

FCC Test Report

Report No.: RF170120E10E

FCC ID: ZMYGPT-2741GNAC

Test Model: GPT-2741GNAC

Received Date: Feb. 16, 2017

Test Date: Feb. 22 to Mar. 03, 2017

Issued Date: Dec. 10, 2019

Applicant: MitraStar Technology 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:** 723255 / TW2022



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Release Control Record

Issue No.	Description	Date Issued
RF170120E10E	Original release.	Dec. 10, 2019

1 Certificate of Conformity

Product: Fiber Optic access equipment

Brand: MitraStar

Test Model: GPT-2741GNAC

Sample Status: ENGINEERING SAMPLE

Applicant: MitraStar Technology Corporation

Test Date: Feb. 22 to Mar. 03, 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 : Vivian Huang , **Date:** Dec. 10, 2019
Vivian Huang / Specialist

Approved by : Clark Lin , **Date:** Dec. 10, 2019
Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -8.10dB at 0.18125MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 2483.50MHz.
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	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.34 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.41 dB
	6GHz ~ 18GHz	3.49 dB
	18GHz ~ 40GHz	3.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Fiber Optic access equipment
Brand	MitraStar
Test Model	GPT-2741GNAC
Sample Status	ENGINEERING SAMPLE
Power Supply rating	DC 12V from adapter
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	874.039mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	RJ-45 cable (Unshielded, 1.5m)

Note:

- This is a supplementary report of Report No.: RF170120E10A. The differences between them are as below information:
 - ◆ Upgrade standard and add FCC ID.
- According to above conditions, there is no addition test has to be performed. All test data were copied from the original test report (Report No.: RF170120E10A). And all data were verified to meet the requirements.
- The test data are copied which have obtained authorization from applicant and brand company both of the original test report (Report No.: RF170120E10A).
- The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Antenna Gain(dBi) Including cable loss	Frequency range	Antenna Type	Connector Type	Cable Length
Chain (0)	HONGBO	290-10434	2.5	2.4~2.4835GHz	Dipole	NA	80mm
Chain (1)	HONGBO	290-10434	2.98	2.4~2.4835GHz	Dipole	NA	80mm

Note:

- For 802.11b/g mode will select Max Gain for the final test.

- The EUT power needs to be supplied from one power adapter, the information is as below table:

Brand	Model No.	Spec.
AMIGO	AMS3-1202000FU	Input: 100-240V, 50/60Hz, 0.8A Output: 12V, 2A DC output cable: Unshielded, 1.8m

6. The EUT incorporates a MIMO function.

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	1TX diversity	1RX diversity
802.11g	6 ~ 54Mbps	1TX diversity	1RX diversity
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

7. The power setting are list as below:

Modulation Mode	Frequency (MHz)	Power Setting
802.11b	2412	25
	2437	26
	2462	25
802.11g	2412	1F
	2437	28
	2462	1E
802.11n(HT20)	2412	19
	2437	28
	2462	1A
802.11n(HT40)	2422	13
	2437	1D
	2452	15

8. 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

Radiated Emission Test (Above 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- Following channel(s) was (were) selected for the final test as listed below.

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

Radiated Emission Test (Below 1GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

Power Line Conducted Emission Test:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

- Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11n (HT20)	1 to 11	6	OFDM	BPSK	6.5

Antenna Port Conducted Measurement:

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

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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	22deg. C, 66%RH	120Vac, 60Hz	Terry Huang
RE $<$ 1G	22deg. C, 66%RH	120Vac, 60Hz	Terry Huang
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

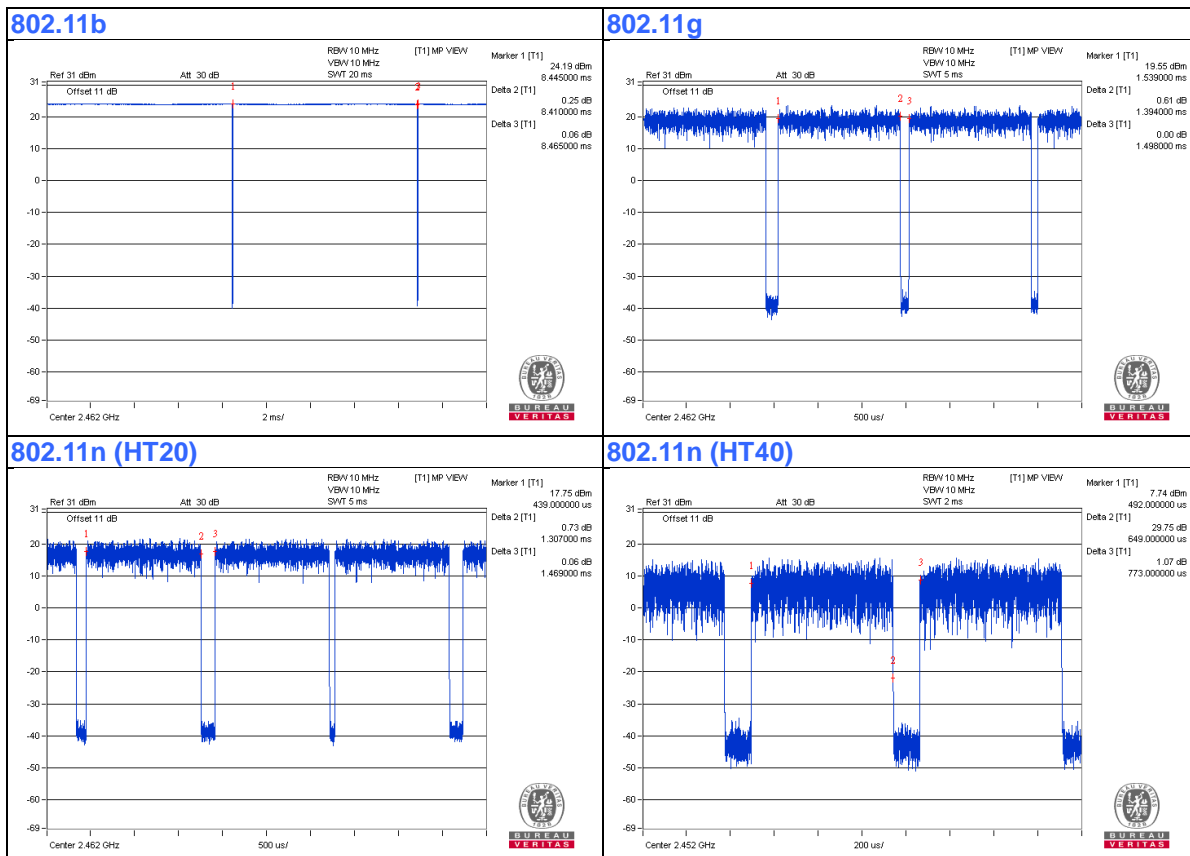
If duty cycle of test signal is $\geq 98\%$, duty factor is not required.
 If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11b: Duty cycle = $8.41/8.465 = 0.994$

802.11g: Duty cycle = $1.394/1.498 = 0.931$, Duty factor = $10 * \log(1/0.931) = 0.31$

802.11n (HT20): Duty cycle = $1.307/1.469 = 0.89$, Duty factor = $10 * \log(1/0.89) = 0.51$

802.11n (HT40): Duty cycle = $0.649/0.773 = 0.84$, Duty factor = $10 * \log(1/0.84) = 0.76$



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	LENOVO	E440	PF071LWC	NA	Provided by Lab

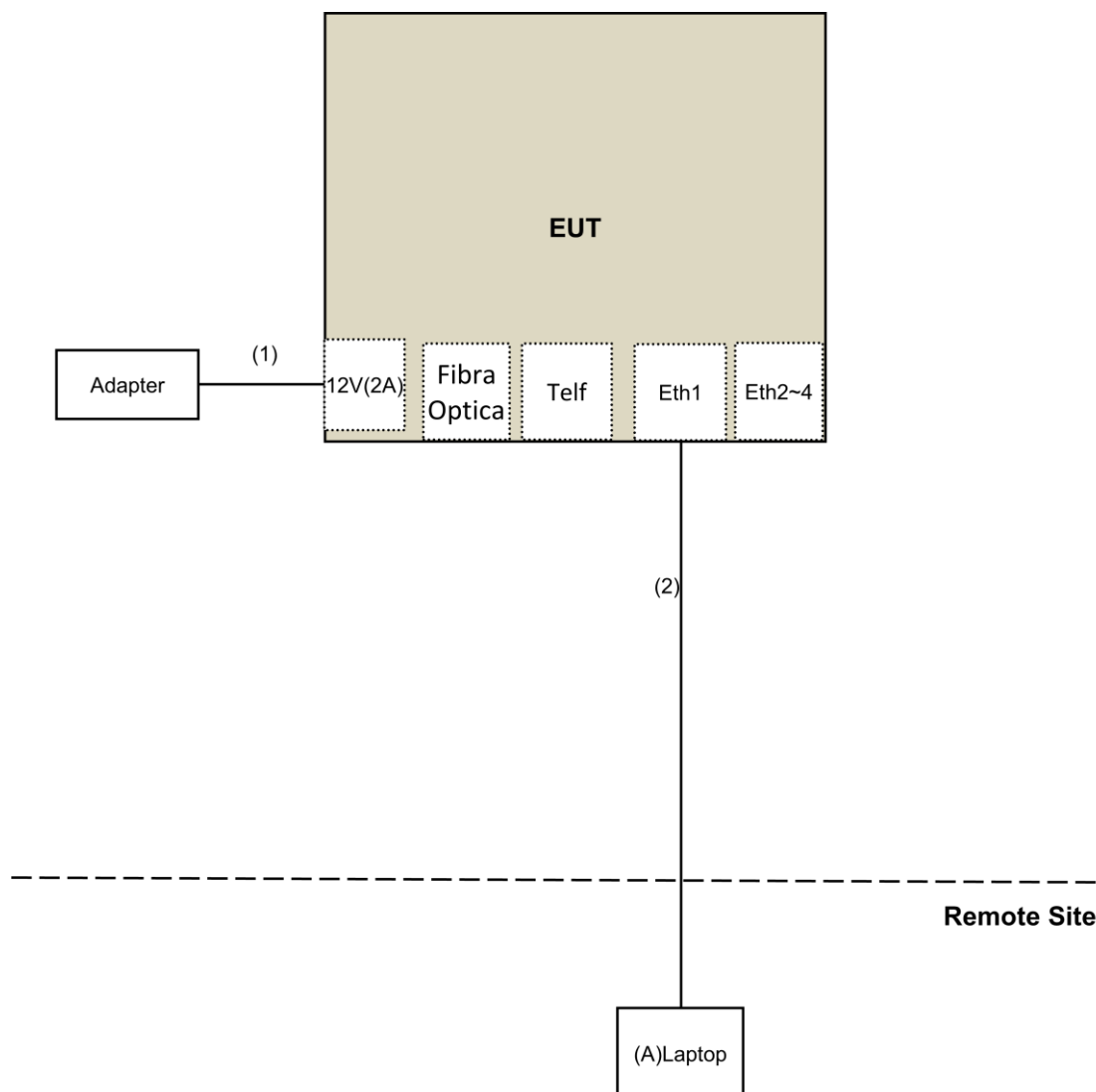
Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.8	No	0	Supplied by client
2.	RJ-45 Cable	1	10	No	0	Provided by Lab

Note: The core(s) is(are) originally attached to the cable(s).

