

FCC Test Report

Report No.: RF170801E03

FCC ID: SUZ-WD518

Test Model: WD518

Received Date: Aug. 01, 2017

Test Date: Sep. 08 to 09, 2017

Issued Date: Sep. 15, 2017

Applicant: Coretronic Corp.

Address: No. 11, Li Hsing Rd, Science-Based Industrial Park, Hsinchu, Taiwan.

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

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

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



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Release Control Record

Issue No.	Description	Date Issued
RF170801E03	Original release.	Sep. 15, 2017

1 Certificate of Conformity

Product: USB WiFi dongle

Brand: DELL, Coretronic

Test Model: WD518

Sample Status: ENGINEERING SAMPLE

Applicant: Coretronic Corp.

Test Date: Sep. 08 to 09, 2017

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

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

Prepared by :

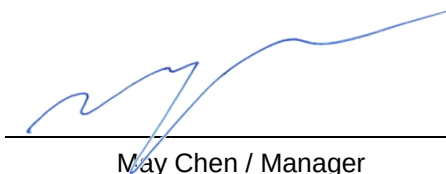


Wendy Wu / Specialist

Date:

Sep. 15, 2017

Approved by :



May Chen / Manager

Date:

Sep. 15, 2017

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 -4.12dB at 21.16797MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2390MHz, 2483.5MHz, 4824MHz, 4874MHz, 4924MHz.
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	No antenna connector is used.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.30 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.16 dB
	6GHz ~ 18GHz	4.91 dB
	18GHz ~ 40GHz	5.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	USB WiFi dongle
Brand	DELL, Coretronic
Test Model	WD518
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	5Vdc from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n: up to 300Mbps
Operating Frequency	2.412 ~ 2.462GHz
Number of Channel	802.11b, 802.11g, 802.11n (HT20):11 802.11n (HT40):7
Output Power	645.066mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Data Cable Supplied	NA

Note:

- The EUT has two brand, which are identical to each other in all aspects except for the following:

Brand	Model	Different
DELL	WD518	For marketing request
Coretronic		

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

Antenna No.	PCB Chain No.	Antenna Gain (dBi)	Frequency range(GHz)	Antenna Type	Connector Type	Cable Length
1	Chian0	0.66	2.4-2.4835	IFA	Soldering	NO
2	Chian1	0.54	2.4-2.4835	IFA	Soldering	NO

- The EUT incorporates a MIMO function.

Modulation Mode	Data Rate (MCS)	TX & RX Configuration	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX

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

3.2 Description of Test Modes

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

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

7 channels are provided for 802.11n (HT40):

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Radiated Emission Test (Below 1GHz):

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT40)	3 to 9	6	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT40)	3 to 9	6	OFDM	BPSK	13.5

Antenna Port Conducted Measurement:

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

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1
802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (system)	TESTED BY
RE $\geq$ 1G	23deg. C, 62%RH	120Vac, 60Hz	Jyunchun Lin
RE<1G	25deg. C, 65%RH	120Vac, 60Hz	Jyunchun Lin
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

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

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

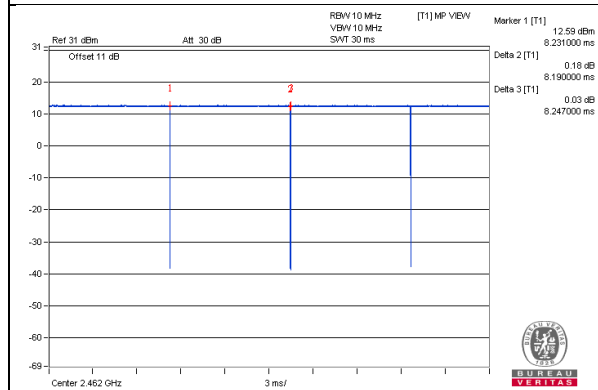
802.11b: Duty cycle = $8.19/8.247 = 0.993$

802.11g: Duty cycle = $1.358/1.461 = 0.93$, Duty factor = $10 * \log(1/0.93) = 0.32$

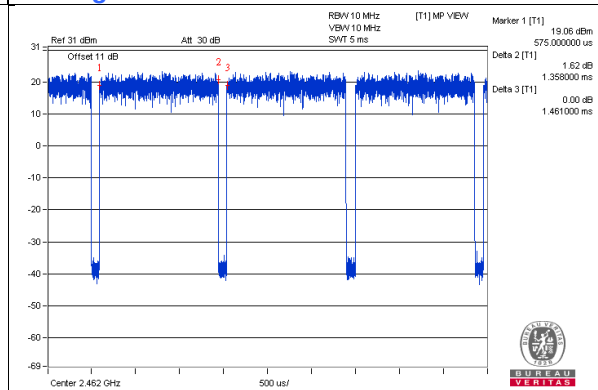
802.11n (HT20): Duty cycle = $1.27/1.434 = 0.886$, Duty factor = $10 * \log(1/0.886) = 0.53$

802.11n (HT40): Duty cycle = $0.632/0.741 = 0.853$, Duty factor = $10 * \log(1/0.853) = 0.69$

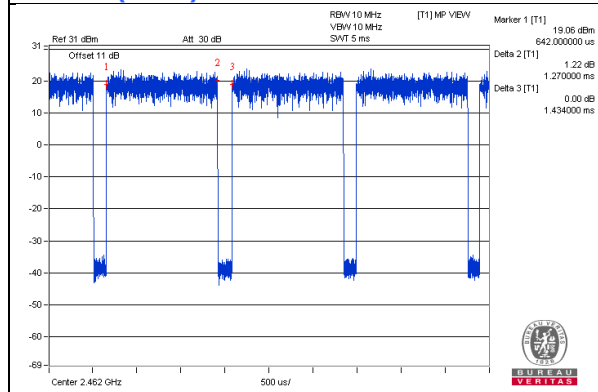
802.11b



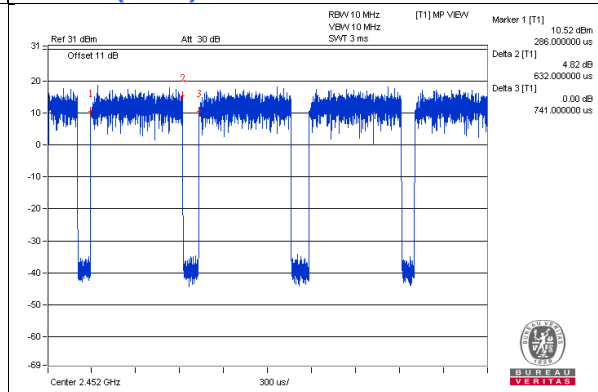
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

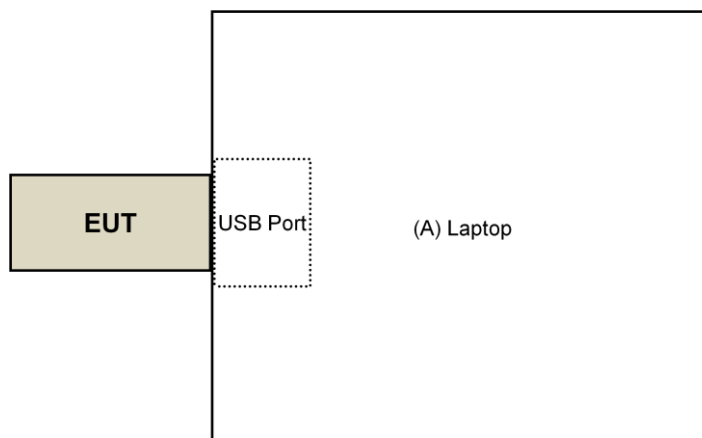
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

Note:

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v04

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 08, 2017	July 07, 2018
Pre-Amplifier ^(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna ^(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 17, 2017	Jan. 16, 2018
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Dec. 13, 2016	Dec. 12, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 27, 2016	Dec. 26, 2017
Pre-Amplifier EMCI	EMC12630SE	980385	Feb. 02, 2017	Feb. 01, 2018
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160923 150318 150321	Feb. 02, 2017 Mar. 29, 2017 Mar. 29, 2017	Feb. 01, 2018 Mar. 28, 2018 Mar. 28, 2018
Pre-Amplifier EMCI	EMC184045SE	980387	Feb. 02, 2017	Feb. 01, 2018
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 15, 2016	Dec. 14, 2017
RF Cable	SUCOFLEX 102	36432/2 36433/2	Jan. 15, 2017	Jan. 14, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSV40	100964	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Sep. 08 to 09, 2017.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

NOTE:

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

For Radiated emission above 30MHz

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

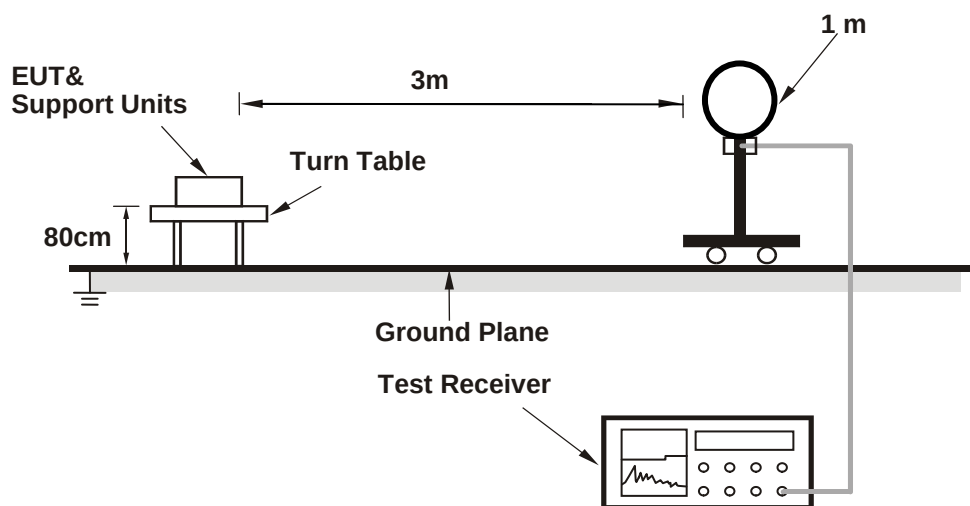
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

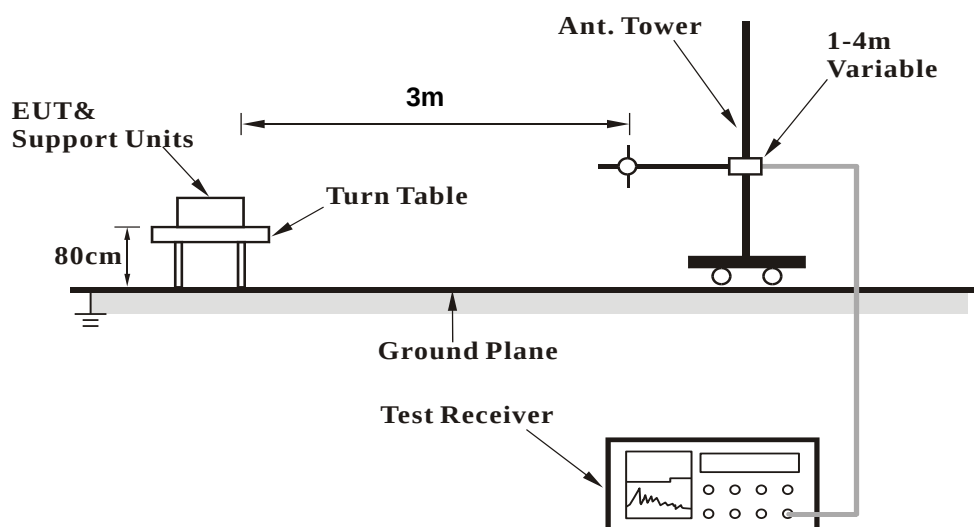
No deviation.

