FCC Test Report

Report No.:	RF170315E03
FCC ID:	I88C3000Z
Test Model:	C3000Z
Received Date:	Mar. 15, 2017
Test Date:	Apr. 06 to 27, 2017
Issued Date:	May 29, 2017
Applicant:	Zyxel Communications Corporation
Address:	No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, 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 (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

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Release Control Record

Issue No.	Description	Date Issued
RF170315E03	Original release.	May 29, 2017

1 Certificate of Conformity

Product:	WiFi-N VDSL2 4-port Combo WAN CPE
Brand:	ZYXEL
Test Model:	C3000Z
Sample Status:	ENGINEERING SAMPLE
Applicant:	Zyxel Communications Corporation
Test Date:	Apr. 06 to 27, 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 : Cindy Hsin , **Date:** May 29, 2017

Cindy Hsin / Specialist

Approved by : , **Date:** May 29, 2017

May Chen / 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 -9.33dB at 0.32969MHz.
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, 2390.00MHz
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) (±)
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	4.78 dB
	6GHz ~ 18GHz	4.52 dB
	18GHz ~ 40GHz	5.08 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	WiFi-N VDSL2 4-port Combo WAN CPE
Brand	ZYXEL
Test Model	C3000Z
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 12V from power adapter
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 in 2.4GHz band
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** **CDD Mode:** 989.071mW **Beamforming Mode:** 509.874mW **5GHz:** **5.18 ~ 5.24GHz:** **CDD Mode:** 703.104mW **Beamforming Mode:** 339.509mW **5.745 ~ 5.825GHz:** **CDD Mode:** 926.785mW **Beamforming Mode:** 346.281mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	RJ 11 cable(unshielded, 3.6m) x1 RJ 45 cable(unshielded, 1.8m) x1

Note:

1. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (2.4GHz)	WLAN (5GHz)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

2. The EUT must be supplied from a power adapter as following table:

Brand	Model	Spec.
UMEC	UP0251M-12PA	Input: 100-240Vac, 50/60Hz, 0.6A Output: 12V, 2A DC output cable (Unshielded, 1.8m)

3. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	3TX	3RX
802.11g	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
VHT20	MCS 0~8, Nss=1	3TX	3RX
	MCS 0~8, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
VHT40	MCS0~9 Nss=1	3TX	3RX
	MCS0~9 Nss=2	3TX	3RX
	MCS0~9 Nss=3	3TX	3RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS 0~8, Nss=1	4TX	4RX
	MCS 0~8, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~8, Nss=4	4TX	4RX
802.11ac (VHT40)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
802.11ac (VHT80)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX

Note:
1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.

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

2.4GHz antenna								
Antenna NO.	PCB NO.	Brand	Model	Antenna Gain(dBi) Including cable loss	Frequency range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	WJ1	Airgain	65-031-049008B	4.5	2.4~2.4835	Dipole	NA	295
2	WJ0	Airgain	65-031-049007B	4.1	2.4~2.4835	Dipole	NA	320
3	WJ2	Airgain	65-031-049009B	3.1	2.4~2.4835	Dipole	NA	270
5GHz antenna								
Antenna NO.	PCB NO.	Brand	Model	Antenna Gain(dBi) Including cable loss	Frequency range (GHz)	Antenna Type	Antenna Connector	Cable Length (mm)
1	JC2	Airgain	65-031-049003B	4.4	5.15~5.85	Dipole	i-pex(MHF)	50
2	JC3	Airgain	65-031-049004B	4.8	5.15~5.85	Dipole	i-pex(MHF)	85
3	JC1	Airgain	65-031-049005B	4.4	5.15~5.85	Dipole	i-pex(MHF)	50
4	JC0	Airgain	65-031-049006B	4.4	5.15~5.85	Dipole	i-pex(MHF)	65

5. The power setting are list as below:

Modulation Mode	Frequency (MHz)	Power Setting (CDD)	Power Setting (Beamforming)
802.11b	2412	80	-
	2437	95	-
	2462	75	-
802.11g	2412	70	-
	2437	96	-
	2462	63	-
802.11n (HT20)	2412	70	70
	2437	96	87
	2462	63	63
802.11n (HT40)	2422	62	62
	2437	66	66
	2452	50	50

6. 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), VHT20:

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), VHT40:

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≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥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.

CDD Mode					
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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	1	OFDM	BPSK	6

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.

CDD Mode					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11g	1 to 11	1	OFDM	BPSK	6

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.

CDD Mode					
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
Beamforming Mode (Output power only)					
MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
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:

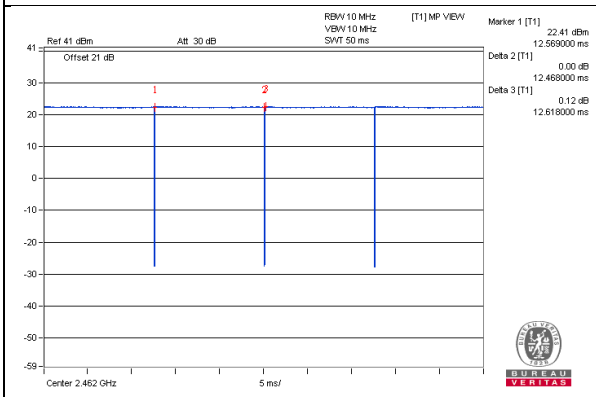
APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Terry Huang
RE<1G	25deg. C, 66%RH	120Vac, 60Hz	Terry Huang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	23deg. C, 66%RH	120Vac, 60Hz	Robert Cheng

3.3 Duty Cycle of Test Signal

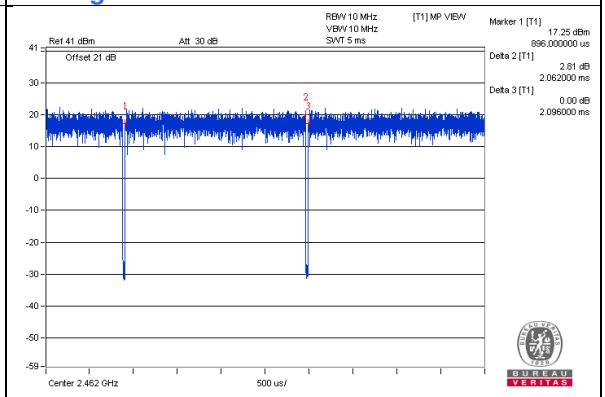
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11b: Duty cycle = 12.468/12.618 = 0.988
802.11g: Duty cycle = 2.062/2.096 = 0.984
802.11n (HT20): Duty cycle = 1.918/1.952 = 0.983
802.11n (HT40): Duty cycle = 0.942/0.975 = 0.966, Duty factor = 10 * log(1/0.966) = 0.15

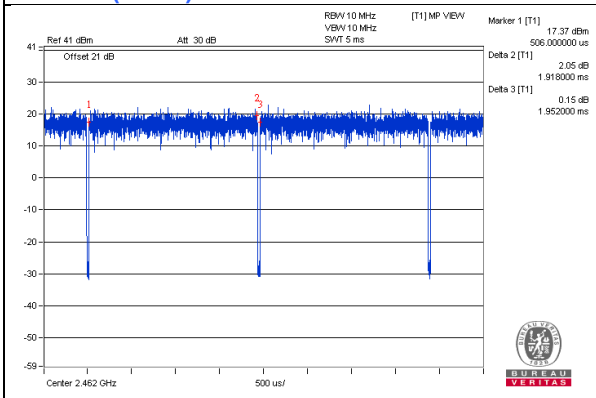
802.11b



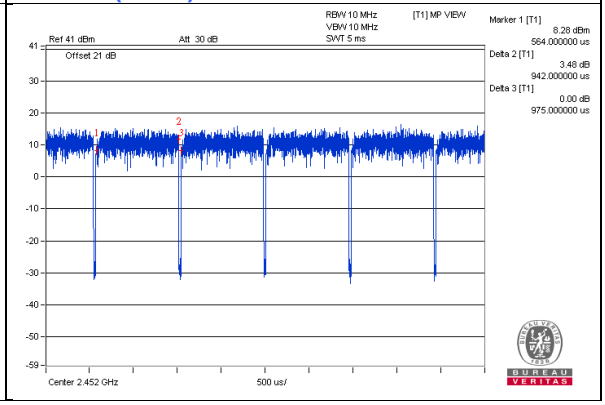
802.11g



802.11n (HT20)



802.11n (HT40)



3.4 Description of Support Units

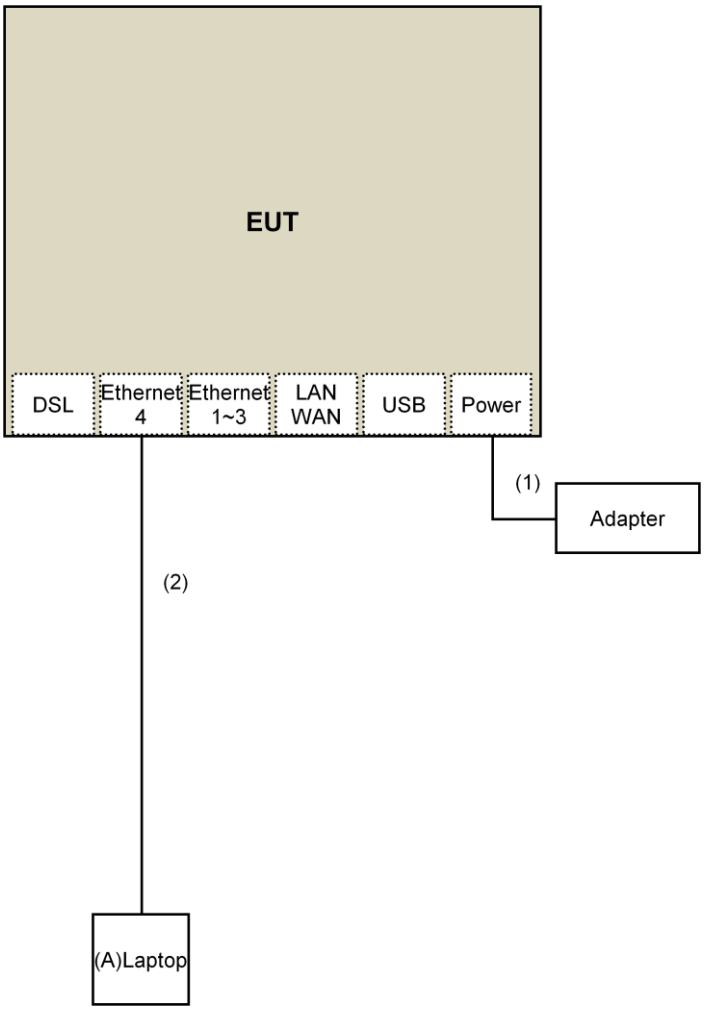
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E5440	6FC7F12	FCC DoC	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

3.4.1 Configuration of System under Test



Note: The test configuration was defined by the client requirement.

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 30dB below the highest level of the desired power:

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

NOTE:

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

4.1.2 Test Instruments

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. 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 150323	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	June 28, 2016	June 27, 2017
Power meter Anritsu	ML2495A	1014008	May 5, 2016	May 4, 2017
Power sensor Anritsu	MA2411B	0917122	May 5, 2016	May 4, 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. The FCC Site Registration No. is 292998
5. The CANADA Site Registration No. is 20331-2
6 Loop antenna was used for all emissions below 30 MHz.
7. Tested Date: Apr. 18 to 27, 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:

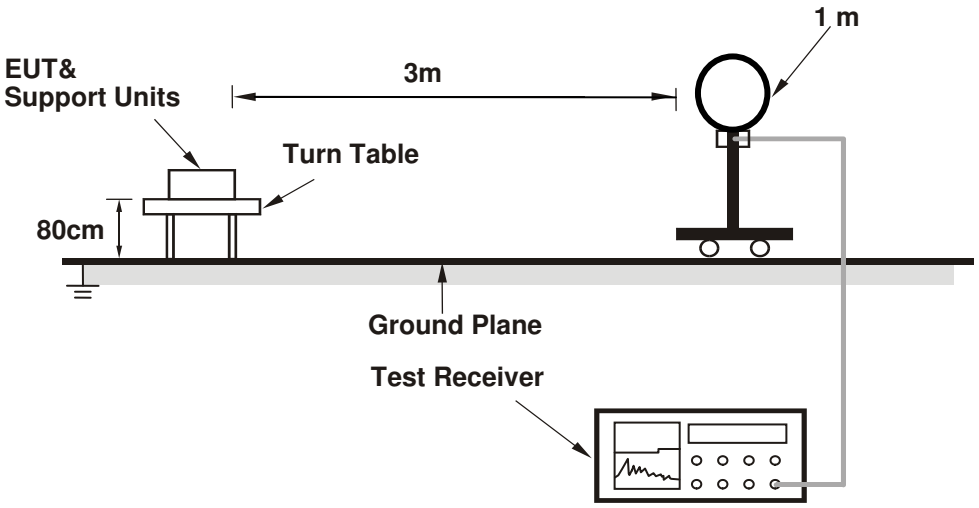
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz. If duty cycle of test signal is < 98%, the duty factor need added to measured value.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

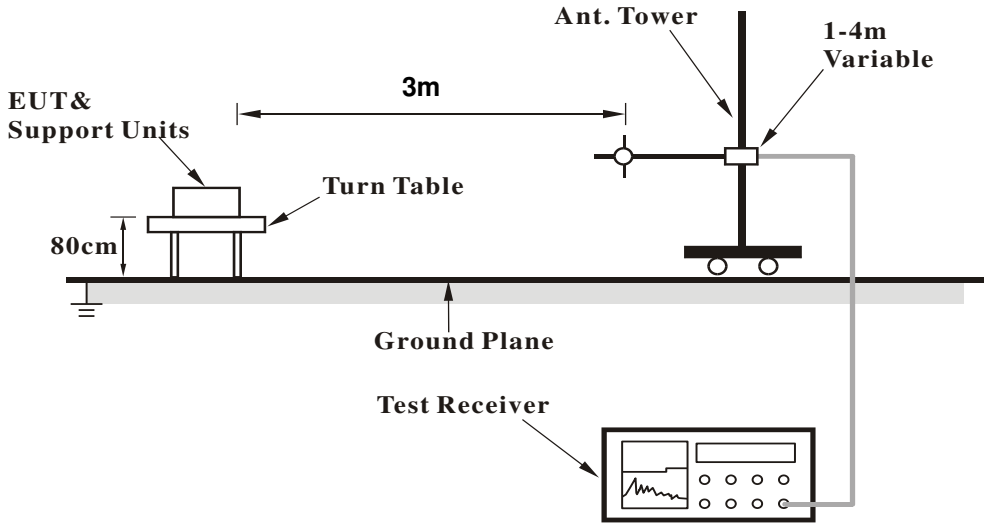
No deviation.

