



**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 1**

CERTIFICATION TEST REPORT

FOR

802.11b/g/n 1X1 WLAN + Bluetooth Atlas

MODEL NUMBER: Atlas001

**FCC ID: ZVAOH00003
IC: 9976A-OH00003**

REPORT NUMBER: 4787541345-3

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Prepared for

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Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6db Bandwidth	FCC 15.247 (a) (2) IC RSS-247 Clause 5.2 (1)	Complied
2	Peak Conducted Output Power	FCC 15.247 (b) (3) IC RSS-247 Clause 5.4 (4)	Complied
3	Power Spectral Density	FCC 15.247 (3) IC RSS-247 Clause 5.2 (2)	Complied
4	Conducted Bandedge and Spurious	FCC 15.247 (d) IC RSS-247 Clause 5.5	Complied
5	Radiated Bandedge and Spurious	FCC 15.247 (d) FCC 15.209 FCC 15.205 IC RSS-247 Clause 5.5 IC RSS-GEN Clause 8.9	Complied
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	Complied

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1. ATTESTATION OF TEST RESULTS**Applicant Information**

Company Name: TCL Technoly Electronics(Huizhou) Co.,Ltd

Address: Section 37, Zhongkai High-tech Development Zone, Huizhou City, Guang Dong Province, China, 516006.

Manufacturer Information

Company Name: Same as applicant

Address: Same as applicant

EUT Description

Product Name Atlas
 Brand Name TrackR
 Model Name Atlas001
 Serial Number N/A
 Model Difference N/A
 Date Tested July 25, 2016 ~ August 5, 2016

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-247 Issue 1	Pass
INDUSTRY CANADA RSS-GEN Issue 4	Pass

Tested By :

Miller Ma

Check By:

Shawn Wen

 Gary Zhang
 Engineer Project Associate

 Shawn Wen
 Laboratory Leader

Approved By:

Shawn Wen

 Shawn Wen
 Laboratory Leader

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-247 Issue 1.

3. FACILITIES AND ACCREDITATIO

Test Location	Shenzhen Huatongwei International Inspection Co., Ltd.
Address	1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China Phone: 86-755-26748019 Fax: 86-755-26748089
Accreditation Certificate	<p>Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.</p> <p>Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.</p> <p>The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.</p> <p>Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.</p>
Description	All measurement facilities use to collect the measurement data are located at 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Conducted Disturbance, 0.15 to 30 MHz	± 3.39 dB
Radiated Disturbance, 9k to 30 MHz	± 2.20 dB
Radiated Disturbance, 30 to 1000 MHz	± 4.24 dB
Radiated Disturbance, 1 to 18 GHz	± 5.16 dB
Radiated Disturbance, 18 to 40 GHz	± 5.54 dB

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is an 802.11b/g/n 1X1 WLAN + Bluetooth Atlas.

5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit chains (NTX)	IEE Std. 802.11	Frequency (MHz)	Channel Number	Max Output Power (dBm)
2400-2483.5	1	b	2412-2462	1-11[11]	16.86
2400-2483.5	1	g	2412-2462	1-11[11]	22.72
2400-2483.5	1	n(HT20)	2412-2462	1-11[11]	21.71

5.3. CHANNEL LIST

Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452		

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel Number	Test Channel
WiFi TX(802.11b)	CH 01, CH 06, CH 11	Low, Middle, High
WiFi TX(802.11g)	CH 01, CH 06, CH 11	Low, Middle, High
WiFi TX(802.11n HT20)	CH 01, CH 06, CH 11	Low, Middle, High

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worst Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software Version (CC3100 & CC3200 Radio Tool GUI)		Test Channel					
Modulation Mode	Transmit Antenna Number	NCB: 20MHz			NCB: 40MHz		
		CH 01	CH 06	11	CH 03	CH 06	CH 9
802.11b	1	0	0	0	N/A		
802.11g	1	0	0	0			
802.11n HT20	1	0	0	0			

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
2(WIFI)	2400-2483.5	Chip Antenna	3.37

EE Std. 802.11	Transmit and Receive Mode	Description	Worst Case (Transmit chain for use)
b	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1be used as transmitting/receiving antenna .	<input checked="" type="checkbox"/> Chain 1
g	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1be used as transmitting/receiving antenna .	<input checked="" type="checkbox"/> Chain 1
g	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1be used as transmitting/receiving antenna .	<input checked="" type="checkbox"/> Chain 1
n(MCS0-7)	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1be used as transmitting/receiving antenna .	<input checked="" type="checkbox"/> Chain 1

Note: 1. The EUT not supports the diversity function for WLAN.
 2. All the modes had been tested but only the worst data in the report.

Chain 1



5.7. WORST-CASE CONFIGURATIONS

IEE Std. 802.11	Modulation Technology	Modulation Type	Data Rate (Mbps)	Worst Case (Mbps)
b	DSSS	DBPSK, DQPSK, CCK	11/5.5/2/1	1
g	OFDM	BPSK, QPSK, 16QAM, 64QAM	54/48/36/24/18/12/9/6	6
n(HT20)	OFDM	BPSK, QPSK, 16QAM, 64QAM	(MCS0~MCS15)	MCS0

5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	N/A	N/A	N/A	N/A

I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	N/A	N/A	N/A	N/A	N/A

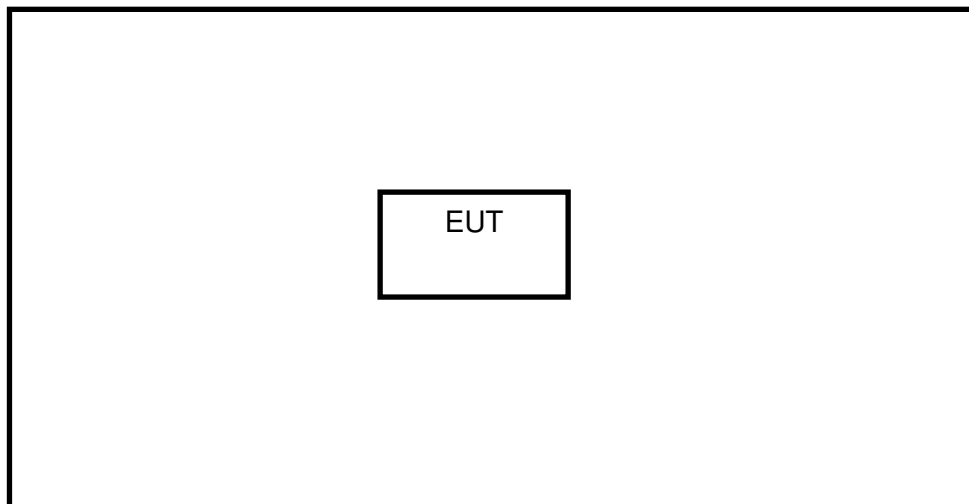
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A:

TEST SETUP

The EUT have the engineer mode inside.

SETUP DIAGRAM FOR TEST



6. MEASURING INSTRUMENT AND SOFTWARE USED

Instrument(Conducted for RF Port)						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	Spectrum Analyzer	R&S	FSV40	100048	Nov.3,2015	Nov.3,2016
Instrument (Line Conducted Emission (AC Main))						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESCI	101247	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Artificial Mains	SCHWARZ BECK	NNLK 8121	573	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Pulse Limiter	R&S	ESH3-Z2	101488	Nov.3,2015	Nov.3,2016
<input checked="" type="checkbox"/>	Test Software	R&S	ES-K1	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Adapter (see note)	HUNTKEY	HW-050100C2W	HWHKAPE51309936	-	-
Instrument (Radiated Tests)						
Use d	Equipment	Manufactur er	Model No.	Serial No.	Last Cal.	Expired date
<input checked="" type="checkbox"/>	EMI Test Receiver	Rohde&Schwarz	ESI 26	100009	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	RF Test Panel	Rohde&Schwarz	TS / RSP	335015/0017	N/A	N/A
<input checked="" type="checkbox"/>	EMI Test Software	Rohde&Schwarz	ESK1	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Ultra-Broadband Antenna	ShwarzBec k	VULB9163	538	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Horn Antenna	ShwarzBec k	9120D	1011	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Loop Antenna	Rohde&Schwarz	HZ-9	838622\013	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Broadband Horn Antenna	ShwarzBec k	BBHA9170	BBHA9170472	Nov.8,2015	Nov.8,2016
<input checked="" type="checkbox"/>	Broadband Preamplifier	SCHWARZ BECK	BBV 9718	9718-247	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	Broadband Preamplifier	SCHWARZ BECK	BBV 9721	9721-102	Nov.2,2015	Nov.2,2016
<input checked="" type="checkbox"/>	Turn Table	MATURO	TT2.0	----	N/A	N/A
<input checked="" type="checkbox"/>	Antenna Mast	MATURO	TAM-4.0-P	----	N/A	N/A

<input checked="" type="checkbox"/>	EMI Test Software	Audix	E3	N/A	N/A	N/A
<input checked="" type="checkbox"/>	Test cable	Siva Cables Italy	RG 58A/U	W14.02	Nov.5,2015	Nov.5,2016

6.1. MEASUREMENT METHODS

No.	Test Item	Standard Name	Section
1	6 dB DTS Bandwidth	ANSI C63.10-2013	11.8.1
2	Maximum Conducted Peak Output Power	ANSI C63.10-2013	11.9.1.2
3	Maximum Power Spectral Density	ANSI C63.10-2013	11.10.2
4	Out-Of-Band Emissions in Non-Restricted Bands	ANSI C63.10-2013	11.11
5	Out-Of-Band Emissions in Restricted Bands	ANSI C63.10-2013	11.12
6	Band-Edge	ANSI C63.10-2013	11.13.3.2
7	AC POWER LINE CONDUCTED EMISSIONS	ANSI C63.4-2014	7.3

7. ANTENNA PORT TEST RESULTS

7.1. 6 dB DTS BANDWIDTH

LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (a) (2) IC RSS-247 Clause 5.2 (1)	6 dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5

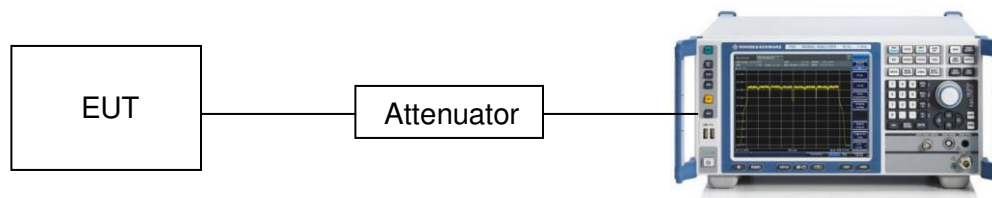
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



TEST CONDITIONS

Temperature: 28°C

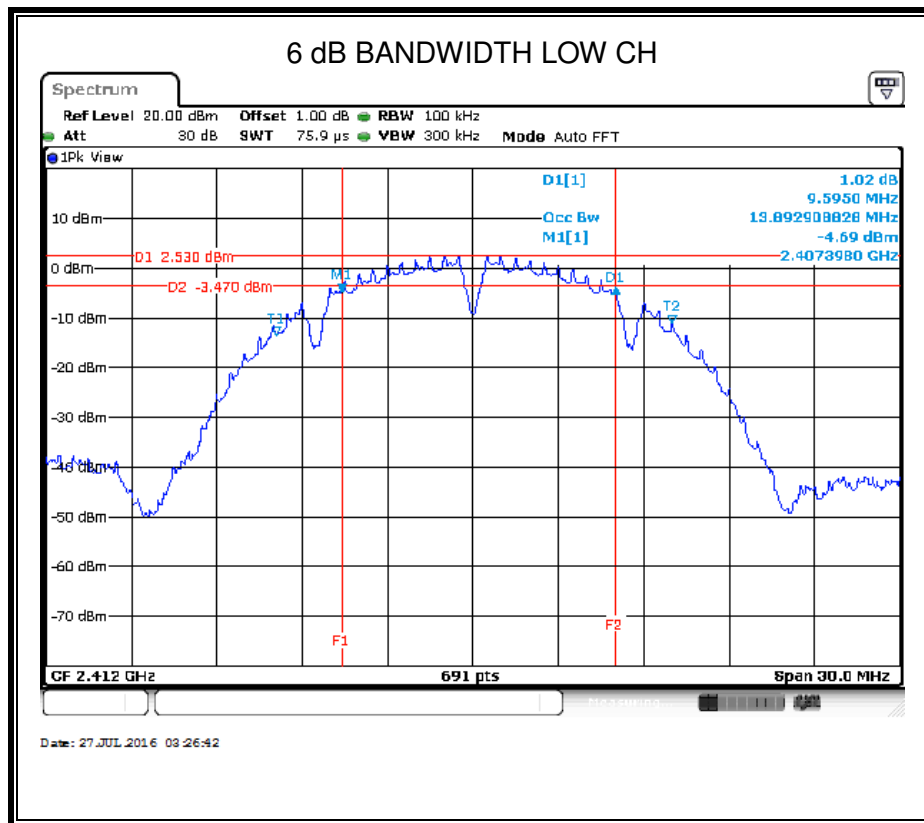
Relative Humidity: 60%

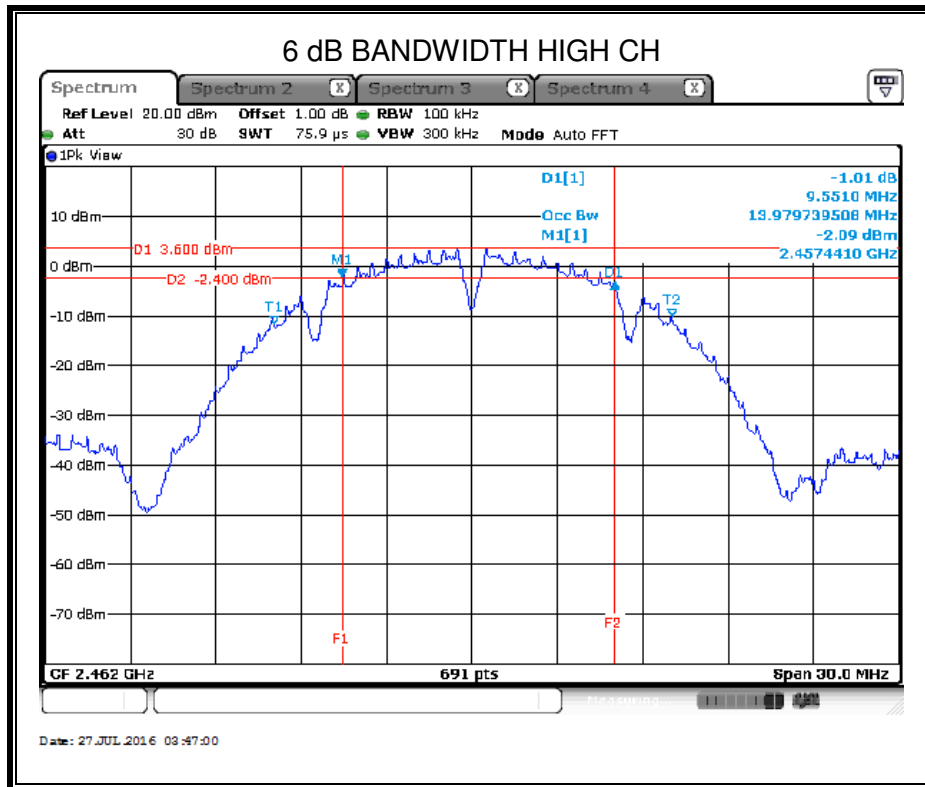
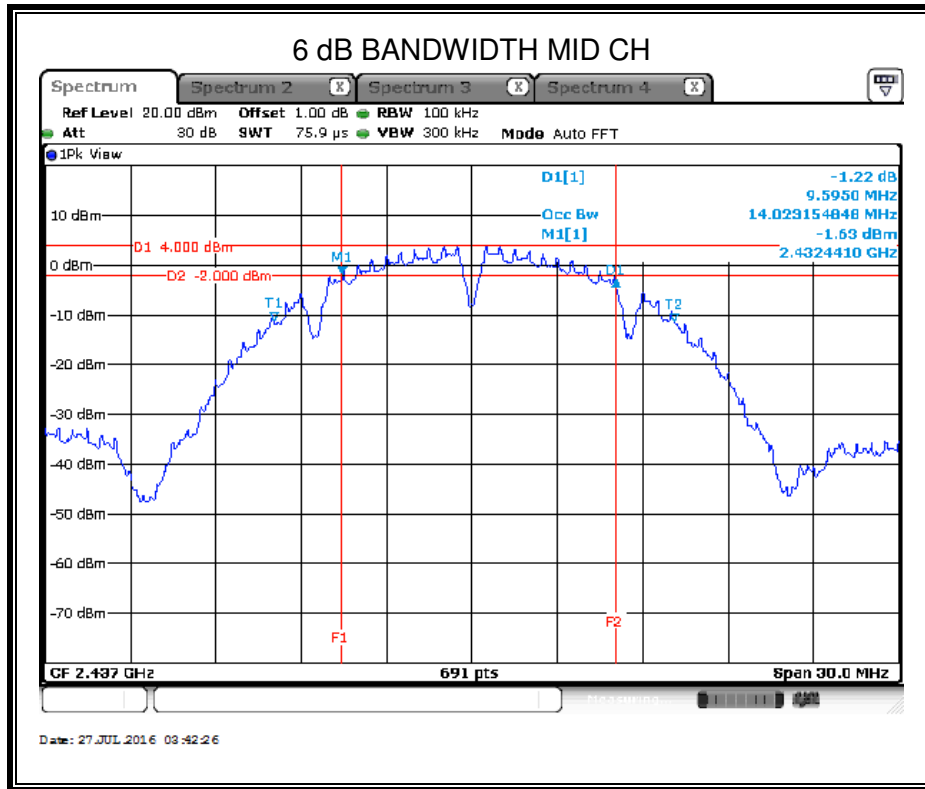
Test Voltage: AC 120V/60Hz

RESULTS

7.1.1. 802.11b MODE

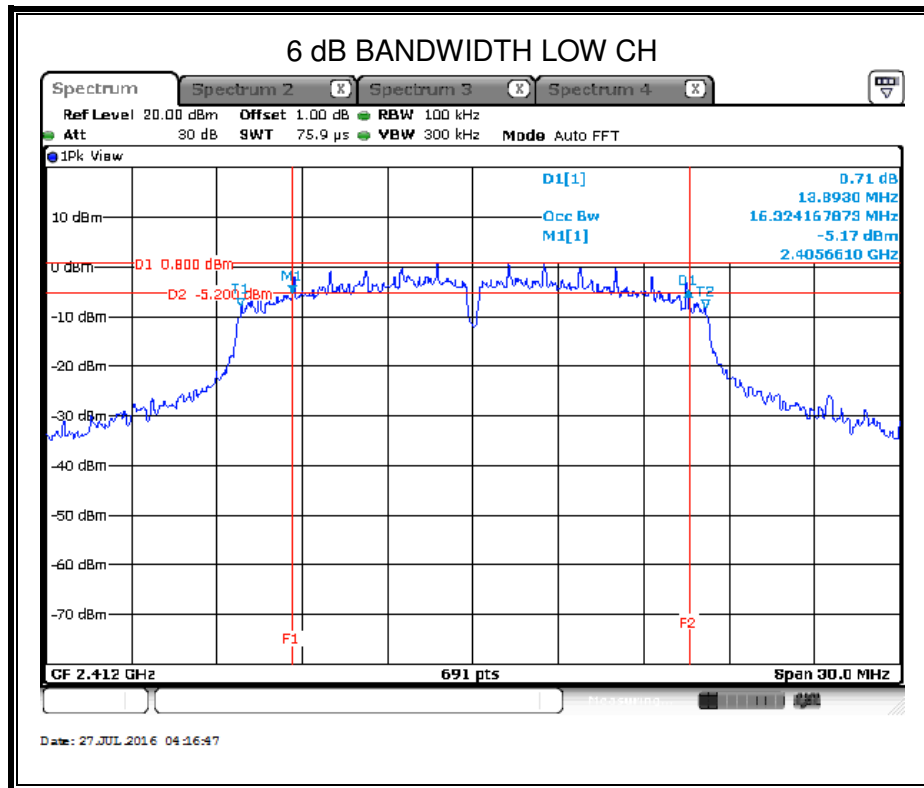
Channel	Frequency (MHz)	6dB bandwidth (KHz)	Limit (kHz)	Result
Low	2412	9595.00	500	Pass
Middle	2437	9595.00	500	Pass
High	2462	9551.00	500	Pass

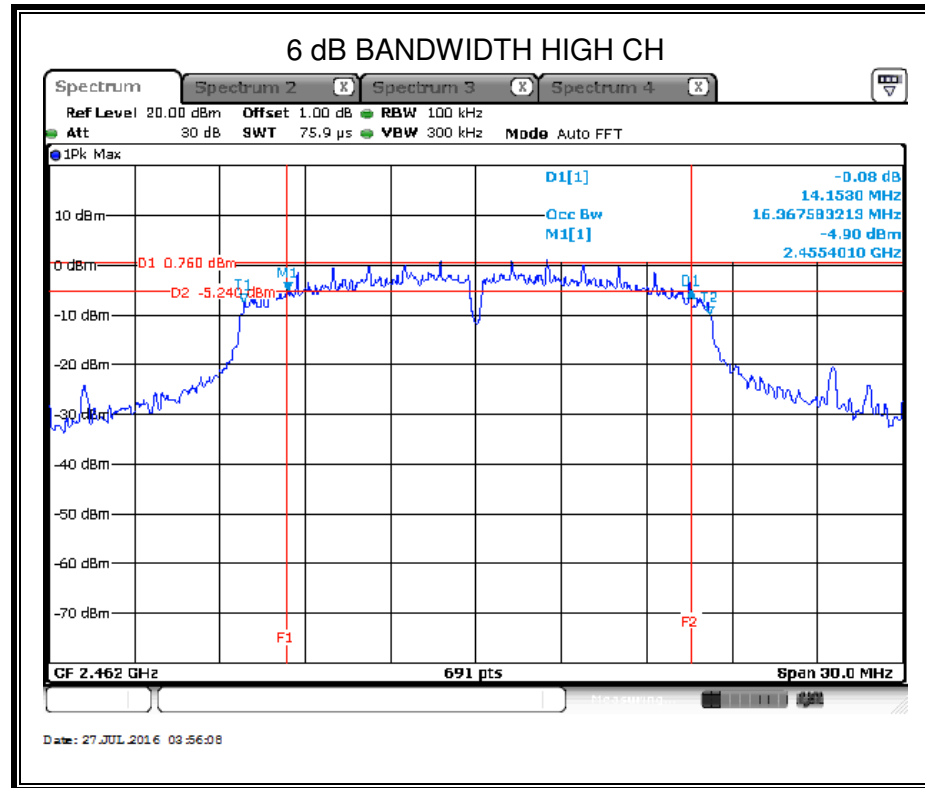
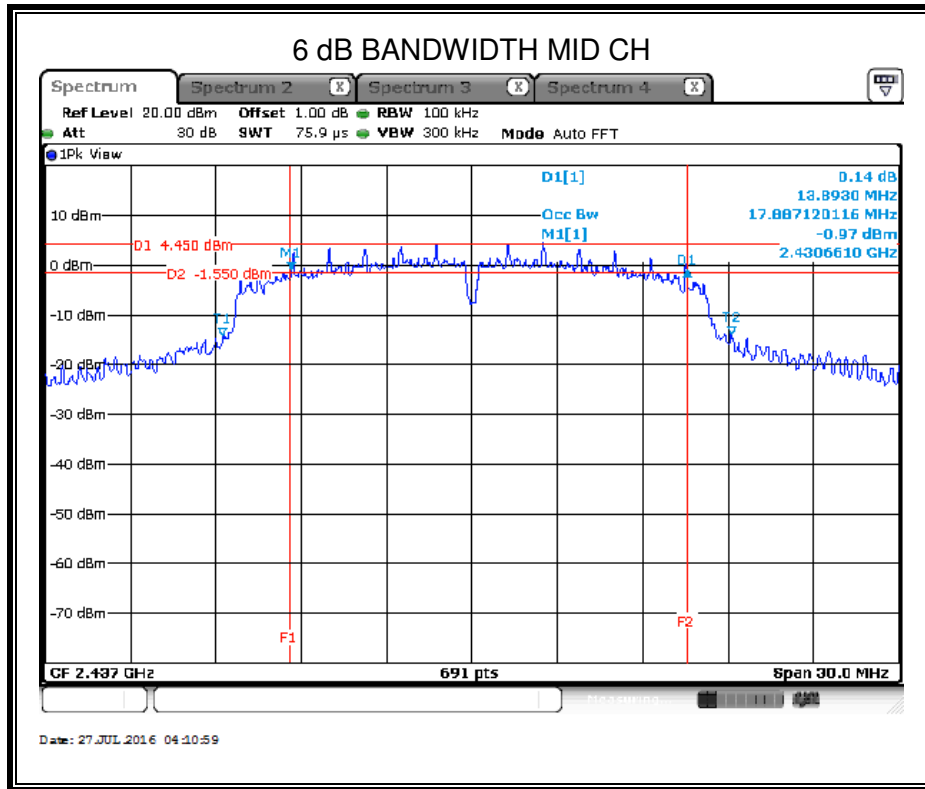




7.1.2. 802.11g MODE

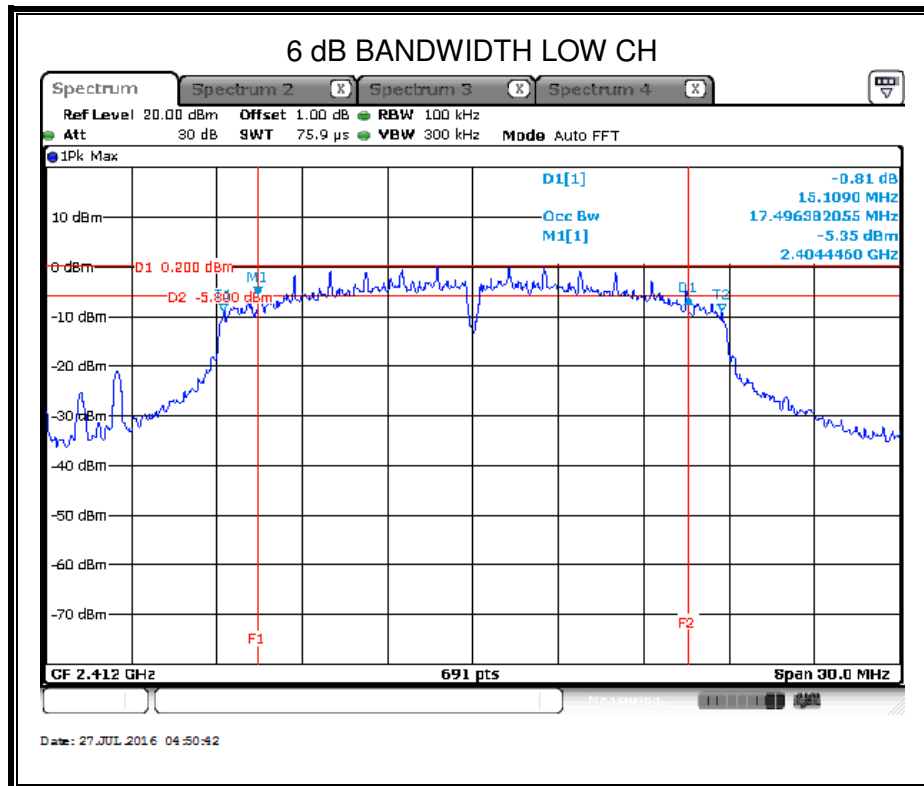
Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2412	13893.00	500	Pass
Middle	2437	13893.00	500	Pass
High	2462	14153.00	500	Pass

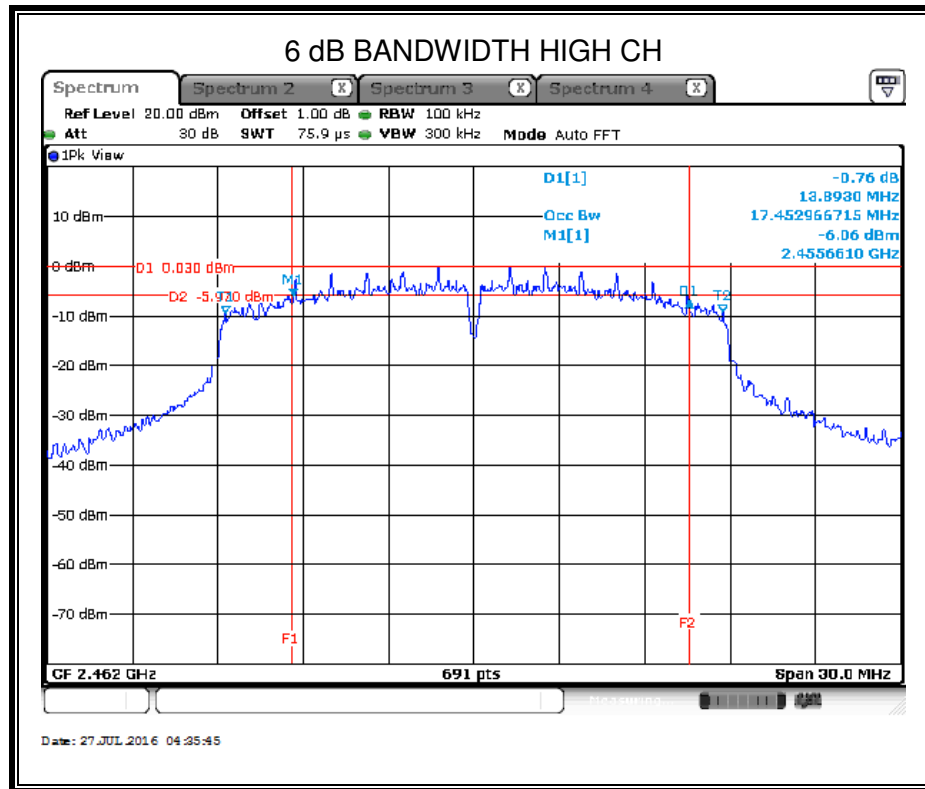
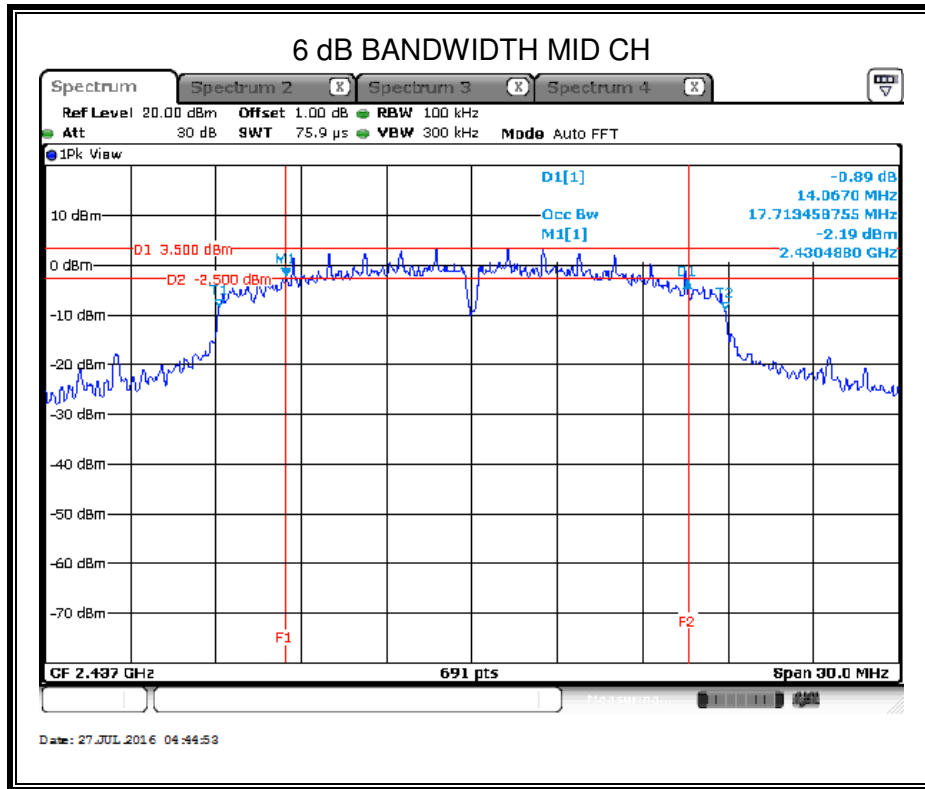




7.1.3. 802.11n HT 20 MODE

Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2412	15109.00	500	Pass
Middle	2437	14067.00	500	Pass
High	2462	13893.00	500	Pass





7.2. PEAK CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247 (b) (3) IC RSS-247 Clause 5.4 (4)	Peak Conducted Output Power	1 watt or 30dBm	2400-2483.5

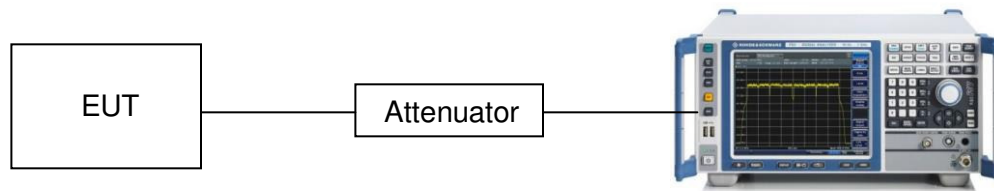
TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
RBW	1MHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Detector	Peak
Sweep time	Auto couple.
Trace	Max hold

Allow trace to fully stabilize and use the instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges (for some instruments, this may require a manual override to select the peak detector). If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the DTS channel bandwidth.