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 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

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 20, 2016	July 19, 2017
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. 02, 2016	Apr. 01, 2017
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-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	160923 150318 150323	Feb. 02, 2017 Mar. 30, 2016 Mar. 30, 2016	Feb. 01, 2018 Mar. 29, 2017 Mar. 29, 2017
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	June 28, 2016	June 27, 2017
Power meter Anritsu	ML2495A	0824006	May 26, 2016	May 25, 2017
Power sensor Anritsu	MA2411B	0738172	May 26, 2016	May 25, 2017

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. Loop antenna was used for all emissions below 30 MHz.
5. Tested Date: Feb. 22, 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. 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:

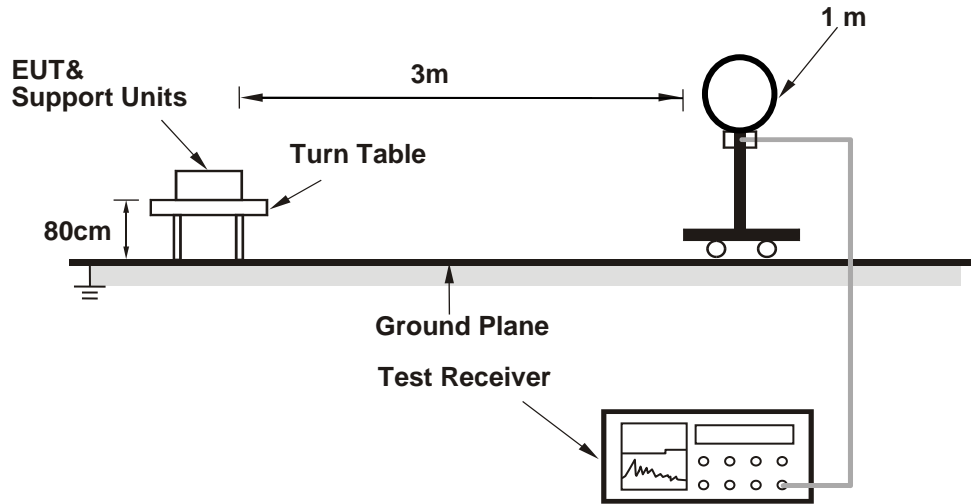
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 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

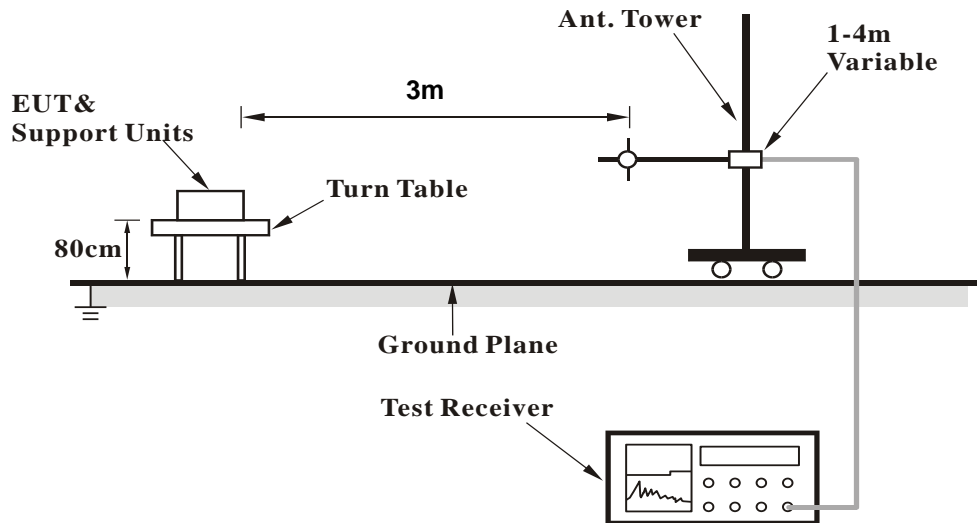
No deviation.

4.1.5 Test Setup

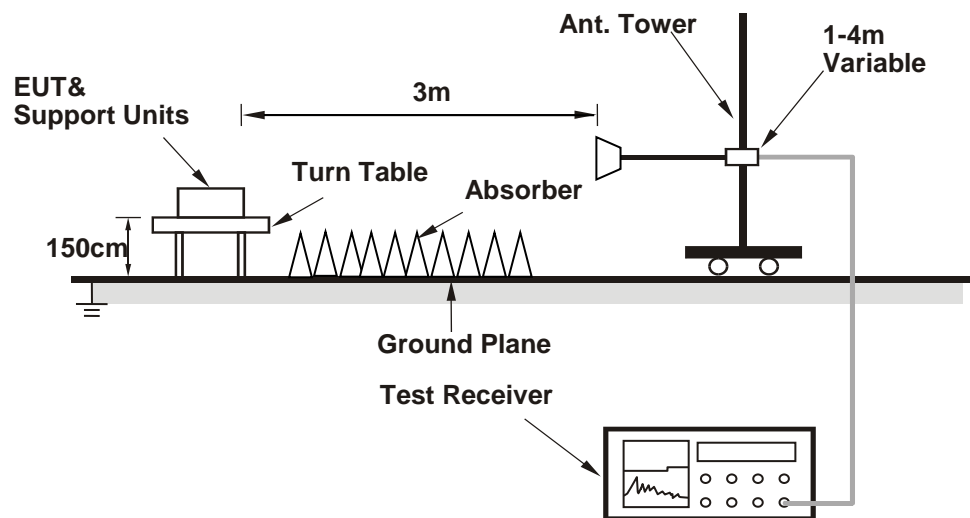
For Radiated emission below 30MHz



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 Laptop which is placed on remote site.
- Controlling software (QATool [MT7603 V0.0.0.71]) has been activated to set the EUT under transmission condition continuously.

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	54.9 PK	74.0	-19.1	1.76 H	360	57.0	-2.1
2	2390.00	49.7 AV	54.0	-4.3	1.76 H	360	51.8	-2.1
3	*2412.00	107.4 PK			1.76 H	360	109.4	-2.0
4	*2412.00	104.8 AV			1.76 H	360	106.8	-2.0
5	4824.00	47.5 PK	74.0	-26.5	2.80 H	145	45.3	2.2
6	4824.00	44.1 AV	54.0	-9.9	2.80 H	145	41.9	2.2

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	60.0 PK	74.0	-14.0	2.34 V	342	62.1	-2.1
2	2390.00	53.9 AV	54.0	-0.1	2.34 V	342	56.0	-2.1
3	*2412.00	112.8 PK			2.34 V	342	114.8	-2.0
4	*2412.00	110.2 AV			2.34 V	342	112.2	-2.0
5	4824.00	54.2 PK	74.0	-19.8	3.24 V	57	52.0	2.2
6	4824.00	52.5 AV	54.0	-1.5	3.24 V	57	50.3	2.2

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	107.6 PK			1.70 H	358	109.6	-2.0
2	*2437.00	105.0 AV			1.70 H	358	107.0	-2.0
3	4874.00	48.7 PK	74.0	-25.3	2.82 H	148	46.4	2.3
4	4874.00	45.8 AV	54.0	-8.2	2.82 H	148	43.5	2.3
5	7311.00	45.9 PK	74.0	-28.1	3.89 H	67	37.3	8.6
6	7311.00	36.0 AV	54.0	-18.0	3.89 H	67	27.4	8.6

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	*2437.00	113.0 PK			2.65 V	340	115.0	-2.0
2	*2437.00	110.5 AV			2.65 V	340	112.5	-2.0
3	4874.00	54.8 PK	74.0	-19.2	3.19 V	11	52.5	2.3
4	4874.00	53.5 AV	54.0	-0.5	3.19 V	11	51.2	2.3
5	7311.00	47.1 PK	74.0	-26.9	2.11 V	115	38.5	8.6
6	7311.00	38.9 AV	54.0	-15.1	2.11 V	115	30.3	8.6

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	105.7 PK			1.75 H	355	107.6	-1.9
2	*2462.00	103.2 AV			1.75 H	355	105.1	-1.9
3	2483.50	53.6 PK	74.0	-20.4	1.75 H	355	55.4	-1.8
4	2483.50	48.8 AV	54.0	-5.2	1.75 H	355	50.6	-1.8
5	4924.00	48.6 PK	74.0	-25.4	2.82 H	143	46.1	2.5
6	4924.00	45.5 AV	54.0	-8.5	2.82 H	143	43.0	2.5
7	7386.00	45.6 PK	74.0	-28.4	3.94 H	74	37.0	8.6
8	7386.00	35.7 AV	54.0	-18.3	3.94 H	74	27.1	8.6

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	*2462.00	111.0 PK			2.62 V	316	112.9	-1.9
2	*2462.00	109.0 AV			2.62 V	316	110.9	-1.9
3	2483.50	59.7 PK	74.0	-14.3	2.62 V	316	61.5	-1.8
4	2483.50	53.9 AV	54.0	-0.1	2.62 V	316	55.7	-1.8
5	4924.00	55.1 PK	74.0	-18.9	2.77 V	64	52.6	2.5
6	4924.00	53.6 AV	54.0	-0.4	2.77 V	64	51.1	2.5
7	7386.00	47.5 PK	74.0	-26.5	2.11 V	87	38.9	8.6
8	7386.00	39.6 AV	54.0	-14.4	2.11 V	87	31.0	8.6

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.

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	62.9 PK	74.0	-11.1	1.80 H	345	65.0	-2.1
2	2390.00	48.0 AV	54.0	-6.0	1.80 H	345	50.1	-2.1
3	*2412.00	107.0 PK			1.80 H	345	109.0	-2.0
4	*2412.00	97.5 AV			1.80 H	345	99.5	-2.0
5	4824.00	39.7 PK	74.0	-34.3	2.10 H	39	37.5	2.2
6	4824.00	28.8 AV	54.0	-25.2	2.10 H	39	26.6	2.2

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	2390.00	69.2 PK	74.0	-4.8	2.25 V	343	71.3	-2.1
2	2390.00	53.8 AV	54.0	-0.2	2.25 V	343	55.9	-2.1
3	*2412.00	112.6 PK			2.25 V	343	114.6	-2.0
4	*2412.00	103.2 AV			2.25 V	343	105.2	-2.0
5	4824.00	47.8 PK	74.0	-26.2	3.19 V	19	45.6	2.2
6	4824.00	36.7 AV	54.0	-17.3	3.19 V	19	34.5	2.2

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	2390.00	54.1 PK	74.0	-19.9	1.83 H	347	56.2	-2.1
2	2390.00	41.0 AV	54.0	-13.0	1.83 H	347	43.1	-2.1
3	*2437.00	111.1 PK			1.83 H	347	113.1	-2.0
4	*2437.00	102.0 AV			1.83 H	347	104.0	-2.0
5	2483.50	55.0 PK	74.0	-19.0	1.83 H	347	56.8	-1.8
6	2483.50	40.2 AV	54.0	-13.8	1.83 H	347	42.0	-1.8
7	4874.00	45.2 PK	74.0	-28.8	2.11 H	43	42.9	2.3
8	4874.00	32.4 AV	54.0	-21.6	2.11 H	43	30.1	2.3
9	7311.00	44.2 PK	74.0	-29.8	1.53 H	129	35.6	8.6
10	7311.00	32.1 AV	54.0	-21.9	1.53 H	129	23.5	8.6

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	2390.00	60.0 PK	74.0	-14.0	1.79 V	347	62.1	-2.1
2	2390.00	46.2 AV	54.0	-7.8	1.79 V	347	48.3	-2.1
3	*2437.00	116.8 PK			1.79 V	347	118.8	-2.0
4	*2437.00	107.6 AV			1.79 V	347	109.6	-2.0
5	2483.50	61.0 PK	74.0	-13.0	1.79 V	347	62.8	-1.8
6	2483.50	45.0 AV	54.0	-9.0	1.79 V	347	46.8	-1.8
7	4874.00	51.7 PK	74.0	-22.3	3.19 V	11	49.4	2.3
8	4874.00	40.4 AV	54.0	-13.6	3.19 V	11	38.1	2.3
9	7311.00	47.8 PK	74.0	-26.2	2.21 V	86	39.2	8.6
10	7311.00	36.0 AV	54.0	-18.0	2.21 V	86	27.4	8.6

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	106.1 PK			1.81 H	356	108.0	-1.9
2	*2462.00	97.4 AV			1.81 H	356	99.3	-1.9
3	2483.50	62.1 PK	74.0	-11.9	1.81 H	356	63.9	-1.8
4	2483.50	48.5 AV	54.0	-5.5	1.81 H	356	50.3	-1.8
5	4924.00	40.1 PK	74.0	-33.9	2.11 H	45	37.6	2.5
6	4924.00	29.3 AV	54.0	-24.7	2.11 H	45	26.8	2.5
7	7386.00	43.2 PK	74.0	-30.8	1.55 H	118	34.6	8.6
8	7386.00	31.3 AV	54.0	-22.7	1.55 H	118	22.7	8.6

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	*2462.00	111.7 PK			2.18 V	349	113.6	-1.9
2	*2462.00	102.6 AV			2.18 V	349	104.5	-1.9
3	2483.50	68.4 PK	74.0	-5.6	2.18 V	349	70.2	-1.8
4	2483.50	53.7 AV	54.0	-0.3	2.18 V	349	55.5	-1.8
5	4924.00	48.5 PK	74.0	-25.5	3.15 V	0	46.0	2.5
6	4924.00	37.2 AV	54.0	-16.8	3.15 V	0	34.7	2.5
7	7386.00	44.8 PK	74.0	-29.2	2.20 V	94	36.2	8.6
8	7386.00	33.2 AV	54.0	-20.8	2.20 V	94	24.6	8.6

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.