4.1.5 Test Setup

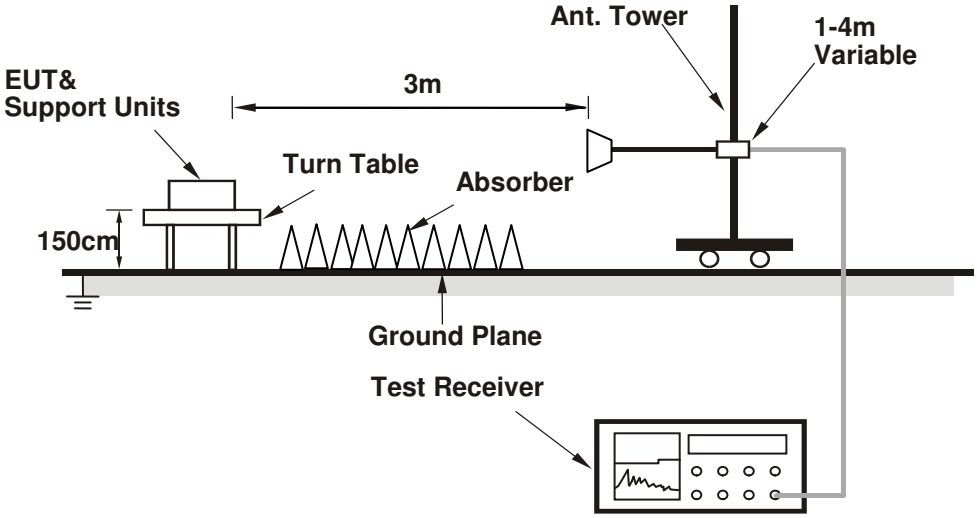
For Radiated emission below 30MHz



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

a. Connected the EUT with the Laptop which is placed on remote site.

b. Contorlling software (Mtool 3.0.0.2) 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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2261.00	58.7 PK	74.0	-15.3	1.45 H	280	60.7	-2.0
2	2261.00	51.5 AV	54.0	-2.5	1.45 H	280	53.5	-2.0
3	2390.00	60.5 PK	74.0	-13.5	1.45 H	280	61.8	-1.3
4	2390.00	53.1 AV	54.0	-0.9	1.45 H	280	54.4	-1.3
5	*2412.00	112.1 PK			1.45 H	280	113.2	-1.1
6	*2412.00	110.0 AV			1.45 H	280	111.1	-1.1
7	4824.00	45.8 PK	74.0	-28.2	1.59 H	252	42.6	3.2
8	4824.00	43.1 AV	54.0	-10.9	1.59 H	252	39.9	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	2261.00	59.8 PK	74.0	-14.2	1.14 V	101	61.8	-2.0
2	2261.00	53.1 AV	54.0	-0.9	1.14 V	101	55.1	-2.0
3	2390.00	61.1 PK	74.0	-12.9	1.89 V	315	62.4	-1.3
4	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.89 V**	**315**	**55.2**	**-1.3**
5	*2412.00	114.3 PK			1.89 V	315	115.4	-1.1
6	*2412.00	112.0 AV			1.89 V	315	113.1	-1.1
7	4824.00	47.1 PK	74.0	-26.9	1.51 V	67	43.9	3.2
8	4824.00	44.3 AV	54.0	-9.7	1.51 V	67	41.1	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	2284.00	58.8 PK	74.0	-15.2	2.14 H	92	60.7	-1.9
2	2284.00	50.8 AV	54.0	-3.2	2.14 H	92	52.7	-1.9
3	2390.00	57.1 PK	74.0	-16.9	1.44 H	278	58.4	-1.3
4	2390.00	44.0 AV	54.0	-10.0	1.44 H	278	45.3	-1.3
5	*2437.00	113.9 PK			1.44 H	278	115.1	-1.2
6	*2437.00	111.7 AV			1.44 H	278	112.9	-1.2
7	2483.50	58.8 PK	74.0	-15.2	1.44 H	278	59.8	-1.0
8	2483.50	45.2 AV	54.0	-8.8	1.44 H	278	46.2	-1.0
9	4874.00	47.9 PK	74.0	-26.1	1.57 H	250	44.6	3.3
10	4874.00	45.1 AV	54.0	-8.9	1.57 H	250	41.8	3.3
11	7311.00	56.3 PK	74.0	-17.7	2.03 H	181	46.5	9.8
12	7311.00	48.3 AV	54.0	-5.7	2.03 H	181	38.5	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	2284.00	59.9 PK	74.0	-14.1	1.14 V	102	61.8	-1.9
2	2284.00	52.5 AV	54.0	-1.5	1.14 V	102	54.4	-1.9
3	2390.00	57.3 PK	74.0	-16.7	1.89 V	13	58.6	-1.3
4	2390.00	44.7 AV	54.0	-9.3	1.89 V	13	46.0	-1.3
5	*2437.00	115.8 PK			1.89 V	13	117.0	-1.2
6	*2437.00	113.8 AV			1.89 V	13	115.0	-1.2
7	2483.50	59.5 PK	74.0	-14.5	1.89 V	13	60.5	-1.0
8	2483.50	45.7 AV	54.0	-8.3	1.89 V	13	46.7	-1.0
9	4874.00	49.2 PK	74.0	-24.8	1.50 V	80	45.9	3.3
10	4874.00	46.5 AV	54.0	-7.5	1.50 V	80	43.2	3.3
11	7311.00	57.7 PK	74.0	-16.3	1.47 V	286	47.9	9.8
12	7311.00	48.7 AV	54.0	-5.3	1.47 V	286	38.9	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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	111.5 PK			1.47 H	275	112.6	-1.1
2	*2462.00	109.5 AV			1.47 H	275	110.6	-1.1
3	2483.50	61.6 PK	74.0	-12.4	1.47 H	275	62.6	-1.0
4	2483.50	53.2 AV	54.0	-0.8	1.47 H	275	54.2	-1.0
5	4924.00	44.5 PK	74.0	-29.5	1.52 H	254	41.0	3.5
6	4924.00	41.7 AV	54.0	-12.3	1.52 H	254	38.2	3.5
7	7386.00	53.1 PK	74.0	-20.9	2.00 H	183	43.2	9.9
8	7386.00	45.1 AV	54.0	-8.9	2.00 H	183	35.2	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	113.7 PK			1.89 V	319	114.8	-1.1
2	*2462.00	111.4 AV			1.89 V	319	112.5	-1.1
3	2483.50	62.4 PK	74.0	-11.6	1.89 V	311	63.4	-1.0
4	2483.50	53.8 AV	54.0	-0.2	1.89 V	311	54.8	-1.0
5	4924.00	46.0 PK	74.0	-28.0	1.53 V	72	42.5	3.5
6	4924.00	43.2 AV	54.0	-10.8	1.53 V	72	39.7	3.5
7	7386.00	55.2 PK	74.0	-18.8	1.48 V	279	45.3	9.9
8	7386.00	46.2 AV	54.0	-7.8	1.48 V	279	36.3	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.

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

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	2261.00	57.9 PK	74.0	-16.1	1.51 H	276	59.9	-2.0
2	2261.00	49.6 AV	54.0	-4.4	1.51 H	276	51.6	-2.0
3	2390.00	70.9 PK	74.0	-3.1	1.51 H	276	72.2	-1.3
4	2390.00	52.8 AV	54.0	-1.2	1.51 H	276	54.1	-1.3
5	*2412.00	111.1 PK			1.51 H	276	112.2	-1.1
6	*2412.00	101.6 AV			1.51 H	276	102.7	-1.1
7	4824.00	46.1 PK	74.0	-27.9	1.55 H	197	42.9	3.2
8	4824.00	33.1 AV	54.0	-20.9	1.55 H	197	29.9	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	2261.00	59.7 PK	74.0	-14.3	1.11 V	100	61.7	-2.0
2	2261.00	53.3 AV	54.0	-0.7	1.11 V	100	55.3	-2.0
3	2390.00	72.5 PK	74.0	-1.5	1.89 V	315	73.8	-1.3
4	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**1.89 V**	**315**	**55.2**	**-1.3**
5	*2412.00	113.3 PK			1.89 V	315	114.4	-1.1
6	*2412.00	103.7 AV			1.89 V	315	104.8	-1.1
7	4824.00	48.7 PK	74.0	-25.3	1.43 V	246	45.5	3.2
8	4824.00	35.8 AV	54.0	-18.2	1.43 V	246	32.6	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	2284.00	59.6 PK	74.0	-14.4	1.58 H	283	61.5	-1.9
2	2284.00	51.4 AV	54.0	-2.6	1.58 H	283	53.3	-1.9
3	2390.00	65.4 PK	74.0	-8.6	1.58 H	283	66.7	-1.3
4	2390.00	49.1 AV	54.0	-4.9	1.58 H	283	50.4	-1.3
5	*2437.00	118.2 PK			1.58 H	283	119.4	-1.2
6	*2437.00	108.1 AV			1.58 H	283	109.3	-1.2
7	2483.50	64.7 PK	74.0	-9.3	1.58 H	283	65.7	-1.0
8	2483.50	49.5 AV	54.0	-4.5	1.58 H	283	50.5	-1.0
9	4874.00	52.1 PK	74.0	-21.9	1.57 H	195	48.8	3.3
10	4874.00	39.4 AV	54.0	-14.6	1.57 H	195	36.1	3.3
11	7311.00	59.6 PK	74.0	-14.4	2.03 H	175	49.8	9.8
12	7311.00	44.5 AV	54.0	-9.5	2.03 H	175	34.7	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	2284.00	60.8 PK	74.0	-13.2	1.00 V	100	62.7	-1.9
2	2284.00	52.7 AV	54.0	-1.3	1.00 V	100	54.6	-1.9
3	2390.00	66.8 PK	74.0	-7.2	2.00 V	185	68.1	-1.3
4	2390.00	50.2 AV	54.0	-3.8	2.00 V	185	51.5	-1.3
5	*2437.00	120.4 PK			2.00 V	185	121.6	-1.2
6	*2437.00	110.2 AV			2.00 V	185	111.4	-1.2
7	2483.50	65.6 PK	74.0	-8.4	2.00 V	185	66.6	-1.0
8	2483.50	50.0 AV	54.0	-4.0	2.00 V	185	51.0	-1.0
9	4874.00	54.8 PK	74.0	-19.2	1.43 V	260	51.5	3.3
10	4874.00	41.9 AV	54.0	-12.1	1.43 V	260	38.6	3.3
11	7311.00	60.6 PK	74.0	-13.4	1.47 V	268	50.8	9.8
12	7311.00	46.0 AV	54.0	-8.0	1.47 V	268	36.2	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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	109.9 PK			1.55 H	285	111.0	-1.1
2	*2462.00	100.4 AV			1.55 H	285	101.5	-1.1
3	2483.50	68.8 PK	74.0	-5.2	1.55 H	285	69.8	-1.0
4	2483.50	52.9 AV	54.0	-1.1	1.55 H	285	53.9	-1.0
5	4924.00	44.2 PK	74.0	-29.8	1.56 H	206	40.7	3.5
6	4924.00	31.7 AV	54.0	-22.3	1.56 H	206	28.2	3.5
7	7386.00	52.0 PK	74.0	-22.0	1.99 H	178	42.1	9.9
8	7386.00	36.9 AV	54.0	-17.1	1.99 H	178	27.0	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	112.1 PK			1.98 V	185	113.2	-1.1
2	*2462.00	102.6 AV			1.98 V	185	103.7	-1.1
3	2483.50	70.2 PK	74.0	-3.8	1.98 V	185	71.2	-1.0
4	2483.50	53.7 AV	54.0	-0.3	1.98 V	185	54.7	-1.0
5	4924.00	46.9 PK	74.0	-27.1	1.44 V	248	43.4	3.5
6	4924.00	34.0 AV	54.0	-20.0	1.44 V	248	30.5	3.5
7	7386.00	53.1 PK	74.0	-20.9	1.52 V	270	43.2	9.9
8	7386.00	38.4 AV	54.0	-15.6	1.52 V	270	28.5	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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2261.00	58.5 PK	74.0	-15.5	1.51 H	181	60.5	-2.0
2	2261.00	49.7 AV	54.0	-4.3	1.51 H	181	51.7	-2.0
3	2390.00	68.4 PK	74.0	-5.6	1.51 H	181	69.7	-1.3
4	2390.00	52.4 AV	54.0	-1.6	1.51 H	181	53.7	-1.3
5	*2412.00	111.0 PK			1.51 H	181	112.1	-1.1
6	*2412.00	101.7 AV			1.51 H	181	102.8	-1.1
7	4824.00	46.3 PK	74.0	-27.7	1.54 H	190	43.1	3.2
8	4824.00	33.5 AV	54.0	-20.5	1.54 H	190	30.3	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	2261.00	60.0 PK	74.0	-14.0	1.11 V	101	62.0	-2.0
2	2261.00	53.5 AV	54.0	-0.5	1.11 V	101	55.5	-2.0
3	2390.00	70.1 PK	74.0	-3.9	2.03 V	185	71.4	-1.3
4	**2390.00**	**53.9 AV**	**54.0**	**-0.1**	**2.03 V**	**185**	**55.2**	**-1.3**
5	*2412.00	113.6 PK			2.03 V	185	114.7	-1.1
6	*2412.00	103.5 AV			2.03 V	185	104.6	-1.1
7	4824.00	48.8 PK	74.0	-25.2	1.46 V	236	45.6	3.2
8	4824.00	35.6 AV	54.0	-18.4	1.46 V	236	32.4	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	2284.00	58.5 PK	74.0	-15.5	1.52 H	182	60.4	-1.9
2	2284.00	51.1 AV	54.0	-2.9	1.52 H	182	53.0	-1.9
3	2390.00	68.1 PK	74.0	-5.9	1.52 H	182	69.4	-1.3
4	2390.00	50.8 AV	54.0	-3.2	1.52 H	182	52.1	-1.3
5	*2437.00	118.1 PK			1.52 H	182	119.3	-1.2
6	*2437.00	107.9 AV			1.52 H	182	109.1	-1.2
7	2483.50	70.3 PK	74.0	-3.7	1.52 H	182	71.3	-1.0
8	2483.50	50.2 AV	54.0	-3.8	1.52 H	182	51.2	-1.0
9	4874.00	51.7 PK	74.0	-22.3	1.58 H	196	48.4	3.3
10	4874.00	39.1 AV	54.0	-14.9	1.58 H	196	35.8	3.3
11	7311.00	59.4 PK	74.0	-14.6	2.08 H	163	49.6	9.8
12	7311.00	44.3 AV	54.0	-9.7	2.08 H	163	34.5	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	2284.00	60.2 PK	74.0	-13.8	1.00 V	103	62.1	-1.9
2	2284.00	52.8 AV	54.0	-1.2	1.00 V	103	54.7	-1.9
3	2390.00	69.3 PK	74.0	-4.7	2.03 V	185	70.6	-1.3
4	2390.00	51.9 AV	54.0	-2.1	2.03 V	185	53.2	-1.3
5	*2437.00	120.2 PK			2.03 V	185	121.4	-1.2
6	*2437.00	110.2 AV			2.03 V	185	111.4	-1.2
7	2483.50	71.5 PK	74.0	-2.5	2.03 V	185	72.5	-1.0
8	2483.50	51.0 AV	54.0	-3.0	2.03 V	185	52.0	-1.0
9	4874.00	54.3 PK	74.0	-19.7	1.43 V	246	51.0	3.3
10	4874.00	41.5 AV	54.0	-12.5	1.43 V	246	38.2	3.3
11	7311.00	60.7 PK	74.0	-13.3	1.45 V	277	50.9	9.8
12	7311.00	46.3 AV	54.0	-7.7	1.45 V	277	36.5	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 11	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	110.0 PK			1.54 H	209	111.1	-1.1
2	*2462.00	99.8 AV			1.54 H	209	100.9	-1.1
3	2483.50	69.6 PK	74.0	-4.4	1.54 H	209	70.6	-1.0
4	2483.50	52.8 AV	54.0	-1.2	1.54 H	209	53.8	-1.0
5	4924.00	44.1 PK	74.0	-29.9	1.53 H	200	40.6	3.5
6	4924.00	31.5 AV	54.0	-22.5	1.53 H	200	28.0	3.5
7	7386.00	52.6 PK	74.0	-21.4	1.95 H	169	42.7	9.9
8	7386.00	37.2 AV	54.0	-16.8	1.95 H	169	27.3	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	112.2 PK			2.11 V	188	113.3	-1.1
2	*2462.00	102.0 AV			2.11 V	188	103.1	-1.1
3	2483.50	71.5 PK	74.0	-2.5	2.11 V	188	72.5	-1.0
4	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**2.11 V**	**188**	**54.9**	**-1.0**
5	4924.00	47.1 PK	74.0	-26.9	1.49 V	247	43.6	3.5
6	4924.00	34.0 AV	54.0	-20.0	1.49 V	247	30.5	3.5
7	7386.00	53.6 PK	74.0	-20.4	1.56 V	278	43.7	9.9
8	7386.00	38.6 AV	54.0	-15.4	1.56 V	278	28.7	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) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2270.00	57.3 PK	74.0	-16.7	1.59 H	198	59.2	-1.9
2	2270.00	47.5 AV	54.0	-6.5	1.59 H	198	49.4	-1.9
3	2390.00	72.5 PK	74.0	-1.5	1.59 H	198	73.8	-1.3
4	2390.00	52.6 AV	54.0	-1.4	1.59 H	198	53.9	-1.3
5	*2422.00	107.1 PK			1.59 H	198	108.4	-1.3
6	*2422.00	97.1 AV			1.59 H	198	98.4	-1.3
7	4844.00	41.4 PK	74.0	-32.6	1.54 H	201	38.1	3.3
8	4844.00	28.7 AV	54.0	-25.3	1.54 H	201	25.4	3.3
9	7266.00	50.7 PK	74.0	-23.3	2.02 H	169	40.9	9.8
10	7266.00	35.3 AV	54.0	-18.7	2.02 H	169	25.5	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	2270.00	58.2 PK	74.0	-15.8	1.11 V	80	60.1	-1.9
2	2270.00	48.8 AV	54.0	-5.2	1.11 V	80	50.7	-1.9
3	2390.00	73.0 PK	74.0	-1.0	1.99 V	188	74.3	-1.3
4	2390.00	53.8 AV	54.0	-0.2	1.99 V	188	55.1	-1.3
5	*2422.00	109.3 PK			1.99 V	188	110.6	-1.3
6	*2422.00	99.4 AV			1.99 V	188	100.7	-1.3
7	4844.00	45.3 PK	74.0	-28.7	1.50 V	248	42.0	3.3
8	4844.00	32.0 AV	54.0	-22.0	1.50 V	248	28.7	3.3
9	7266.00	50.7 PK	74.0	-23.3	1.59 V	273	40.9	9.8
10	7266.00	35.8 AV	54.0	-18.2	1.59 V	273	26.0	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 6	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