4.1.5 Test Setup

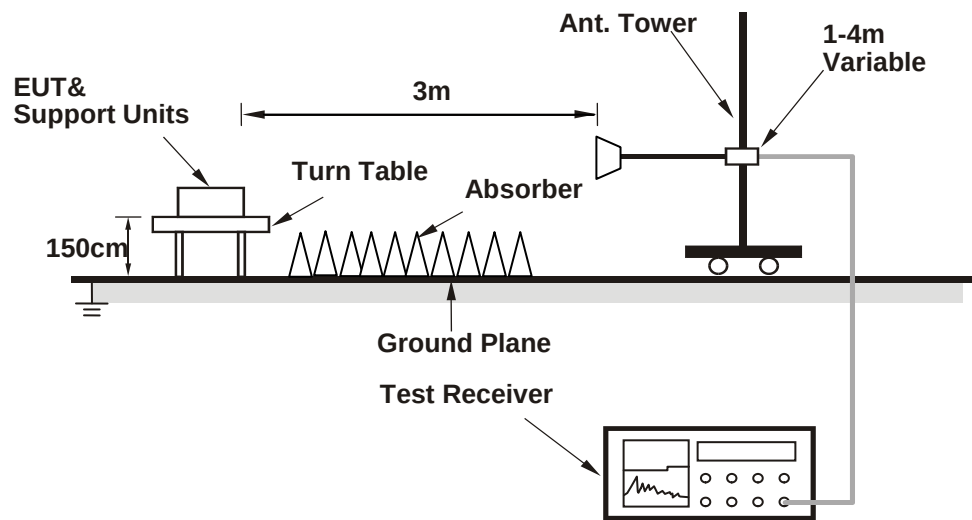
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

- Connected the EUT with the Notebook Computer which is placed on the testing table.
- Contorlling software (MP_Kit_RTL11n_8192EU_USB_v24) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data :

802.11b

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.8 PK	74.0	-15.2	1.34 H	108	60.1	-1.3
2	2390.00	48.4 AV	54.0	-5.6	1.34 H	108	49.7	-1.3
3	*2412.00	93.9 PK			1.34 H	108	95.0	-1.1
4	*2412.00	91.2 AV			1.34 H	108	92.3	-1.1
5	4824.00	55.2 PK	74.0	-18.8	1.10 H	135	52.0	3.2
6	4824.00	53.9 AV	54.0	-0.1	1.10 H	135	50.7	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	58.0 PK	74.0	-16.0	2.40 V	100	59.3	-1.3
2	2390.00	47.5 AV	54.0	-6.5	2.40 V	100	48.8	-1.3
3	*2412.00	91.7 PK			2.40 V	100	92.8	-1.1
4	*2412.00	89.1 AV			2.40 V	100	90.2	-1.1
5	4824.00	48.7 PK	74.0	-25.3	1.16 V	38	45.5	3.2
6	4824.00	46.3 AV	54.0	-7.7	1.16 V	38	43.1	3.2

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
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	95.2 PK			1.34 H	108	96.4	-1.2
2	*2437.00	92.3 AV			1.34 H	108	93.5	-1.2
3	4874.00	55.3 PK	74.0	-18.7	1.10 H	135	52.0	3.3
4	4874.00	53.9 AV	54.0	-0.1	1.10 H	135	50.6	3.3
5	7311.00	43.9 PK	74.0	-30.1	1.10 H	198	34.1	9.8
6	7311.00	30.7 AV	54.0	-23.3	1.10 H	198	20.9	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	93.1 PK			2.36 V	90	94.3	-1.2
2	*2437.00	90.2 AV			2.36 V	90	91.4	-1.2
3	4874.00	48.9 PK	74.0	-25.1	1.14 V	37	45.6	3.3
4	4874.00	46.7 AV	54.0	-7.3	1.14 V	37	43.4	3.3
5	7311.00	43.9 PK	74.0	-30.1	1.14 V	50	34.1	9.8
6	7311.00	30.7 AV	54.0	-23.3	1.14 V	50	20.9	9.8

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
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	94.9 PK			1.34 H	108	96.0	-1.1
2	*2462.00	92.0 AV			1.34 H	108	93.1	-1.1
3	2483.50	57.3 PK	74.0	-16.7	1.34 H	108	58.3	-1.0
4	2483.50	43.6 AV	54.0	-10.4	1.34 H	108	44.6	-1.0
5	4924.00	55.2 PK	74.0	-18.8	1.10 H	161	51.7	3.5
6	4924.00	53.9 AV	54.0	-0.1	1.10 H	161	50.4	3.5
7	7386.00	44.5 PK	74.0	-29.5	1.14 H	186	34.6	9.9
8	7386.00	31.1 AV	54.0	-22.9	1.14 H	186	21.2	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	92.8 PK			2.42 V	87	93.9	-1.1
2	*2462.00	90.0 AV			2.42 V	87	91.1	-1.1
3	2483.50	56.1 PK	74.0	-17.9	2.42 V	87	57.1	-1.0
4	2483.50	42.4 AV	54.0	-11.6	2.42 V	87	43.4	-1.0
5	4924.00	48.3 PK	74.0	-25.7	1.11 V	49	44.8	3.5
6	4924.00	46.3 AV	54.0	-7.7	1.11 V	49	42.8	3.5
7	7386.00	44.3 PK	74.0	-29.7	1.17 V	45	34.4	9.9
8	7386.00	31.1 AV	54.0	-22.9	1.17 V	45	21.2	9.9

REMARKS:

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

802.11g

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
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	69.9 PK	74.0	-4.1	1.34 H	108	71.2	-1.3
2	2390.00	53.9 AV	54.0	-0.1	1.34 H	108	55.2	-1.3
3	*2412.00	105.2 PK			1.34 H	108	106.3	-1.1
4	*2412.00	95.5 AV			1.34 H	108	96.6	-1.1
5	4824.00	66.2 PK	74.0	-7.8	1.11 H	130	63.0	3.2
6	4824.00	52.7 AV	54.0	-1.3	1.11 H	130	49.5	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.4 PK	74.0	-5.6	2.47 V	77	69.7	-1.3
2	2390.00	52.4 AV	54.0	-1.6	2.47 V	77	53.7	-1.3
3	*2412.00	103.1 PK			2.47 V	77	104.2	-1.1
4	*2412.00	93.5 AV			2.47 V	77	94.6	-1.1
5	4824.00	59.3 PK	74.0	-14.7	1.14 V	62	56.1	3.2
6	4824.00	45.1 AV	54.0	-8.9	1.14 V	62	41.9	3.2

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
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	105.0 PK			1.34 H	108	106.2	-1.2
2	*2437.00	95.3 AV			1.34 H	108	96.5	-1.2
3	4874.00	66.7 PK	74.0	-7.3	1.10 H	135	63.4	3.3
4	4874.00	53.9 AV	54.0	-0.1	1.10 H	135	50.6	3.3
5	7311.00	47.6 PK	74.0	-26.4	1.10 H	188	37.8	9.8
6	7311.00	35.1 AV	54.0	-18.9	1.10 H	188	25.3	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	102.8 PK			2.49 V	84	104.0	-1.2
2	*2437.00	93.3 AV			2.49 V	84	94.5	-1.2
3	4874.00	59.3 PK	74.0	-14.7	1.16 V	70	56.0	3.3
4	4874.00	45.3 AV	54.0	-8.7	1.16 V	70	42.0	3.3
5	7311.00	43.9 PK	74.0	-30.1	1.20 V	32	34.1	9.8
6	7311.00	30.8 AV	54.0	-23.2	1.20 V	32	21.0	9.8

REMARKS:

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

CHANNEL	TX Channel 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	105.0 PK			1.34 H	108	106.1	-1.1
2	*2462.00	95.2 AV			1.34 H	108	96.3	-1.1
3	2483.50	69.6 PK	74.0	-4.4	1.34 H	108	70.6	-1.0
4	2483.50	53.9 AV	54.0	-0.1	1.34 H	108	54.9	-1.0
5	4924.00	66.1 PK	74.0	-7.9	1.09 H	119	62.6	3.5
6	4924.00	52.3 AV	54.0	-1.7	1.09 H	119	48.8	3.5
7	7386.00	47.3 PK	74.0	-26.7	1.06 H	202	37.4	9.9
8	7386.00	34.8 AV	54.0	-19.2	1.06 H	202	24.9	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.9 PK			2.51 V	92	104.0	-1.1
2	*2462.00	93.2 AV			2.51 V	92	94.3	-1.1
3	2483.50	68.1 PK	74.0	-5.9	2.51 V	92	69.1	-1.0
4	2483.50	52.5 AV	54.0	-1.5	2.51 V	92	53.5	-1.0
5	4924.00	59.3 PK	74.0	-14.7	1.16 V	80	55.8	3.5
6	4924.00	45.3 AV	54.0	-8.7	1.16 V	80	41.8	3.5
7	7386.00	44.4 PK	74.0	-29.6	1.24 V	44	34.5	9.9
8	7386.00	31.2 AV	54.0	-22.8	1.24 V	44	21.3	9.9

REMARKS:

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

802.11n (HT20)

CHANNEL	TX Channel 1	DETECTOR FUNCTION	Peak (PK)
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	69.6 PK	74.0	-4.4	1.34 H	108	70.9	-1.3
2	2390.00	53.7 AV	54.0	-0.3	1.34 H	108	55.0	-1.3
3	*2412.00	105.0 PK			1.34 H	108	106.1	-1.1
4	*2412.00	95.1 AV			1.34 H	108	96.2	-1.1
5	4824.00	66.0 PK	74.0	-8.0	1.10 H	135	62.8	3.2
6	4824.00	52.9 AV	54.0	-1.1	1.10 H	135	49.7	3.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	68.1 PK	74.0	-5.9	2.45 V	83	69.4	-1.3
2	2390.00	52.1 AV	54.0	-1.9	2.45 V	83	53.4	-1.3
3	*2412.00	103.0 PK			2.45 V	83	104.1	-1.1
4	*2412.00	93.0 AV			2.45 V	83	94.1	-1.1
5	4824.00	59.3 PK	74.0	-14.7	1.12 V	53	56.1	3.2
6	4824.00	45.2 AV	54.0	-8.8	1.12 V	53	42.0	3.2

REMARKS:

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

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Peak (PK)
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	105.9 PK			1.34 H	108	107.1	-1.2
2	*2437.00	96.1 AV			1.34 H	108	97.3	-1.2
3	4874.00	67.2 PK	74.0	-6.8	1.10 H	135	63.9	3.3
4	4874.00	53.6 AV	54.0	-0.4	1.10 H	135	50.3	3.3
5	7311.00	47.6 PK	74.0	-26.4	1.13 H	201	37.8	9.8
6	7311.00	35.1 AV	54.0	-18.9	1.13 H	201	25.3	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2437.00	103.8 PK			2.49 V	88	105.0	-1.2
2	*2437.00	94.1 AV			2.49 V	88	95.3	-1.2
3	4874.00	59.2 PK	74.0	-14.8	1.14 V	73	55.9	3.3
4	4874.00	44.9 AV	54.0	-9.1	1.14 V	73	41.6	3.3
5	7311.00	44.0 PK	74.0	-30.0	1.21 V	35	34.2	9.8
6	7311.00	30.7 AV	54.0	-23.3	1.21 V	35	20.9	9.8

REMARKS:

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

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
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	104.8 PK			1.34 H	108	105.9	-1.1
2	*2462.00	94.9 AV			1.34 H	108	96.0	-1.1
3	2483.50	69.9 PK	74.0	-4.1	1.34 H	108	70.9	-1.0
4	2483.50	53.9 AV	54.0	-0.1	1.34 H	108	54.9	-1.0
5	4924.00	64.8 PK	74.0	-9.2	1.09 H	150	61.3	3.5
6	4924.00	51.5 AV	54.0	-2.5	1.09 H	150	48.0	3.5
7	7386.00	48.0 PK	74.0	-26.0	1.07 H	209	38.1	9.9
8	7386.00	35.2 AV	54.0	-18.8	1.07 H	209	25.3	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2462.00	102.7 PK			2.53 V	102	103.8	-1.1
2	*2462.00	92.8 AV			2.53 V	102	93.9	-1.1
3	2483.50	68.3 PK	74.0	-5.7	2.53 V	102	69.3	-1.0
4	2483.50	52.3 AV	54.0	-1.7	2.53 V	102	53.3	-1.0
5	4924.00	59.3 PK	74.0	-14.7	1.19 V	88	55.8	3.5
6	4924.00	45.4 AV	54.0	-8.6	1.19 V	88	41.9	3.5
7	7386.00	44.2 PK	74.0	-29.8	1.19 V	31	34.3	9.9
8	7386.00	30.9 AV	54.0	-23.1	1.19 V	31	21.0	9.9

REMARKS:

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

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.8 PK	74.0	-7.2	1.34 H	108	68.1	-1.3
2	2390.00	53.8 AV	54.0	-0.2	1.34 H	108	55.1	-1.3
3	*2422.00	100.2 PK			1.34 H	108	101.5	-1.3
4	*2422.00	90.3 AV			1.34 H	108	91.6	-1.3
5	4844.00	57.4 PK	74.0	-16.6	1.08 H	148	54.1	3.3
6	4844.00	47.1 AV	54.0	-6.9	1.08 H	148	43.8	3.3
7	7266.00	44.6 PK	74.0	-29.4	1.09 H	202	34.8	9.8
8	7266.00	31.4 AV	54.0	-22.6	1.09 H	202	21.6	9.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.2 PK	74.0	-8.8	2.56 V	102	66.5	-1.3
2	2390.00	52.1 AV	54.0	-1.9	2.56 V	102	53.4	-1.3
3	*2422.00	98.1 PK			2.56 V	102	99.4	-1.3
4	*2422.00	88.2 AV			2.56 V	102	89.5	-1.3
5	4844.00	52.6 PK	74.0	-21.4	1.21 V	98	49.3	3.3
6	4844.00	38.6 AV	54.0	-15.4	1.21 V	98	35.3	3.3
7	7266.00	44.0 PK	74.0	-30.0	1.19 V	31	34.2	9.8
8	7266.00	30.6 AV	54.0	-23.4	1.19 V	31	20.8	9.8

