

FCC TEST REPORT (15.247)

REPORT NO.: RF131022E03

MODEL NO.: QCASP141

FCC ID: PPD-QCASP141

IC: 4104A-QCASP141

RECEIVED: Oct. 22, 2013

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ISSUED: Jan. 09, 2014

APPLICANT: Qualcomm Atheros, Inc.

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Table of Contents

RELEASE CONTROL RECORD	5
1. CERTIFICATION	6
2. SUMMARY OF TEST RESULTS	7
2.1 MEASUREMENT UNCERTAINTY	8
3. GENERAL INFORMATION.....	9
3.1 GENERAL DESCRIPTION OF EUT	9
3.2 DESCRIPTION OF ANTENNA	11
3.3 DESCRIPTION OF TEST MODES	12
3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL	13
3.4 GENERAL DESCRIPTION OF APPLIED STANDARDS.....	16
3.5 DUTY CYCLE OF TEST SIGNAL	17
3.6 DESCRIPTION OF SUPPORT UNITS	18
3.7 CONFIGURATION OF SYSTEM UNDER TEST.....	18
4. TEST TYPES AND RESULTS	19
4.1 CONDUCTED OUTPUT POWER MEASUREMENT	19
4.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT.....	19
4.1.2 INSTRUMENTS	19
4.1.3 TEST PROCEDURES.....	19
4.1.4 DEVIATION FROM TEST STANDARD	19
4.1.5 TEST SETUP	19
4.1.6 EUT OPERATING CONDITIONS.....	20
4.1.7 TEST RESULTS.....	21
4.2 AVERAGE OUTPUT POWER.....	22
4.2.1 FOR REFERENCE.....	22
4.2.2 TEST INSTRUMENTS	22
4.2.3 TEST PROCEDURES.....	22
4.2.4 TEST SETUP	22
4.2.5 EUT OPERATING CONDITIONS.....	22
4.2.6 TEST RESULTS	23
4.3 POWER SPECTRAL DENSITY MEASUREMENT	24
4.3.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT	24
4.3.2 TEST INSTRUMENTS	24
4.3.3 TEST PROCEDURE	24
4.3.4 DEVIATION FROM TEST STANDARD	24
4.3.5 TEST SETUP	24
4.3.6 EUT OPERATING CONDITION	24
4.3.7 TEST RESULTS.....	25



A D T

4.4	6dB BANDWIDTH MEASUREMENT	29
4.4.1	LIMITS OF 6dB BANDWIDTH MEASUREMENT	29
4.4.2	TEST INSTRUMENTS	29
4.4.3	TEST PROCEDURE	29
4.4.4	DEVIATION FROM TEST STANDARD	29
4.4.5	TEST SETUP	29
4.4.6	EUT OPERATING CONDITIONS.....	29
4.4.7	TEST RESULTS.....	30
4.5	OCCUPIED BANDWIDTH MEASUREMENT	34
4.5.1	TEST INSTRUMENTS	34
4.5.2	TEST PROCEDURE	34
4.5.3	TEST SETUP	34
4.5.4	EUT OPERATING CONDITIONS.....	34
4.5.5	TEST RESULTS.....	35
4.6	CONDUCTED OUT-BAND EMISSION MEASUREMENT	39
4.6.1	LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT	39
4.6.2	TEST INSTRUMENTS	39
4.6.3	TEST PROCEDURE	39
4.6.4	DEVIATION FROM TEST STANDARD	40
4.6.5	EUT OPERATING CONDITION	40
4.6.6	TEST RESULTS.....	40
4.7	UNWANTED EMISSION MEASUREMENT (Radiated versus Conducted).....	45
4.7.1	LIMITS OF UNWANTED EMISSION MEASUREMENT	45
4.7.2	TEST INSTRUMENTS	46
4.7.3	TEST PROCEDURES.....	48
4.7.4	DEVIATION FROM TEST STANDARD	50
4.7.5	TEST SETUP	51
4.7.6	EUT OPERATING CONDITIONS.....	52
4.7.7	TEST RESULTS (RADIATED MEASUREMENT).....	53
4.7.8	TEST RESULTS (CONDUCTED MEASUREMENT).....	67
4.8	AC POWER LINE CONDUCTED EMISSION MEASUREMENT	81
4.8.1	LIMITS OF AC POWER LINE CONDUCTED EMISSION MEASUREMENT.....	81
4.8.2	TEST INSTRUMENTS	81
4.8.3	TEST PROCEDURES.....	82
4.8.4	DEVIATION FROM TEST STANDARD	82
4.8.5	TEST SETUP	83
4.8.6	EUT OPERATING CONDITIONS.....	83
4.8.7	TEST RESULTS (MODE 1).....	84
4.8.8	TEST RESULTS (MODE 2).....	86



A D T

4.	PHOTOGRAPHS OF THE TEST CONFIGURATION	88
5.	INFORMATION ON THE TESTING LABORATORIES.....	89
6.	APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB.....	90



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF131022E03	Original release	Jan. 09, 2014



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1. CERTIFICATION

PRODUCT: 1x1 802.11b/g/n module
BRAND NAME: Qualcomm Atheros
MODEL NO.: QCASP141
TEST SAMPLE: R&D SAMPLE
APPLICANT: Qualcomm Atheros, Inc.
TESTED: Nov. 06 to Dec. 19, 2013
STANDARDS: FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10-2009
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: QCASP141) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and was in 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 : Phoenix Huang , **DATE:** Jan. 09, 2014
(Phoenix Huang, Specialist)

APPROVED BY : May Chen , **DATE:** Jan. 09, 2014
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) ; RSS-210; RSS-Gen				
STANDARD SECTION		TEST TYPE	RESULT	REMARK
FCC Part 15	RSS-Gen			
15.207	RSS-Gen 7.2.4	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -23.36dB at 0.37266MHz
15.247(d) 15.209	RSS-210 A8.5	Radiated Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -1.1dB at 4874.00MHz & 7311.00MHz
15.247(d)	RSS-210 A8.5	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	RSS-210 A8.2 (a)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	RSS-210 A8.2 (4)	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	RSS-210 A8.2 (b)	Power Spectral Density	PASS	Meet the requirement of limit.
-	RSS-Gen 4.6	Occupied Bandwidth Measurement	-	Meet the requirement

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Conducted emissions	2.98 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.72 dB
Radiated emissions (6GHz -18GHz)	4.00 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	1x1 802.11b/g/n module
MODEL NO.	QCASP141
POWER SUPPLY	DC 3.3V from host equipment
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
MODULATION TECHNOLOGY	DSSS, OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11g: up to 54Mbps 802.11n : up to 150Mbps
OPERATING FREQUENCY	2.412 ~ 2.462GHz
NUMBER OF CHANNEL	11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40)
MAXIMUM OUTPUT POWER	802.11b: 188.365mW 802.11g: 456.037mW 802.11n (HT20): 448.745mW 802.11n (HT40): 153.109mW
ANTENNA TYPE	See item 3.2
DATA CABLE	NA
I/O PORTS	NA
ASSOCIATED DEVICES	NA

NOTE:

- The modular has two variant designs as following table:

Variant No.	Description	Remark
SKU #1	Thin	Total 26 pins are pulled out on thin module.
SKU #2	SP141	Total 27 pins are pulled out on SP141.

Note: 1. The pin, EXT_ANT for external antenna which is on SP141 module is deleted on thin module.
2. From the above variant designs, the radiated emission worst case was found in **SKU #1**. Therefore only the test data of the mode was recorded in this report.

3. The EUT incorporates a SISO function.

MODULATION MODE	TX/RX FUNCTION
802.11b	1TX/1RX
802.11g	1TX/1RX
802.11n (HT20)	1TX/1RX
802.11n (HT40)	1TX/1RX

4. The EUT was pre-tested under the following modes:

Test Mode	Data rate
Mode A	400ns GI
Mode B	800ns GI

From the above modes, the worst case was found in **Mode B**. Therefore only the test data of the mode was recorded in this report.

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

3.2 DESCRIPTION OF ANTENNA

The declared antenna gain is 3.62dBi, this antenna gain was used for conducted spurious/bandedge calculations.

3.3 DESCRIPTION OF TEST MODES

11 channels are provided for 802.11b, 802.11g, 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		

3.3.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO					DESCRIPTION
	PLC	UE < 1G	UE ³ 1G	APCM	OB	
1	√	√	√	√	√	SKU #1
2	√	-	-	-	-	SKU #2

Where **PLC**: Power Line Conducted Emission **UE < 1G**: Unwanted Emission below 1GHz
UE ³ 1G: Unwanted Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

AC 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	DATA RATE (Mbps)
802.11g	1 to 11	6	OFDM	6

UNWANTED EMISSION TEST (BELOW 1 GHz):

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

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

UNWANTED EMISSION TEST (ABOVE 1 GHz):

- ☒ Radiated versus Conducted Measurements
- ☒ 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	DATA RATE (Mbps)
802.11b	1 to 11	1, 6, 11	DSSS	1
802.11g	1 to 11	1, 6, 11	OFDM	6
802.11n (HT20)	1 to 11	1, 6, 11	OFDM	6.5
802.11n (HT40)	3 to 9	3, 6, 9	OFDM	13.5

ANTENNA PORT CONDUCTED MEASUREMENT:

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

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

CONDUCTED OUT-BAND EMISSION MEASUREMENT:

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

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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER (SYSTEM)	TESTED BY
PLC	24deg. C, 58%RH	120Vac, 60Hz	Bear Lee
UE<1G	25deg. C, 68%RH	120Vac, 60Hz	Tim Ho
UE ³ 1G	22deg. C, 68%RH	120Vac, 60Hz	Chilin Lee
APCM	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee
OB	25deg. C, 60%RH	120Vac, 60Hz	Chilin Lee

3.4 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 (Section 15.247)

558074 D01 DTS Meas Guidance v03r01

ANSI C63.10-2009

Canada RSS-210 Issue 8 (2010-12)

Canada RSS-Gen Issue 3 (2010-12)

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

3.5 DUTY CYCLE OF TEST SIGNAL

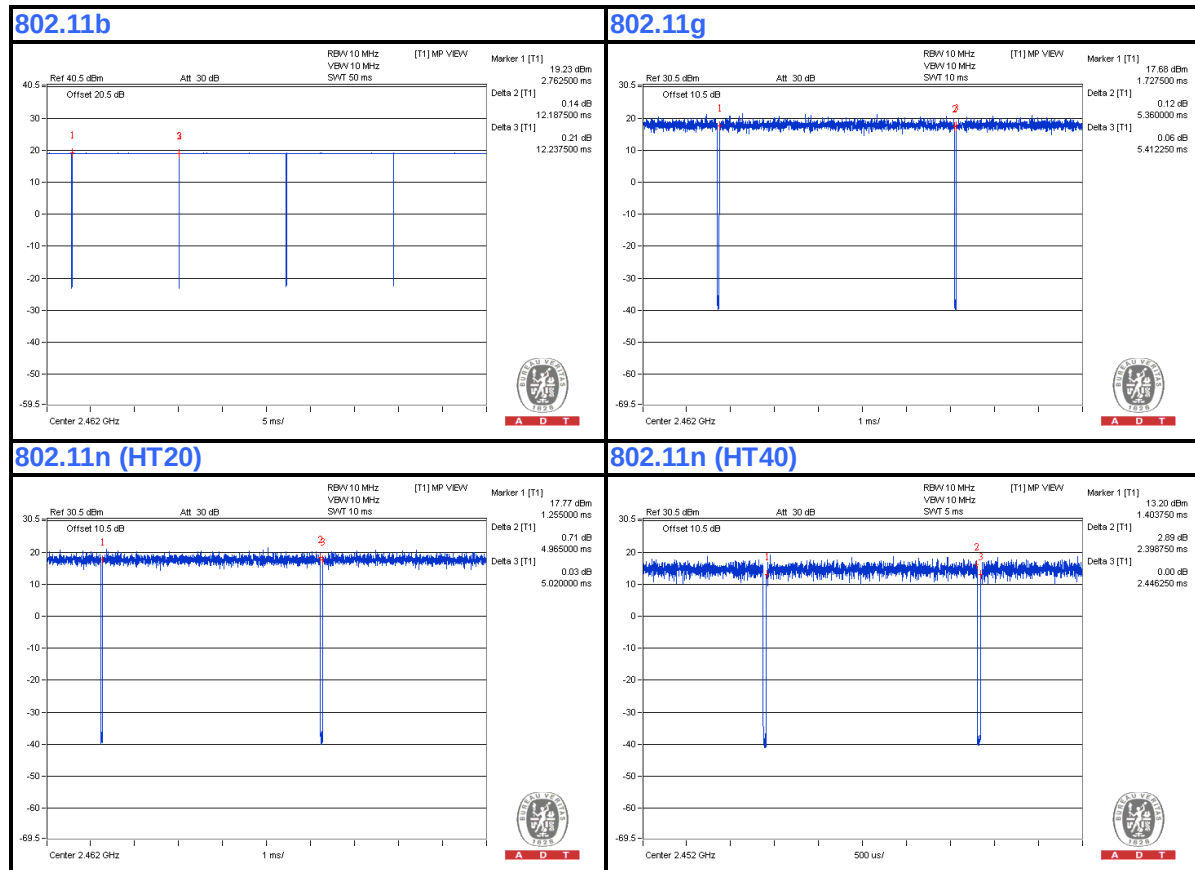
If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

802.11b: Duty cycle = 12.188 ms/12.238 ms = 0.996

802.11g: Duty cycle = 5.36 ms/5.412 ms = 0.99

802.11n (HT20): Duty cycle = 4.965 ms/5.02 ms = 0.989

802.11n (HT40): Duty cycle = 2.399 ms/2.446 ms = 0.981



3.6 DESCRIPTION OF SUPPORT UNITS

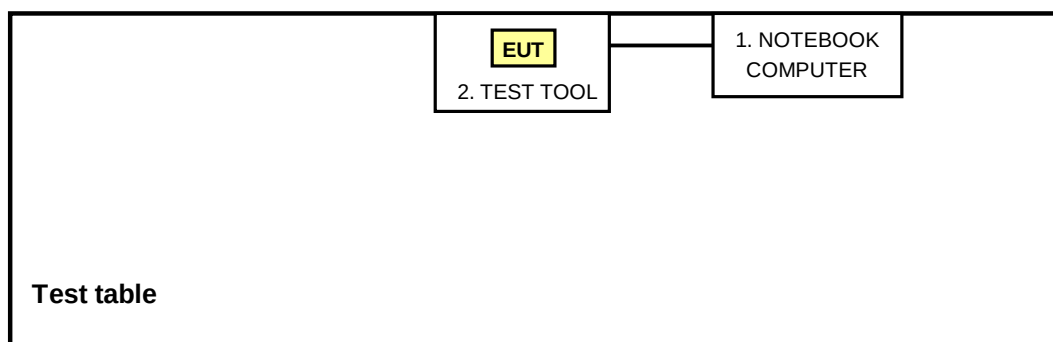
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1	NOTEBOOK COMPUTER	DELL	E6420	482T3R1	FCC DoC
2	TEST TOOL	Qualcomm Atheros	NA	NA	NA

No.	Signal cable description
1	USB Cable, 1.3m
2	NA

Note: The power cords of the above support units were unshielded (1.8m).