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	2284.00	57.9 PK	74.0	-16.1	1.57 H	202	59.8	-1.9
2	2284.00	48.6 AV	54.0	-5.4	1.57 H	202	50.5	-1.9
3	2390.00	64.3 PK	74.0	-9.7	1.57 H	202	65.6	-1.3
4	2390.00	48.5 AV	54.0	-5.5	1.57 H	202	49.8	-1.3
5	*2437.00	108.8 PK			1.57 H	202	110.0	-1.2
6	*2437.00	98.3 AV			1.57 H	202	99.5	-1.2
7	2483.50	69.8 PK	74.0	-4.2	1.57 H	202	70.8	-1.0
8	2483.50	52.6 AV	54.0	-1.4	1.57 H	202	53.6	-1.0
9	4874.00	42.6 PK	74.0	-31.4	1.58 H	214	39.3	3.3
10	4874.00	30.0 AV	54.0	-24.0	1.58 H	214	26.7	3.3
11	7311.00	51.9 PK	74.0	-22.1	2.01 H	182	42.1	9.8
12	7311.00	36.7 AV	54.0	-17.3	2.01 H	182	26.9	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	2284.00	58.6 PK	74.0	-15.4	1.00 V	103	60.5	-1.9
2	2284.00	49.9 AV	54.0	-4.1	1.00 V	103	51.8	-1.9
3	2390.00	65.6 PK	74.0	-8.4	1.99 V	188	66.9	-1.3
4	2390.00	49.2 AV	54.0	-4.8	1.99 V	188	50.5	-1.3
5	*2437.00	111.0 PK			1.99 V	188	112.2	-1.2
6	*2437.00	100.8 AV			1.99 V	188	102.0	-1.2
7	2483.50	72.1 PK	74.0	-1.9	1.99 V	188	73.1	-1.0
8	**2483.50**	**53.9 AV**	**54.0**	**-0.1**	**1.99 V**	**188**	**54.9**	**-1.0**
9	4874.00	45.9 PK	74.0	-28.1	1.52 V	263	42.6	3.3
10	4874.00	32.7 AV	54.0	-21.3	1.52 V	263	29.4	3.3
11	7311.00	52.3 PK	74.0	-21.7	1.59 V	280	42.5	9.8
12	7311.00	37.2 AV	54.0	-16.8	1.59 V	280	27.4	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	2298.00	56.8 PK	74.0	-17.2	1.61 H	213	58.6	-1.8
2	2298.00	48.4 AV	54.0	-5.6	1.61 H	213	50.2	-1.8
3	*2452.00	104.4 PK			1.61 H	213	105.5	-1.1
4	*2452.00	94.2 AV			1.61 H	213	95.3	-1.1
5	2483.50	66.6 PK	74.0	-7.4	1.61 H	213	67.6	-1.0
6	2483.50	53.1 AV	54.0	-0.9	1.61 H	213	54.1	-1.0
7	4904.00	40.3 PK	74.0	-33.7	1.57 H	188	36.8	3.5
8	4904.00	27.7 AV	54.0	-26.3	1.57 H	188	24.2	3.5
9	7356.00	49.8 PK	74.0	-24.2	2.02 H	153	39.9	9.9
10	7356.00	34.2 AV	54.0	-19.8	2.02 H	153	24.3	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	2298.00	58.2 PK	74.0	-15.8	1.00 V	105	60.0	-1.8
2	2298.00	49.2 AV	54.0	-4.8	1.00 V	105	51.0	-1.8
3	*2452.00	106.3 PK			2.00 V	188	107.4	-1.1
4	*2452.00	96.1 AV			2.00 V	188	97.2	-1.1
5	2483.50	67.9 PK	74.0	-6.1	2.00 V	188	68.9	-1.0
6	2483.50	53.7 AV	54.0	-0.3	2.00 V	188	54.7	-1.0
7	4904.00	44.8 PK	74.0	-29.2	1.53 V	253	41.3	3.5
8	4904.00	31.3 AV	54.0	-22.7	1.53 V	253	27.8	3.5
9	7356.00	49.7 PK	74.0	-24.3	1.54 V	279	39.8	9.9
10	7356.00	35.1 AV	54.0	-18.9	1.54 V	279	25.2	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.

Below 1GHz Data:

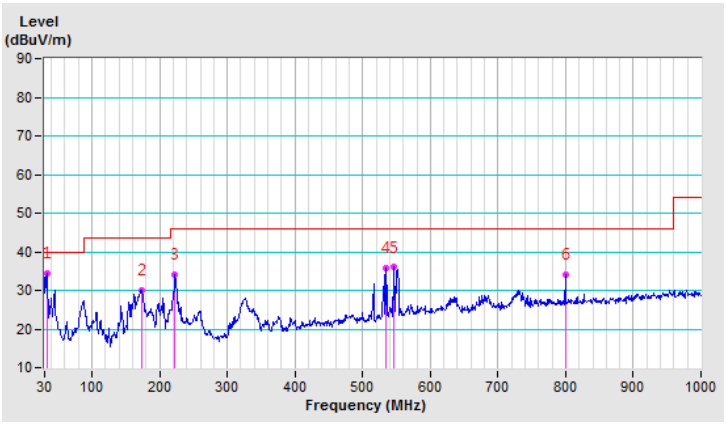
802.11g

CHANNEL	TX Channel 1	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	33.40	34.5 QP	40.0	-5.5	3.00 H	36	44.2	-9.7
2	173.63	30.1 QP	43.5	-13.4	1.50 H	265	39.4	-9.3
3	222.40	34.0 QP	46.0	-12.0	1.50 H	86	45.4	-11.4
4	534.98	35.7 QP	46.0	-10.3	1.50 H	46	37.9	-2.2
5	546.67	36.0 QP	46.0	-10.0	1.50 H	114	38.1	-2.1
6	799.21	34.2 QP	46.0	-11.8	1.00 H	102	31.9	2.3

REMARKS:

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

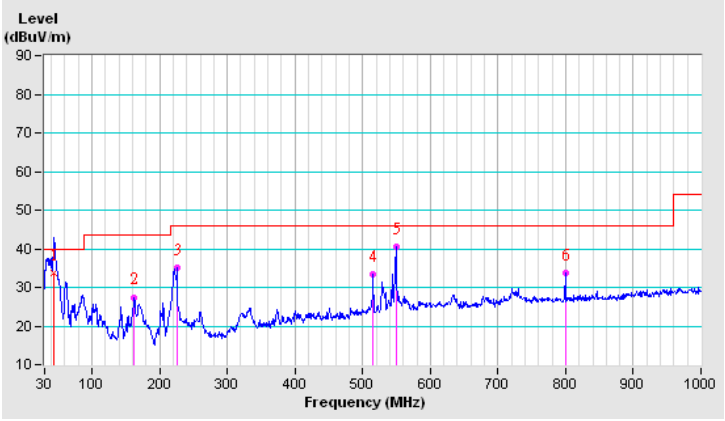


CHANNEL	TX Channel 1	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	43.80	33.6 QP	40.0	-6.4	1.50 V	37	14.8	18.8
2	162.43	27.5 QP	43.5	-16.0	1.50 V	65	36.0	-8.5
3	226.13	35.0 QP	46.0	-11.0	1.50 V	12	46.6	-11.6
4	514.83	33.3 QP	46.0	-12.7	2.00 V	360	35.7	-2.4
5	549.14	40.4 QP	46.0	-5.6	1.00 V	360	42.4	-2.0
6	799.23	33.6 QP	46.0	-12.4	1.00 V	360	31.3	2.3

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
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 13, 2016	June 12, 2017
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 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: Apr. 06, 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.