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	60.5 PK	74.0	-13.5	1.78 H	351	62.6	-2.1
2	2390.00	48.2 AV	54.0	-5.8	1.78 H	351	50.3	-2.1
3	*2412.00	107.8 PK			1.78 H	351	109.8	-2.0
4	*2412.00	98.0 AV			1.78 H	351	100.0	-2.0
5	4824.00	40.5 PK	74.0	-33.5	2.19 H	52	38.3	2.2
6	4824.00	29.4 AV	54.0	-24.6	2.19 H	52	27.2	2.2

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	67.2 PK	74.0	-6.8	2.03 V	349	69.3	-2.1
2	2390.00	53.3 AV	54.0	-0.7	2.03 V	349	55.4	-2.1
3	*2412.00	112.9 PK			2.03 V	349	114.9	-2.0
4	*2412.00	103.3 AV			2.03 V	349	105.3	-2.0
5	4824.00	51.7 PK	74.0	-22.3	3.20 V	6	49.5	2.2
6	4824.00	38.9 AV	54.0	-15.1	3.20 V	6	36.7	2.2

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	2390.00	54.1 PK	74.0	-19.9	1.75 H	358	56.2	-2.1
2	2390.00	42.8 AV	54.0	-11.2	1.75 H	358	44.9	-2.1
3	*2437.00	113.6 PK			1.75 H	358	115.6	-2.0
4	*2437.00	104.1 AV			1.75 H	358	106.1	-2.0
5	2483.50	58.6 PK	74.0	-15.4	1.75 H	358	60.4	-1.8
6	2483.50	43.5 AV	54.0	-10.5	1.75 H	358	45.3	-1.8
7	4874.00	39.9 PK	74.0	-34.1	2.15 H	47	37.6	2.3
8	4874.00	29.0 AV	54.0	-25.0	2.15 H	47	26.7	2.3
9	7311.00	43.3 PK	74.0	-30.7	1.61 H	106	34.7	8.6
10	7311.00	31.2 AV	54.0	-22.8	1.61 H	106	22.6	8.6

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	2390.00	60.1 PK	74.0	-13.9	1.98 V	348	62.2	-2.1
2	2390.00	47.8 AV	54.0	-6.2	1.98 V	348	49.9	-2.1
3	*2437.00	118.9 PK			1.98 V	348	120.9	-2.0
4	*2437.00	109.7 AV			1.98 V	348	111.7	-2.0
5	2483.50	64.6 PK	74.0	-9.4	1.98 V	348	66.4	-1.8
6	2483.50	48.0 AV	54.0	-6.0	1.98 V	348	49.8	-1.8
7	4874.00	53.7 PK	74.0	-20.3	3.19 V	0	51.4	2.3
8	4874.00	40.6 AV	54.0	-13.4	3.19 V	0	38.3	2.3
9	7311.00	51.4 PK	74.0	-22.6	2.21 V	84	42.8	8.6
10	7311.00	39.0 AV	54.0	-15.0	2.21 V	84	30.4	8.6

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	107.0 PK			1.77 H	358	108.9	-1.9
2	*2462.00	97.1 AV			1.77 H	358	99.0	-1.9
3	2483.50	62.3 PK	74.0	-11.7	1.77 H	358	64.1	-1.8
4	2483.50	48.1 AV	54.0	-5.9	1.77 H	358	49.9	-1.8
5	4924.00	40.4 PK	74.0	-33.6	2.10 H	35	37.9	2.5
6	4924.00	29.8 AV	54.0	-24.2	2.10 H	35	27.3	2.5
7	7386.00	43.8 PK	74.0	-30.2	1.56 H	133	35.2	8.6
8	7386.00	31.8 AV	54.0	-22.2	1.56 H	133	23.2	8.6

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	*2462.00	112.4 PK			2.03 V	349	114.3	-1.9
2	*2462.00	102.7 AV			2.03 V	349	104.6	-1.9
3	2483.50	68.3 PK	74.0	-5.7	2.03 V	349	70.1	-1.8
4	2483.50	53.5 AV	54.0	-0.5	2.03 V	349	55.3	-1.8
5	4924.00	50.2 PK	74.0	-23.8	3.15 V	4	47.7	2.5
6	4924.00	37.6 AV	54.0	-16.4	3.15 V	4	35.1	2.5
7	7386.00	48.3 PK	74.0	-25.7	2.28 V	79	39.7	8.6
8	7386.00	36.5 AV	54.0	-17.5	2.28 V	79	27.9	8.6

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.

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	62.0 PK	74.0	-12.0	1.78 H	360	64.1	-2.1
2	2390.00	48.5 AV	54.0	-5.5	1.78 H	360	50.6	-2.1
3	*2422.00	102.9 PK			1.78 H	360	105.0	-2.1
4	*2422.00	93.2 AV			1.78 H	360	95.3	-2.1
5	4844.00	39.9 PK	74.0	-34.1	2.14 H	56	37.6	2.3
6	4844.00	29.1 AV	54.0	-24.9	2.14 H	56	26.8	2.3
7	7266.00	42.7 PK	74.0	-31.3	1.53 H	130	34.1	8.6
8	7266.00	30.8 AV	54.0	-23.2	1.53 H	130	22.2	8.6

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	2390.00	68.2 PK	74.0	-5.8	2.32 V	348	70.3	-2.1
2	2390.00	53.6 AV	54.0	-0.4	2.32 V	348	55.7	-2.1
3	*2422.00	108.2 PK			2.32 V	348	110.3	-2.1
4	*2422.00	98.6 AV			2.32 V	348	100.7	-2.1
5	4844.00	41.0 PK	74.0	-33.0	3.17 V	10	38.7	2.3
6	4844.00	30.0 AV	54.0	-24.0	3.17 V	10	27.7	2.3
7	7266.00	43.2 PK	74.0	-30.8	2.23 V	81	34.6	8.6
8	7266.00	31.6 AV	54.0	-22.4	2.23 V	81	23.0	8.6

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 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	61.4 PK	74.0	-12.6	1.75 H	346	63.5	-2.1
2	2390.00	48.6 AV	54.0	-5.4	1.75 H	346	50.7	-2.1
3	*2437.00	107.9 PK			1.75 H	346	109.9	-2.0
4	*2437.00	98.1 AV			1.75 H	346	100.1	-2.0
5	2483.50	60.8 PK	74.0	-13.2	1.75 H	346	62.6	-1.8
6	2483.50	46.1 AV	54.0	-7.9	1.75 H	346	47.9	-1.8
7	4874.00	40.3 PK	74.0	-33.7	2.07 H	48	38.0	2.3
8	4874.00	29.4 AV	54.0	-24.6	2.07 H	48	27.1	2.3
9	7311.00	43.6 PK	74.0	-30.4	1.52 H	129	35.0	8.6
10	7311.00	31.5 AV	54.0	-22.5	1.52 H	129	22.9	8.6

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	2390.00	67.4 PK	74.0	-6.6	1.93 V	347	69.5	-2.1
2	2390.00	53.6 AV	54.0	-0.4	1.93 V	347	55.7	-2.1
3	*2437.00	113.2 PK			1.93 V	347	115.2	-2.0
4	*2437.00	103.6 AV			1.93 V	347	105.6	-2.0
5	2483.50	66.1 PK	74.0	-7.9	1.93 V	347	67.9	-1.8
6	2483.50	50.1 AV	54.0	-3.9	1.93 V	347	51.9	-1.8
7	4874.00	41.4 PK	74.0	-32.6	3.13 V	6	39.1	2.3
8	4874.00	30.9 AV	54.0	-23.1	3.13 V	6	28.6	2.3
9	7311.00	44.2 PK	74.0	-29.8	2.33 V	71	35.6	8.6
10	7311.00	32.5 AV	54.0	-21.5	2.33 V	71	23.9	8.6

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 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	102.5 PK			1.79 H	350	104.4	-1.9
2	*2452.00	93.9 AV			1.79 H	350	95.8	-1.9
3	2483.50	62.3 PK	74.0	-11.7	1.79 H	350	64.1	-1.8
4	2483.50	48.5 AV	54.0	-5.5	1.79 H	350	50.3	-1.8
5	4904.00	39.8 PK	74.0	-34.2	2.14 H	39	37.4	2.4
6	4904.00	28.9 AV	54.0	-25.1	2.14 H	39	26.5	2.4
7	7356.00	43.5 PK	74.0	-30.5	1.51 H	129	34.9	8.6
8	7356.00	31.4 AV	54.0	-22.6	1.51 H	129	22.8	8.6

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	*2452.00	108.2 PK			1.93 V	347	110.1	-1.9
2	*2452.00	99.0 AV			1.93 V	347	100.9	-1.9
3	2483.50	68.8 PK	74.0	-5.2	1.93 V	347	70.6	-1.8
4	2483.50	53.7 AV	54.0	-0.3	1.93 V	347	55.5	-1.8
5	4904.00	41.0 PK	74.0	-33.0	3.18 V	19	38.6	2.4
6	4904.00	29.5 AV	54.0	-24.5	3.18 V	19	27.1	2.4
7	7356.00	43.0 PK	74.0	-31.0	2.28 V	87	34.4	8.6
8	7356.00	30.5 AV	54.0	-23.5	2.28 V	87	21.9	8.6

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.

Below 1GHz Data:

802.11n (HT20)

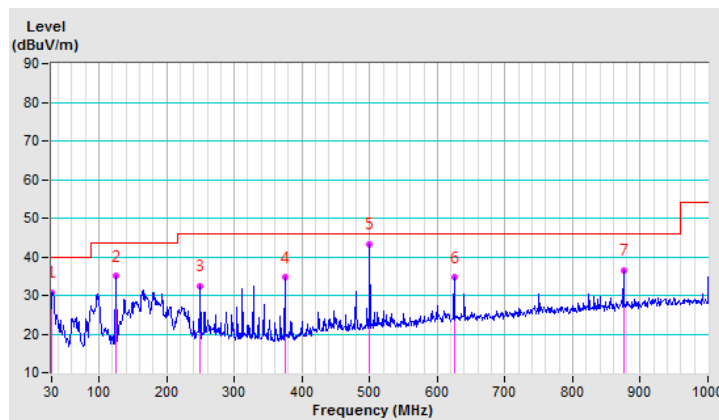
CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.68	30.8 QP	40.0	-9.2	1.00 H	238	40.5	-9.7
2	125.01	35.0 QP	43.5	-8.5	1.50 H	82	44.8	-9.8
3	250.02	32.3 QP	46.0	-13.7	1.50 H	360	42.0	-9.7
4	375.00	34.6 QP	46.0	-11.4	1.00 H	360	40.6	-6.0
5	500.01	43.3 QP	46.0	-2.7	2.00 H	360	46.1	-2.8
6	625.02	34.6 QP	46.0	-11.4	2.00 H	0	34.7	-0.1
7	875.02	36.4 QP	46.0	-9.6	1.00 H	154	32.9	3.5

REMARKS:

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



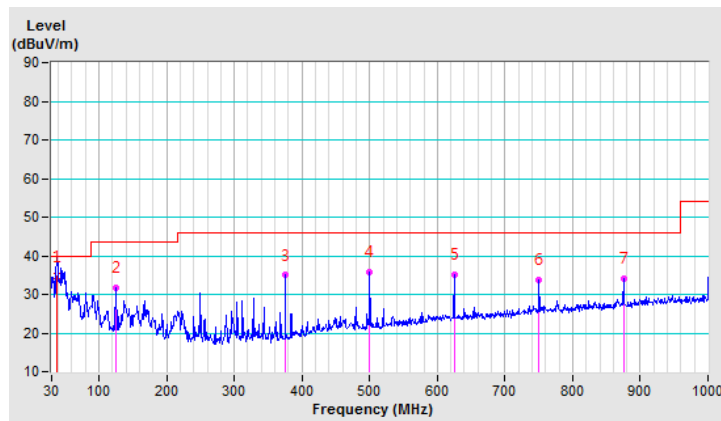
CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.26	34.6 QP	40.0	-5.4	1.50 V	230	43.4	-8.8
2	125.01	31.8 QP	43.5	-11.7	1.00 V	356	41.6	-9.8
3	375.00	34.9 QP	46.0	-11.1	1.50 V	337	40.9	-6.0
4	500.01	35.7 QP	46.0	-10.3	2.00 V	296	38.5	-2.8
5	625.00	35.2 QP	46.0	-10.8	1.00 V	98	35.3	-0.1
6	750.01	33.8 QP	46.0	-12.2	1.50 V	77	31.8	2.0
7	875.02	34.1 QP	46.0	-11.9	2.00 V	278	30.6	3.5

REMARKS:

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
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: Mar. 03, 2017

4.2.3 Test Procedures

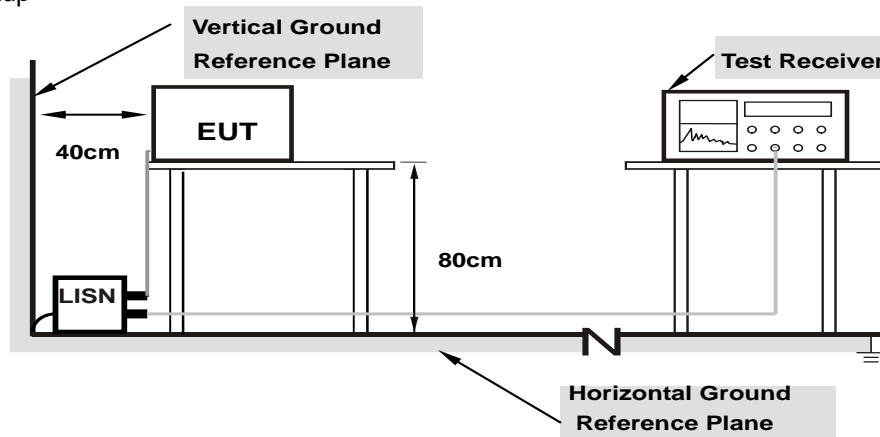
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

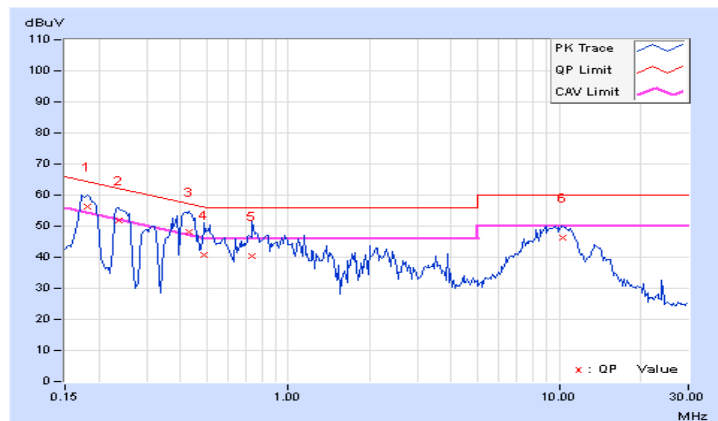
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	10.20	46.13	34.93	56.33	45.13	64.43	54.43	-8.10	-9.30
2	0.23594	10.21	41.73	30.65	51.94	40.86	62.24	52.24	-10.30	-11.38
3	0.43125	10.24	37.89	25.86	48.13	36.10	57.23	47.23	-9.10	-11.13
4	0.48984	10.25	30.48	17.01	40.73	27.26	56.17	46.17	-15.44	-18.91
5	0.73594	10.27	30.17	16.14	40.44	26.41	56.00	46.00	-15.56	-19.59
6	10.28516	10.76	35.48	29.01	46.24	39.77	60.00	50.00	-13.76	-10.23

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

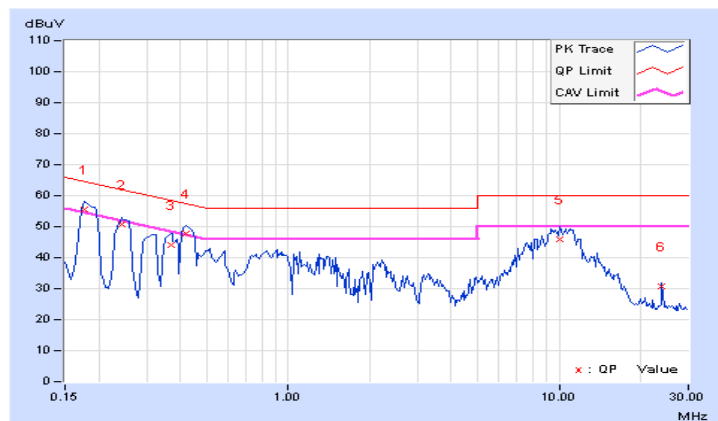


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17734	10.18	45.44	33.12	55.62	43.30	64.61	54.61	-8.99	-11.31
2	0.24375	10.19	40.60	29.97	50.79	40.16	61.97	51.97	-11.18	-11.81
3	0.36875	10.23	33.99	22.16	44.22	32.39	58.53	48.53	-14.31	-16.14
4	0.41953	10.24	37.40	25.61	47.64	35.85	57.46	47.46	-9.82	-11.61
5	10.07813	10.64	35.22	29.04	45.86	39.68	60.00	50.00	-14.14	-10.32
6	24.00000	11.39	19.34	19.00	30.73	30.39	60.00	50.00	-29.27	-19.61

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

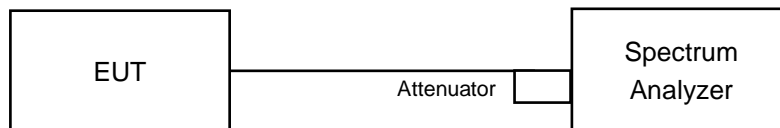


4.3 6dB Bandwidth Measurement

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
1	2412	10.10	0.5	PASS
6	2437	10.10	0.5	PASS
11	2462	10.10	0.5	PASS

802.11g

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	15.18	0.5	PASS
6	2437	15.18	0.5	PASS
11	2462	15.18	0.5	PASS

802.11n (HT20)

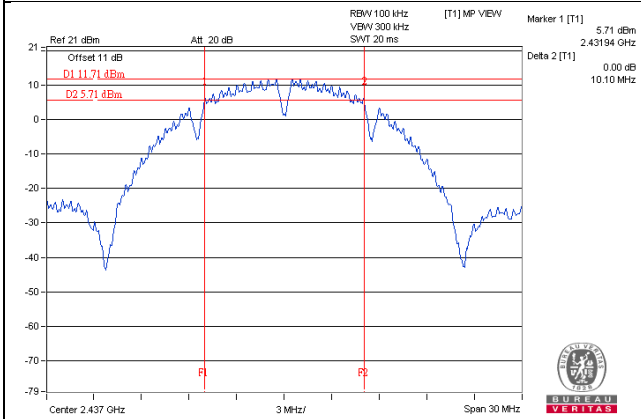
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.16	15.75	0.5	Pass
6	2437	15.19	15.18	0.5	Pass
11	2462	15.17	15.74	0.5	Pass

802.11n (HT40)

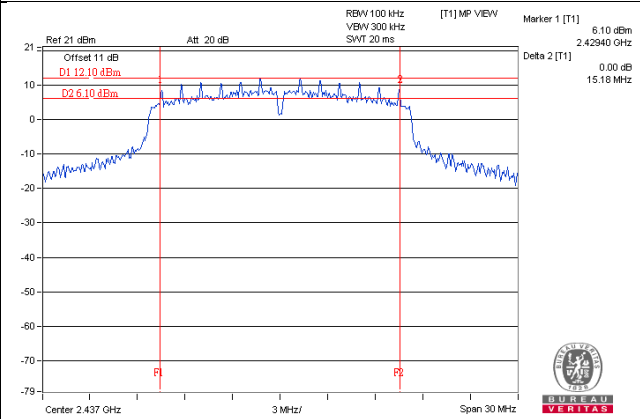
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.17	35.12	0.5	Pass
6	2437	35.19	35.13	0.5	Pass
9	2452	35.23	35.16	0.5	Pass

Spectrum Plot of Worst Value

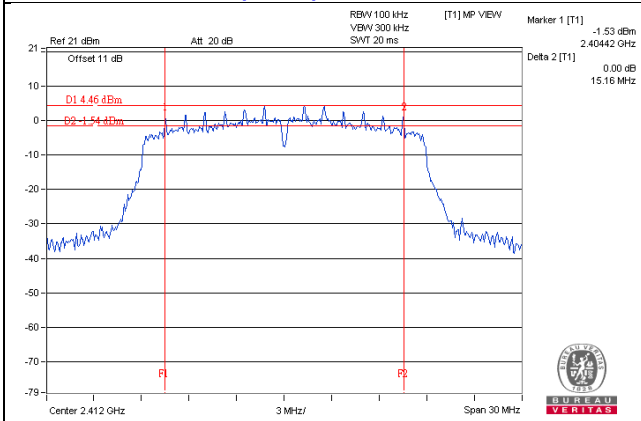
802.11b / CH6



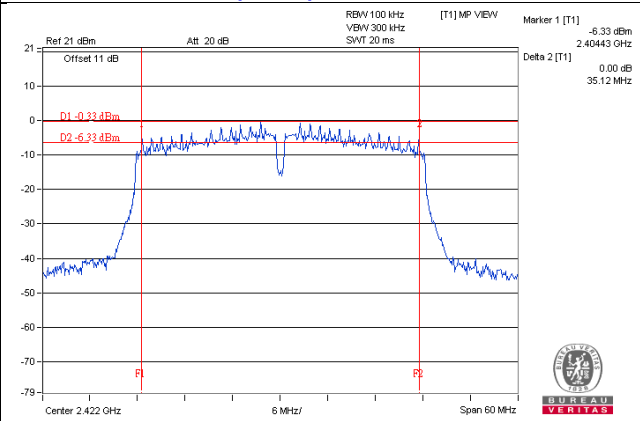
802.11g / CH6



802.11n (HT20) / Chain 0 : CH1



802.11n (HT40) / Chain 1 : CH3



4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

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

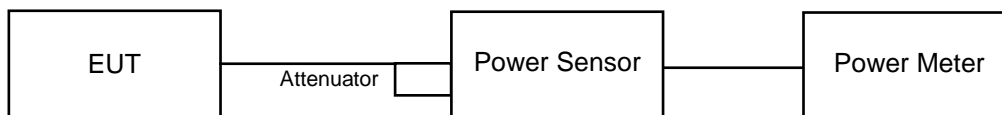
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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

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

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

Same as Item 4.3.6.