3.7 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED OUTPUT POWER MEASUREMENT

4.1.1 LIMITS OF MAXIMUM OUTPUT POWER MEASUREMENT

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

4.1.2 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

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. Tested date : Dec. 02, 2013

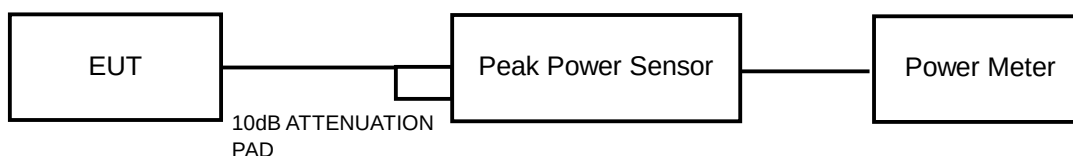
4.1.3 TEST PROCEDURES

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



4.1.6 EUT OPERATING CONDITIONS

The software (artgui.exe [ver2.3]) provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.1.7 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	181.134	22.58	30	PASS
6	2437	188.365	22.75	30	PASS
11	2462	103.753	20.16	30	PASS

802.11g

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	229.087	23.60	30	PASS
6	2437	456.037	26.59	30	PASS
11	2462	160.325	22.05	30	PASS

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
1	2412	212.324	23.27	30	PASS
6	2437	448.745	26.52	30	PASS
11	2462	149.279	21.74	30	PASS

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PEAK POWER (mW)	PEAK POWER (dBm)	LIMIT (dBm)	PASS/FAIL
3	2422	124.165	20.94	30	PASS
6	2437	153.109	21.85	30	PASS
9	2452	106.414	20.27	30	PASS

4.2 AVERAGE OUTPUT POWER

4.2.1 FOR REFERENCE.

4.2.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 20, 2013	May 19, 2014
Power sensor Anritsu	MA2411B	0738172	May 20, 2013	May 19, 2014

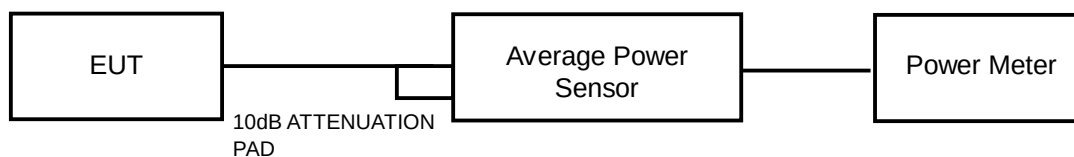
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 02, 2013

4.2.3 TEST PROCEDURES

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

4.2.4 TEST SETUP



4.2.5 EUT OPERATING CONDITIONS

Same as Item 4.1.6

4.2.6 TEST RESULTS

802.11b

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	114.025	20.57
6	2437	109.648	20.40
11	2462	63.096	18.00

802.11g

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	29.376	14.68
6	2437	174.582	22.42
11	2462	21.478	13.32

802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
1	2412	25.763	14.11
6	2437	131.826	21.20
11	2462	19.543	12.91

802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (mW)	AVERAGE POWER (dBm)
3	2422	15.171	11.81
6	2437	19.861	12.98
9	2452	13.122	11.18

4.3 POWER SPECTRAL DENSITY MEASUREMENT

4.3.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.3.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

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. Tested date : Dec. 02, 2013

4.3.3 TEST PROCEDURE

1. Set the RBW = 3 kHz, VBW =10 kHz, Detector = peak.
2. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
3. Use the peak marker function to determine the maximum amplitude level.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



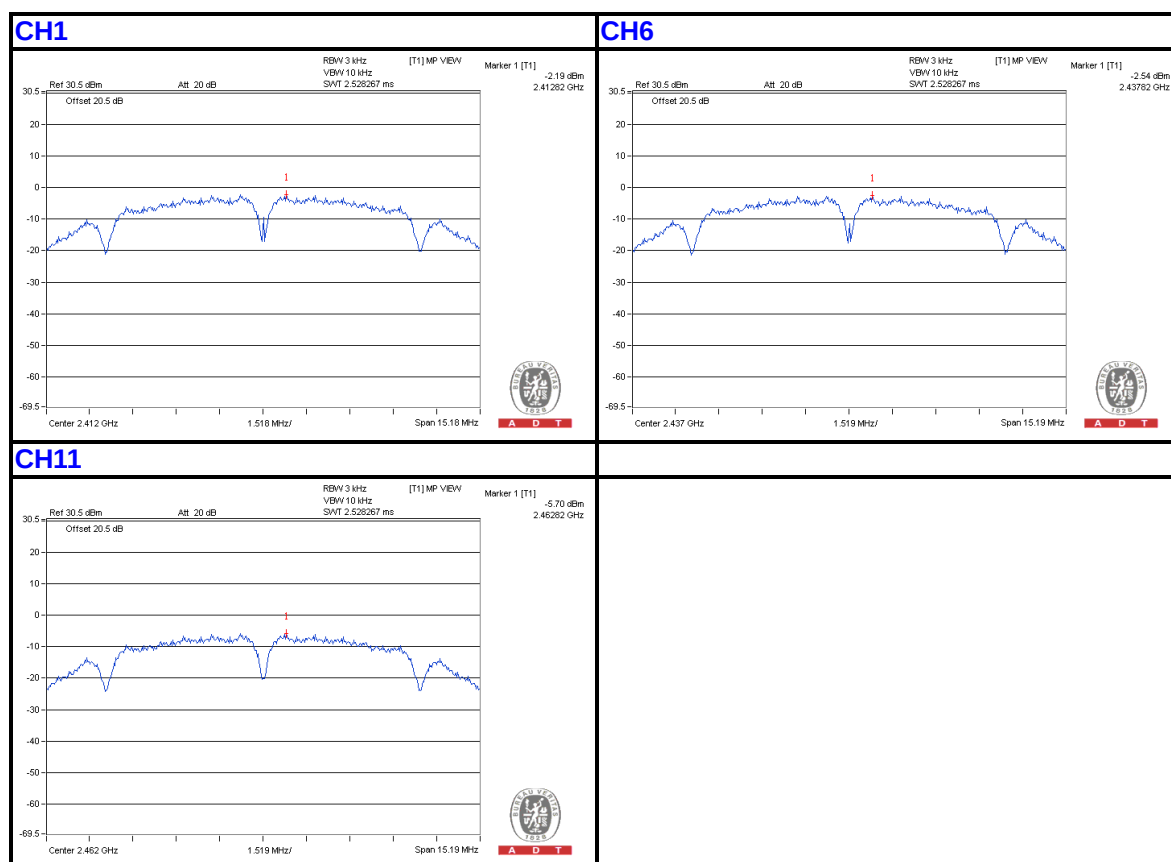
4.3.6 EUT OPERATING CONDITION

Same as Item 4.1.6

4.3.7 TEST RESULTS

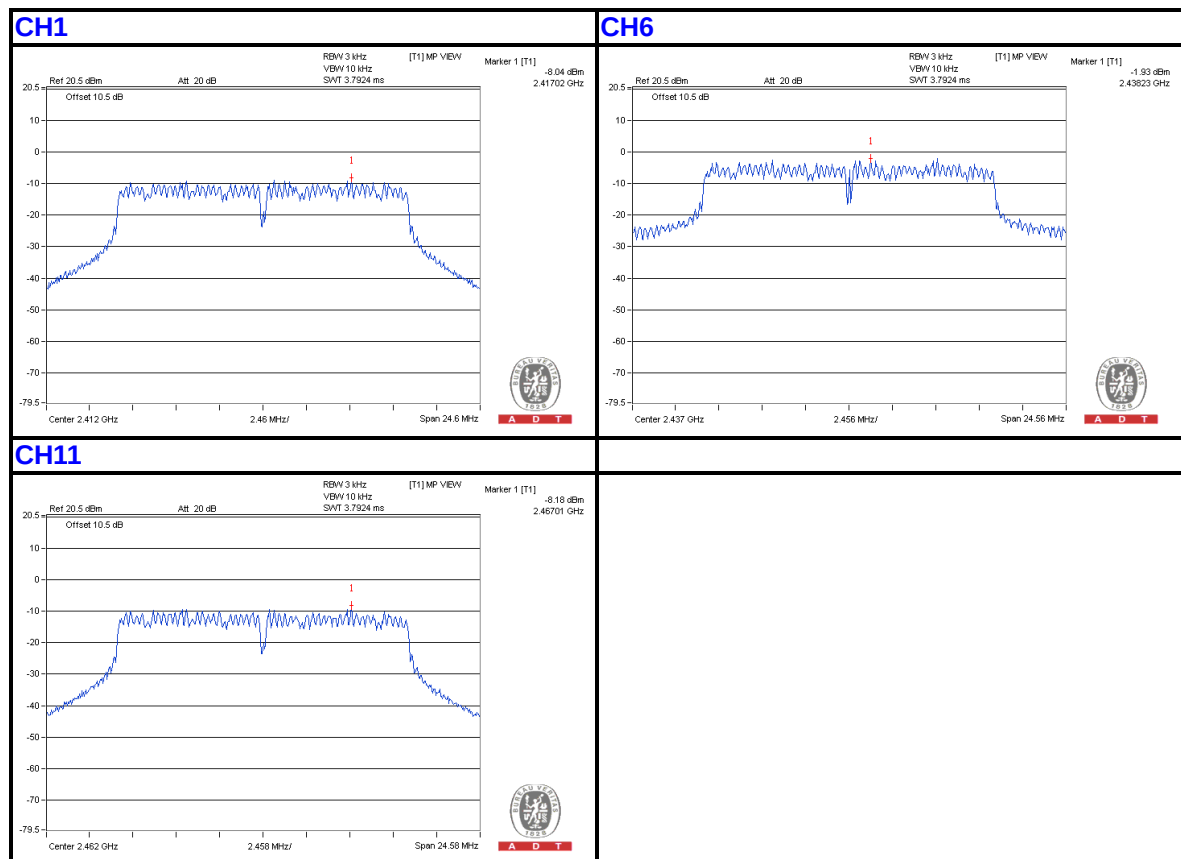
802.11b

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-2.19	8	PASS
6	2437	-2.54	8	PASS
11	2462	-5.70	8	PASS



802.11g

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-8.04	8	PASS
6	2437	-1.93	8	PASS
11	2462	-8.18	8	PASS

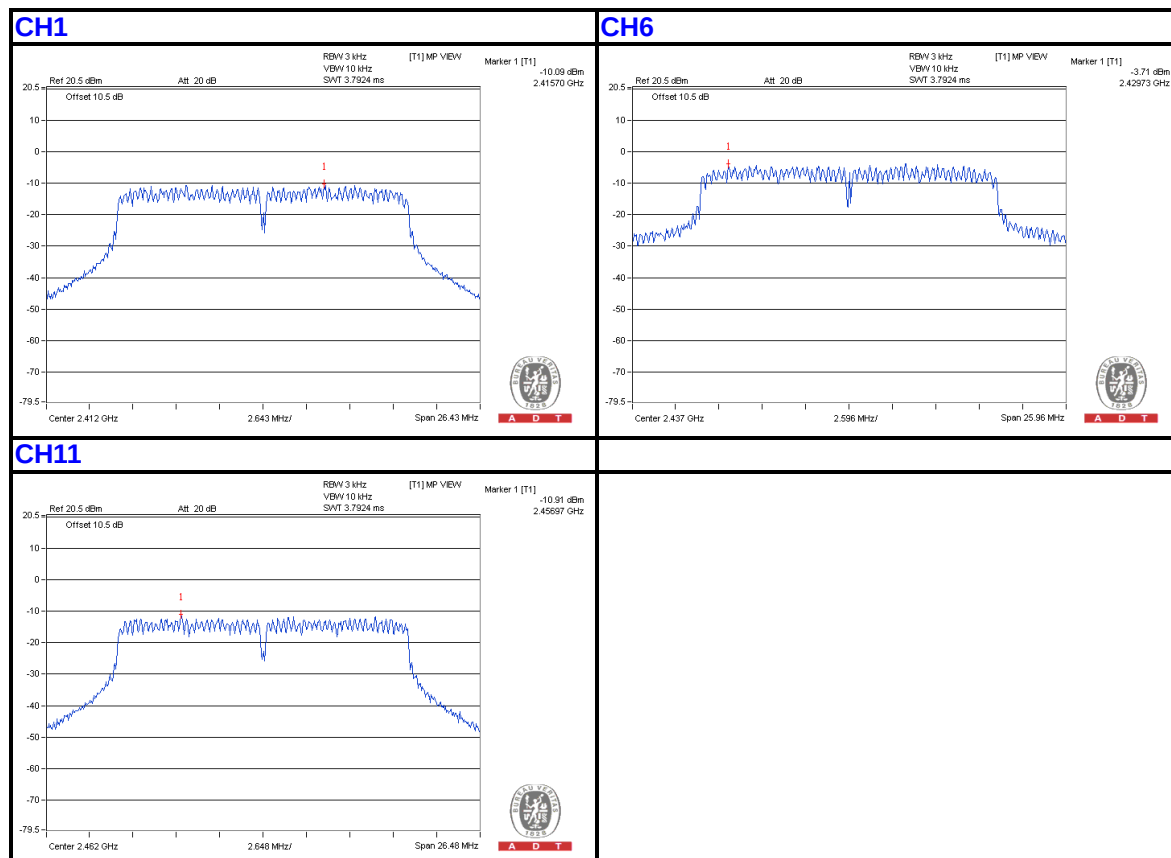




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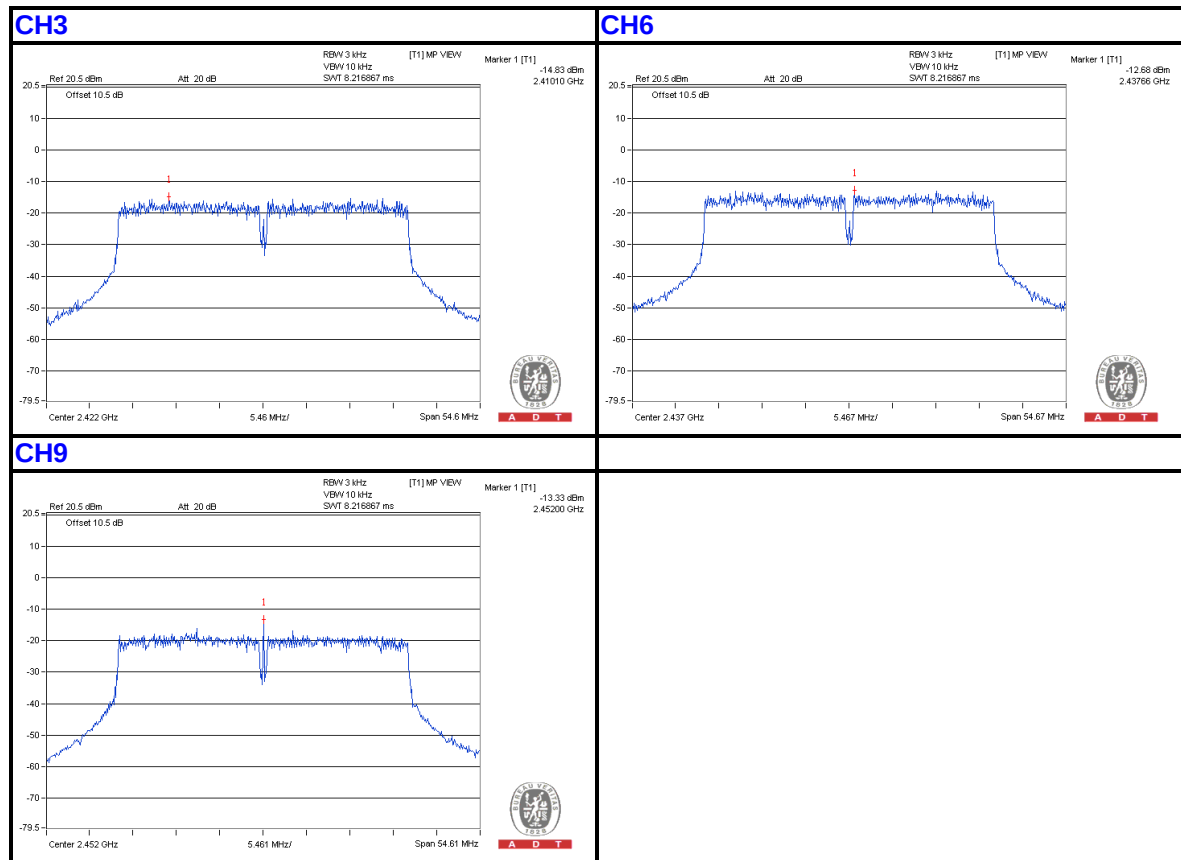
802.11n (HT20)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
1	2412	-10.09	8	PASS
6	2437	-3.71	8	PASS
11	2462	-10.91	8	PASS



802.11n (HT40)

CHANNEL	FREQUENCY (MHz)	PSD (dBm)	LIMIT (dBm)	PASS /FAIL
3	2422	-14.83	8	PASS
6	2437	-12.68	8	PASS
9	2452	-13.33	8	PASS



4.4 6dB BANDWIDTH MEASUREMENT

4.4.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.4.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

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. Tested date : Dec. 02, 2013

