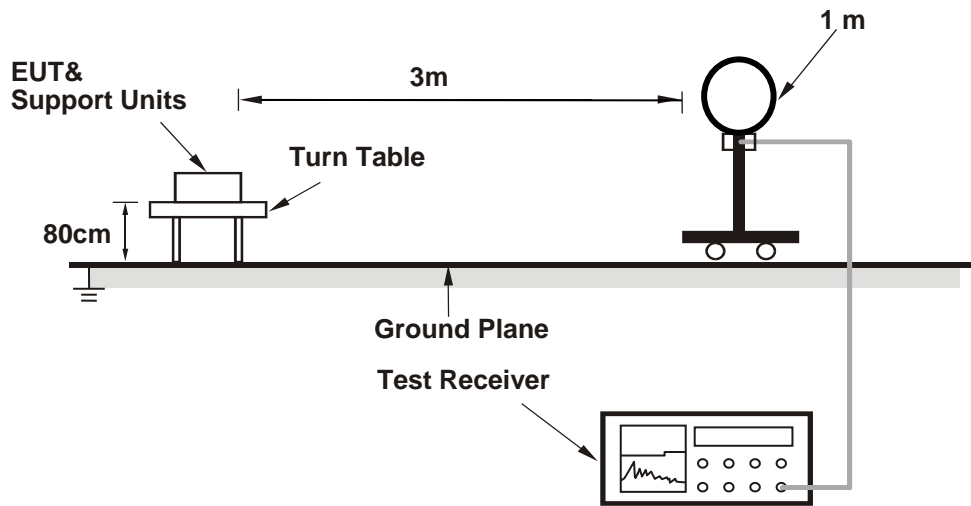
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

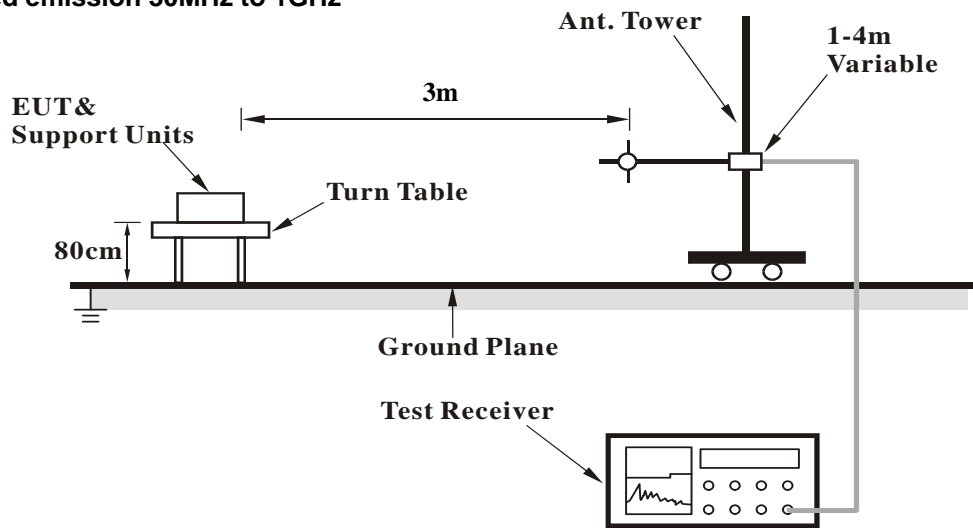
No deviation.

4.1.5 Test Set Up

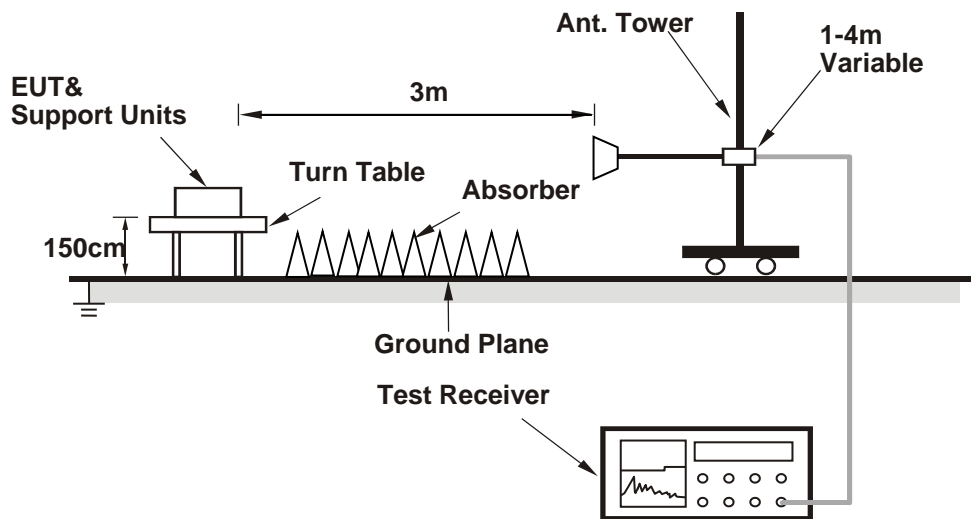
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- a. Placed the EUT on the testing table.
- b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
- c. The communication partner connected with EUT via a RJ45 cable and ran a test program (QRCT 3.0.239.0) to enable EUT under transmission condition continuously at specific channel frequency.
- d. The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Worst-case Data:

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	2.36 H	60	27.60	33.40
2	2390.00	52.6 AV	54.0	-1.4	2.36 H	60	19.20	33.40
3	*2412.00	118.6 PK			2.36 H	61	85.20	33.40
4	*2412.00	114.6 AV			2.36 H	61	81.20	33.40
5	4824.00	48.8 PK	74.0	-25.2	2.92 H	189	45.20	3.60
6	4824.00	37.1 AV	54.0	-16.9	2.92 H	189	33.50	3.60
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.8 PK	74.0	-13.2	3.67 V	7	27.40	33.40
2	2390.00	50.4 AV	54.0	-3.6	3.67 V	7	17.00	33.40
3	*2412.00	118.2 PK			3.72 V	13	84.80	33.40
4	*2412.00	115.0 AV			3.72 V	13	81.60	33.40
5	4824.00	48.4 PK	74.0	-25.6	2.28 V	240	44.80	3.60
6	4824.00	35.5 AV	54.0	-18.5	2.28 V	240	31.90	3.60

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1125.00	49.6 PK	74.0	-24.4	1.50 H	349	55.7	-6.1
2	1125.00	46.6 AV	54.0	-7.4	1.50 H	349	52.7	-6.1
3	1625.00	44.9 PK	74.0	-29.1	1.46 H	126	50.7	-5.8
4	1625.00	41.0 AV	54.0	-13.0	1.46 H	126	46.8	-5.8
5	*2437.00	121.4 PK			1.07 H	37	88.5	32.9
6	*2437.00	118.0 AV			1.07 H	37	85.1	32.9
7	4874.00	48.2 PK	74.0	-25.8	2.19 H	318	44.6	3.6
8	4874.00	37.6 AV	54.0	-16.4	2.19 H	318	34.0	3.6

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	1125.00	50.6 PK	74.0	-23.4	1.98 V	339	56.7	-6.1
2	1125.00	49.0 AV	54.0	-5.0	1.98 V	339	55.1	-6.1
3	1625.00	44.2 PK	74.0	-29.8	1.41 V	232	50.0	-5.8
4	1625.00	38.9 AV	54.0	-15.1	1.41 V	232	44.7	-5.8
5	*2437.00	120.4 PK			2.76 V	316	87.5	32.9
6	*2437.00	116.8 AV			2.76 V	316	83.9	32.9
7	4874.00	47.7 PK	74.0	-26.3	1.50 V	203	44.1	3.6
8	4874.00	35.4 AV	54.0	-18.6	1.50 V	203	31.8	3.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	121.4 PK			1.72 H	317	87.90	33.50
2	*2462.00	118.0 AV			1.72 H	317	84.50	33.50
3	2483.50	62.1 PK	74.0	-11.9	1.45 H	43	28.60	33.50
4	2483.50	52.6 AV	54.0	-1.4	1.45 H	43	19.10	33.50
5	4924.00	48.6 PK	74.0	-25.4	2.69 H	172	45.30	3.30
6	4924.00	35.8 AV	54.0	-18.2	2.69 H	172	32.50	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	119.0 PK			3.93 V	16	85.50	33.50
2	*2462.00	115.7 AV			3.93 V	16	82.20	33.50
3	2483.50	62.5 PK	74.0	-11.5	3.82 V	23	29.00	33.50
4	2483.50	49.1 AV	54.0	-4.9	3.82 V	23	15.60	33.50
5	4924.00	47.9 PK	74.0	-26.1	2.56 V	218	44.60	3.30
6	4924.00	35.0 AV	54.0	-19.0	2.56 V	218	31.70	3.30

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.6 PK	74.0	-6.4	2.25 H	299	34.20	33.40
2	2390.00	52.2 AV	54.0	-1.8	2.25 H	299	18.80	33.40
3	*2412.00	122.5 PK			2.36 H	56	89.10	33.40
4	*2412.00	110.0 AV			2.36 H	56	76.60	33.40
5	4824.00	50.3 PK	74.0	-23.7	1.69 H	297	46.70	3.60
6	4824.00	37.5 AV	54.0	-16.5	1.69 H	297	33.90	3.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	67.4 PK	74.0	-6.6	3.81 V	12	34.00	33.40
2	2390.00	52.0 AV	54.0	-2.0	3.81 V	12	18.60	33.40
3	*2412.00	119.4 PK			3.85 V	7	86.00	33.40
4	*2412.00	108.4 AV			3.85 V	7	75.00	33.40
5	4824.00	49.3 PK	74.0	-24.7	1.29 V	154	45.70	3.60
6	4824.00	36.4 AV	54.0	-17.6	1.29 V	154	32.80	3.60

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.3 PK	74.0	-7.7	2.36 H	69	32.90	33.40
2	2390.00	52.9 AV	54.0	-1.1	2.36 H	69	19.50	33.40
3	*2437.00	126.7 PK			2.26 H	56	93.30	33.40
4	*2437.00	115.6 AV			2.26 H	56	82.20	33.40
5	4874.00	49.6 PK	74.0	-24.4	2.85 H	139	46.30	3.30
6	4874.00	36.9 AV	54.0	-17.1	2.85 H	139	33.60	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.4 PK	74.0	-10.6	3.51 V	8	30.00	33.40
2	2390.00	51.0 AV	54.0	-3.0	3.51 V	8	17.60	33.40
3	*2437.00	125.2 PK			4.00 V	15	91.80	33.40
4	*2437.00	113.9 AV			4.00 V	15	80.50	33.40
5	4874.00	48.5 PK	74.0	-25.5	1.39 V	218	45.20	3.30
6	4874.00	35.8 AV	54.0	-18.2	1.39 V	218	32.50	3.30

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	117.8 PK			2.18 H	96	84.30	33.50
2	*2462.00	106.8 AV			2.18 H	96	73.30	33.50
3	2483.50	66.4 PK	74.0	-7.6	2.16 H	59	32.90	33.50
4	2483.50	52.7 AV	54.0	-1.3	2.16 H	59	19.20	33.50
5	4924.00	49.8 PK	74.0	-24.2	2.91 H	187	46.50	3.30
6	4924.00	36.7 AV	54.0	-17.3	2.91 H	187	33.40	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	116.8 PK			4.00 V	38	83.30	33.50
2	*2462.00	106.3 AV			4.00 V	38	72.80	33.50
3	2483.50	66.2 PK	74.0	-7.8	3.82 V	27	32.70	33.50
4	2483.50	52.0 AV	54.0	-2.0	3.82 V	27	18.50	33.50
5	4924.00	48.6 PK	74.0	-25.4	2.71 V	118	45.30	3.30
6	4924.00	36.1 AV	54.0	-17.9	2.71 V	118	32.80	3.30

REMARKS:

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

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.5 PK	74.0	-10.5	2.69 H	291	30.10	33.40
2	2390.00	52.3 AV	54.0	-1.7	2.69 H	291	18.90	33.40
3	*2412.00	118.6 PK			2.62 H	57	85.20	33.40
4	*2412.00	107.3 AV			2.62 H	57	73.90	33.40
5	4824.00	50.1 PK	74.0	-23.9	2.90 H	169	46.50	3.60
6	4824.00	36.8 AV	54.0	-17.2	2.90 H	169	33.20	3.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.2 PK	74.0	-7.8	3.92 V	17	32.80	33.40
2	2390.00	52.1 AV	54.0	-1.9	3.92 V	17	18.70	33.40
3	*2412.00	117.5 PK			3.84 V	11	84.10	33.40
4	*2412.00	105.8 AV			3.84 V	11	72.40	33.40
5	4824.00	49.3 PK	74.0	-24.7	1.85 V	211	45.70	3.60
6	4824.00	36.2 AV	54.0	-17.8	1.85 V	211	32.60	3.60

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.1 PK	74.0	-8.9	2.66 H	76	31.70	33.40
2	2390.00	52.5 AV	54.0	-1.5	2.66 H	76	19.10	33.40
3	*2437.00	124.7 PK			2.58 H	85	91.30	33.40
4	*2437.00	114.0 AV			2.58 H	85	80.60	33.40
5	4874.00	49.5 PK	74.0	-24.5	2.71 H	156	46.20	3.30
6	4874.00	36.8 AV	54.0	-17.2	2.71 H	156	33.50	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.6 PK	74.0	-10.4	3.80 V	19	30.20	33.40
2	2390.00	52.1 AV	54.0	-1.9	3.80 V	19	18.70	33.40
3	*2437.00	123.5 PK			3.78 V	9	90.10	33.40
4	*2437.00	112.9 AV			3.78 V	9	79.50	33.40
5	4874.00	48.9 PK	74.0	-25.1	1.94 V	213	45.60	3.30
6	4874.00	35.7 AV	54.0	-18.3	1.94 V	213	32.40	3.30

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	117.8 PK			2.47 H	65	84.30	33.50
2	*2462.00	106.8 AV			2.47 H	65	73.30	33.50
3	2483.50	68.3 PK	74.0	-5.7	2.37 H	87	34.80	33.50
4	2483.50	52.9 AV	54.0	-1.1	2.37 H	87	19.40	33.50
5	4924.00	49.9 PK	74.0	-24.1	2.95 H	142	46.60	3.30
6	4924.00	36.7 AV	54.0	-17.3	2.95 H	142	33.40	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	116.6 PK			3.87 V	14	83.10	33.50
2	*2462.00	105.5 AV			3.87 V	14	72.00	33.50
3	2483.50	66.5 PK	74.0	-7.5	3.89 V	10	33.00	33.50
4	2483.50	52.5 AV	54.0	-1.5	3.89 V	10	19.00	33.50
5	4924.00	48.5 PK	74.0	-25.5	1.28 V	251	45.20	3.30
6	4924.00	35.7 AV	54.0	-18.3	1.28 V	251	32.40	3.30

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	63.5 PK	74.0	-10.5	2.34 H	63	30.10	33.40
2	2390.00	52.7 AV	54.0	-1.3	2.34 H	63	19.30	33.40
3	*2422.00	107.7 PK			2.21 H	64	74.30	33.40
4	*2422.00	98.1 AV			2.21 H	64	64.70	33.40
5	4844.00	48.0 PK	74.0	-26.0	1.53 H	226	44.50	3.50
6	4844.00	35.1 AV	54.0	-18.9	1.53 H	226	31.60	3.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	60.1 PK	74.0	-13.9	3.70 V	33	26.70	33.40
2	2390.00	48.9 AV	54.0	-5.1	3.70 V	33	15.50	33.40
3	*2422.00	106.2 PK			3.72 V	9	72.80	33.40
4	*2422.00	97.0 AV			3.72 V	9	63.60	33.40
5	4844.00	47.7 PK	74.0	-26.3	2.45 V	102	44.20	3.50
6	4844.00	34.8 AV	54.0	-19.2	2.45 V	102	31.30	3.50

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.2 PK			3.23 H	74	78.80	33.40
2	*2437.00	102.4 AV			3.23 H	74	69.00	33.40
3	2483.50	65.9 PK	74.0	-8.1	3.24 H	71	32.40	33.50
4	2483.50	52.5 AV	54.0	-1.5	3.24 H	71	19.00	33.50
5	4874.00	47.9 PK	74.0	-26.1	2.44 H	326	44.60	3.30
6	4874.00	34.8 AV	54.0	-19.2	2.44 H	326	31.50	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	112.2 PK			3.91 V	10	78.80	33.40
2	*2437.00	102.8 AV			3.91 V	10	69.40	33.40
3	2483.50	62.1 PK	74.0	-11.9	3.86 V	9	28.60	33.50
4	2483.50	49.5 AV	54.0	-4.5	3.86 V	9	16.00	33.50
5	4874.00	47.6 PK	74.0	-26.4	2.13 V	155	44.30	3.30
6	4874.00	34.5 AV	54.0	-19.5	2.13 V	155	31.20	3.30

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	109.7 PK			1.97 H	296	76.20	33.50
2	*2452.00	100.2 AV			1.97 H	296	66.70	33.50
3	2483.50	65.4 PK	74.0	-8.6	1.89 H	287	31.90	33.50
4	2483.50	52.7 AV	54.0	-1.3	1.89 H	287	19.20	33.50
5	4904.00	48.1 PK	74.0	-25.9	2.23 H	332	44.80	3.30
6	4904.00	34.5 AV	54.0	-19.5	2.23 H	332	31.20	3.30

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	109.5 PK			3.67 V	24	76.00	33.50
2	*2452.00	99.8 AV			3.67 V	24	66.30	33.50
3	2483.50	66.3 PK	74.0	-7.7	3.50 V	45	32.80	33.50
4	2483.50	52.5 AV	54.0	-1.5	3.50 V	45	19.00	33.50
5	4904.00	47.4 PK	74.0	-26.6	1.58 V	332	44.10	3.30
6	4904.00	34.3 AV	54.0	-19.7	1.58 V	332	31.00	3.30

REMARKS:

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

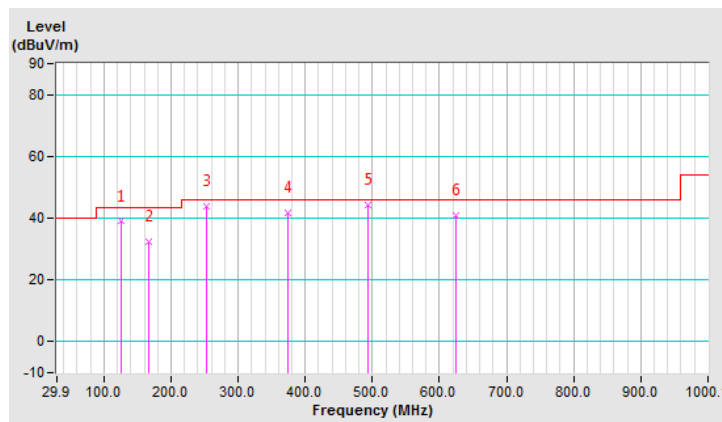
Below 1GHz Worst-case Data: 802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	125.17	38.9 QP	43.5	-4.6	1.50 H	238	49.9	-11.0
2	166.00	32.2 QP	43.5	-11.3	1.99 H	245	41.3	-9.1
3	253.49	44.0 QP	46.0	-2.0	1.00 H	82	53.1	-9.1
4	374.04	41.7 QP	46.0	-4.3	1.00 H	105	47.6	-5.9
5	492.64	44.4 QP	46.0	-1.6	1.99 H	15	48.2	-3.8
6	624.85	41.0 QP	46.0	-5.0	1.00 H	211	41.7	-0.7

Remarks:

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

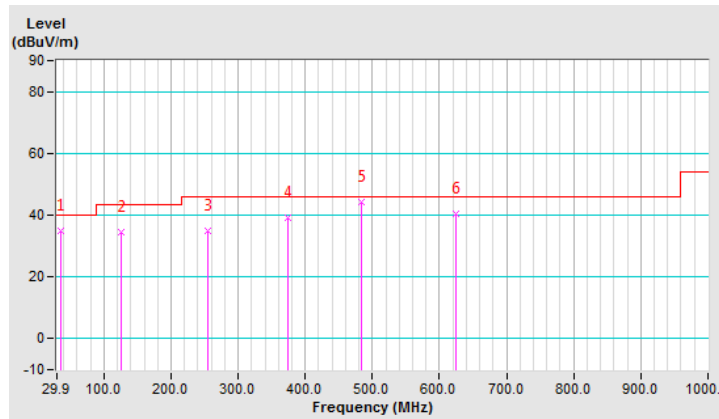


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	35.73	34.9 QP	40.0	-5.1	1.01 V	177	46.0	-11.1
2	125.17	34.7 QP	43.5	-8.8	1.01 V	221	45.7	-11.0
3	255.44	34.9 QP	46.0	-11.1	2.00 V	246	43.9	-9.0
4	374.04	39.1 QP	46.0	-6.9	1.51 V	16	45.0	-5.9
5	482.92	44.1 QP	46.0	-1.9	1.01 V	331	48.1	-4.0
6	624.85	40.6 QP	46.0	-5.4	1.01 V	352	41.3	-0.7

Remarks:

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

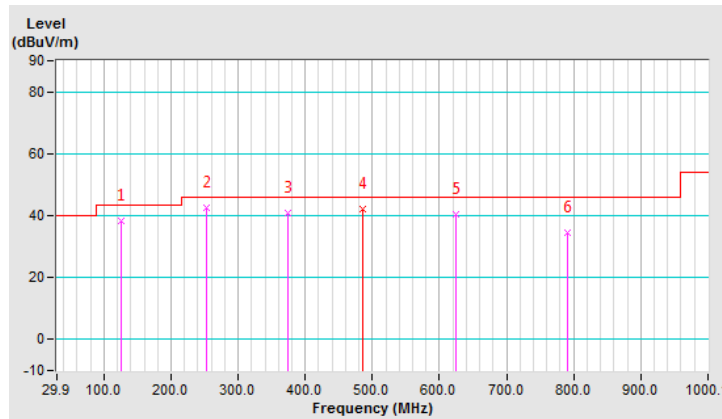


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	125.17	38.5 QP	43.5	-5.0	1.49 H	234	49.5	-11.0
2	253.49	42.6 QP	46.0	-3.4	1.00 H	312	51.7	-9.1
3	374.04	40.9 QP	46.0	-5.1	1.00 H	119	46.8	-5.9
4	486.59	42.1 QP	46.0	-3.9	1.98 H	15	46.0	-3.9
5	624.85	40.3 QP	46.0	-5.7	1.00 H	125	41.0	-0.7
6	790.12	34.5 QP	46.0	-11.5	1.49 H	162	32.2	2.3

Remarks:

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

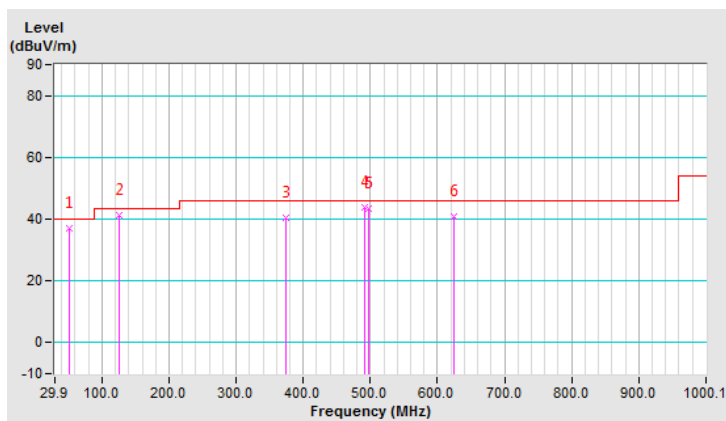


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	51.29	37.0 QP	40.0	-3.0	1.01 V	28	46.7	-9.7
2	125.17	41.1 QP	43.5	-2.4	1.01 V	35	52.1	-11.0
3	374.04	40.3 QP	46.0	-5.7	1.50 V	5	46.2	-5.9
4	490.70	43.9 QP	46.0	-2.1	1.01 V	307	47.7	-3.8
5	496.53	43.2 QP	46.0	-2.8	1.01 V	304	46.9	-3.7
6	624.85	40.7 QP	46.0	-5.3	1.01 V	343	41.4	-0.7

Remarks:

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

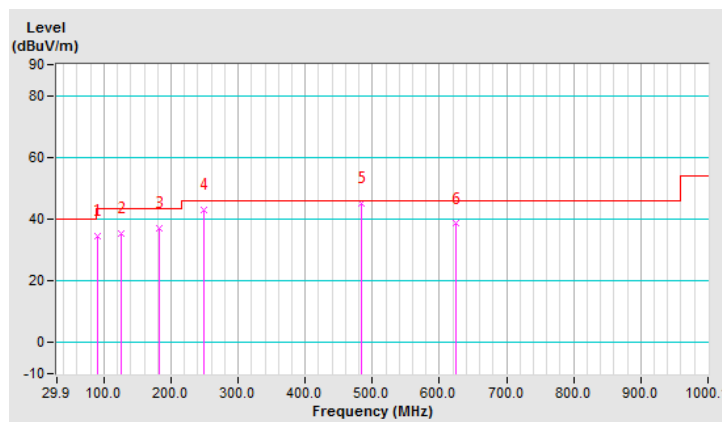


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	C

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	90.17	34.4 QP	43.5	-9.1	1.99 H	258	49.0	-14.6
2	125.17	35.5 QP	43.5	-8.0	1.49 H	243	46.5	-11.0
3	181.55	37.2 QP	43.5	-6.3	1.49 H	273	47.6	-10.4
4	249.60	43.1 QP	46.0	-2.9	1.00 H	256	52.2	-9.1
5	482.92	45.2 QP	46.0	-0.8	1.49 H	306	49.2	-4.0
6	624.85	38.5 QP	46.0	-7.5	1.00 H	140	39.2	-0.7

Remarks:

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

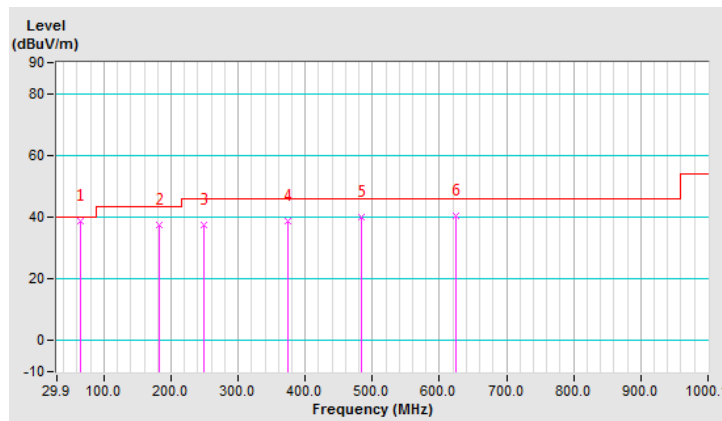


CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	C

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	64.90	38.6 QP	40.0	-1.4	1.00 V	21	49.5	-10.9
2	181.55	37.4 QP	43.5	-6.1	1.00 V	108	47.8	-10.4
3	249.60	37.6 QP	46.0	-8.4	2.00 V	295	46.7	-9.1
4	374.04	38.9 QP	46.0	-7.1	1.00 V	139	44.8	-5.9
5	482.92	40.2 QP	46.0	-5.8	1.00 V	22	44.2	-4.0
6	624.85	40.3 QP	46.0	-5.7	1.00 V	139	41.0	-0.7

Remarks:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Tested date: Mar. 08 ~ Mar. 19, 2019

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS 30	100288	Jan. 03, 2019	Jan. 02, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
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 1.
 3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

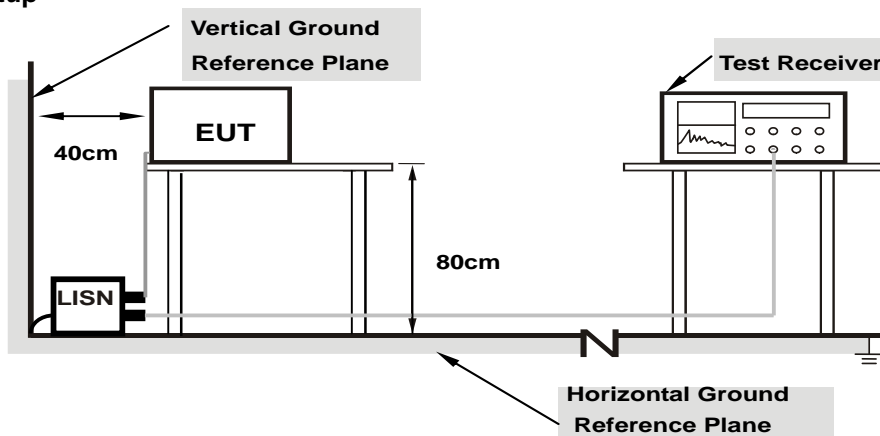
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

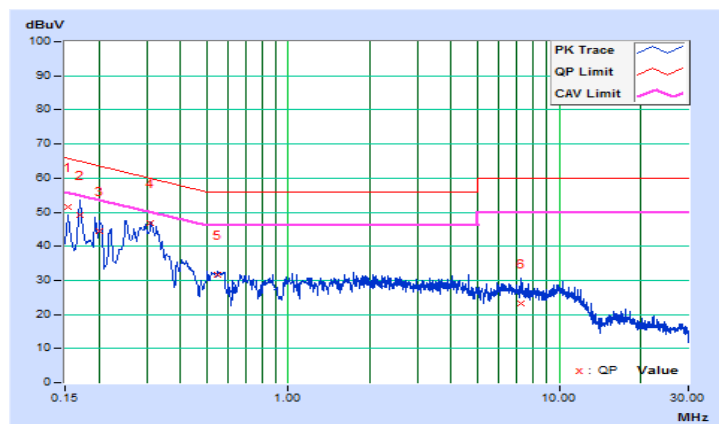
4.2.7 Test Results

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

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	9.69	41.96	29.05	51.65	38.74	65.78	55.78	-14.13	-17.04
2	0.17000	9.69	39.43	26.03	49.12	35.72	64.96	54.96	-15.84	-19.24
3	0.20201	9.68	34.86	23.41	44.54	33.09	63.53	53.53	-18.99	-20.44
4	0.31037	9.68	37.11	30.49	46.79	40.17	59.96	49.96	-13.17	-9.79
5	0.54975	9.68	21.90	16.97	31.58	26.65	56.00	46.00	-24.42	-19.35
6	7.18600	9.81	13.39	7.98	23.20	17.79	60.00	50.00	-36.80	-32.21

Remarks:

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

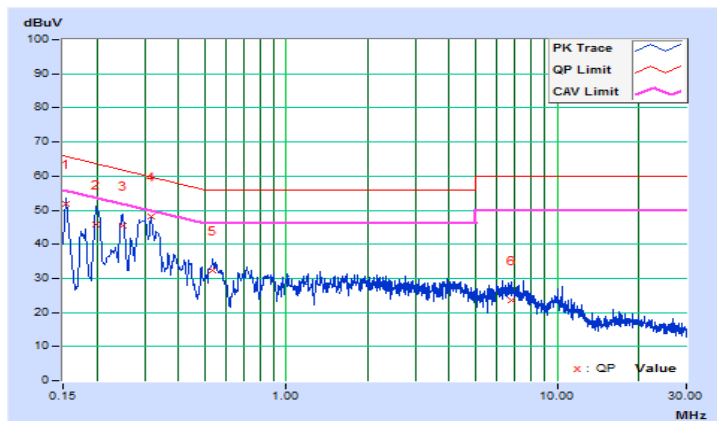


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15400	9.66	42.33	29.48	51.99	39.14	65.78
2	0.19832	9.66	36.26	25.24	45.92	34.90	63.68	53.68	-17.76	-18.78
3	0.24941	9.66	35.75	26.18	45.41	35.84	61.78	51.78	-16.37	-15.94
4	0.31698	9.65	38.39	30.76	48.04	40.41	59.79	49.79	-11.75	-9.38
5	0.53404	9.65	22.51	15.90	32.16	25.55	56.00	46.00	-23.84	-20.45
6	6.77800	9.78	13.92	8.36	23.70	18.14	60.00	50.00	-36.30	-31.86

Remarks:

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

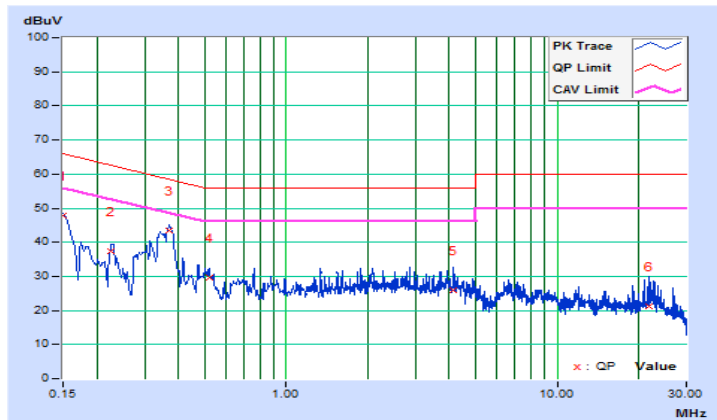


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	9.69	38.02	27.13	47.71	36.82	66.00
2	0.22624	9.68	27.58	18.18	37.26	27.86	62.59	52.59	-25.33	-24.73
3	0.37028	9.68	33.76	27.45	43.44	37.13	58.49	48.49	-15.05	-11.36
4	0.51800	9.68	20.11	14.32	29.79	24.00	56.00	46.00	-26.21	-22.00
5	4.15000	9.75	16.08	9.01	25.83	18.76	56.00	46.00	-30.17	-27.24
6	21.94600	9.93	11.12	4.10	21.05	14.03	60.00	50.00	-38.95	-35.97

Remarks:

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

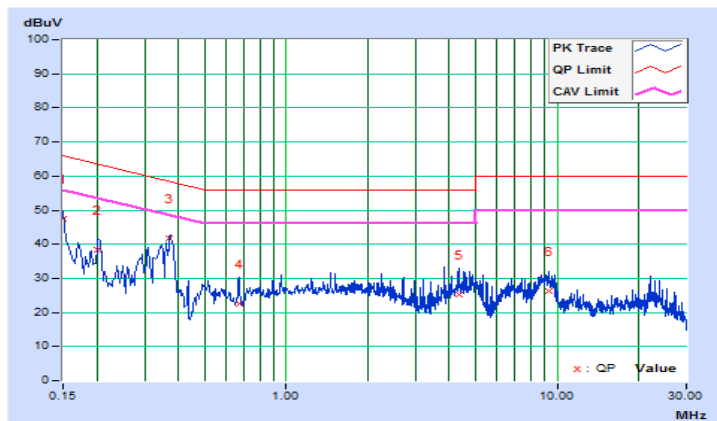


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15000	9.66	37.81	27.39	47.47	37.05	66.00
2	0.20201	9.66	28.86	17.48	38.52	27.14	63.53	53.53	-25.01	-26.39
3	0.37126	9.65	32.17	25.55	41.82	35.20	58.47	48.47	-16.65	-13.27
4	0.66809	9.65	12.86	6.47	22.51	16.12	56.00	46.00	-33.49	-29.88
5	4.35800	9.73	15.40	8.31	25.13	18.04	56.00	46.00	-30.87	-27.96
6	9.28600	9.83	16.37	11.32	26.20	21.15	60.00	50.00	-33.80	-28.85

Remarks:

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

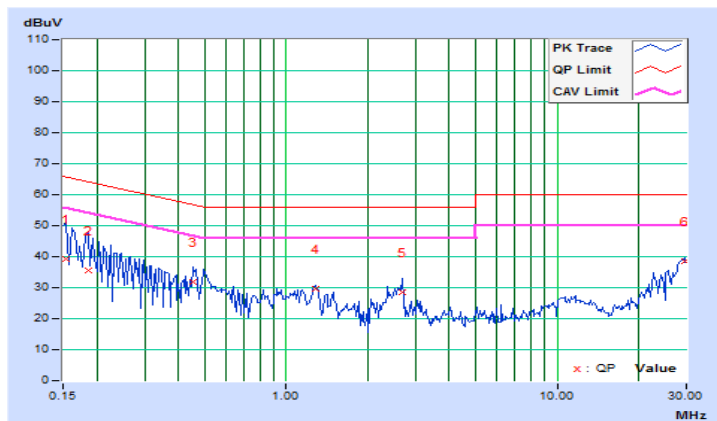


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.15391	9.69	29.68	9.60	39.37	19.29	65.79
2	0.18516	9.68	25.85	8.41	35.53	18.09	64.25	54.25	-28.72	-36.16
3	0.45469	9.68	22.16	9.86	31.84	19.54	56.79	46.79	-24.95	-27.25
4	1.28516	9.68	19.79	12.20	29.47	21.88	56.00	46.00	-26.53	-24.12
5	2.67578	9.72	18.95	2.82	28.67	12.54	56.00	46.00	-27.33	-33.46
6	29.44531	9.95	28.45	23.76	38.40	33.71	60.00	50.00	-21.60	-16.29

Remarks:

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

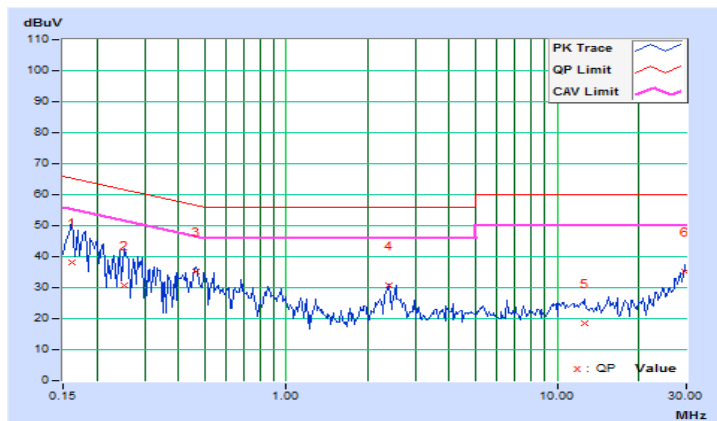


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.16172	9.66	28.57	4.55	38.23	14.21	65.38
2	0.25156	9.66	21.02	6.77	30.68	16.43	61.71	51.71	-31.03	-35.28
3	0.46250	9.65	25.42	20.51	35.07	30.16	56.65	46.65	-21.58	-16.49
4	2.38281	9.68	21.20	6.35	30.88	16.03	56.00	46.00	-25.12	-29.97
5	12.58594	9.89	8.52	1.69	18.41	11.58	60.00	50.00	-41.59	-38.42
6	29.69531	10.04	25.15	23.62	35.19	33.66	60.00	50.00	-24.81	-16.34

Remarks:

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

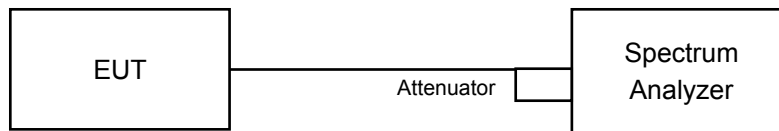


4.3 6dB Bandwidth Measurement

4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	8.10	8.10	7.56	7.12	0.5	Pass
6	2437	8.11	8.12	8.09	7.13	0.5	Pass
11	2462	7.62	8.13	8.08	8.10	0.5	Pass

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	16.35	15.95	15.56	15.96	0.5	Pass
6	2437	16.36	16.34	15.40	15.96	0.5	Pass
11	2462	16.37	16.35	15.78	15.77	0.5	Pass