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	66.8 PK	74.0	-7.2	1.34 H	108	68.1	-1.3
2	2390.00	52.5 AV	54.0	-1.5	1.34 H	108	53.8	-1.3
3	*2437.00	104.4 PK			1.34 H	108	105.6	-1.2
4	*2437.00	95.1 AV			1.34 H	108	96.3	-1.2
5	2483.50	68.2 PK	74.0	-5.8	1.34 H	108	69.2	-1.0
6	2483.50	53.9 AV	54.0	-0.1	1.34 H	108	54.9	-1.0
7	4874.00	61.8 PK	74.0	-12.2	1.10 H	134	58.5	3.3
8	4874.00	51.7 AV	54.0	-2.3	1.10 H	134	48.4	3.3
9	7311.00	46.6 PK	74.0	-27.4	1.10 H	204	36.8	9.8
10	7311.00	33.8 AV	54.0	-20.2	1.10 H	204	24.0	9.8

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	65.2 PK	74.0	-8.8	2.50 V	91	66.5	-1.3
2	2390.00	50.9 AV	54.0	-3.1	2.50 V	91	52.2	-1.3
3	*2437.00	102.2 PK			2.50 V	91	103.4	-1.2
4	*2437.00	93.1 AV			2.50 V	91	94.3	-1.2
5	2483.50	66.8 PK	74.0	-7.2	2.50 V	91	67.8	-1.0
6	2483.50	52.3 AV	54.0	-1.7	2.50 V	91	53.3	-1.0
7	4874.00	57.8 PK	74.0	-16.2	1.17 V	83	54.5	3.3
8	4874.00	43.8 AV	54.0	-10.2	1.17 V	83	40.5	3.3
9	7311.00	43.7 PK	74.0	-30.3	1.25 V	39	33.9	9.8
10	7311.00	30.3 AV	54.0	-23.7	1.25 V	39	20.5	9.8

REMARKS:

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

CHANNEL	TX Channel 9	DETECTOR FUNCTION	Peak (PK)
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	99.8 PK			1.34 H	108	100.9	-1.1
2	*2452.00	90.0 AV			1.34 H	108	91.1	-1.1
3	2483.50	68.1 PK	74.0	-5.9	1.34 H	108	69.1	-1.0
4	2483.50	53.9 AV	54.0	-0.1	1.34 H	108	54.9	-1.0
5	4904.00	57.9 PK	74.0	-16.1	1.04 H	156	54.4	3.5
6	4904.00	47.6 AV	54.0	-6.4	1.04 H	156	44.1	3.5
7	7356.00	45.0 PK	74.0	-29.0	1.04 H	199	35.1	9.9
8	7356.00	31.7 AV	54.0	-22.3	1.04 H	199	21.8	9.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2452.00	97.7 PK			2.52 V	86	98.8	-1.1
2	*2452.00	87.9 AV			2.52 V	86	89.0	-1.1
3	2483.50	66.6 PK	74.0	-7.4	2.52 V	86	67.6	-1.0
4	2483.50	52.3 AV	54.0	-1.7	2.52 V	86	53.3	-1.0
5	4904.00	52.3 PK	74.0	-21.7	1.25 V	102	48.8	3.5
6	4904.00	38.5 AV	54.0	-15.5	1.25 V	102	35.0	3.5
7	7356.00	44.2 PK	74.0	-29.8	1.16 V	43	34.3	9.9
8	7356.00	30.9 AV	54.0	-23.1	1.16 V	43	21.0	9.9

REMARKS:

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

Below 1GHz Data:

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	99.65	30.9 QP	43.5	-12.6	2.00 H	264	43.7	-12.8
2	166.58	37.7 QP	43.5	-5.8	2.00 H	96	46.0	-8.3
3	249.87	31.7 QP	46.0	-14.3	1.00 H	360	41.2	-9.5
4	298.81	30.9 QP	46.0	-15.1	1.00 H	245	38.6	-7.7
5	431.53	26.4 QP	46.0	-19.6	2.00 H	342	30.4	-4.0
6	782.40	30.1 QP	46.0	-15.9	1.00 H	276	27.5	2.6
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	131.17	29.2 QP	43.5	-14.3	1.00 V	349	38.4	-9.2
2	166.60	34.2 QP	43.5	-9.3	1.00 V	128	42.5	-8.3
3	286.61	27.0 QP	46.0	-19.0	2.00 V	158	34.9	-7.9
4	427.89	24.7 QP	46.0	-21.3	1.50 V	168	28.8	-4.1
5	731.77	26.5 QP	46.0	-19.5	1.00 V	0	25.0	1.5
6	959.24	31.2 QP	46.0	-14.8	1.00 V	202	26.5	4.7

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.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 29, 2016	Sep. 28, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
Software BVADT	BVADT_Cond_V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3. Tested Date: Sep. 08, 2017.

4.2.3 Test Procedures

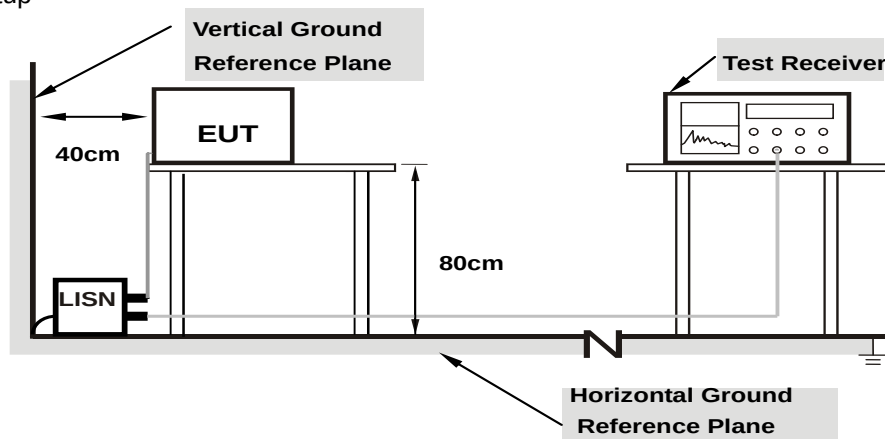
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

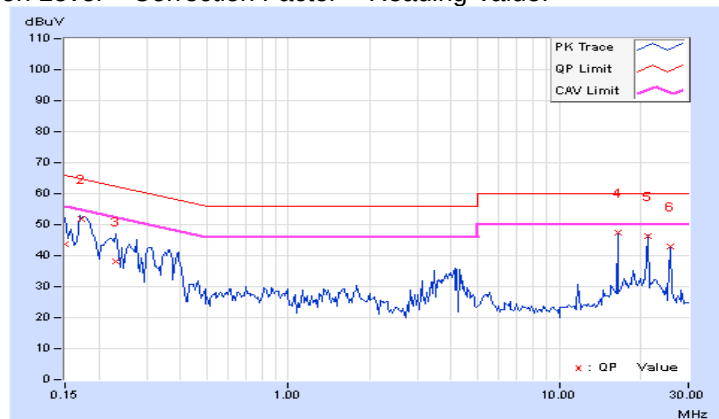
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.07	33.74	13.35	43.81	23.42	66.00	56.00	-22.19	-32.58
2	0.17341	10.07	41.93	24.15	52.00	34.22	64.80	54.80	-12.80	-20.58
3	0.23203	10.07	28.18	12.01	38.25	22.08	62.38	52.38	-24.13	-30.30
4	16.46484	11.06	36.24	34.71	47.30	45.77	60.00	50.00	-12.70	-4.23
5	21.16797	11.30	35.13	34.40	46.43	45.70	60.00	50.00	-13.57	-4.30
6	25.87200	11.33	31.58	30.99	42.91	42.32	60.00	50.00	-17.09	-7.68

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.

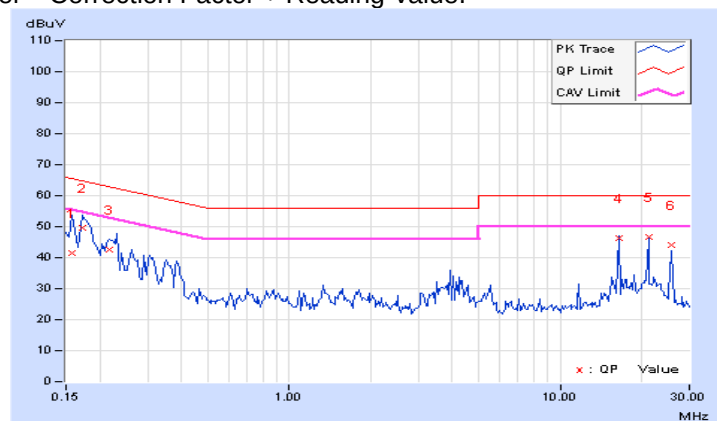


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.06	31.50	12.27	41.56	22.33	65.58	55.58	-24.02	-33.25
2	0.17344	10.05	39.55	29.55	49.60	39.60	64.79	54.79	-15.19	-15.19
3	0.21678	10.04	32.57	23.14	42.61	33.18	62.94	52.94	-20.33	-19.76
4	16.46484	10.85	35.52	34.97	46.37	45.82	60.00	50.00	-13.63	-4.18
5	21.16797	11.00	35.63	34.88	46.63	45.88	60.00	50.00	-13.37	-4.12
6	25.87337	10.97	32.92	31.37	43.89	42.34	60.00	50.00	-16.11	-7.66

REMARKS:

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

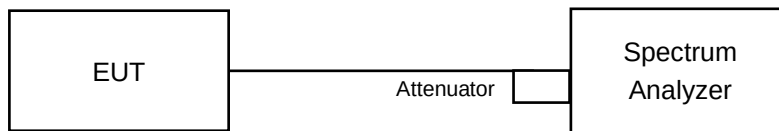


4.3 6dB Bandwidth Measurement

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

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	10.04	9.62	0.5	PASS
6	2437	10.06	10.09	0.5	PASS
11	2462	9.61	9.61	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.45	16.43	0.5	PASS
6	2437	16.41	16.41	0.5	PASS
11	2462	16.45	16.42	0.5	PASS

802.11n (HT20)

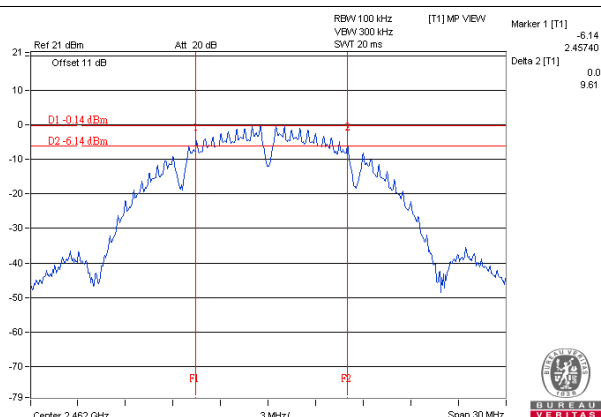
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.68	17.63	0.5	Pass
6	2437	17.66	17.65	0.5	Pass
11	2462	17.69	17.68	0.5	Pass

802.11n (HT40)

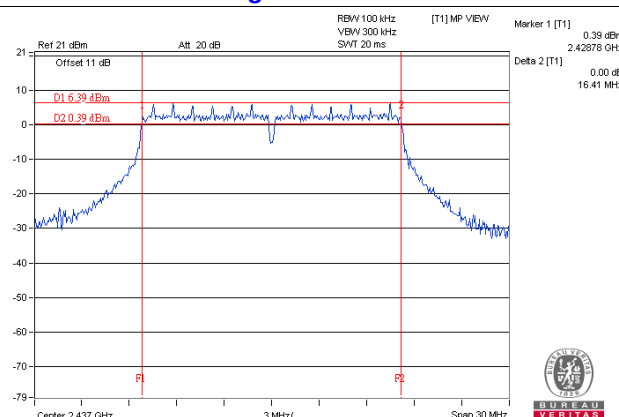
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.05	35.84	0.5	Pass
6	2437	35.70	35.71	0.5	Pass
9	2452	35.80	35.85	0.5	Pass

Spectrum Plot of Worst Value

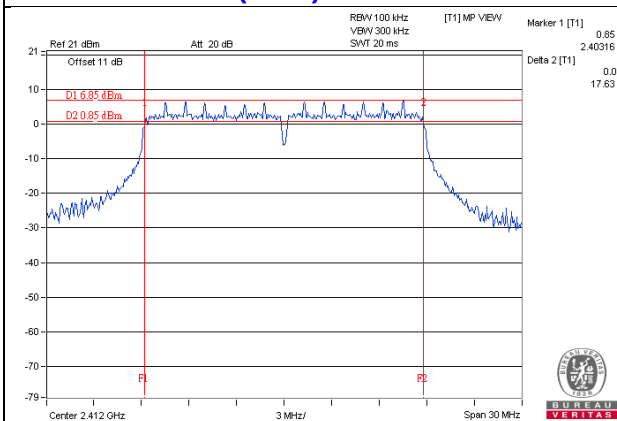
802.11b / Chain 1 : CH11



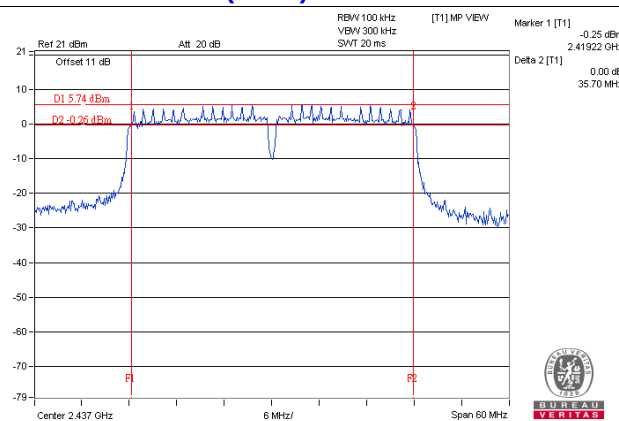
802.11g / Chain 1 : CH6



802.11n (HT20) / Chain 1 : CH1



802.11n (HT40) / Chain 0 : CH6



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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