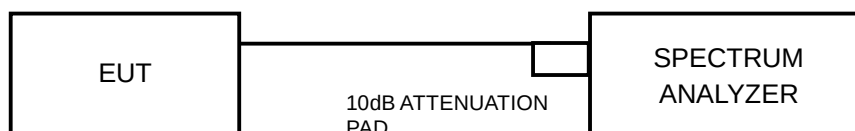
4.4.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100kHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
3. Trace mode = max hold.
4. Sweep = auto couple.
5. 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

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as Item 4.1.6



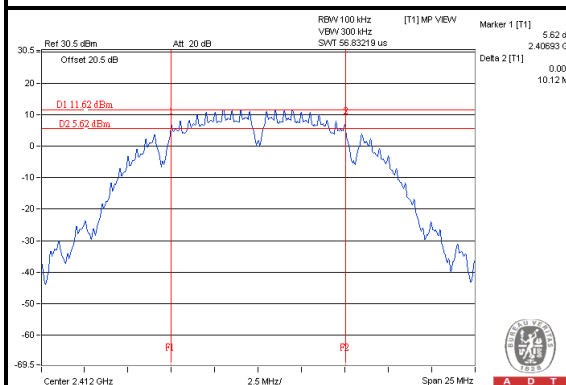
A D T

4.4.7 TEST RESULTS

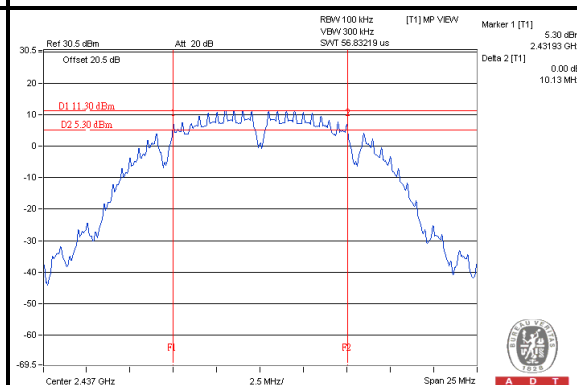
802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	10.12	0.5	PASS
6	2437	10.13	0.5	PASS
11	2462	10.13	0.5	PASS

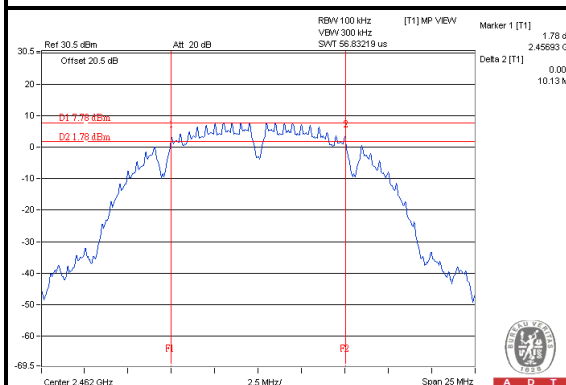
CH1



CH6



CH11



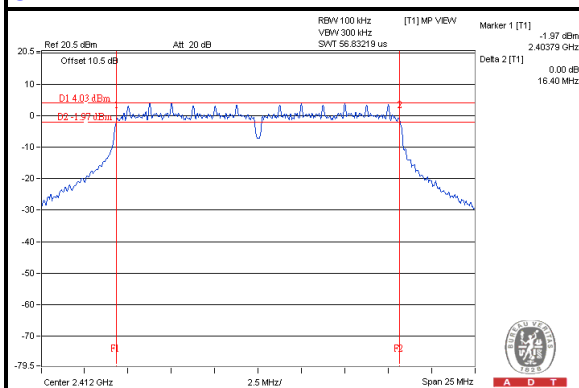


A D T

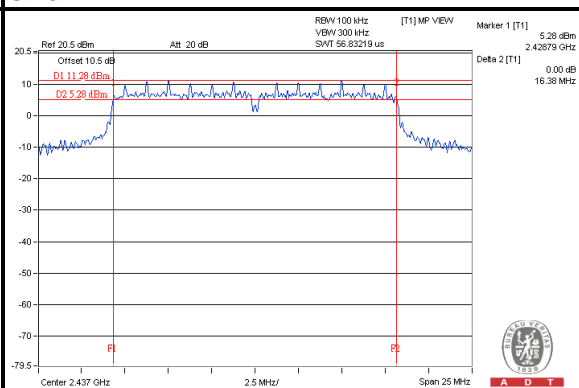
802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	16.40	0.5	PASS
6	2437	16.38	0.5	PASS
11	2462	16.39	0.5	PASS

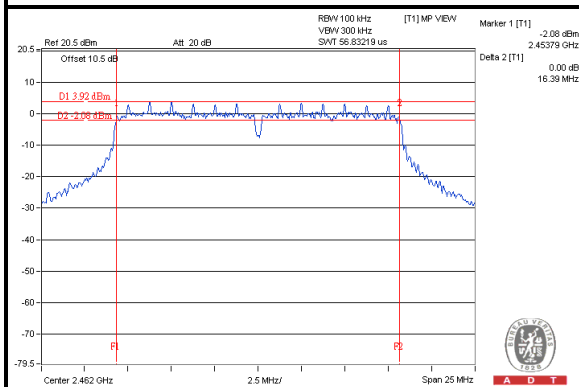
CH1



CH6



CH11



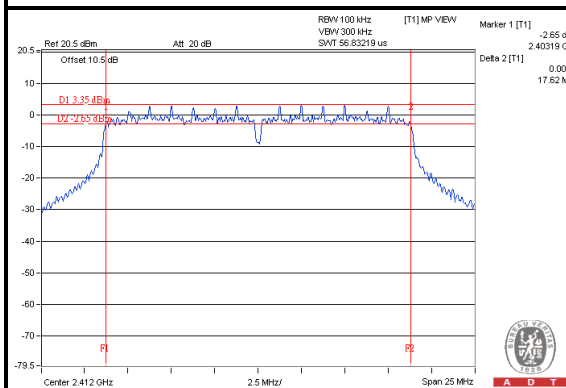


A D T

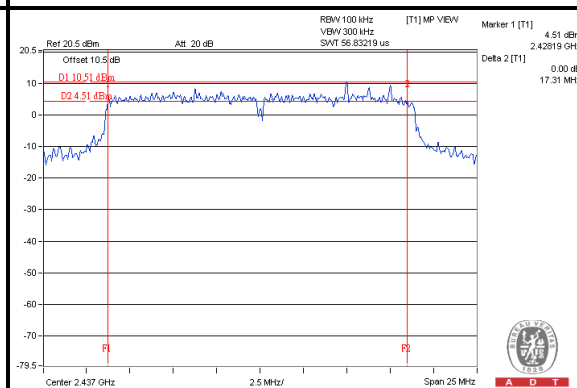
802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
1	2412	17.62	0.5	PASS
6	2437	17.31	0.5	PASS
11	2462	17.66	0.5	PASS

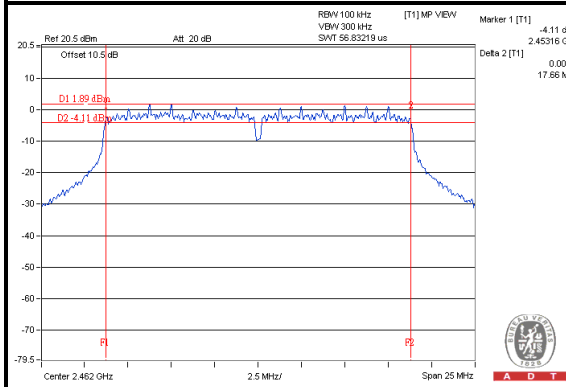
CH1



CH6



CH11



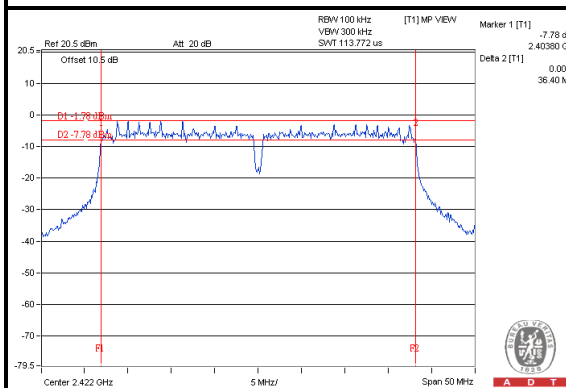


A D T

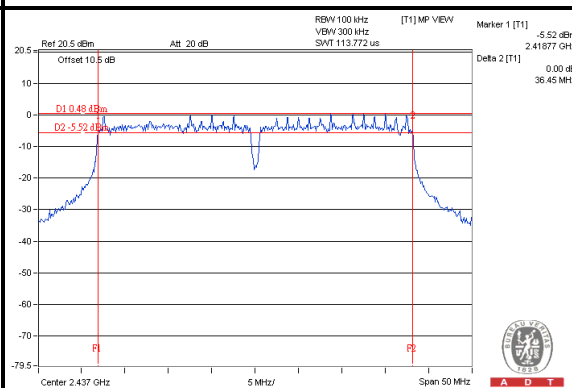
802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
3	2422	36.40	0.5	PASS
6	2437	36.45	0.5	PASS
9	2452	36.41	0.5	PASS

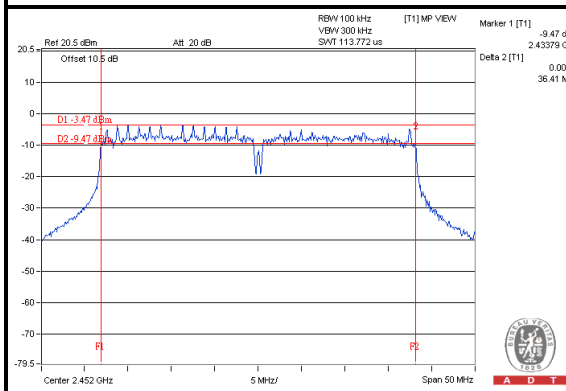
CH3



CH6



CH9



4.5 OCCUPIED BANDWIDTH MEASUREMENT

4.5.1 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

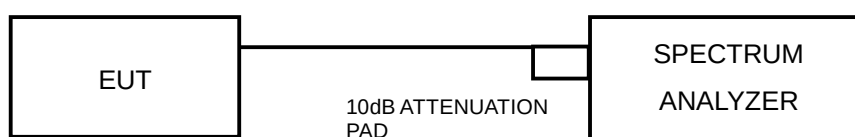
Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. Tested date : Dec. 02, 2013

4.5.2 TEST PROCEDURE

1. Set RBW $\geq 1\%$ of the emission bandwidth.
2. Set the VBW $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Record the 99% emission bandwidth.

4.5.3 TEST SETUP



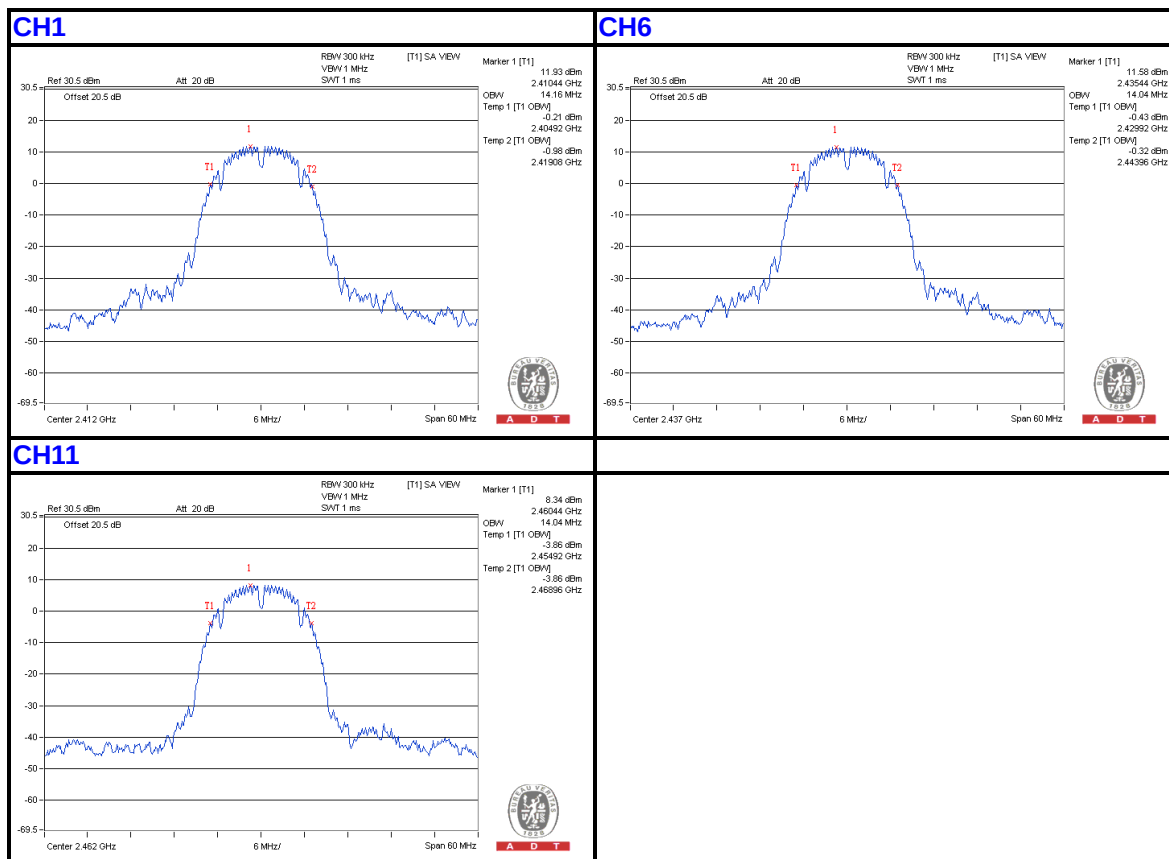
4.5.4 EUT OPERATING CONDITIONS

Same as Item 4.1.6

4.5.5 TEST RESULTS

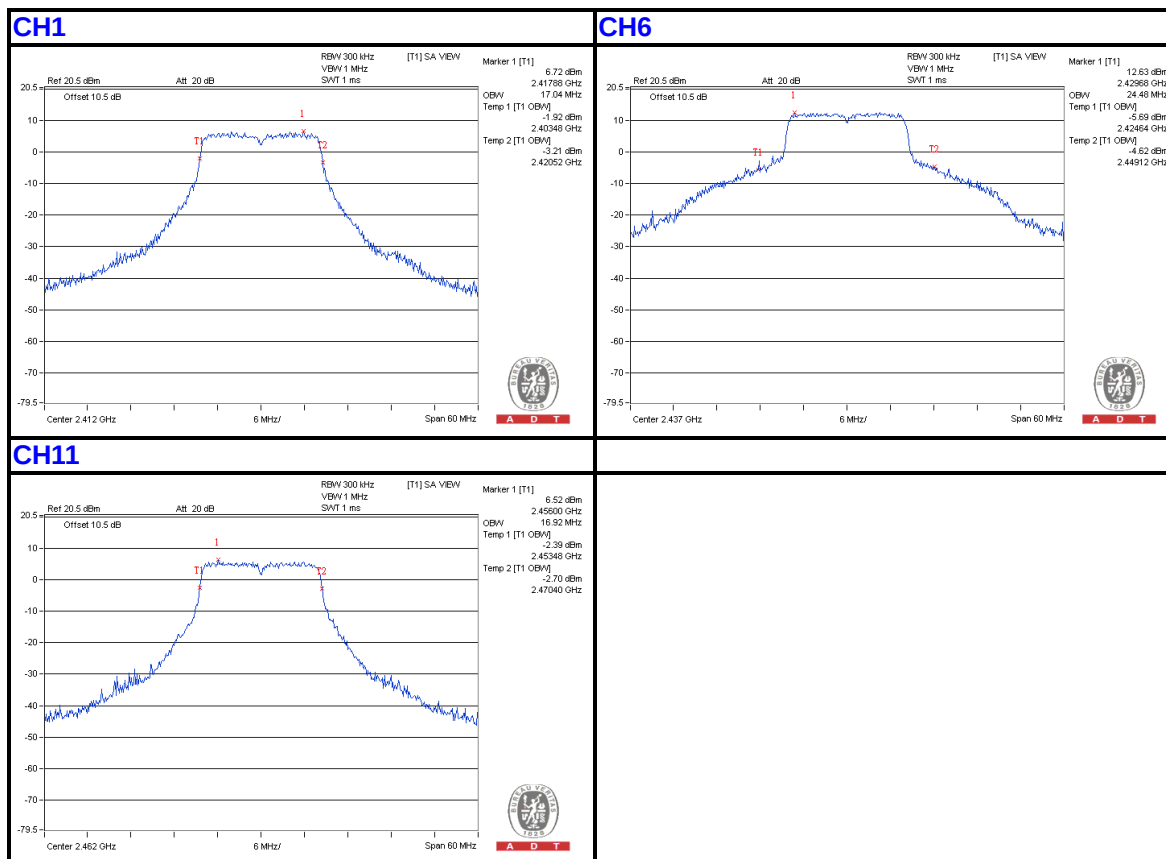
802.11b

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	14.16
6	2437	14.04
11	2462	14.04