802.11n (HT20)

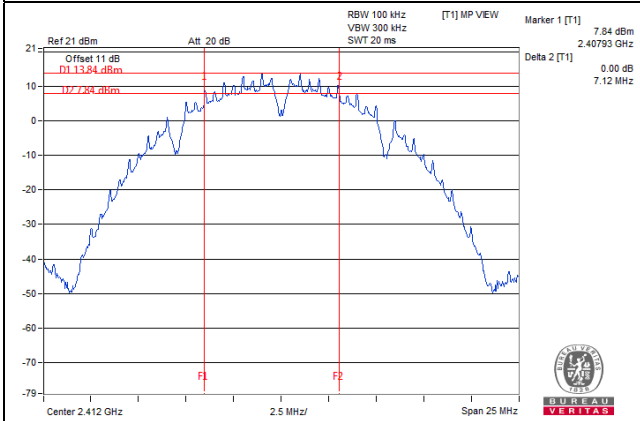
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
1	2412	17.56	16.05	16.02	16.36	0.5	Pass
6	2437	16.87	16.92	15.19	16.57	0.5	Pass
11	2462	17.23	16.34	16.31	16.36	0.5	Pass

802.11n (HT40)

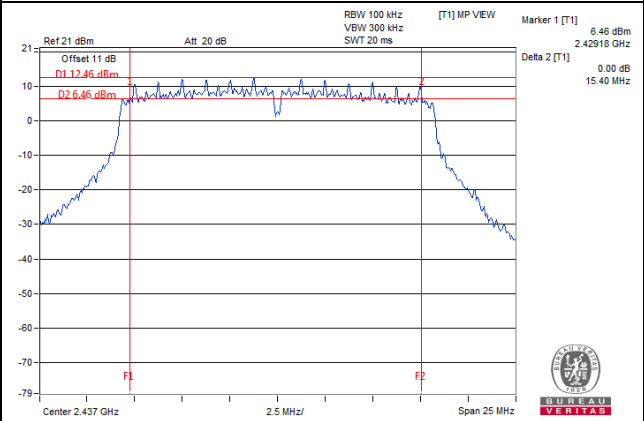
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
3	2422	35.20	35.09	35.21	35.12	0.5	Pass
6	2437	35.28	35.14	35.23	33.93	0.5	Pass
9	2452	35.26	35.13	35.09	35.30	0.5	Pass

Spectrum Plot of Worst Value

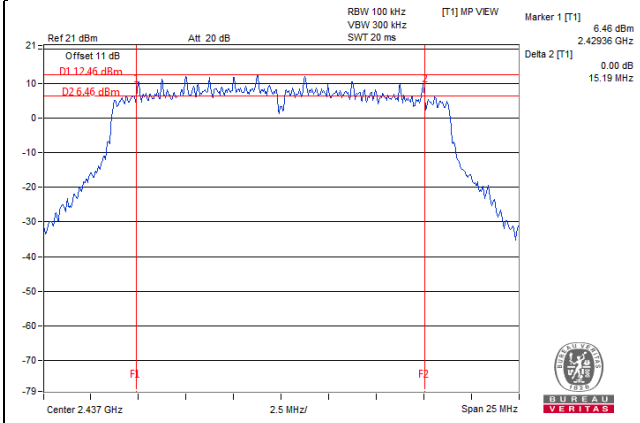
802.11b



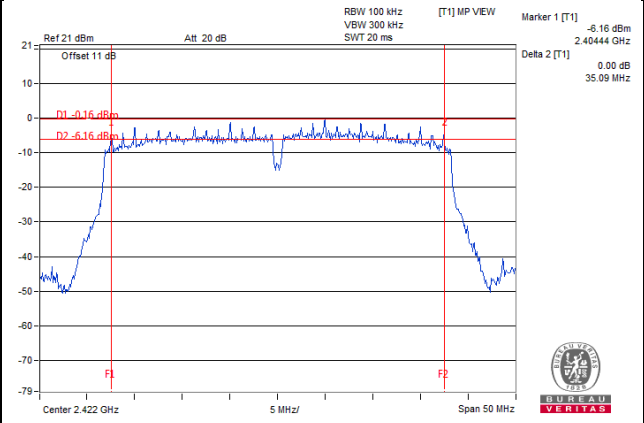
802.11g



802.11n (HT20)



802.11n (HT40)



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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

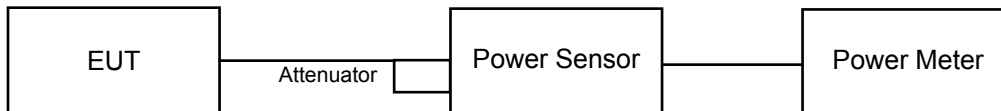
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

CDD Mode

802.11b

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	21.67	21.69	21.45	21.52	576.007	27.60	30	Pass
6	2437	23.56	23.53	23.42	23.54	898.140	29.53	30	Pass
11	2462	23.49	23.11	22.64	23.25	823.004	29.15	30	Pass

802.11g

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	18.14	18.04	17.99	18.04	255.474	24.07	30	Pass
6	2437	23.13	22.92	22.86	23.04	796.042	29.01	30	Pass
11	2462	16.82	16.62	16.53	16.67	185.434	22.68	30	Pass

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	15.86	15.66	15.46	15.71	147.756	21.70	30	Pass
6	2437	22.69	22.63	22.58	22.74	738.077	28.68	30	Pass
11	2462	16.88	16.71	16.62	16.73	188.652	22.76	30	Pass

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	12.69	12.66	12.67	13.05	75.705	18.79	30	Pass
6	2437	18.46	18.25	18.49	18.61	280.223	24.48	30	Pass
9	2452	15.73	15.84	16.07	16.06	156.605	21.95	30	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
1	2412	15.11	14.91	14.71	14.96	124.321	20.95	29.99	Pass
6	2437	21.94	21.88	21.83	21.99	621.015	27.93	29.99	Pass
11	2462	16.13	15.96	15.87	15.98	158.731	22.01	29.99	Pass

Note:

1. The antenna is cross-polarized antenna.
2. Gain = 3dBi + 10log (2) = 6.01dBi > 6dBi > 6dBi, so the power limit shall be reduced to 30-(6.01-6) = 29.99dBm.

802.11n (HT40)

Chan.	Chan. Freq. (MHz)	AVG. Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
3	2422	11.94	11.91	11.92	12.30	63.697	18.04	29.99	Pass
6	2437	17.71	17.50	17.74	17.86	235.777	23.73	29.99	Pass
9	2452	14.98	15.09	15.32	15.31	131.766	21.20	29.99	Pass

Note:

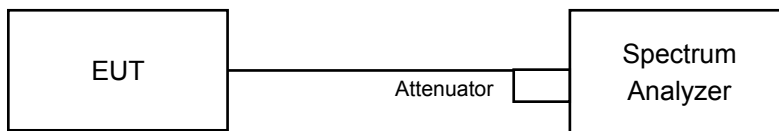
1. The antenna is cross-polarized antenna.
2. Gain = 3dBi + 10log (2) = 6.01dBi > 6dBi > 6dBi, so the power limit shall be reduced to 30-(6.01-6) = 29.99dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For AVG. power (duty cycle $\geq 98\%$)

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \times \text{RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span}/\text{RBW}$.
- Sweep time = auto couple.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.

For AVG. power (duty cycle $< 98\%$)

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Total PSD PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-5.42	6.02	0.60	7.99	Pass
	6	2437	-3.59	6.02	2.43	7.99	Pass
	11	2462	-3.44	6.02	2.58	7.99	Pass
1	1	2412	-5.26	6.02	0.76	7.99	Pass
	6	2437	-3.84	6.02	2.18	7.99	Pass
	11	2462	-3.94	6.02	2.08	7.99	Pass
2	1	2412	-5.85	6.02	0.17	7.99	Pass
	6	2437	-4.25	6.02	1.77	7.99	Pass
	11	2462	-4.18	6.02	1.84	7.99	Pass
3	1	2412	-4.88	6.02	1.14	7.99	Pass
	6	2437	-3.90	6.02	2.12	7.99	Pass
	11	2462	-3.66	6.02	2.36	7.99	Pass

Note:

- Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
- The antenna is cross-polarized antenna.
- Directional gain = $3\text{dBi} + 10\log(2) = 6.01\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.01 - 6) = 7.99\text{dBm}$.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty factor (dB)	Total PSD PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-11.59	6.02	0.16	-5.41	7.99	Pass
	6	2437	-7.60	6.02	0.16	-1.42	7.99	Pass
	11	2462	-13.54	6.02	0.16	-7.36	7.99	Pass
1	1	2412	-12.28	6.02	0.16	-6.10	7.99	Pass
	6	2437	-7.53	6.02	0.16	-1.35	7.99	Pass
	11	2462	-13.76	6.02	0.16	-7.58	7.99	Pass
2	1	2412	-11.48	6.02	0.16	-5.30	7.99	Pass
	6	2437	-6.90	6.02	0.16	-0.72	7.99	Pass
	11	2462	-13.51	6.02	0.16	-7.33	7.99	Pass
3	1	2412	-11.85	6.02	0.16	-5.67	7.99	Pass
	6	2437	-7.11	6.02	0.16	-0.93	7.99	Pass
	11	2462	-13.10	6.02	0.16	-6.92	7.99	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra corresponding frequency bins on the various outputs by computer.
2. The antenna is cross-polarized antenna.
3. Directional gain = 3dBi + 10log (2) = 6.01dBi > 6dBi, so the power density limit shall be reduced to 8-(6.01-6) = 7.99dBm.
4. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty factor (dB)	Total PSD PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	1	2412	-14.21	6.02	0.09	-8.10	7.99	Pass
	6	2437	-6.93	6.02	0.09	-0.82	7.99	Pass
	11	2462	-13.06	6.02	0.09	-6.95	7.99	Pass
1	1	2412	-13.93	6.02	0.09	-7.82	7.99	Pass
	6	2437	-7.23	6.02	0.09	-1.12	7.99	Pass
	11	2462	-12.66	6.02	0.09	-6.55	7.99	Pass
2	1	2412	-14.03	6.02	0.09	-7.92	7.99	Pass
	6	2437	-6.63	6.02	0.09	-0.52	7.99	Pass
	11	2462	-12.33	6.02	0.09	-6.22	7.99	Pass
3	1	2412	-13.30	6.02	0.09	-7.19	7.99	Pass
	6	2437	-7.00	6.02	0.09	-0.89	7.99	Pass
	11	2462	-12.28	6.02	0.09	-6.17	7.99	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The antenna is cross-polarized antenna.
3. Directional gain = 3dBi + 10log (2) = 6.01dBi > 6dBi, so the power density limit shall be reduced to 8-(6.01-6) = 7.99dBm.
4. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/10kHz)	10 log (N=4) dB	Duty factor (dB)	Total PSD PSD With Duty Factor (dBm/10kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	3	2422	-20.82	6.02	0.17	-14.63	7.99	Pass
	6	2437	-14.82	6.02	0.17	-8.63	7.99	Pass
	9	2452	-17.50	6.02	0.17	-11.31	7.99	Pass
1	3	2422	-19.93	6.02	0.17	-13.74	7.99	Pass
	6	2437	-14.79	6.02	0.17	-8.60	7.99	Pass
	9	2452	-16.62	6.02	0.17	-10.43	7.99	Pass
2	3	2422	-19.73	6.02	0.17	-13.54	7.99	Pass
	6	2437	-13.80	6.02	0.17	-7.61	7.99	Pass
	9	2452	-16.28	6.02	0.17	-10.09	7.99	Pass
3	3	2422	-20.04	6.02	0.17	-13.85	7.99	Pass
	6	2437	-13.92	6.02	0.17	-7.73	7.99	Pass
	9	2452	-16.16	6.02	0.17	-9.97	7.99	Pass

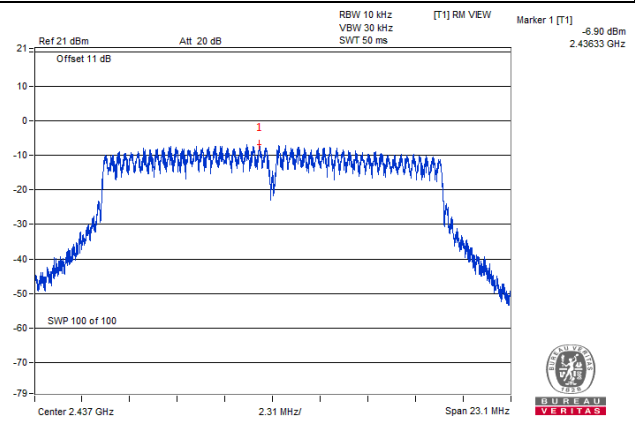
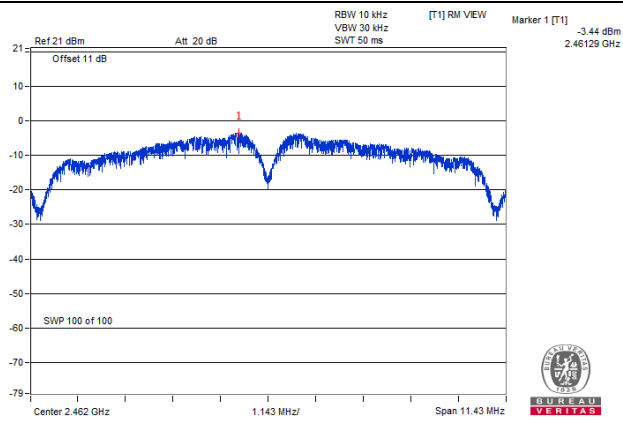
Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The antenna is cross-polarized antenna.
3. Directional gain = $3\text{dBi} + 10\log(2) = 6.01\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $8 - (6.01 - 6) = 7.99\text{dBm}$.
4. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

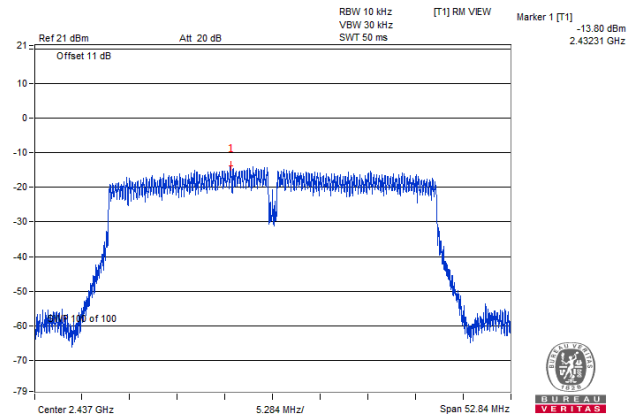
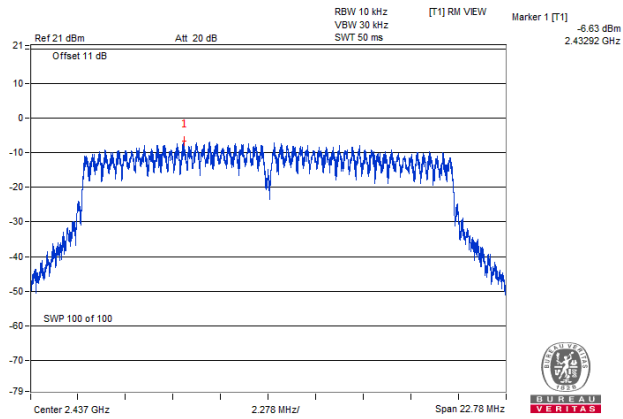
802.11b

802.11g



802.11n (HT20)

802.11n (HT40)

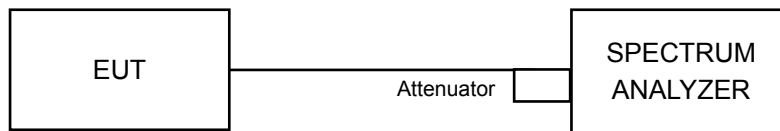


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

- Set RBW = 100 kHz.
- Set VBW \geq 300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

Same as Item 4.3.6

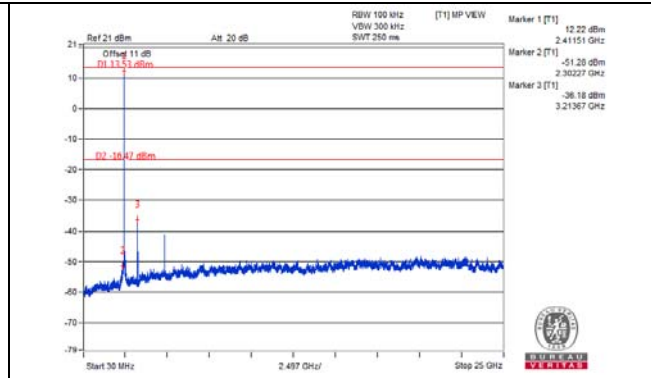
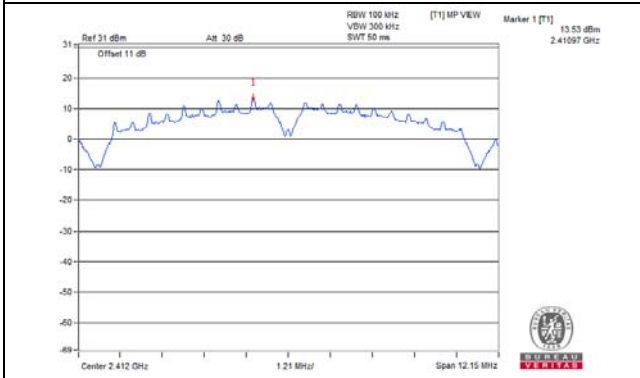
4.6.7 Test Results

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

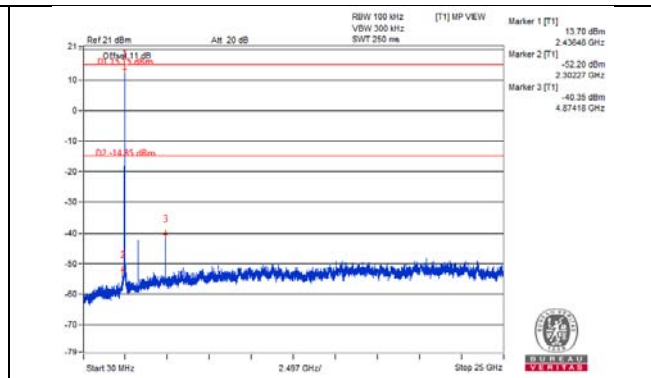
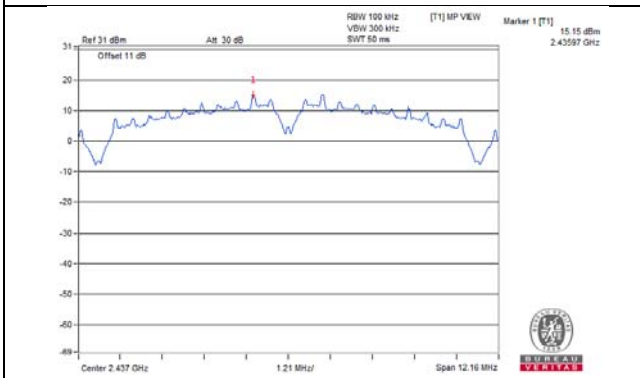
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 30dB offset below D1. It shows compliance with the requirement.