TEST SETUP



TEST CONDITIONS

Temperature: 28°C

Relative Humidity: 60%

Test Voltage: AC 120V/60Hz

RESULTS

Each data rate test results:

Mode	Data rate	Frequency	Conducted Output Power(PK)
		(MHz)	(dBm)
802.11b	1Mbps	2412	15.56
	2Mbps	2412	15.48
	5.5Mbps	2412	15.16
	11Mbps	2412	14.93
802.11g	6Mbps	2412	19.41
	9Mbps	2412	19.36
	12Mbps	2412	19.25
	18Mbps	2412	19.12
	24Mbps	2412	18.98
	36Mbps	2412	18.86
	48Mbps	2412	18.77
	54Mbps	2412	18.64
802.11n(HT20)	MCS0	2412	18.87
	MCS1	2412	18.65
	MCS2	2412	18.53
	MCS3	2412	18.41
	MCS4	2412	18.22
	MCS5	2412	17.93
	MCS6	2412	17.88
	MCS7	2412	17.76

The worst data rate for each modulation type :

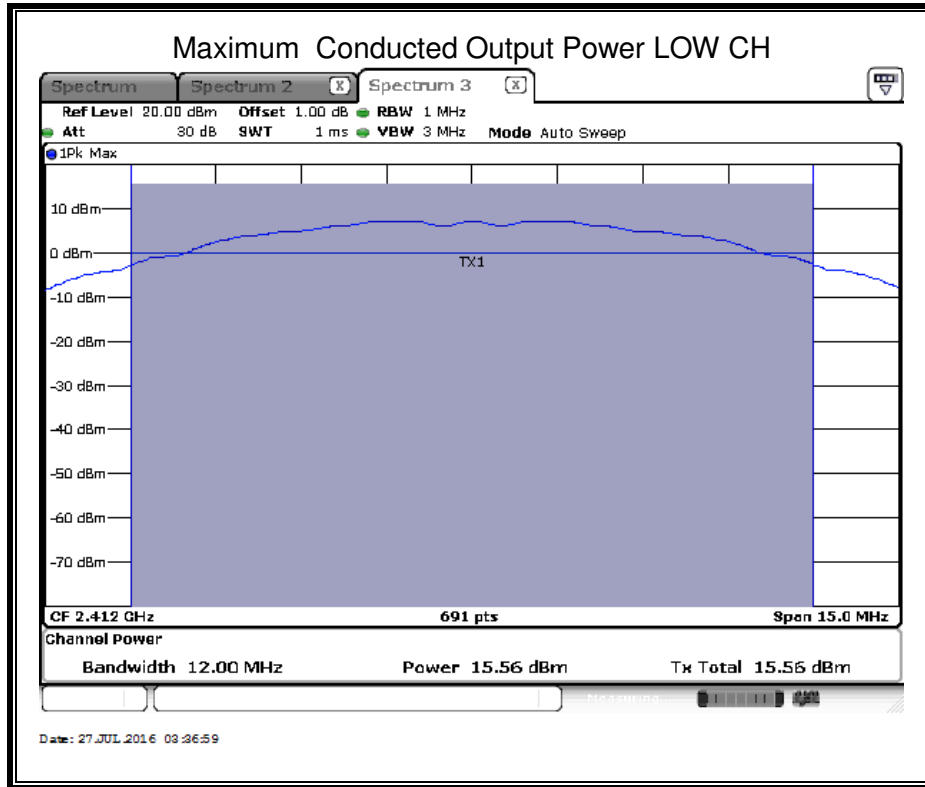
802.11b mode: 1Mbps

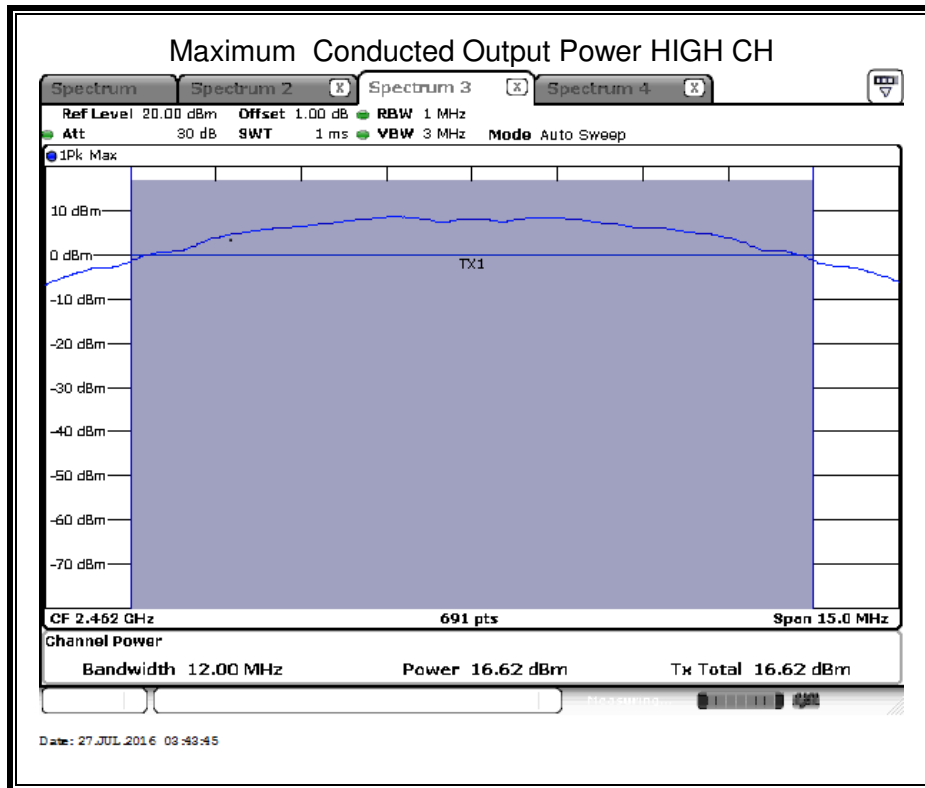
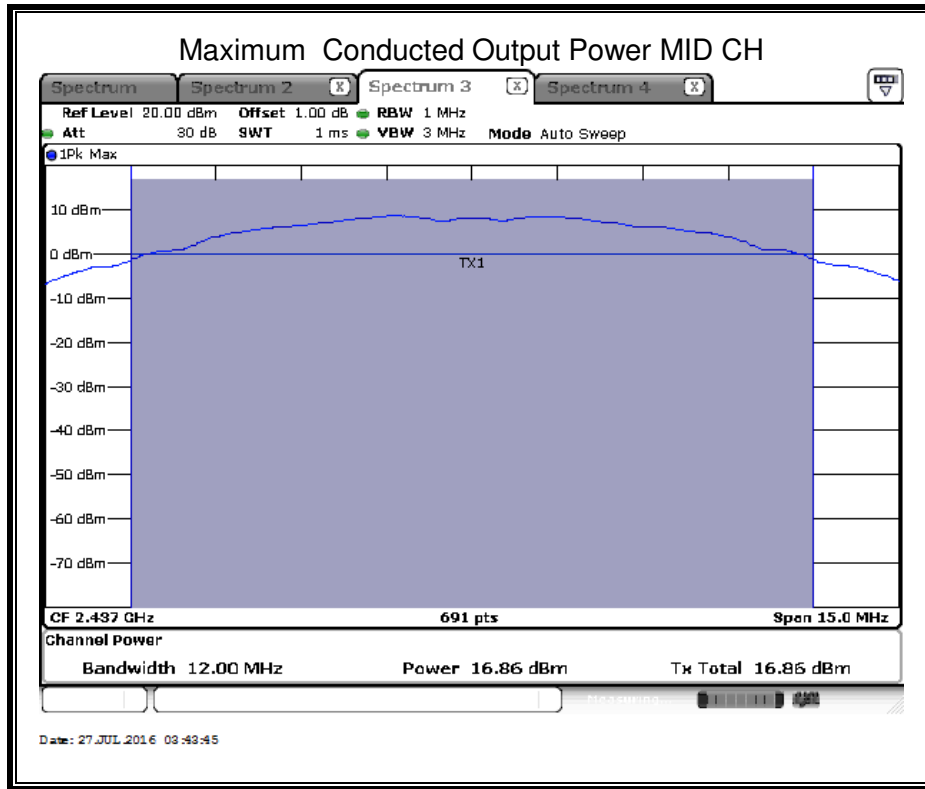
802.11g mode: 6Mbps

802.11n HT20 mode : 6.5Mbps

7.2.1. 802.11b MODE

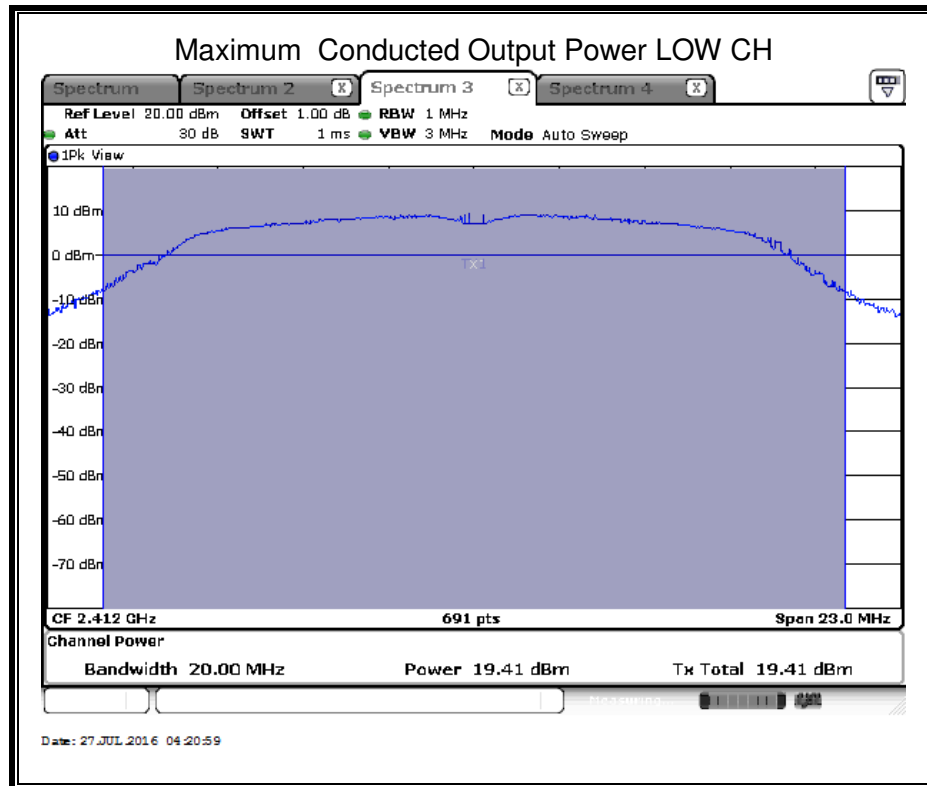
Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	15.56	30
Middle	2437	16.86	30
High	2462	16.52	30

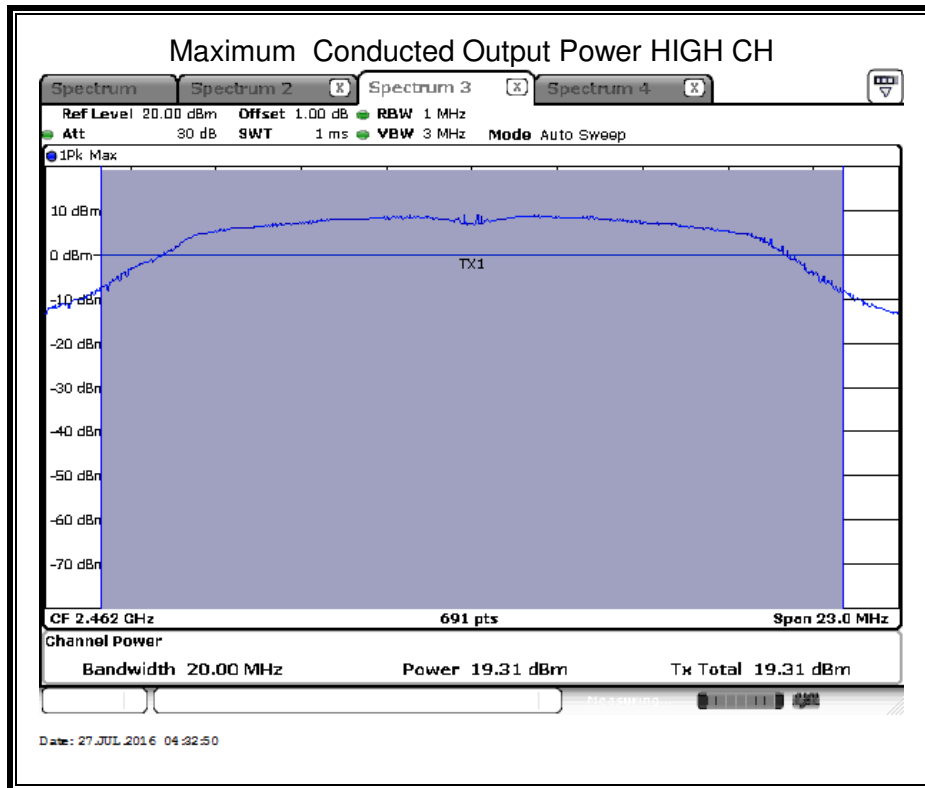
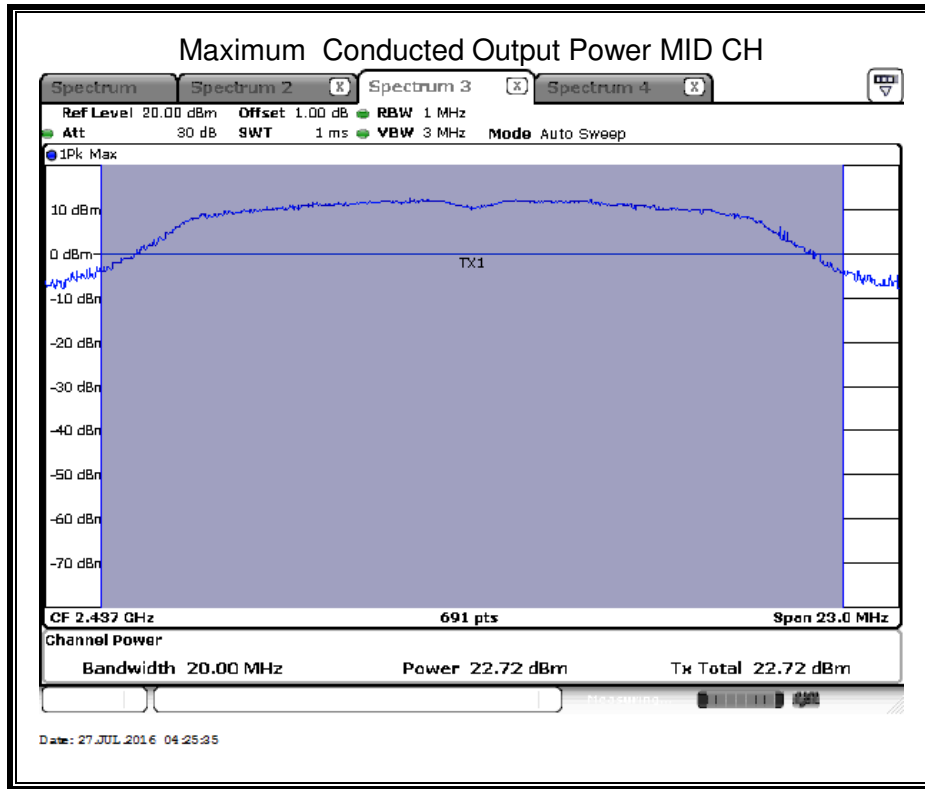




7.2.2. 802.11g MODE

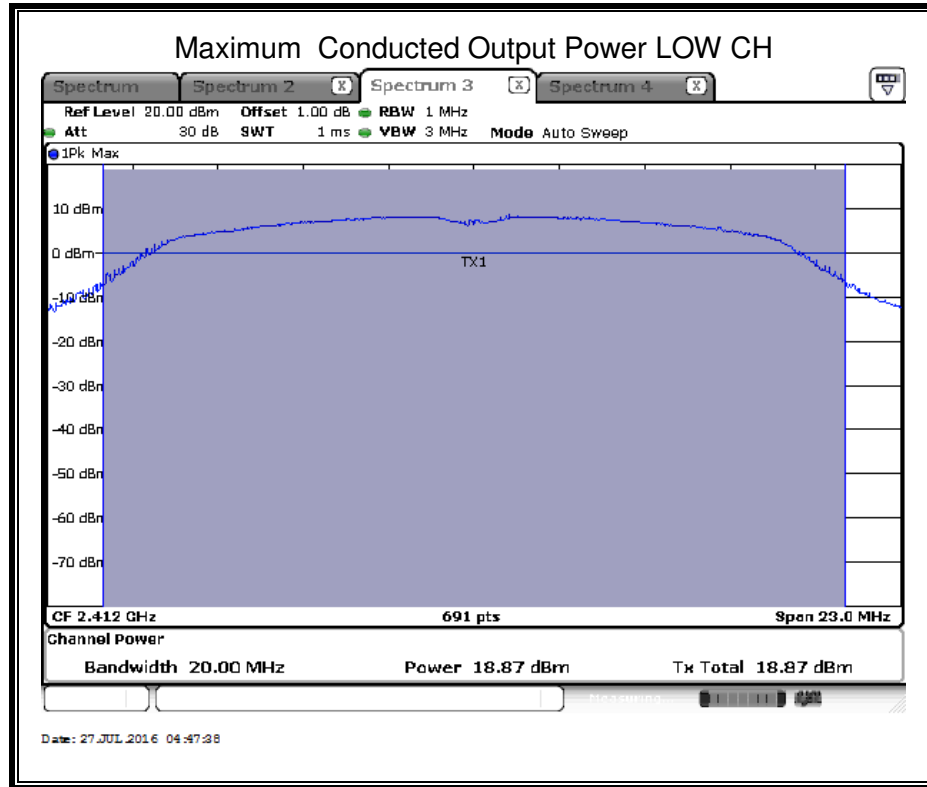
Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	19.41	30
Middle	2437	22.72	30
High	2462	19.31	30

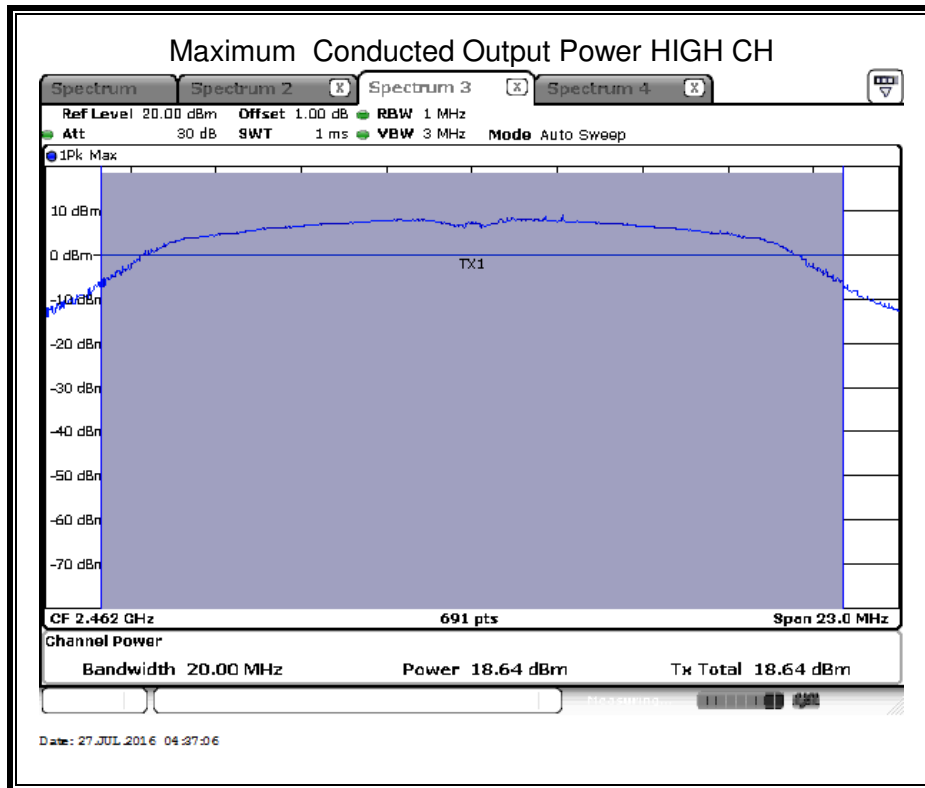
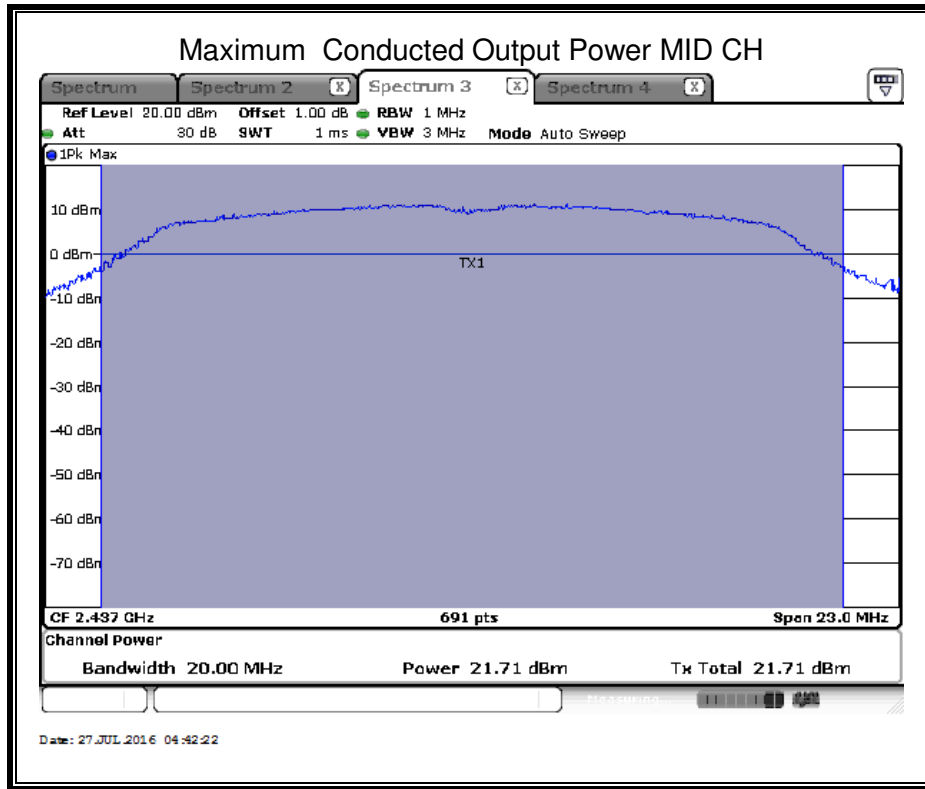




7.2.3. 802.11n HT 20 MODE

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	dBm
Low	2412	18.87	30
Middle	2437	21.71	30
High	2462	18.64	30





7.3. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) IC RSS-247 5.2 (2)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

TEST PROCEDURE

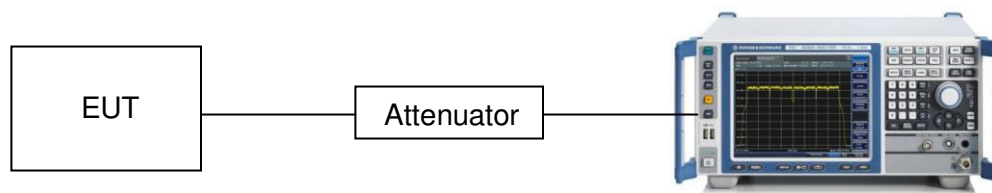
Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

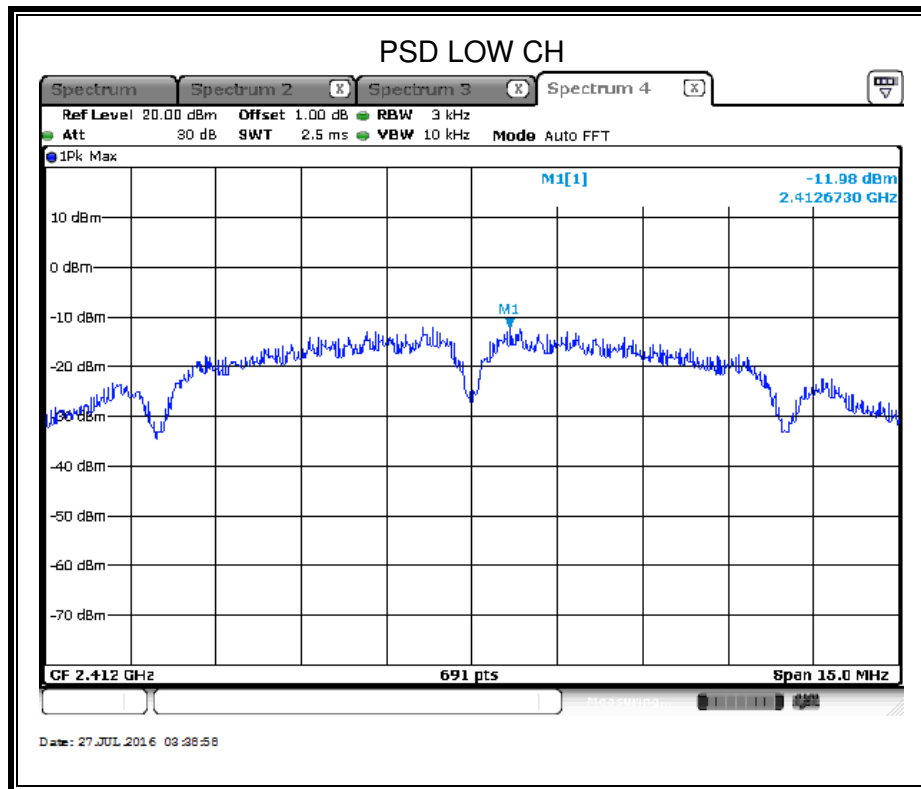
TEST SETUP

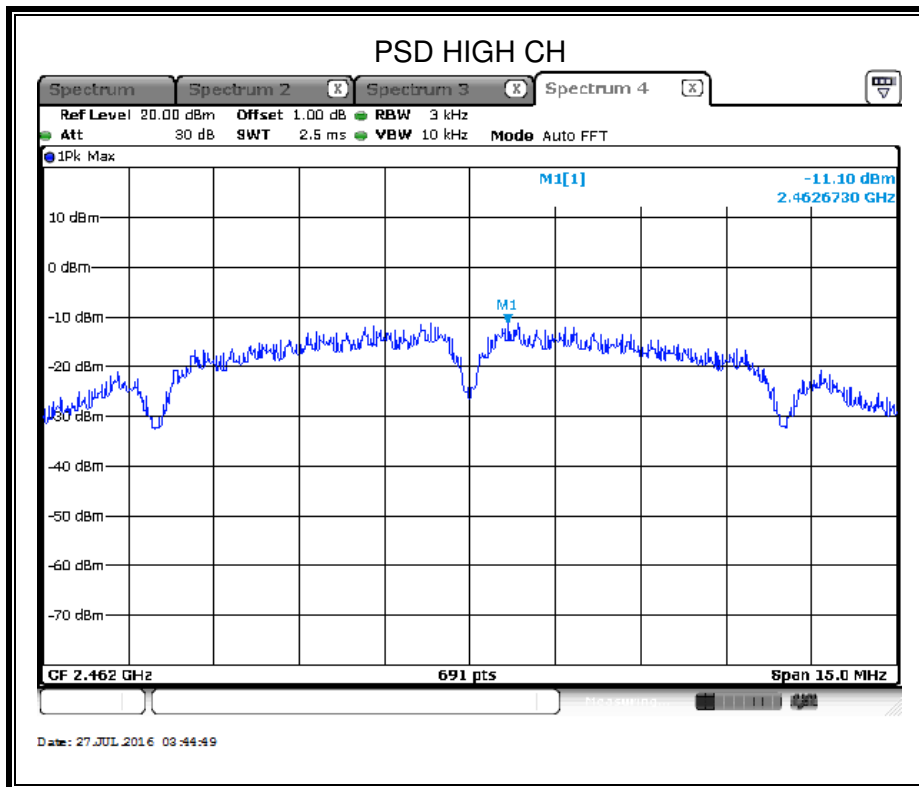
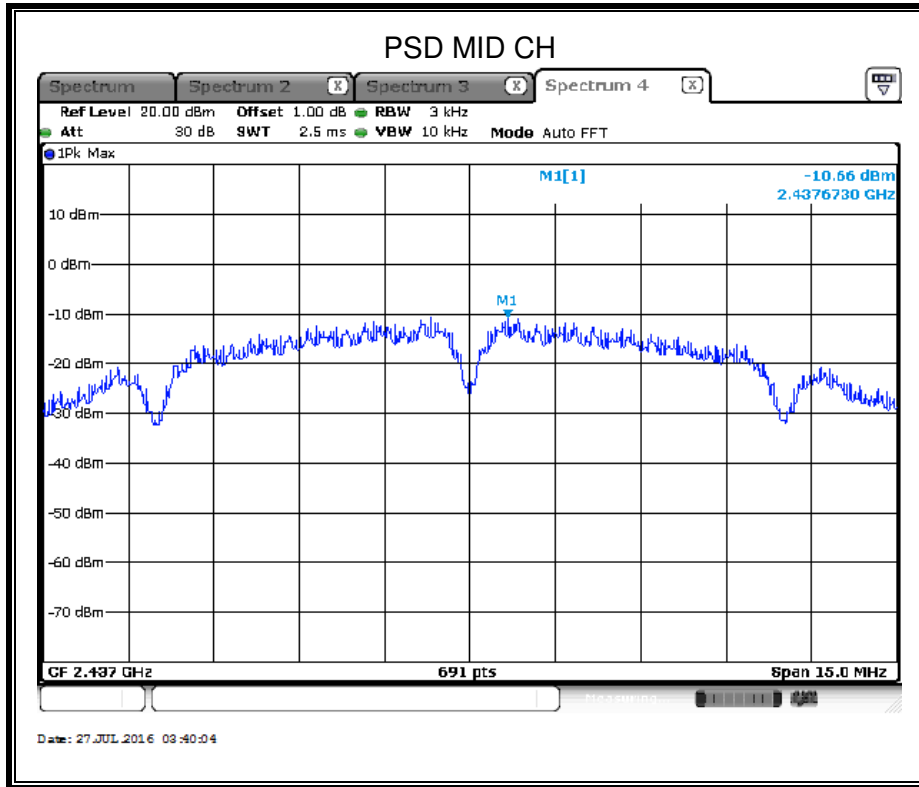