802.11g

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	17.04
6	2437	24.48
11	2462	16.92



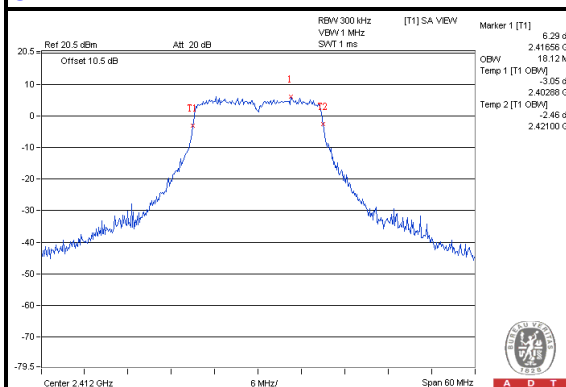


A D T

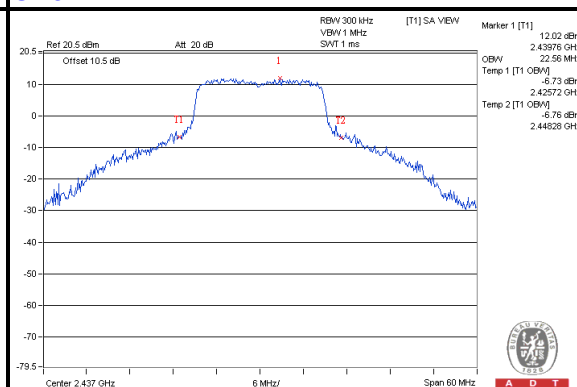
802.11n (HT20)

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
1	2412	18.12
6	2437	22.56
11	2462	18.12

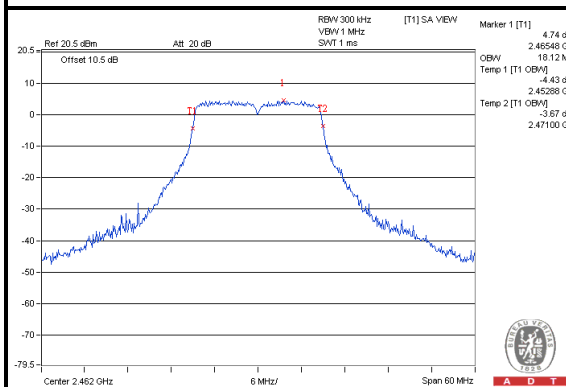
CH1



CH6

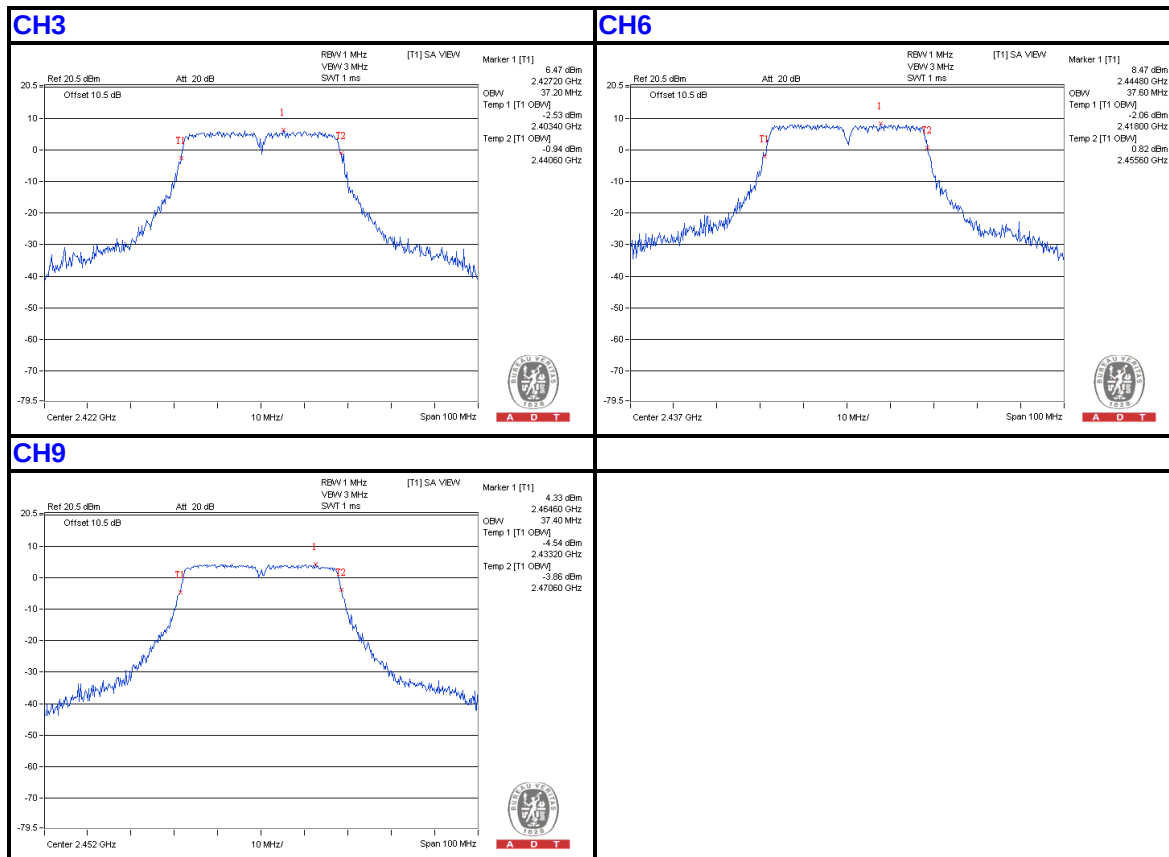


CH11



802.11n (HT40)

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)
3	2422	37.20
6	2437	37.60
9	2452	37.40



4.6 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.6.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.6.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP 40	100036	Jan. 21, 2013	Jan. 20, 2014

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. Tested date : Dec. 02, 2013

4.6.3 TEST PROCEDURE

Measurement Procedure - Reference Level

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 –Unwanted Emission Level

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 EUT OPERATING CONDITION

Same as Item 4.1.6

4.6.6 TEST RESULTS

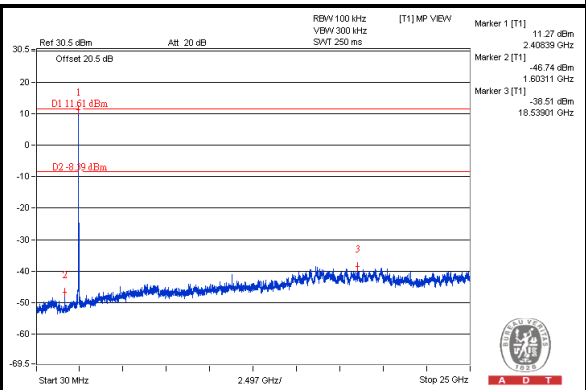
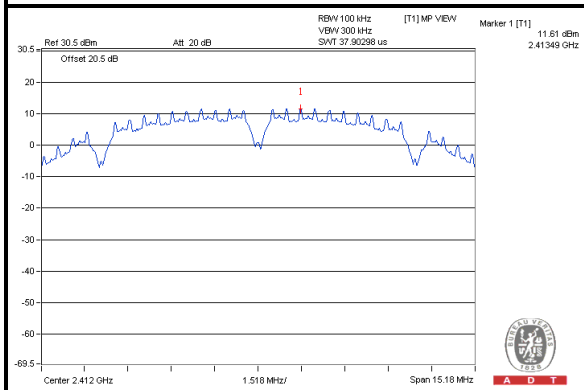
The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.



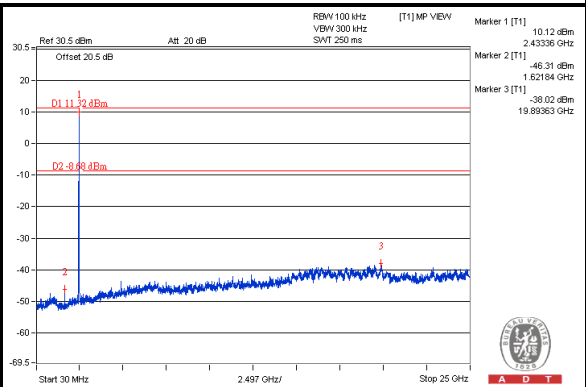
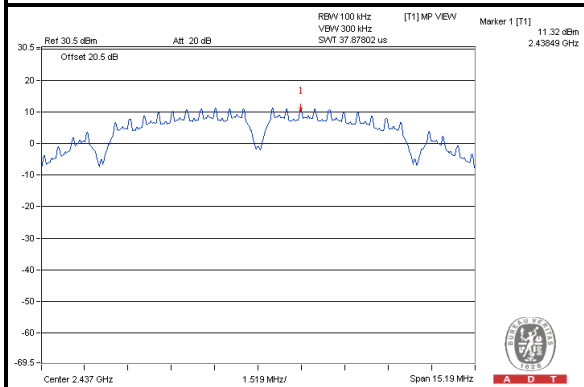
A D T

802.11b

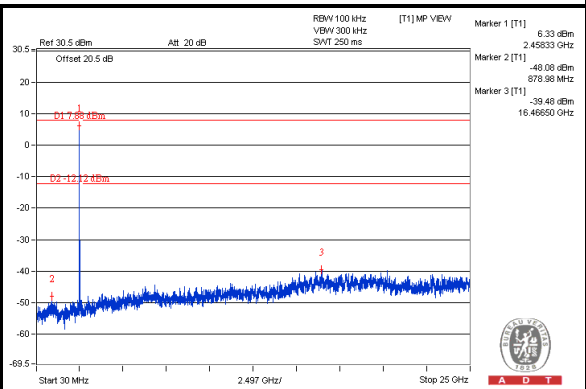
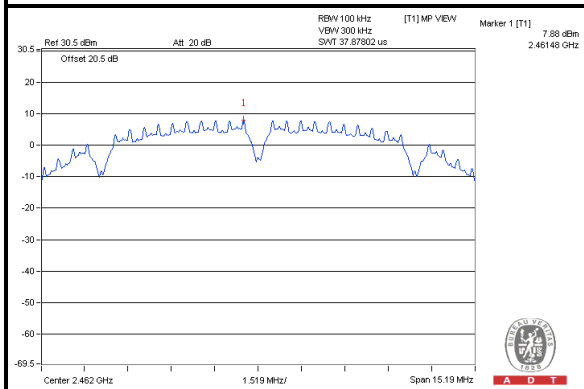
CH 1



CH 6



CH 11

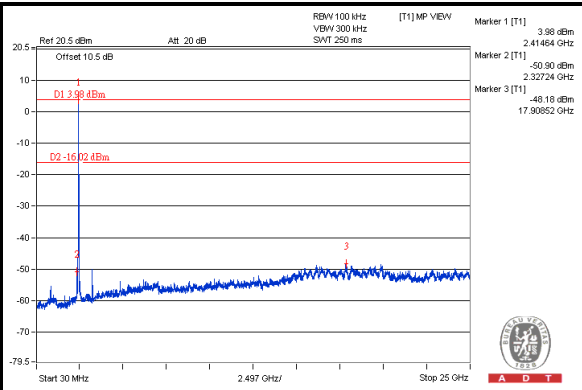
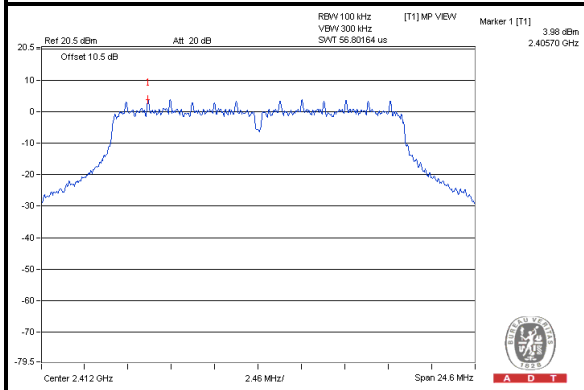




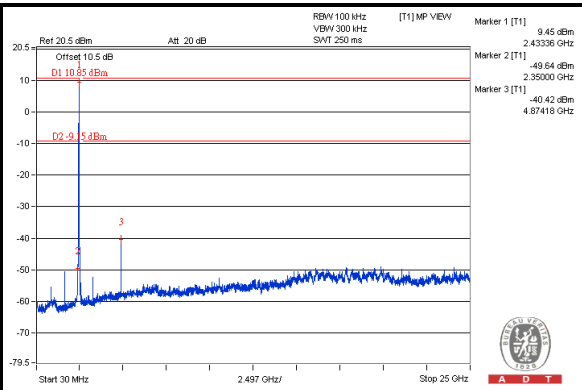
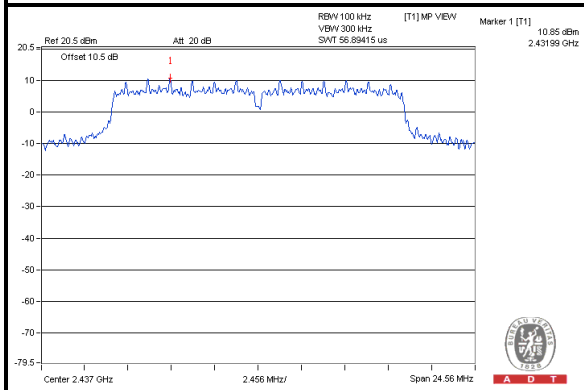
A D T

802.11g

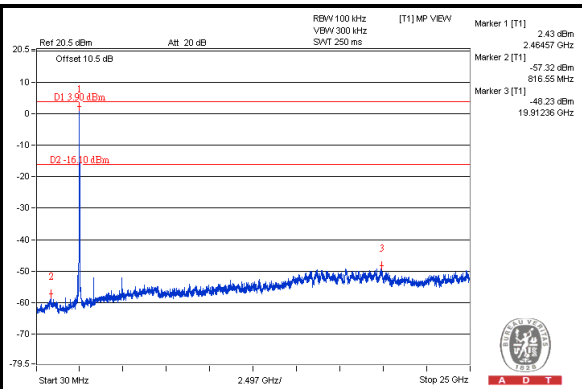
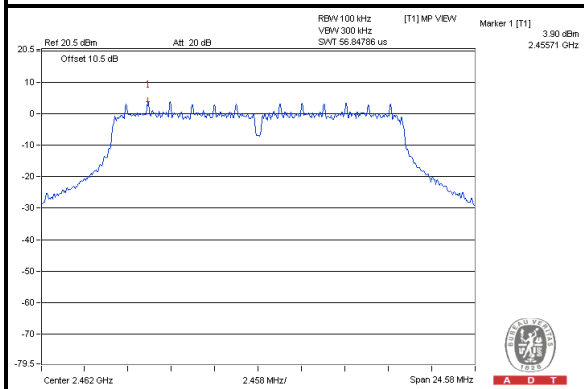
CH 1