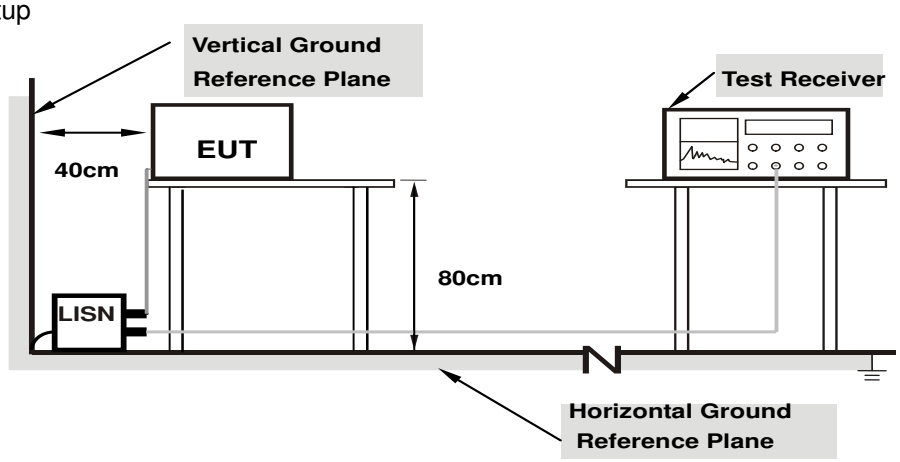
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

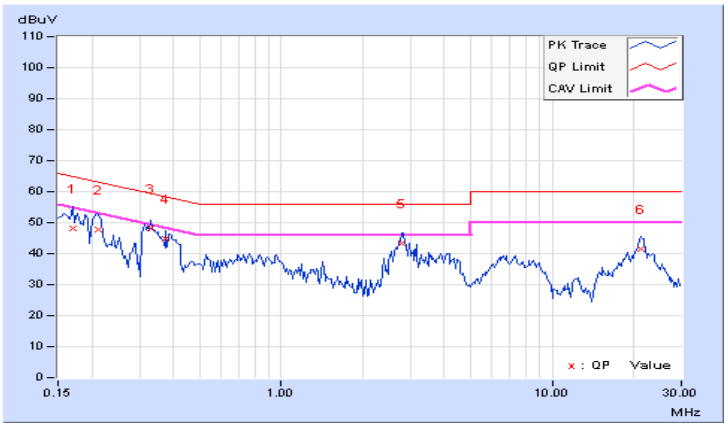
4.2.7 Test Results

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16953	10.20	38.13	25.16	48.33	35.36	64.98	54.98	-16.65	-19.62
2	0.21250	10.20	37.54	27.64	47.74	37.84	63.11	53.11	-15.37	-15.27
3	**0.32969**	**10.23**	**37.96**	**29.90**	**48.19**	**40.13**	**59.46**	**49.46**	**-11.27**	**-9.33**
4	0.37656	10.24	34.50	23.93	44.74	34.17	58.35	48.35	-13.61	-14.18
5	2.78516	10.30	33.04	18.66	43.34	28.96	56.00	46.00	-12.66	-17.04
6	21.24219	11.72	29.73	22.75	41.45	34.47	60.00	50.00	-18.55	-15.53

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.

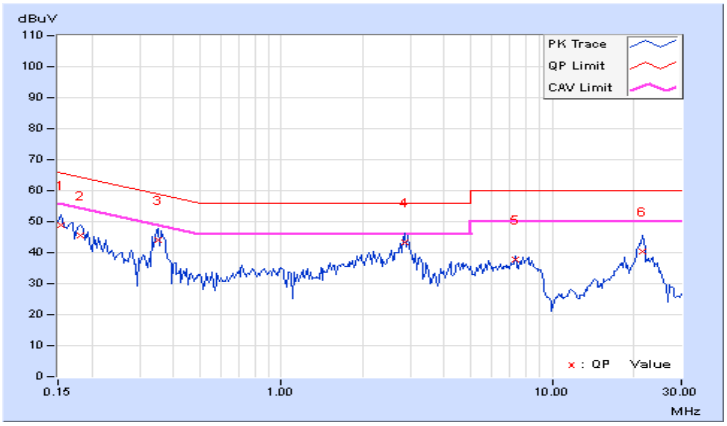


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.19	38.82	25.30	49.01	35.49	65.79	55.79	-16.78	-20.30
2	0.18125	10.18	35.38	21.94	45.56	32.12	64.43	54.43	-18.87	-22.31
3	0.35313	10.22	34.02	25.27	44.24	35.49	58.89	48.89	-14.65	-13.40
4	2.85547	10.27	32.89	21.65	43.16	31.92	56.00	46.00	-12.84	-14.08
5	7.36328	10.45	27.28	22.12	37.73	32.57	60.00	50.00	-22.27	-17.43
6	21.61719	11.38	29.12	22.13	40.50	33.51	60.00	50.00	-19.50	-16.49

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.

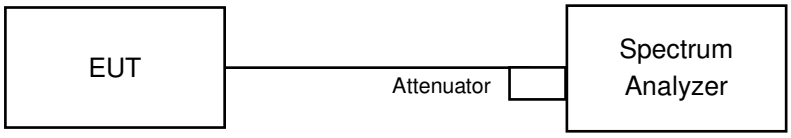


4.3 6dB Bandwidth Measurement

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) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.3.5 Deviation fromTest Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

802.11b

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	9.10	9.09	9.05	0.5	PASS
6	2437	9.11	9.15	9.12	0.5	PASS
11	2462	9.11	9.09	9.13	0.5	PASS

802.11g

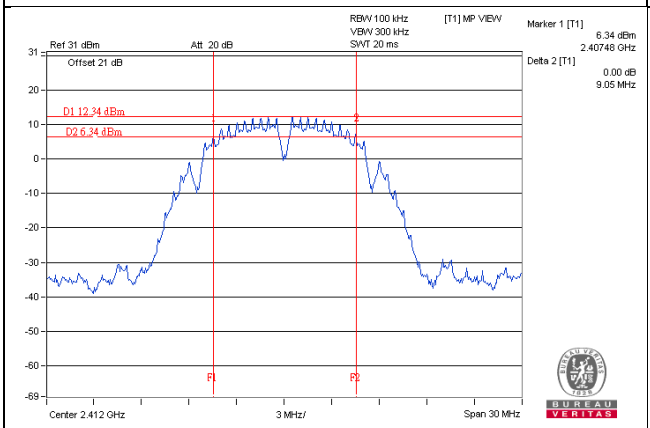
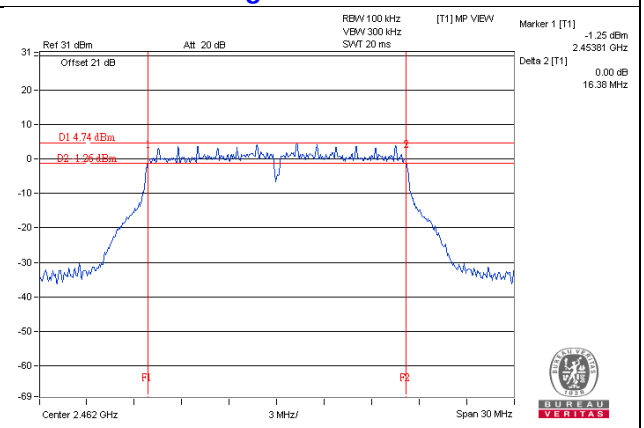
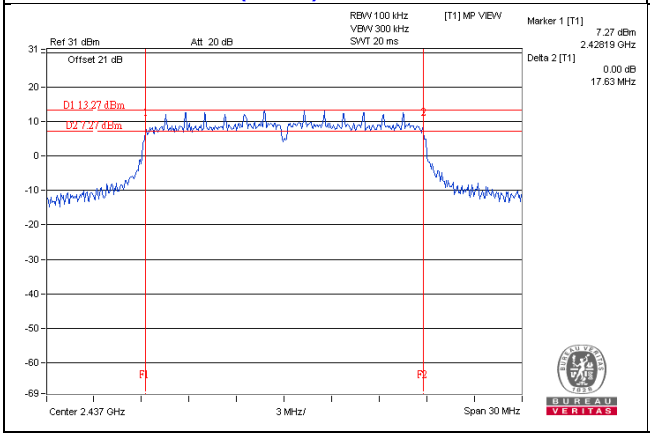
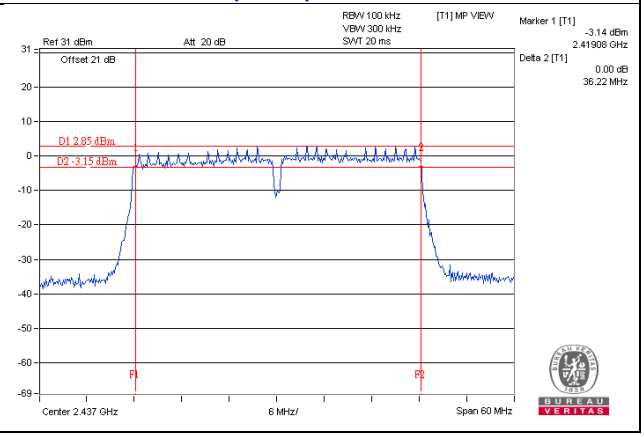
Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	16.43	16.42	16.45	0.5	PASS
6	2437	16.40	16.39	16.40	0.5	PASS
11	2462	16.38	16.39	16.39	0.5	PASS

802.11n (HT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
1	2412	17.68	17.65	17.66	0.5	Pass
6	2437	17.65	17.63	17.65	0.5	Pass
11	2462	17.68	17.67	17.66	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)			Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2		
3	2422	36.42	36.46	36.41	0.5	Pass
6	2437	36.53	36.54	36.22	0.5	Pass
9	2452	36.42	36.51	36.52	0.5	Pass

Spectrum Plot of Worst Value	
802.11b / Chain 2 : CH1	**802.11g / Chain 0 : CH11**
	
802.11n (HT20) / Chain 1 : CH6	**802.11n (HT40) / Chain 2 : CH6**
	

4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

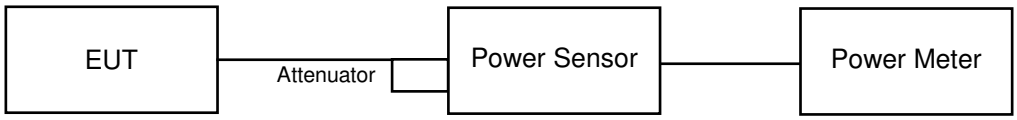
For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

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

An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the 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

CDD Mode

802.11b

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	21.26	21.13	21.35	399.836	26.02	30.00	Pass
6	2437	25.28	25.05	25.21	989.071	29.95	30.00	Pass
11	2462	19.91	19.87	20.21	299.954	24.77	30.00	Pass

802.11g

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	18.05	17.91	18.17	191.243	22.82	30.00	Pass
6	2437	24.52	24.23	24.54	832.435	29.20	30.00	Pass
11	2462	16.41	16.29	16.53	131.29	21.18	30.00	Pass

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	18.01	18.03	18.19	192.691	22.85	30.00	Pass
6	2437	24.45	24.29	24.44	825.117	29.17	30.00	Pass
11	2462	16.41	16.24	16.44	129.88	21.14	30.00	Pass

802.11n (HT40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
3	2422	16.24	16.16	16.59	128.982	21.11	30.00	Pass
6	2437	17.39	17.21	17.66	165.775	22.20	30.00	Pass
9	2452	13.23	13.10	13.43	63.484	18.03	30.00	Pass

Beamforming Mode

802.11n (HT20)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	18.01	18.03	18.19	192.691	22.85	27.31	Pass
6	2437	22.28	22.10	22.52	509.874	27.07	27.31	Pass
11	2462	16.41	16.24	16.44	129.88	21.14	27.31	Pass

Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power limit shall be reduced to 30-(8.69-6) = 27.31dBm.

802.11n (HT40)

Chan.	Frequency (MHz)	Avg. Power (dBm)			Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2				
1	2412	16.24	16.16	16.59	128.982	21.11	27.31	Pass
6	2437	17.39	17.21	17.66	165.775	22.20	27.31	Pass
11	2462	13.23	13.10	13.43	63.484	18.03	27.31	Pass

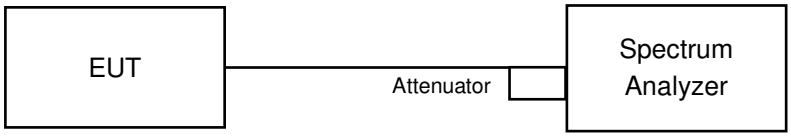
Note: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power limit shall be reduced to 30-(8.69-6) = 27.31dBm.

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

802.11b, 802.11g, 802.11n (HT20)

a) Set instrument center frequency to DTS channel center frequency.
b) Set span to at least 1.5 times the OBW.
c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. .
d) Set VBW ≥3 x RBW.
e) Detector = power averaging (RMS) or sample detector (when RMS not available).
f) Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
g) Sweep time = auto couple.
h) Employ trace averaging (RMS) mode over a minimum of 100 traces.
i) Use the peak marker function to determine the maximum amplitude level.

802.11n (HT40)

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6

4.5.7 Test Results

802.11b

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-9.20	4.77	-4.43	5.31	Pass
	6	2437	-6.69	4.77	-1.92	5.31	Pass
	11	2462	-10.35	4.77	-5.58	5.31	Pass
1	1	2412	-7.56	4.77	-2.79	5.31	Pass
	6	2437	-1.83	4.77	2.94	5.31	Pass
	11	2462	-8.82	4.77	-4.05	5.31	Pass
2	1	2412	-10.14	4.77	-5.37	5.31	Pass
	6	2437	-5.94	4.77	-1.17	5.31	Pass
	11	2462	-10.95	4.77	-6.18	5.31	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power density limit shall be reduced to 8-(8.69-6) = 5.31dBm.

802.11g

TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-13.97	4.77	-9.20	5.31	Pass
	6	2437	-8.06	4.77	-3.29	5.31	Pass
	11	2462	-14.96	4.77	-10.19	5.31	Pass
1	1	2412	-11.94	4.77	-7.17	5.31	Pass
	6	2437	-6.53	4.77	-1.76	5.31	Pass
	11	2462	-15.93	4.77	-11.16	5.31	Pass
2	1	2412	-13.88	4.77	-9.11	5.31	Pass
	6	2437	-6.60	4.77	-1.83	5.31	Pass
	11	2462	-15.14	4.77	-10.37	5.31	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power density limit shall be reduced to 8-(8.69-6) = 5.31dBm.