802.11b
CHAIN 0

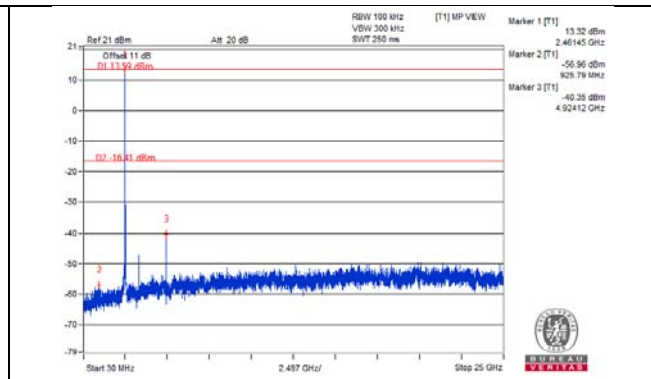
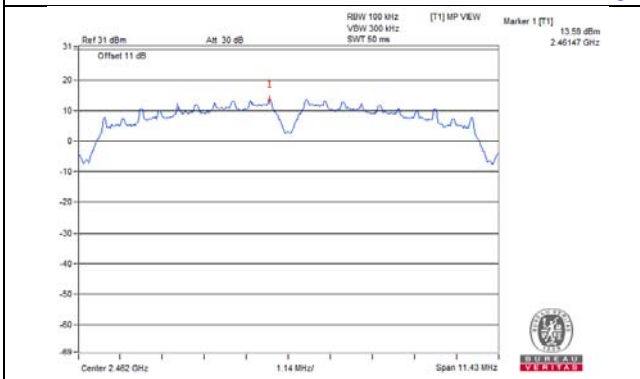
CH 1



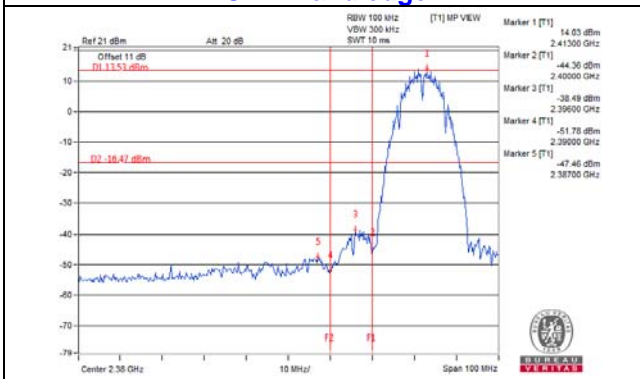
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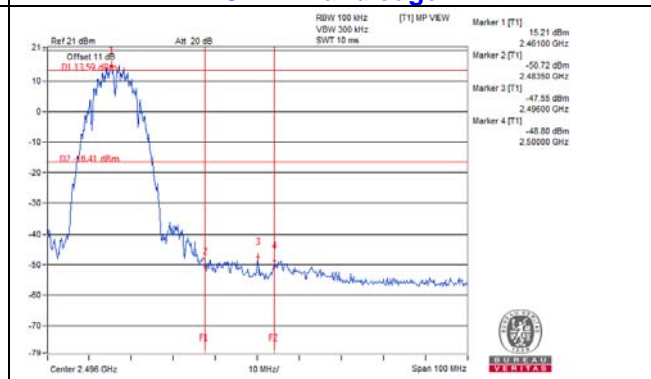
CH 11



CH 1 Band edge

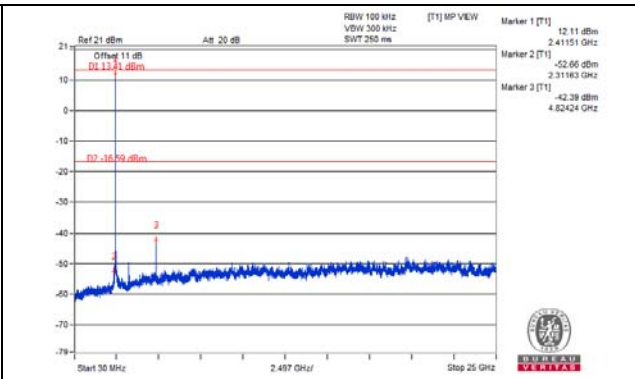
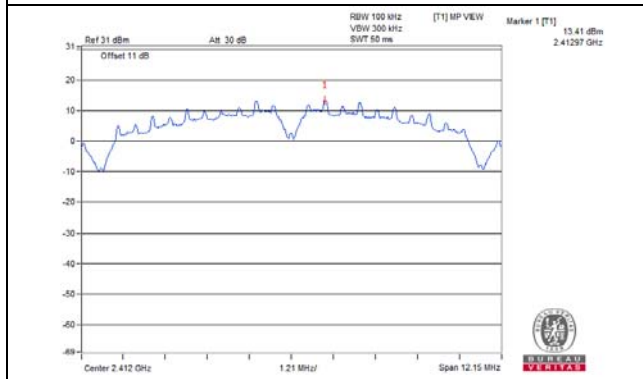


CH 11 Band edge

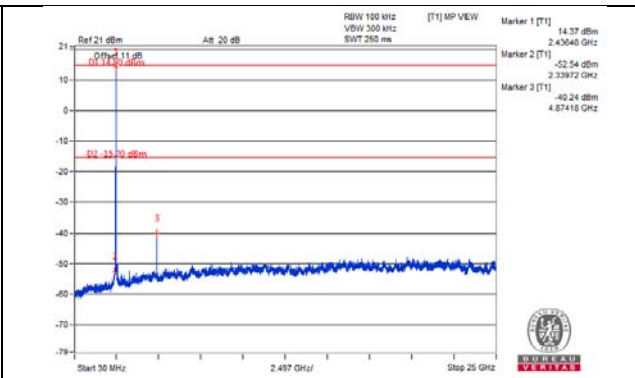
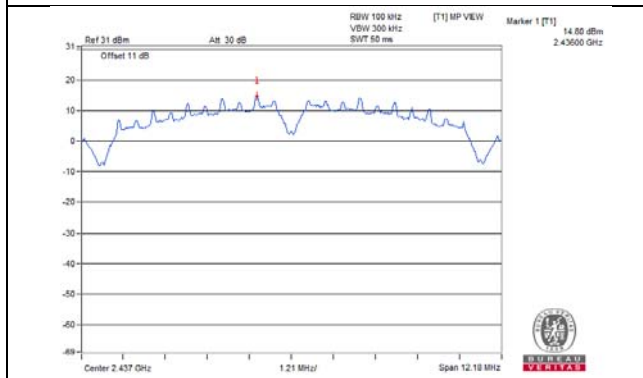


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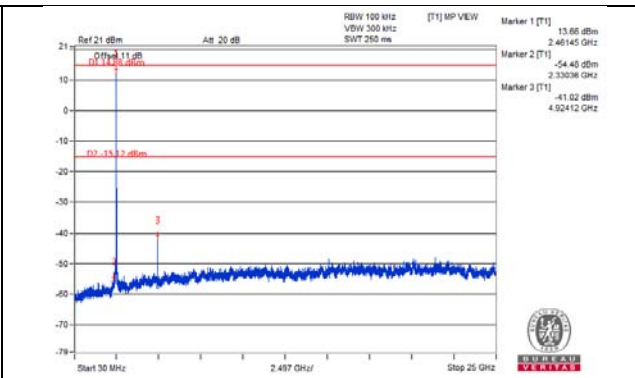
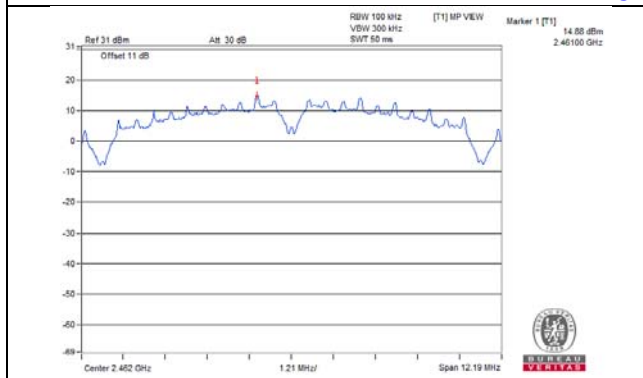
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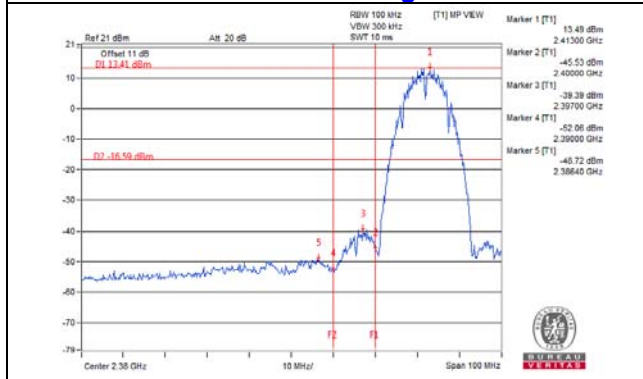
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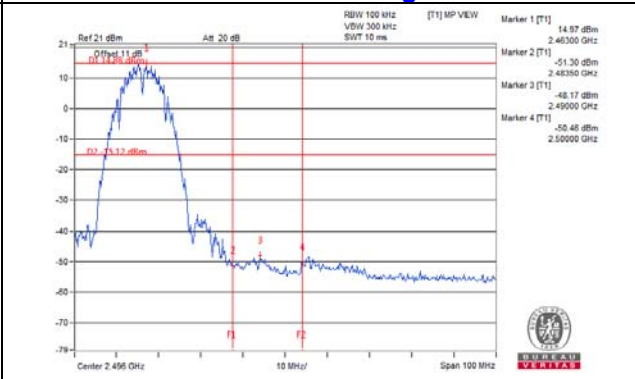
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CH 1 Band edge

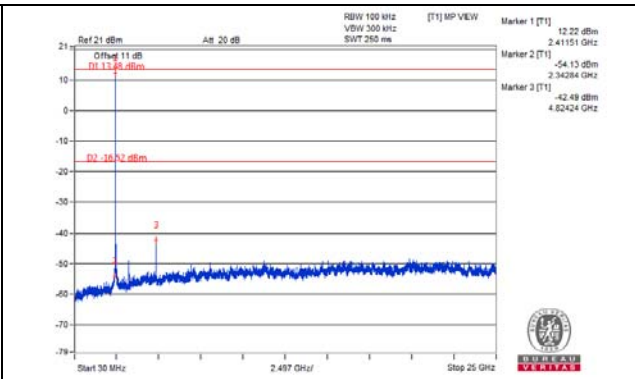
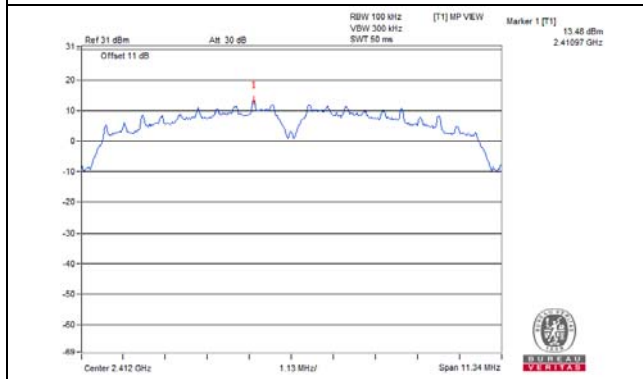


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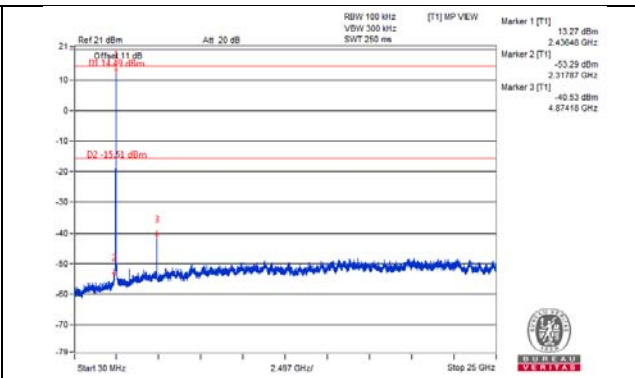
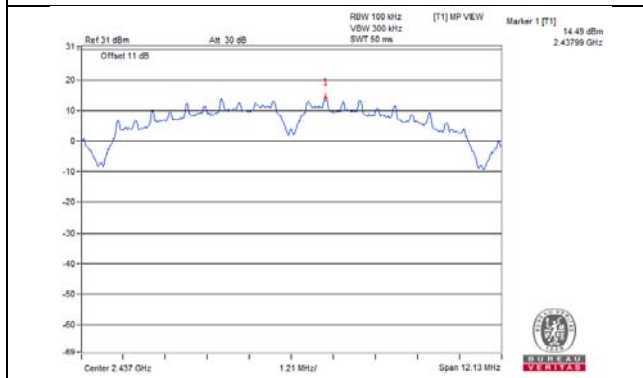


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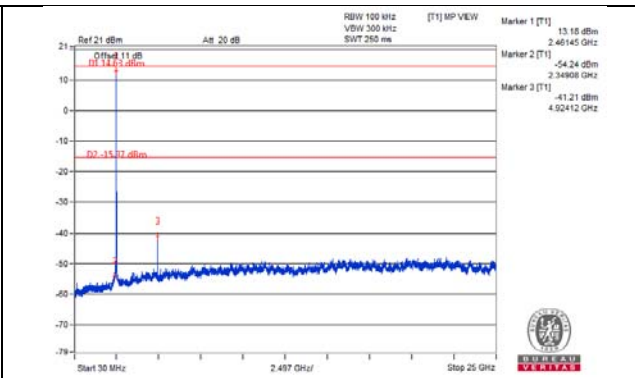
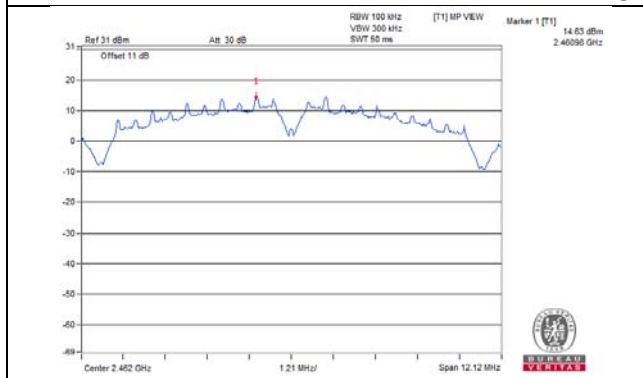
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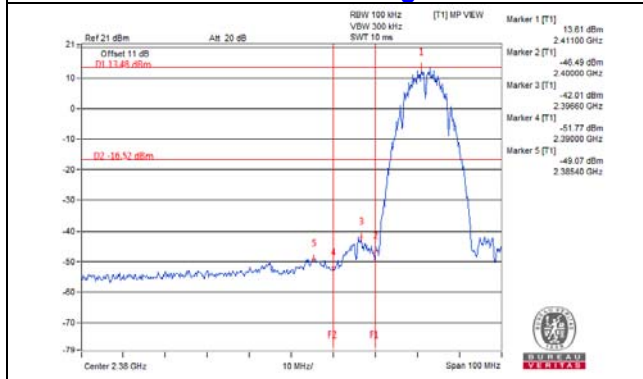
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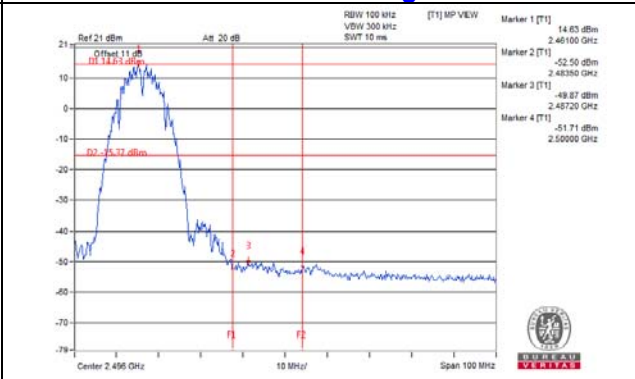
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CH 1 Band edge

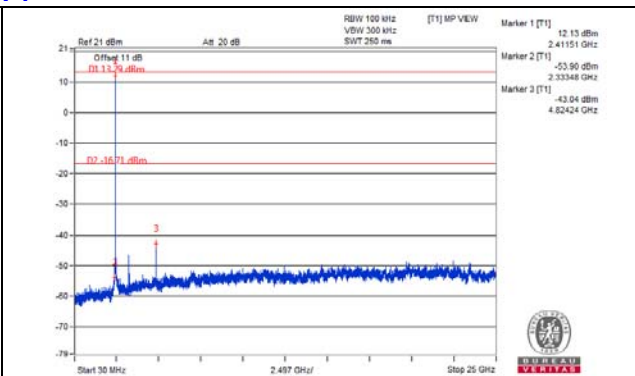
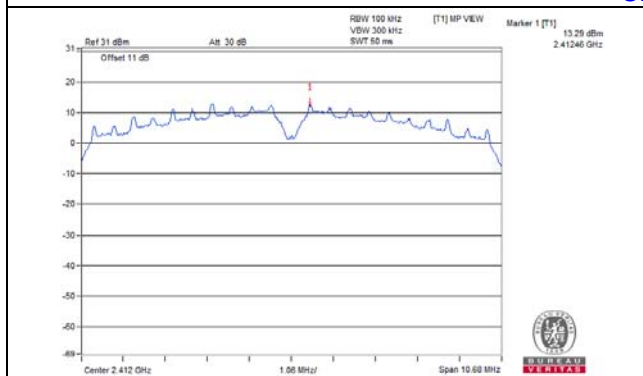


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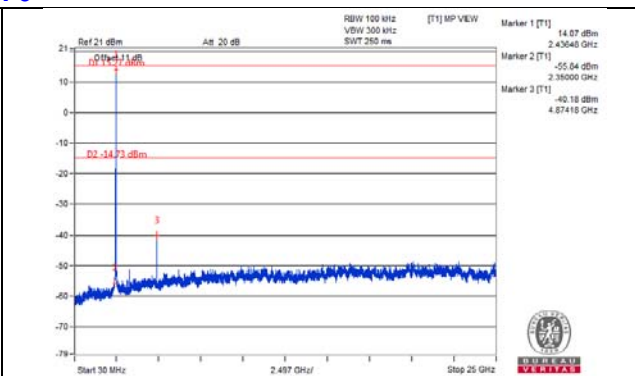
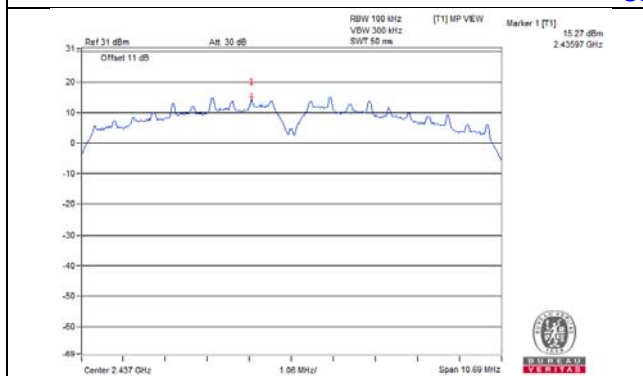