CH 6



CH 11

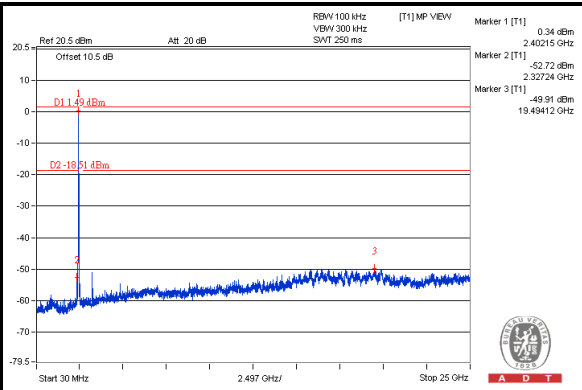
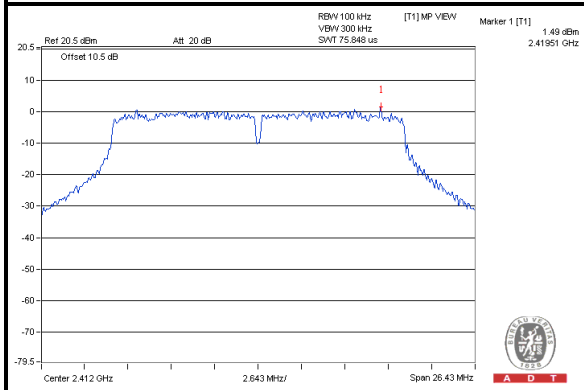




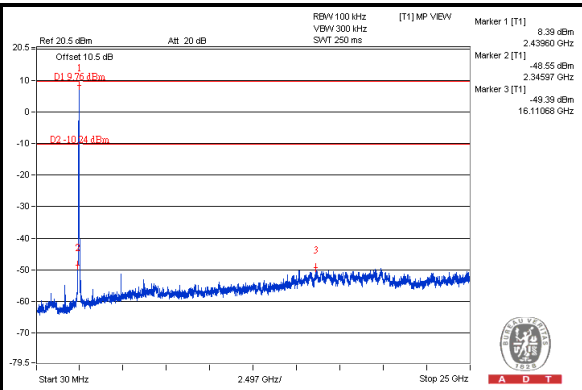
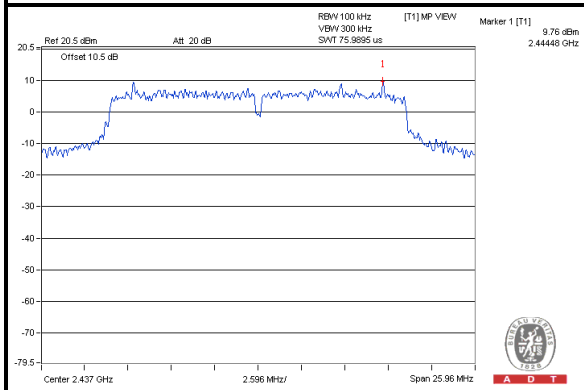
A D T

802.11n (HT20)

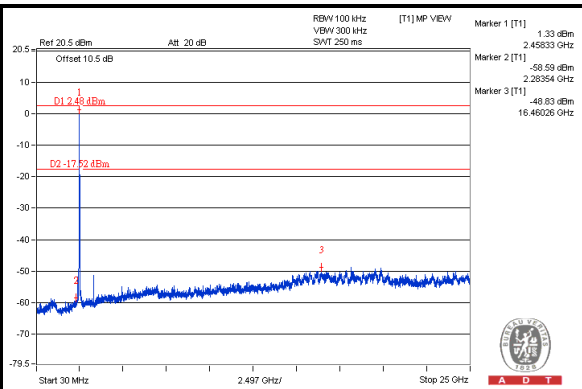
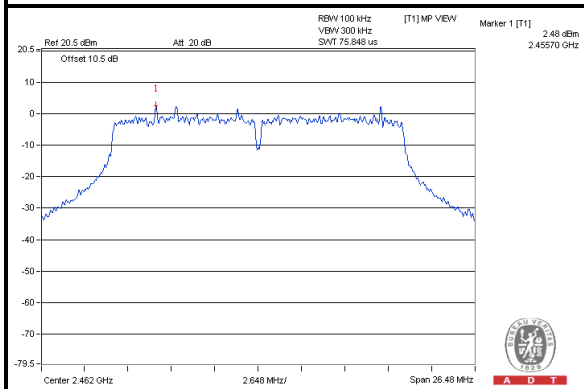
CH 1



CH 6



CH 11

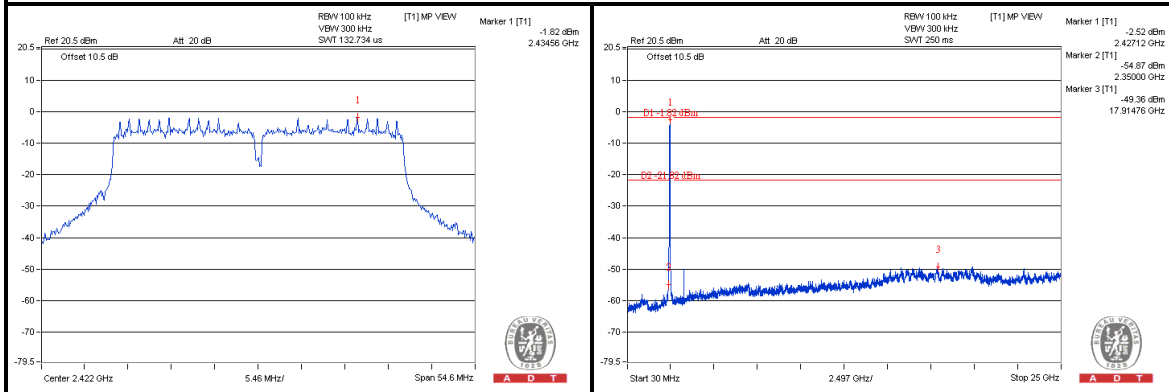




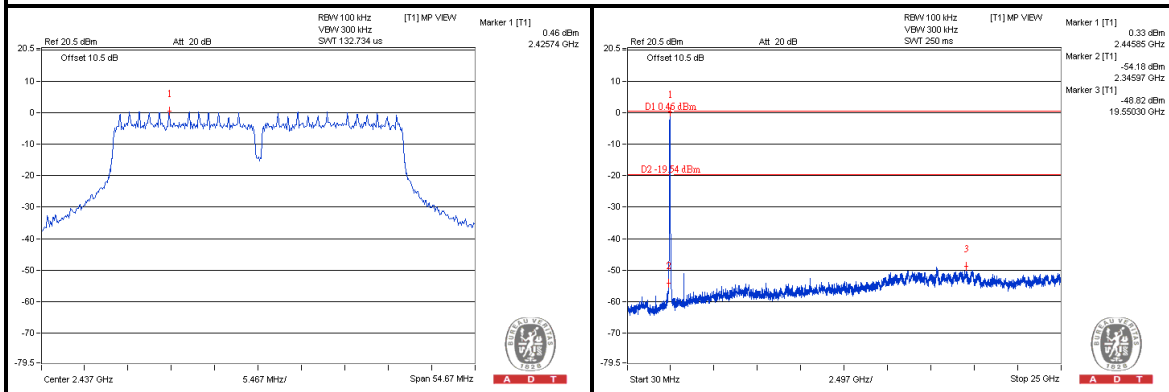
A D T

802.11n (HT40)

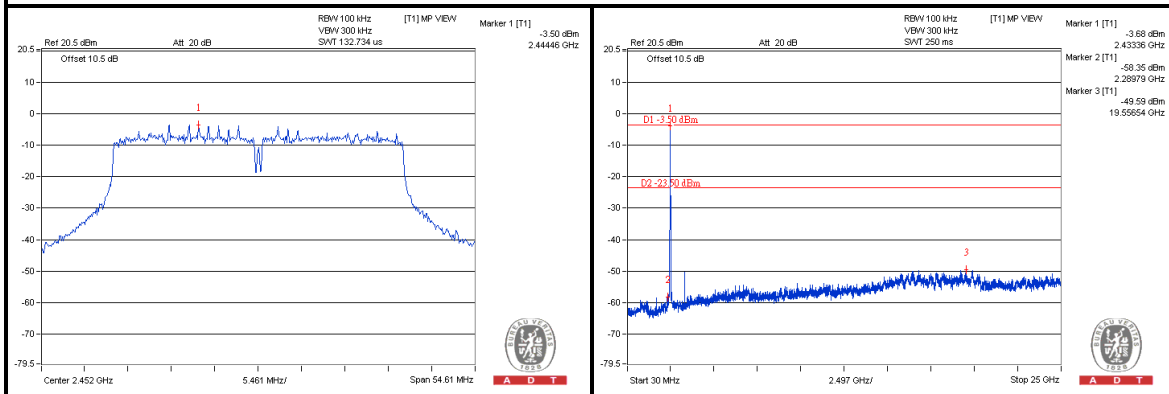
CH 3



CH 6



CH 9



4.7 UNWANTED EMISSION MEASUREMENT (Radiated versus Conducted)

4.7.1 LIMITS OF UNWANTED EMISSION 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.

4.7.2 TEST INSTRUMENTS

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	Jan. 29, 2013	Jan. 28, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 14, 2012	Nov. 13, 2013
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Mar. 19, 2013	Mar. 18, 2014
RF Cable	NA	CHGCAB_001	Oct. 05, 2013	Oct. 04, 2014
Horn_Antenna AISI	AIH.8018	0000320091110	Nov. 19, 2012	Nov. 18, 2013
Pre-Amplifier Agilent	8449B	3008A02578	June 25, 2013	June 24, 2014
RF Cable	NA	RF104-201 RF104-203 RF104-204	Dec. 25, 2012	Dec. 24, 2013
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 14, 2012	Nov. 13, 2013
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5. The VCCI Site Registration No. is G-137.
6. The CANADA Site Registration No. is IC 7450H-2.
7. Tested Date: Nov. 06, 2013



A D T

For above 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY50010156	Jan. 16, 2013	Jan. 15, 2014
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Mar. 25, 2013	Mar. 24, 2014
RF Cable	NA	CHHCAB_001	Oct. 06, 2013	Oct. 05, 2014
Spectrum Analyzer R&S	FSV40	100964	July 15, 2013	July 14, 2014
Horn_Antenna AISI	AIH.8018	0000220091110	Dec. 06, 2013	Dec. 05, 2014
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 29, 2013	Oct. 28, 2014
RF Cable	NA	RF104-205 RF104-207 RF104-202	Dec. 12, 2013	Dec. 11, 2014
Spectrum Analyzer Agilent	E4446A	MY48250253	Aug. 28, 2013	Aug. 27, 2014
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Oct. 08, 2013	Oct. 07, 2014
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in 966 Chamber No. H.
4. The FCC Site Registration No. is 797305.
5. The CANADA Site Registration No. is IC 7450H-3.
6. Tested Date: Dec. 19, 2013

4.7.3 TEST PROCEDURES

For Below 1GHz test:

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at an accredited test facility. 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 antenna is a broadband antenna, and its height 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.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for quasi-peak detection (QP) at frequency below 1GHz.

For Above 1GHz test:

Following FCC KDB 558074 D01 DTS Meas. Guidance :

Radiated versus Conducted Measurements.

The unwanted emission limits in both the restricted and non-restricted bands are based on antenna-port conducted measurements in conjunction with cabinet emissions tests are permitted to demonstrate compliance.

The following steps was performed:

- a. Cabinet emissions measurements. Radiated measurement was performed to ensure that cabinet emissions are below the emission limits. For the cabinet-emission measurements the antenna was replaced by a termination matching the nominal impedance of the antenna.
- b. Conducted tests was performed using equipment that matches the nominal impedance of the antenna assembly used with the EUT
- c. EIRP calculation. A value representative of an upper bound on out-of-band antenna gain (in dBi) shall be added to the measured antenna-port conducted emission power to compute EIRP within the specified measurement bandwidth. (For emissions in the restricted bands, additional calculations are required to convert EIRP to field strength at the specified distance.) The upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands or 2 dBi, whichever is greater
- d. For all of Radiation emission test
 - d-1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
 - d-2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
 - d-3. 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-4. 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.
 - d-5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
 - d-6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

1. 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.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.
3. All modes of operation were investigated and the worst-case emissions are reported.

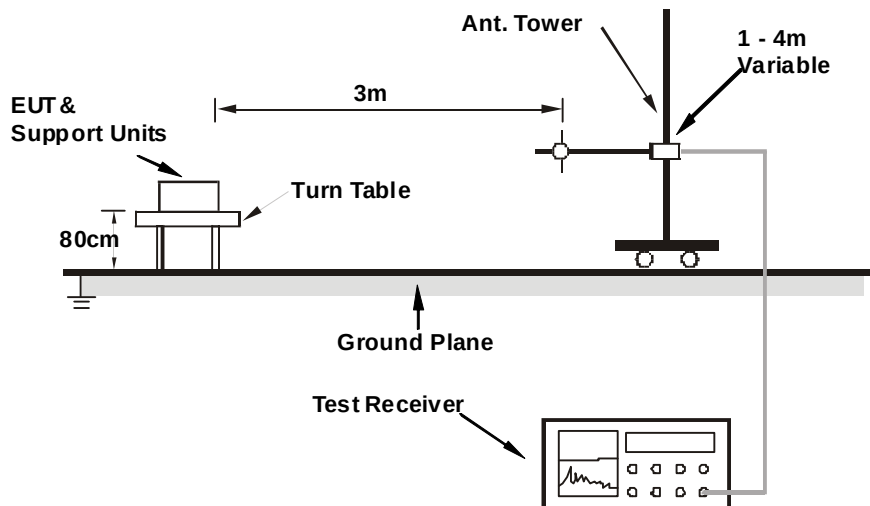
4.7.4 DEVIATION FROM TEST STANDARD

No deviation

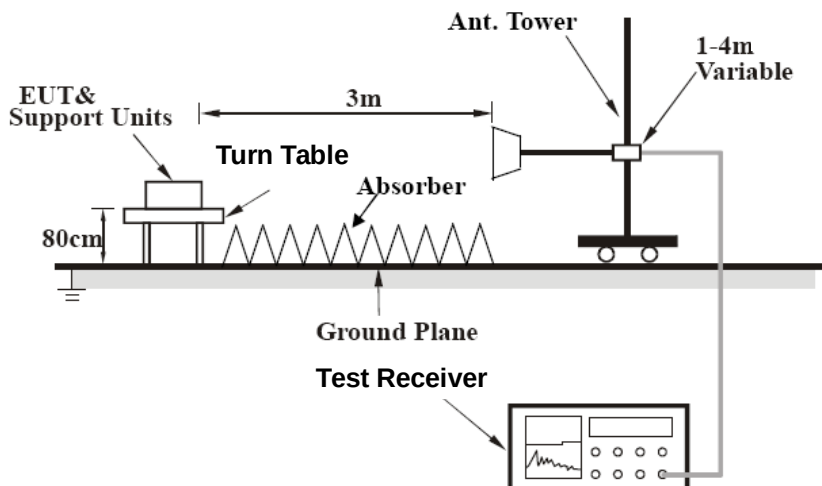
4.7.5 TEST SETUP

For radiated configuration:

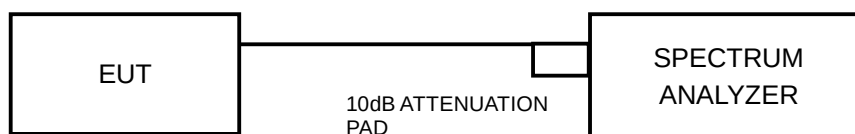
<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For conducted configuration:



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.7.6 EUT OPERATING CONDITIONS

1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “artgui.exe [ver2.3]” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.7.7 TEST RESULTS (RADIATED MEASUREMENT)

Radiated versus Conducted Measurement	
☐ Conducted measurement	☒ Radiated measurement
<u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) <u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

BELOW 1GHz WORST-CASE DATA

802.11g

CHANNEL	TX Channel 6	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	167.98	39.6 QP	43.5	-3.9	2.00 H	74	53.44	-13.87
2	204.00	41.8 QP	43.5	-1.7	1.00 H	136	58.22	-16.46
3	287.68	42.0 QP	46.0	-4.0	1.00 H	157	54.92	-12.96
4	291.95	43.5 QP	46.0	-2.5	1.00 H	147	56.40	-12.89
5	335.99	42.1 QP	46.0	-3.9	1.00 H	142	53.72	-11.59
6	600.02	40.3 QP	46.0	-5.7	1.50 H	264	45.54	-5.25
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	77.53	28.6 QP	40.0	-11.5	1.00 V	63	46.26	-17.71
2	204.02	31.9 QP	43.5	-11.6	1.00 V	101	48.32	-16.46
3	272.99	32.8 QP	46.0	-13.2	1.50 V	100	46.27	-13.48
4	290.74	32.8 QP	46.0	-13.2	1.50 V	92	45.68	-12.90
5	600.02	37.2 QP	46.0	-8.8	1.50 V	143	42.42	-5.25
6	768.02	35.1 QP	46.0	-10.9	1.50 V	360	36.98	-1.88