802.11n (HT20)

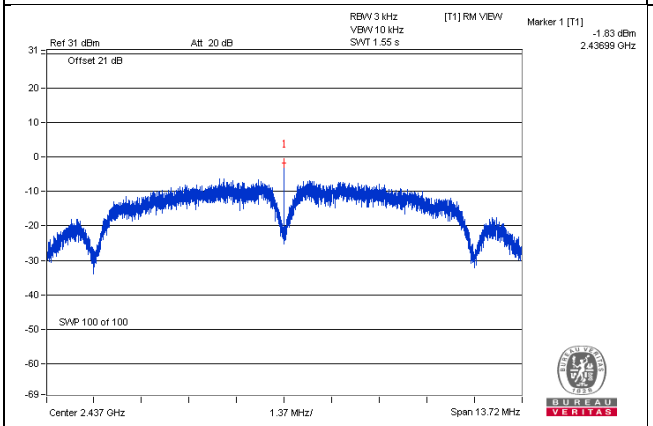
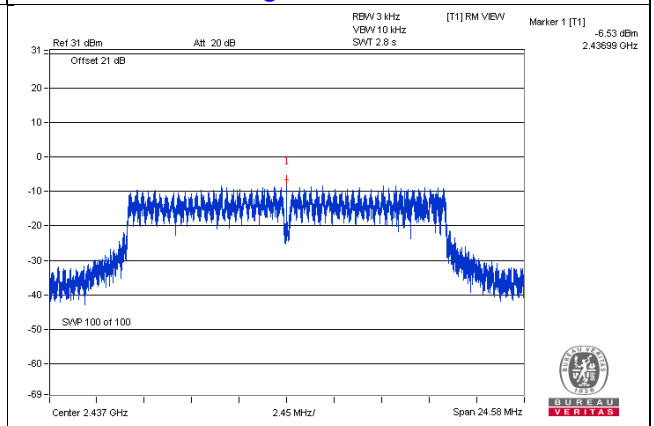
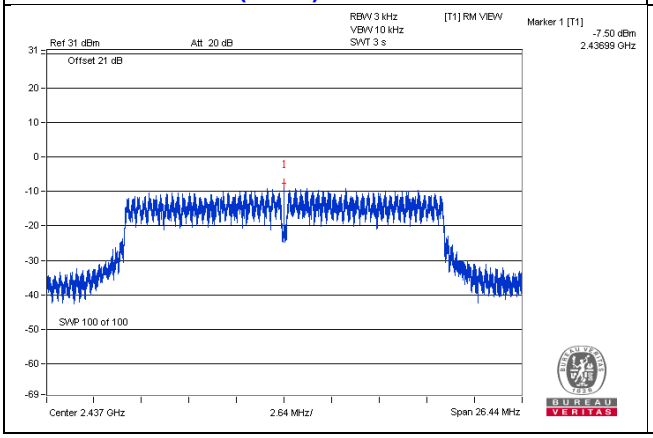
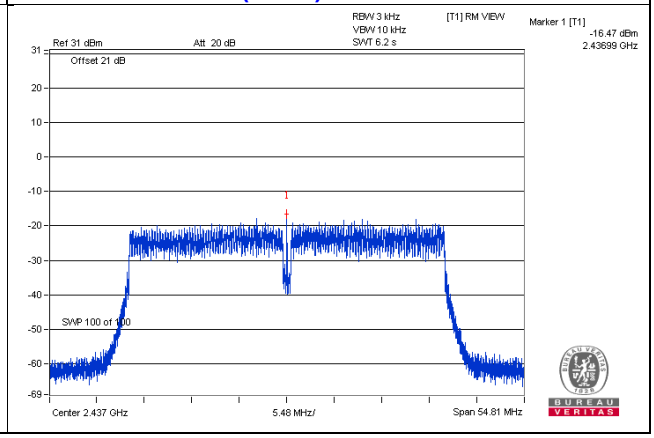
TX chain	Channel	Freq. (MHz)	PSD (dBm/3kHz)	10 log (N=3) dB	Total PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	1	2412	-14.39	4.77	-9.62	5.31	Pass
	6	2437	-7.96	4.77	-3.19	5.31	Pass
	11	2462	-16.48	4.77	-11.71	5.31	Pass
1	1	2412	-15.00	4.77	-10.23	5.31	Pass
	6	2437	-7.50	4.77	-2.73	5.31	Pass
	11	2462	-16.59	4.77	-11.82	5.31	Pass
2	1	2412	-14.11	4.77	-9.34	5.31	Pass
	6	2437	-9.08	4.77	-4.31	5.31	Pass
	11	2462	-16.29	4.77	-11.52	5.31	Pass

NOTE: Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power density limit shall be reduced to 8-(8.69-6) = 5.31dBm.

802.11n (HT40)

TX chain	Channel	Freq. (MHz)	PSD W/O Duty Factor (dBm/3kHz)	10 log (N=3) dB	Duty Factor (dB)	TOTAL PSD With Duty Factor (dBm/3kHz)	Limit (dBm/3kHz)	Pass /Fail
0	3	2422	-18.61	4.77	0.15	-13.69	5.31	PASS
	6	2437	-18.21	4.77	0.15	-13.29	5.31	PASS
	9	2452	-21.01	4.77	0.15	-16.09	5.31	PASS
1	3	2422	-18.87	4.77	0.15	-13.95	5.31	PASS
	6	2437	-16.47	4.77	0.15	-11.55	5.31	PASS
	9	2452	-22.41	4.77	0.15	-17.49	5.31	PASS
2	3	2422	-19.10	4.77	0.15	-14.18	5.31	PASS
	6	2437	-18.50	4.77	0.15	-13.58	5.31	PASS
	9	2452	-22.27	4.77	0.15	-17.35	5.31	PASS

NOTE: 1. Directional gain = 10 log[$(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 3] = 8.69dBi > 6dBi , so the power density limit shall be reduced to 8-(8.69-6) = 5.31dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

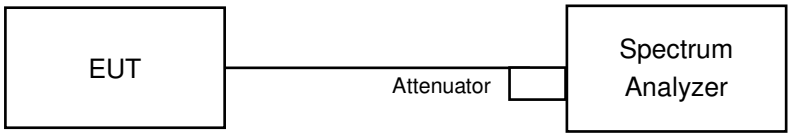
Spectrum Plot of Worst Value	
802.11b / Chain 1 : CH6	**802.11g / Chain 1 : CH6**
	
802.11n (HT20) / Chain 1 : CH6	**802.11n (HT40) / Chain 1 : CH6**
	

4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOBE

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

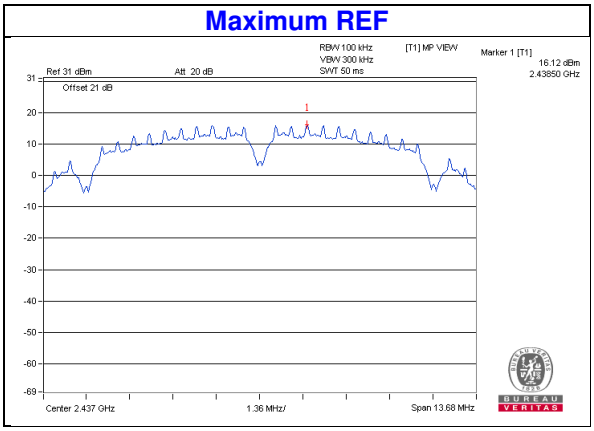
Same as Item 4.3.6

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 30dB offset below D1. It shows compliance with the requirement.