RESULTS

7.3.1. 802.11b MODE

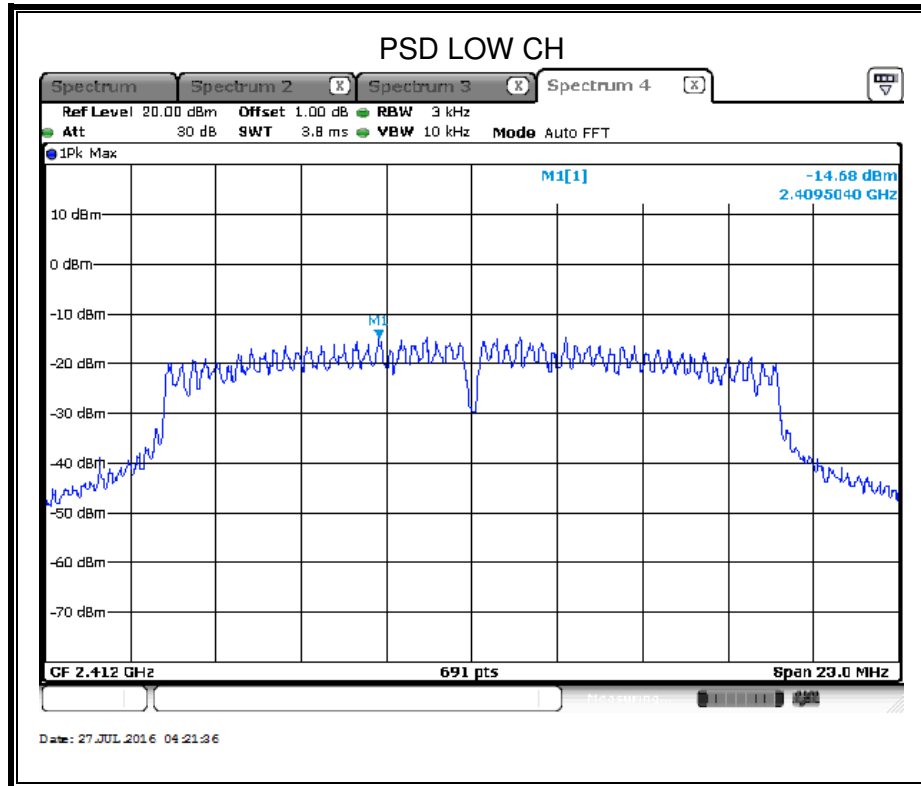
Test Channel	Frequency	Power Spectral Density (dBm)	Limit (dBm)	Result
Low	2412MHz	-11.98	8	PASS
Middle	2437MHz	-10.66	8	PASS
High	2462MHz	-11.10	8	PASS

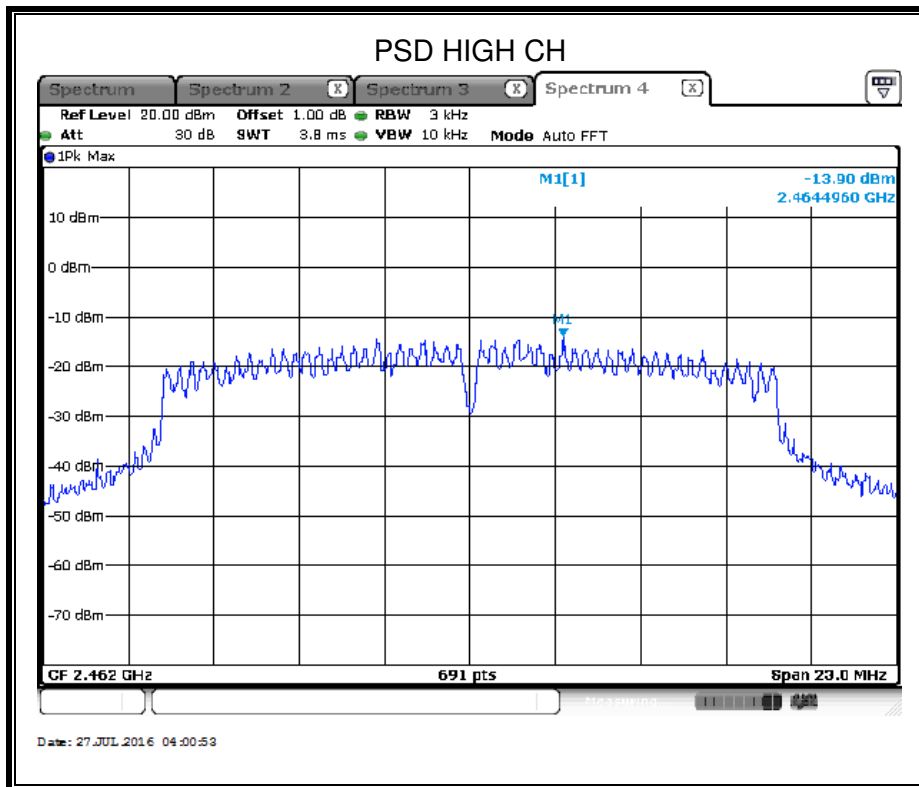
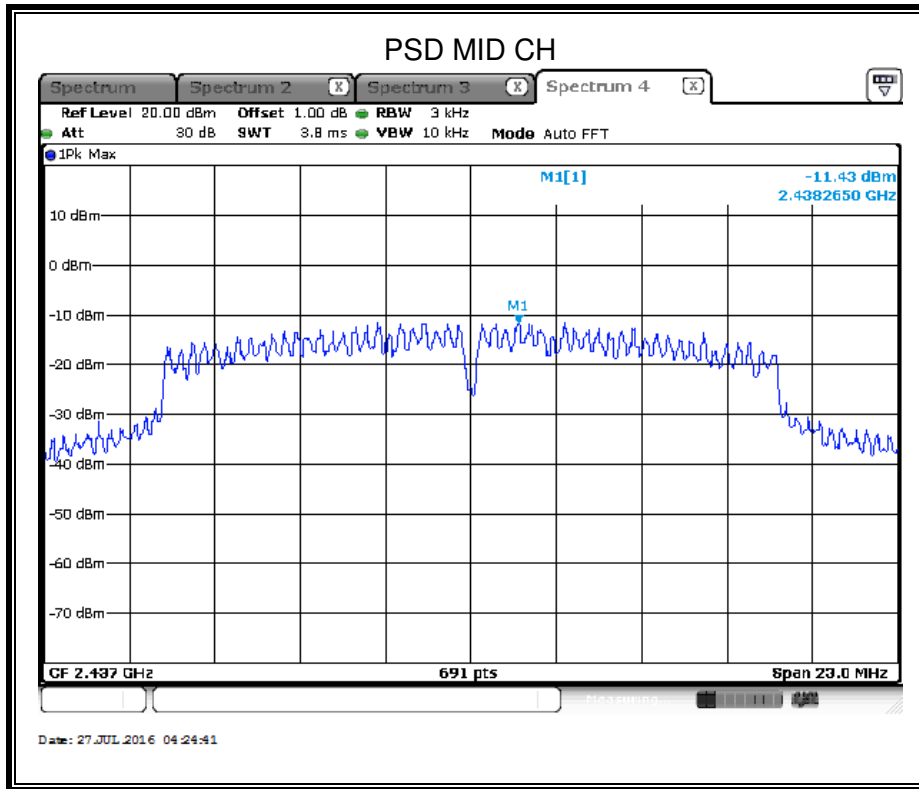




7.3.2. 802.11g MODE

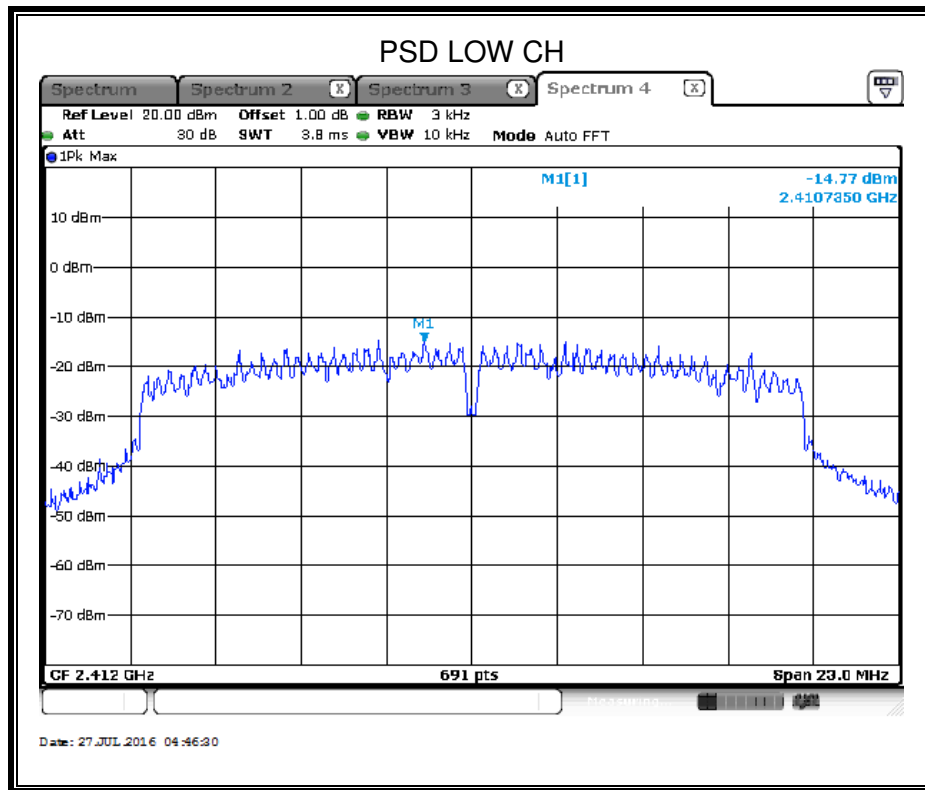
Test Channel	Frequency	Power Spectral Density (dBm)	Limit (dBm)	Result
Low	2412MHz	-14.68	8	PASS
Middle	2437MHz	-11.43	8	PASS
High	2462MHz	-13.90	8	PASS

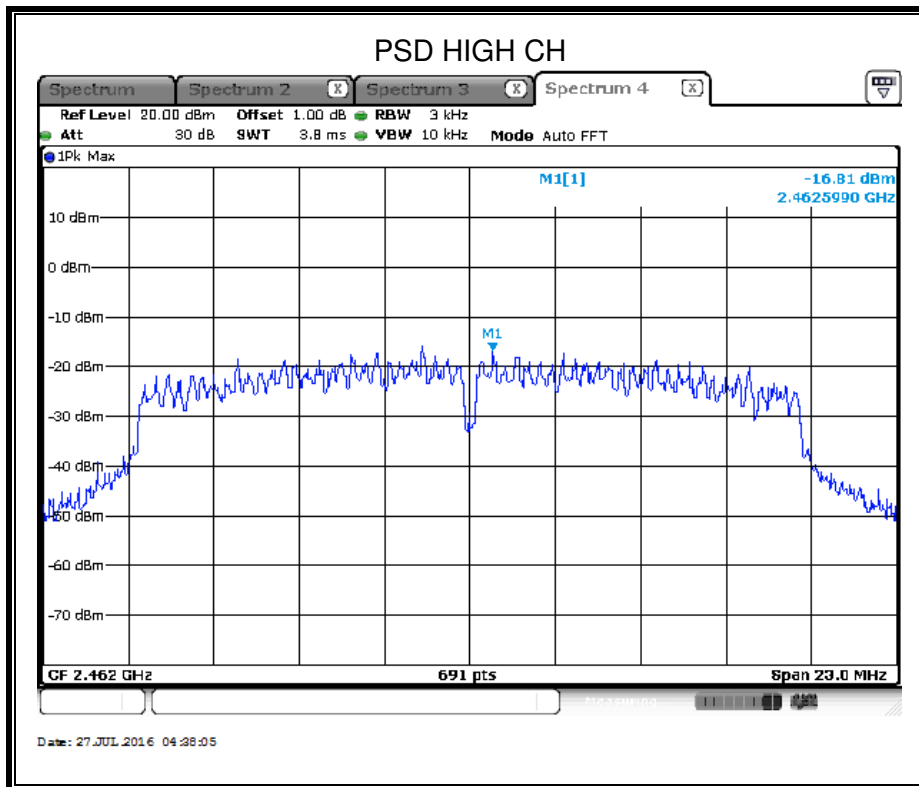
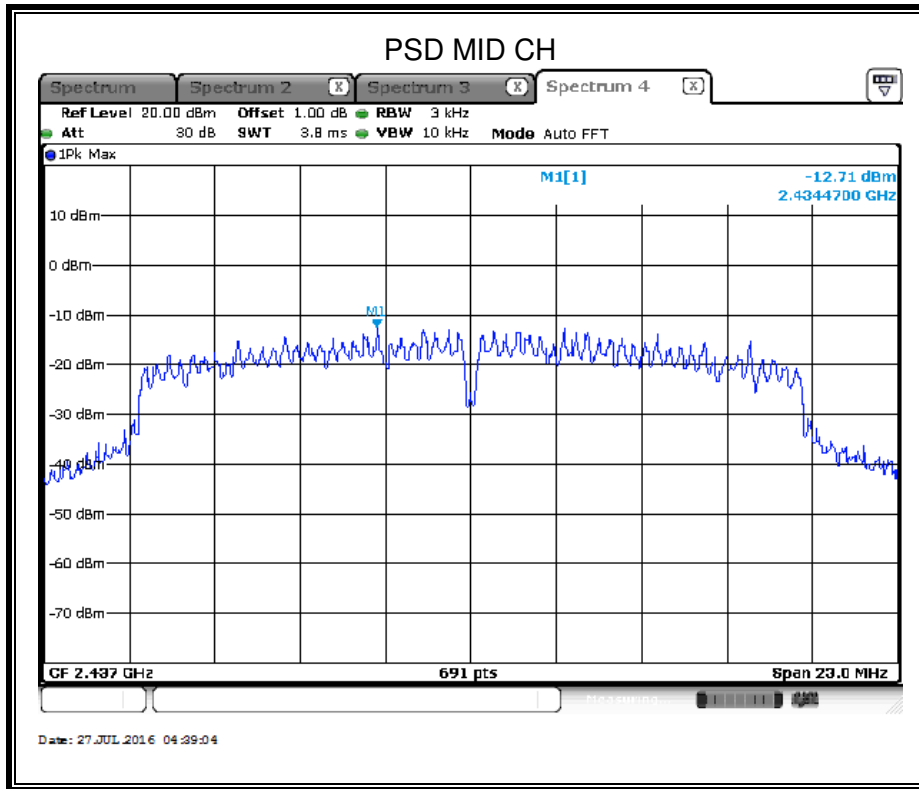




7.3.3. 802.11n HT 20 MODE

Test Channel	Frequency	Power Spectral Density (dBm)	Limit (dBm)	Result
Low	2412MHz	-14.77	8	PASS
Middle	2437MHz	-12.71	8	PASS
High	2462MHz	-16.81	8	PASS





7.4. CONDUCTED BANDEGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) , Subpart C IC RSS-247 ISSUE 1		
Section	Test Item	Limit
FCC §15.247 (d) IC RSS-247 5.5	Conducted Bandedge and Spurious Emissions	at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

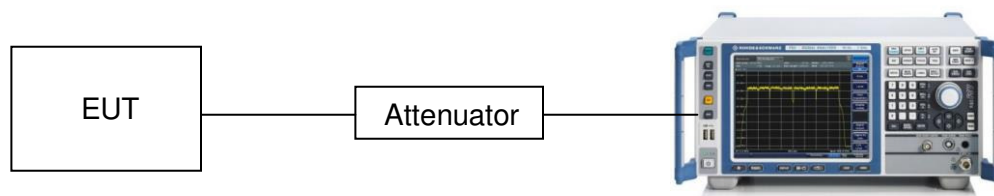
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

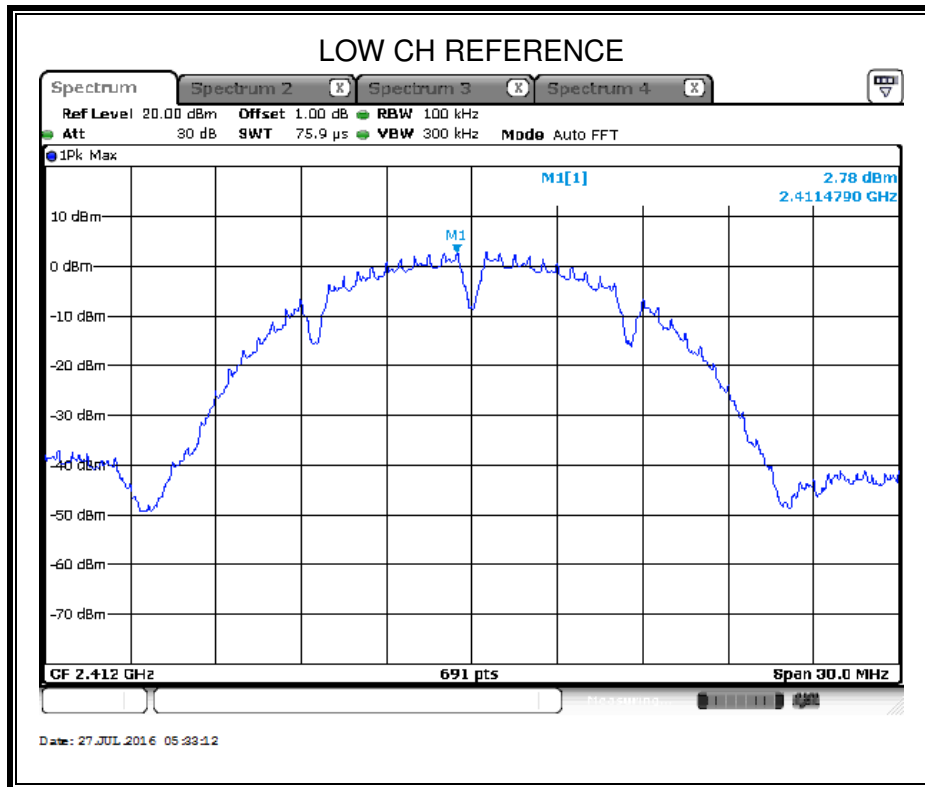
Use the peak marker function to determine the maximum amplitude level.

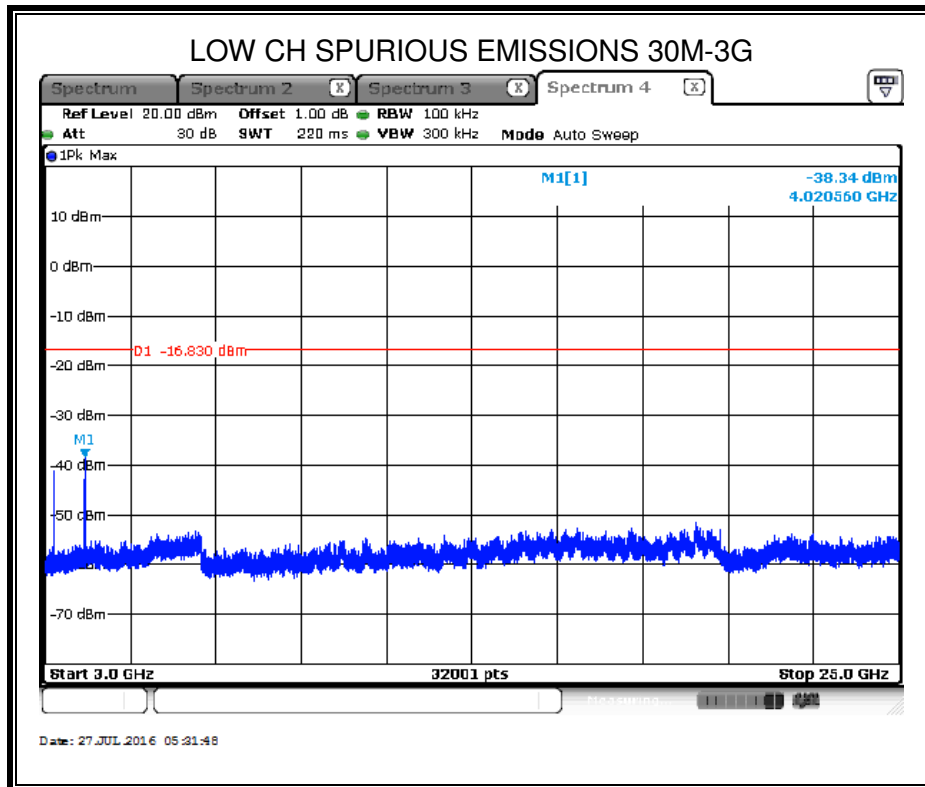
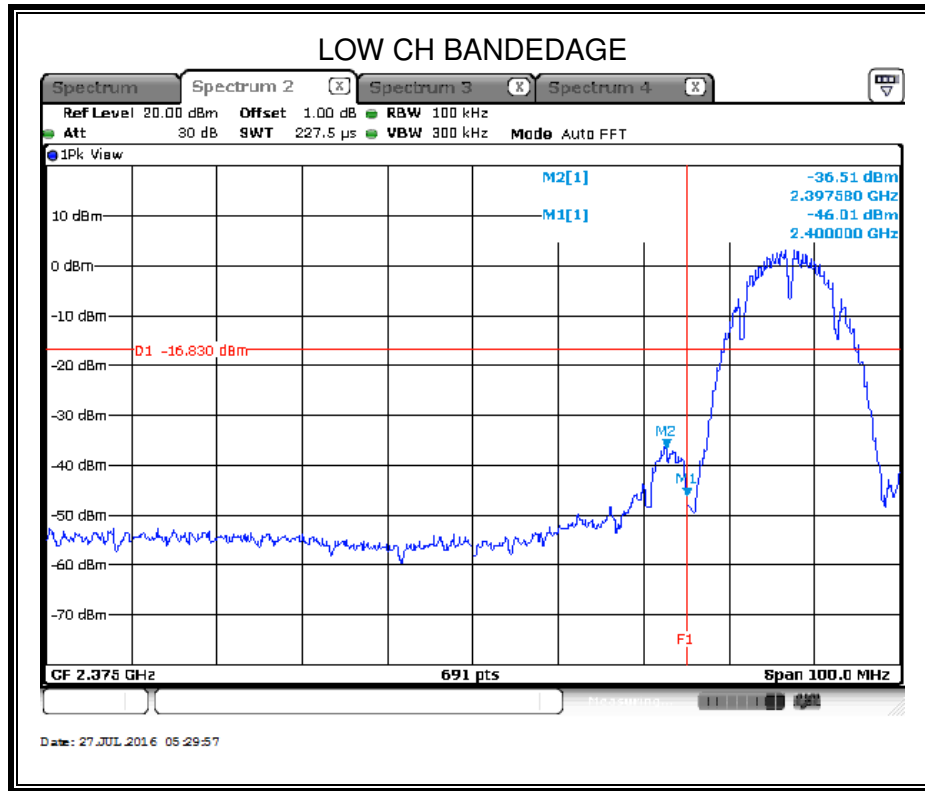
TEST SETUP

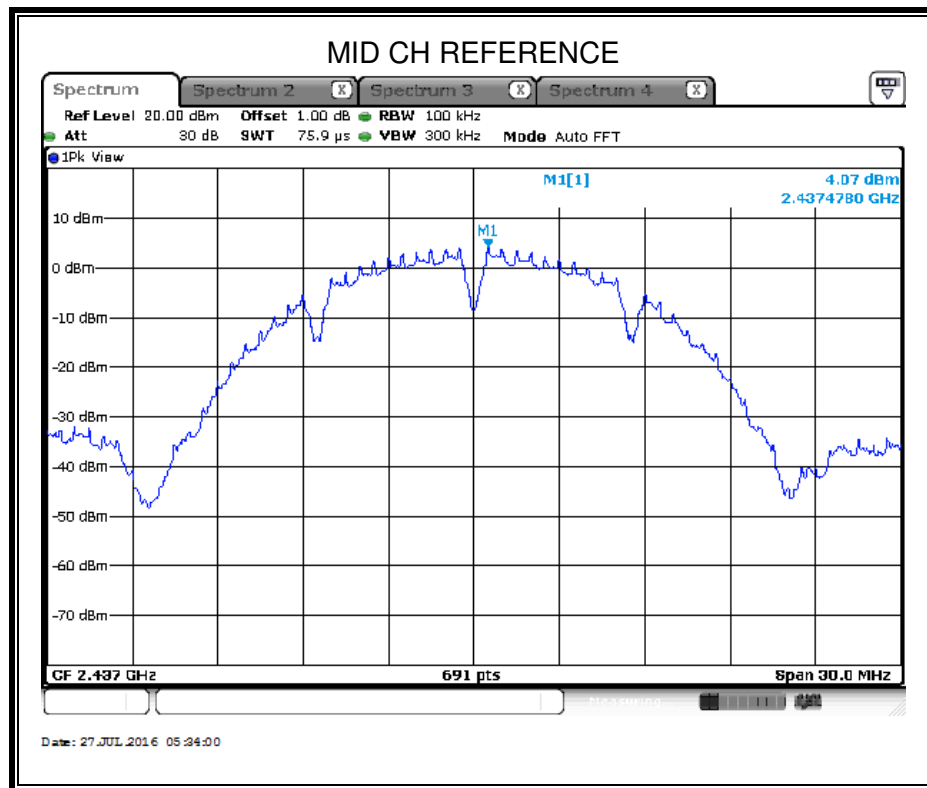
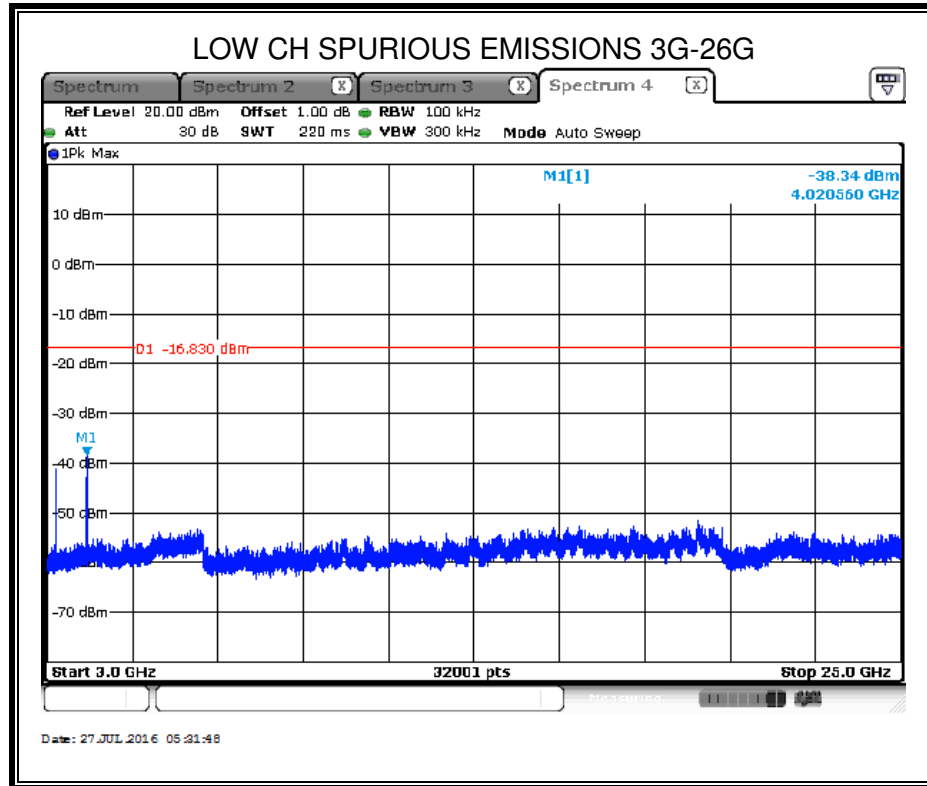


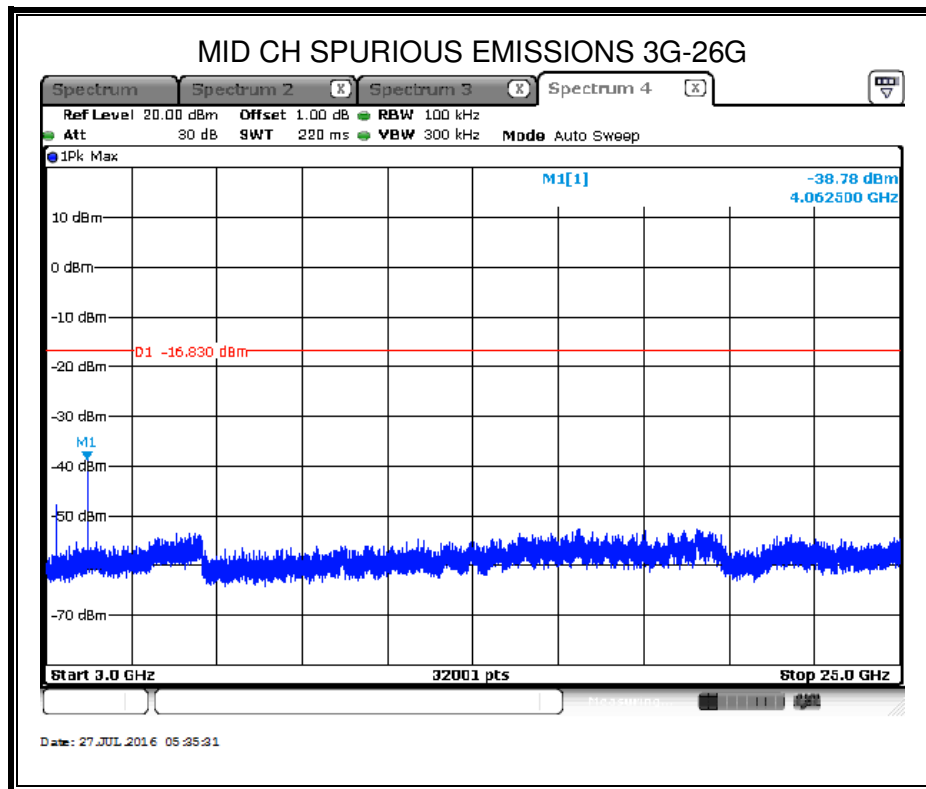
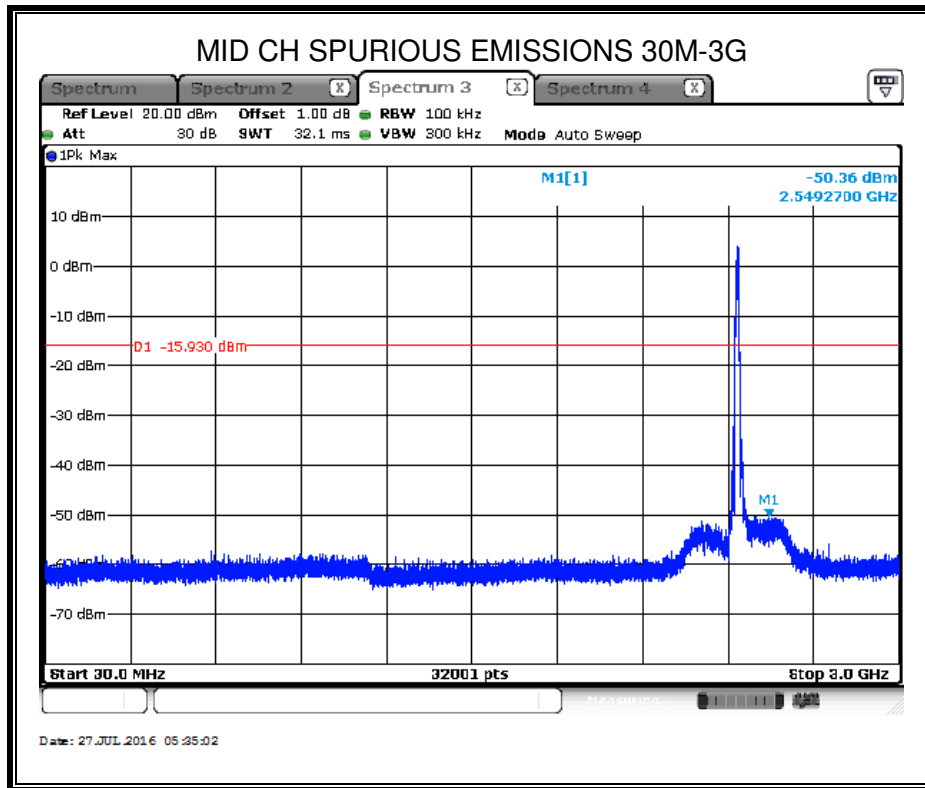
RESULTS