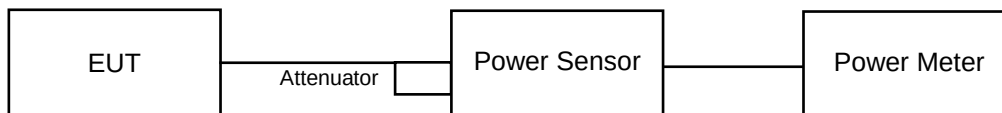
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

802.11b

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	10.79	10.01	22.018	13.43	30.00	Pass
6	2437	11.59	9.83	24.037	13.81	30.00	Pass
11	2462	11.42	9.27	22.321	13.49	30.00	Pass

802.11g

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.61	24.41	565.126	27.52	30.00	Pass
6	2437	25.40	24.08	602.596	27.80	30.00	Pass
11	2462	24.66	23.08	495.651	26.95	30.00	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	24.52	24.63	573.541	27.59	30.00	Pass
6	2437	25.38	24.13	603.965	27.81	30.00	Pass
11	2462	24.55	23.12	490.218	26.90	30.00	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	23.67	22.82	424.235	26.28	30.00	Pass
6	2437	25.44	24.70	645.066	28.10	30.00	Pass
9	2452	23.53	22.38	398.406	26.00	30.00	Pass

FOR AVERAGE POWER

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	8.50	7.89	13.231	11.22
6	2437	9.41	7.80	14.756	11.69
11	2462	9.32	7.65	14.372	11.58

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.18	17.35	120.091	20.80
6	2437	18.65	16.77	120.816	20.82
11	2462	17.29	15.55	89.472	19.52

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.15	17.42	120.521	20.81
6	2437	18.60	16.83	120.639	20.81
11	2462	17.20	15.50	87.962	19.44

802.11n (HT40)

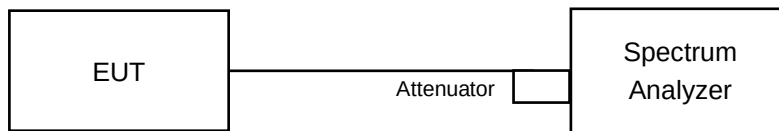
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	15.50	14.33	62.583	17.96
6	2437	18.78	17.85	136.463	21.35
9	2452	14.75	13.89	54.345	17.35

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-13.29	3.01	-10.28	8	Pass
	6	2437	-13.07	3.01	-10.06	8	Pass
	11	2462	-11.45	3.01	-8.44	8	Pass
1	1	2412	-14.79	3.01	-11.78	8	Pass
	6	2437	-15.29	3.01	-12.28	8	Pass
	11	2462	-13.43	3.01	-10.42	8	Pass

Note: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 3.61\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-8.28	3.01	-5.27	8	Pass
	6	2437	-6.67	3.01	-3.66	8	Pass
	11	2462	-8.78	3.01	-5.77	8	Pass
1	1	2412	-7.62	3.01	-4.61	8	Pass
	6	2437	-7.92	3.01	-4.91	8	Pass
	11	2462	-9.55	3.01	-6.54	8	Pass

Note: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 3.61\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-8.64	3.01	-5.63	8	Pass
	6	2437	-6.52	3.01	-3.51	8	Pass
	11	2462	-8.37	3.01	-5.36	8	Pass
1	1	2412	-7.83	3.01	-4.82	8	Pass
	6	2437	-8.12	3.01	-5.11	8	Pass
	11	2462	-9.85	3.01	-6.84	8	Pass

Note: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 3.61\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

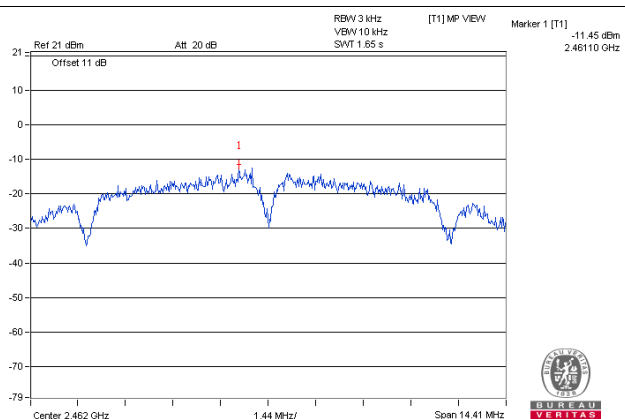
802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-12.45	3.01	-9.44	8	Pass
	6	2437	-9.28	3.01	-6.27	8	Pass
	9	2452	-13.94	3.01	-10.93	8	Pass
1	3	2422	-13.42	3.01	-10.41	8	Pass
	6	2437	-9.67	3.01	-6.66	8	Pass
	9	2452	-14.21	3.01	-11.20	8	Pass

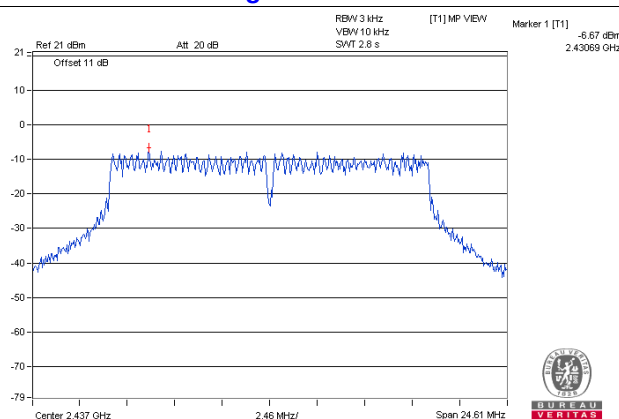
Note: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 3.61\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.

Spectrum Plot of Worst Value

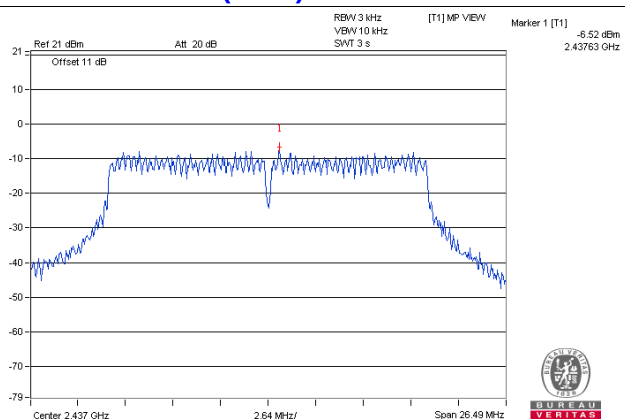
802.11b / Chain 0 : CH11



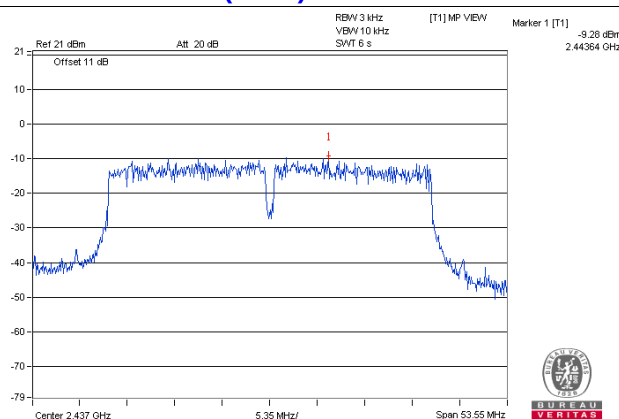
802.11g / Chain 0 : CH6



802.11n (HT20) / Chain 0 : CH6



802.11n (HT40) / Chain 0 : CH6

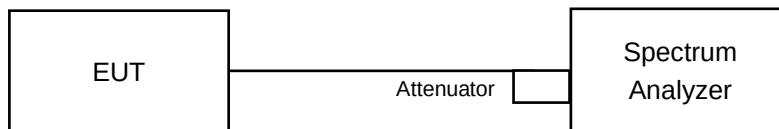


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

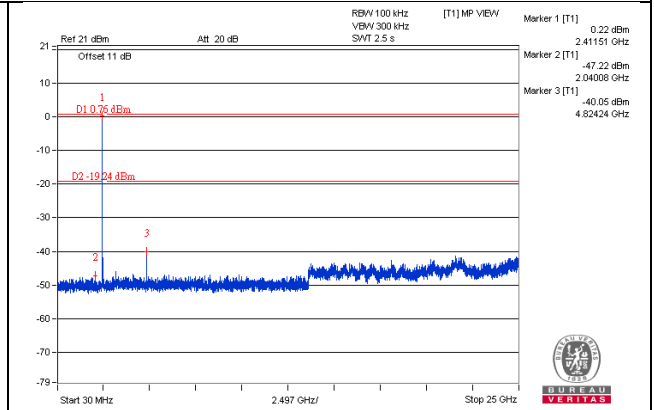
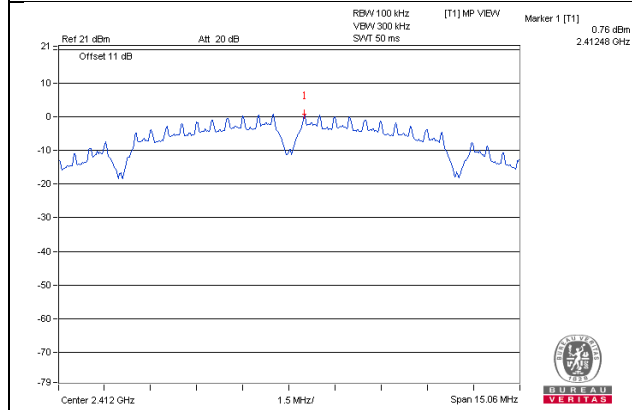
Same as Item 4.3.6

4.6.7 Test Results

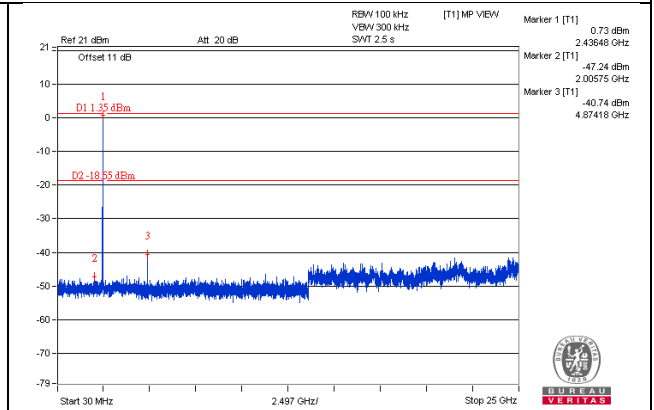
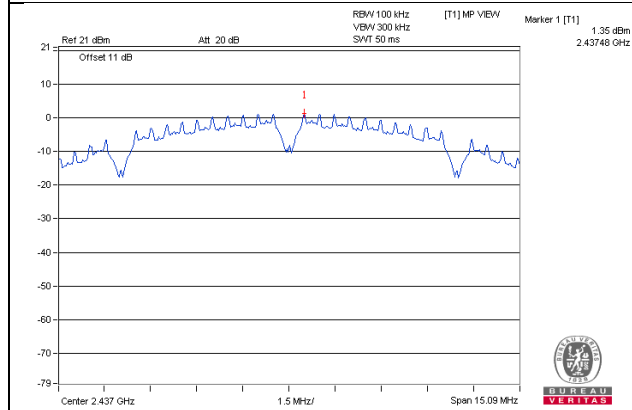
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b CHAIN 0

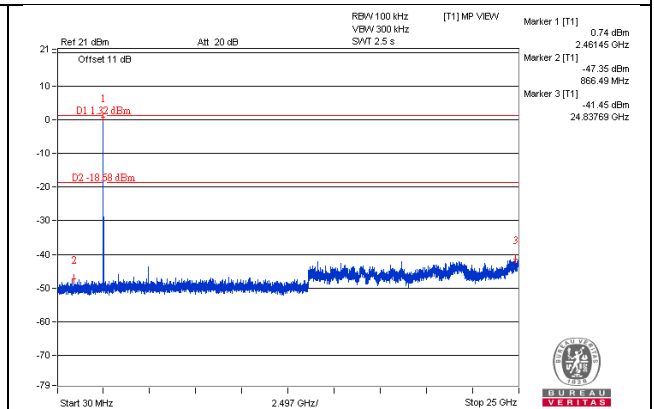
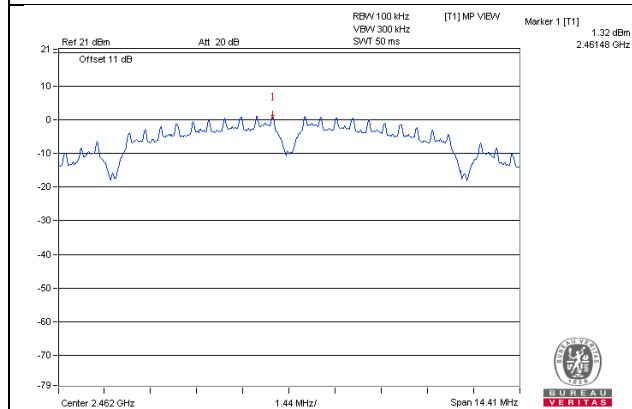
CH 1