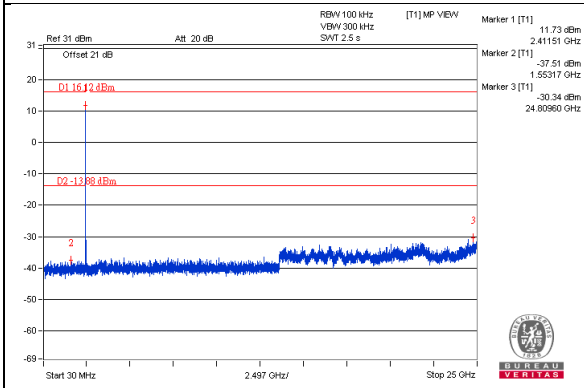
802.11b

Maximum REF

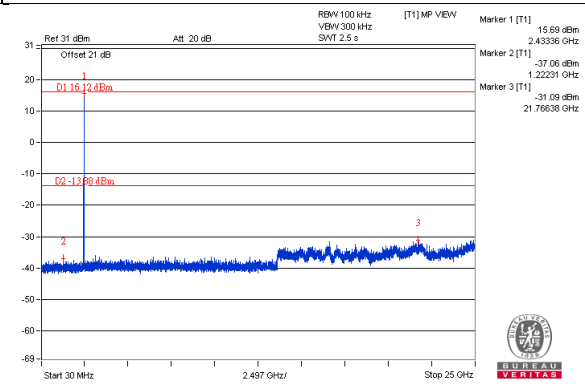


CHAIN 0

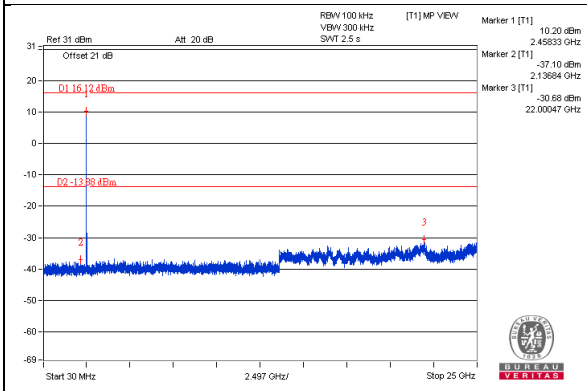
CH 1



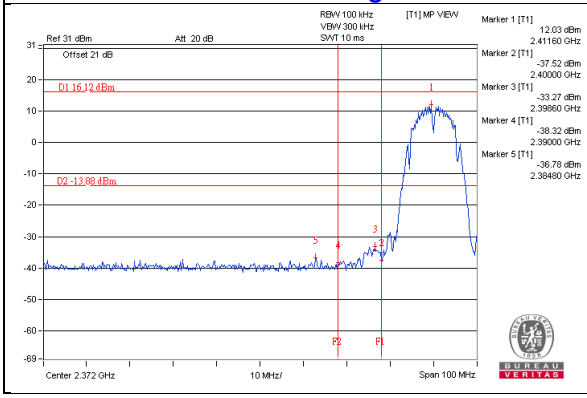
CH 6



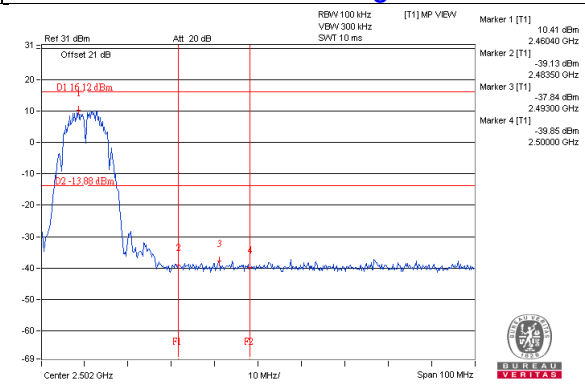
CH 11



CH 1 Band edge

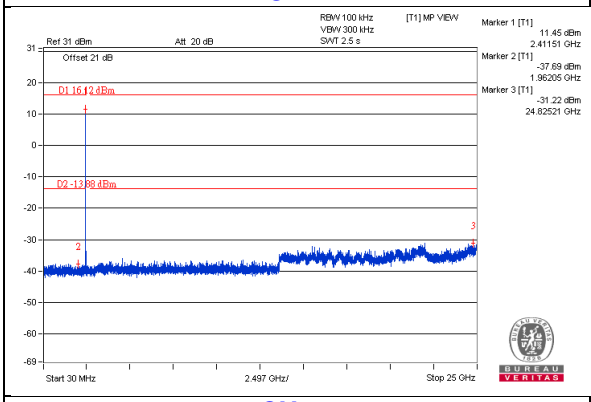


CH 11 Band edge

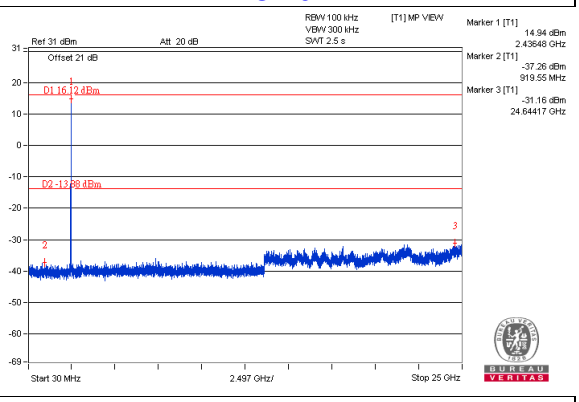


CHAIN 1

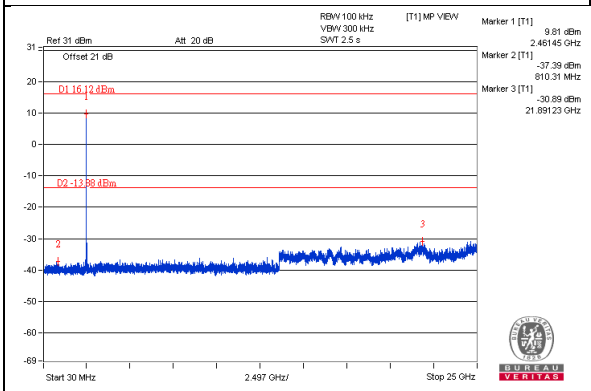
CH 1



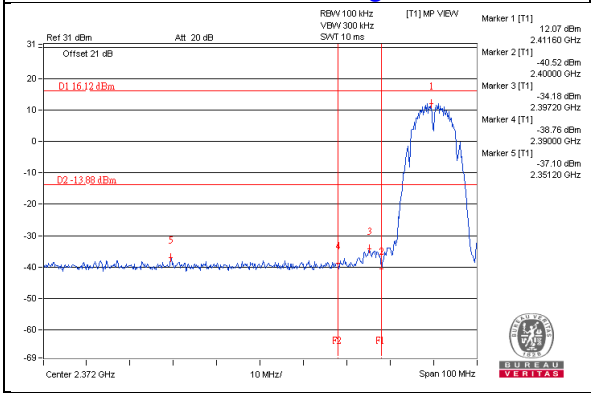
CH 6



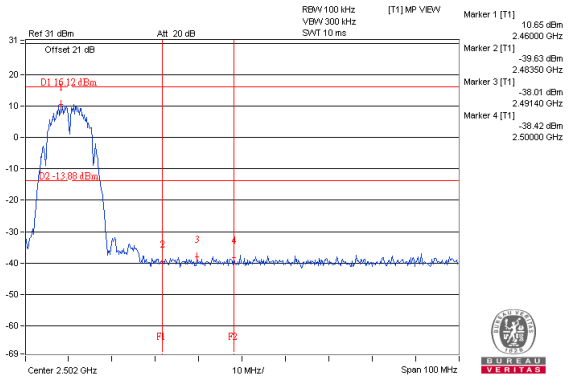
CH 11



CH 1 Band edge

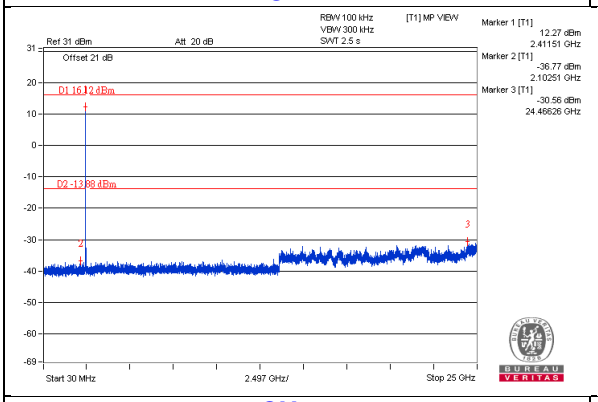


CH 11 Band edge

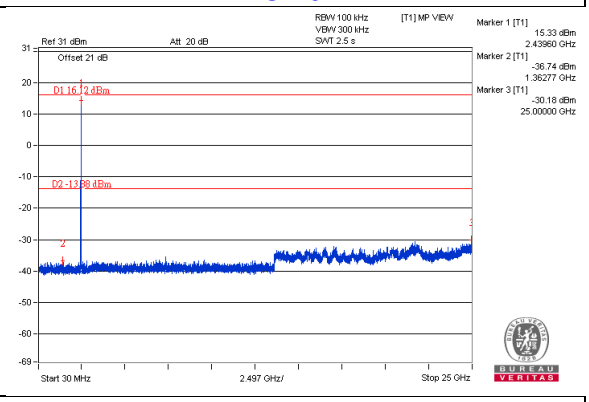


CHAIN 2

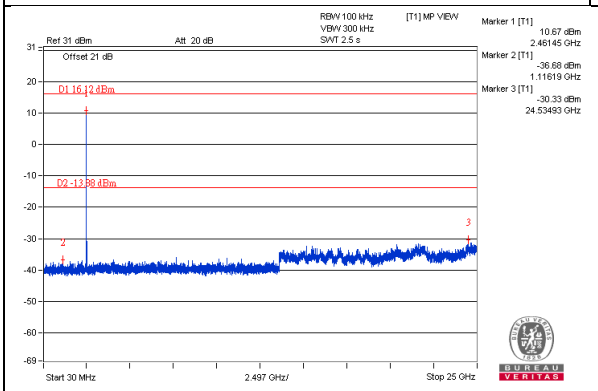
CH 1



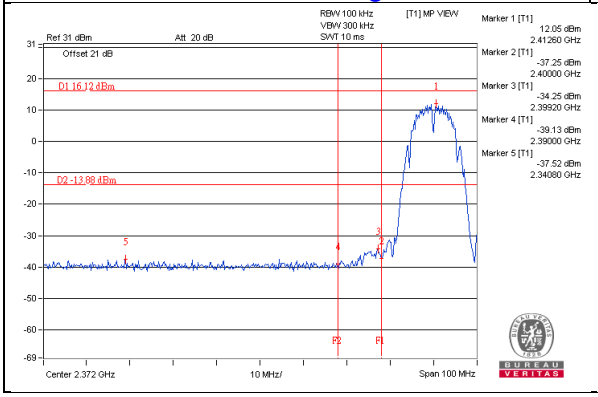
CH 6



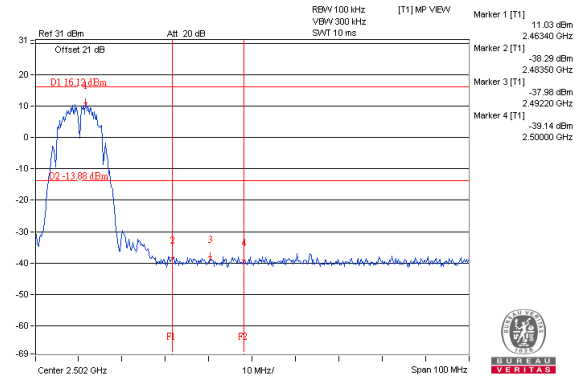
CH 11



CH 1 Band edge

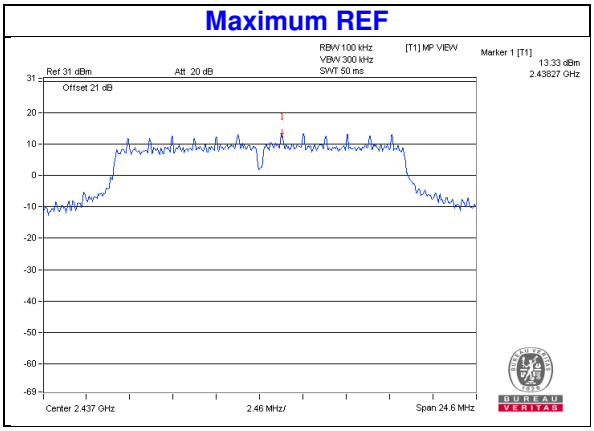


CH 11 Band edge



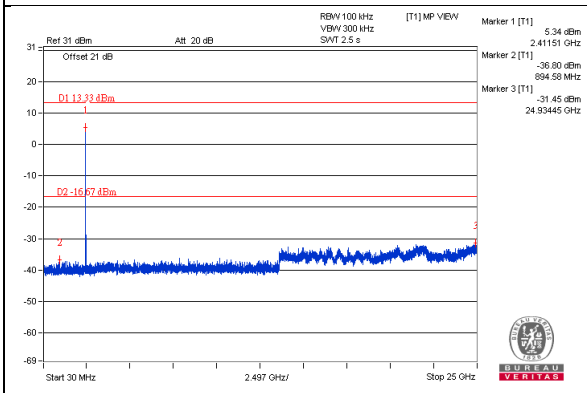
802.11g

Maximum REF



CHAIN 0

CH 1



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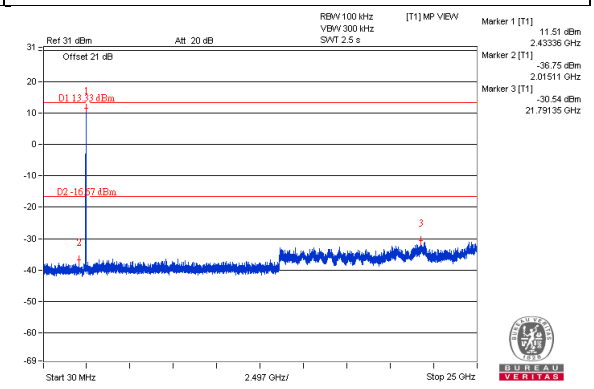

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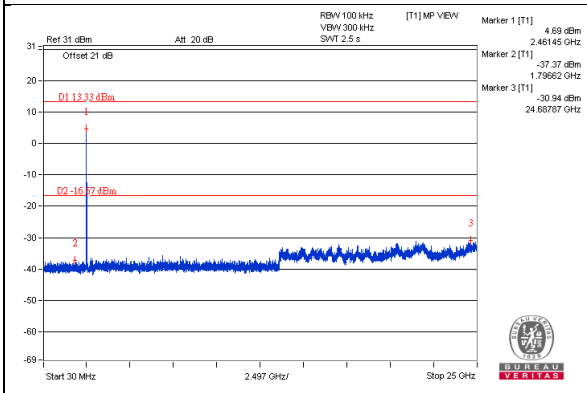

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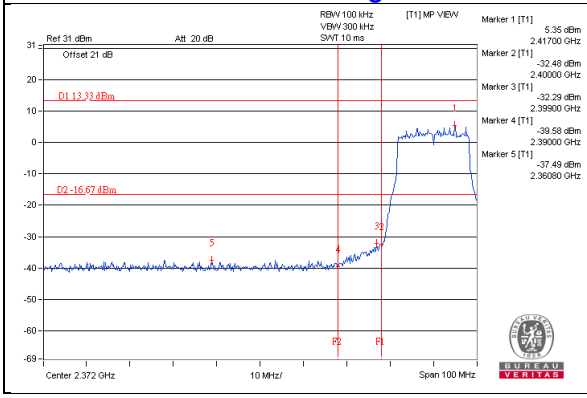

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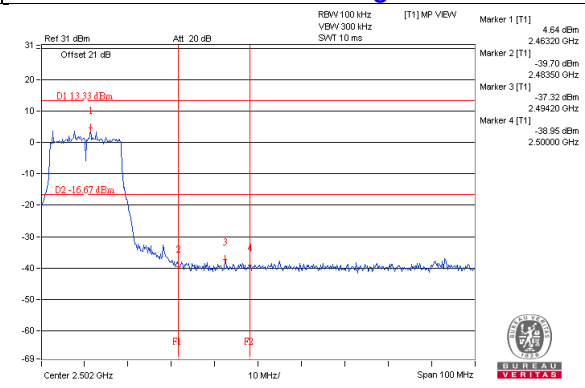
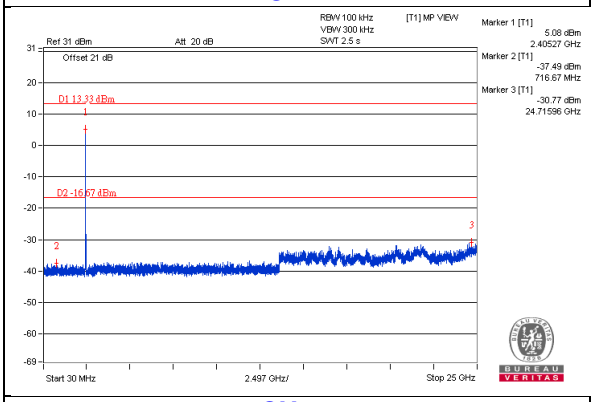


CHAIN 1

CH 1



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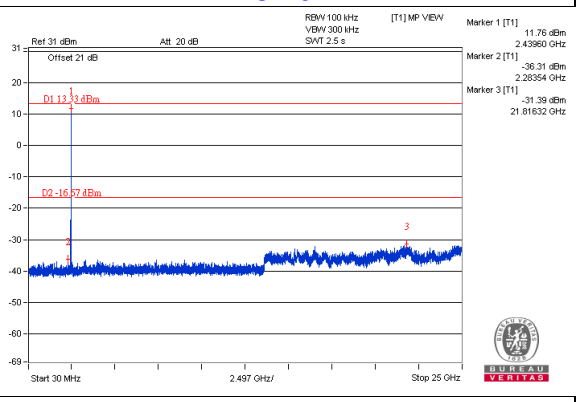

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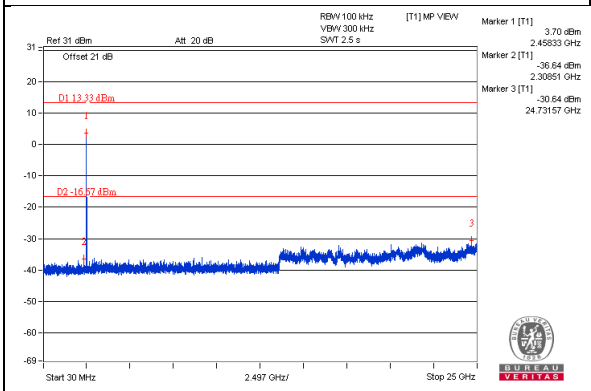
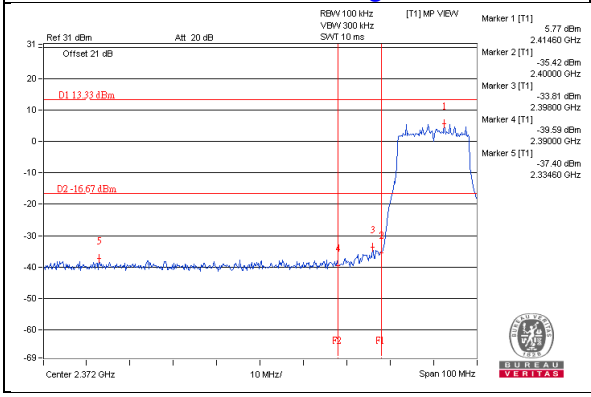


CH 1 Band edge



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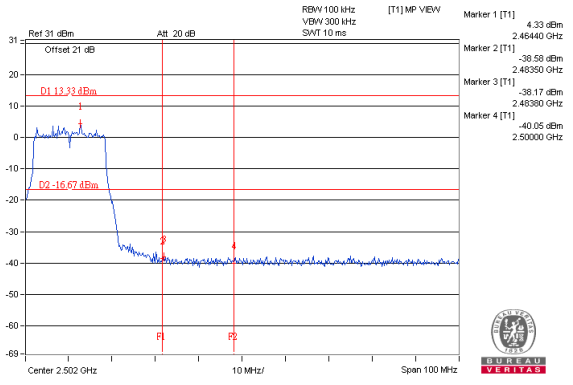
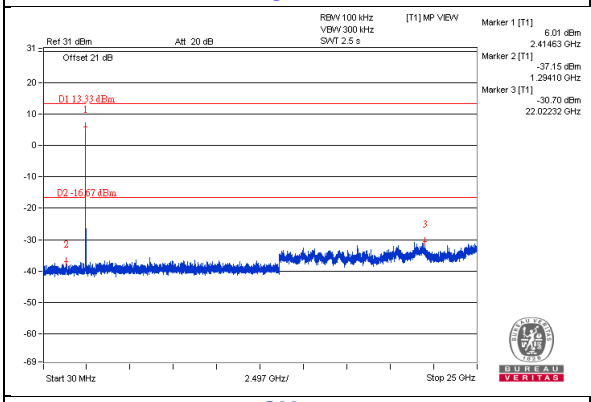