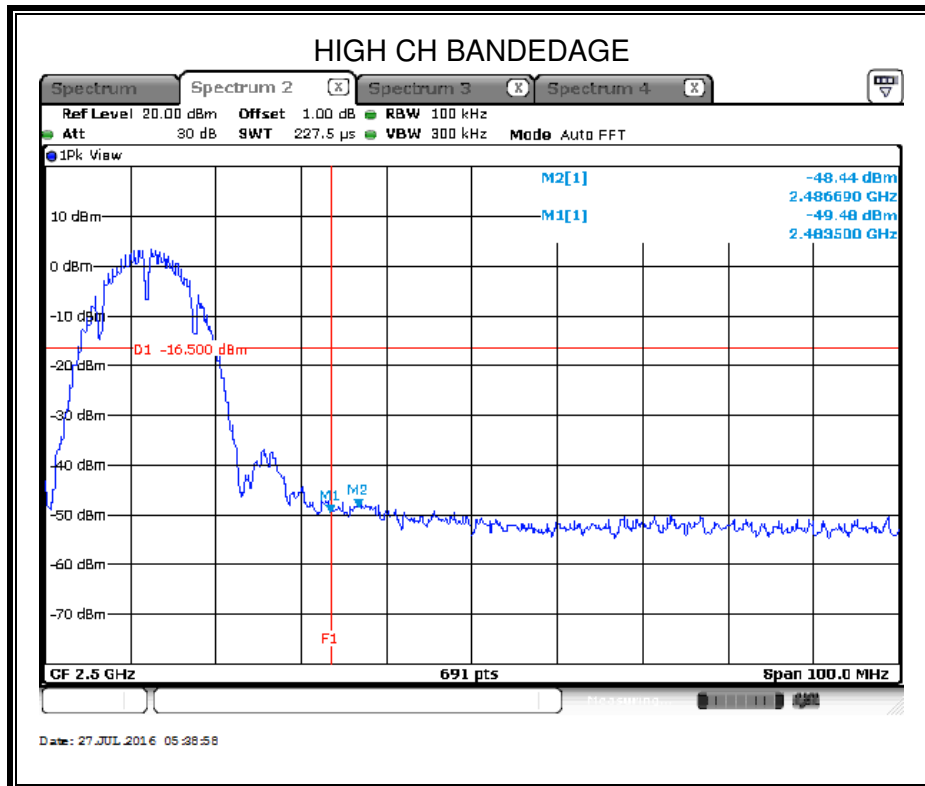
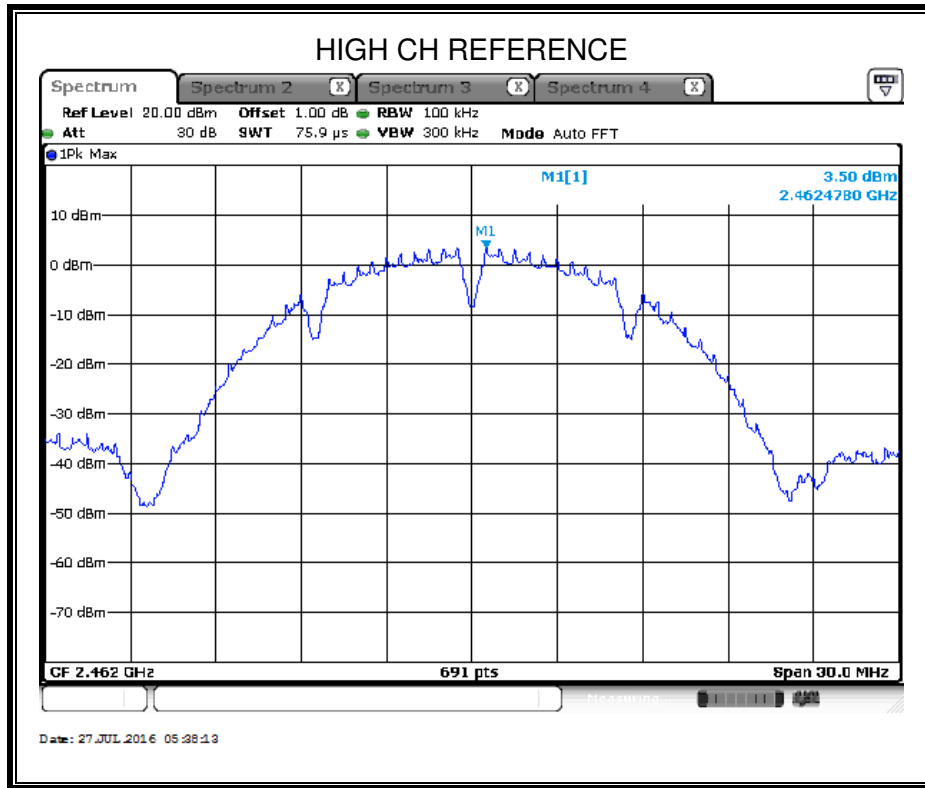
7.4.1. 802.11b MODE

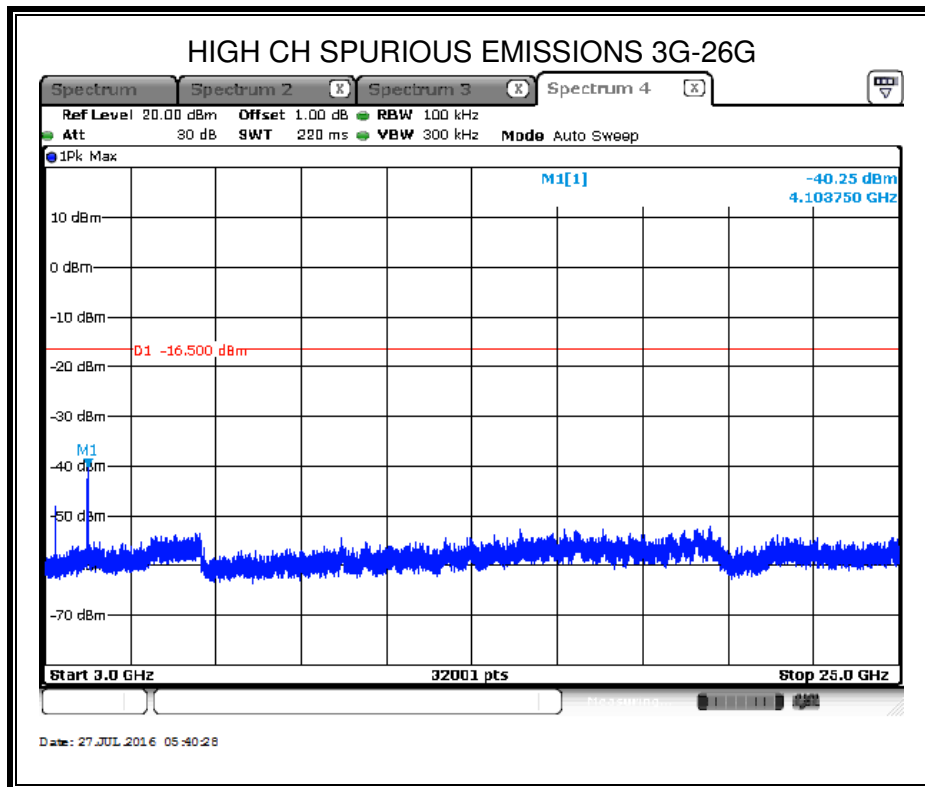
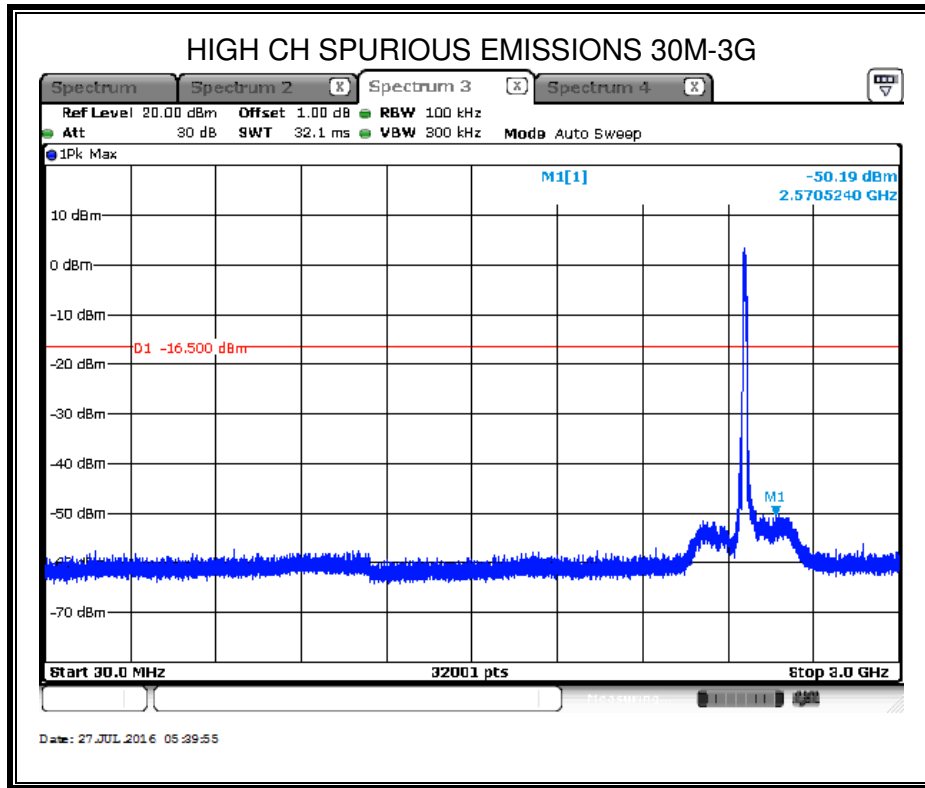




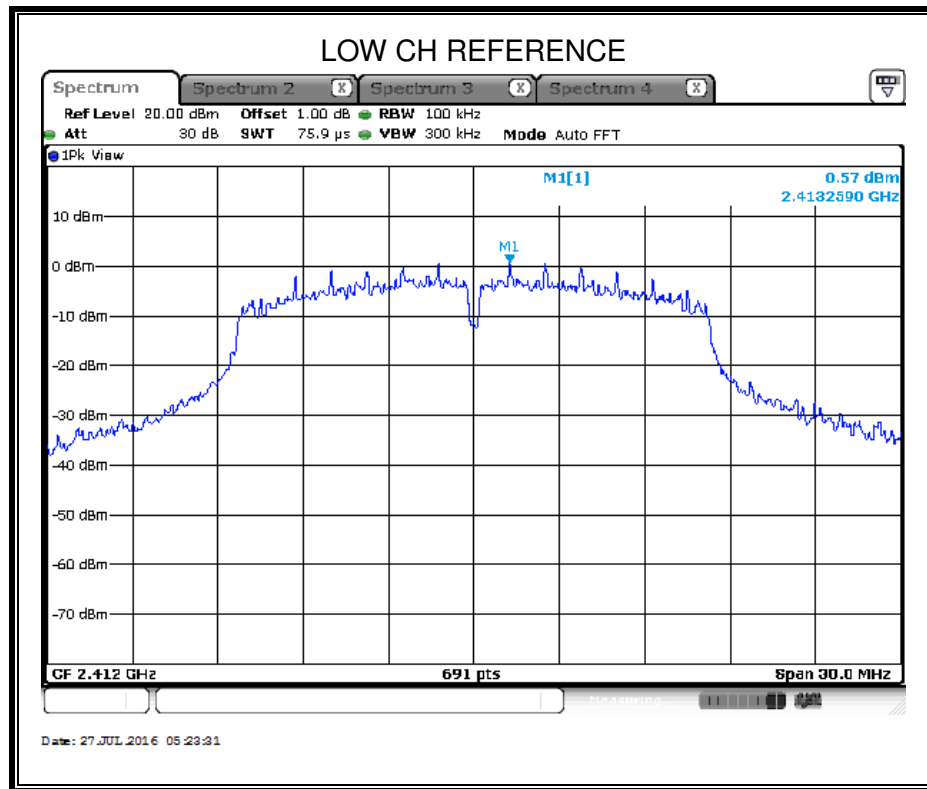


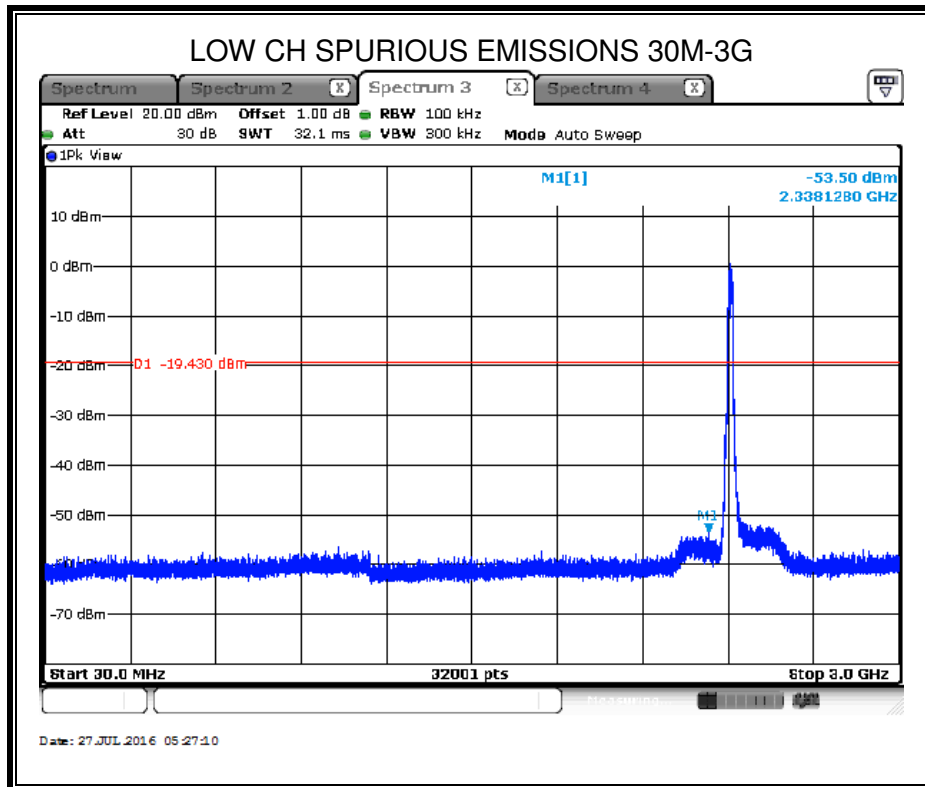
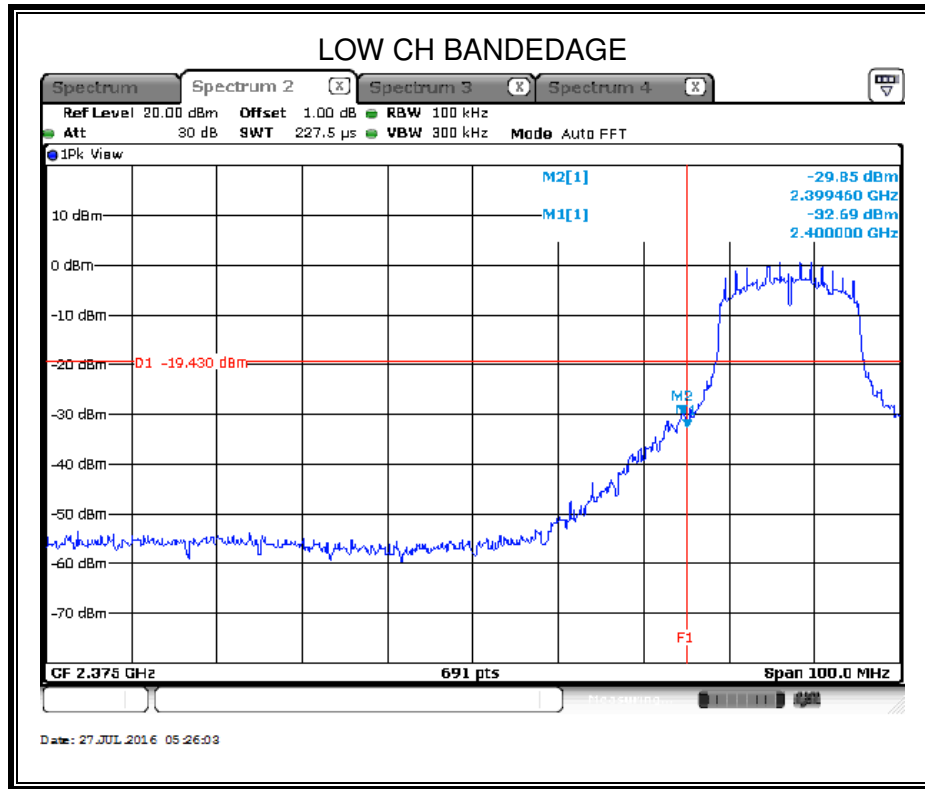


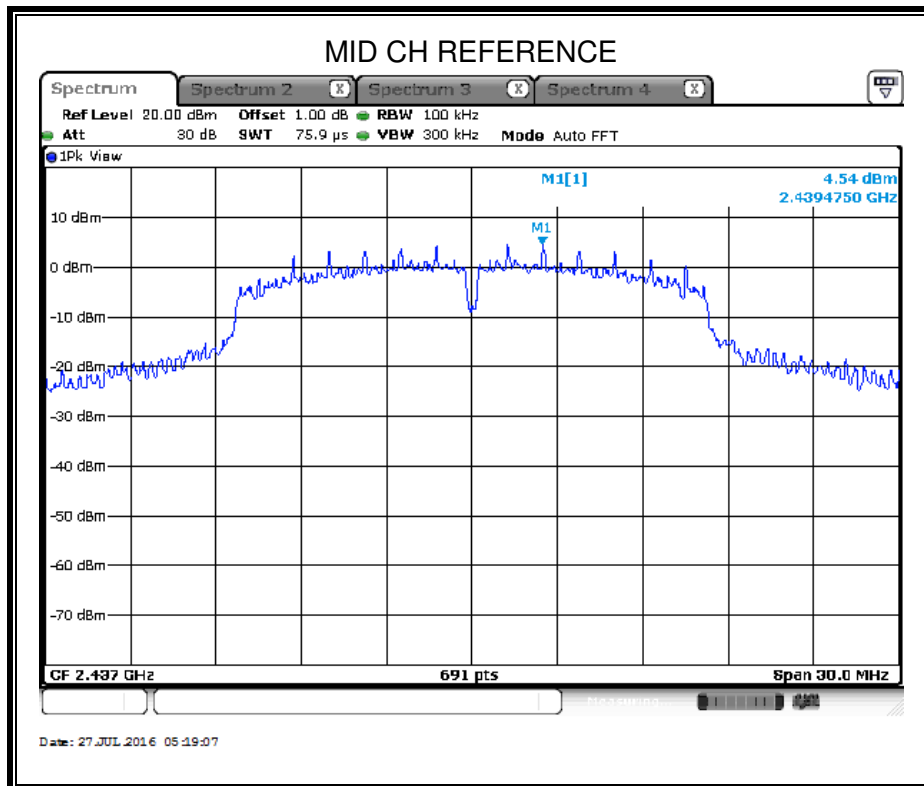
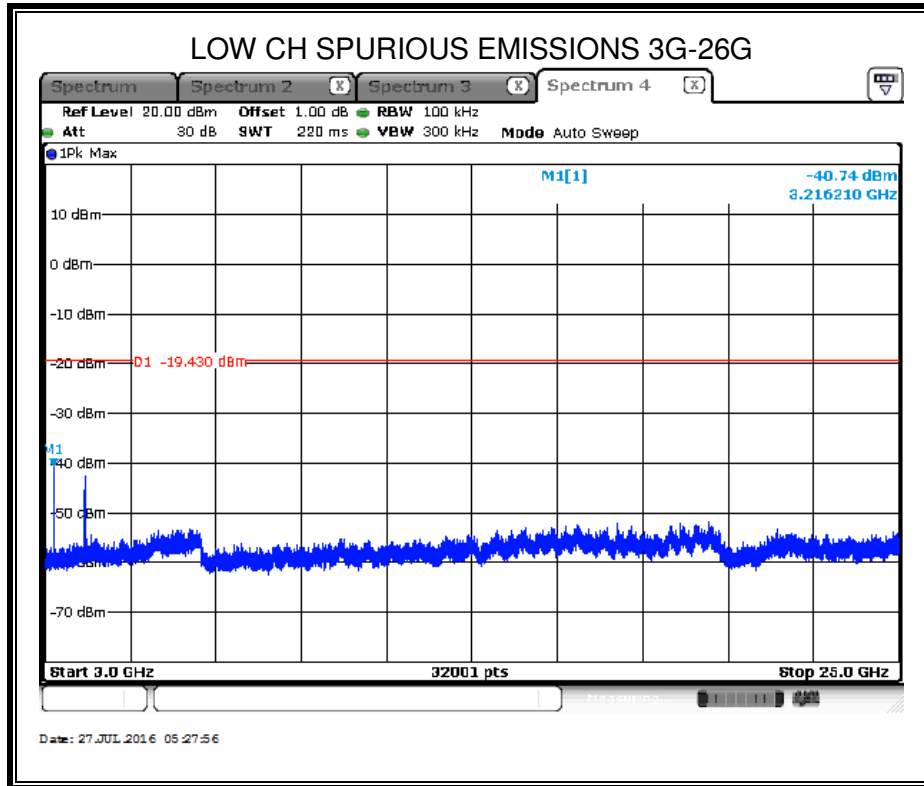


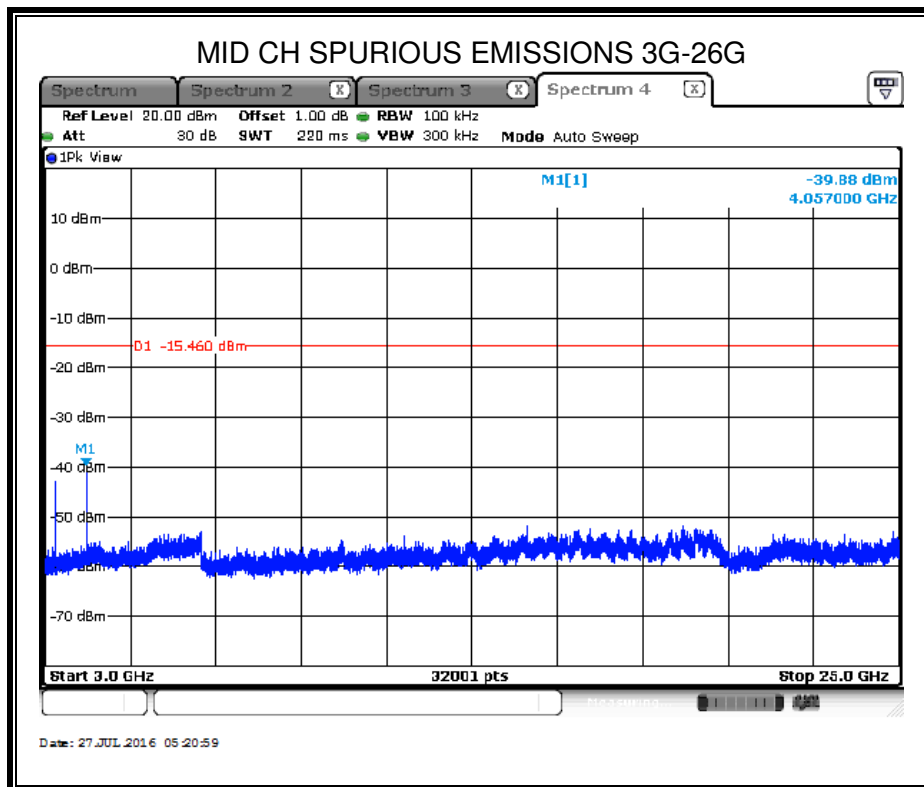
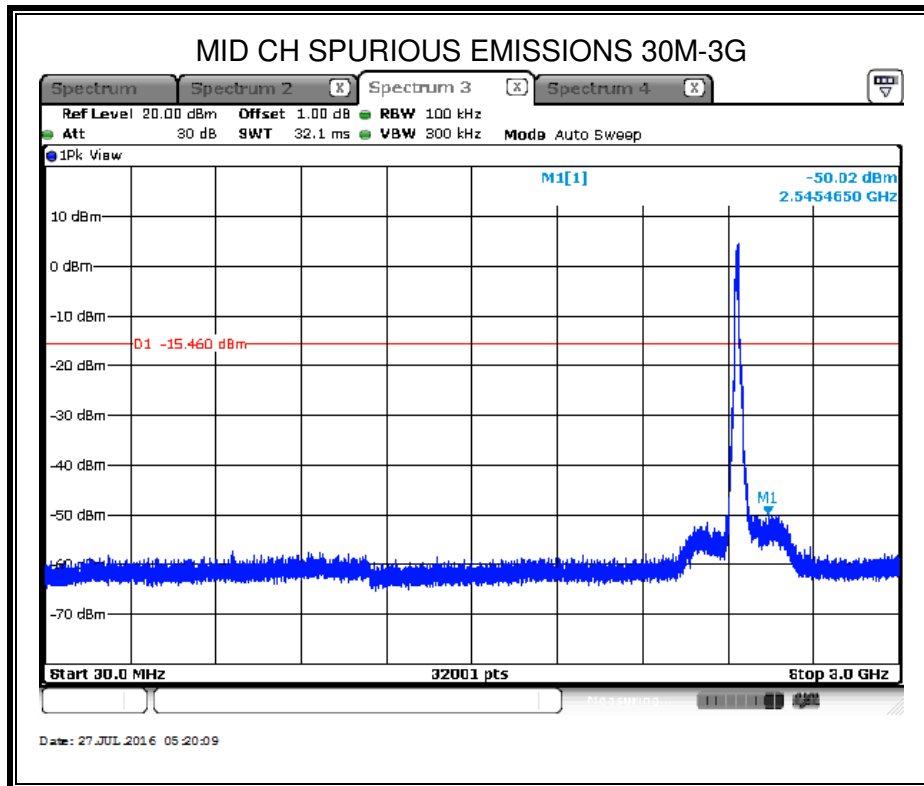


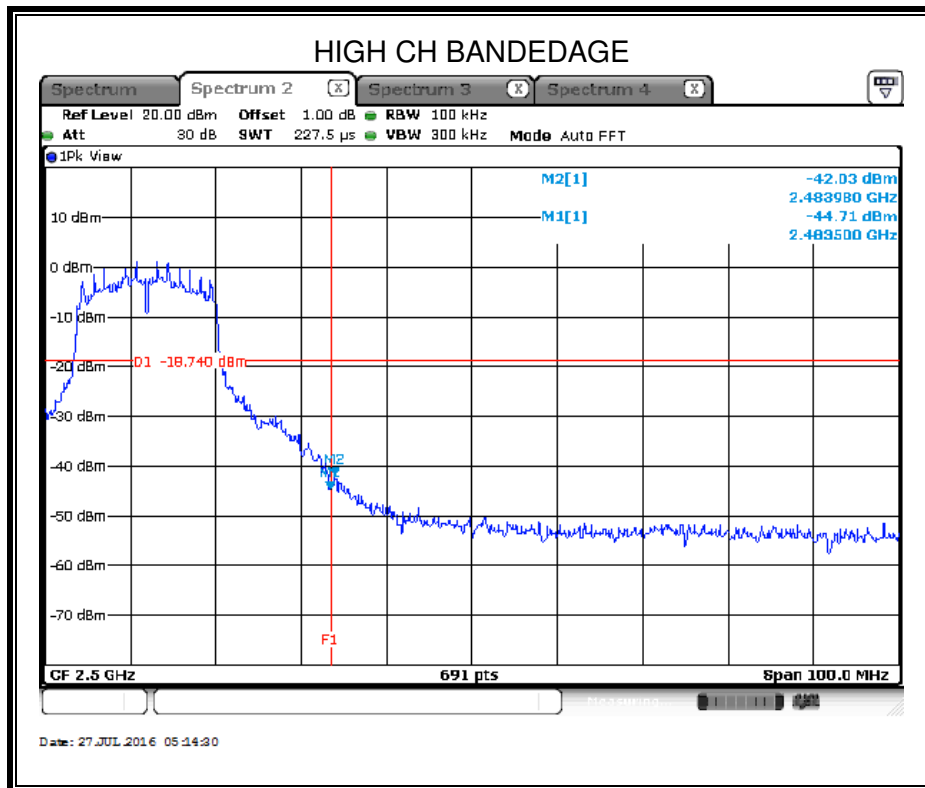
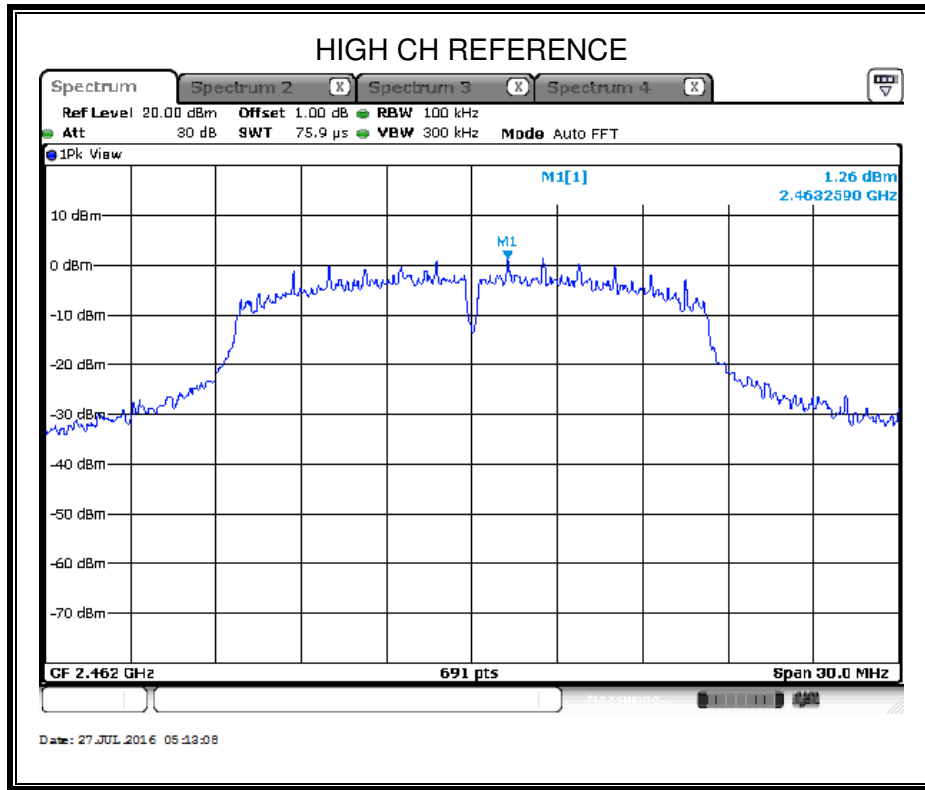
7.4.2. 802.11g MODE