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

Radiated test was done with 50ohm terminator on antenna port

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	4824.00	56.2 PK	74.0	-17.8	1.81 H	265	49.80	6.40
2	4824.00	52.7 AV	54.0	-1.3	1.81 H	265	46.30	6.40
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	4824.00	56.6 PK	74.0	-17.4	1.97 V	238	50.20	6.40
2	4824.00	51.4 AV	54.0	-2.6	1.97 V	238	45.00	6.40

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	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	4874.00	56.5 PK	74.0	-17.5	1.91 H	266	49.97	6.53
2	4874.00	51.5 AV	54.0	-2.5	1.91 H	266	44.97	6.53
3	7311.00	60.1 PK	74.0	-13.9	1.00 H	215	49.01	11.09
4	7311.00	47.6 AV	54.0	-6.4	1.00 H	215	36.51	11.09
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	4874.00	57.3 PK	74.0	-16.7	1.94 V	240	50.77	6.53
2	4874.00	52.9 AV	54.0	-1.1	1.94 V	240	46.37	6.53
3	7311.00	58.7 PK	74.0	-15.3	1.00 V	306	47.61	11.09
4	7311.00	46.8 AV	54.0	-7.2	1.00 V	306	35.71	11.09

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 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	4924.00	55.7 PK	74.0	-18.3	1.93 H	262	49.16	6.54
2	4924.00	50.4 AV	54.0	-3.6	1.93 H	262	43.86	6.54
3	7386.00	56.9 PK	74.0	-17.1	1.00 H	215	45.49	11.41
4	7386.00	44.8 AV	54.0	-9.2	1.00 H	215	33.39	11.41
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	4924.00	57.3 PK	74.0	-16.7	1.92 V	240	50.76	6.54
2	4924.00	52.7 AV	54.0	-1.3	1.92 V	240	46.16	6.54
3	7386.00	57.6 PK	74.0	-16.4	1.00 V	306	46.19	11.41
4	7386.00	46.1 AV	54.0	-7.9	1.00 V	306	34.69	11.41

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

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	4824.00	52.2 PK	74.0	-21.8	1.09 H	184	45.80	6.40
2	4824.00	40.9 AV	54.0	-13.1	1.09 H	184	34.50	6.40
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	4824.00	50.9 PK	74.0	-23.1	1.96 V	57	44.50	6.40
2	4824.00	39.1 AV	54.0	-14.9	1.96 V	57	32.70	6.40

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	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	4874.00	55.5 PK	74.0	-18.5	1.04 H	183	49.00	6.50
2	4874.00	43.7 AV	54.0	-10.3	1.04 H	183	37.20	6.50
3	7311.00	59.9 PK	74.0	-14.1	1.00 H	174	48.80	11.10
4	7311.00	47.3 AV	54.0	-6.7	1.00 H	174	36.20	11.10
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	4874.00	57.0 PK	74.0	-17.0	2.00 V	55	50.50	6.50
2	4874.00	45.4 AV	54.0	-8.6	2.00 V	55	38.90	6.50
3	7311.00	63.4 PK	74.0	-10.6	1.62 V	144	52.30	11.10
4	7311.00	52.5 AV	54.0	-1.5	1.62 V	144	41.40	11.10

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 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	4924.00	51.5 PK	74.0	-22.5	1.13 H	196	44.90	6.60
2	4924.00	40.5 AV	54.0	-13.5	1.13 H	196	33.90	6.60
3	7386.00	56.5 PK	74.0	-17.5	1.05 H	185	45.10	11.40
4	7386.00	44.6 AV	54.0	-9.4	1.05 H	185	33.20	11.40
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	4924.00	51.1 PK	74.0	-22.9	1.99 V	54	44.50	6.60
2	4924.00	39.4 AV	54.0	-14.6	1.99 V	54	32.80	6.60
3	7386.00	57.0 PK	74.0	-17.0	1.09 V	179	45.60	11.40
4	7386.00	44.8 AV	54.0	-9.2	1.09 V	179	33.40	11.40

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

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	4824.00	52.2 PK	74.0	-21.8	1.11 H	184	45.80	6.40
2	4824.00	40.8 AV	54.0	-13.2	1.11 H	184	34.40	6.40
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	4824.00	51.5 PK	74.0	-22.5	1.94 V	50	45.10	6.40
2	4824.00	39.7 AV	54.0	-14.3	1.94 V	50	33.30	6.40

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	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	4874.00	55.5 PK	74.0	-18.5	1.08 H	191	49.00	6.50
2	4874.00	43.5 AV	54.0	-10.5	1.08 H	191	37.00	6.50
3	7311.00	59.7 PK	74.0	-14.3	1.03 H	183	48.60	11.10
4	7311.00	46.9 AV	54.0	-7.1	1.03 H	183	35.80	11.10
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	4874.00	57.4 PK	74.0	-16.6	1.97 V	43	50.90	6.50
2	4874.00	45.6 AV	54.0	-8.4	1.97 V	43	39.10	6.50
3	7311.00	63.7 PK	74.0	-10.3	1.58 V	152	52.60	11.10
4	7311.00	52.9 AV	54.0	-1.1	1.58 V	152	41.80	11.10

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 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	4924.00	51.2 PK	74.0	-22.8	1.09 H	186	44.60	6.60
2	4924.00	40.2 AV	54.0	-13.8	1.09 H	186	33.60	6.60
3	7386.00	56.4 PK	74.0	-17.6	1.06 H	195	45.00	11.40
4	7386.00	44.7 AV	54.0	-9.3	1.06 H	195	33.30	11.40
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	4924.00	51.3 PK	74.0	-22.7	1.98 V	60	44.70	6.60
2	4924.00	39.6 AV	54.0	-14.4	1.98 V	60	33.00	6.60
3	7386.00	57.0 PK	74.0	-17.0	1.12 V	177	45.60	11.40
4	7386.00	45.1 AV	54.0	-8.9	1.12 V	177	33.70	11.40

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

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	4844.00	51.4 PK	74.0	-22.6	1.10 H	165	44.90	6.50
2	4844.00	40.1 AV	54.0	-13.9	1.10 H	165	33.60	6.50
3	7266.00	56.3 PK	74.0	-17.7	1.08 H	203	45.30	11.00
4	7266.00	44.5 AV	54.0	-9.5	1.08 H	203	33.50	11.00
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	4844.00	51.1 PK	74.0	-22.9	1.94 V	56	44.60	6.50
2	4844.00	39.7 AV	54.0	-14.3	1.94 V	56	33.20	6.50
3	7266.00	56.3 PK	74.0	-17.7	1.08 V	173	45.30	11.00
4	7266.00	44.7 AV	54.0	-9.3	1.08 V	173	33.70	11.00

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	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	4874.00	50.8 PK	74.0	-23.2	1.07 H	180	44.30	6.50
2	4874.00	39.7 AV	54.0	-14.3	1.07 H	180	33.20	6.50
3	7311.00	56.7 PK	74.0	-17.3	1.08 H	186	45.60	11.10
4	7311.00	45.2 AV	54.0	-8.8	1.08 H	186	34.10	11.10
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	4874.00	51.6 PK	74.0	-22.4	2.00 V	70	45.10	6.50
2	4874.00	39.8 AV	54.0	-14.2	2.00 V	70	33.30	6.50
3	7311.00	57.1 PK	74.0	-16.9	1.17 V	188	46.00	11.10
4	7311.00	45.4 AV	54.0	-8.6	1.17 V	188	34.30	11.10

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 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	4904.00	50.5 PK	74.0	-23.5	1.11 H	177	44.00	6.50
2	4904.00	39.7 AV	54.0	-14.3	1.11 H	177	33.20	6.50
3	7356.00	55.6 PK	74.0	-18.4	1.06 H	188	44.30	11.30
4	7356.00	44.2 AV	54.0	-9.8	1.06 H	188	32.90	11.30
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	4904.00	51.8 PK	74.0	-22.2	1.99 V	69	45.30	6.50
2	4904.00	39.9 AV	54.0	-14.1	1.99 V	69	33.40	6.50
3	7356.00	57.7 PK	74.0	-16.3	1.18 V	175	46.40	11.30
4	7356.00	45.5 AV	54.0	-8.5	1.18 V	175	34.20	11.30

REMARKS:

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

4.7.8 TEST RESULTS (CONDUCTED MEASUREMENT)

Radiated versus Conducted Measurement	
☒ Conducted measurement	☐ Radiated measurement
<u>For Radiated measurement:</u> The level of unwanted emissions was measured when radiated by the cabinet or structure of the equipment with the antenna connector(s) terminated by a specified load (cabinet radiation) <u>For Conducted measurement:</u> The level of unwanted emissions was measured as their power in a specified load (conducted spurious emissions).	

Conducted Measurement Factor
a. For the out of band spurious the gain for the specific band may have been used rather than the highest gain across all bands. b. For the band edge the gain for the specific band may have been used. c. In restricted bands below 1000 MHz, add upper bound on ground plane reflection: For $f = 30 - 1000$ MHz, add 4.7 dB. Note: The conducted emission test was considered some factor to compute test result.

The declared antenna gain is 3.62dBi, this antenna gain was used for conducted spurious/bandedge calculations.



A D T

BELOW 1GHz DATA

802.11g - Channel 6

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	64.92 QP	27.72	40	-12.28	-71.16	3.62	-67.54
2	161.435 QP	28.26	43.5	-15.24	-70.62	3.62	-67
3	393.0225 QP	30.24	46	-15.76	-68.64	3.62	-65.02
4	480.08 QP	34.19	46	-11.81	-64.69	3.62	-61.07
5	799.4525 QP	40.49	46	-5.51	-58.39	3.62	-54.77
6	826.37 QP	44.01	46	-1.99	-54.87	3.62	-51.25

Note 1. Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

Note 2. The raw value was include the ground plane reflection (4.7dB)

Note 3. These frequencies in test report was the highest value below 1 GHz emission even restricted and non-restricted band

ABOVE 1GHz DATA

802.11b - Channel 1

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4825 PK	56.25	74	-17.75	-42.63	3.62	-39.01
2	4821.875 AV	52.74	54	-1.26	-46.14	3.62	-42.52

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

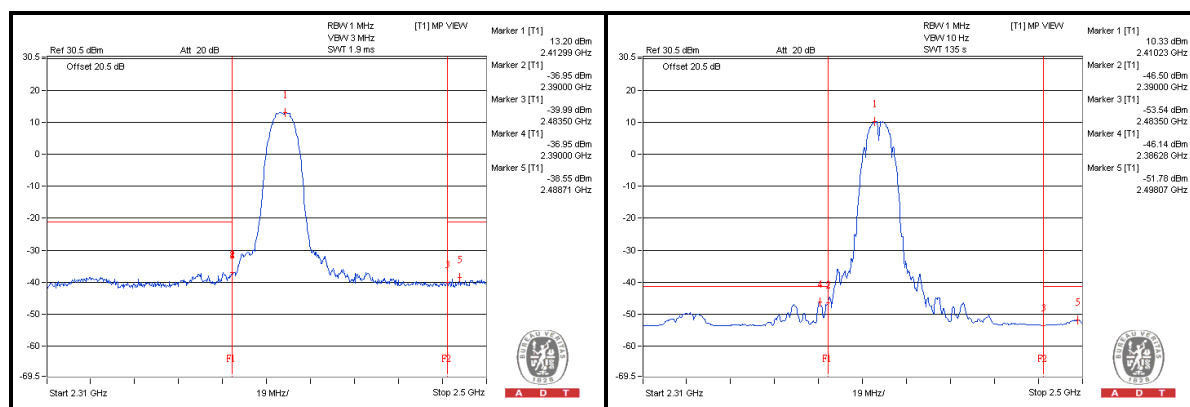
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2386 PK	61.88	74	-12.12	-37	3.62	-33.38
2	2386.275362 AV	52.74	54	-1.26	-46.14	3.62	-42.52
3	2488.710145 PK	60.33	74	-13.67	-38.55	3.62	-34.93
4	2498.072464 AV	47.1	54	-6.9	-51.78	3.62	-48.16

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11b - Channel 6

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4875 PK	55.71	74	-18.29	-43.17	3.62	-39.55
2	4871.875 AV	52.09	54	-1.91	-46.79	3.62	-43.17
3	7293.75 PK	52.34	74	-21.66	-46.54	3.62	-42.92
4	7293.75 AV	39.66	54	-14.34	-59.22	3.62	-55.6

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

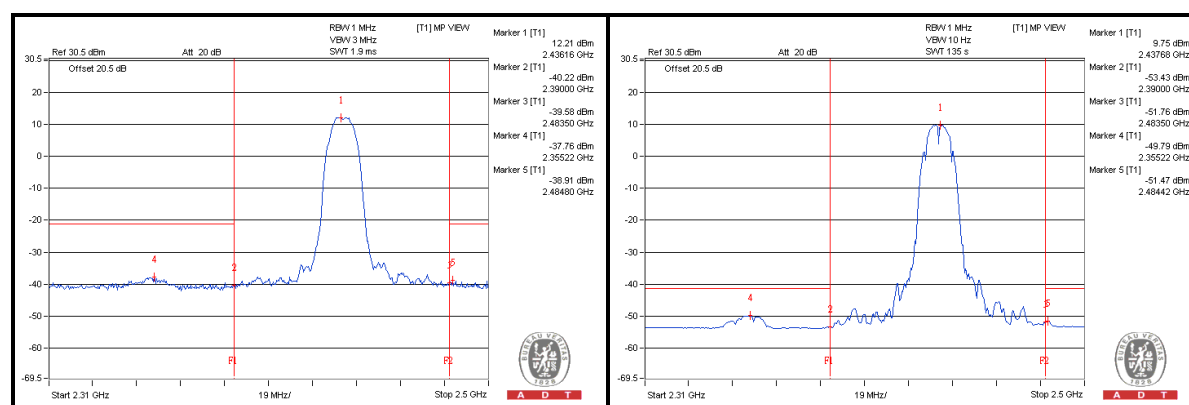
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2355.22 PK	61.12	74	-12.88	-37.76	3.62	-34.14
2	2355.22 AV	49.09	54	-4.91	-49.79	3.62	-46.17
3	2484.8 PK	59.97	74	-14.03	-38.91	3.62	-35.29
4	2484.42 AV	47.41	54	-6.59	-51.47	3.62	-47.85

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11b - Channel 11

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4925 PK	56.4	74	-17.6	-42.48	3.62	-38.86
2	4921.875 AV	52.94	54	-1.06	-45.94	3.62	-42.32
3	7393.75 PK	51.6	74	-22.4	-47.28	3.62	-43.66
4	7390.625 AV	39.55	54	-14.45	-59.33	3.62	-55.71

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

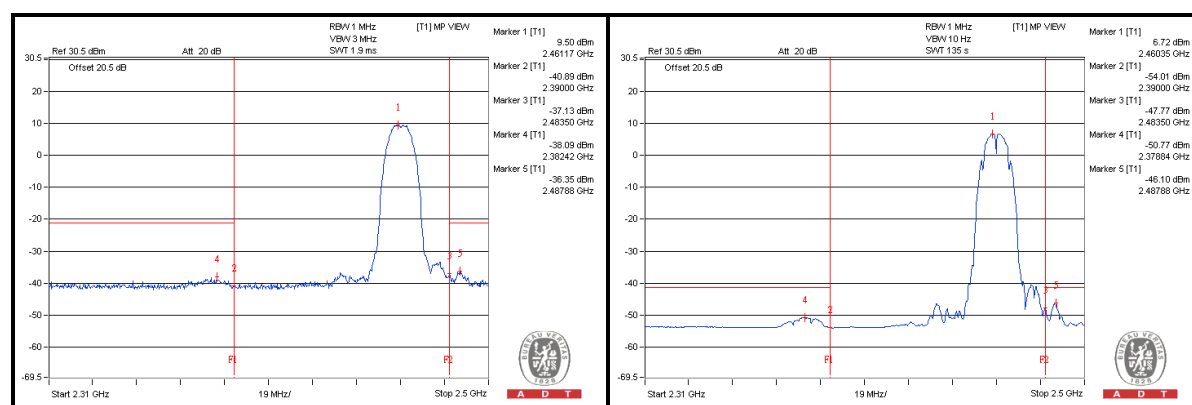
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2382.42029 PK	60.79	74	-13.21	-38.09	3.62	-34.47
2	2378.84058 AV	48.11	54	-5.89	-50.77	3.62	-47.15
3	2487.884058 PK	62.53	74	-11.47	-36.35	3.62	-32.73
4	2487.884058 AV	52.78	54	-1.22	-46.1	3.62	-42.48