CHAIN 2

CH 1



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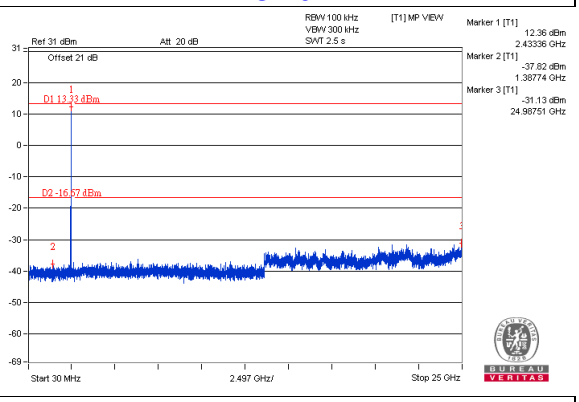

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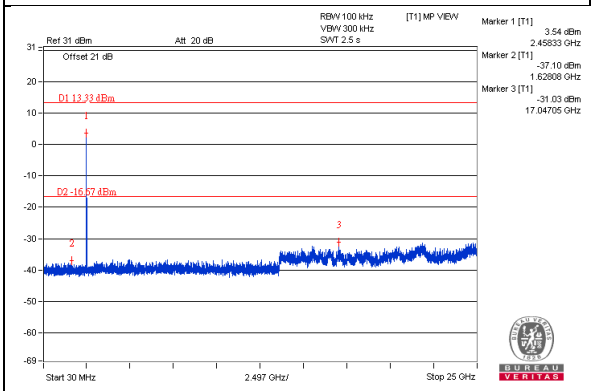

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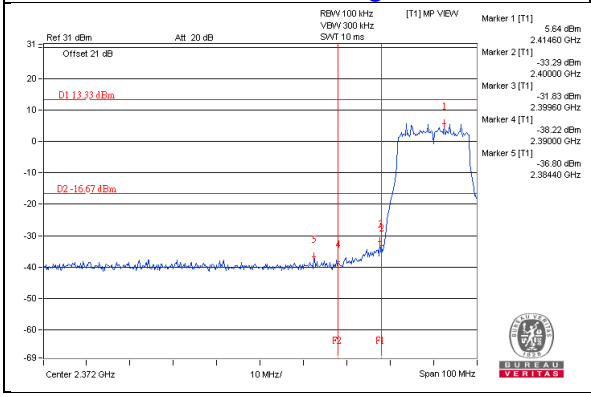

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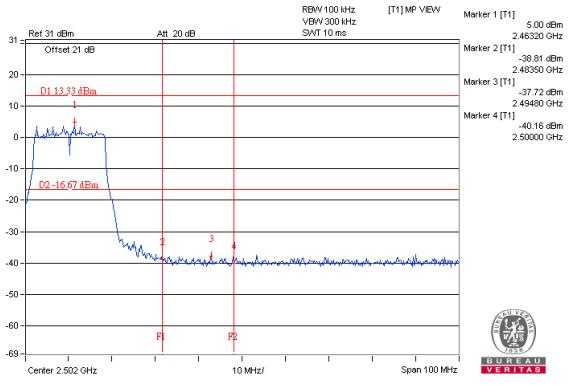
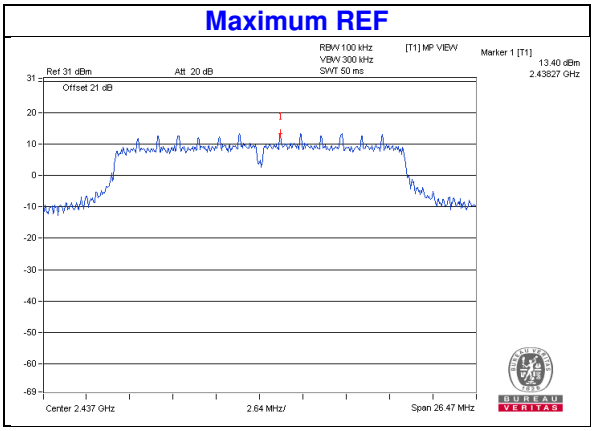
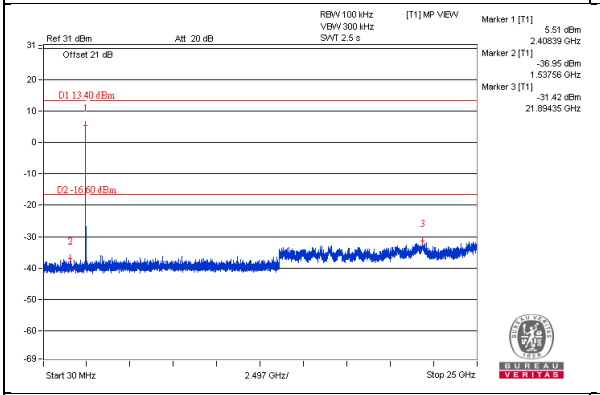


802.11n (HT20)

Maximum REF



CH 1



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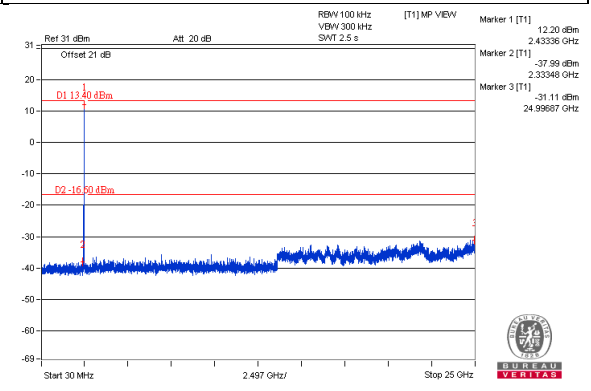

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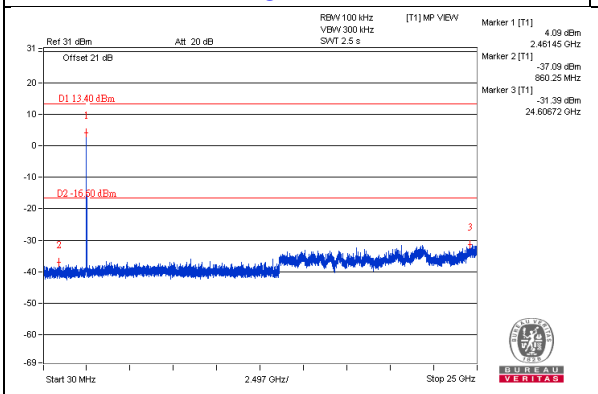

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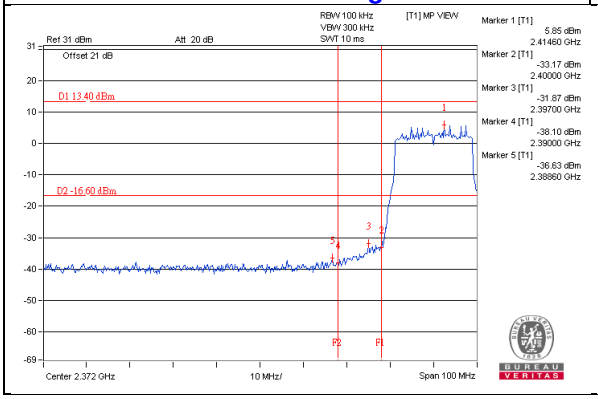

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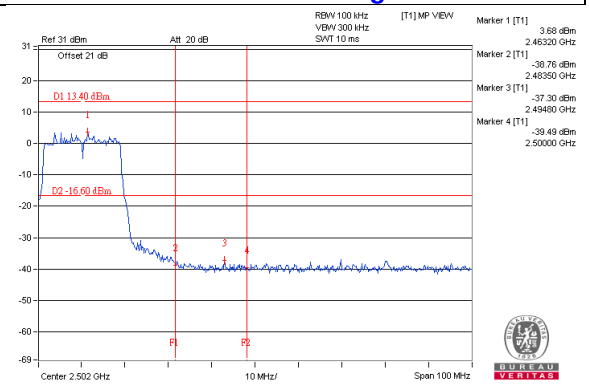
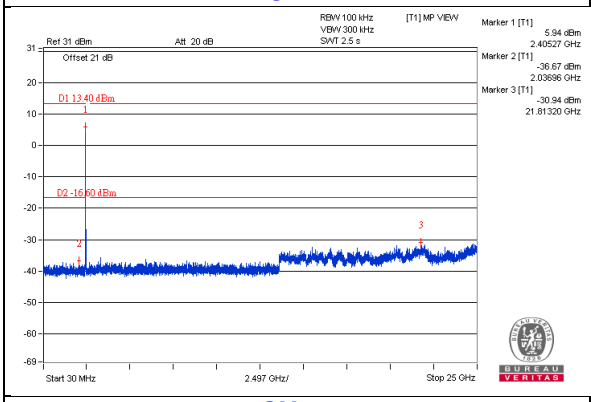


CHAIN 1

CH 1



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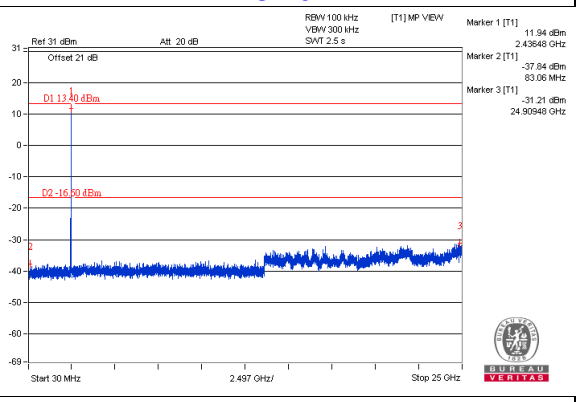

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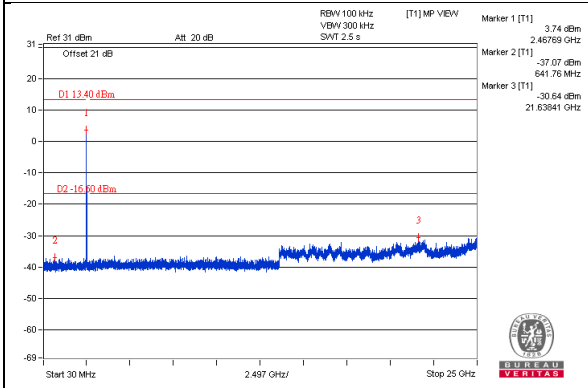

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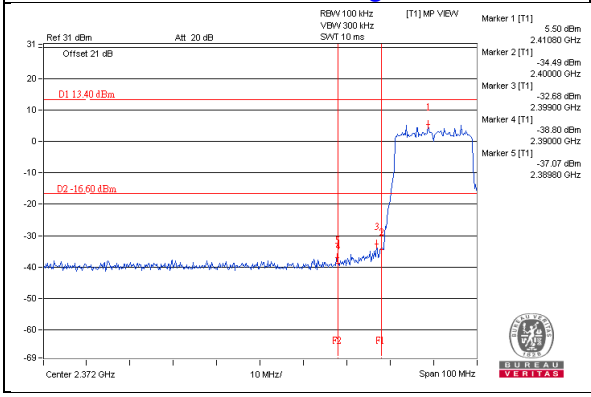

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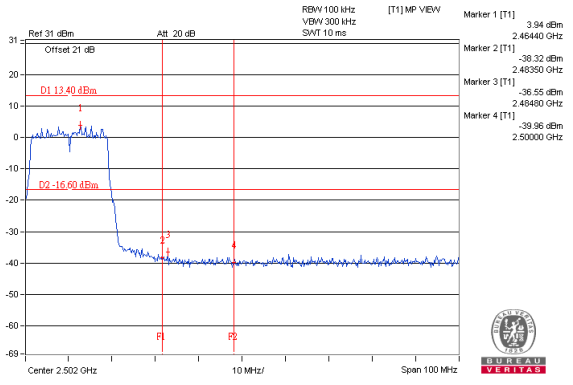
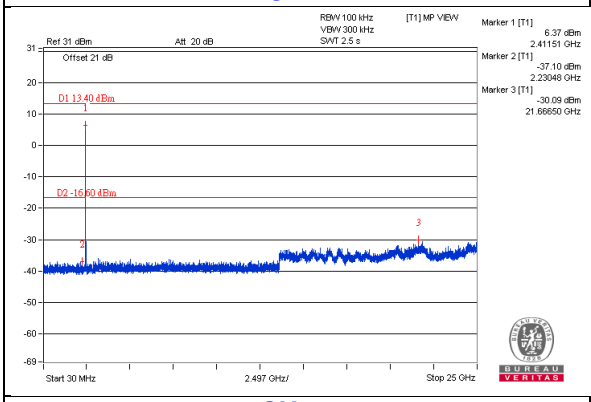


CHAIN 2

CH 1



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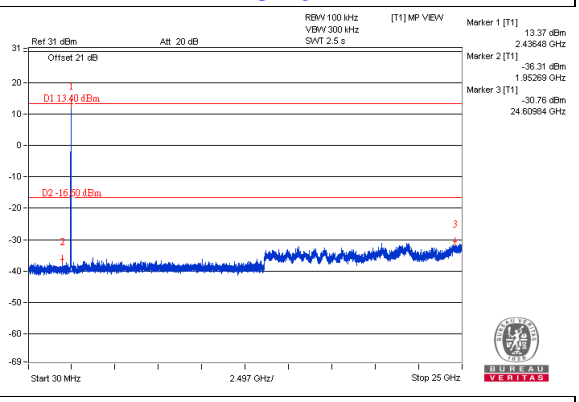

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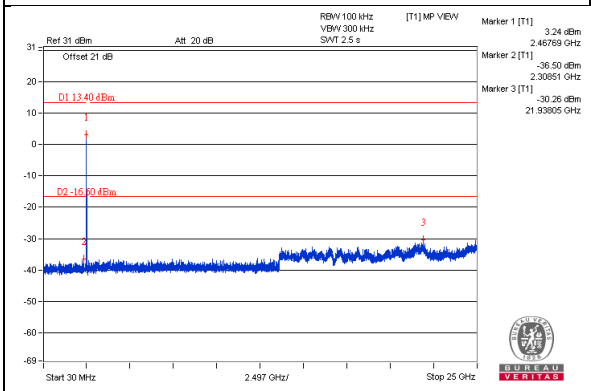