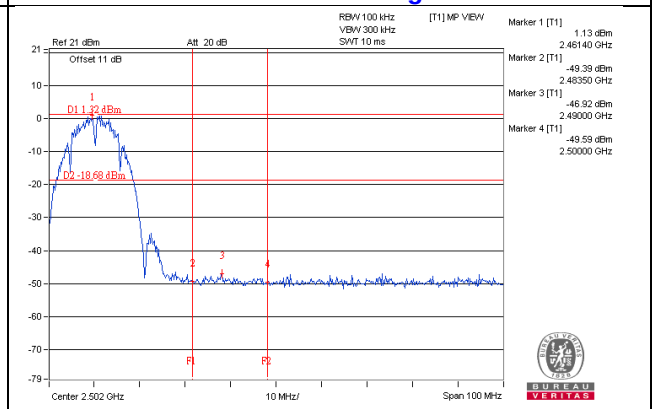
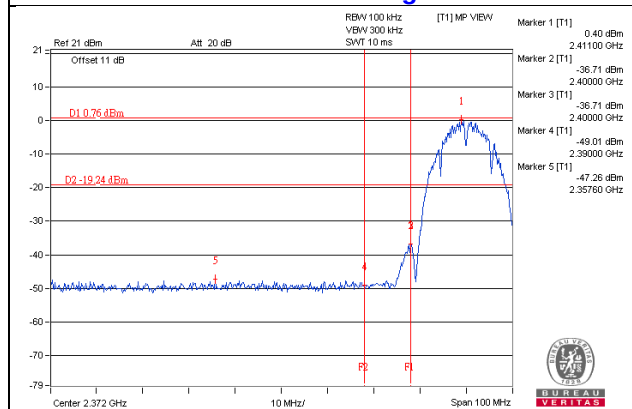
CH 6



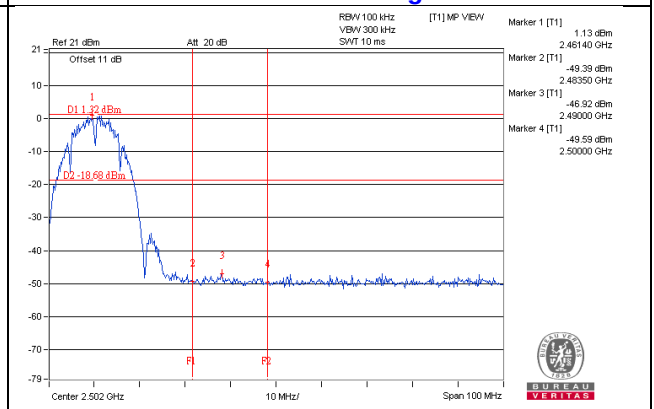
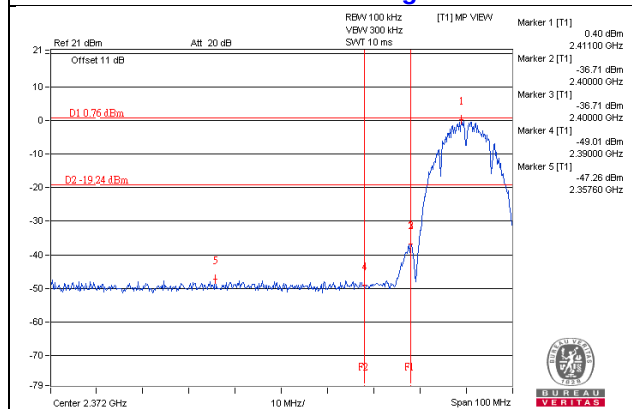
CH 11



CH 1 Band edge

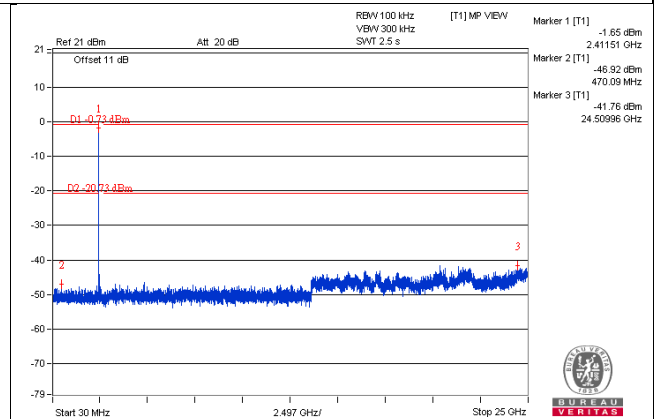
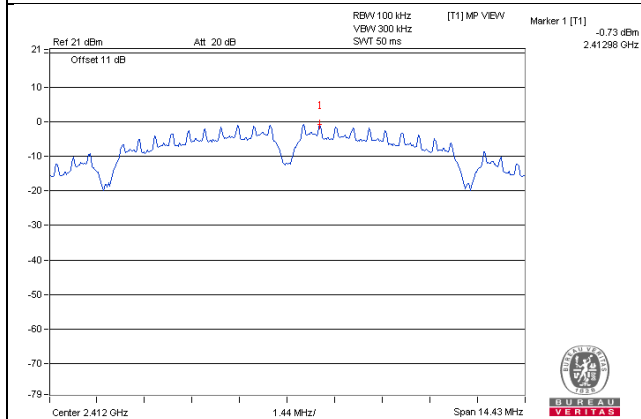


CH 11 Band edge

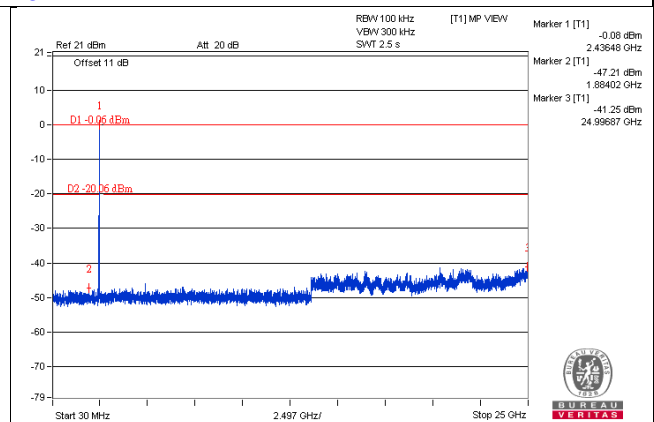
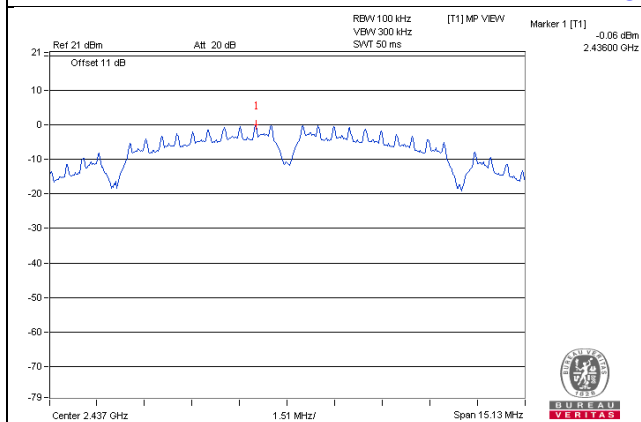


CHAIN 1

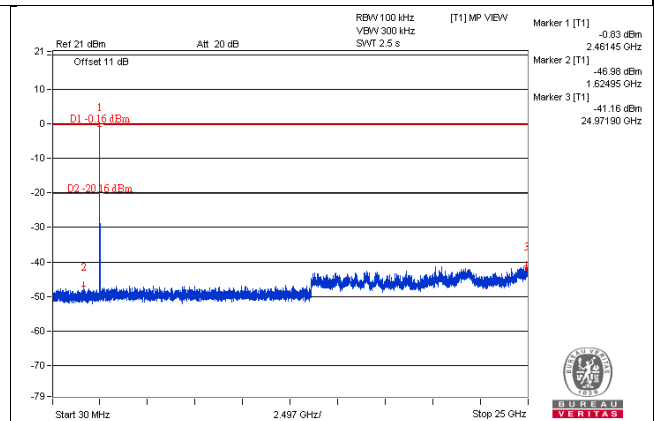
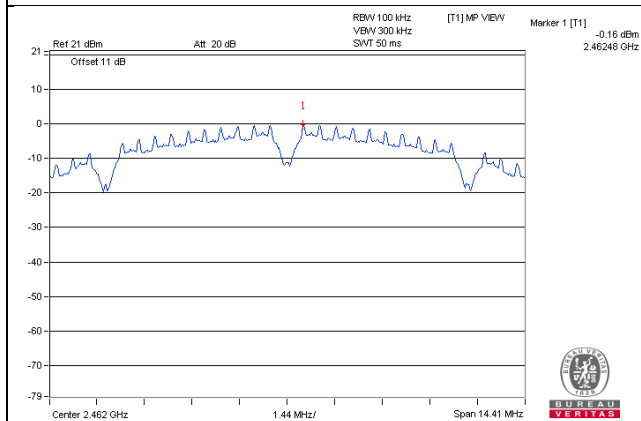
CH 1



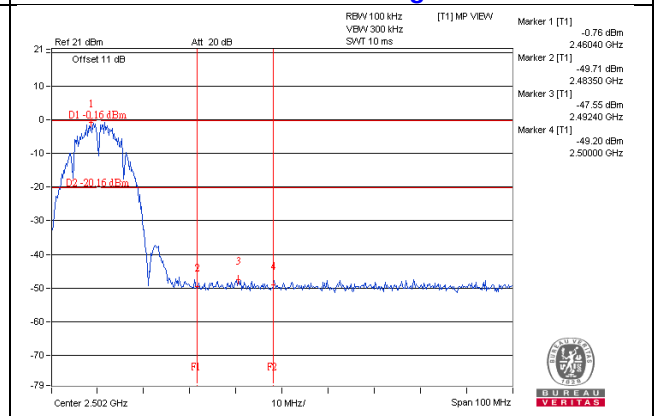
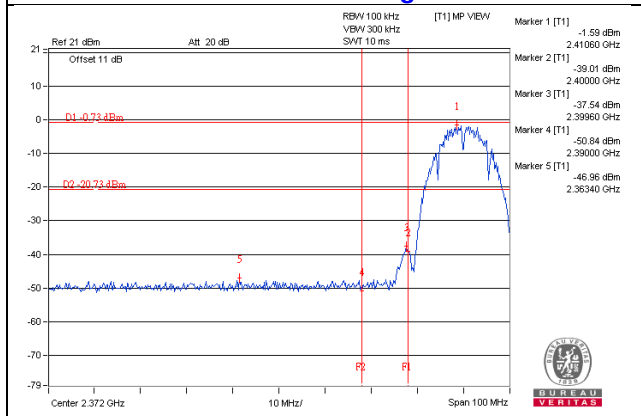
CH 6



CH 11

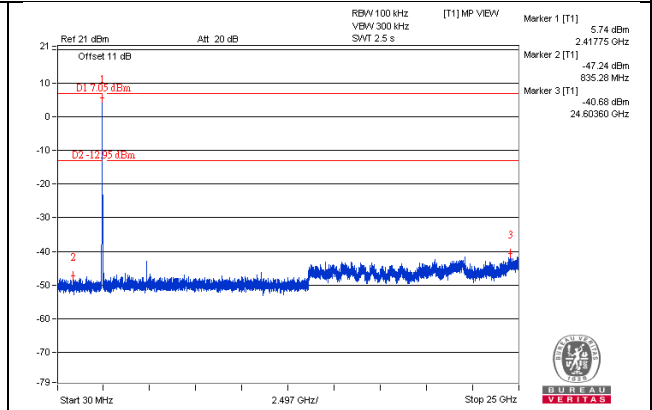
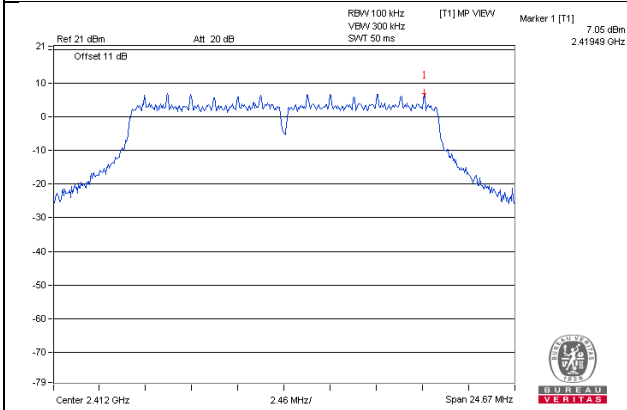