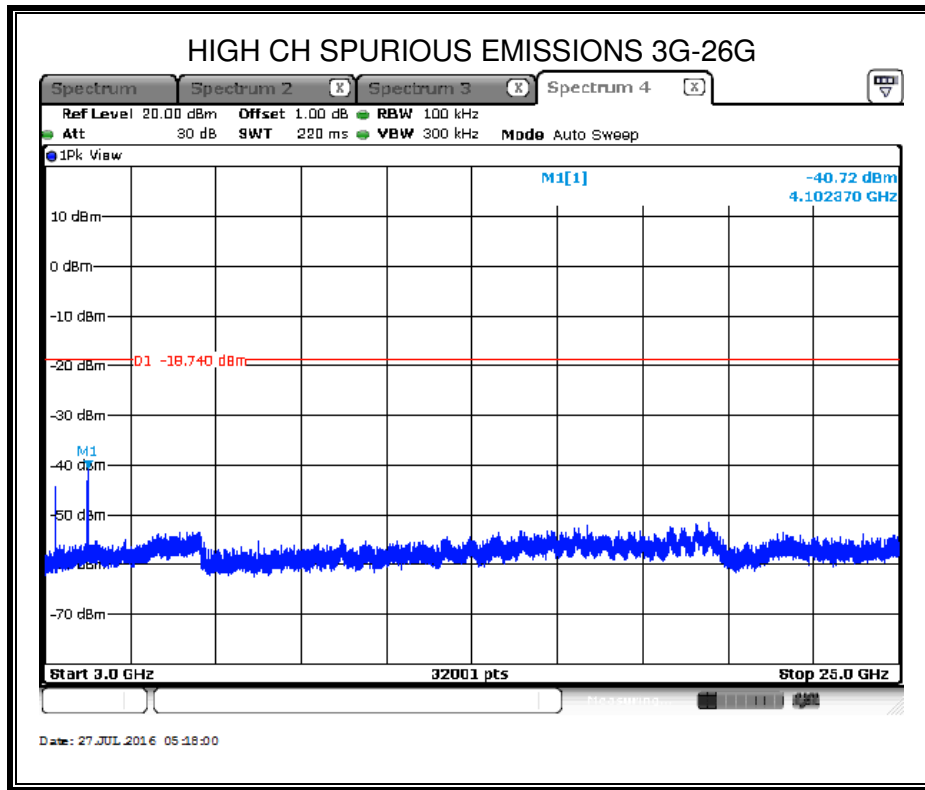
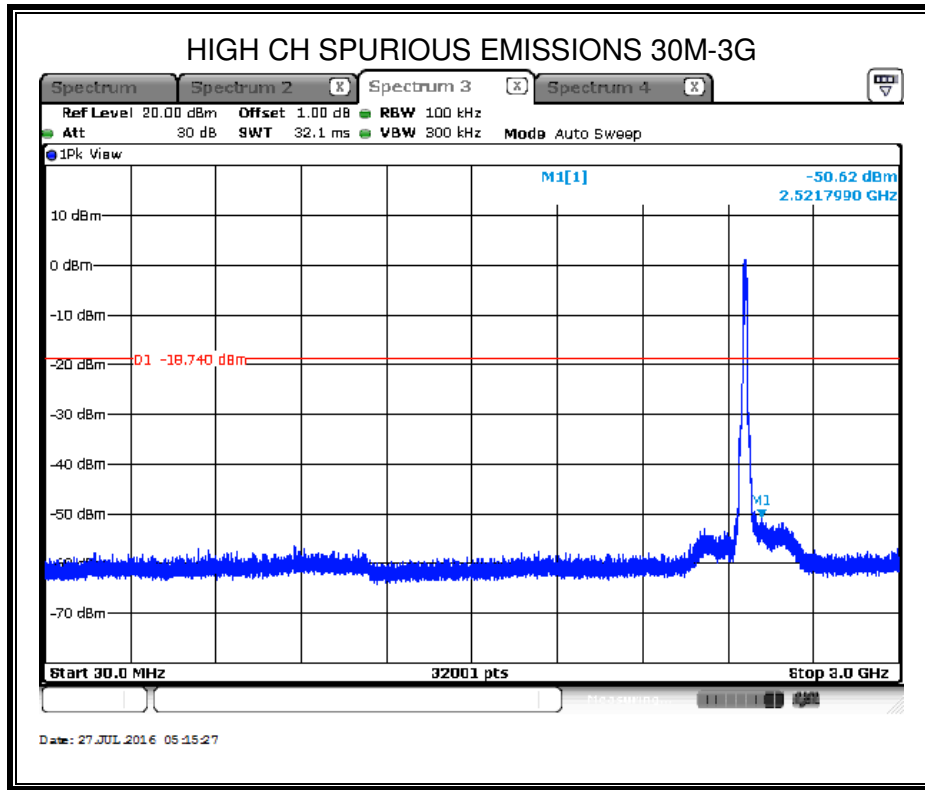




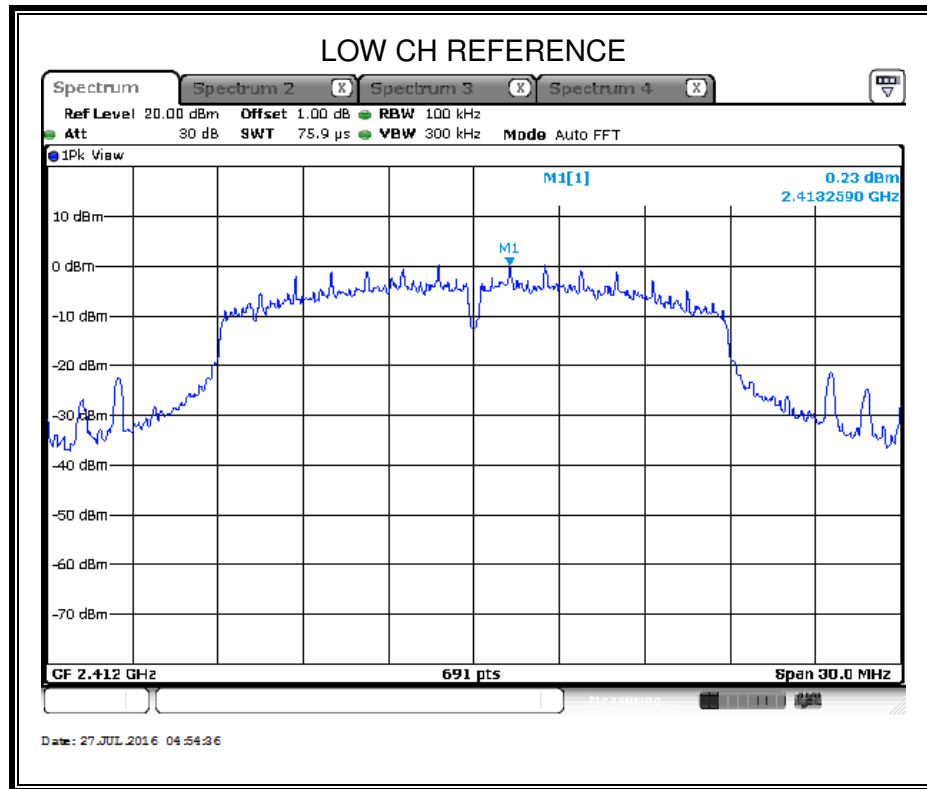


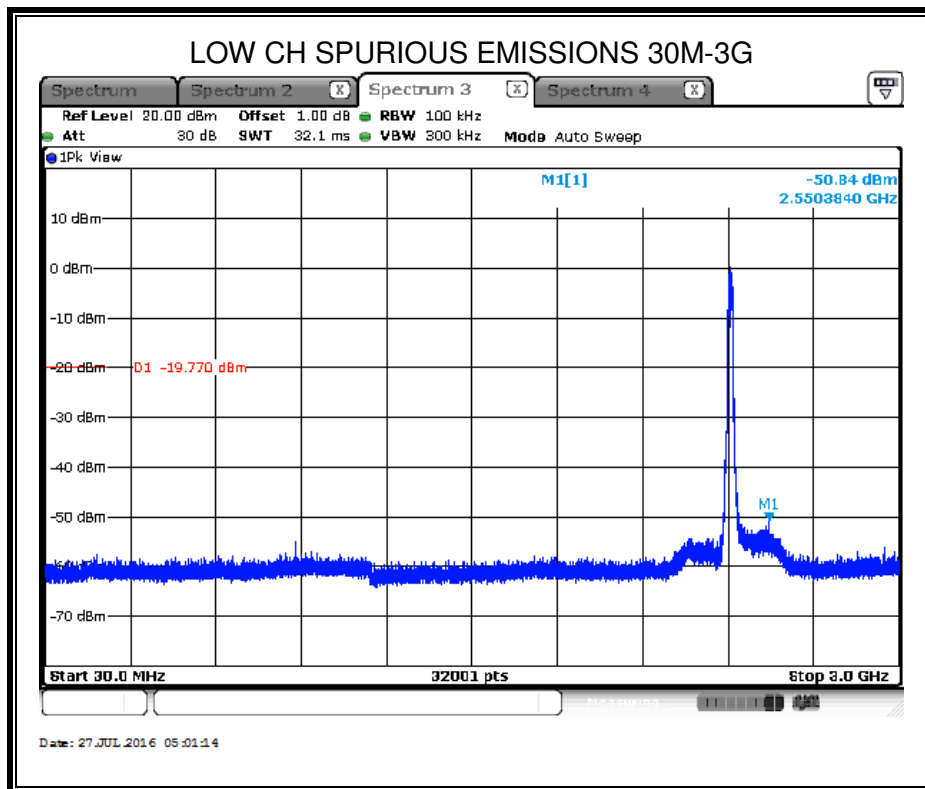
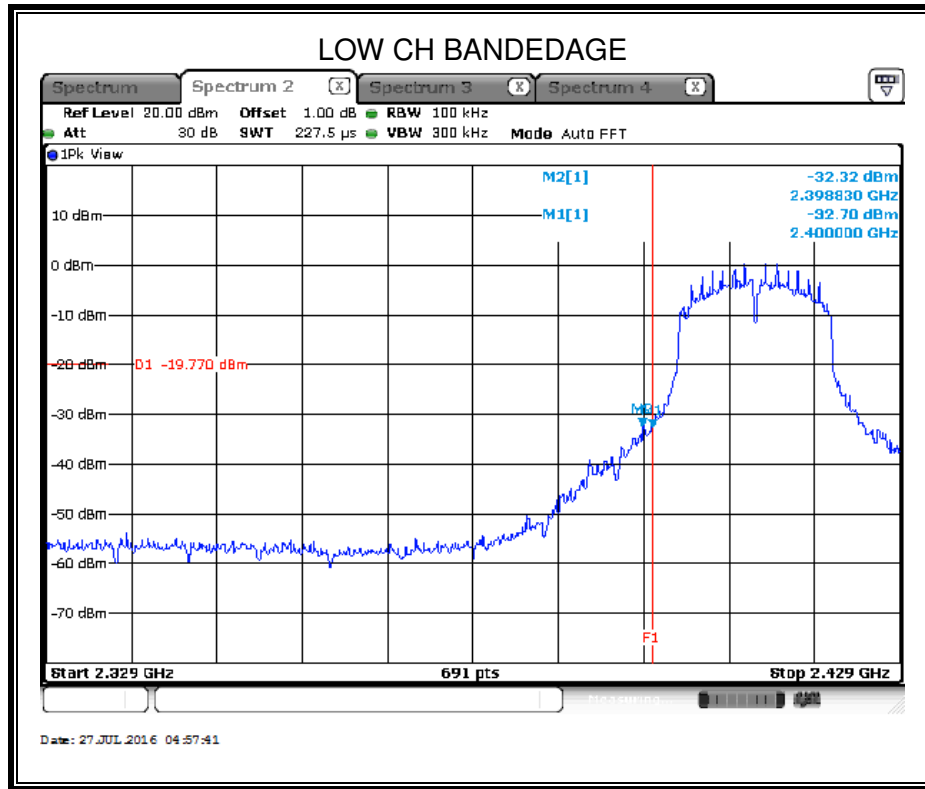


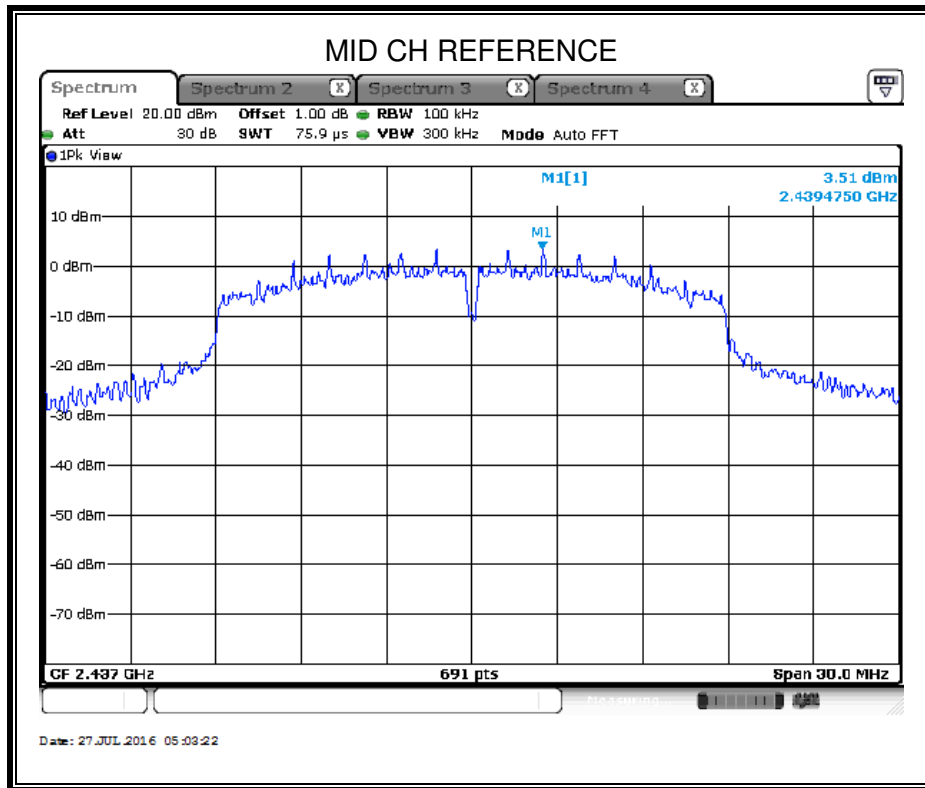
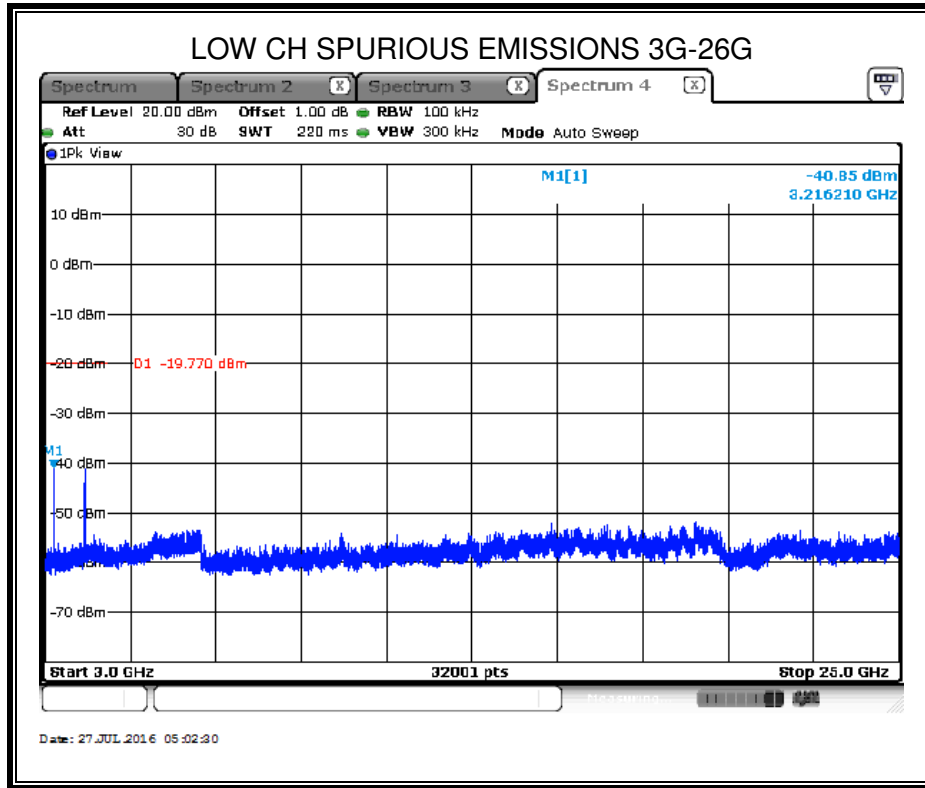


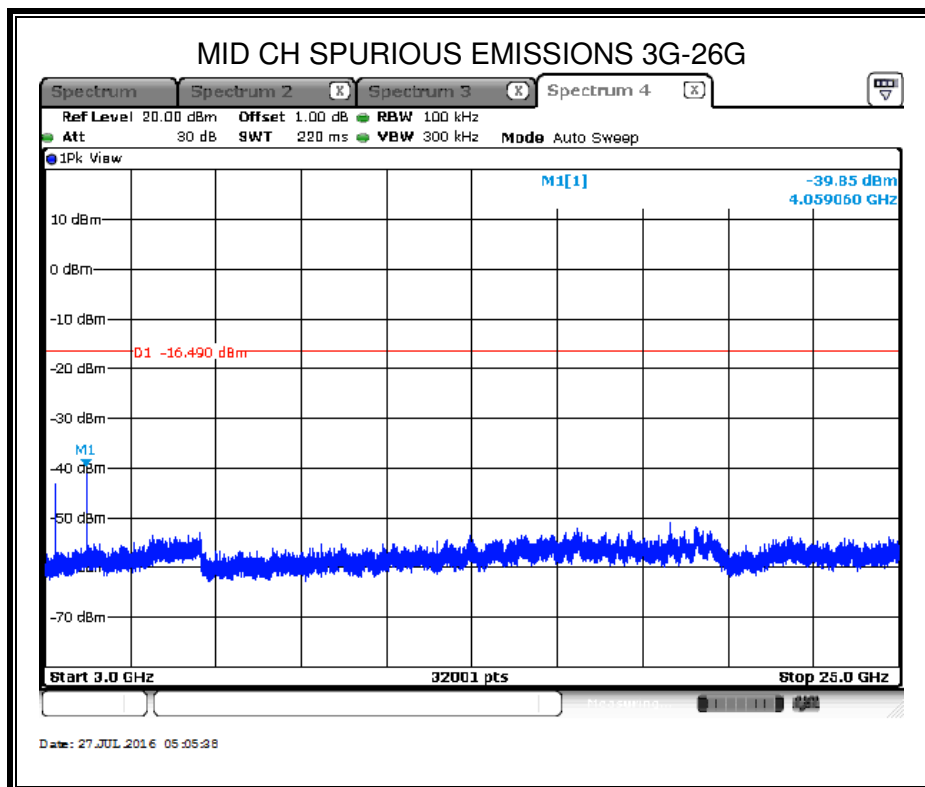
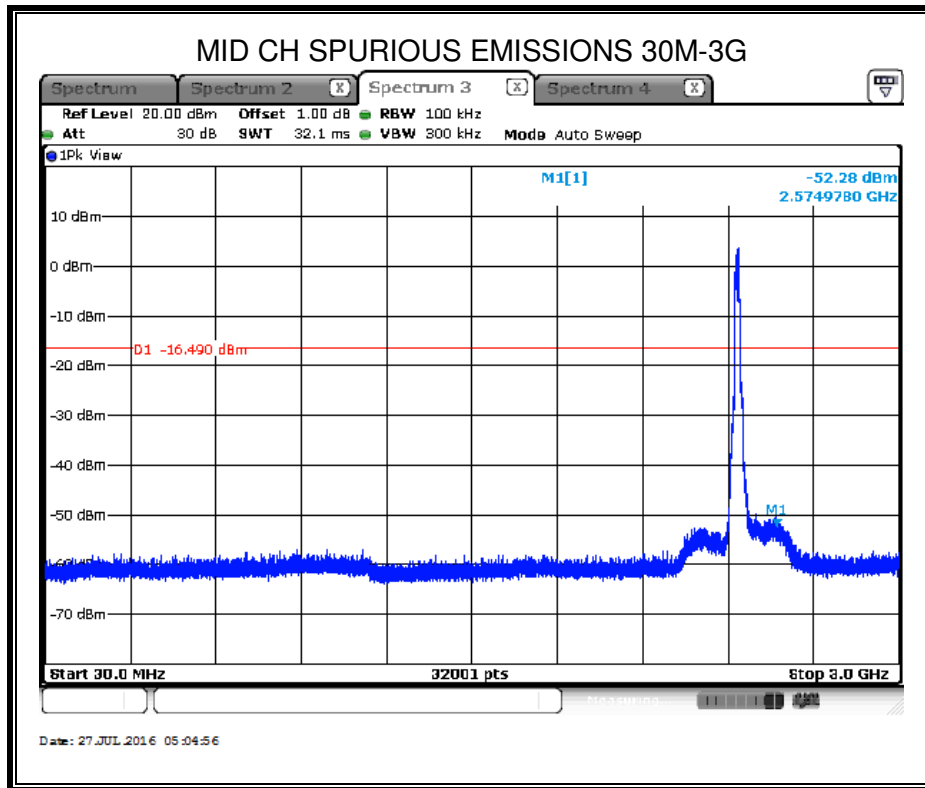


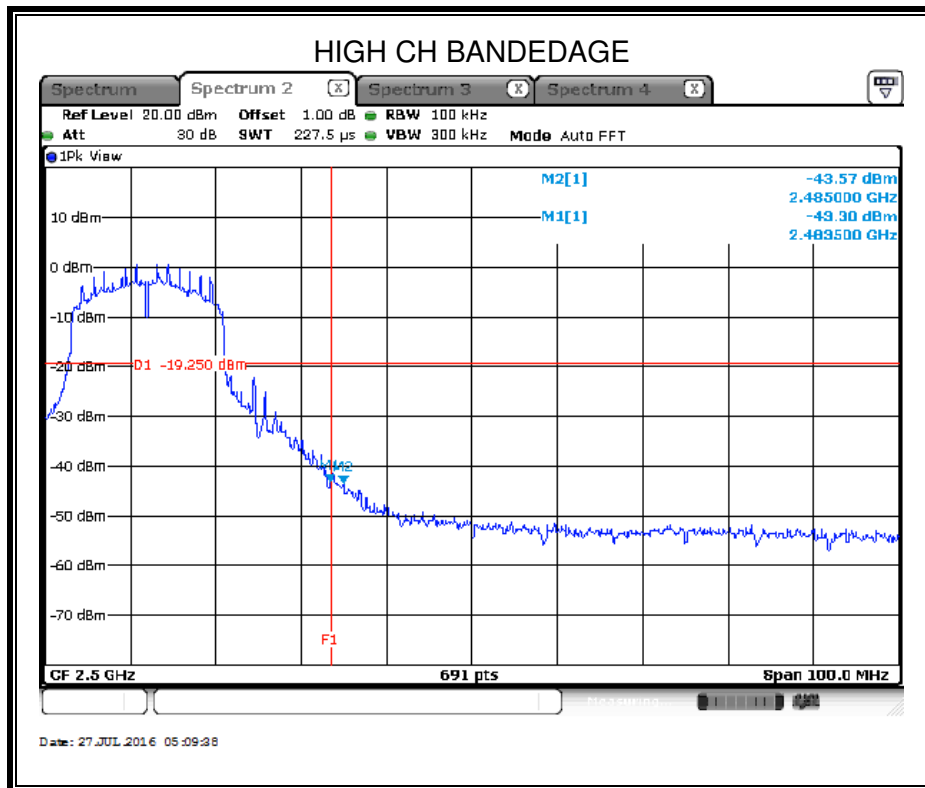
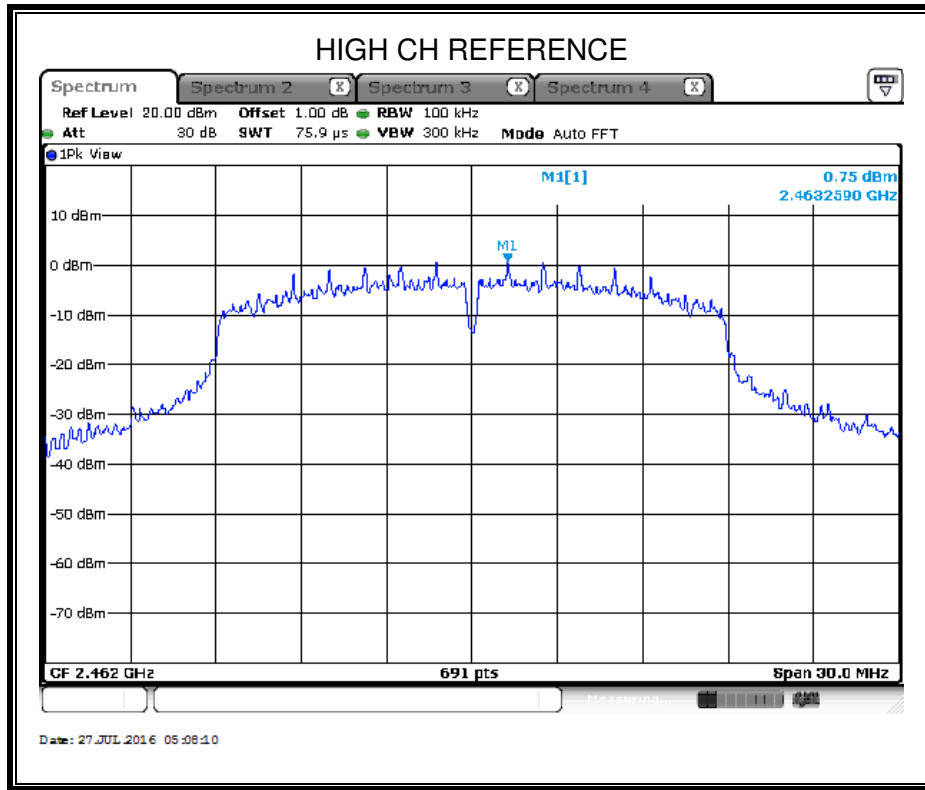
7.4.3. 802.11n HT20 MODE

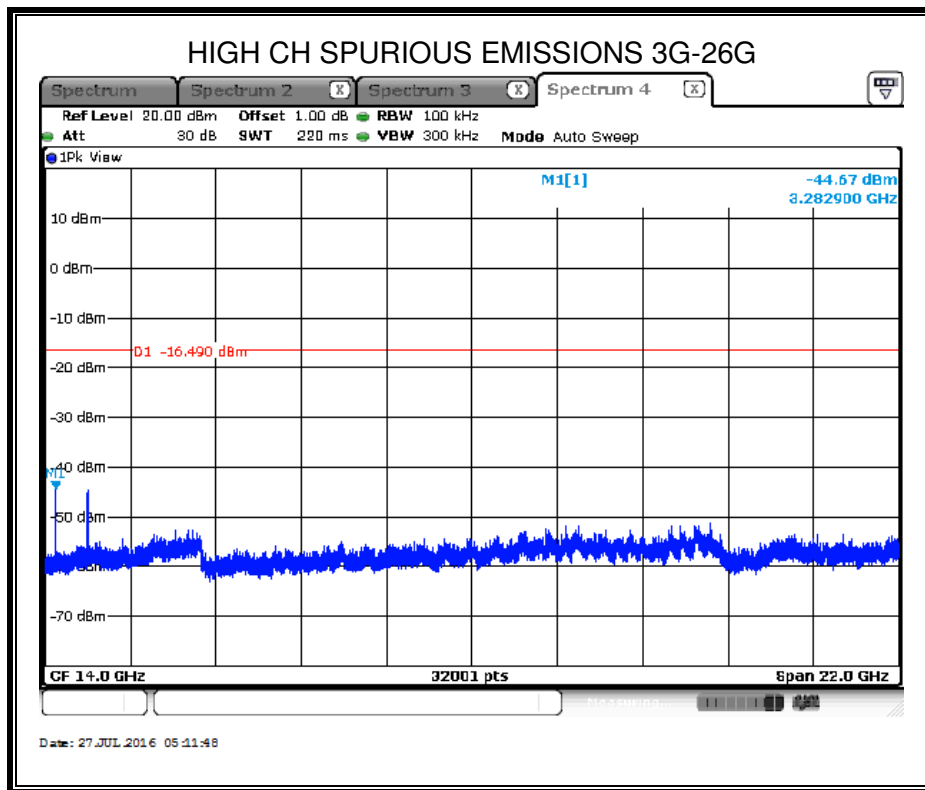
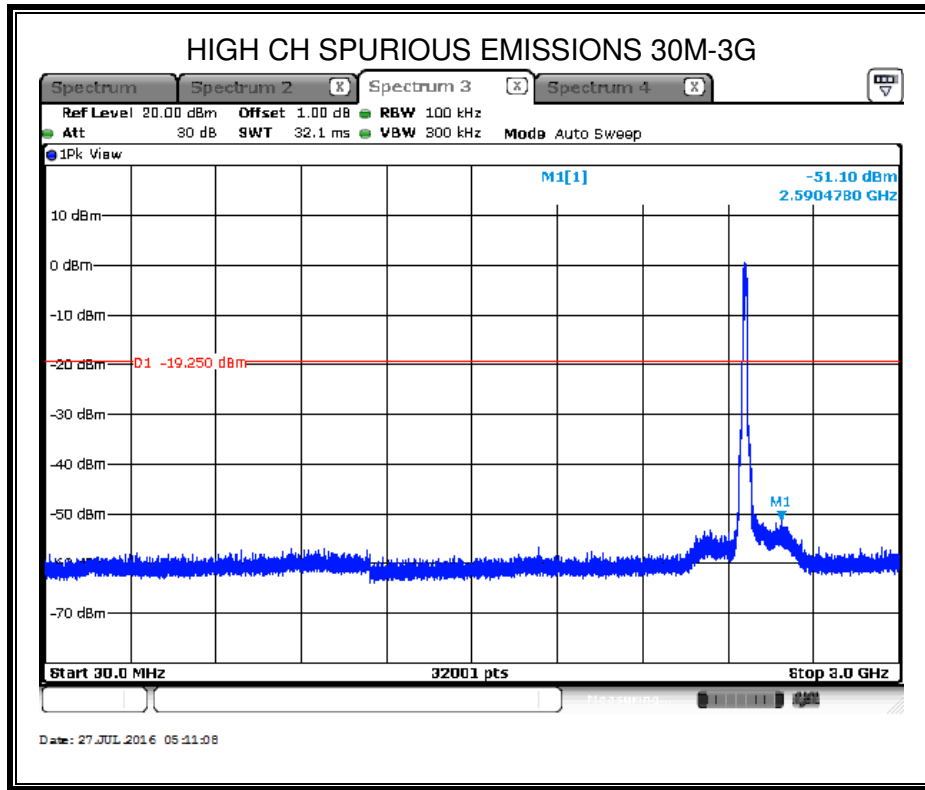