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11g - Channel 1

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4812.5 PK	50.32	74	-23.68	-48.56	3.62	-44.94
2	4821.875 AV	39.78	54	-14.22	-59.1	3.62	-55.48

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

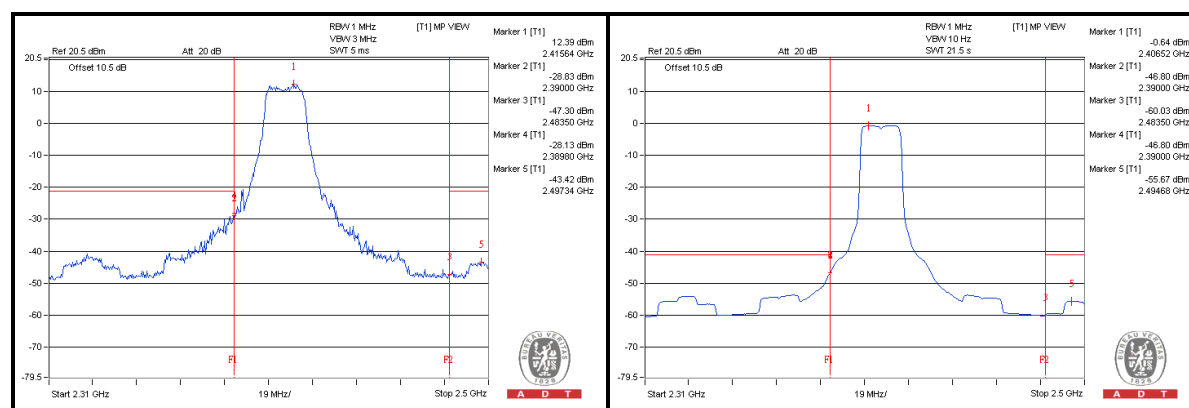
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2389.8 PK	70.75	74	-3.25	-28.13	3.62	-24.51
2	2389.8 AV	51.78	54	-2.22	-47.1	3.62	-43.48
3	2497.34 PK	55.46	74	-18.54	-43.42	3.62	-39.8
4	2494.68 AV	43.21	54	-10.79	-55.67	3.62	-52.05

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11g - Channel 6

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4871.875 PK	57.16	74	-16.84	-41.72	3.62	-38.1
2	4875 AV	45.1	54	-8.9	-53.78	3.62	-50.16
3	7312.5 PK	52.69	74	-21.31	-46.19	3.62	-42.57
4	7315.625 AV	40.89	54	-13.11	-57.99	3.62	-54.37

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

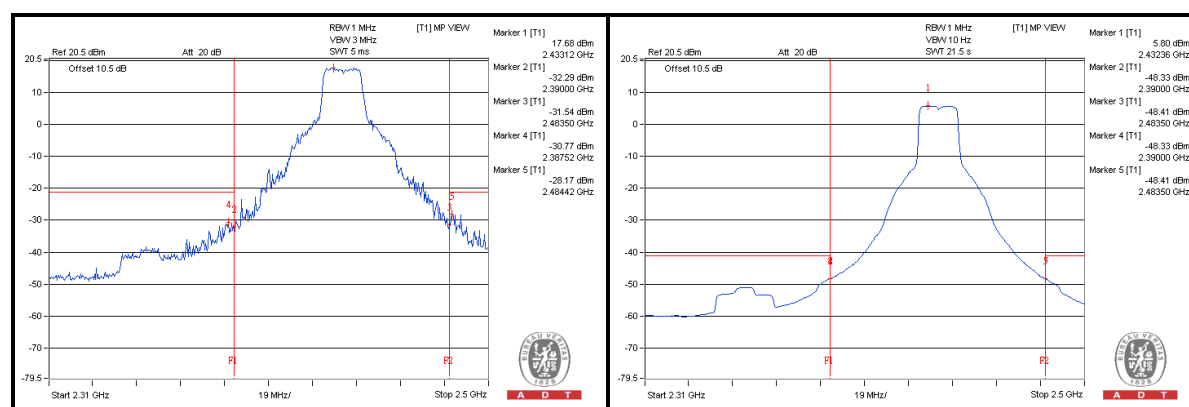
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2387.52 PK	68.11	74	-5.89	-30.77	3.62	-27.15
2	2389.8 AV	50.49	54	-3.51	-48.39	3.62	-44.77
3	2484.42 PK	70.71	74	-3.29	-28.17	3.62	-24.55
4	2483.66 AV	50.37	54	-3.63	-48.51	3.62	-44.89

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11g - Channel 11

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4925 PK	50.73	74	-23.27	-48.15	3.62	-44.53
2	4925 AV	39.86	54	-14.14	-59.02	3.62	-55.4
3	7368.75 PK	51.68	74	-22.32	-47.2	3.62	-43.58
4	7387.5 AV	40.58	54	-13.42	-58.3	3.62	-54.68

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

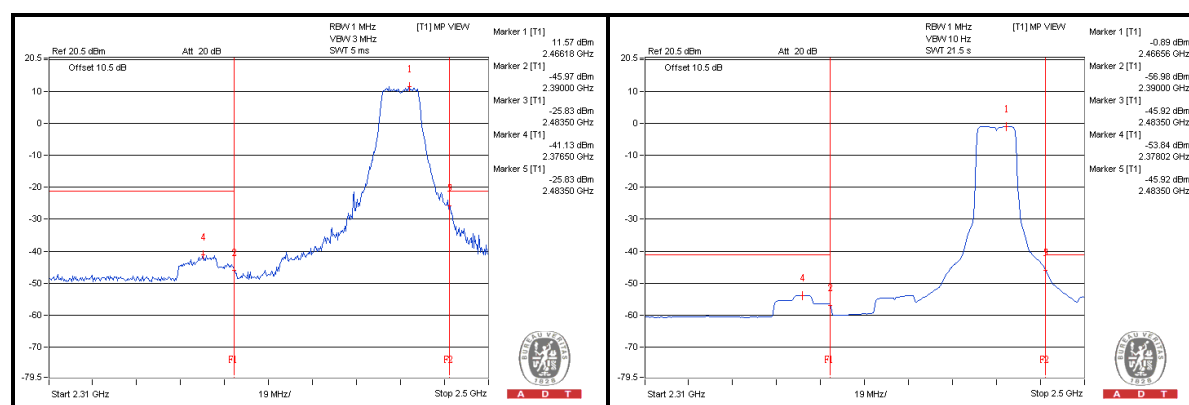
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2376.5 PK	57.75	74	-16.25	-41.13	3.62	-37.51
2	2378.02 AV	45.04	54	-8.96	-53.84	3.62	-50.22
3	2483.66 PK	72.92	74	-1.08	-25.96	3.62	-22.34
4	2483.66 AV	52.75	54	-1.25	-46.13	3.62	-42.51

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11n (HT20) - Channel 1

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4840.625 PK	50.08	74	-23.92	-48.8	3.62	-45.18
2	4825 AV	39.66	54	-14.34	-59.22	3.62	-55.6

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

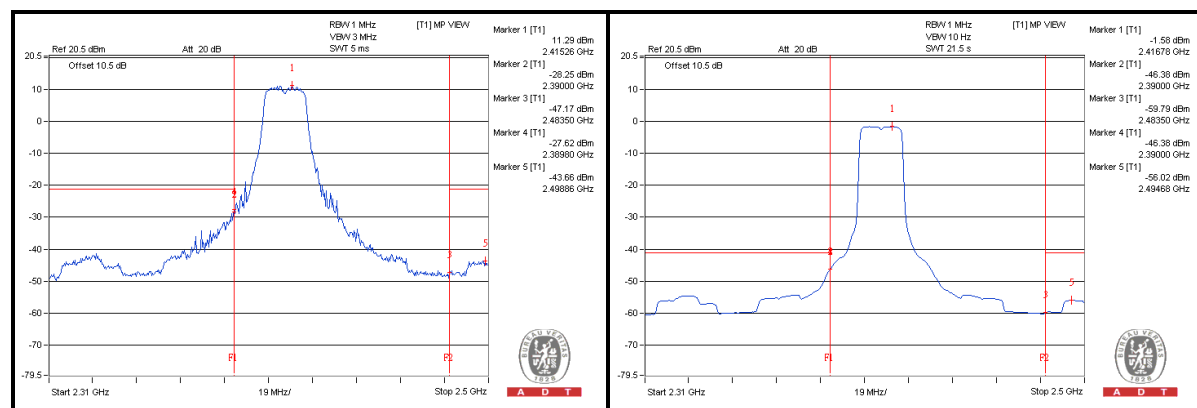
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2389.8 PK	71.26	74	-2.74	-27.62	3.62	-24
2	2389.8 AV	52.29	54	-1.71	-46.59	3.62	-42.97
3	2498.86 PK	55.22	74	-18.78	-43.66	3.62	-40.04
4	2494.68 AV	42.86	54	-11.14	-56.02	3.62	-52.4

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11n (HT20) - Channel 6

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4871.875 PK	55.44	74	-18.56	-43.44	3.62	-39.82
2	4875 AV	44.33	54	-9.67	-54.55	3.62	-50.93
3	7318.75 PK	51.66	74	-22.34	-47.22	3.62	-43.6
4	7318.75 AV	40.61	54	-13.39	-58.27	3.62	-54.65

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

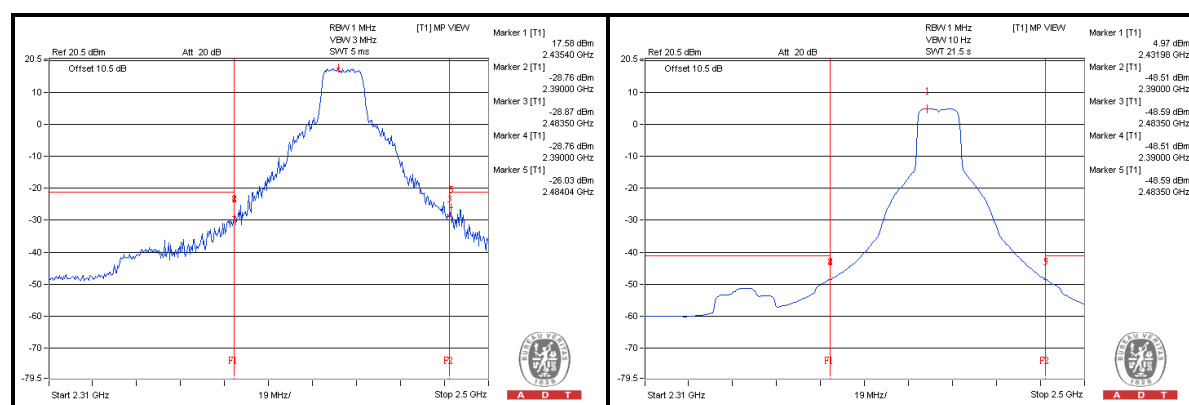
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2389.8 PK	69.84	74	-4.16	-29.04	3.62	-25.42
2	2389.8 AV	50.28	54	-3.72	-48.6	3.62	-44.98
3	2484.04 PK	72.85	74	-1.15	-26.03	3.62	-22.41
4	2483.66 AV	50.23	54	-3.77	-48.65	3.62	-45.03

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11n (HT20) - Channel 11

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4915.625 PK	50.6	74	-23.4	-48.28	3.62	-44.66
2	4925 AV	39.61	54	-14.39	-59.27	3.62	-55.65
3	7400 PK	51.24	74	-22.76	-47.64	3.62	-44.02
4	7381.25 AV	40.57	54	-13.43	-58.31	3.62	-54.69

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

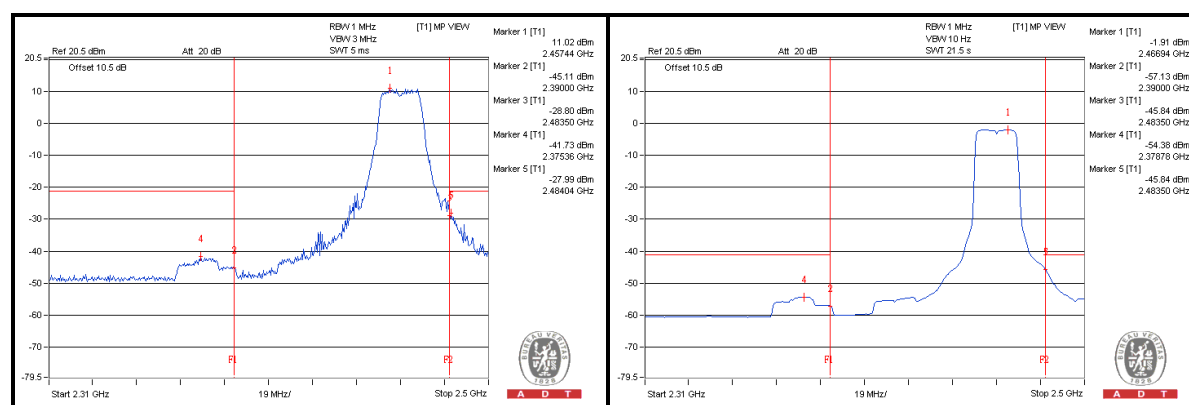
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2375.36 PK	57.15	74	-16.85	-41.73	3.62	-38.11
2	2378.4 AV	44.5	54	-9.5	-54.38	3.62	-50.76
3	2484.04 PK	70.89	74	-3.11	-27.99	3.62	-24.37
4	2483.66 AV	52.88	54	-1.12	-46	3.62	-42.38

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11n (HT40) - Channel 3

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4843.75 PK	51.6	74	-22.4	-47.28	3.62	-43.66
2	4837.5 AV	39.22	54	-14.78	-59.66	3.62	-56.04

Note :

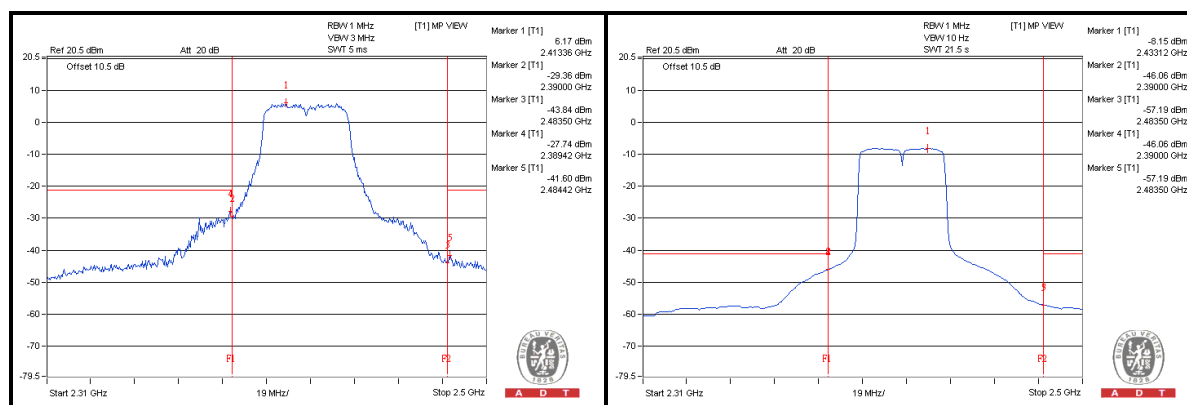
Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.

Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2389.42 PK	71.14	74	-2.86	-27.74	3.62	-24.12
2	2389.42 AV	52.74	54	-1.26	-46.14	3.62	-42.52
3	2484.42 PK	57.28	74	-16.72	-41.6	3.62	-37.98
4	2483.66 AV	41.68	54	-12.32	-57.2	3.62	-53.58

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8
d = measurement distance in 3 meters.