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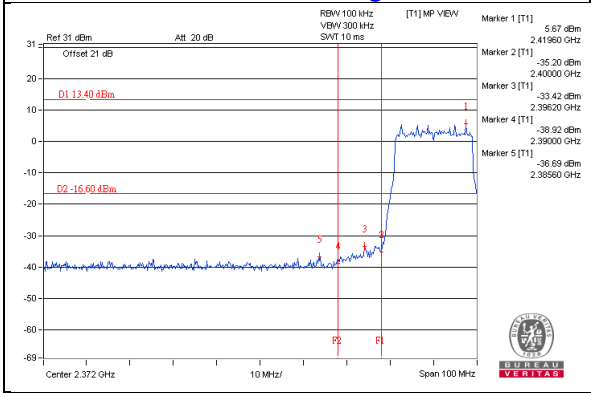

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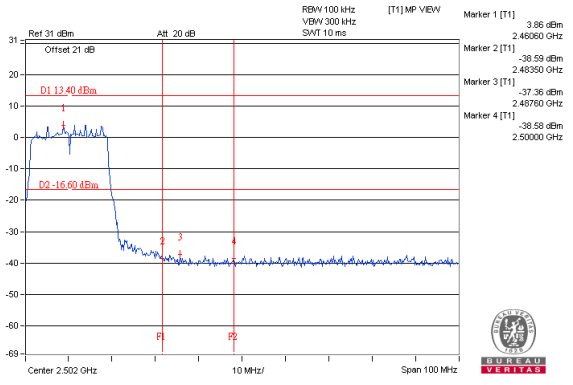

802.11n (HT40)

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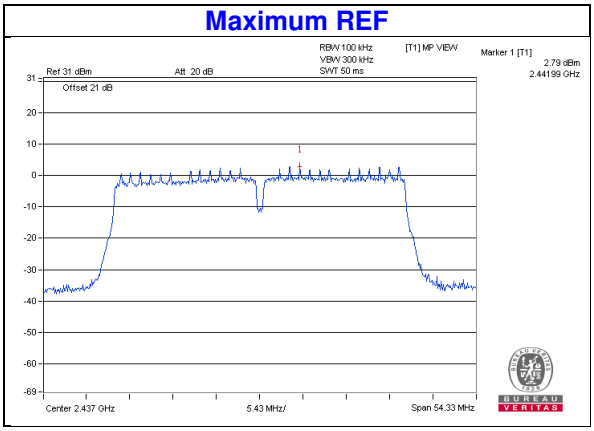
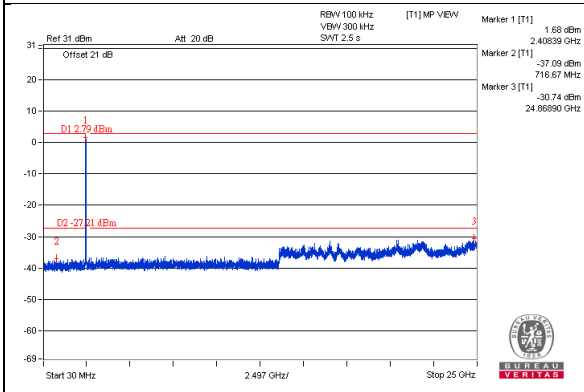


CH 3



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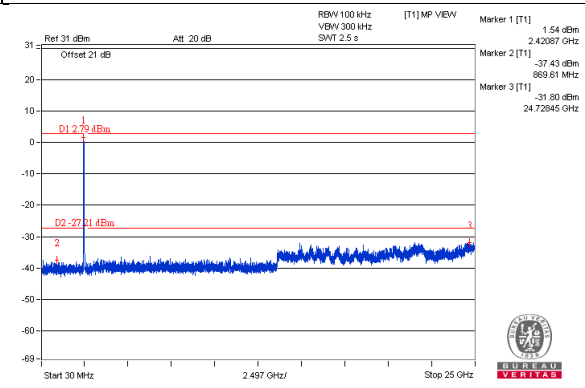
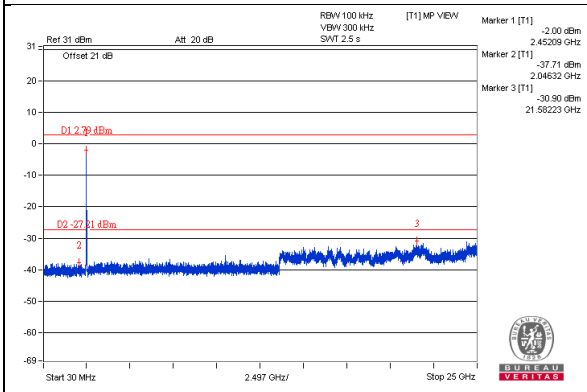
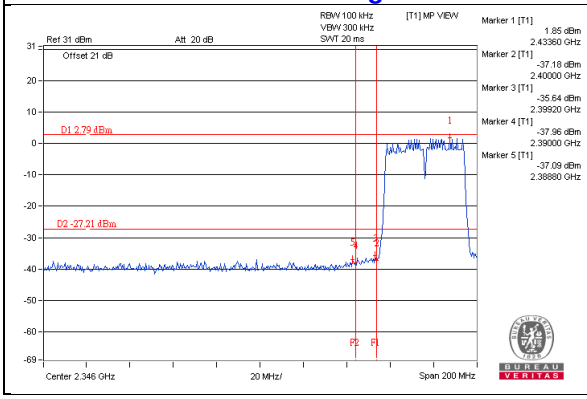


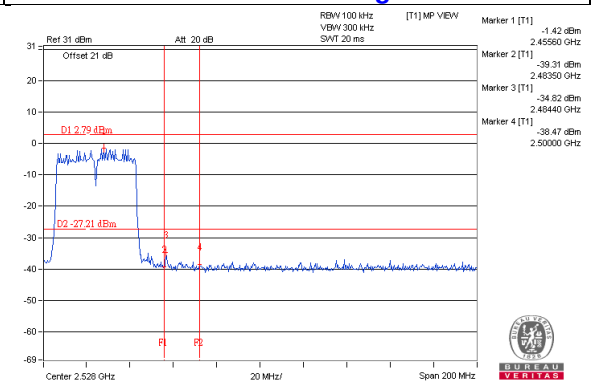
CH 9



CH 1 Band edge

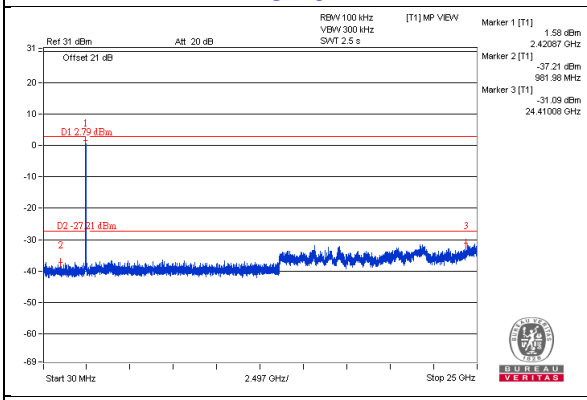


CH 11 Band edge

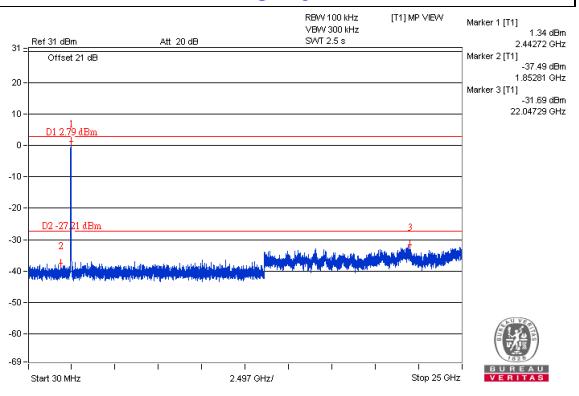


CHAIN 1

CH 3



CH 6



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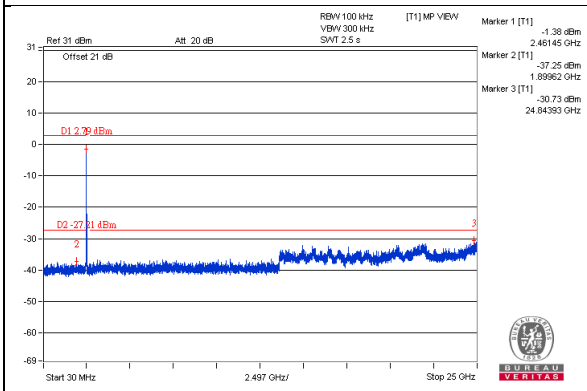

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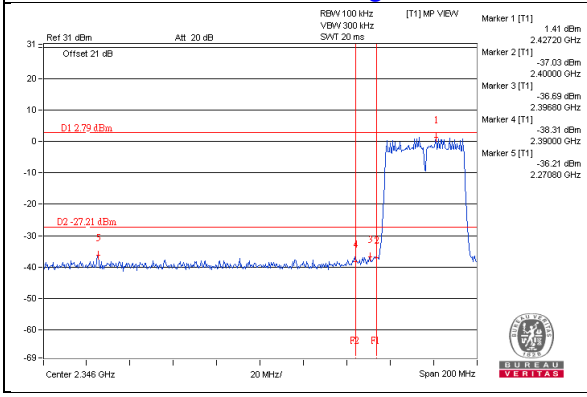
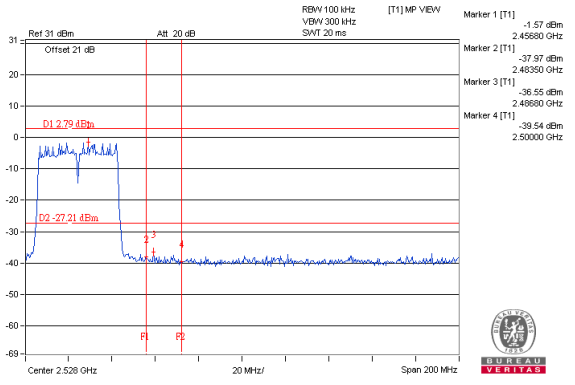
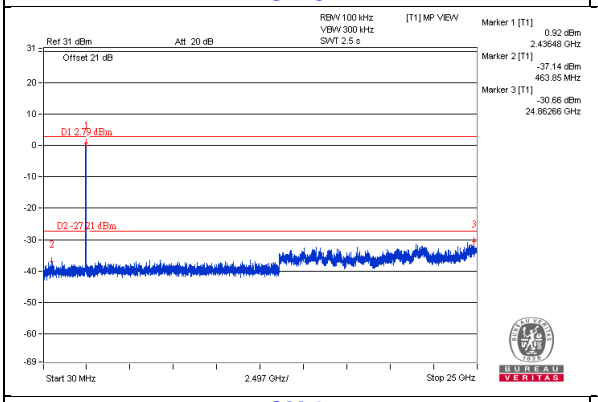


CH 11 Band edge

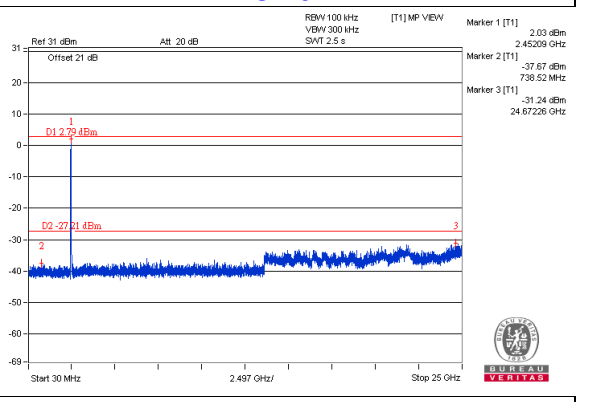


CHAIN 2

CH 3



CH 6



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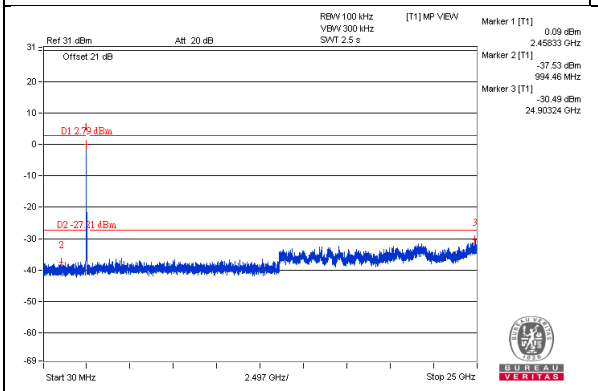
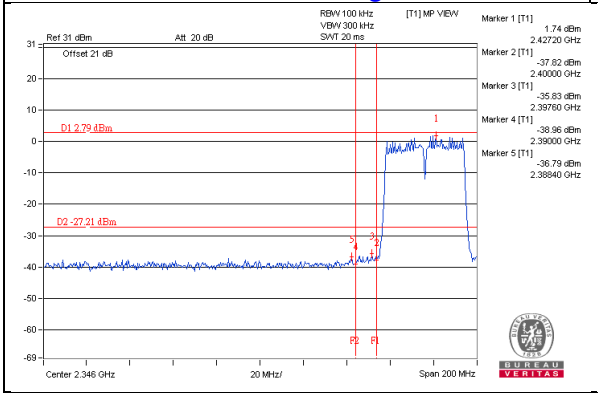
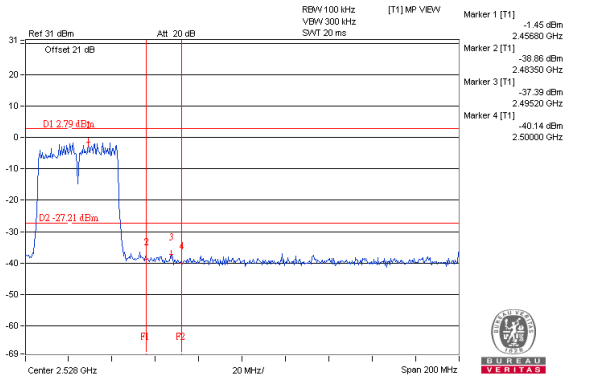


CH 1 Band edge



CH 11 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 accredited and approved 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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