CH 1 Band edge

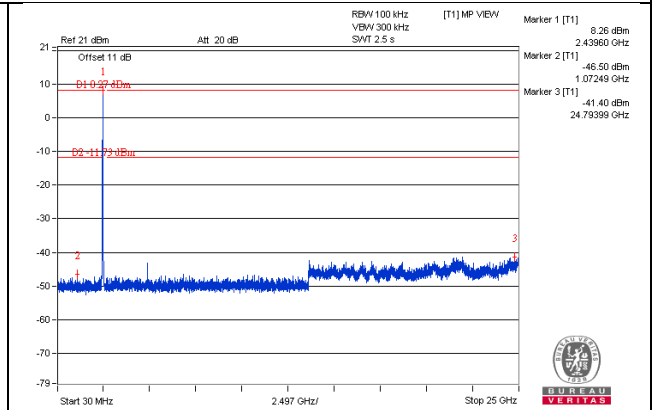
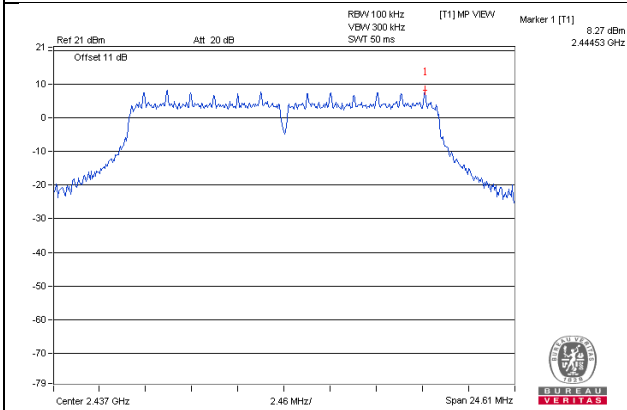


802.11g CHAIN 0

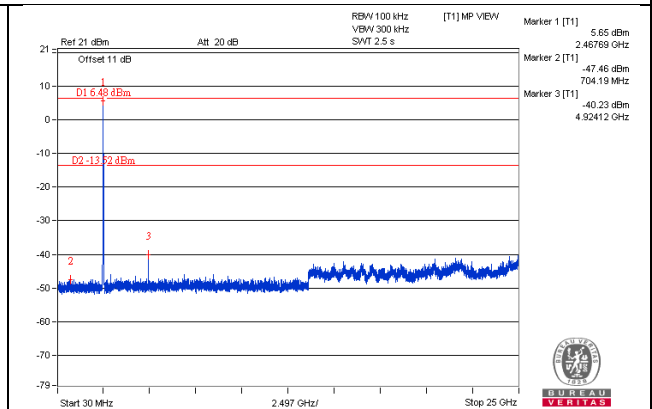
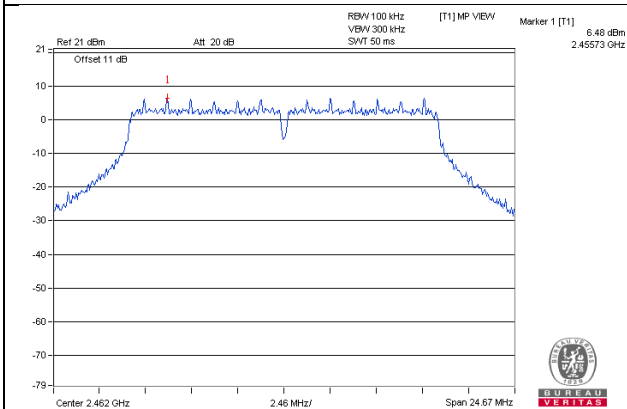
CH 1



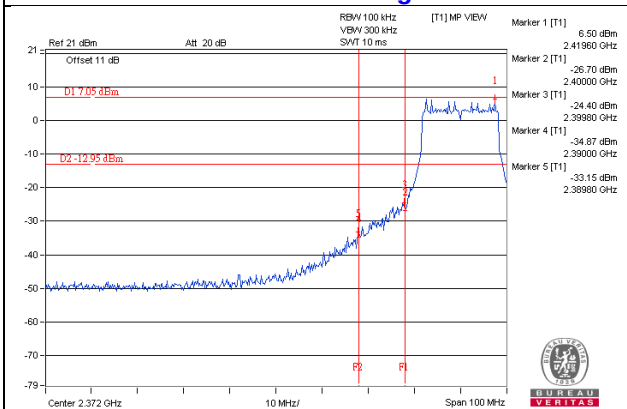
CH 6



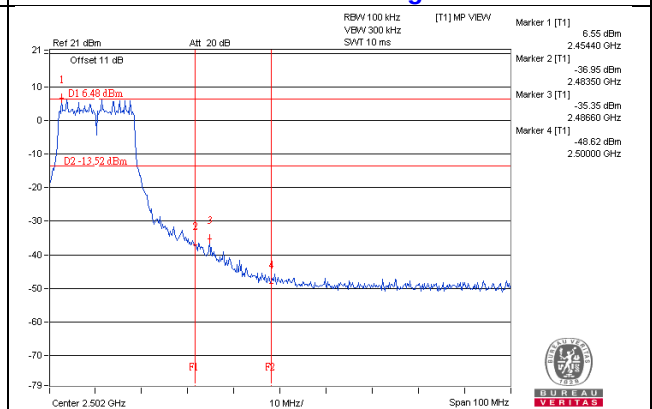
CH 11



CH 1 Band edge

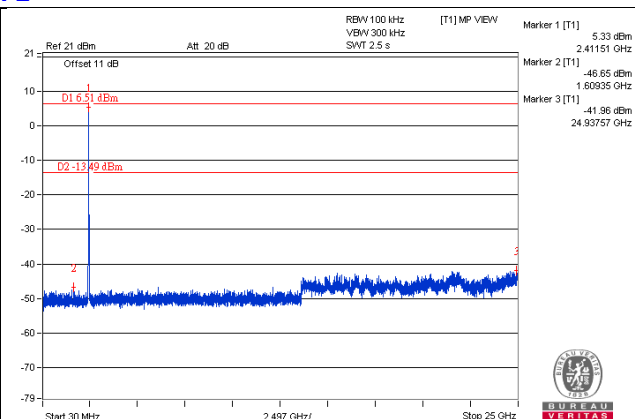
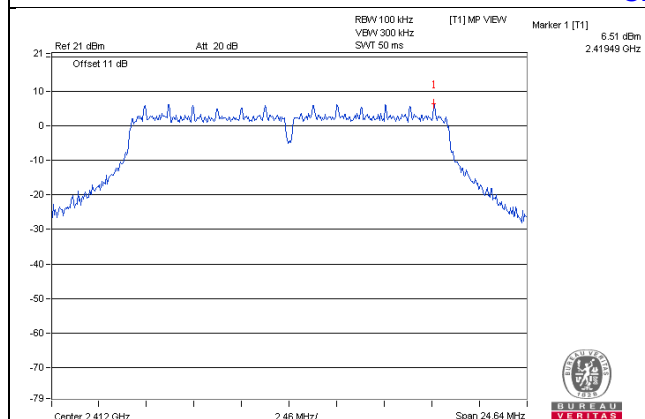


CH 11 Band edge

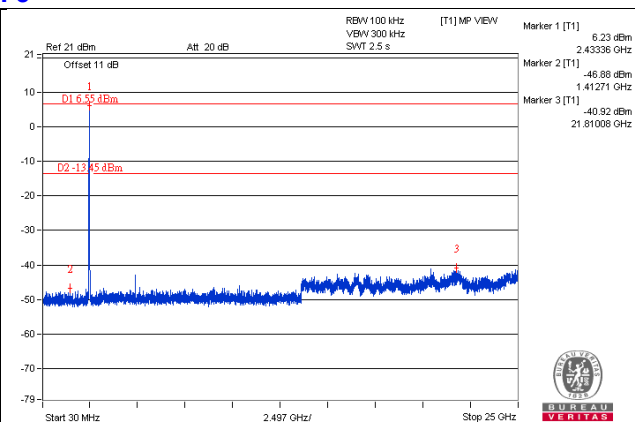
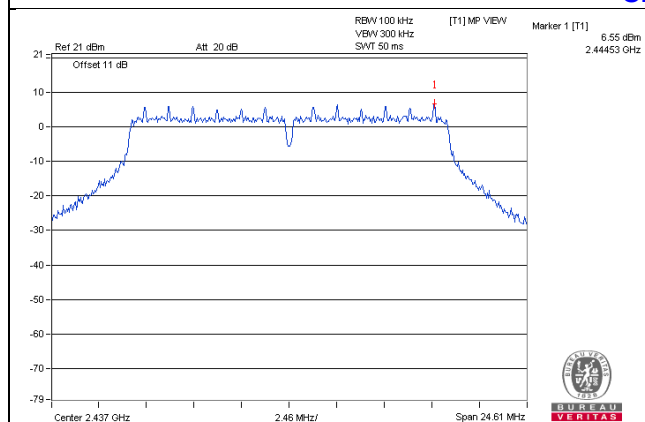


CHAIN 1

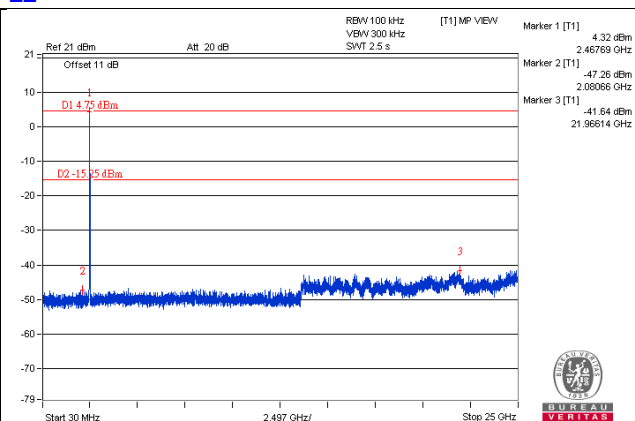
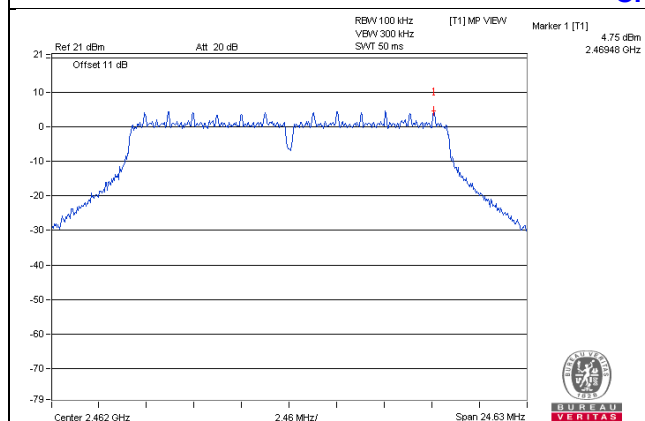
CH 1



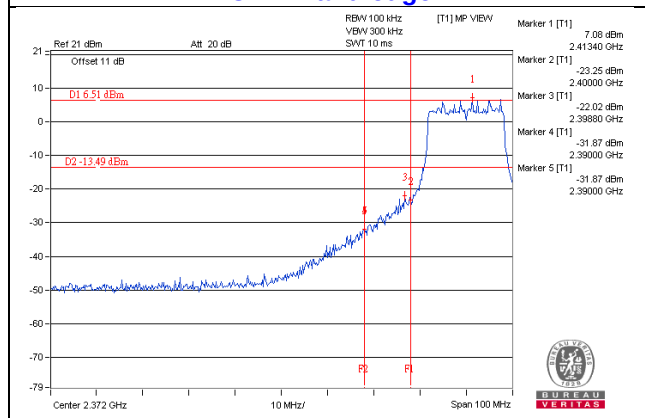
CH 6



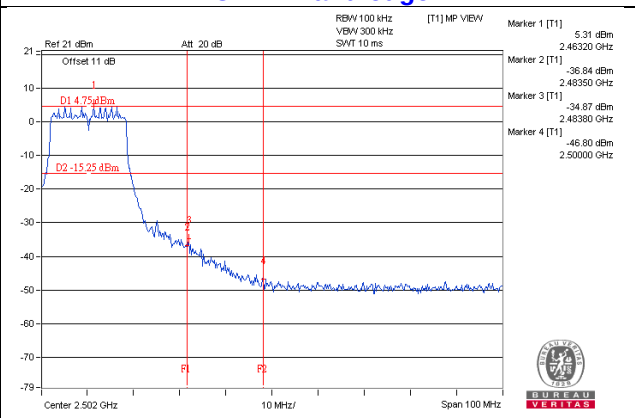
CH 11



CH 1 Band edge

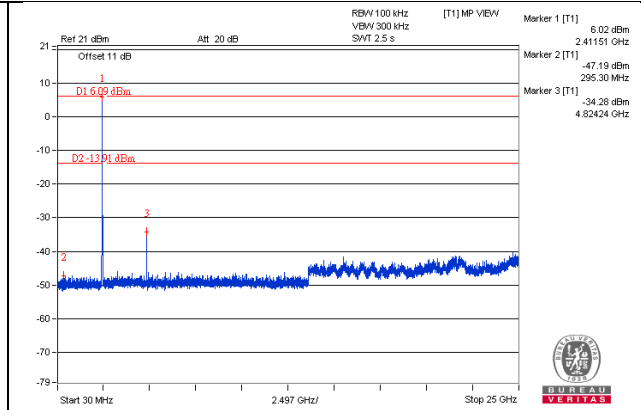
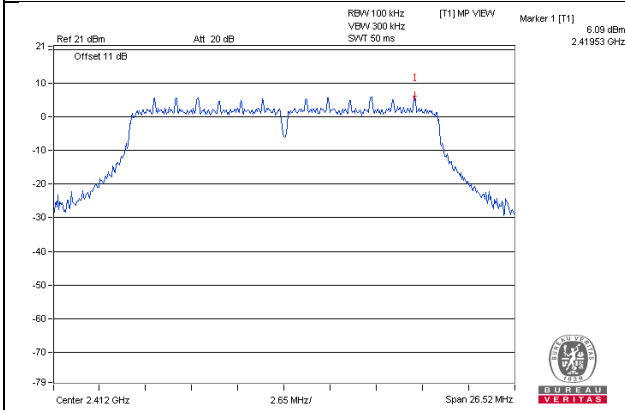