4.4.7 Test Results

FOR PEAK POWER

802.11b

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	229.615	23.61	30	Pass
6	2437	260.615	24.16	30	Pass
11	2462	222.331	23.47	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
1	2412	331.131	25.20	30	Pass
6	2437	470.977	26.73	30	Pass
11	2462	288.403	24.60	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	22.83	24.07	447.137	26.50	30	Pass
6	2437	26.10	26.69	874.039	29.42	30	Pass
11	2462	22.93	24.14	455.754	26.59	30	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	19.60	19.96	190.284	22.79	30	Pass
6	2437	23.77	24.32	508.628	27.06	30	Pass
9	2452	20.25	21.12	235.345	23.72	30	Pass

FOR AVERAGE POWER

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	155.597	21.92
6	2437	177.828	22.50
11	2462	150.661	21.78

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
1	2412	64.269	18.08
6	2437	162.555	22.11
11	2462	55.59	17.45

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	14.51	15.36	62.605	17.97
6	2437	21.56	22.31	313.435	24.96
11	2462	14.79	15.74	67.627	18.30

802.11n (HT40)

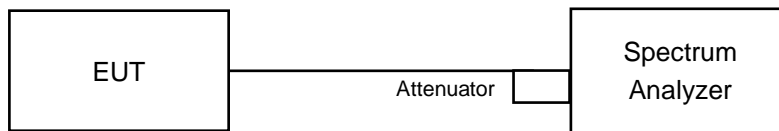
Chan.	Frequency (MHz)	Avg. Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	11.79	12.35	32.28	15.09
6	2437	16.70	17.31	100.601	20.03
9	2452	12.65	13.37	40.135	16.04

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 3kHz.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-5.27	8	Pass
6	2437	-4.26	8	Pass
11	2462	-4.40	8	Pass

802.11g

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
1	2412	-8.59	8	Pass
6	2437	-4.69	8	Pass
11	2462	-9.99	8	Pass

802.11n (HT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=2) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-11.73	3.01	-8.72	8	Pass
	6	2437	-5.47	3.01	-2.46	8	Pass
	11	2462	-10.38	3.01	-7.37	8	Pass
1	1	2412	-12.27	3.01	-9.26	8	Pass
	6	2437	-2.87	3.01	0.14	8	Pass
	11	2462	-10.65	3.01	-7.64	8	Pass

NOTE: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.75\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

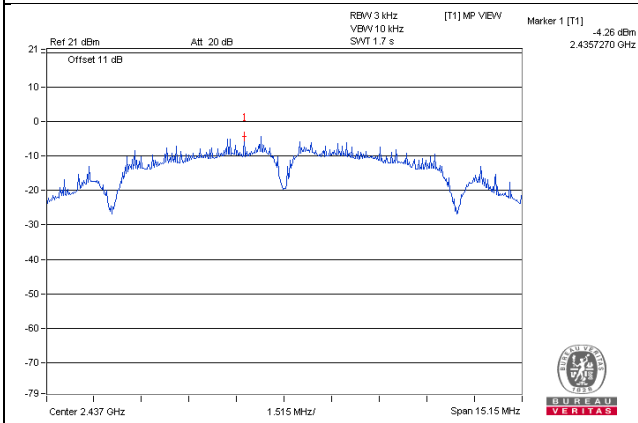
802.11n (HT40)

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	-17.42	3.01	-14.41	8	Pass
	6	2437	-13.18	3.01	-10.17	8	Pass
	9	2452	-17.40	3.01	-14.39	8	Pass
1	3	2422	-17.65	3.01	-14.64	8	Pass
	6	2437	-10.86	3.01	-7.85	8	Pass
	9	2452	-16.10	3.01	-13.09	8	Pass

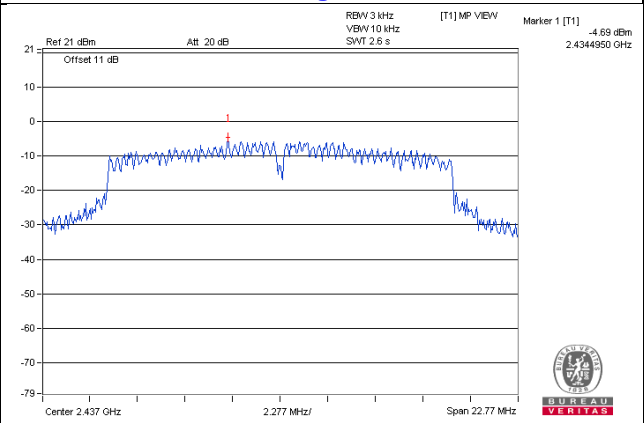
NOTE: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 5.75\text{dBi} < 6\text{dBi}$, so the power density limit shall not be reduced.

Spectrum Plot of Worst Value

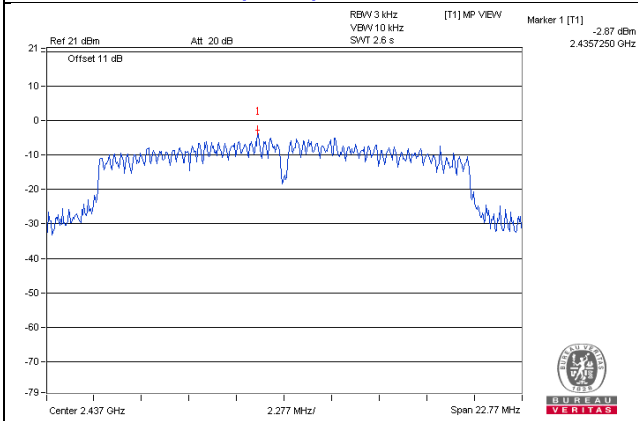
802.11b / CH6



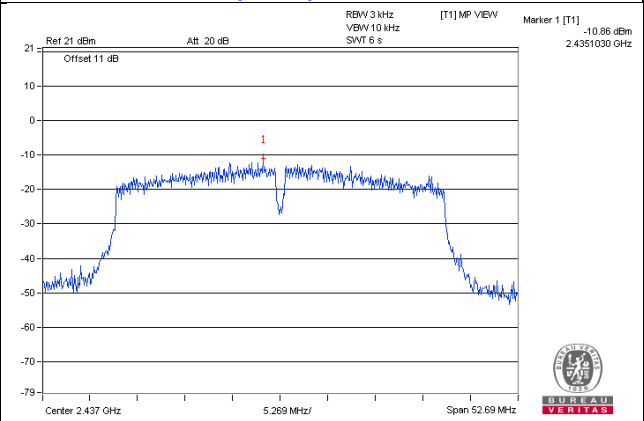
802.11g / CH6



802.11n (HT20) / Chain 1 : CH6



802.11n (HT40) / Chain 1 : CH6

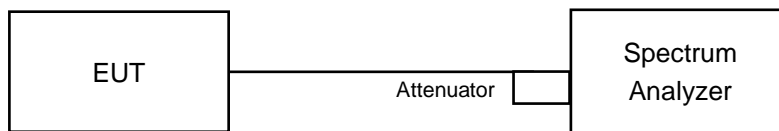


4.6 Conducted Out of Band Emission Measurement

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 OOB

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

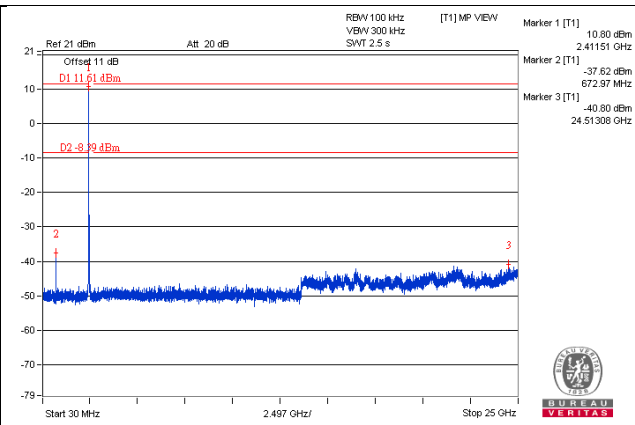
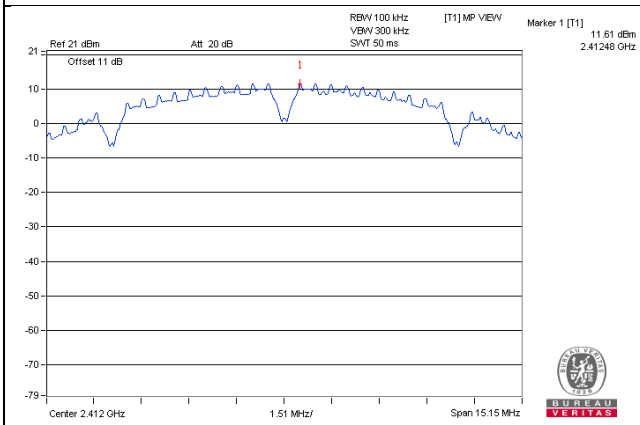
Same as Item 4.3.6

4.6.7 Test Results

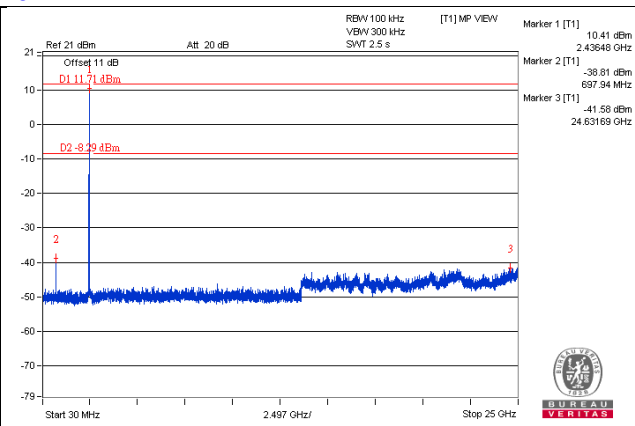
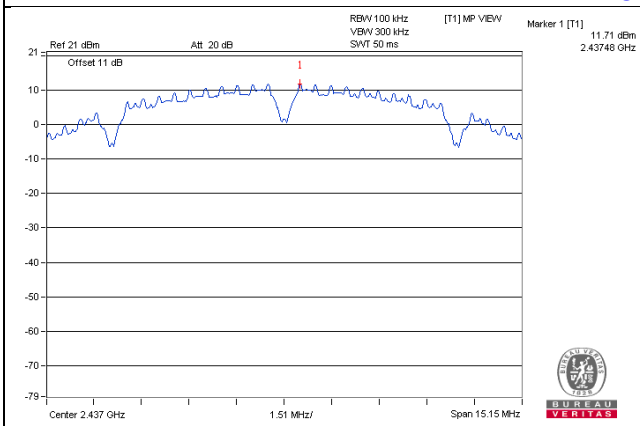
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

802.11b

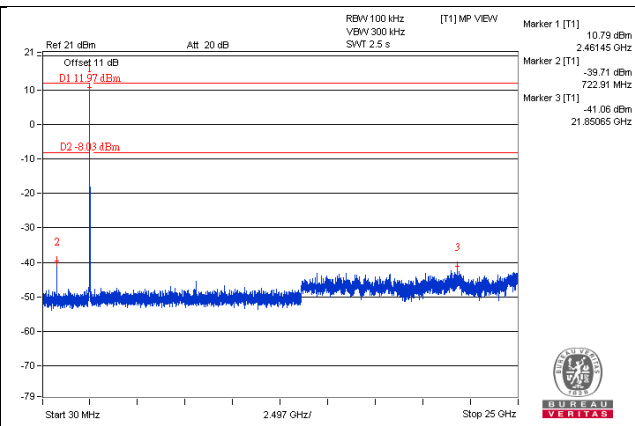
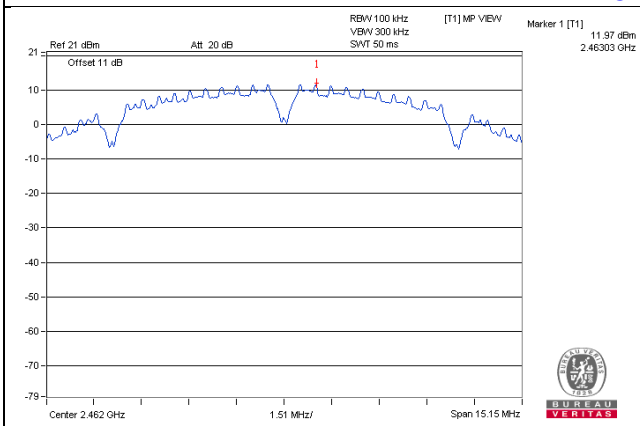
CH 1