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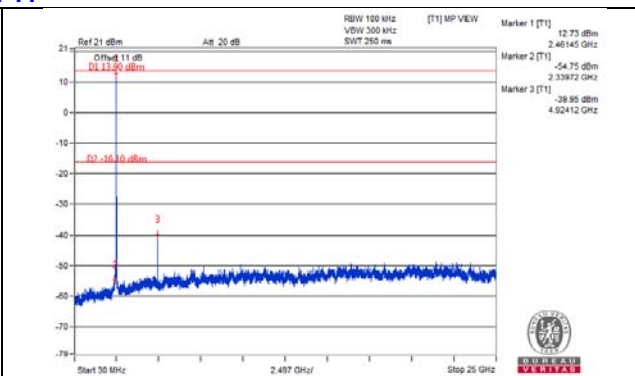
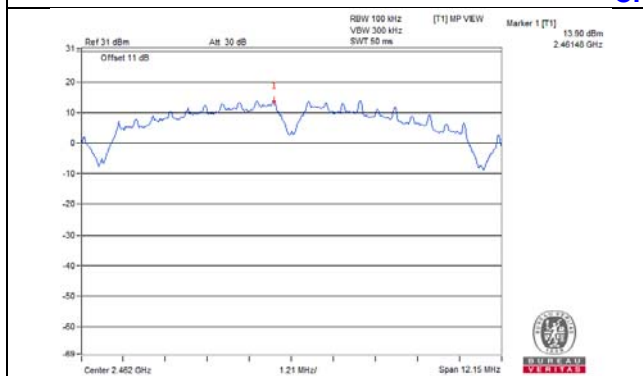
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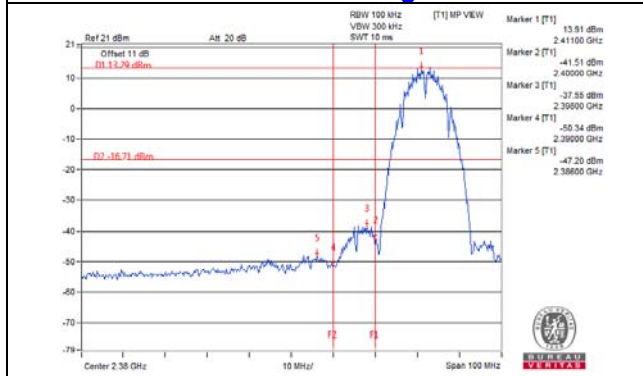
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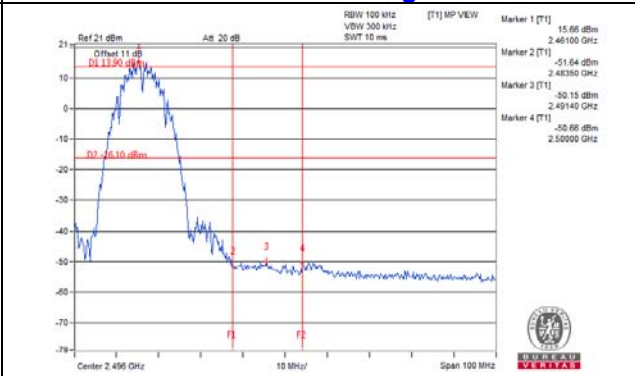
CH 11



CH 1 Band edge

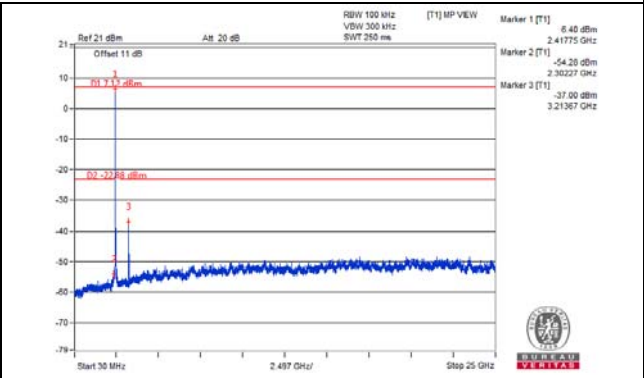
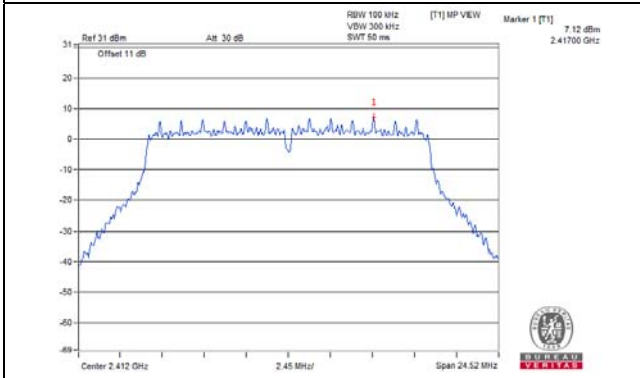


CH 11 Band edge

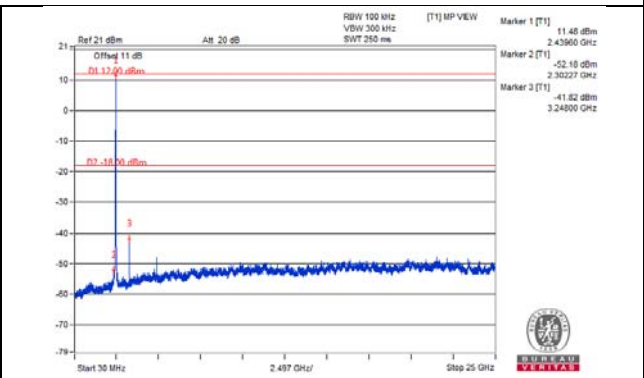
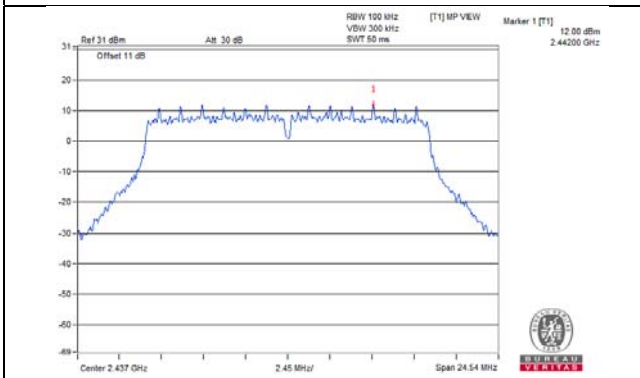


802.11g
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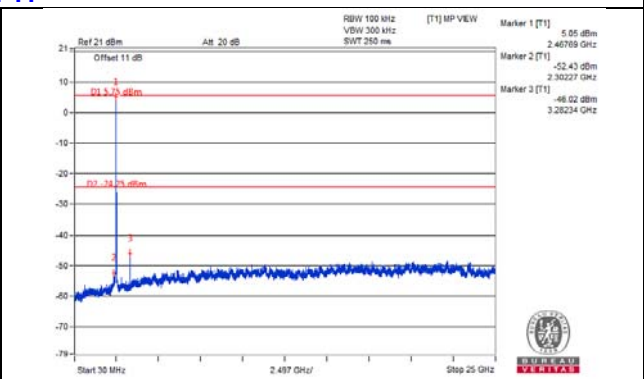
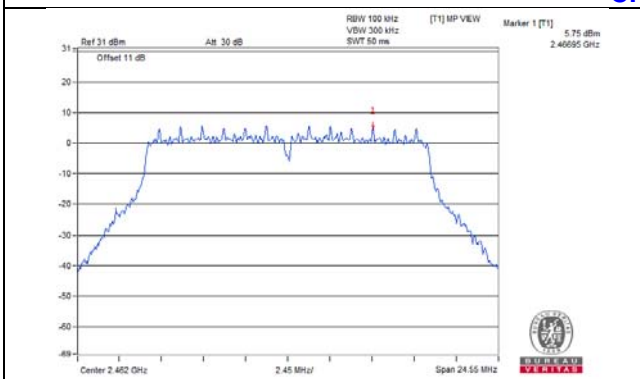
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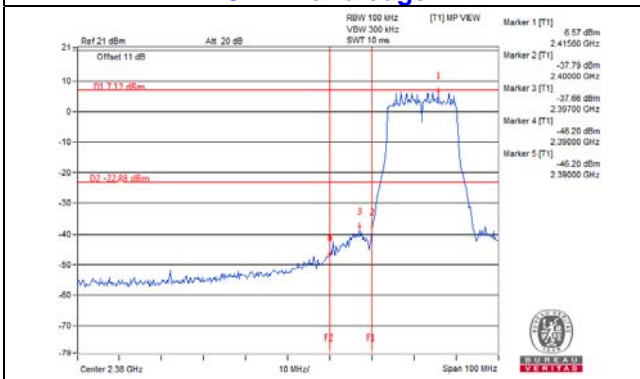
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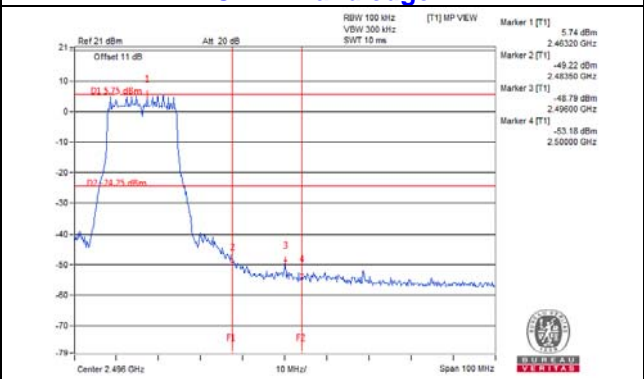
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CH 1 Band edge

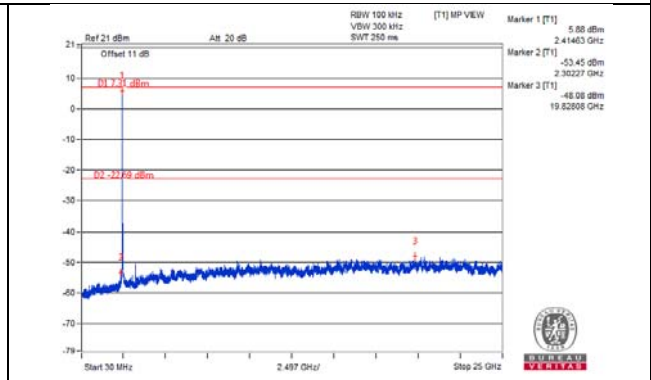
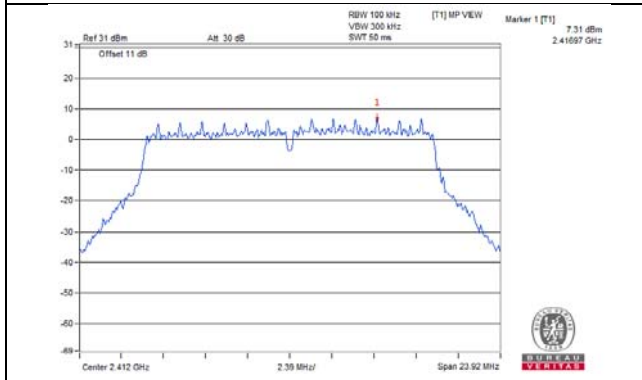


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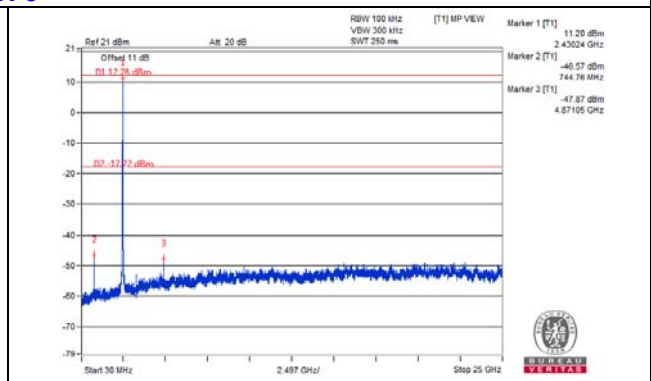
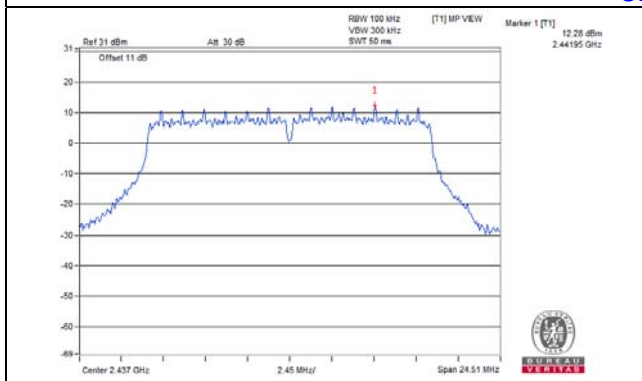


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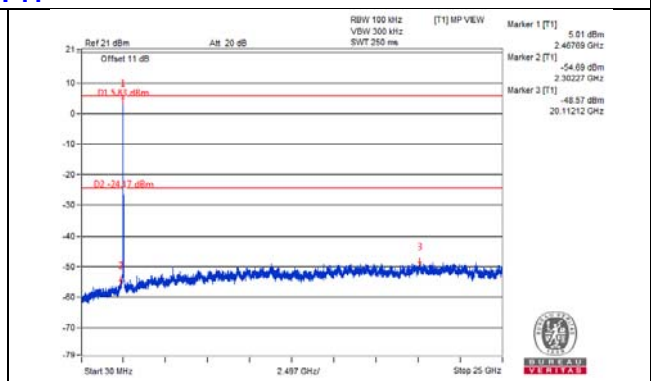
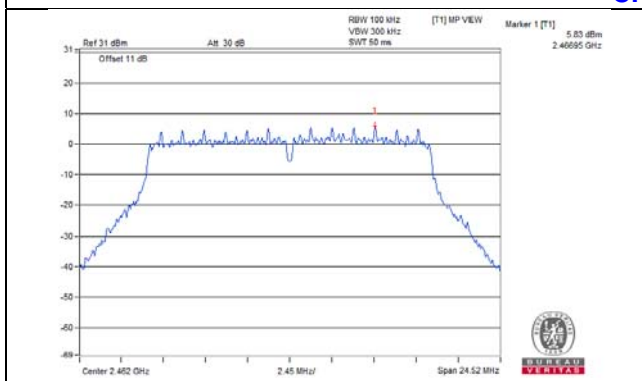
CH 1



CH 6

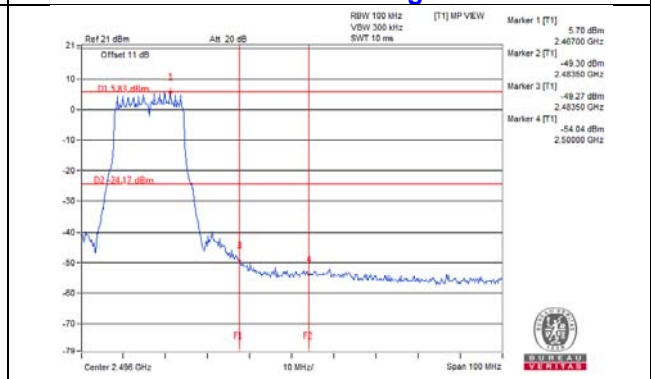
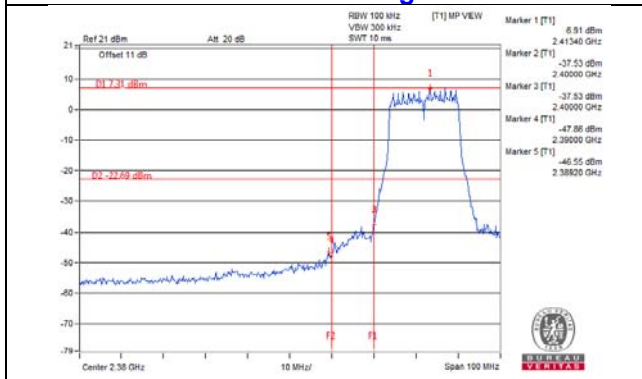


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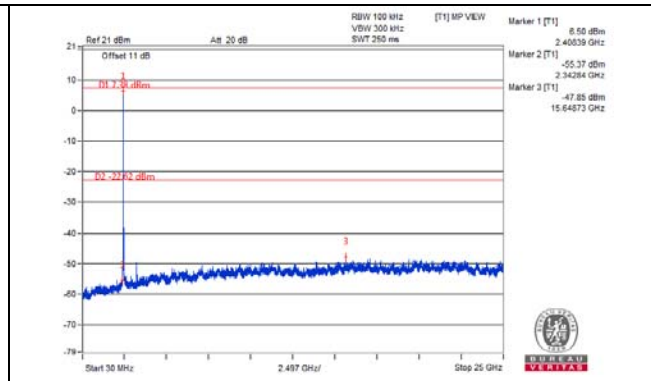
CH 1 Band edge

CH 11 Band edge

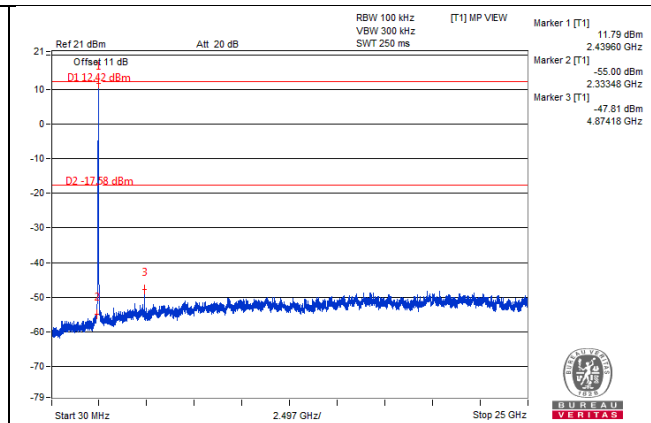
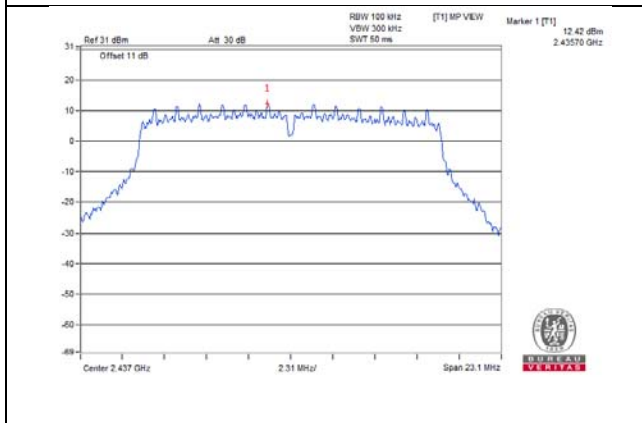


CHAIN 2

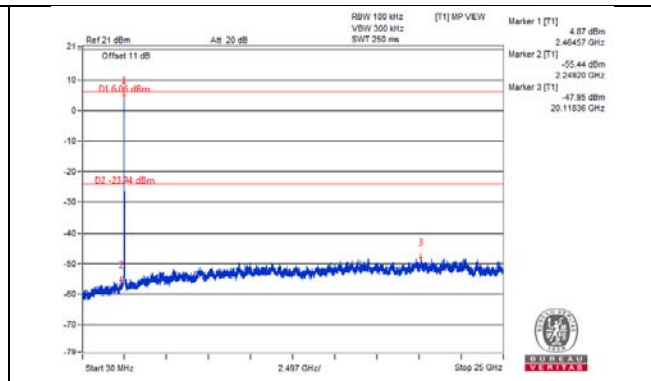
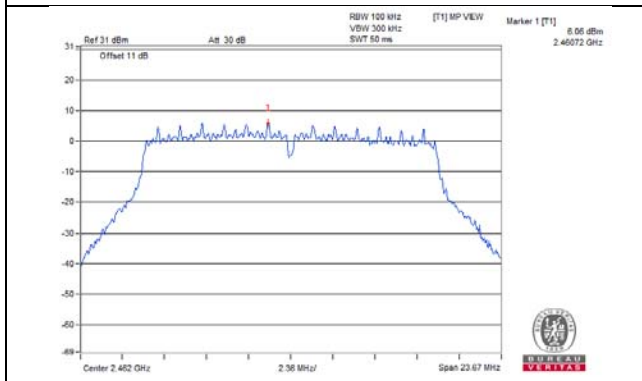
CH 1