802.11n (HT40) - Channel 6

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4865.625 PK	50.04	74	-23.96	-48.84	3.62	-45.22
2	4875 AV	39.35	54	-14.65	-59.53	3.62	-55.91
3	7293.75 PK	52.13	74	-21.87	-46.75	3.62	-43.13
4	7318.75 AV	40.37	54	-13.63	-58.51	3.62	-54.89

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

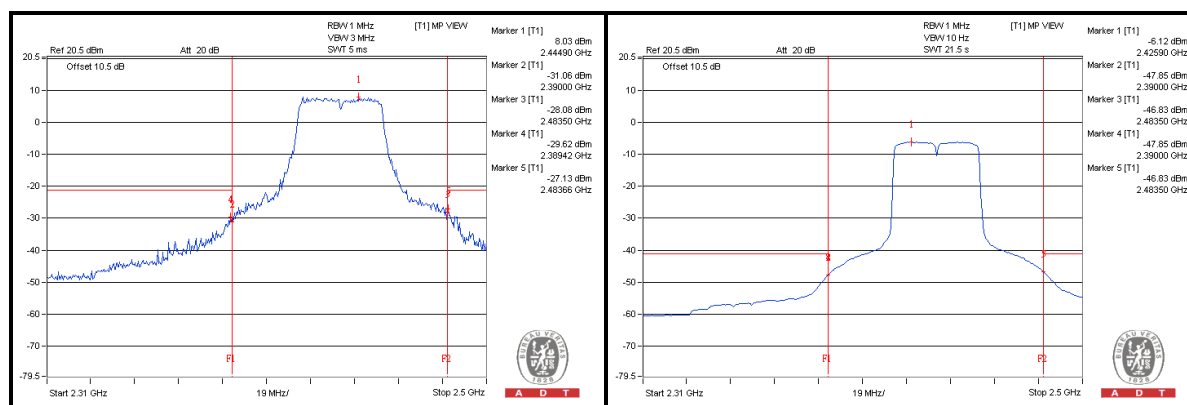
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2389.42 PK	69.26	74	-4.74	-29.62	3.62	-26
2	2389.8 AV	50.88	54	-3.12	-48	3.62	-44.38
3	2483.66 PK	71.75	74	-2.25	-27.13	3.62	-23.51
4	2483.66 AV	51.95	54	-2.05	-46.93	3.62	-43.31

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



802.11n (HT40) - Channel 9

Conducted spurious emission table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	4918.75 PK	49.39	74	-24.61	-49.49	3.62	-45.87
2	4915.625 AV	39.27	54	-14.73	-59.61	3.62	-55.99
3	7400 PK	51.29	74	-22.71	-47.59	3.62	-43.97
4	7384.375 AV	40.56	54	-13.44	-58.32	3.62	-54.7

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.

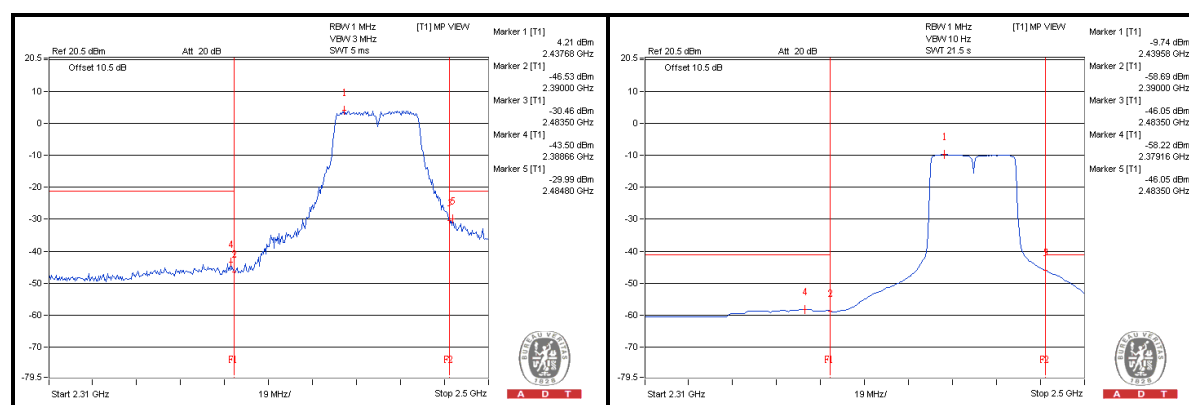
Bandedge table

No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw Value (dBm)	Correction Factor (dB)	EIRP Level (dBm)
1	2388.66 PK	55.38	74	-18.62	-43.5	3.62	-39.88
2	2379.16 AV	40.66	54	-13.34	-58.22	3.62	-54.6
3	2484.8 PK	68.89	74	-5.11	-29.99	3.62	-26.37
4	2483.66 AV	52.78	54	-1.22	-46.1	3.62	-42.48

Note :

Emission Level (dBuV/m) = EIRP Level (dBm) – 20log(d) + 104.8

d = measurement distance in 3 meters.



4.8 AC POWER LINE CONDUCTED EMISSION MEASUREMENT

4.8.1 LIMITS OF AC POWER LINE CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50

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

4.8.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Mar. 08, 2013	Mar. 07, 2014
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK8127	8127-522	Sep. 05, 2013	Sep. 04, 2014
Line-Impedance Stabilization Network (for Peripheral)	ENV216	100072	June 06, 2013	June 05, 2014
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 11, 2013	Mar. 10, 2014
50 ohms Terminator	50	EMC-03	Sep. 24, 2013	Sep. 23, 2014
Software ADT	BV ADT_Cond_V7.3.7. 3	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. C.
3. The VCCI Con C Registration No. is C-3611.
4. Tested Date: Nov. 28, 2013

4.8.3 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) were not recorded.

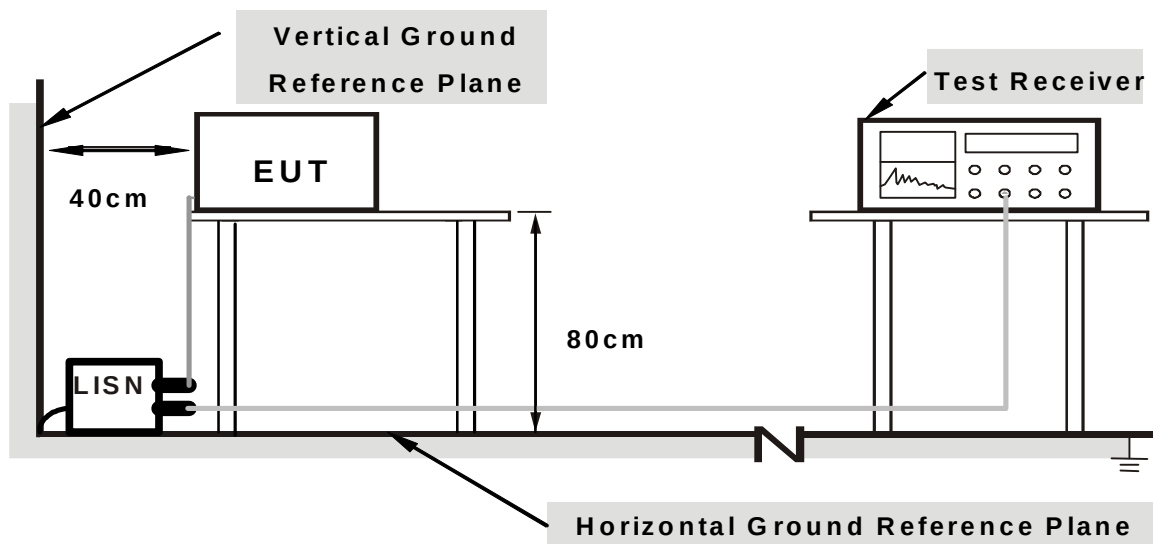
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.8.5 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.8.6 EUT OPERATING CONDITIONS

Same as Item 4.7.6

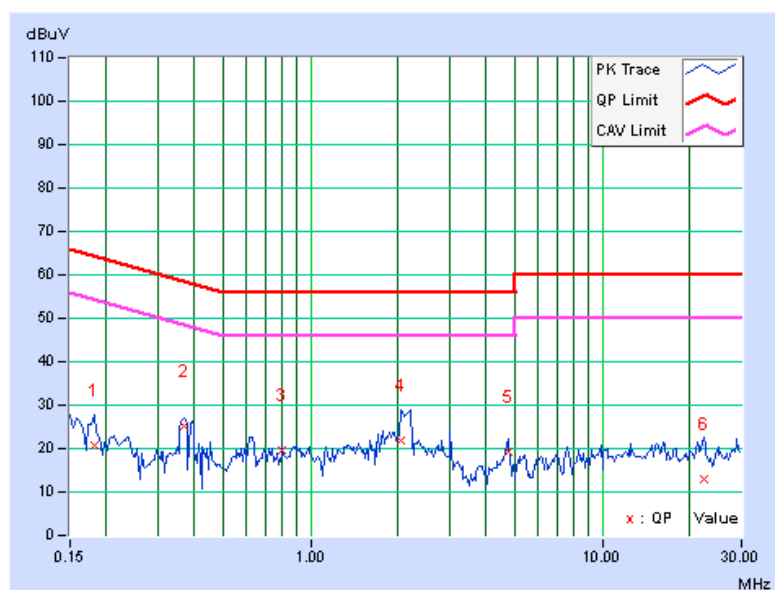
4.8.7 TEST RESULTS (MODE 1)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.18125	0.09	20.50	13.98	20.59	14.07	64.43	54.43	-43.84	-40.36
2	0.36875	0.13	24.97	23.71	25.10	23.84	58.53	48.53	-33.43	-24.69
3	0.80234	0.16	19.44	14.10	19.60	14.26	56.00	46.00	-36.40	-31.74
4	2.03906	0.21	21.56	14.80	21.77	15.01	56.00	46.00	-34.23	-30.99
5	4.75781	0.30	18.86	13.50	19.16	13.80	56.00	46.00	-36.84	-32.20
6	22.40625	0.78	12.09	7.57	12.87	8.35	60.00	50.00	-47.13	-41.65

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

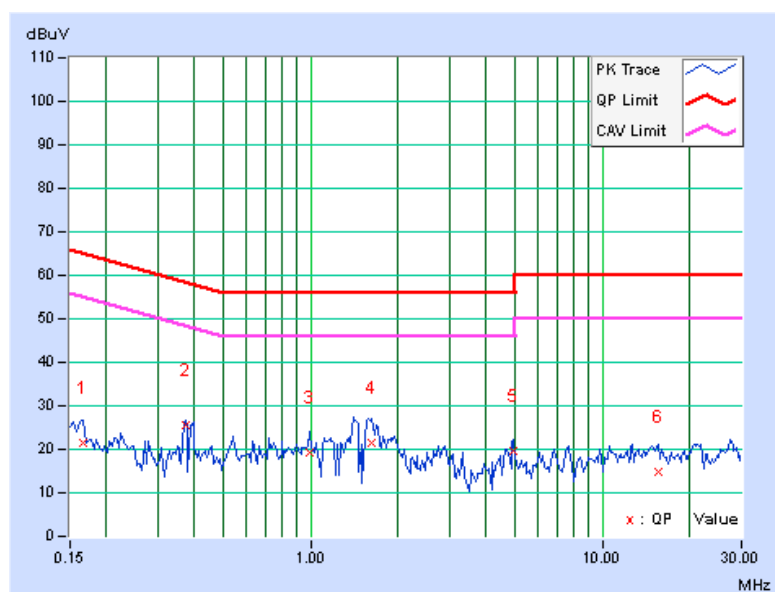


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.09	21.30	16.02	21.39	16.11	65.18	55.18	-43.78	-39.06
2	0.37266	0.13	25.38	24.95	25.51	25.08	58.44	48.44	-32.93	-23.36
3	0.99375	0.17	19.00	13.60	19.17	13.77	56.00	46.00	-36.83	-32.23
4	1.62891	0.20	21.46	14.43	21.66	14.63	56.00	46.00	-34.34	-31.37
5	4.97266	0.31	19.47	6.54	19.78	6.85	56.00	46.00	-36.22	-39.15
6	15.60938	0.63	14.00	8.34	14.63	8.97	60.00	50.00	-45.37	-41.03

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



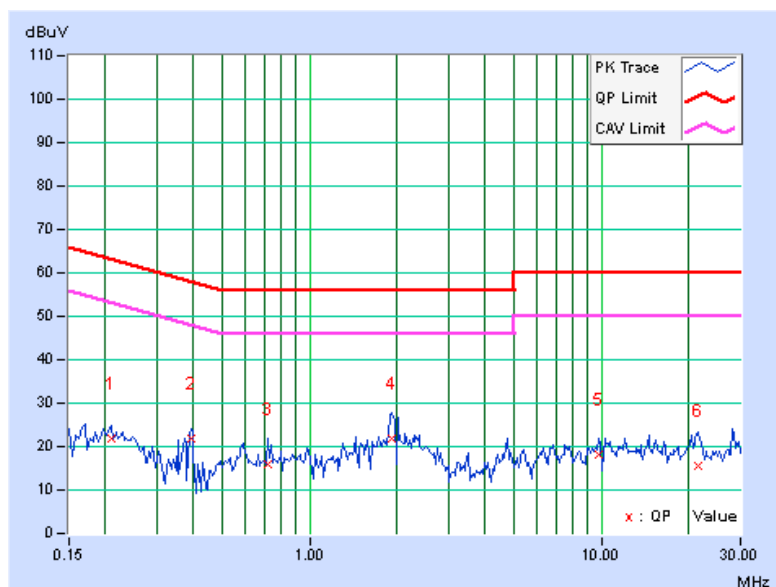
4.8.8 TEST RESULTS (MODE 2)

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.20859	0.10	21.75	15.92	21.85	16.02	63.26	53.26	-41.41	-37.24
2	0.39219	0.14	21.85	20.75	21.99	20.89	58.02	48.02	-36.03	-27.13
3	0.71641	0.16	15.78	8.63	15.94	8.79	56.00	46.00	-40.06	-37.21
4	1.92578	0.21	21.77	12.14	21.98	12.35	56.00	46.00	-34.02	-33.65
5	9.78516	0.46	17.78	12.58	18.24	13.04	60.00	50.00	-41.76	-36.96
6	21.53906	0.76	14.75	9.87	15.51	10.63	60.00	50.00	-44.49	-39.37

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

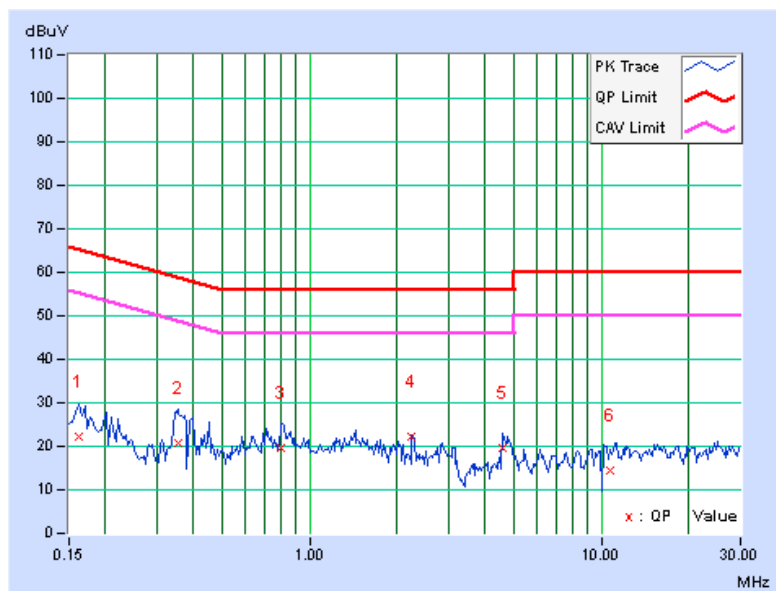


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)
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	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.09	22.10	14.83	22.19	14.92	65.38	55.38	-43.18	-40.45
2	0.35313	0.13	20.59	16.68	20.72	16.81	58.89	48.89	-38.17	-32.08
3	0.80234	0.16	19.60	13.39	19.76	13.55	56.00	46.00	-36.24	-32.45
4	2.24609	0.23	22.00	13.44	22.23	13.67	56.00	46.00	-33.77	-32.33
5	4.58984	0.30	19.21	13.98	19.51	14.28	56.00	46.00	-36.49	-31.72
6	10.69531	0.49	14.06	8.90	14.55	9.39	60.00	50.00	-45.45	-40.61

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. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

5. 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.

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



A D T

6. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

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