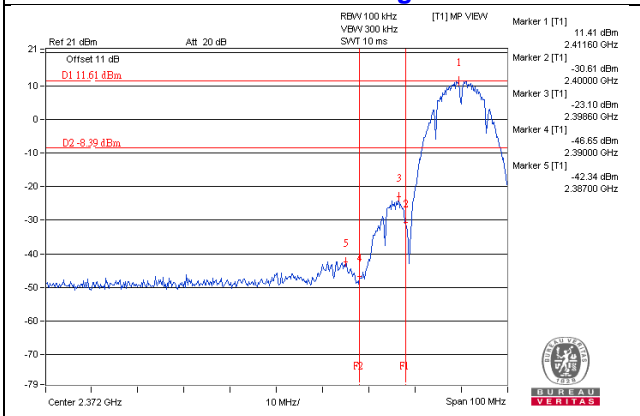
CH 6



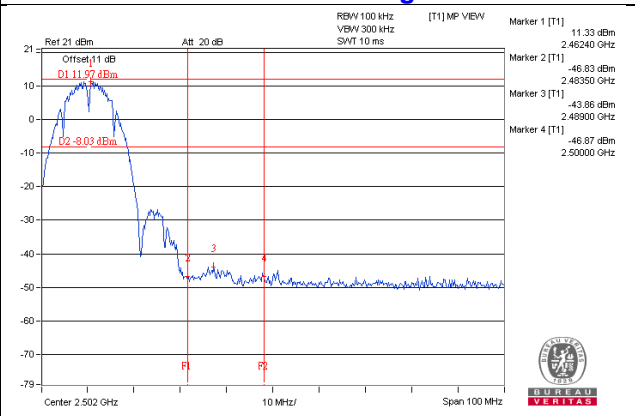
CH 11



CH 1 Band edge

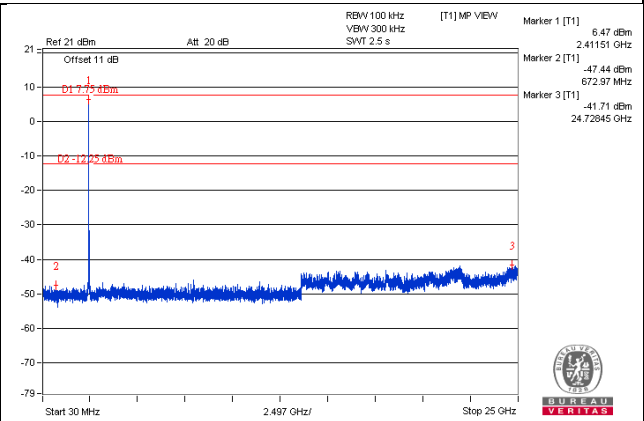
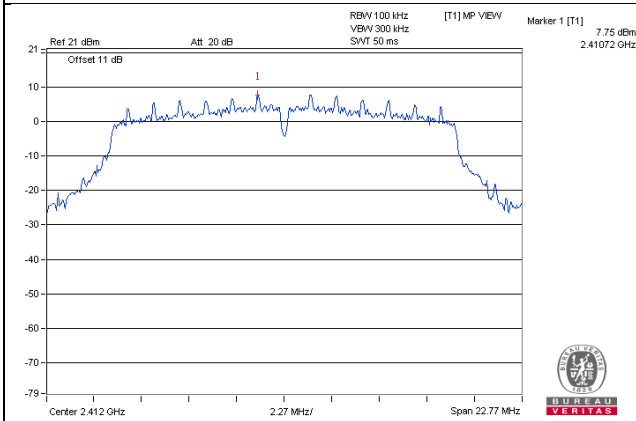


CH 11 Band edge

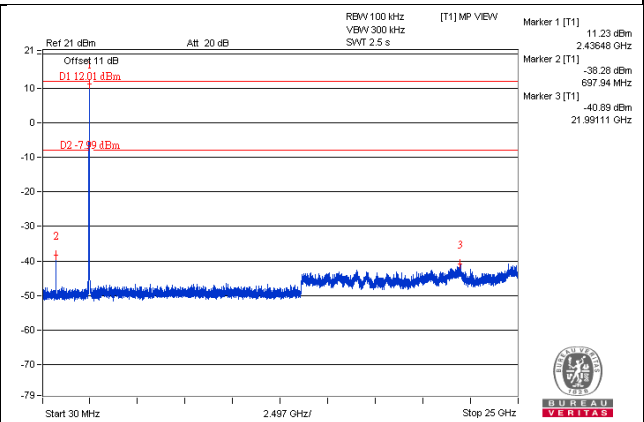
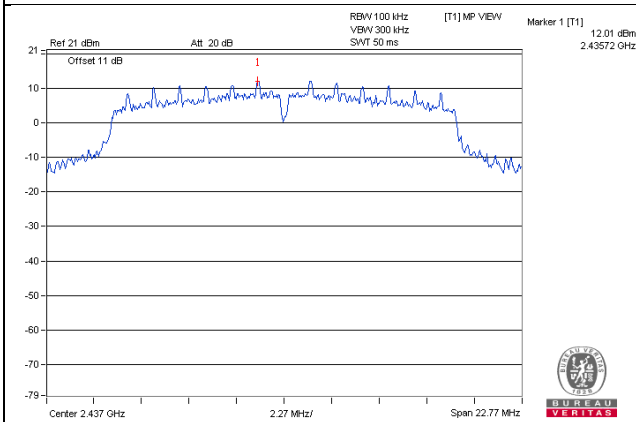


802.11g

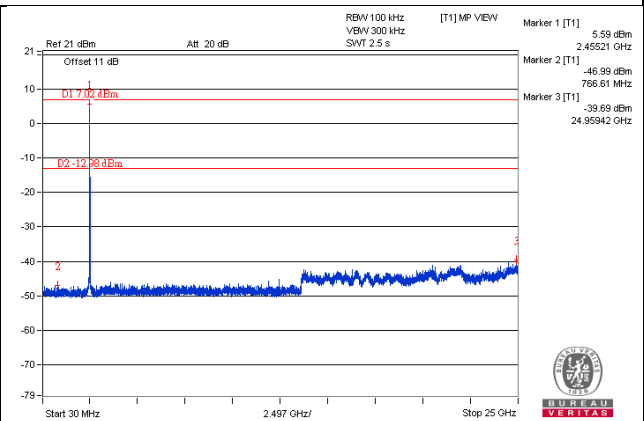
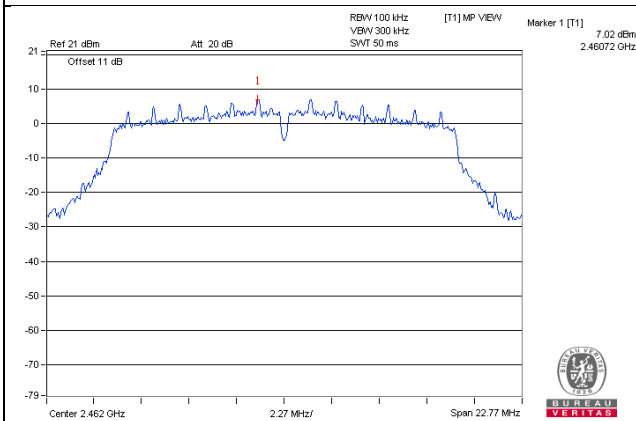
CH 1



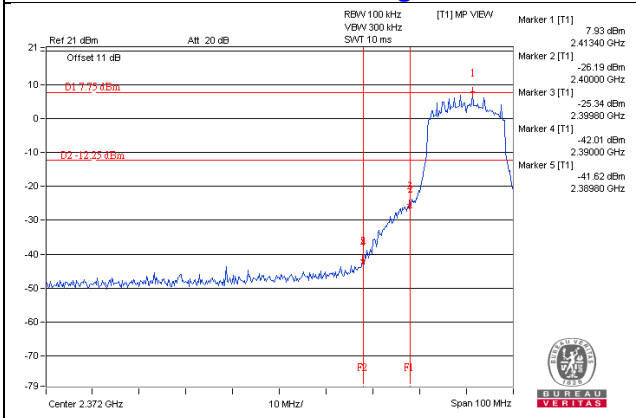
CH 6



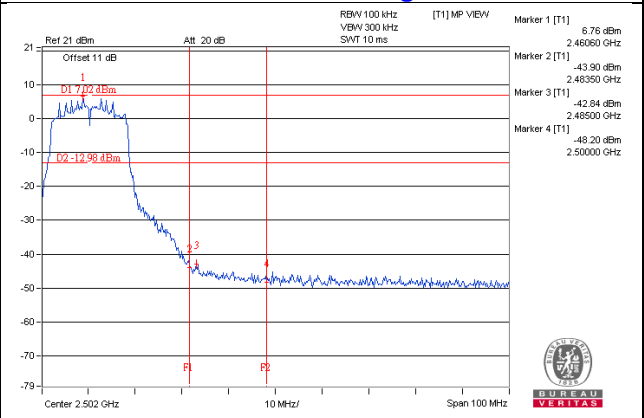
CH 11



CH 1 Band edge

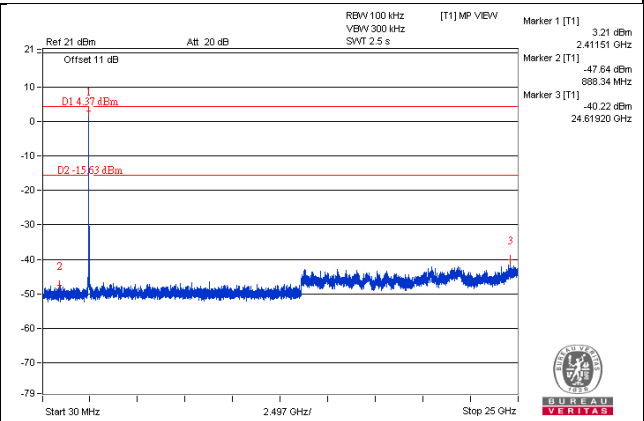
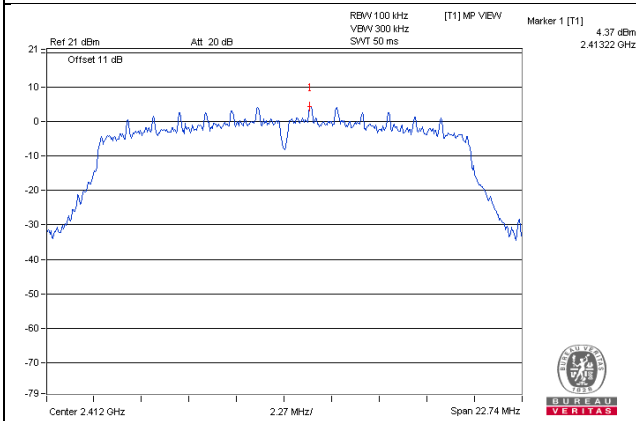


CH 11 Band edge

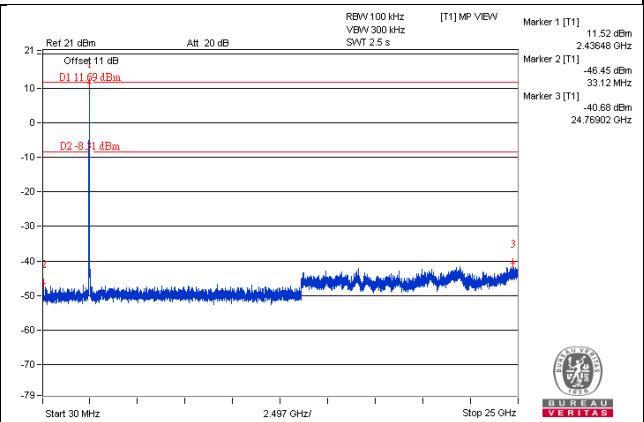
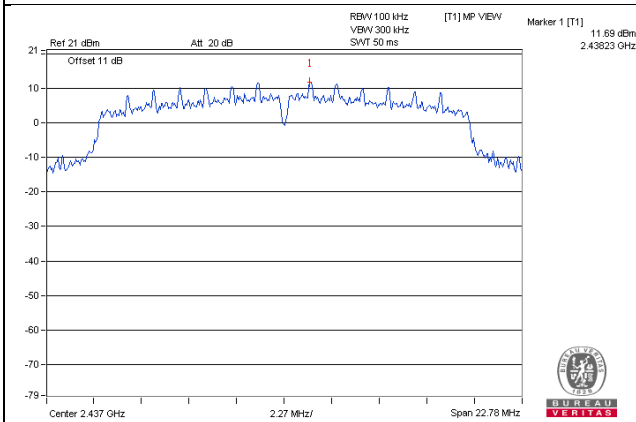