8. RADIATED TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

Please refer to FCC §15.205 and §15.209

Please refer to IC RSS-GEN Clause 8.9 (Transmitter)

Radiation Disturbance Test Limit for FCC (Class B)(9KHz-1GHz)

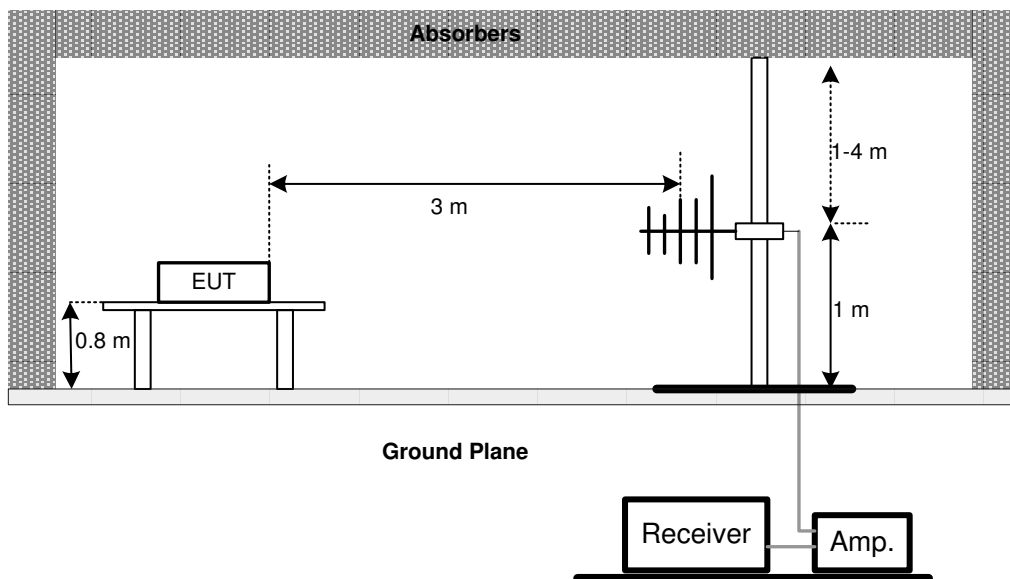
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

TEST SETUP AND PROCEDURE

Below 1G

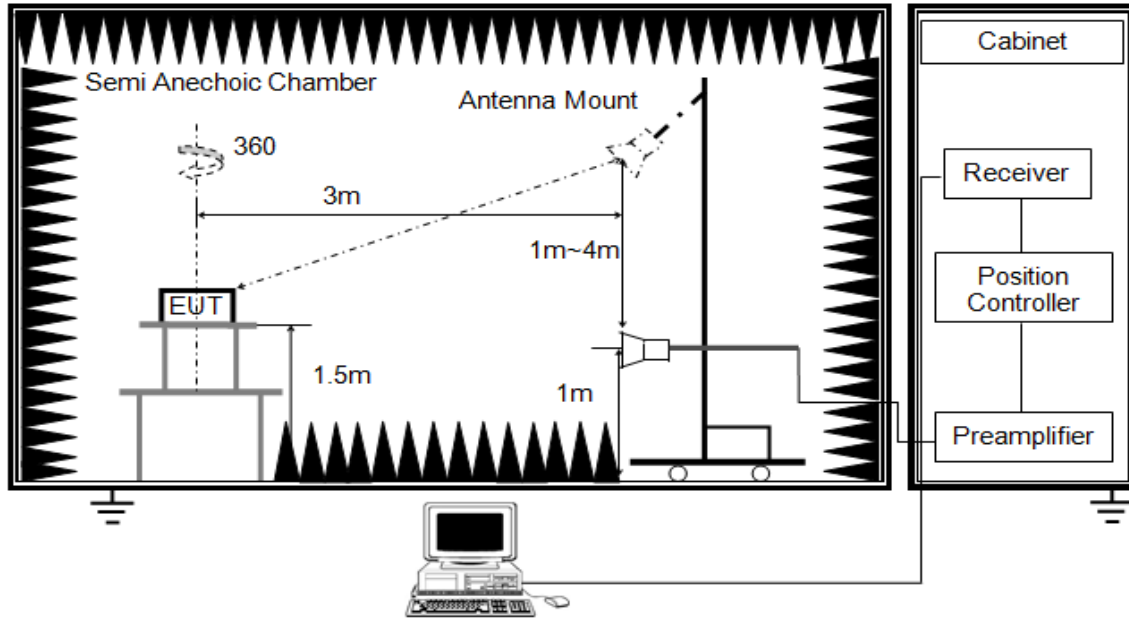


The setting of the spectrum analyser

RBW	120KHz
VBW	300KHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

ABOVE 1G

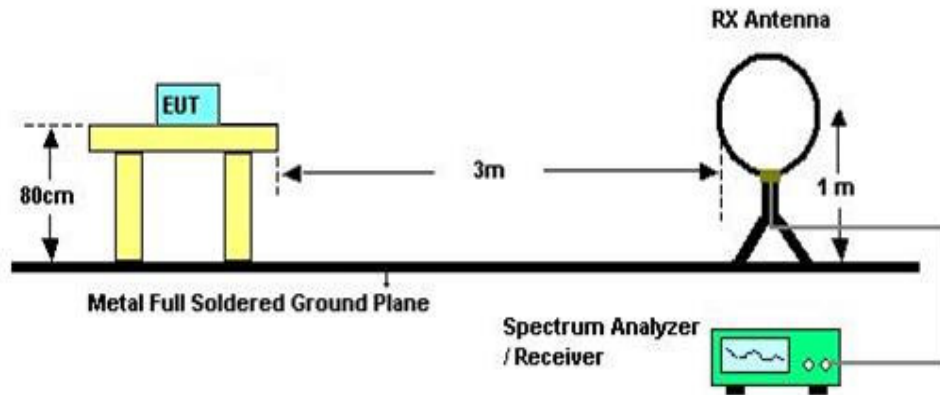


The setting of the spectrum analyser

RBW	1M MHz
VBW	3MHz
Sweep	Auto
Detector	Peak and Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: $\text{Antenna Factor} + \text{Cable Loss} + \text{Read Level} - \text{Preamp Factor} = \text{Level}$
6. For measurement above 1GHz, the emission measurement will be measured by the peak detector and the AV detector.

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration)

TEST CONDITIONS

Temperature: 22.2°C

Relative Humidity: 61%

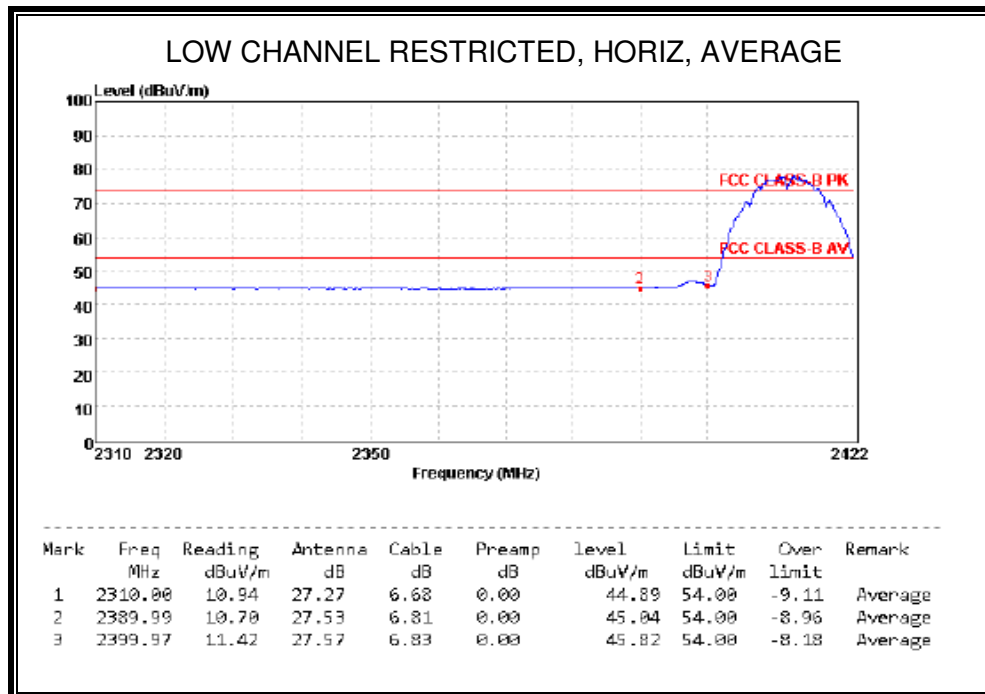
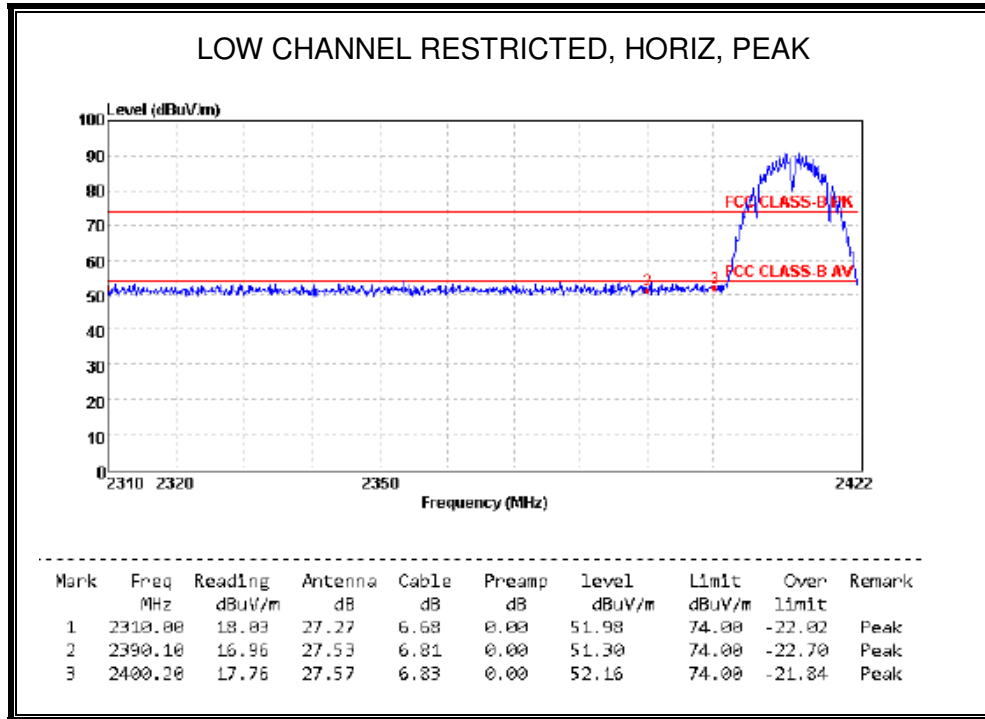
Test Voltage: AC 120V/60Hz

Note: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

8.2. RESTRICTED BANDEGE

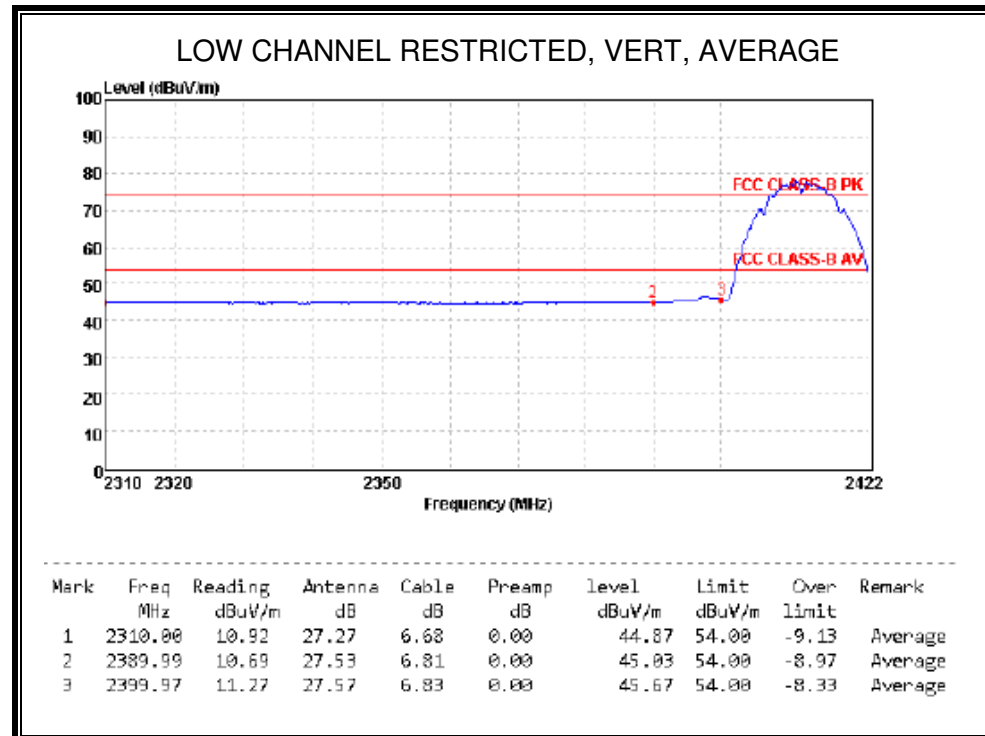
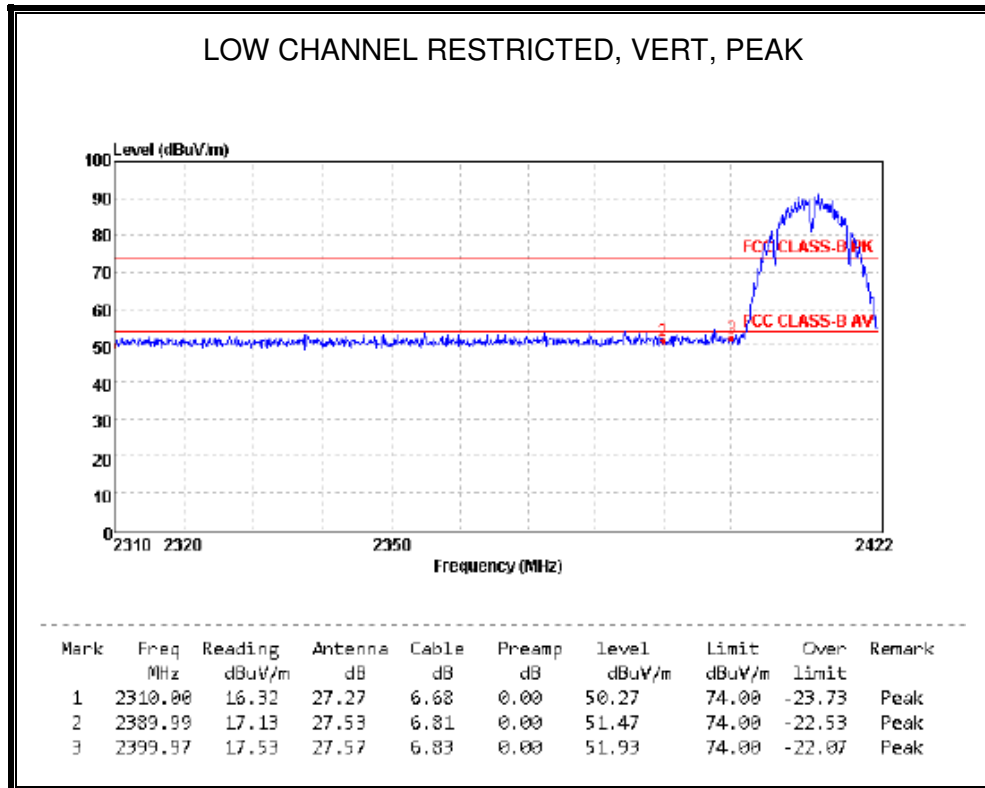
8.2.1. 802.11b MODE

RESTRICTED BANDEGE (LOW CHANNEL, HORIZONTAL)



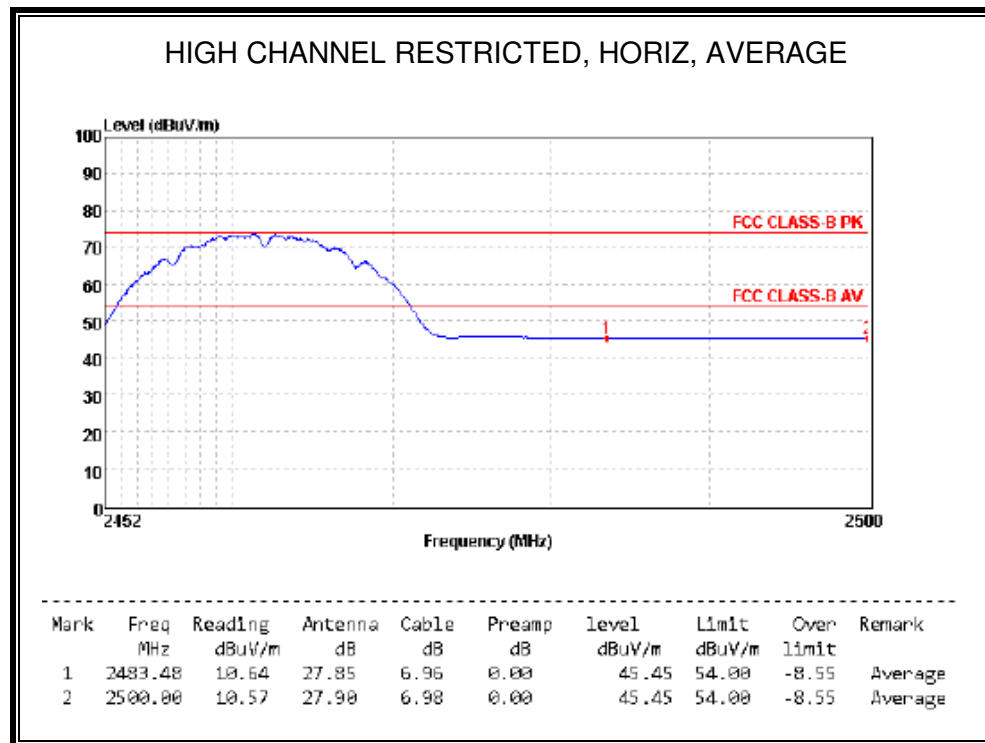
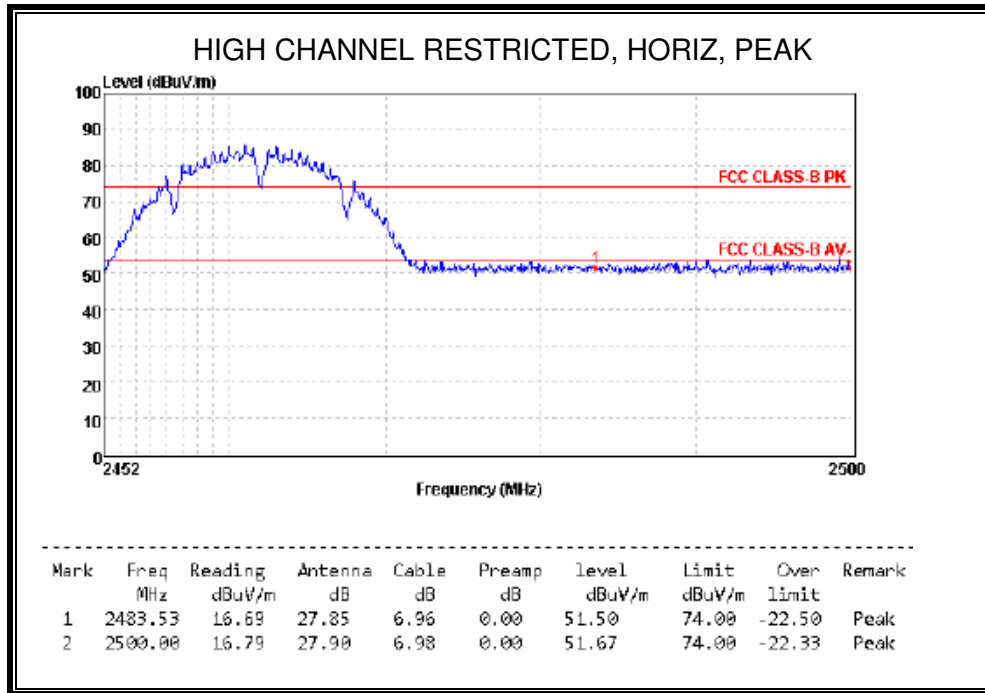
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



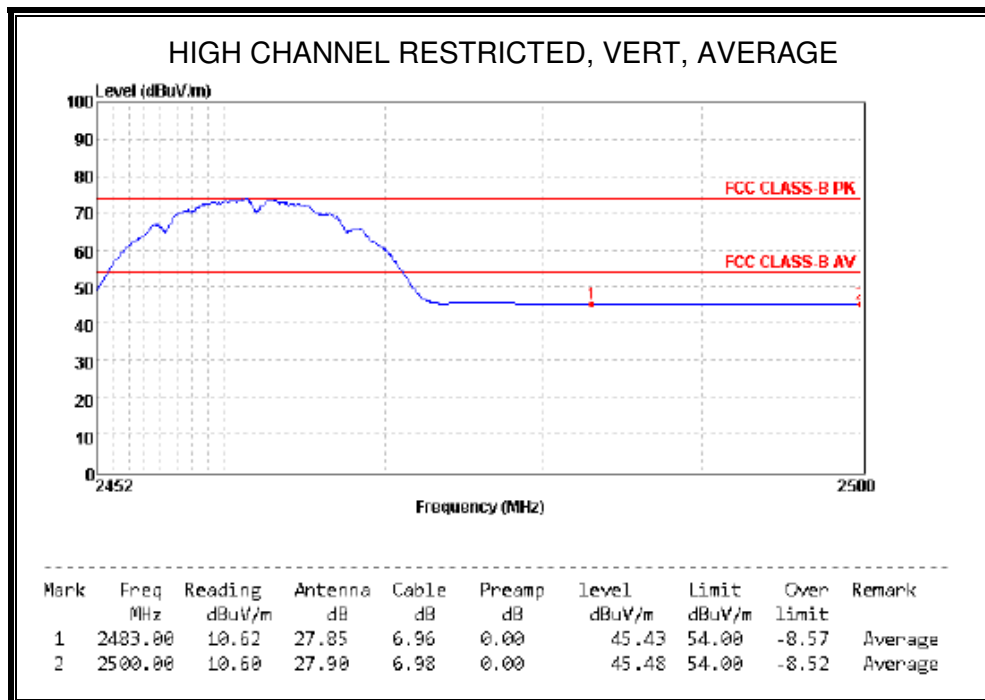
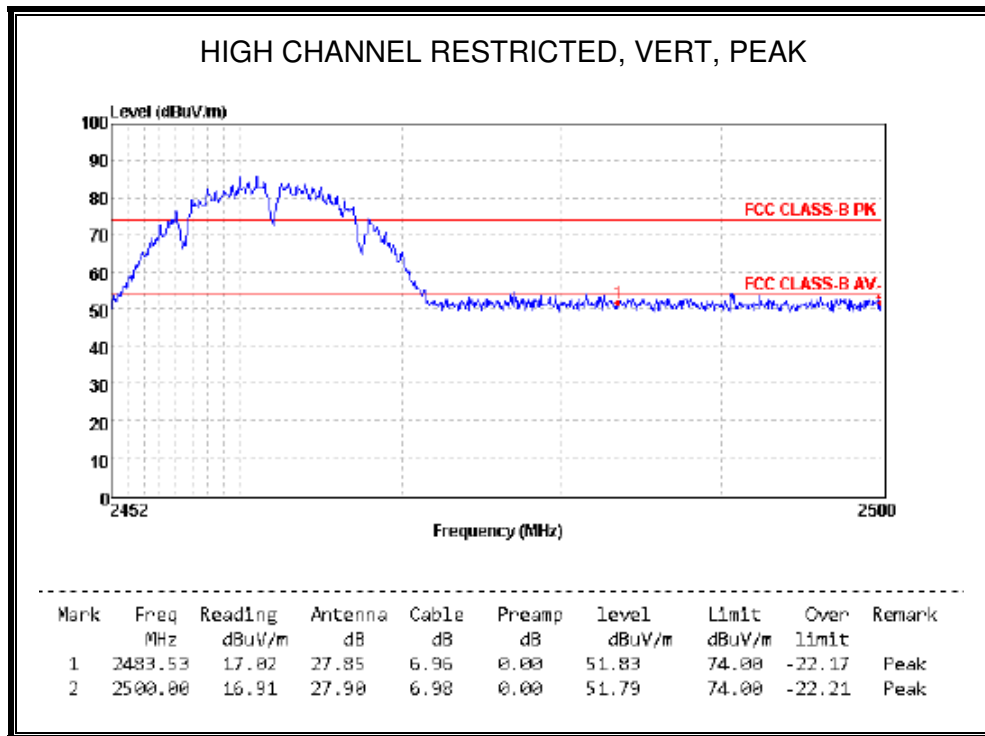
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

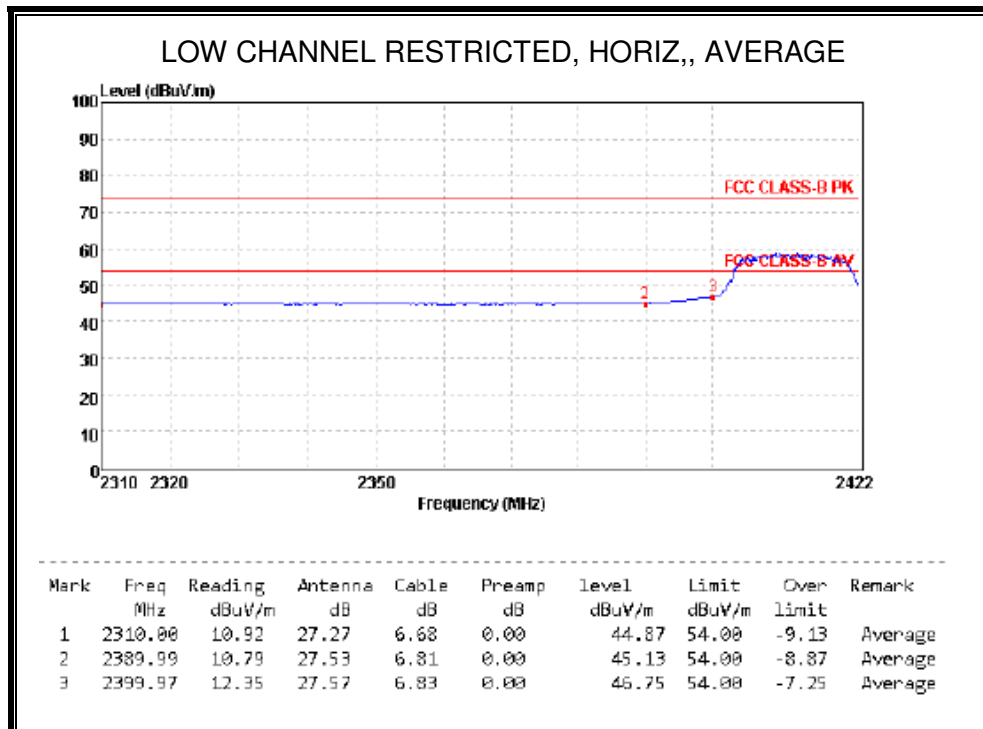
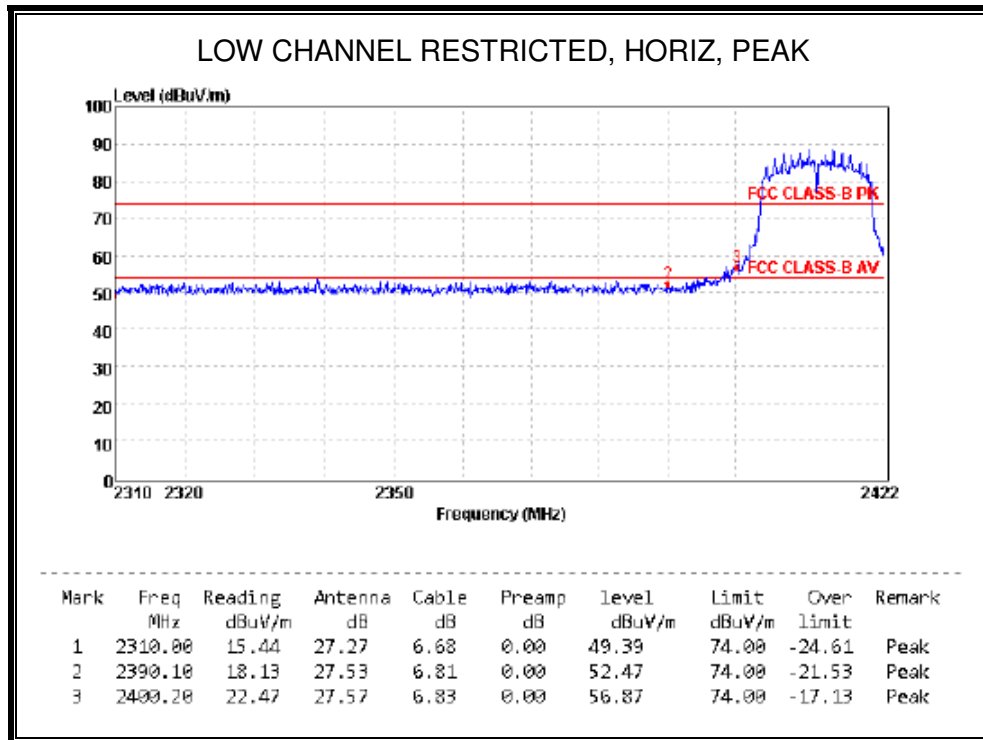
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