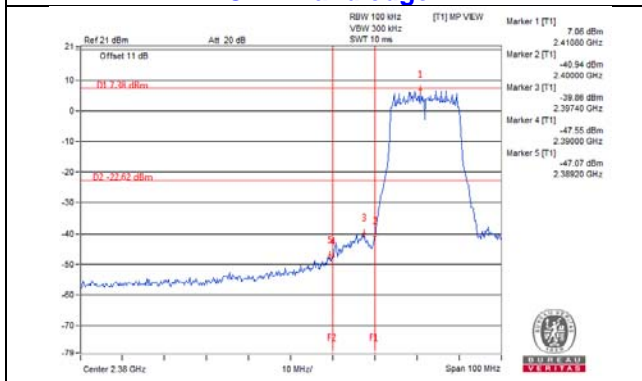
CH 6



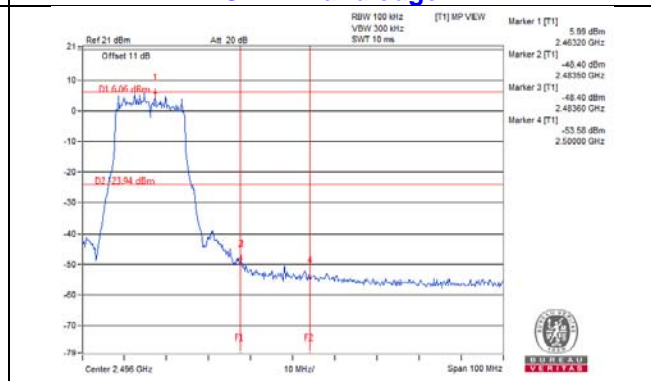
CH 11



CH 1 Band edge

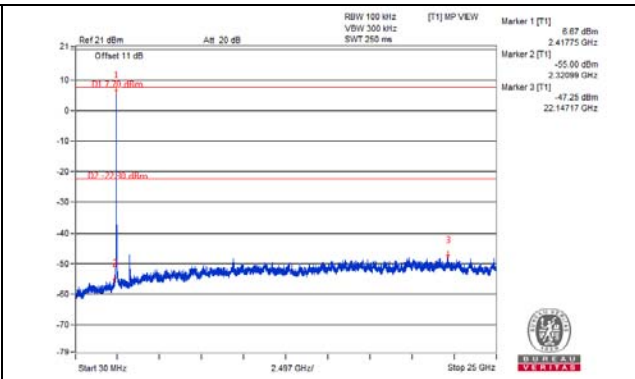
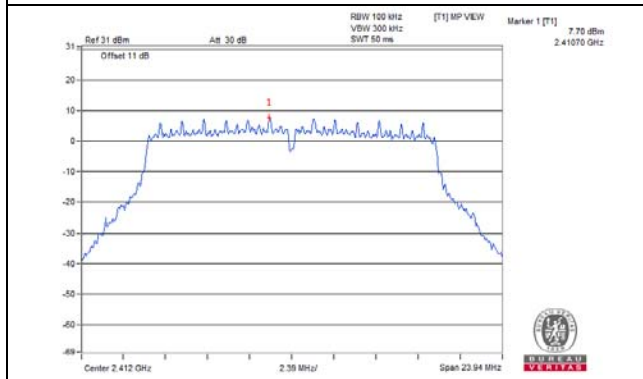


CH 11 Band edge

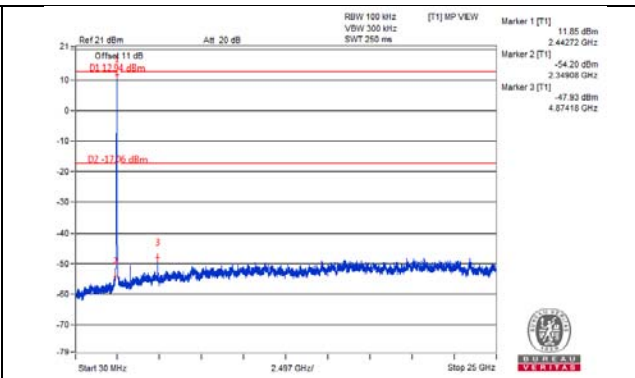
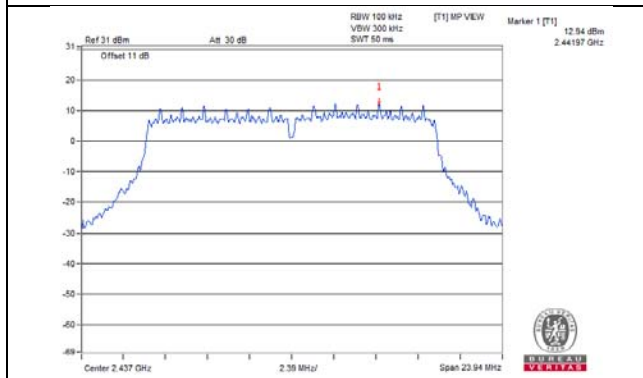


CHAIN 3

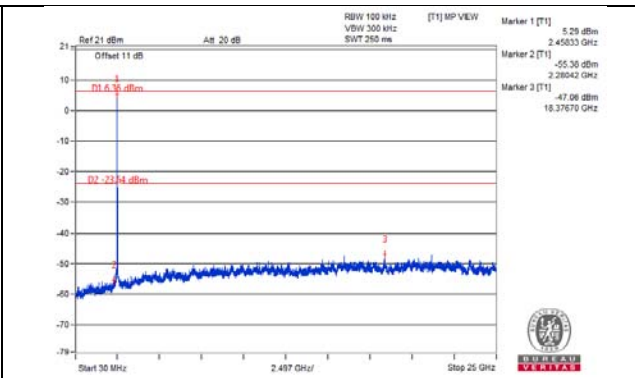
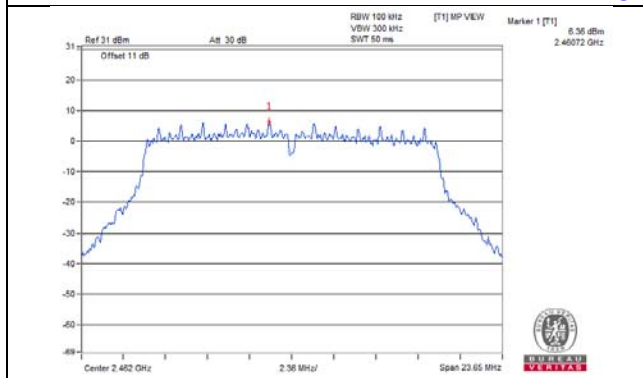
CH 1



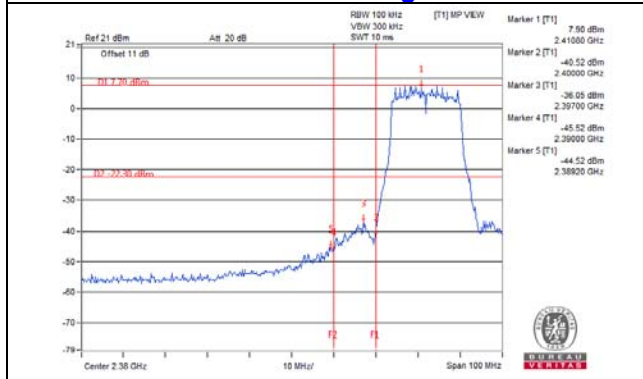
CH 6



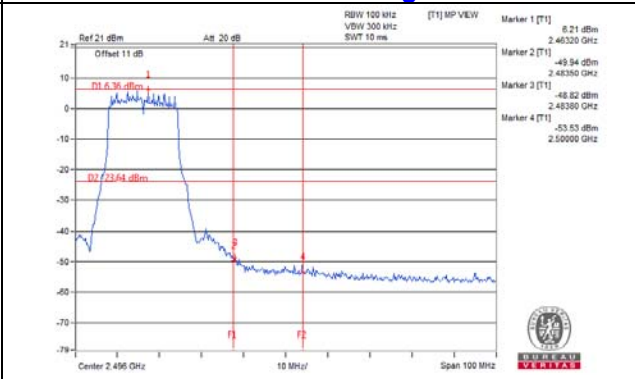
CH 11



CH 1 Band edge

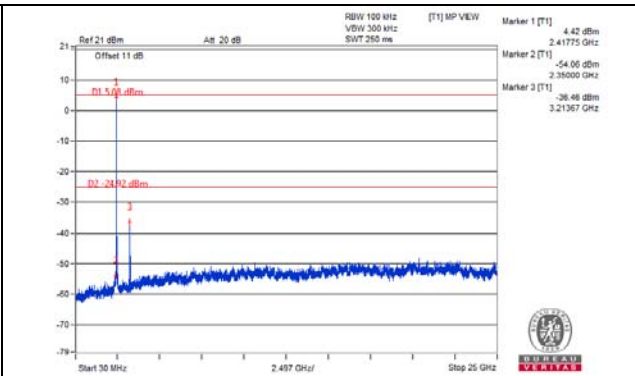
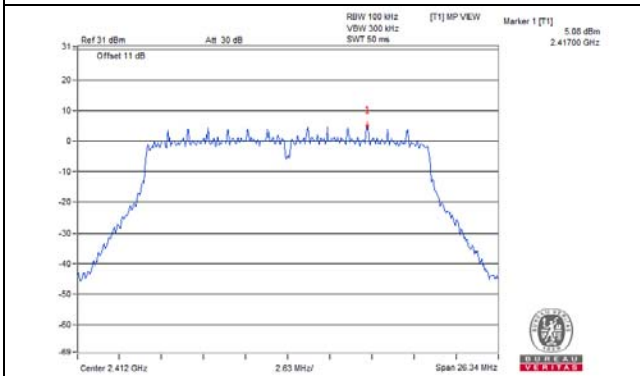


CH 11 Band edge

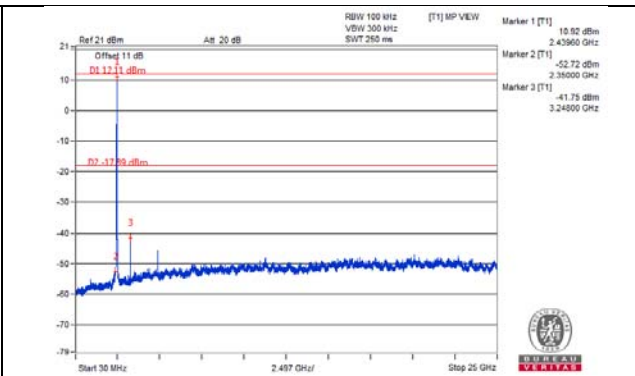
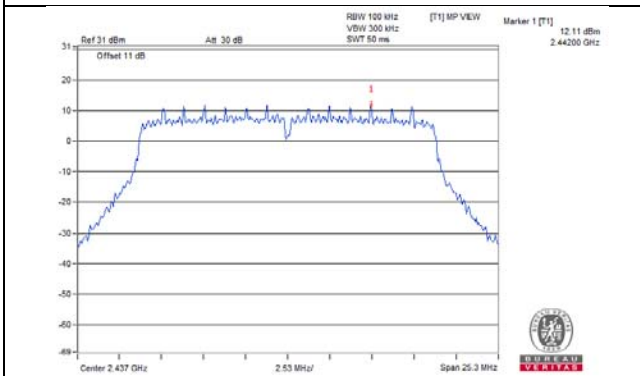


802.11n (HT20)
CHAIN 0

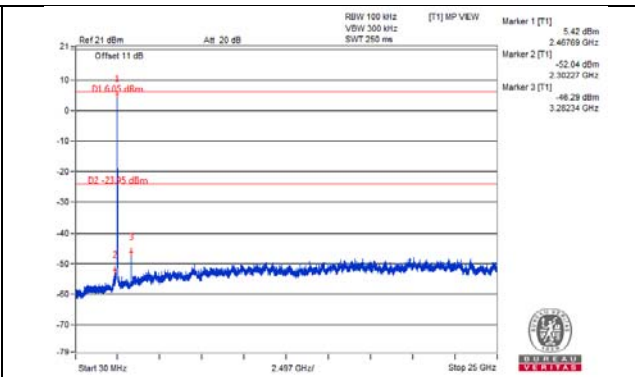
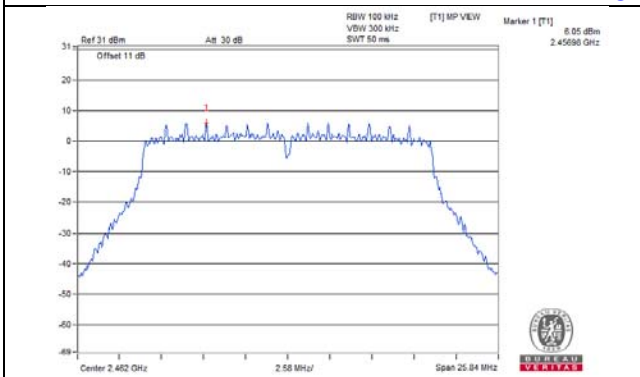
CH 1



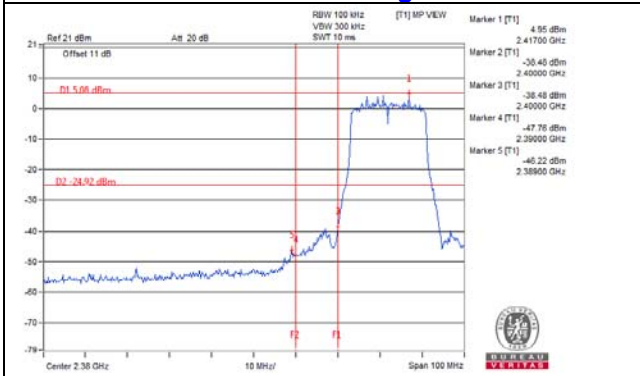
CH 6



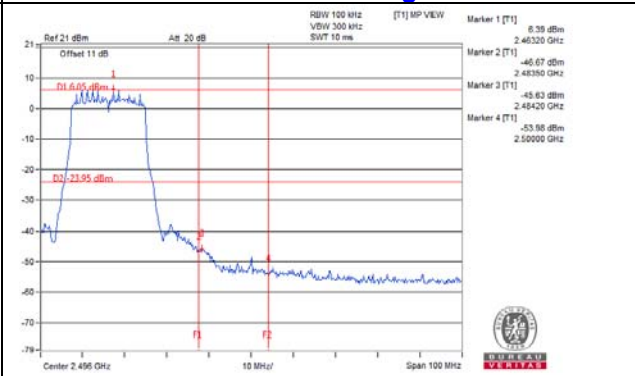
CH 11



CH 1 Band edge

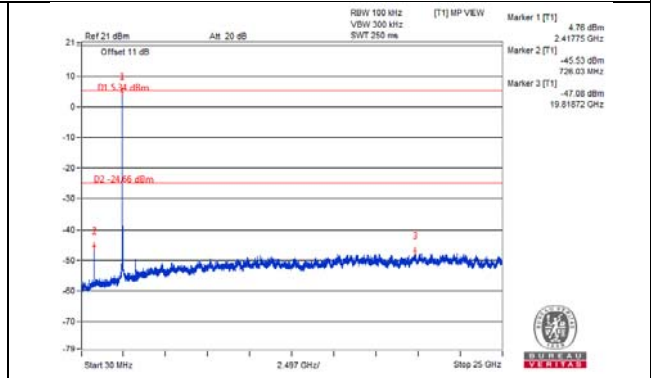
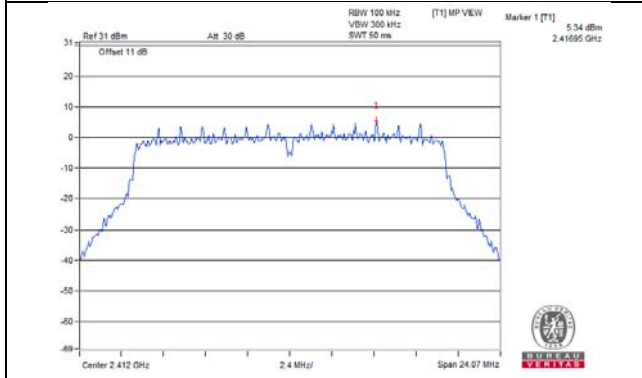


CH 11 Band edge

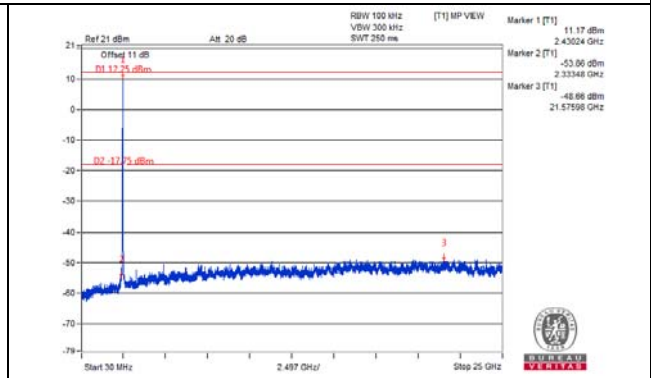
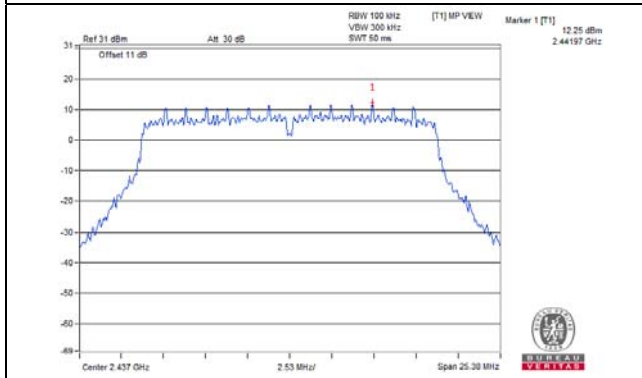


CHAIN 1

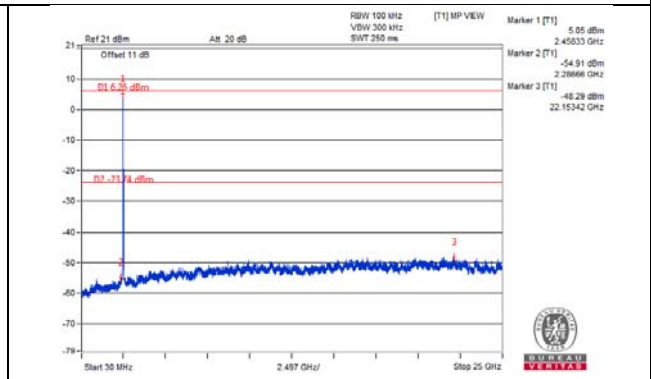
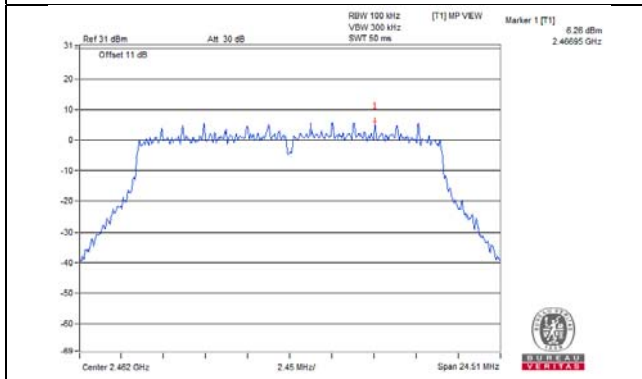
CH 1