802.11n (HT20) : Chain 0

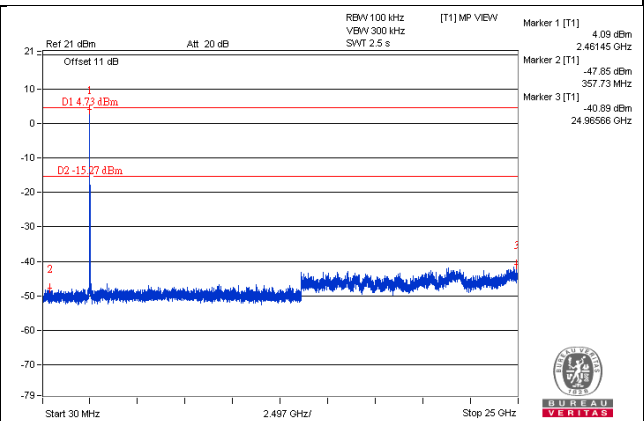
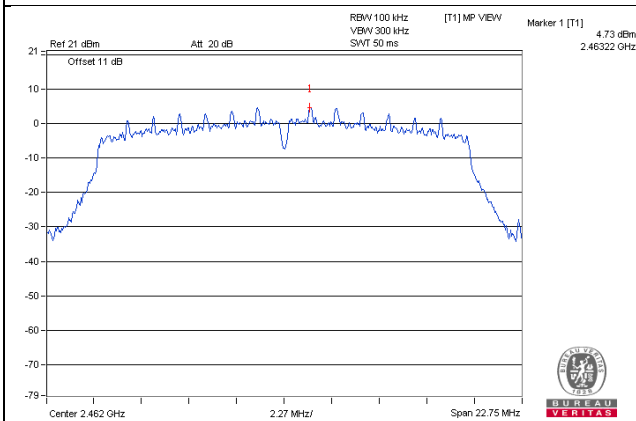
CH 1



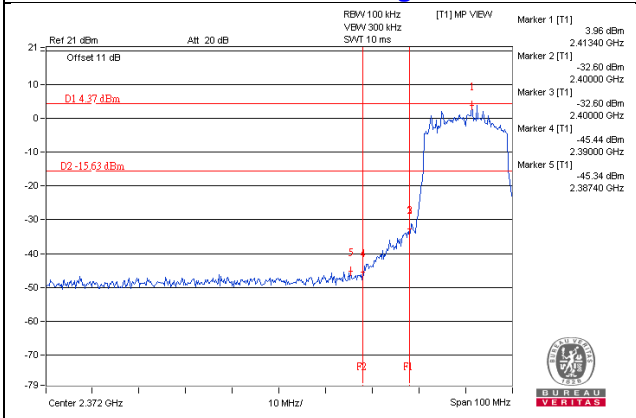
CH 6



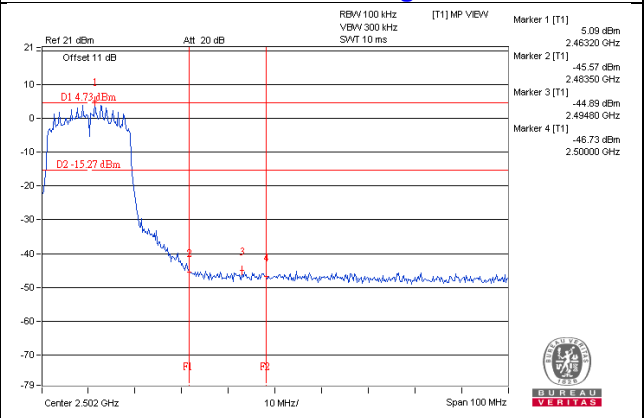
CH 11



CH 1 Band edge

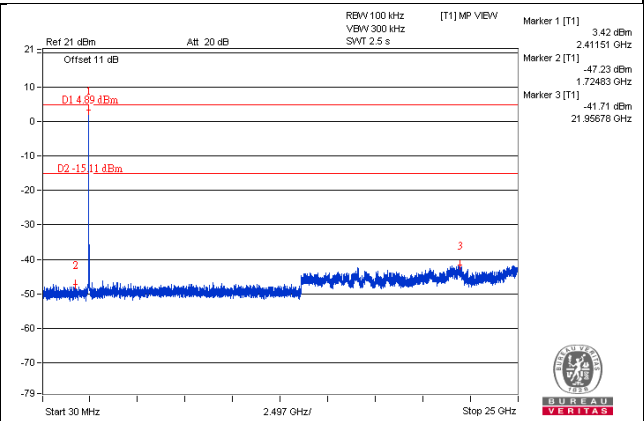
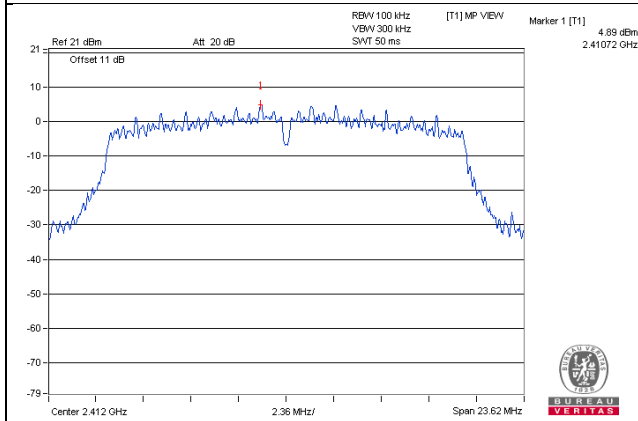


CH 11 Band edge

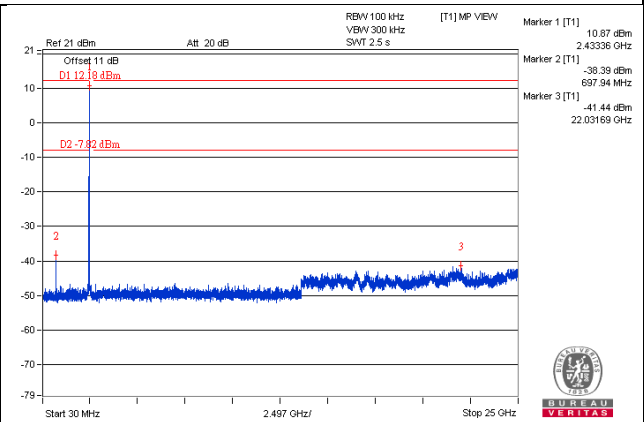
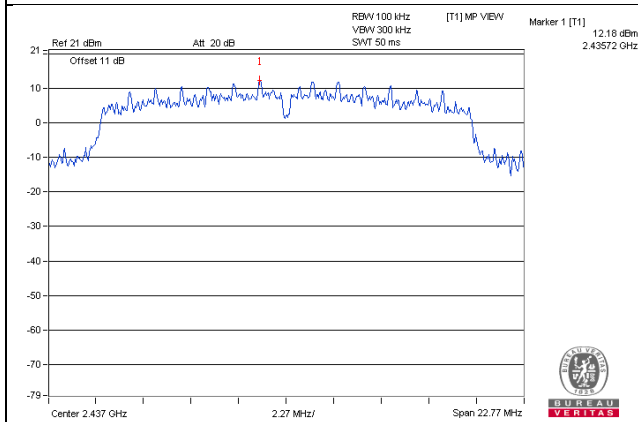


Chain 1

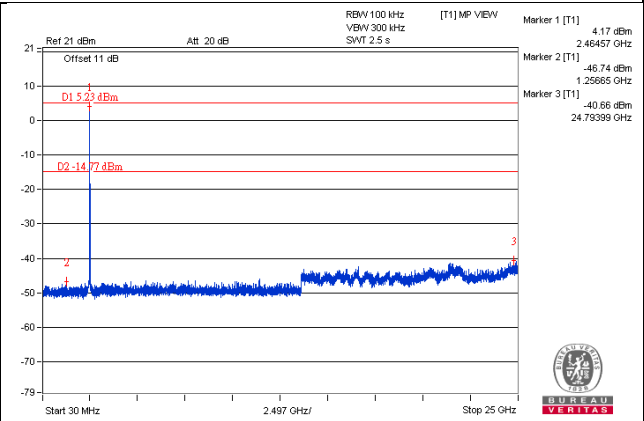
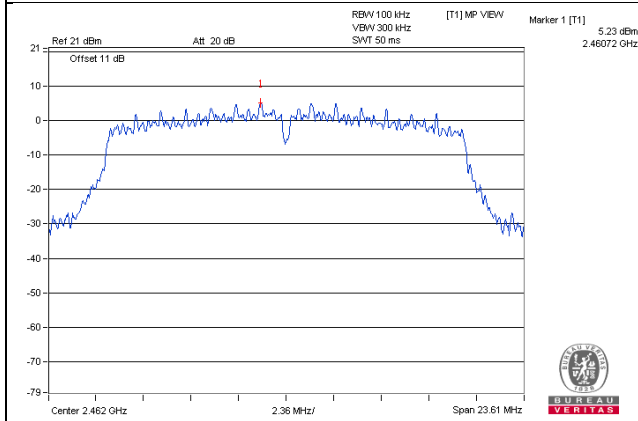
CH 1



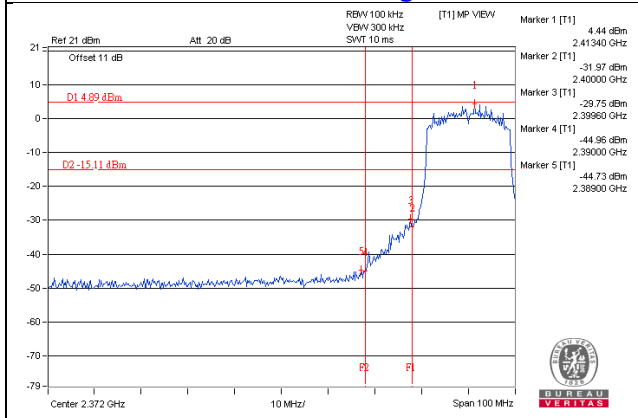
CH 6



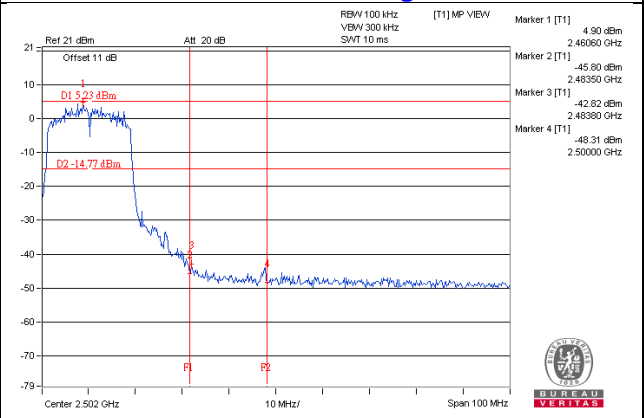
CH 11



CH 1 Band edge

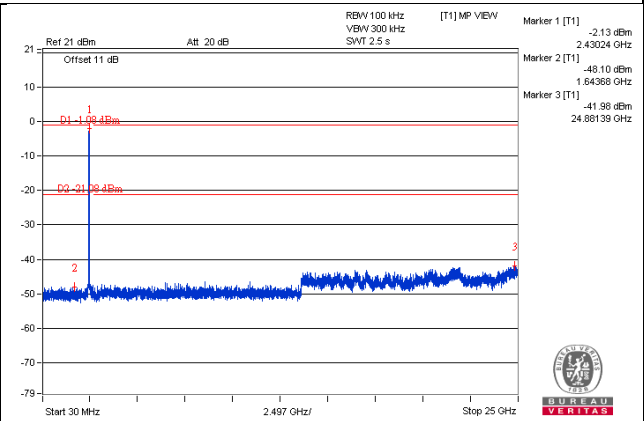
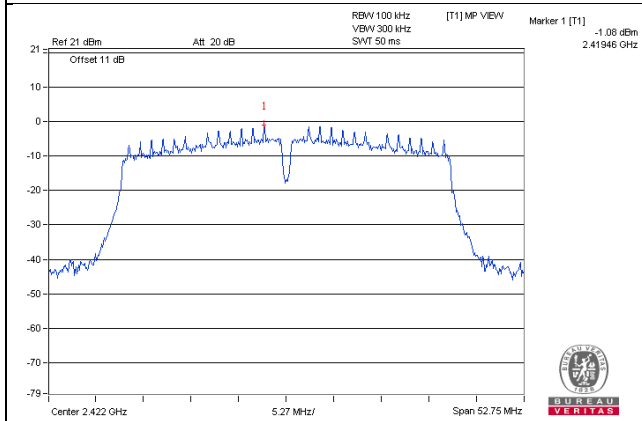