CH 11 Band edge

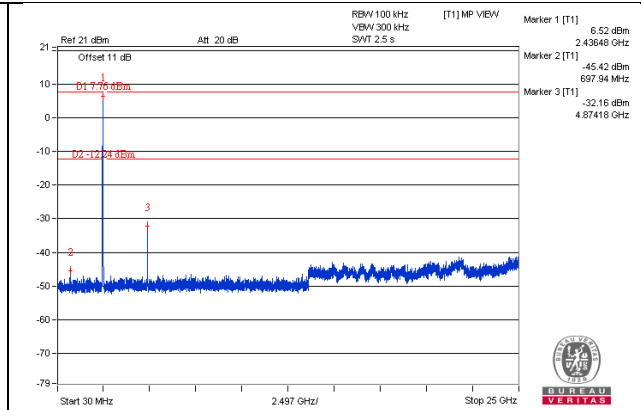
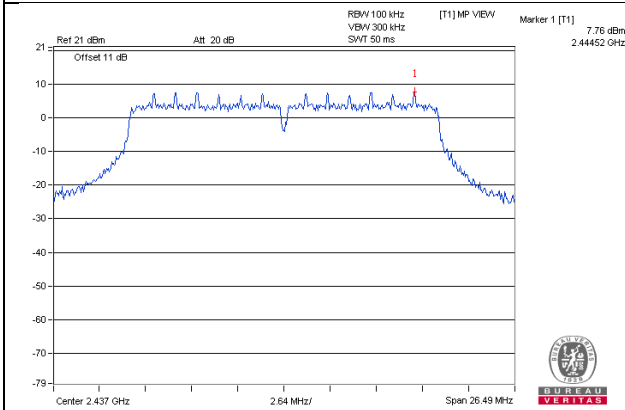


802.11n (HT20) CHAIN 0

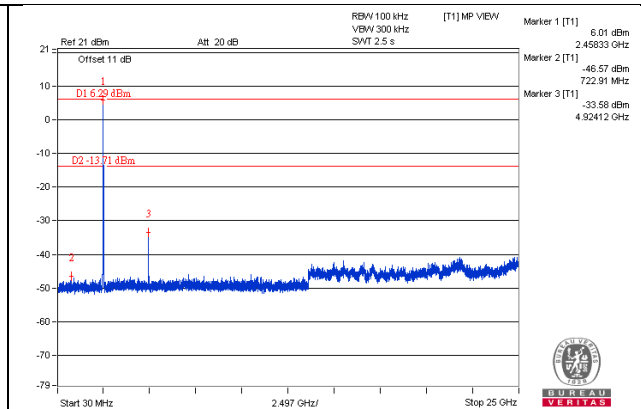
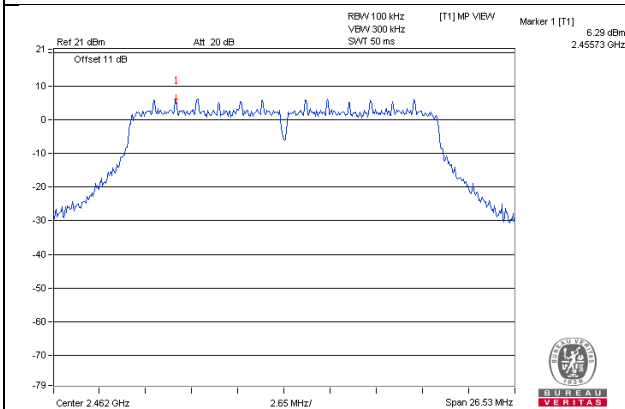
CH 1



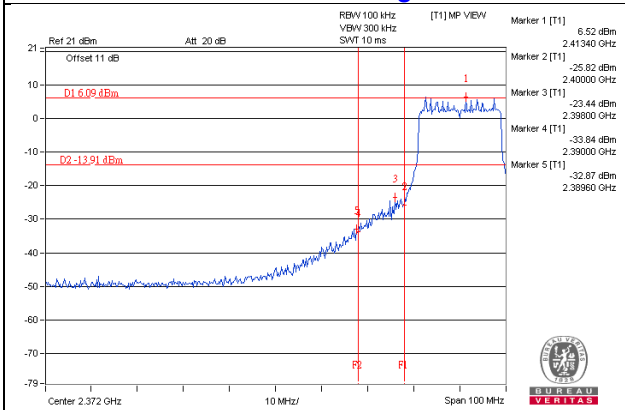
CH 6



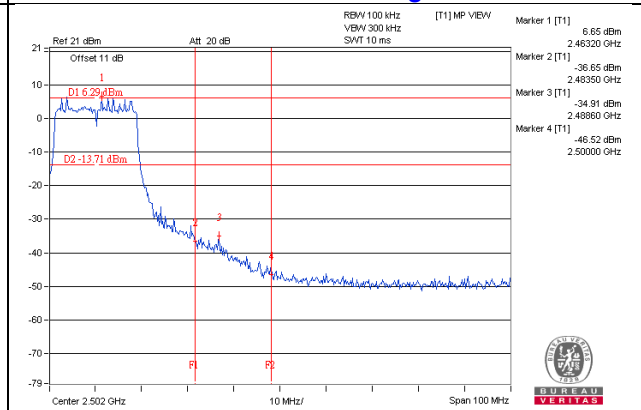
CH 11



CH 1 Band edge

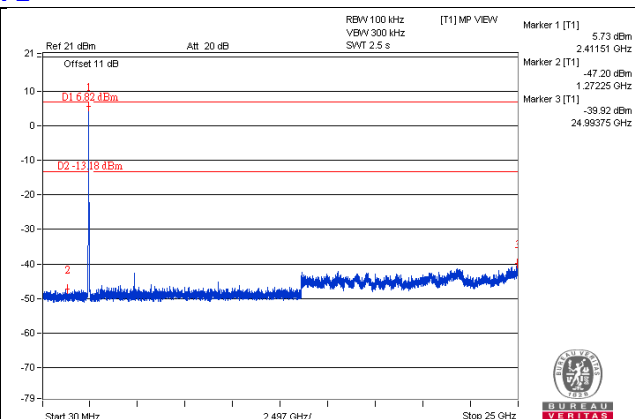
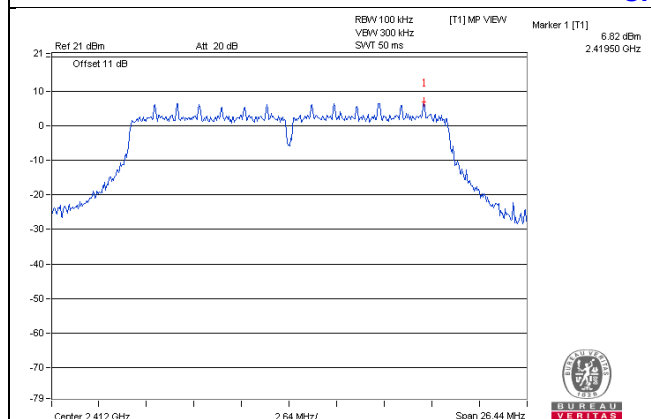


CH 11 Band edge

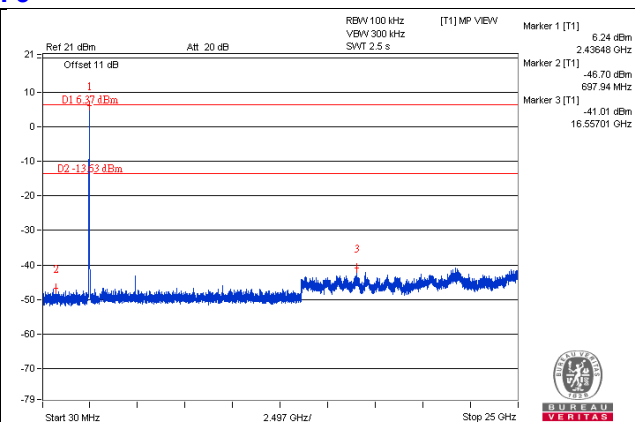
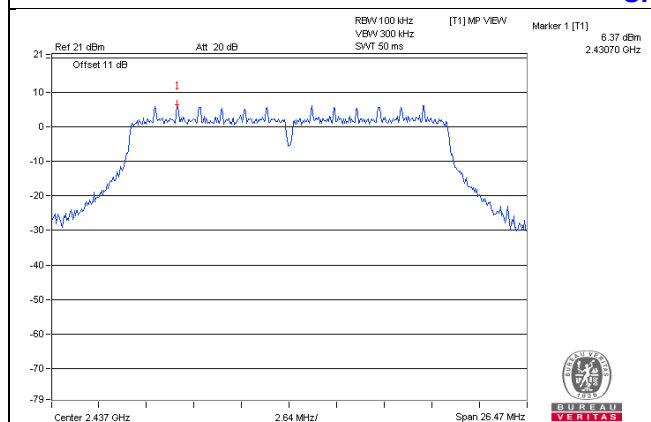


CHAIN 1

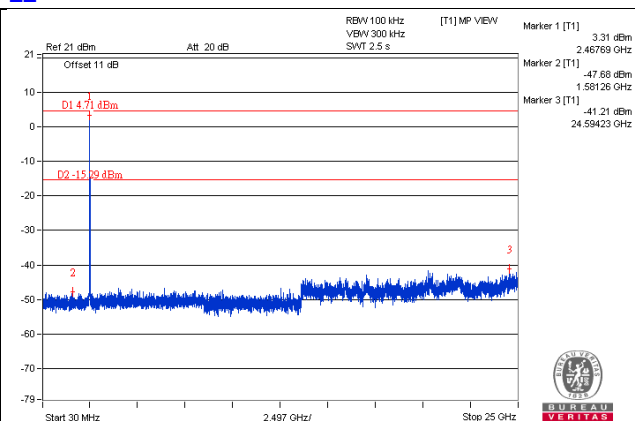
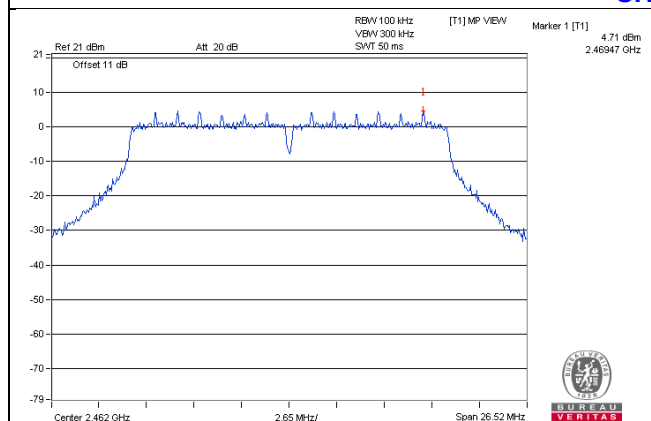
CH 1