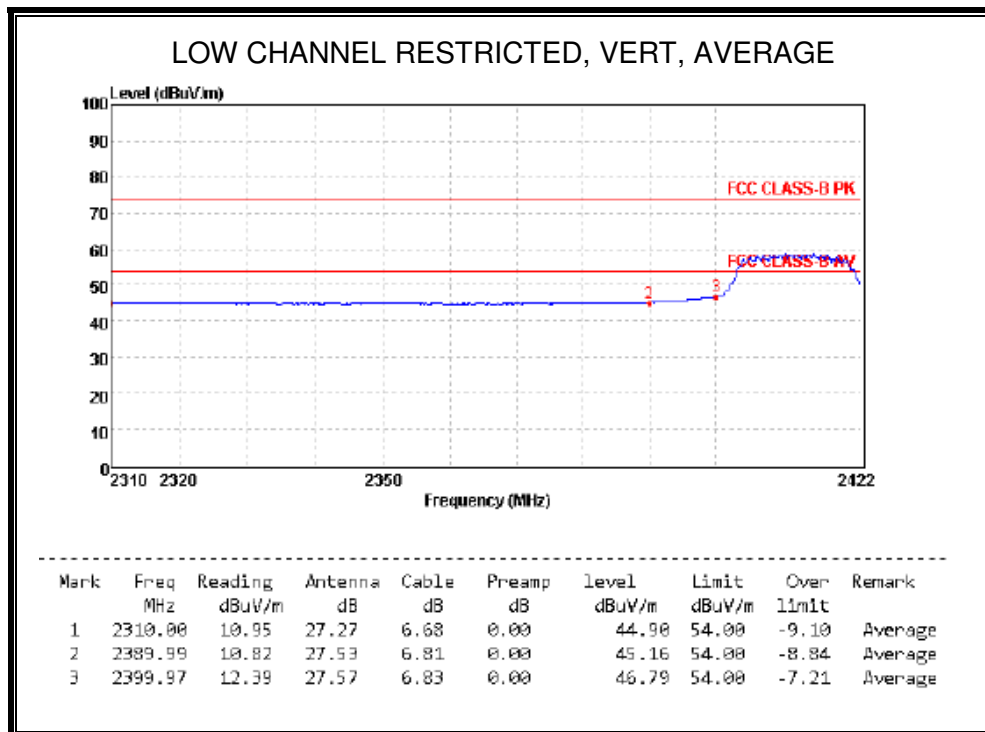
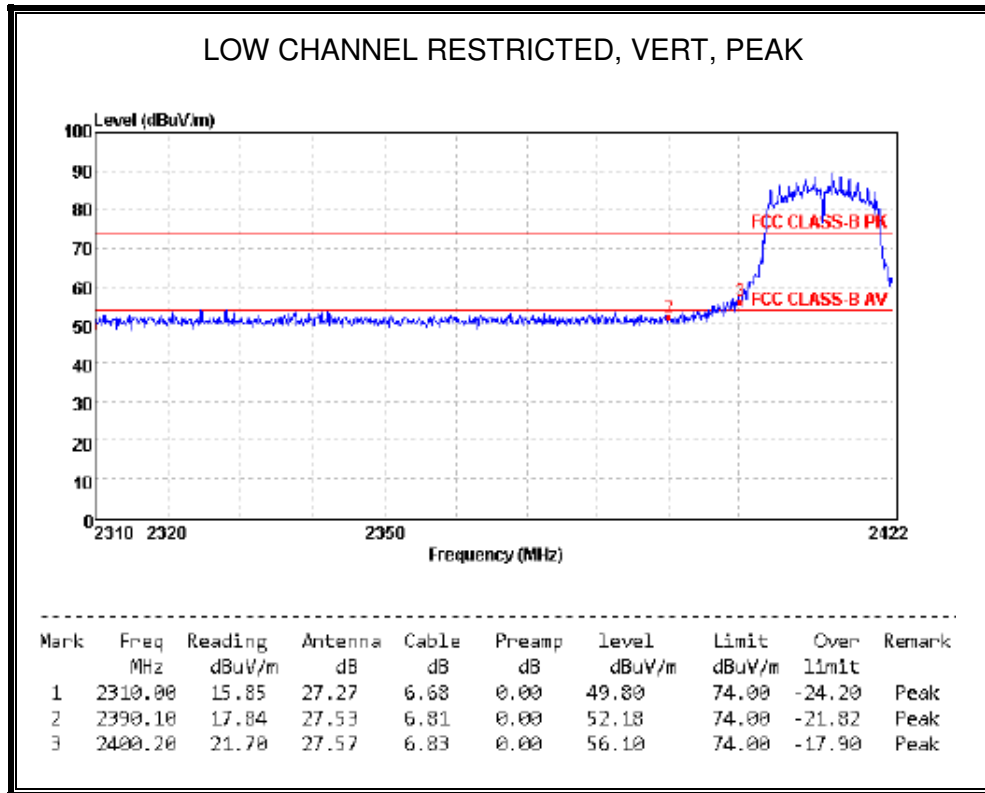
8.2.1. 802.11g MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)

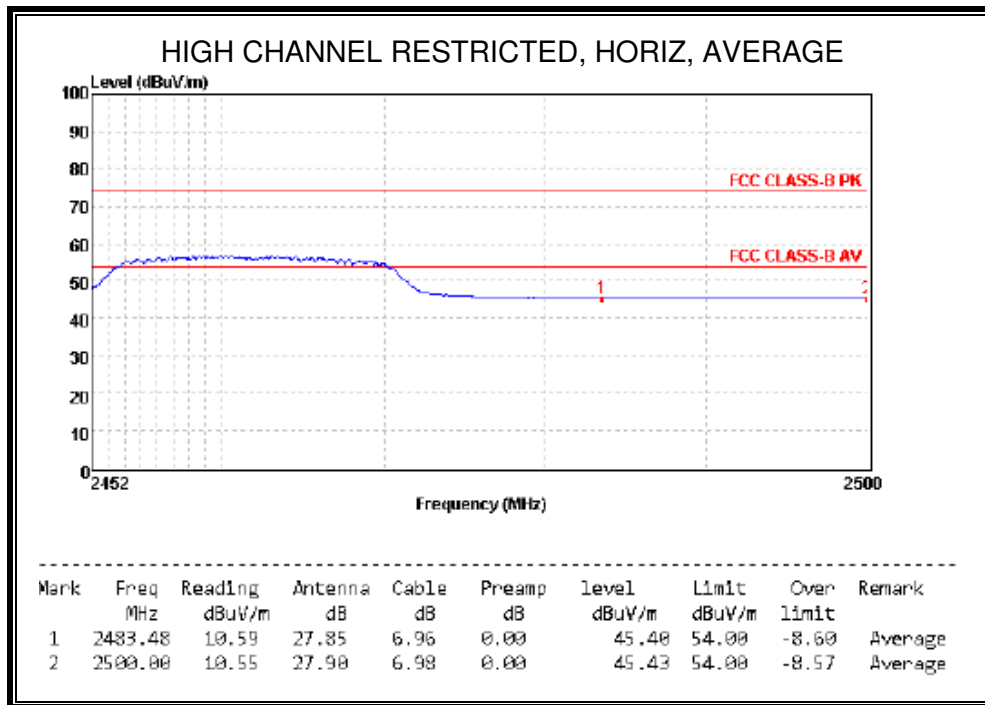
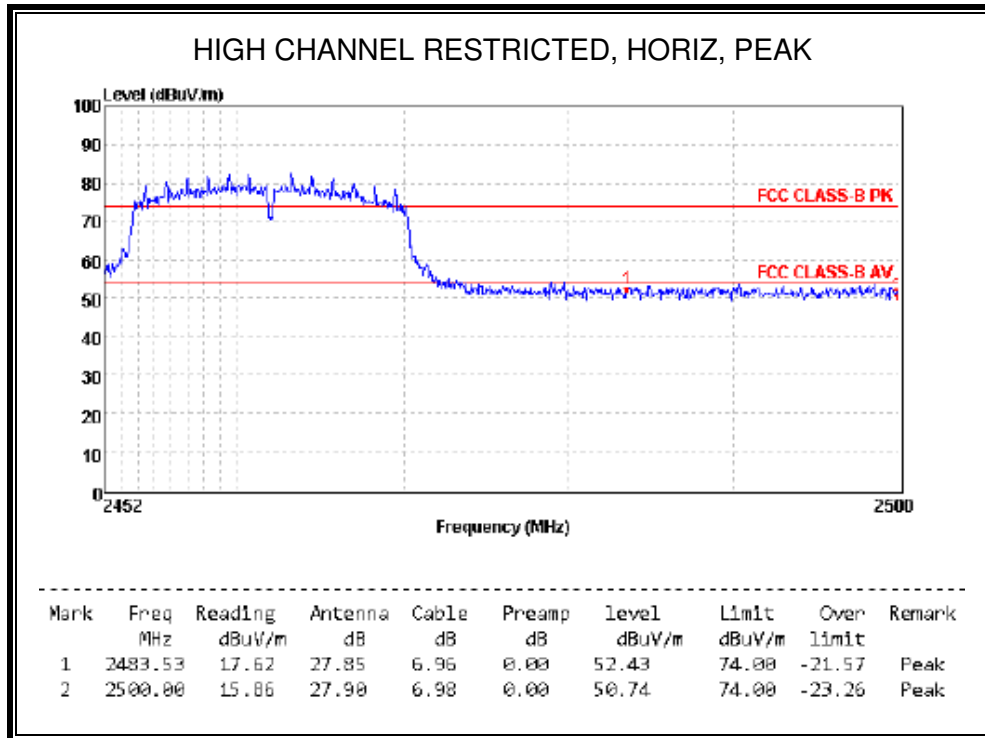


* - indicates frequency in CFR15.205/IC8.10 Restricted Band

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

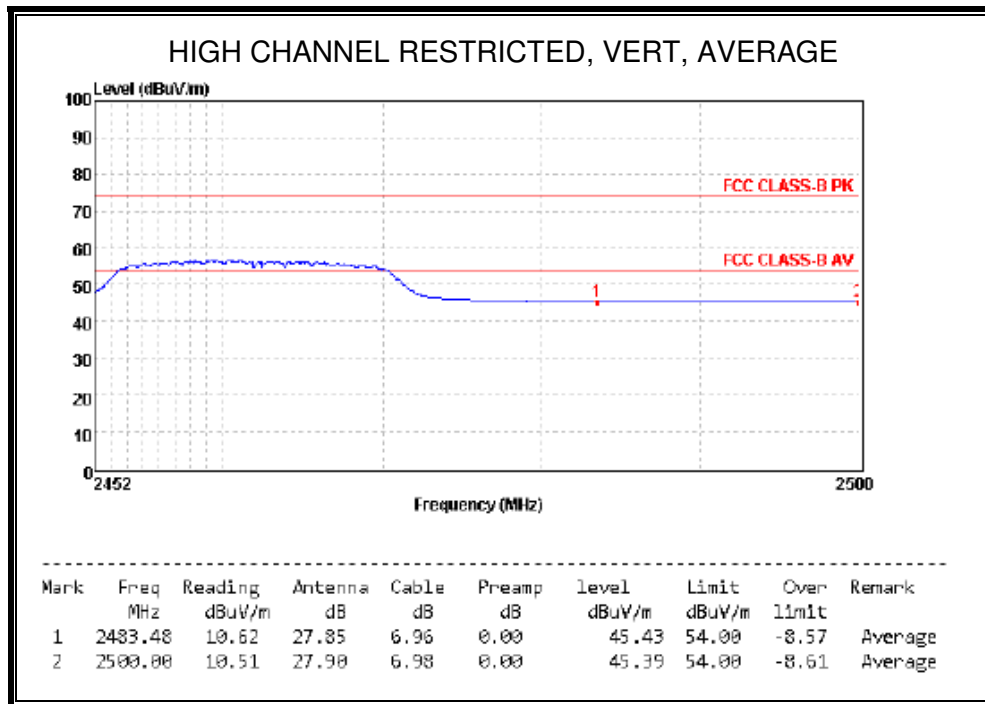
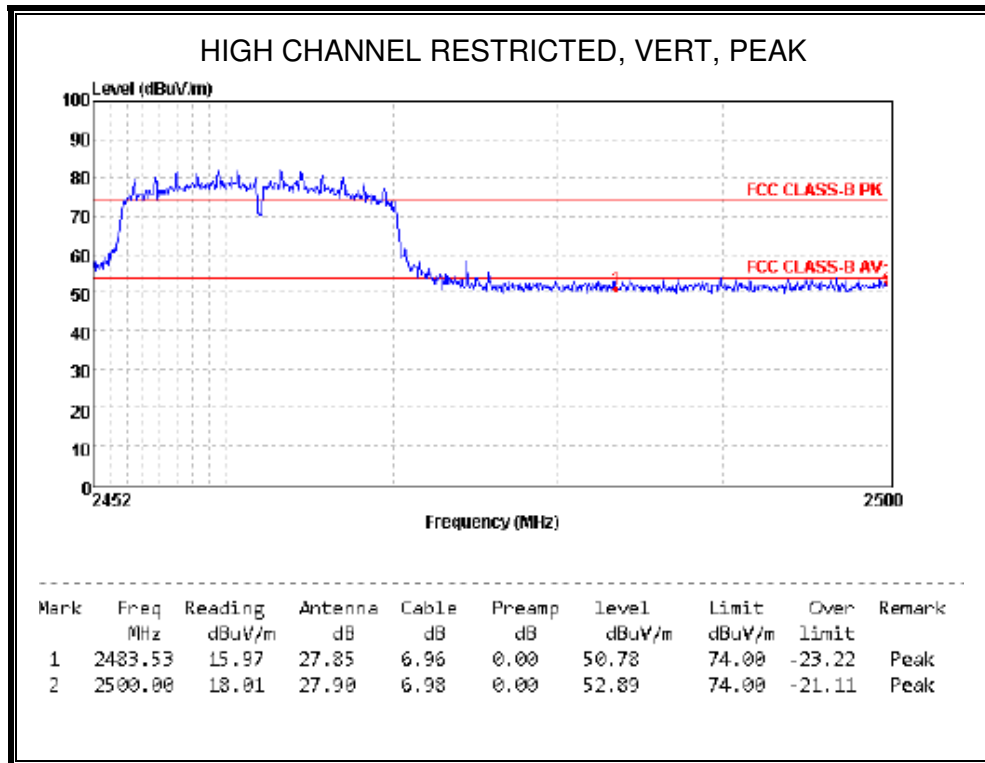


RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

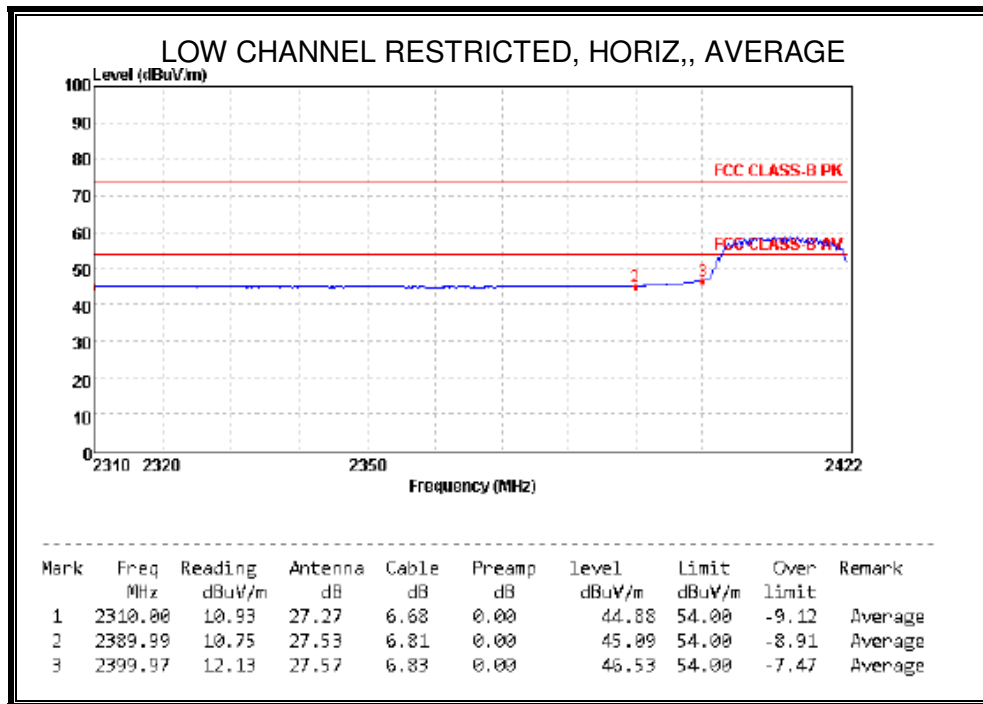
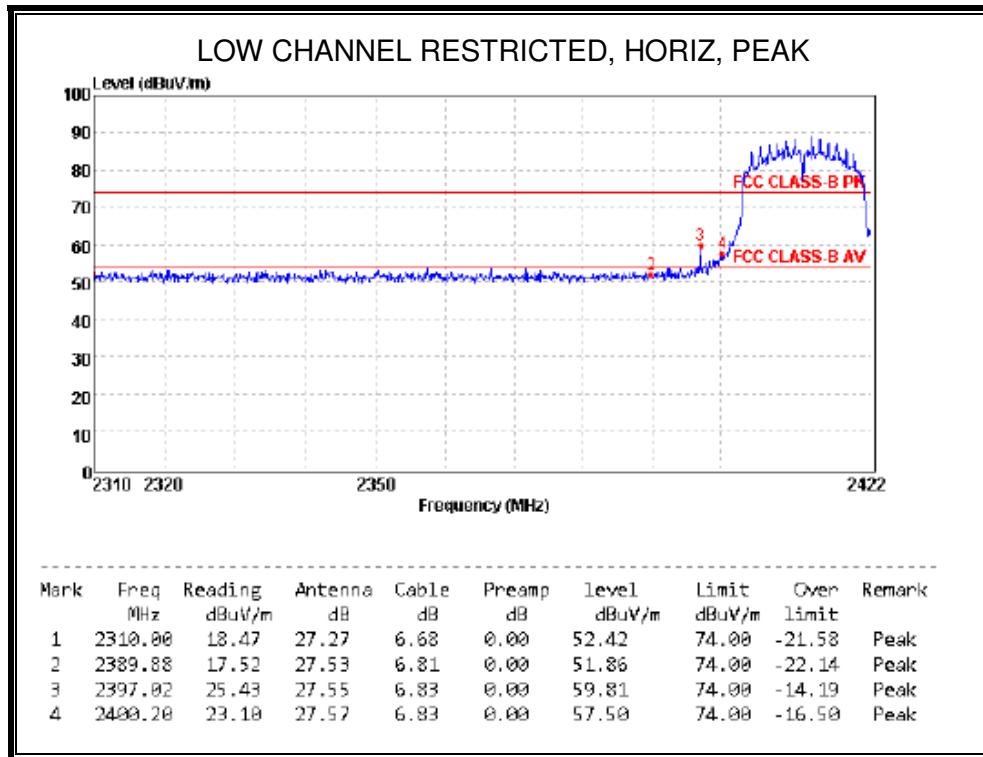
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

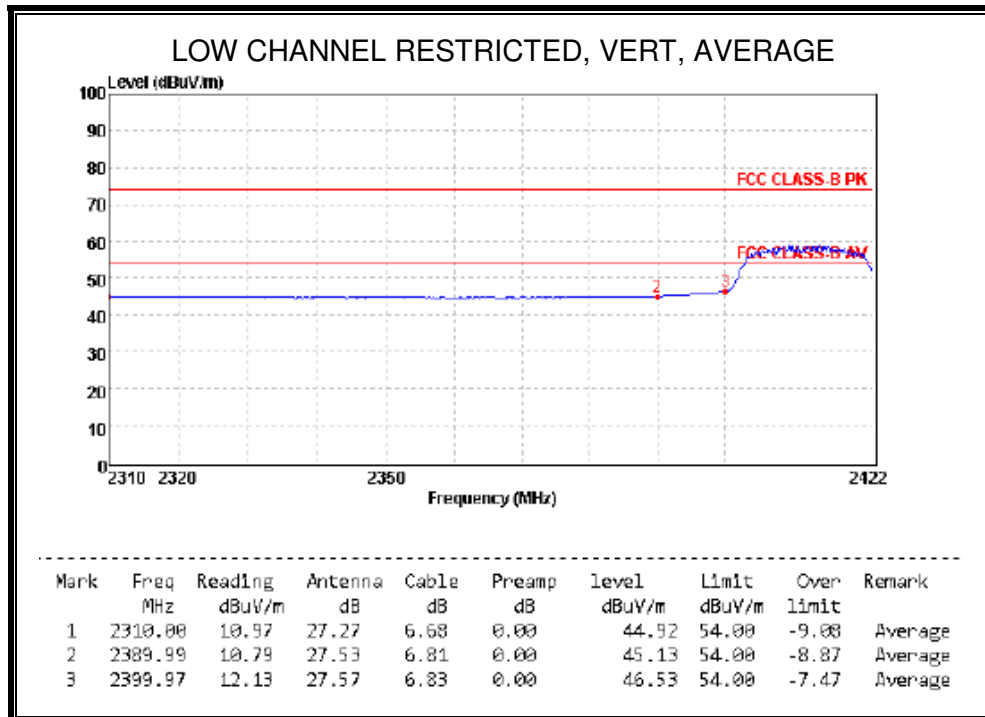
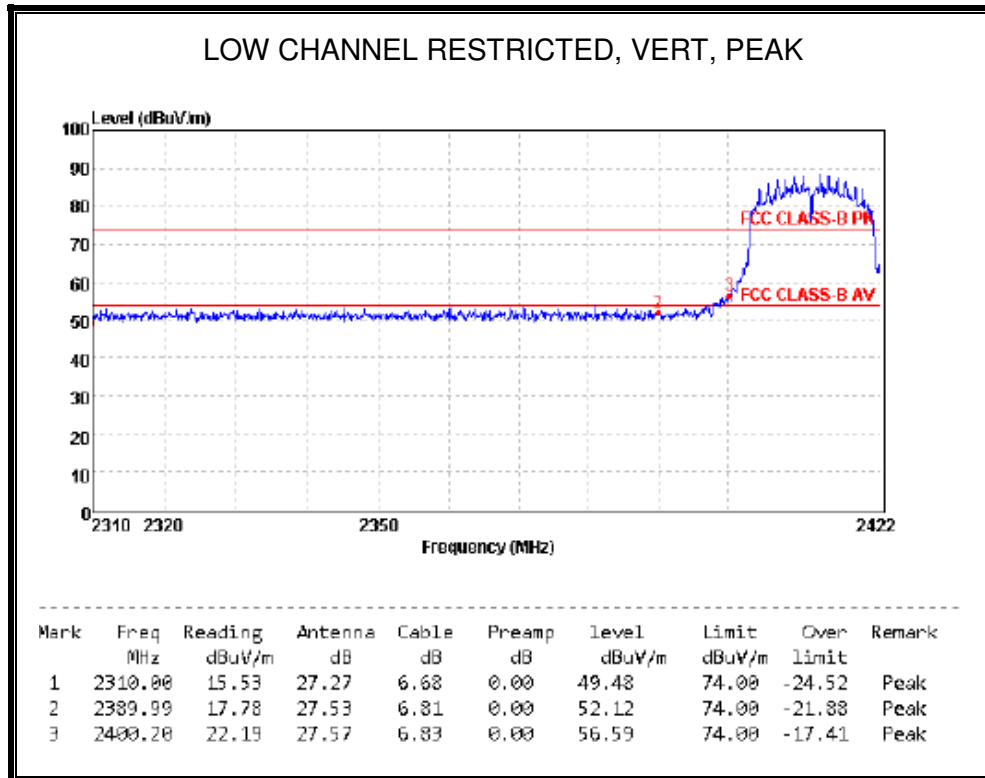
8.2.1. 802.11n MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



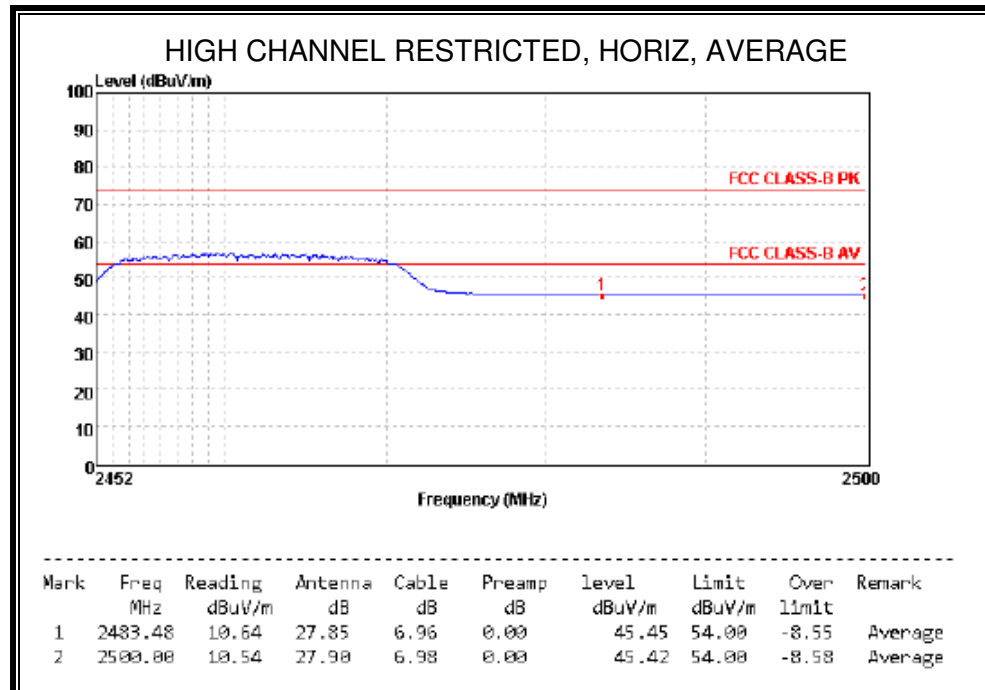
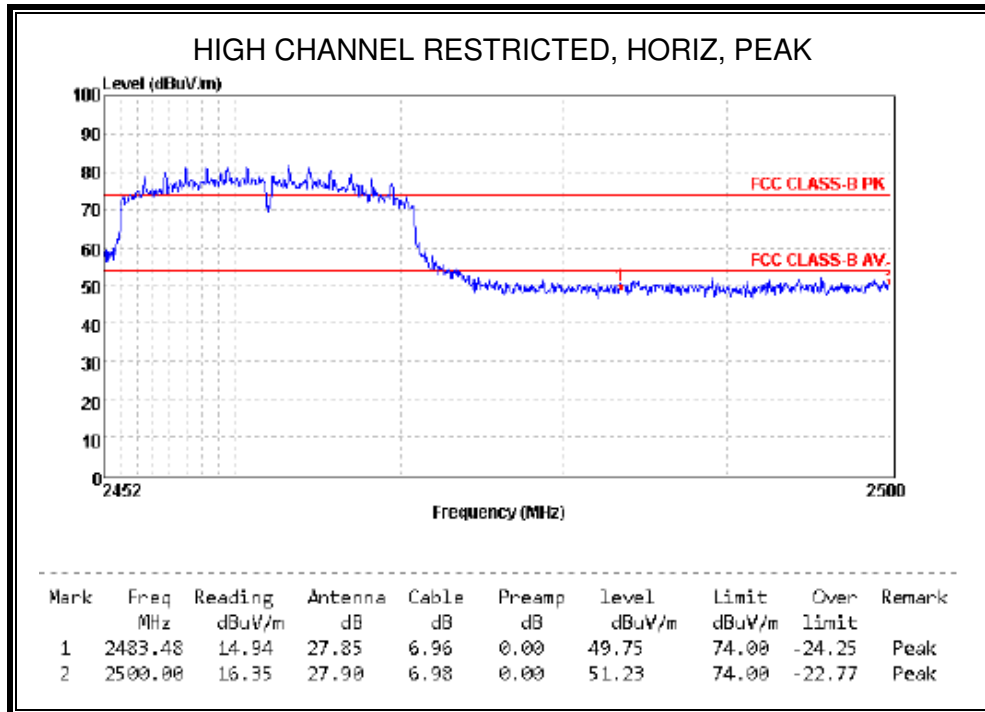
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)



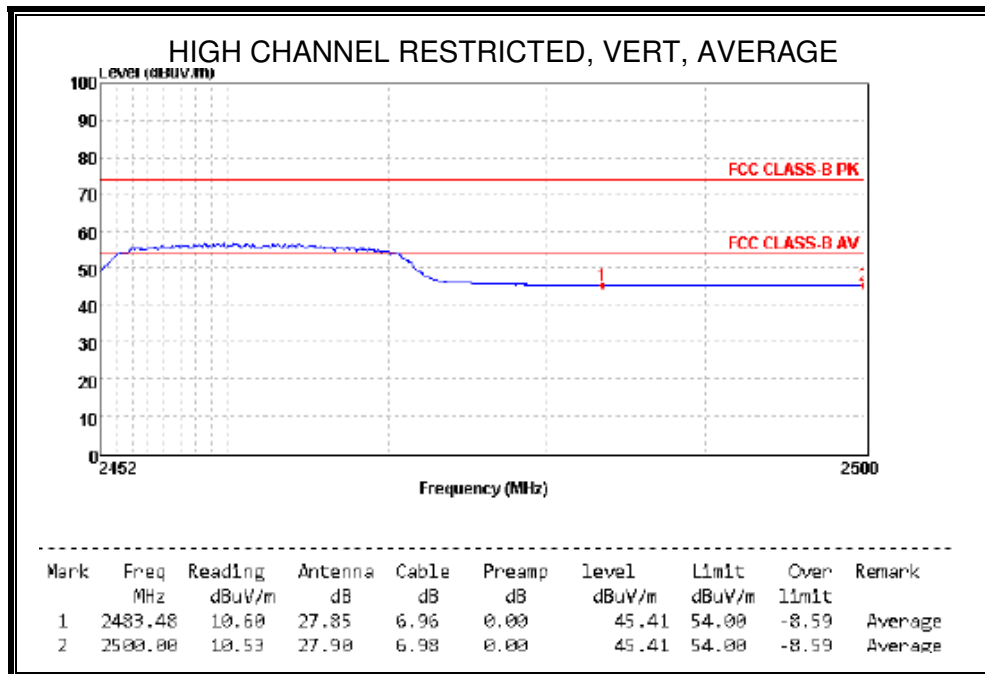
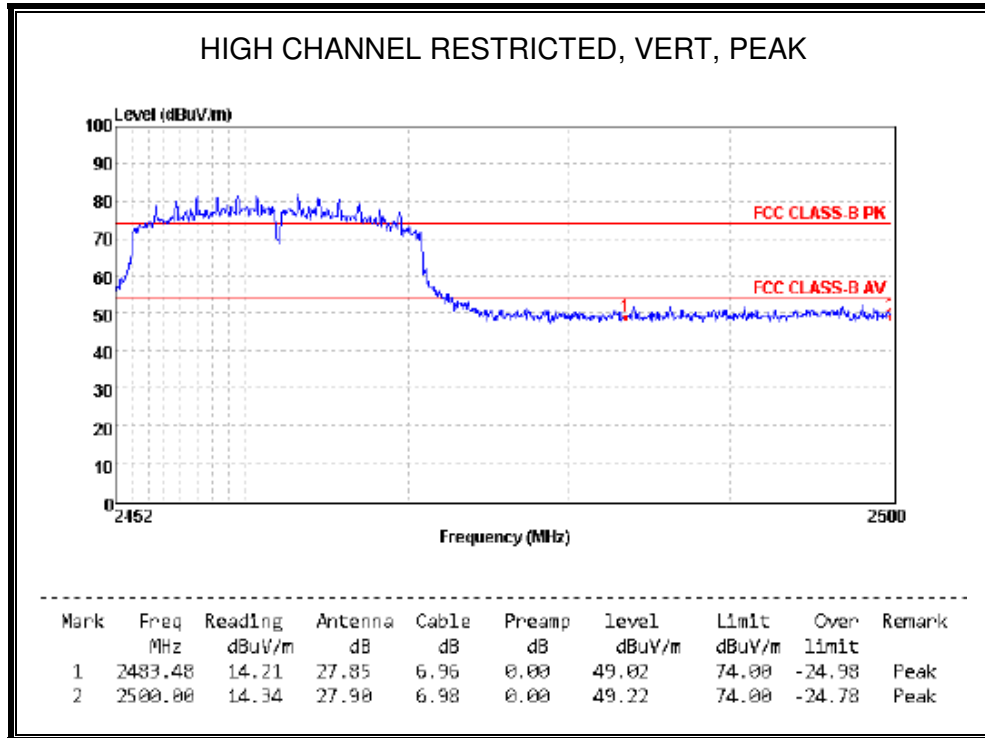
* - indicates frequency in CFR15.205/IC8.10 Restricted Band