CH 11 Band edge

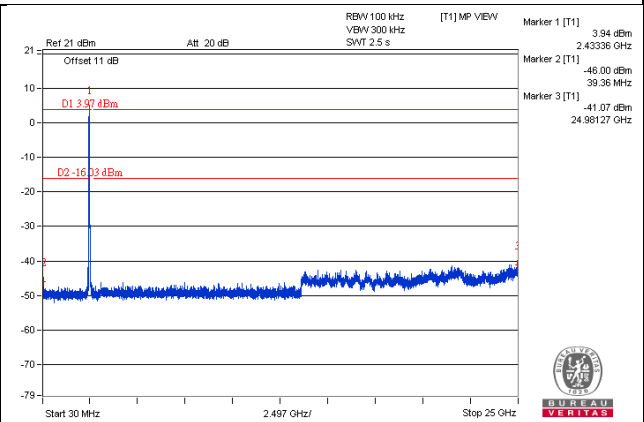
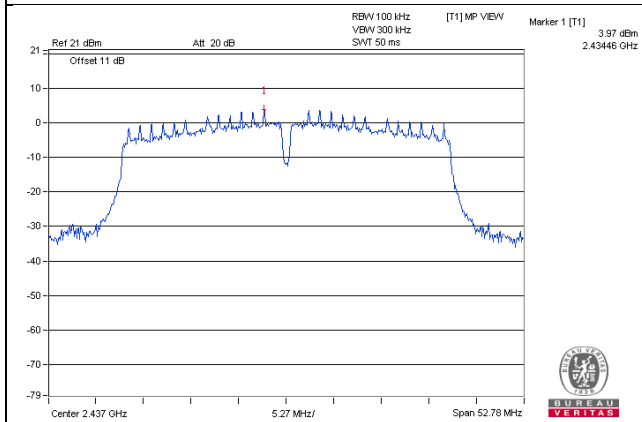


802.11n (HT40) : Chain 0

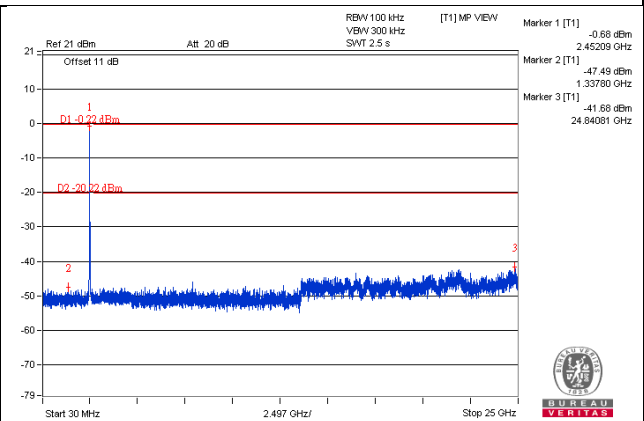
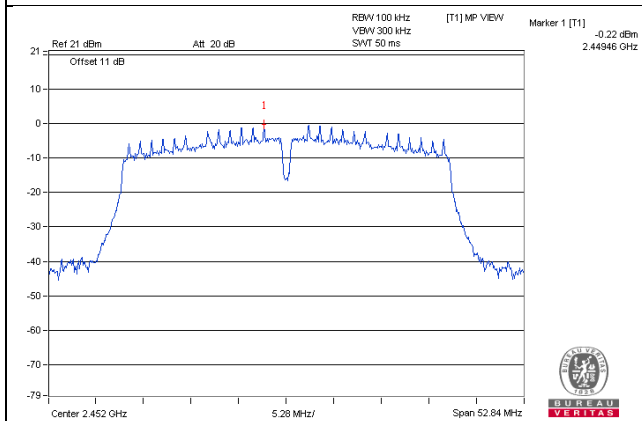
CH 3



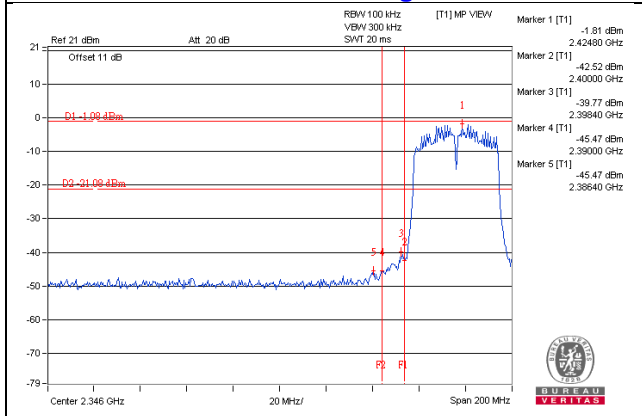
CH 6



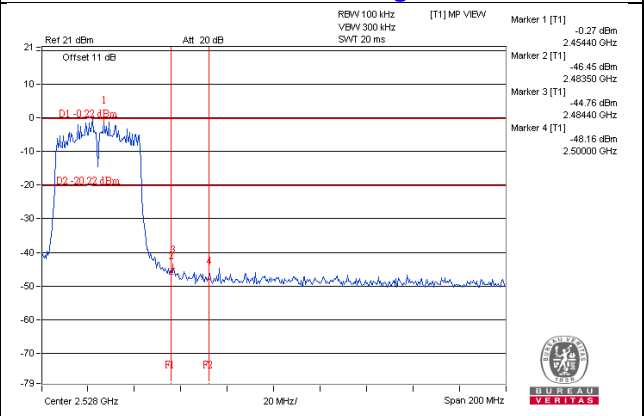
CH 9



CH 3 Band edge

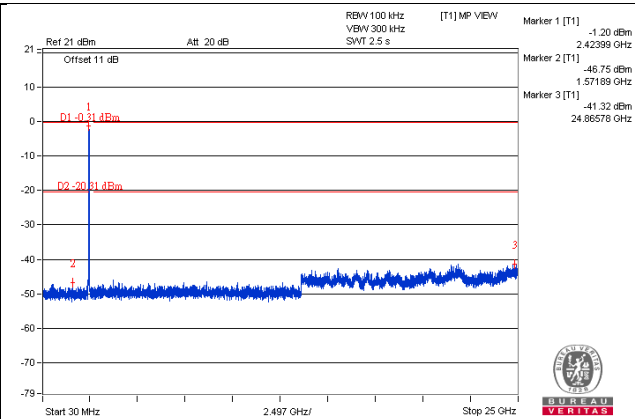
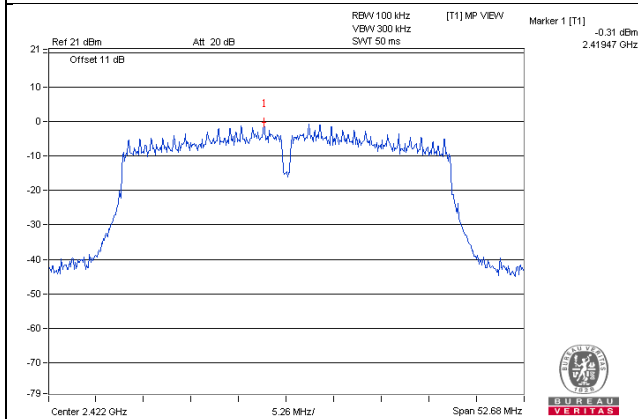


CH 9 Band edge

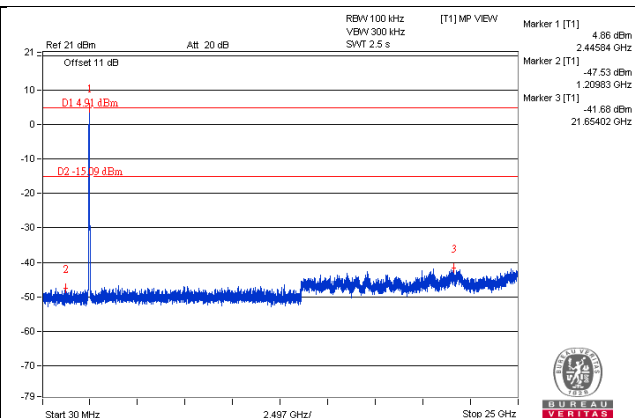
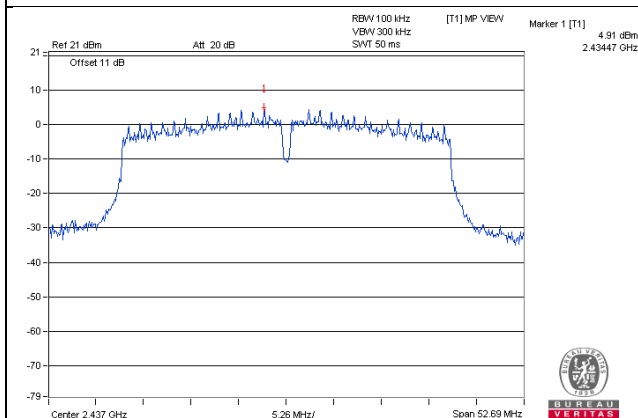


Chain 1

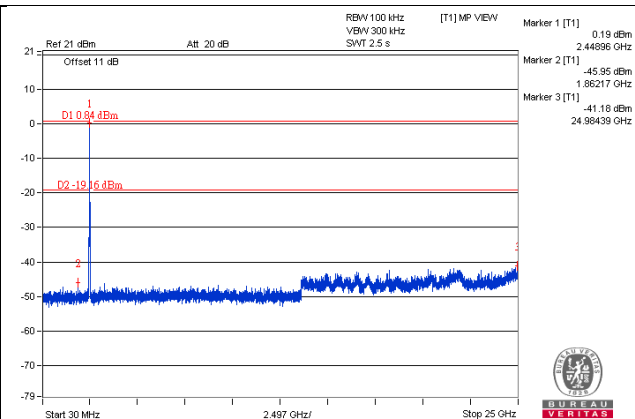
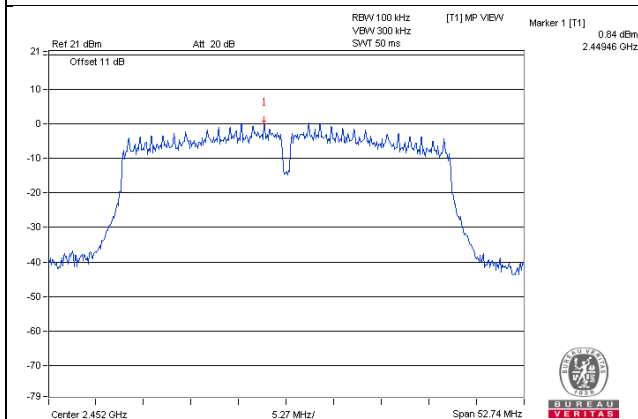
CH 3



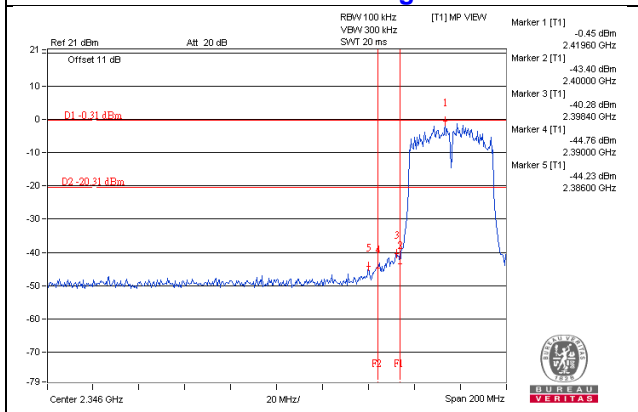
CH 6



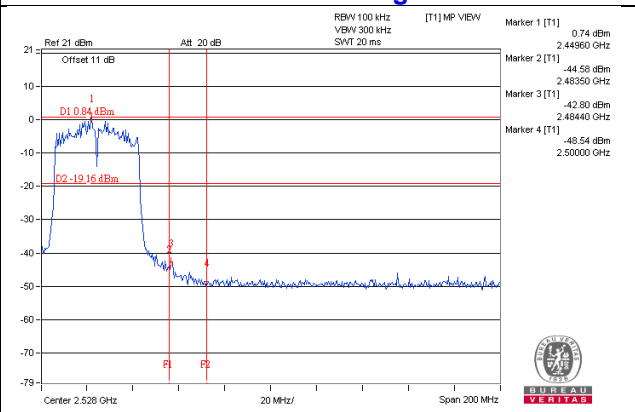
CH 9



CH 3 Band edge



CH 9 Band edge



5 Pictures of Test Arrangements

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

Appendix – Information of the Testing Laboratories

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

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

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

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