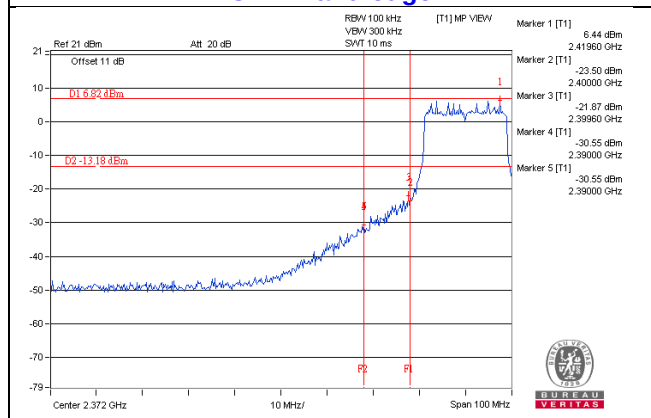
CH 6



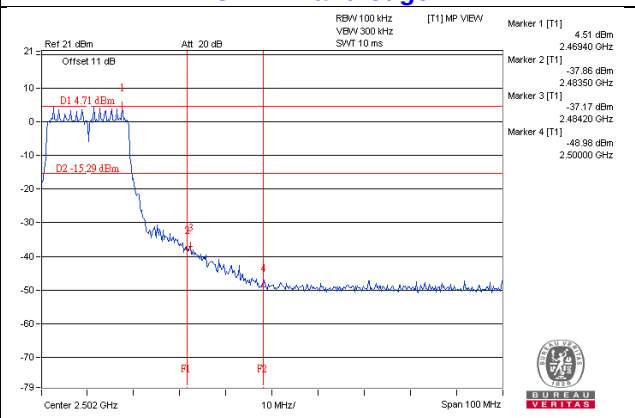
CH 11



CH 1 Band edge

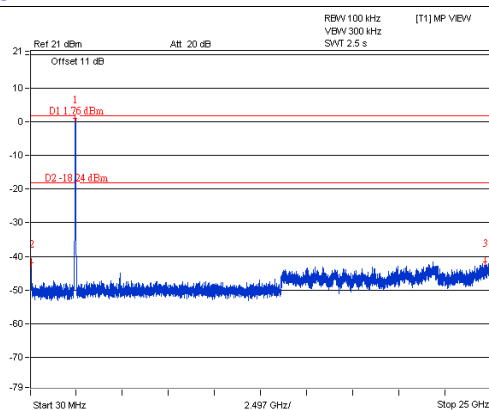
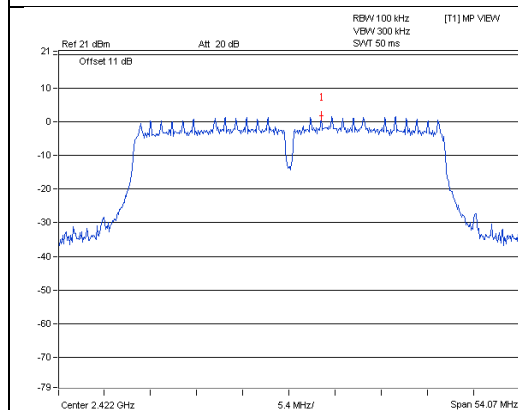


CH 11 Band edge

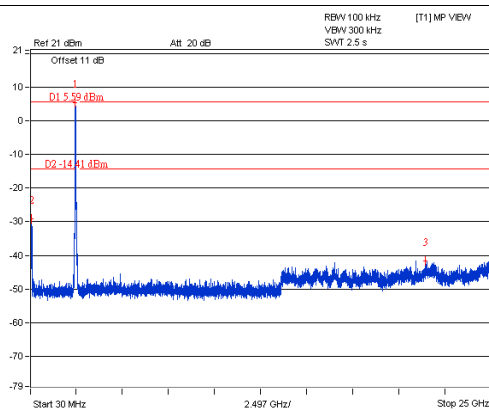
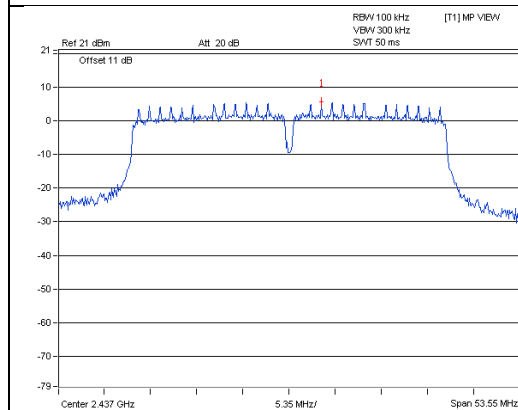


802.11n (HT40) Chain 0

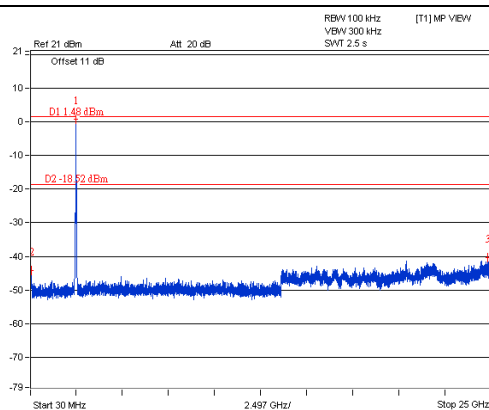
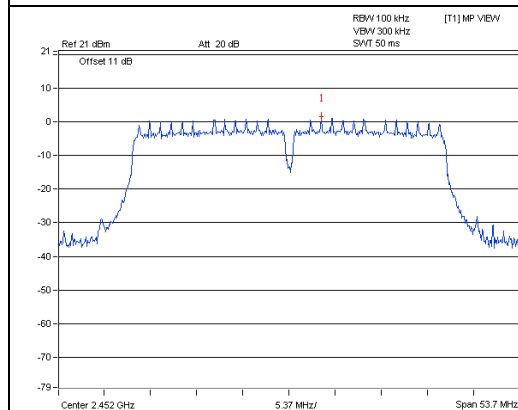
CH 3



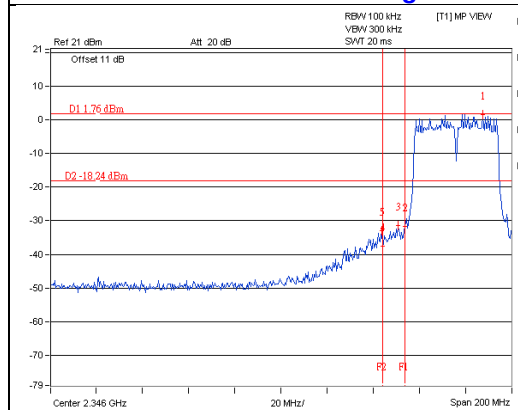
CH 6



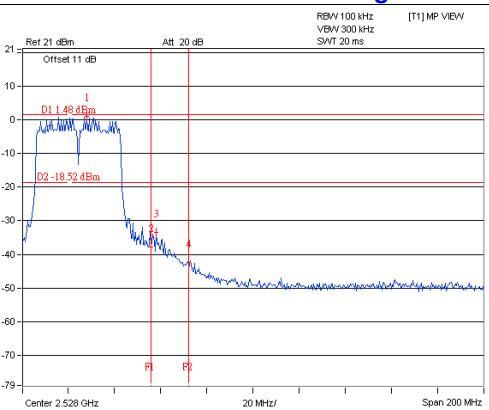
CH 9



CH 3 Band edge

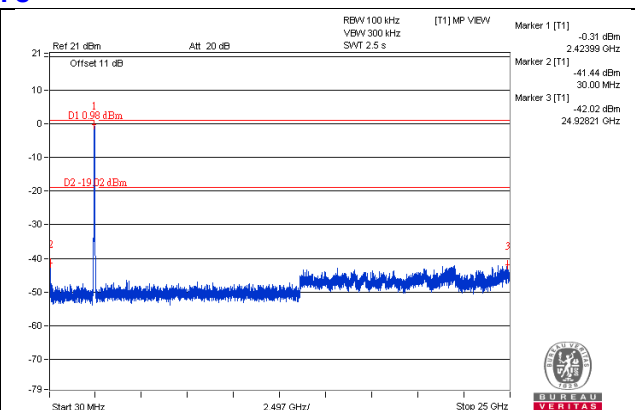
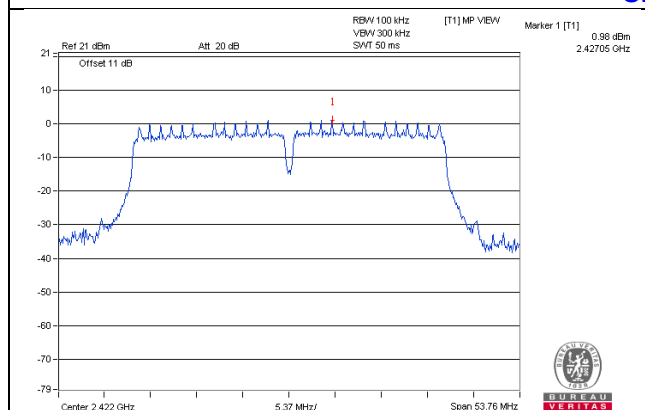


CH 9 Band edge

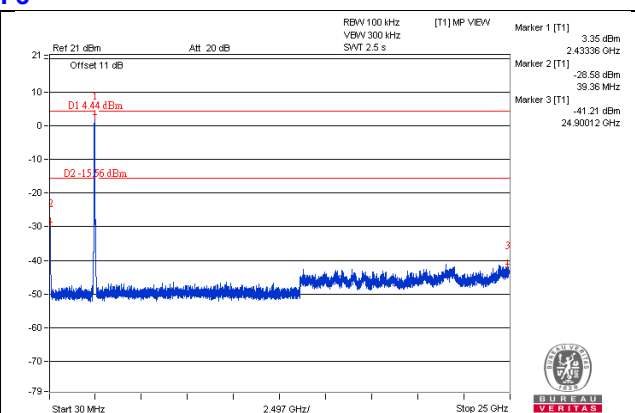
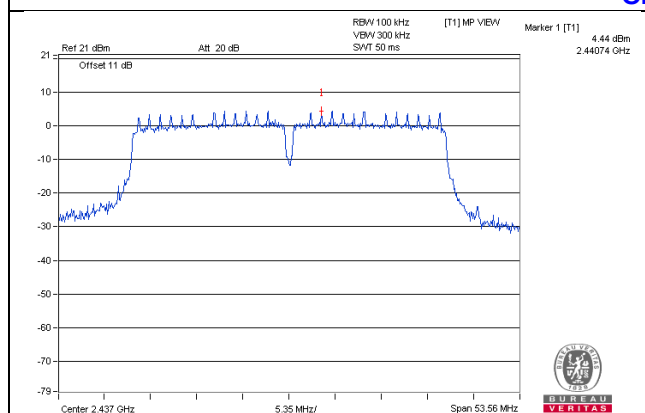


Chain 1

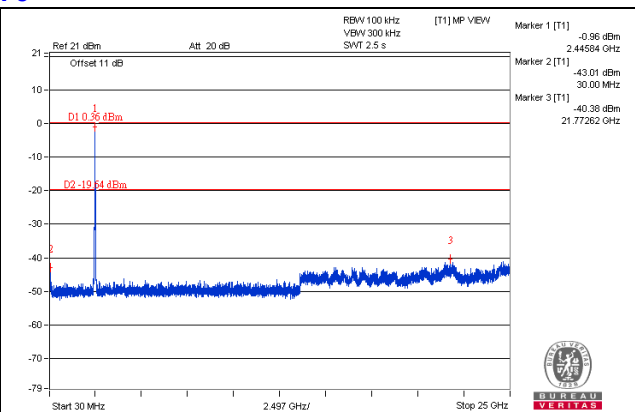
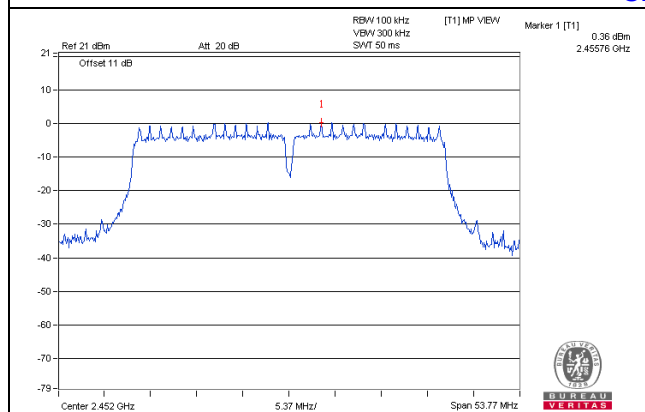
CH 3



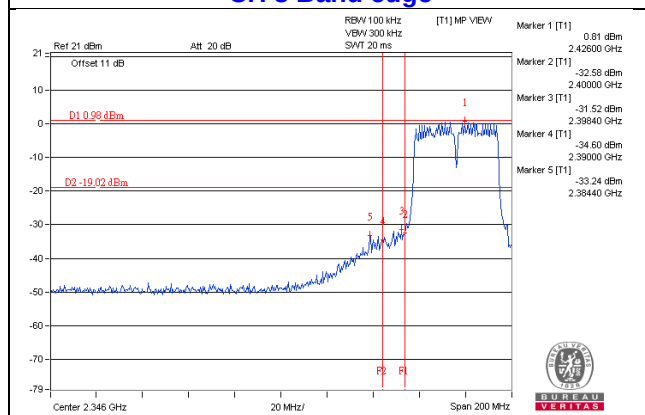
CH 6



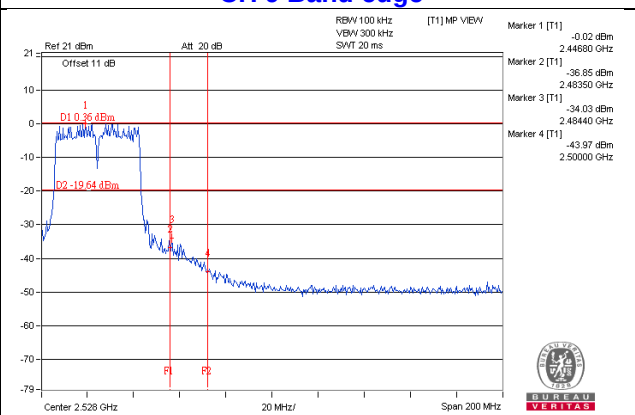
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information on the Testing Laboratories

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

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

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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