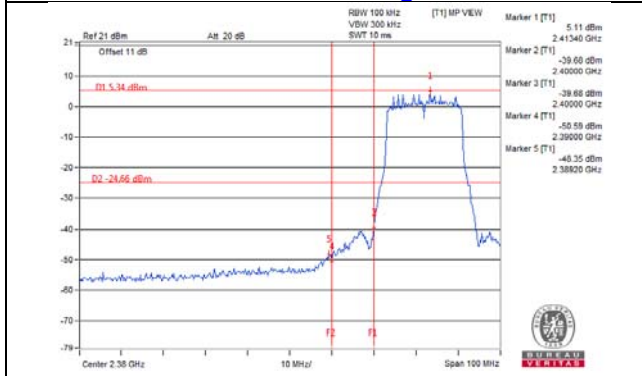
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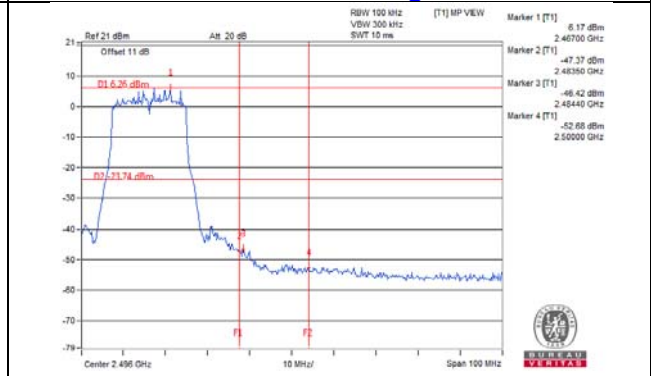
CH 11



CH 1 Band edge

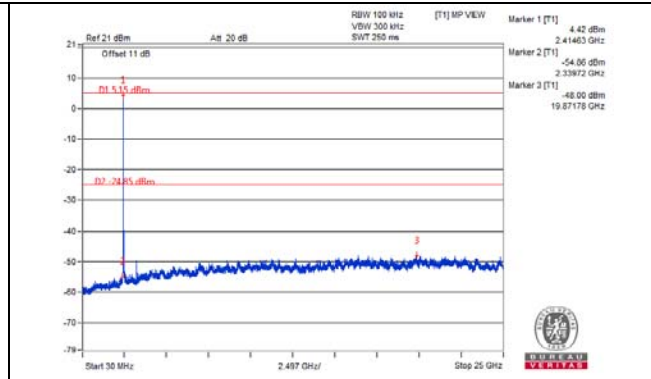
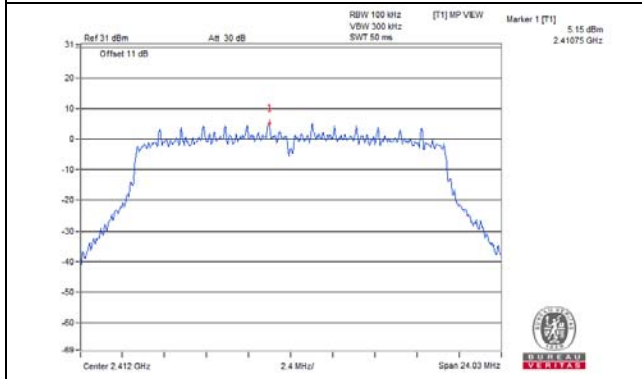


CH 11 Band edge

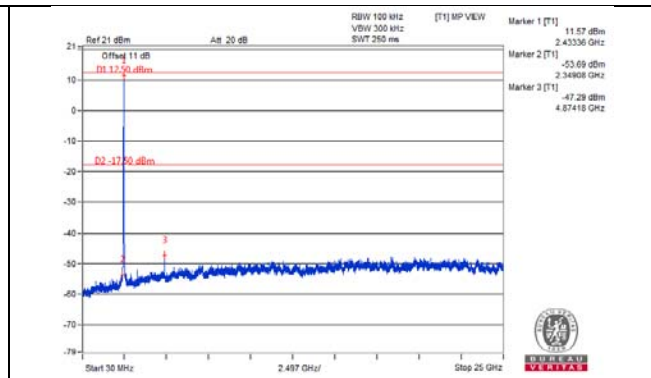
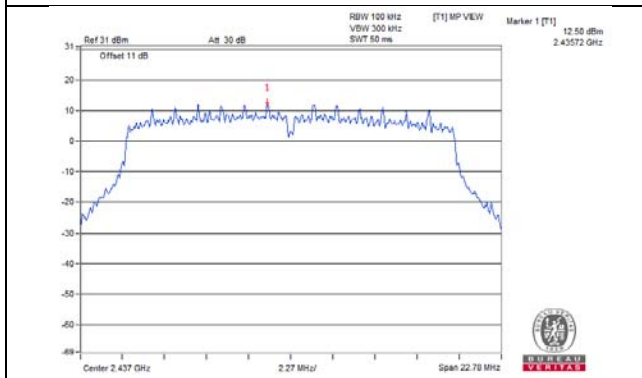


CHAIN 2

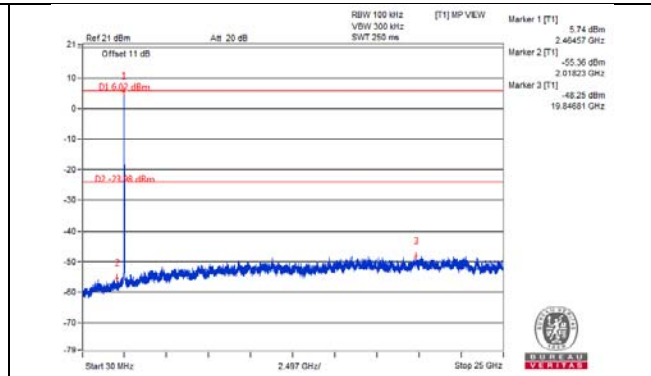
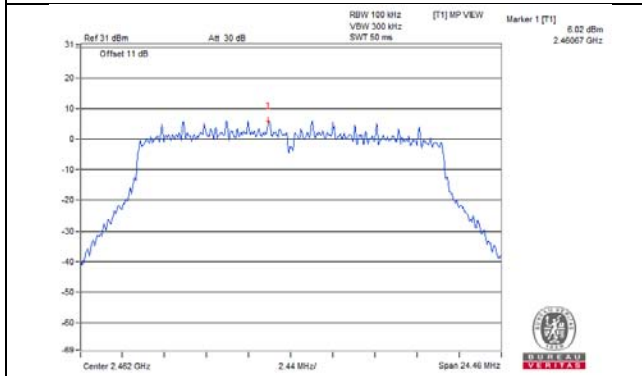
CH 1



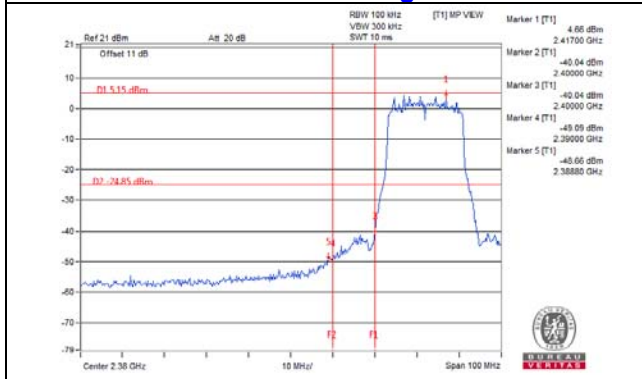
CH 6



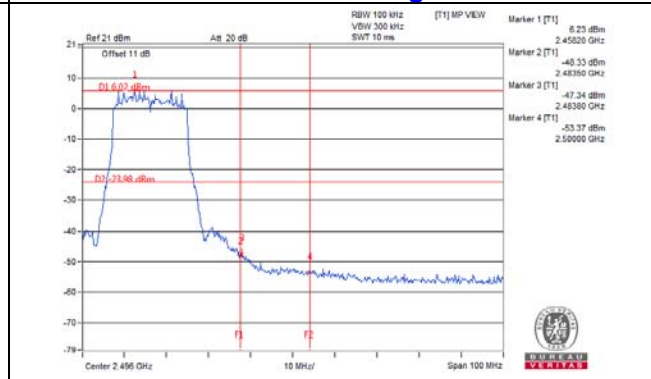
CH 11



CH 1 Band edge

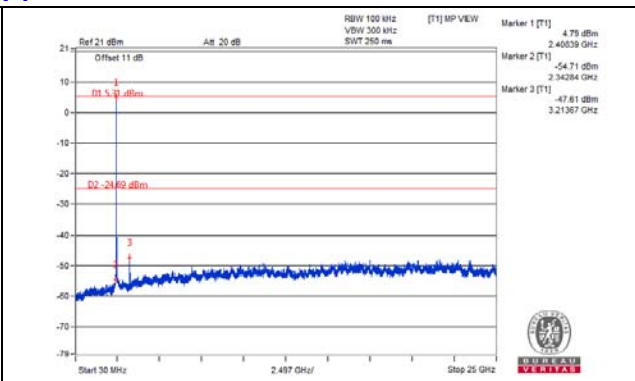
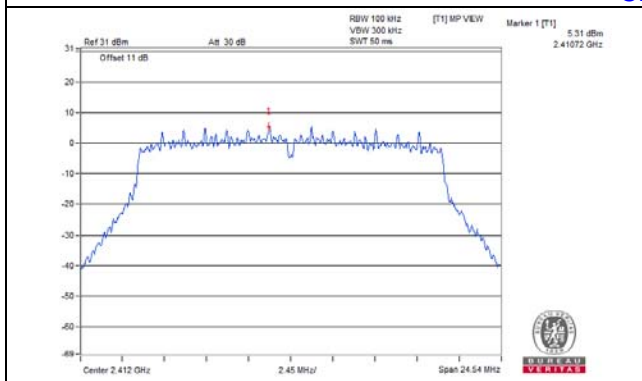


CH 11 Band edge

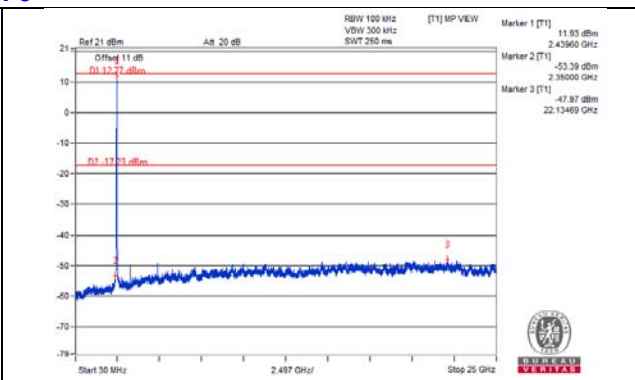
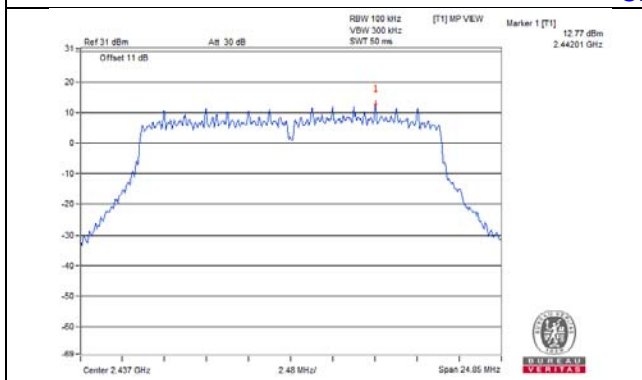


CHAIN 3

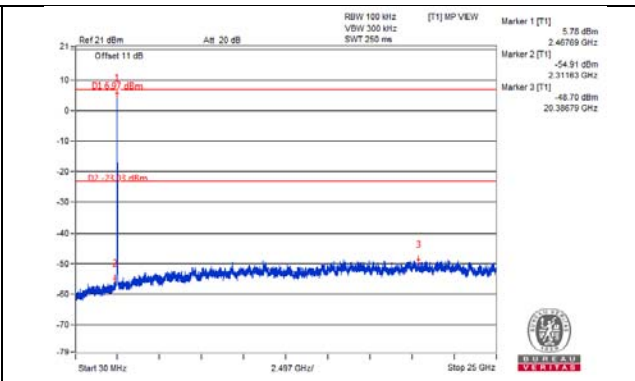
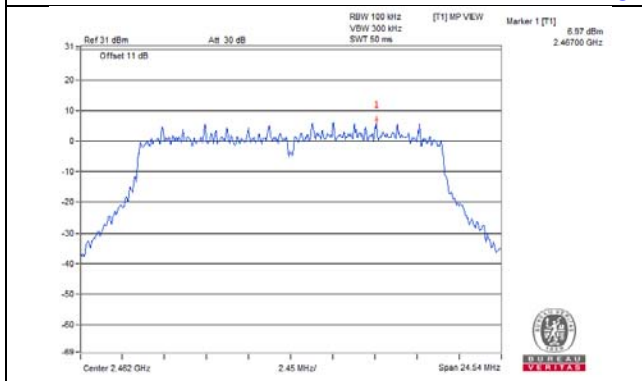
CH 1



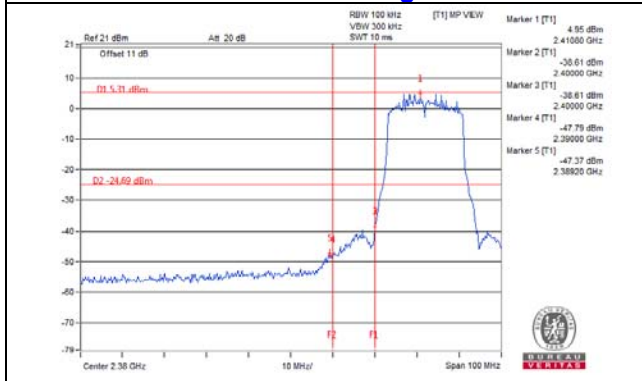
CH 6



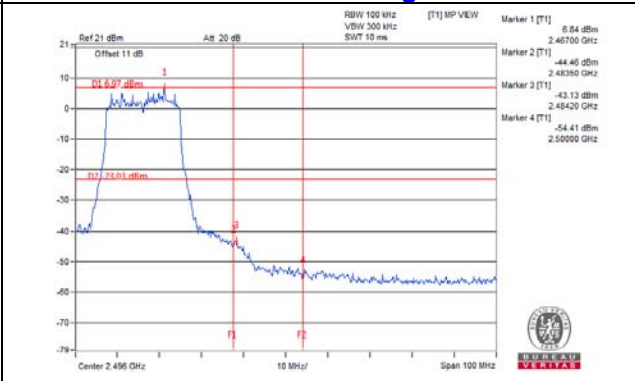
CH 11



CH 1 Band edge

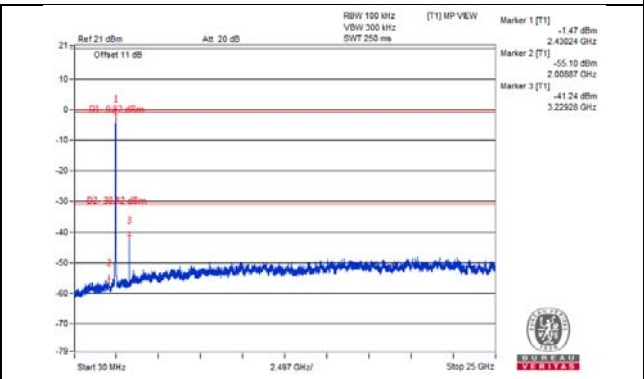
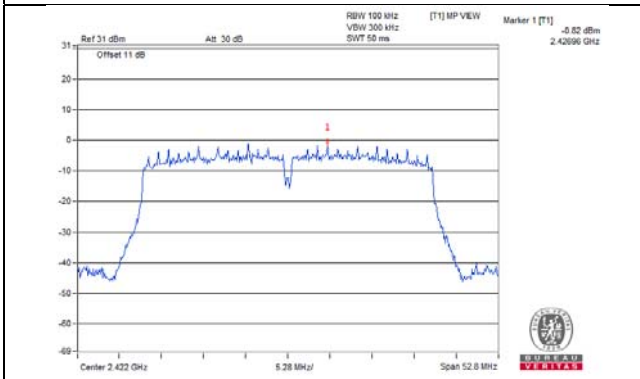


CH 11 Band edge

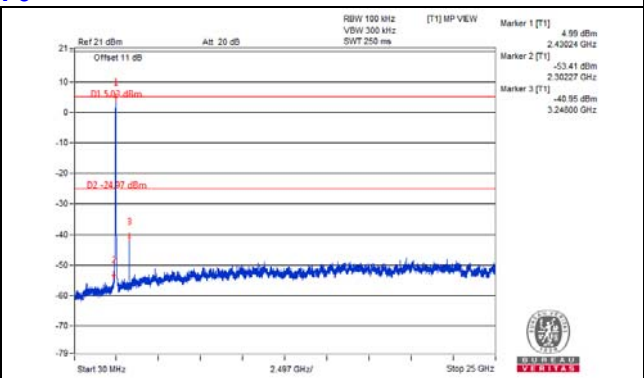
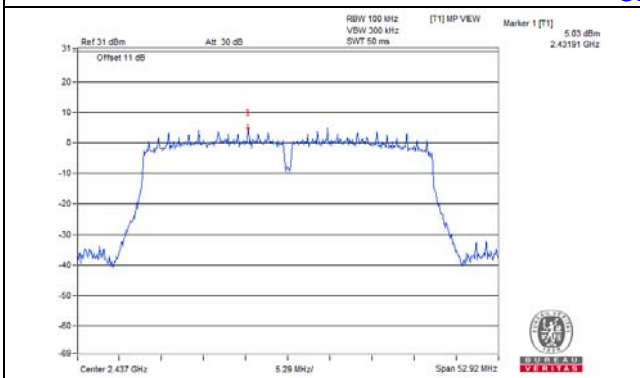


802.11n (HT40)
CHAIN 0

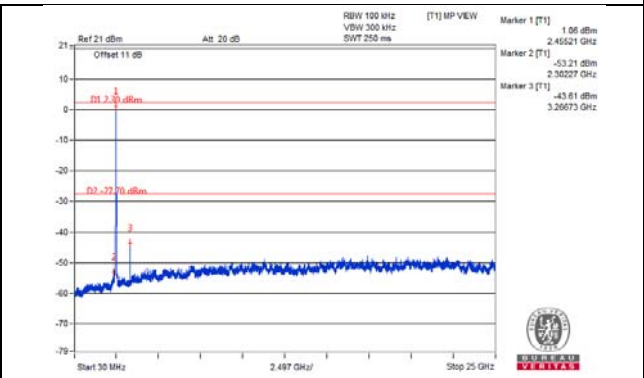
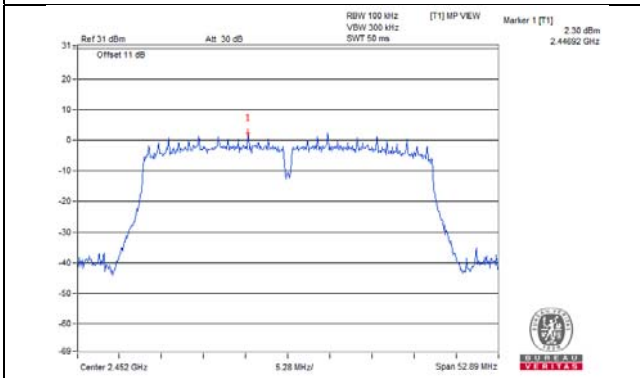
CH 3



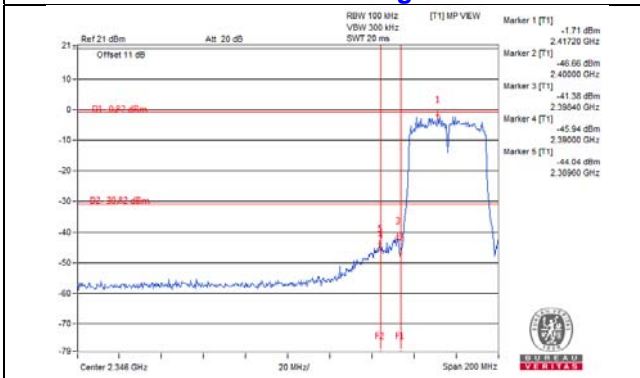
CH 6



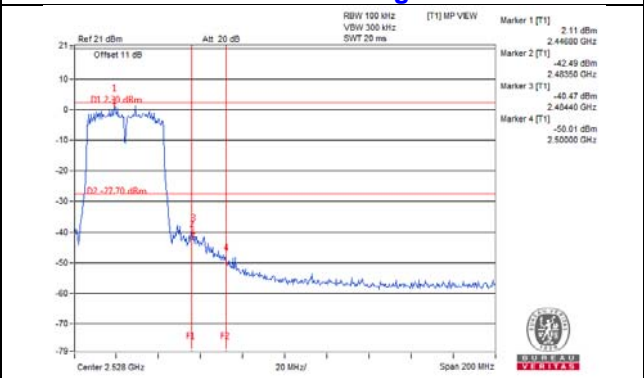
CH 9



CH 3 Band edge

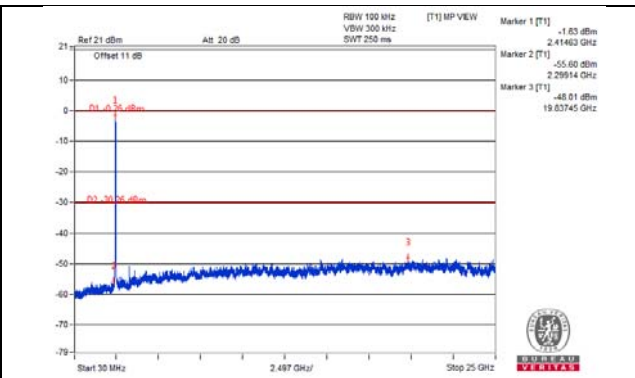
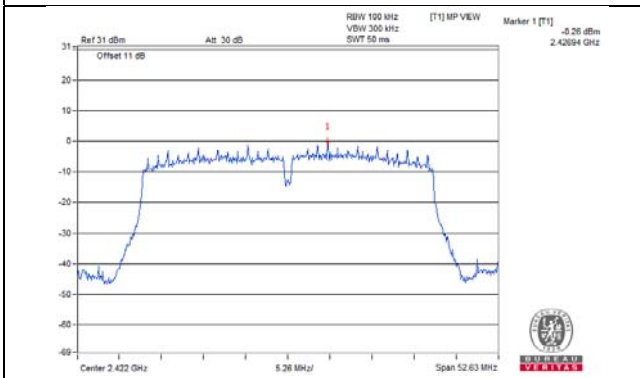


CH 9 Band edge

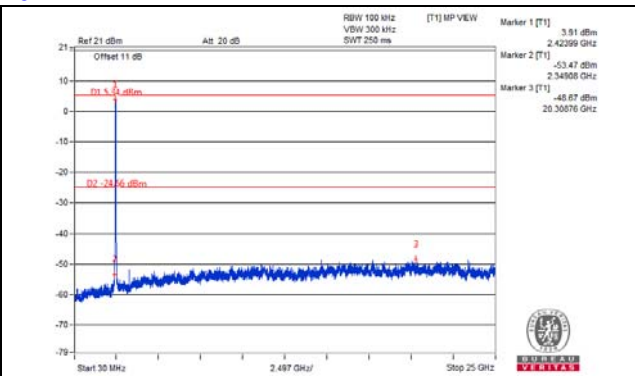
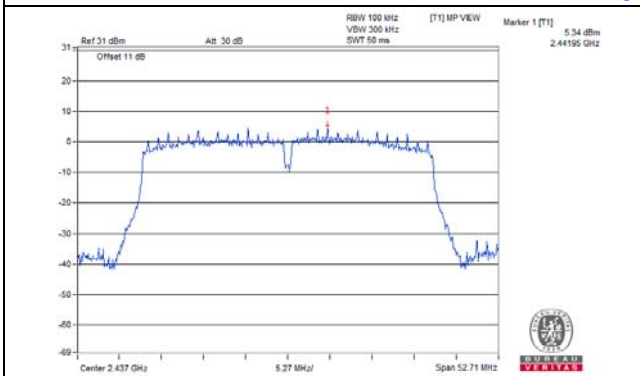


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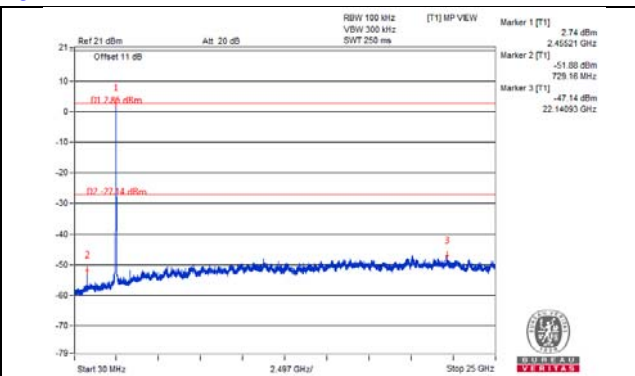
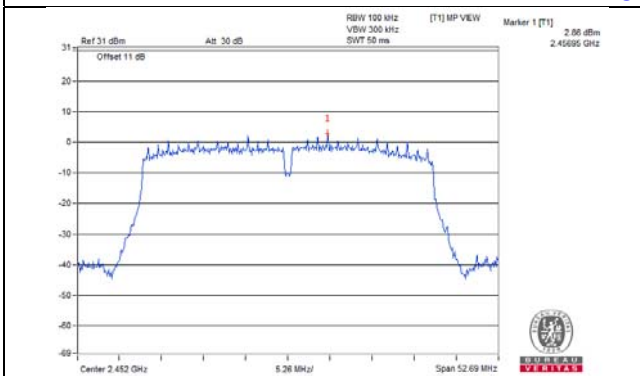
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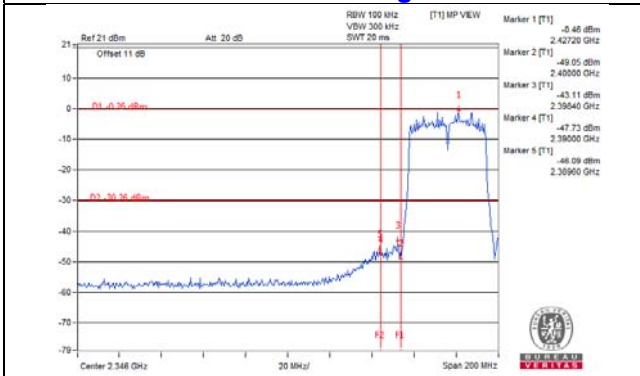
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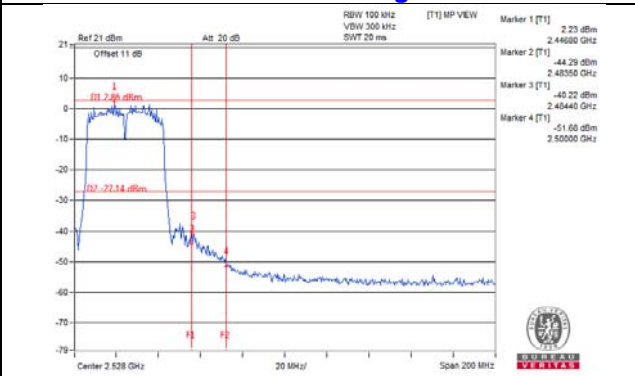
CH 9



CH 3 Band edge

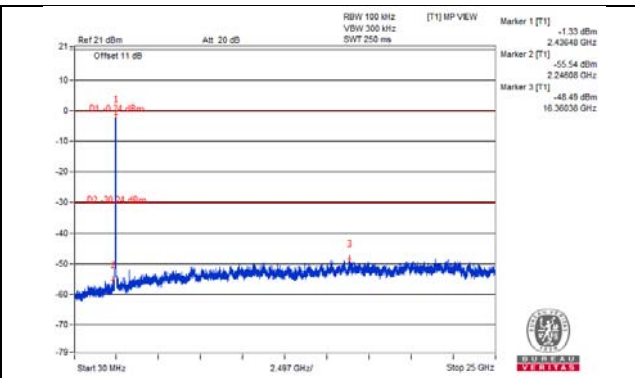
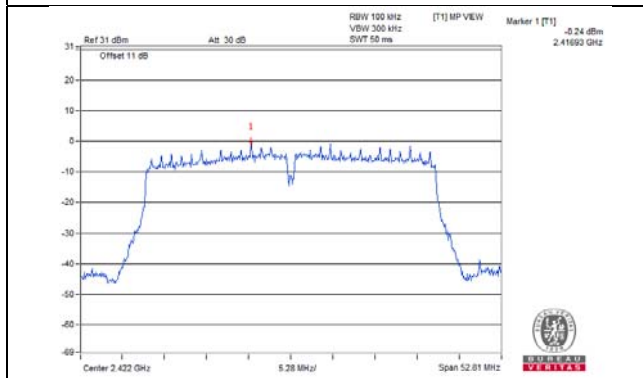


CH 9 Band edge

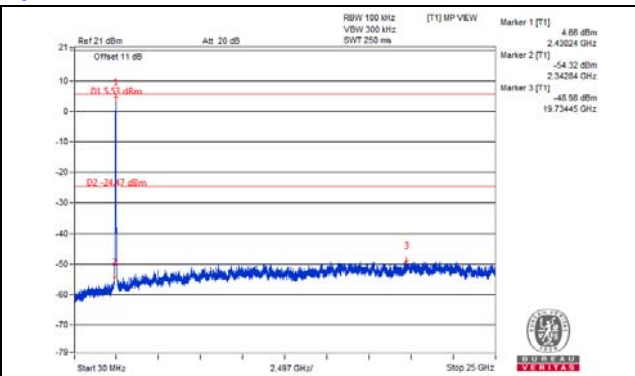
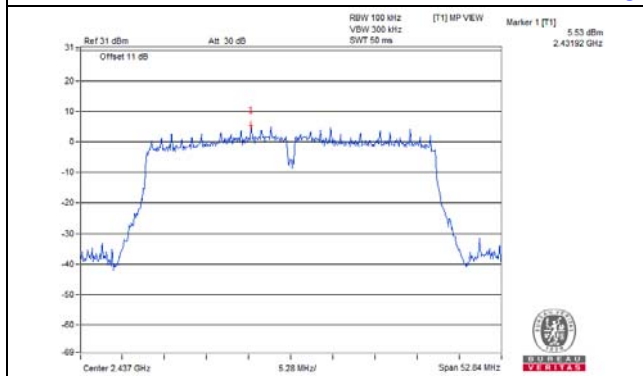


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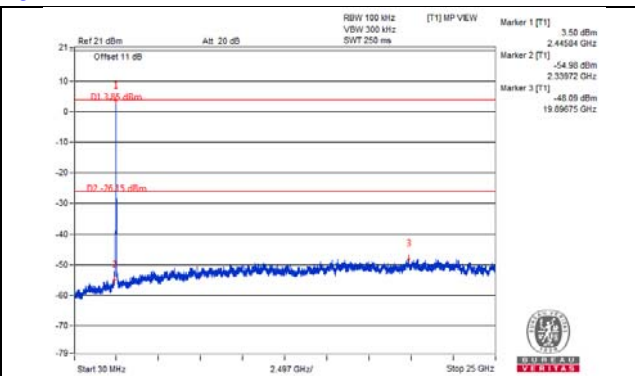
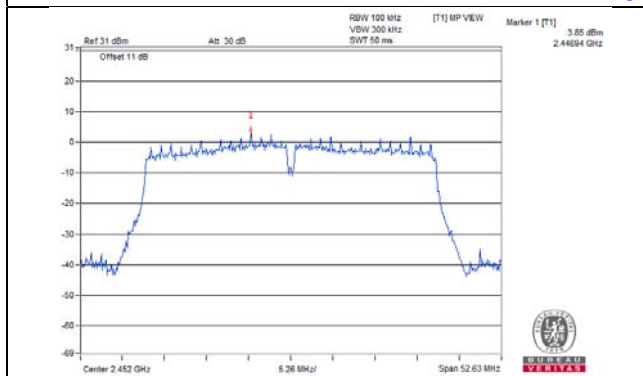
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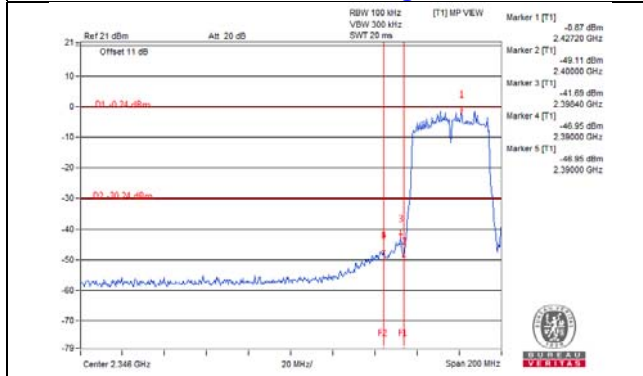
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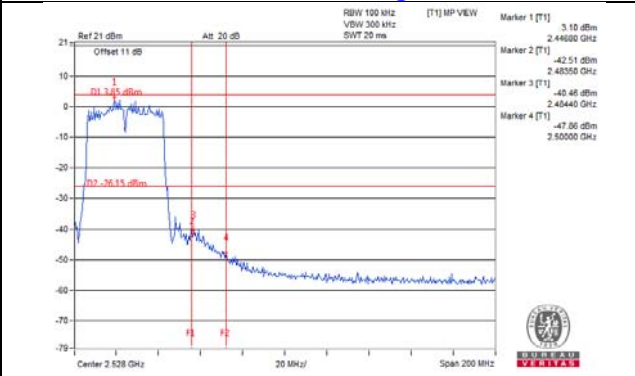
CH 9



CH 3 Band edge

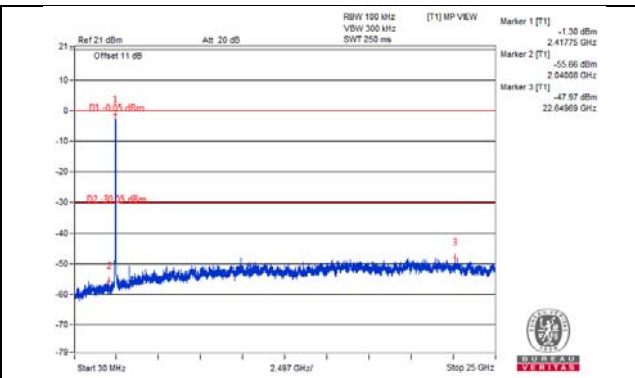
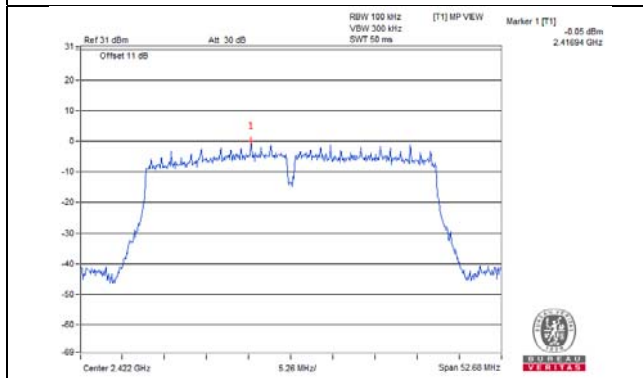


CH 9 Band edge

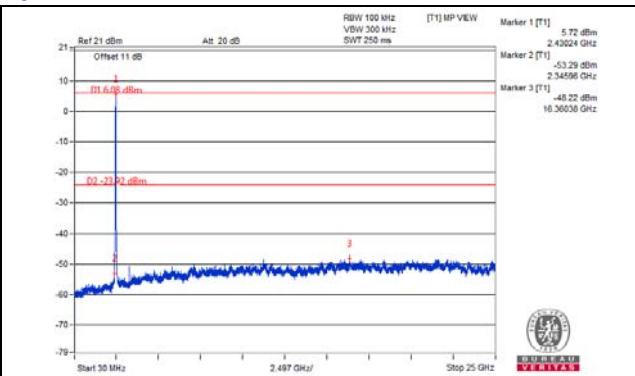
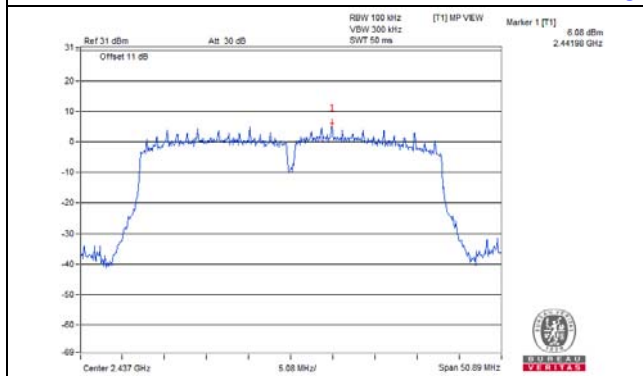


CHAIN 3

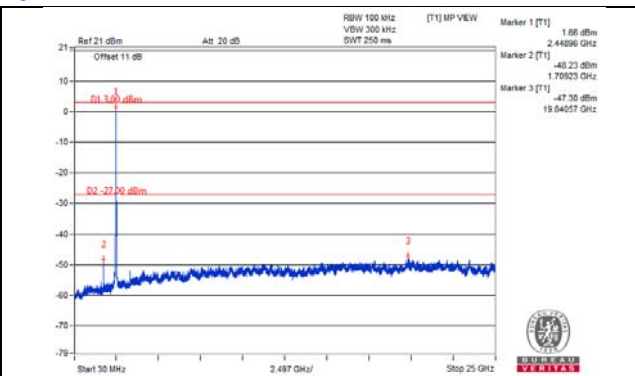
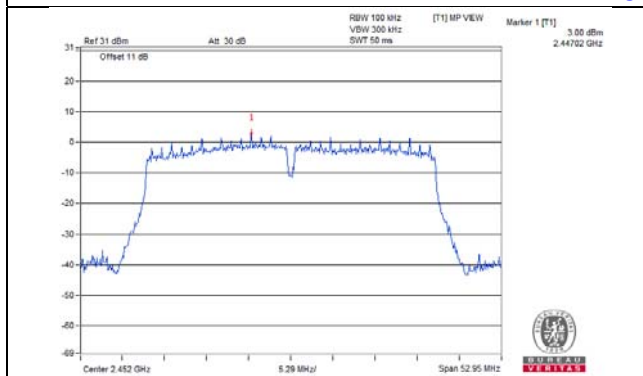
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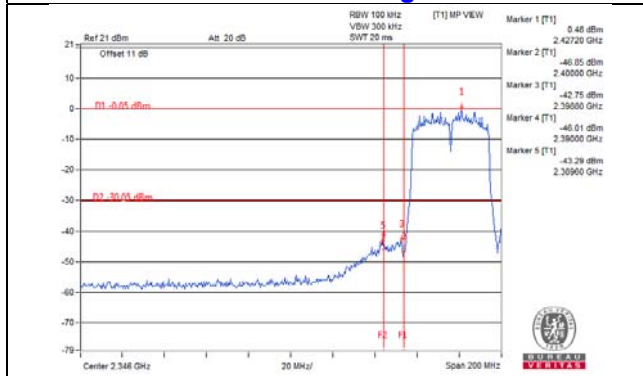
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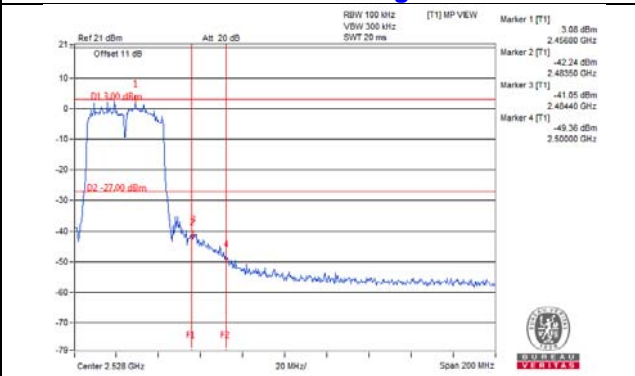
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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