RESTRICTED BANDEGE (HIGH CHANNEL, HORIZONTAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

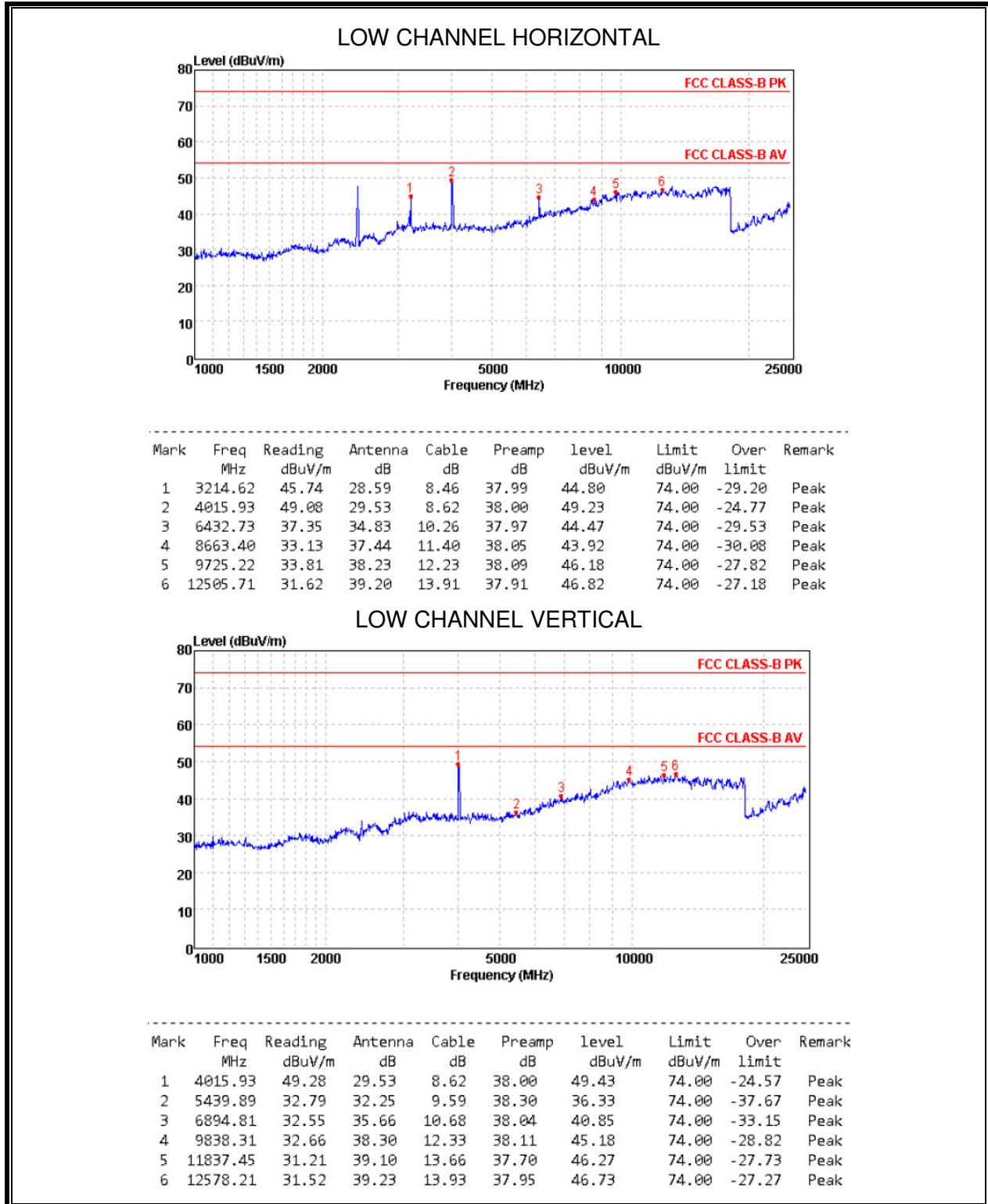
RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)



* - indicates frequency in CFR15.205/IC8.10 Restricted Band

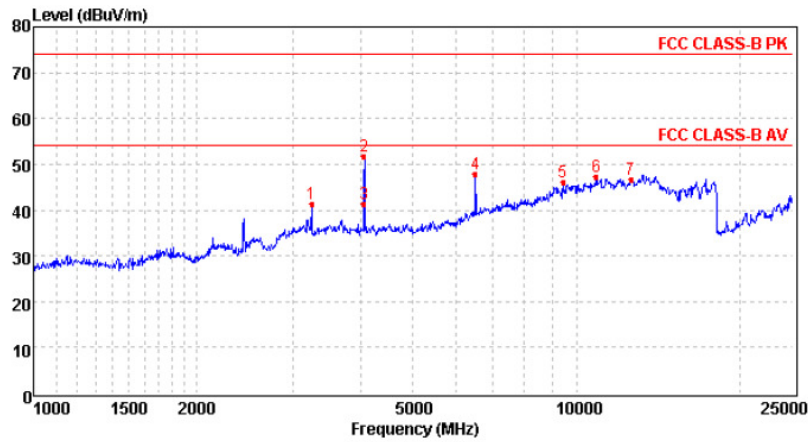
8.3. SPURIOUS EMISSIONS (1~25GHz)

8.3.1. 802.11b MODE



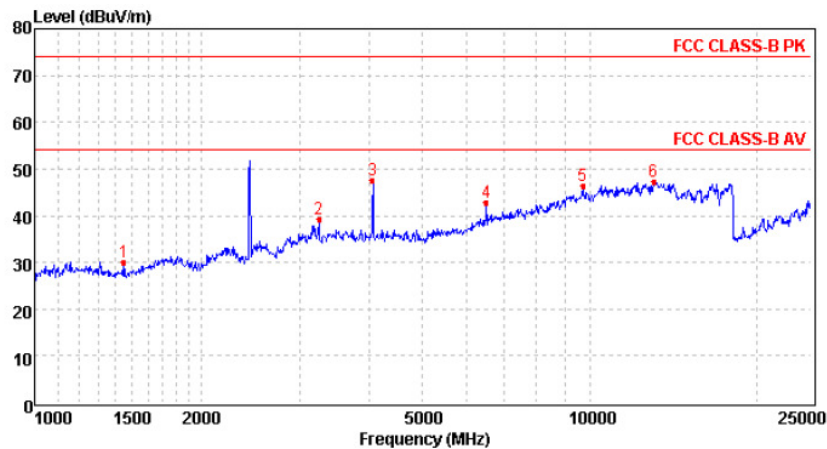
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

MID CHANNEL HORIZONTAL



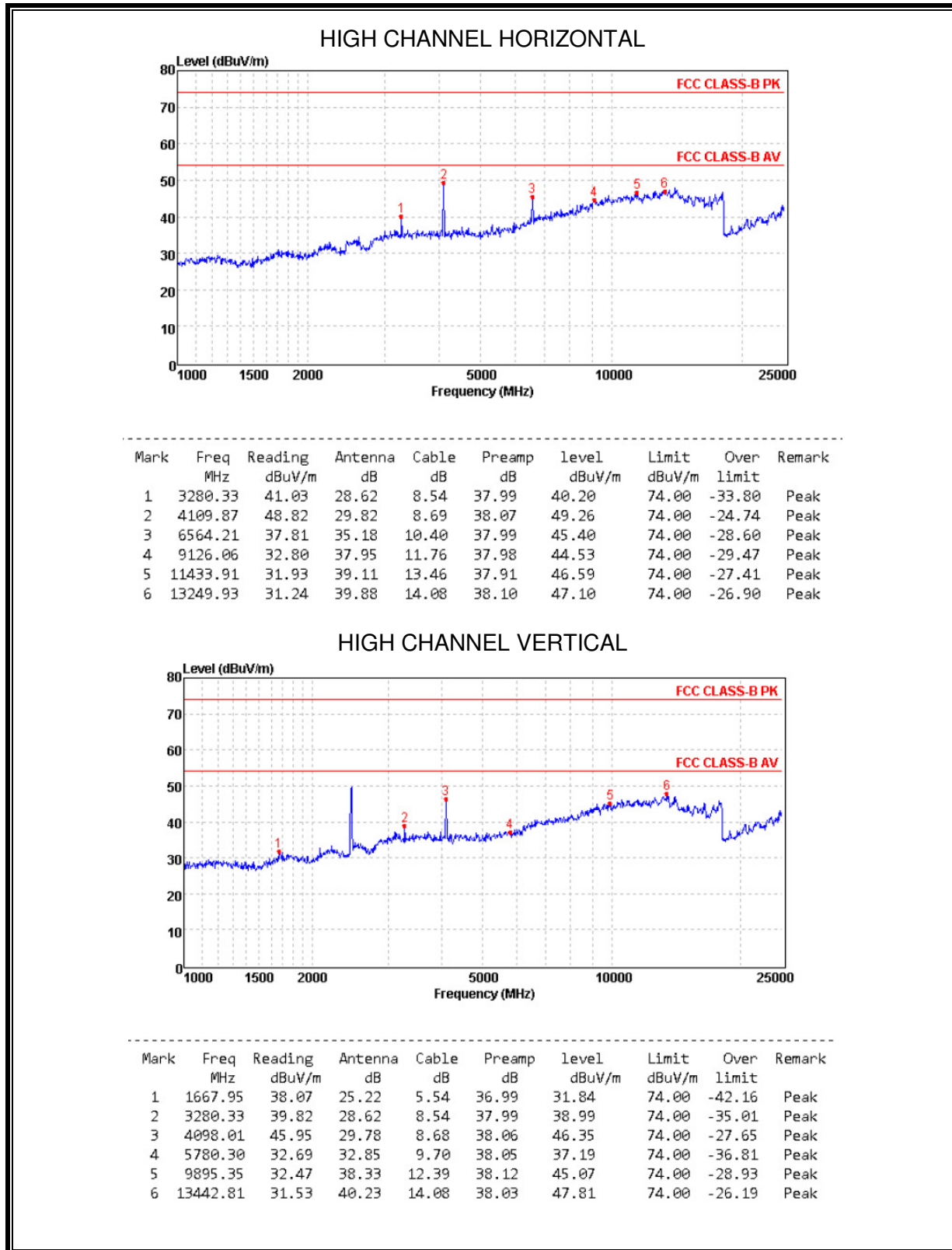
Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3252.01	42.10	28.61	8.50	37.99	41.22	74.00	-32.78	Peak
2	4062.63	51.50	29.67	8.66	38.03	51.80	74.00	-22.20	Peak
3	4062.63	41.00	29.67	8.65	38.03	41.29	54.00	-12.71	Average
4	6507.54	40.40	35.10	10.35	37.98	47.87	74.00	-26.13	Peak
5	9420.88	34.14	38.07	11.95	38.03	46.13	74.00	-27.87	Peak
6	10854.25	33.15	39.04	13.14	38.14	47.19	74.00	-26.81	Peak
7	12578.21	31.54	39.23	13.93	37.95	46.75	74.00	-27.25	Peak

MID CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1447.69	37.12	24.66	5.08	36.78	30.08	74.00	-43.92	Peak
2	3252.01	40.00	28.61	8.50	37.99	39.12	74.00	-34.88	Peak
3	4062.63	47.35	29.67	8.66	38.03	47.65	74.00	-26.35	Peak
4	6507.54	35.39	35.10	10.35	37.98	42.86	74.00	-31.14	Peak
5	9697.15	34.05	38.22	12.20	38.08	46.39	74.00	-27.61	Peak
6	13022.13	32.01	39.47	14.07	38.18	47.37	74.00	-26.63	Peak

Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

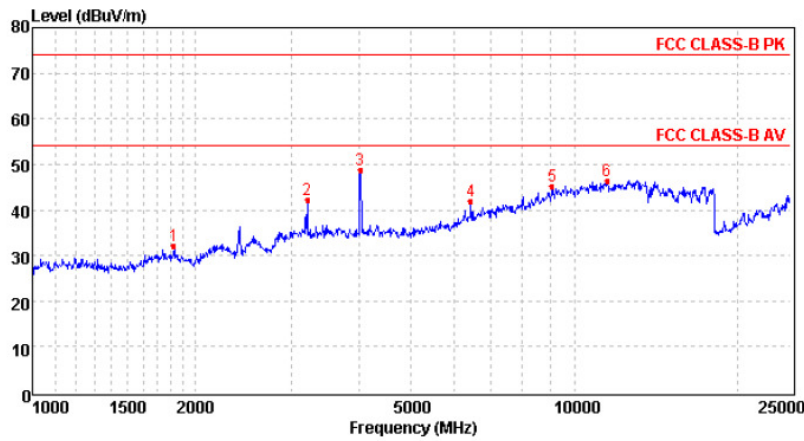


Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

8.3.2. 802.11g MODE

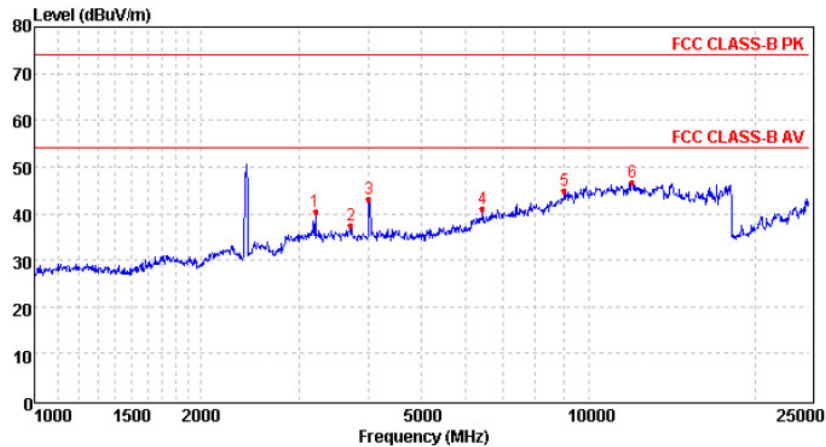
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

LOW CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1824.30	37.69	25.65	5.84	37.12	32.06	74.00	-41.94	Peak
2	3214.62	43.10	28.59	8.46	37.99	42.16	74.00	-31.84	Peak
3	4027.55	48.63	29.57	8.63	38.01	48.82	74.00	-25.18	Peak
4	6432.73	34.76	34.83	10.26	37.97	41.88	74.00	-32.12	Peak
5	9099.72	33.51	37.94	11.75	37.97	45.23	74.00	-28.77	Peak
6	11467.00	31.77	39.11	13.48	37.89	46.47	74.00	-27.53	Peak

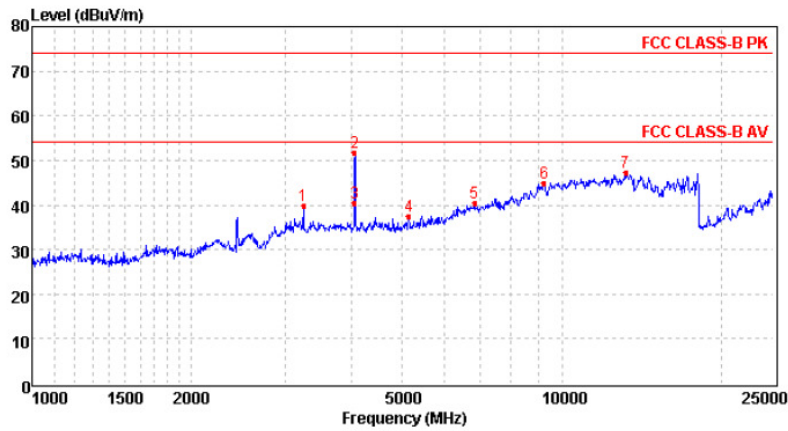
LOW CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3214.62	41.24	28.59	8.46	37.99	40.30	74.00	-33.70	Peak
2	3725.20	37.79	29.07	8.71	37.99	37.58	74.00	-36.42	Peak
3	4015.93	43.12	29.53	8.62	38.00	43.27	74.00	-30.73	Peak
4	6432.73	33.89	34.83	10.26	37.97	41.01	74.00	-32.99	Peak
5	9047.27	33.13	37.92	11.71	37.96	44.80	74.00	-29.20	Peak
6	11975.10	31.52	39.10	13.71	37.63	46.70	74.00	-27.30	Peak

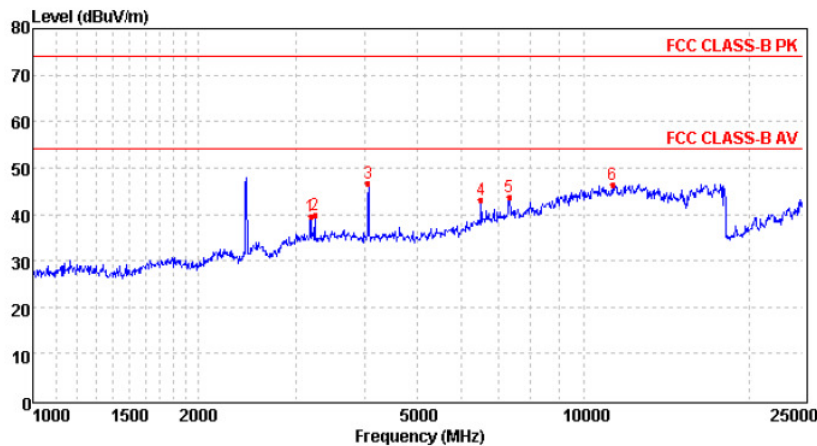
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

MID CHANNEL HORIZONTAL



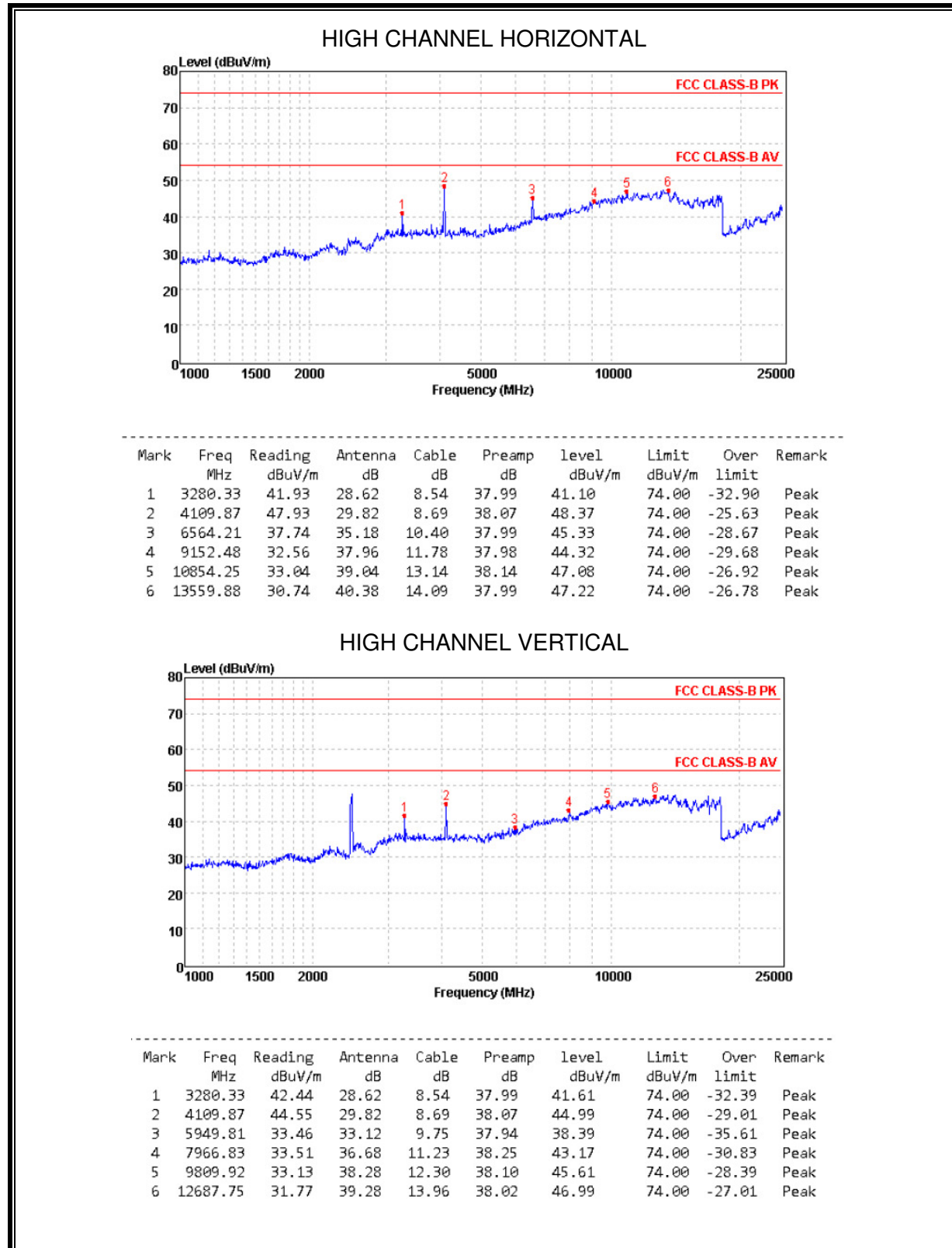
Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3252.01	40.68	28.61	8.50	37.99	39.80	74.00	-34.20	Peak
2	4062.63	51.38	29.67	8.66	38.03	51.68	74.00	-22.32	Peak
3	4062.63	40.29	29.67	8.66	38.03	40.59	54.00	-13.41	Average
4	5134.34	35.02	31.53	9.42	38.54	37.43	74.00	-36.57	Peak
5	6835.28	32.39	35.58	10.62	38.04	40.55	74.00	-33.45	Peak
6	9232.19	33.17	37.99	11.84	38.00	45.00	74.00	-29.00	Peak
7	13173.56	31.53	39.75	14.08	38.12	47.24	74.00	-26.76	Peak

MID CHANNEL VERTICAL



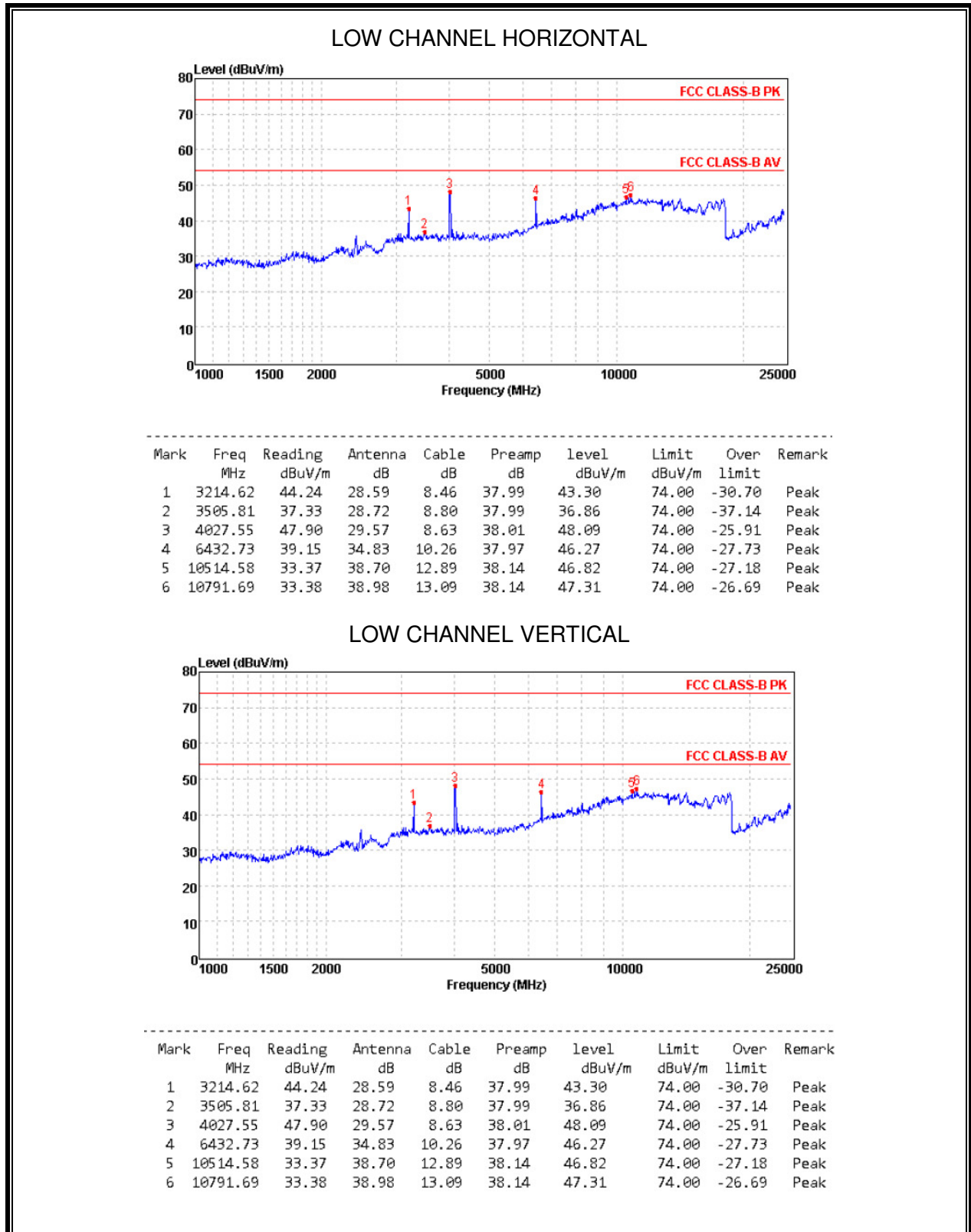
Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3196.09	40.43	28.58	8.43	37.99	39.45	74.00	-34.55	Peak
2	3252.01	40.66	28.61	8.50	37.99	39.78	74.00	-34.22	Peak
3	4062.63	46.45	29.67	8.66	38.03	46.75	74.00	-27.25	Peak
4	6507.54	35.74	35.10	10.35	37.98	43.21	74.00	-30.79	Peak
5	7326.27	34.93	36.07	10.90	38.13	43.77	74.00	-30.23	Peak
6	11269.86	31.92	39.15	13.37	38.00	46.44	74.00	-27.56	Peak

Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing



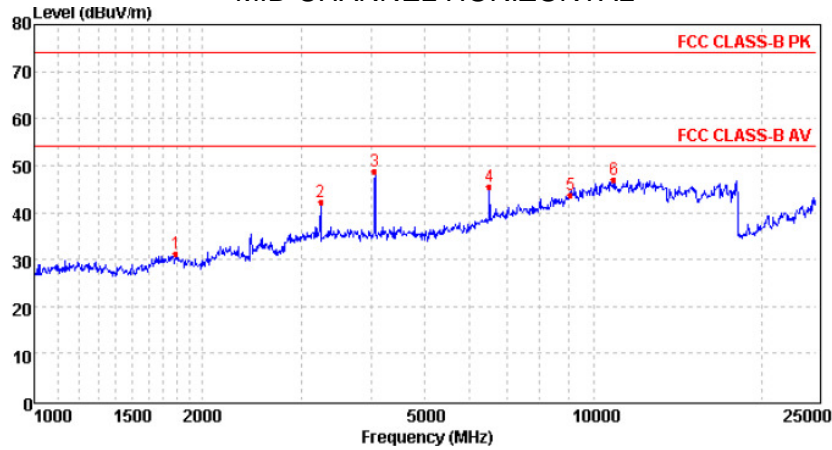
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

8.3.3. 802.11n HT 20 MODE



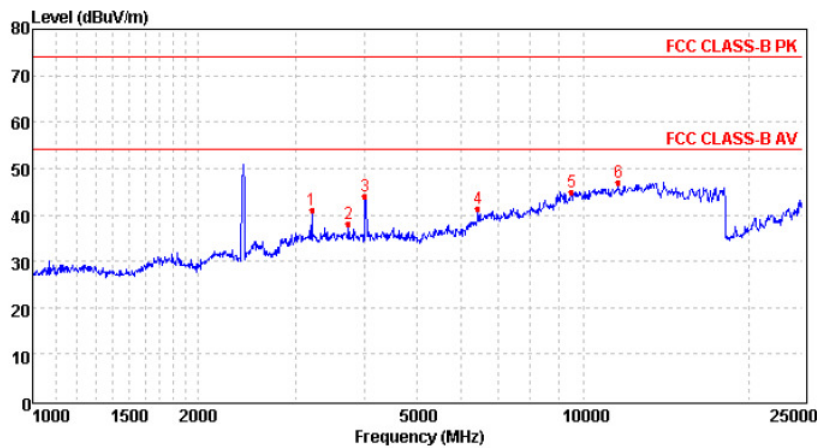
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

MID CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	1792.94	36.90	25.57	5.78	37.09	31.16	74.00	-42.84	Peak
2	3252.01	43.17	28.61	8.50	37.99	42.29	74.00	-31.71	Peak
3	4062.63	48.40	29.67	8.66	38.03	48.70	74.00	-25.30	Peak
4	6507.54	38.17	35.10	10.35	37.98	45.64	74.00	-28.36	Peak
5	9099.72	31.94	37.94	11.75	37.97	43.66	74.00	-30.34	Peak
6	10854.25	32.84	39.04	13.14	38.14	46.88	74.00	-27.12	Peak

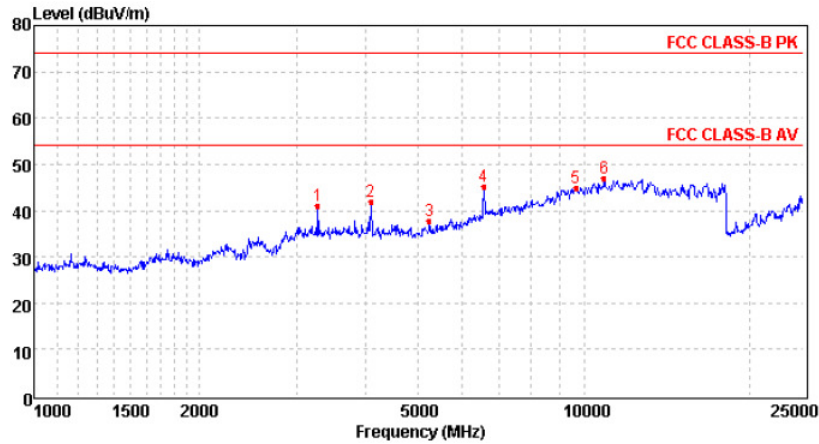
MID CHANNEL VERTICAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3214.62	41.95	28.59	8.46	37.99	41.01	74.00	-32.99	Peak
2	3746.79	38.22	29.11	8.70	37.99	38.04	74.00	-35.96	Peak
3	4015.93	43.95	29.53	8.62	38.00	44.10	74.00	-29.90	Peak
4	6432.73	34.26	34.83	10.26	37.97	41.38	74.00	-32.62	Peak
5	9502.93	32.89	38.10	11.99	38.05	44.93	74.00	-29.07	Peak
6	11566.87	32.17	39.10	13.53	37.84	46.96	74.00	-27.04	Peak

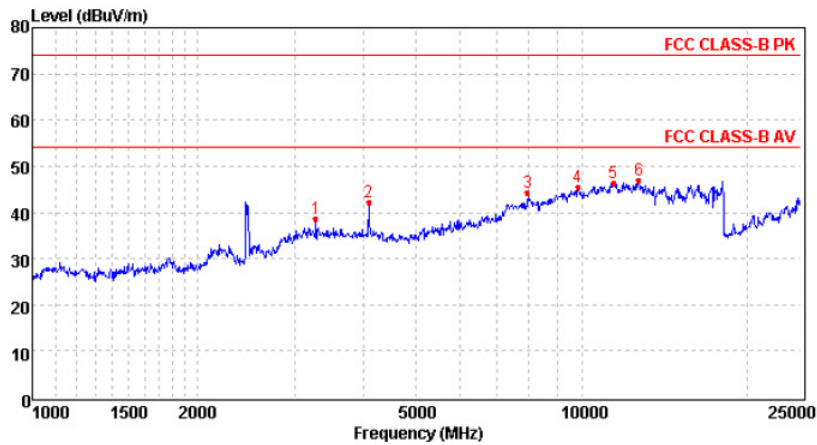
Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

HIGH CHANNEL HORIZONTAL



Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3280.33	41.93	28.62	8.54	37.99	41.10	74.00	-32.90	Peak
2	4098.01	41.52	29.78	8.68	38.06	41.92	74.00	-32.08	Peak
3	5224.15	34.89	31.75	9.48	38.47	37.65	74.00	-36.35	Peak
4	6564.21	37.74	35.18	10.40	37.99	45.33	74.00	-28.67	Peak
5	9641.26	32.52	38.18	12.14	38.07	44.77	74.00	-29.23	Peak
6	10854.25	33.04	39.04	13.14	38.14	47.08	74.00	-26.92	Peak

HIGH CHANNEL VERTICAL



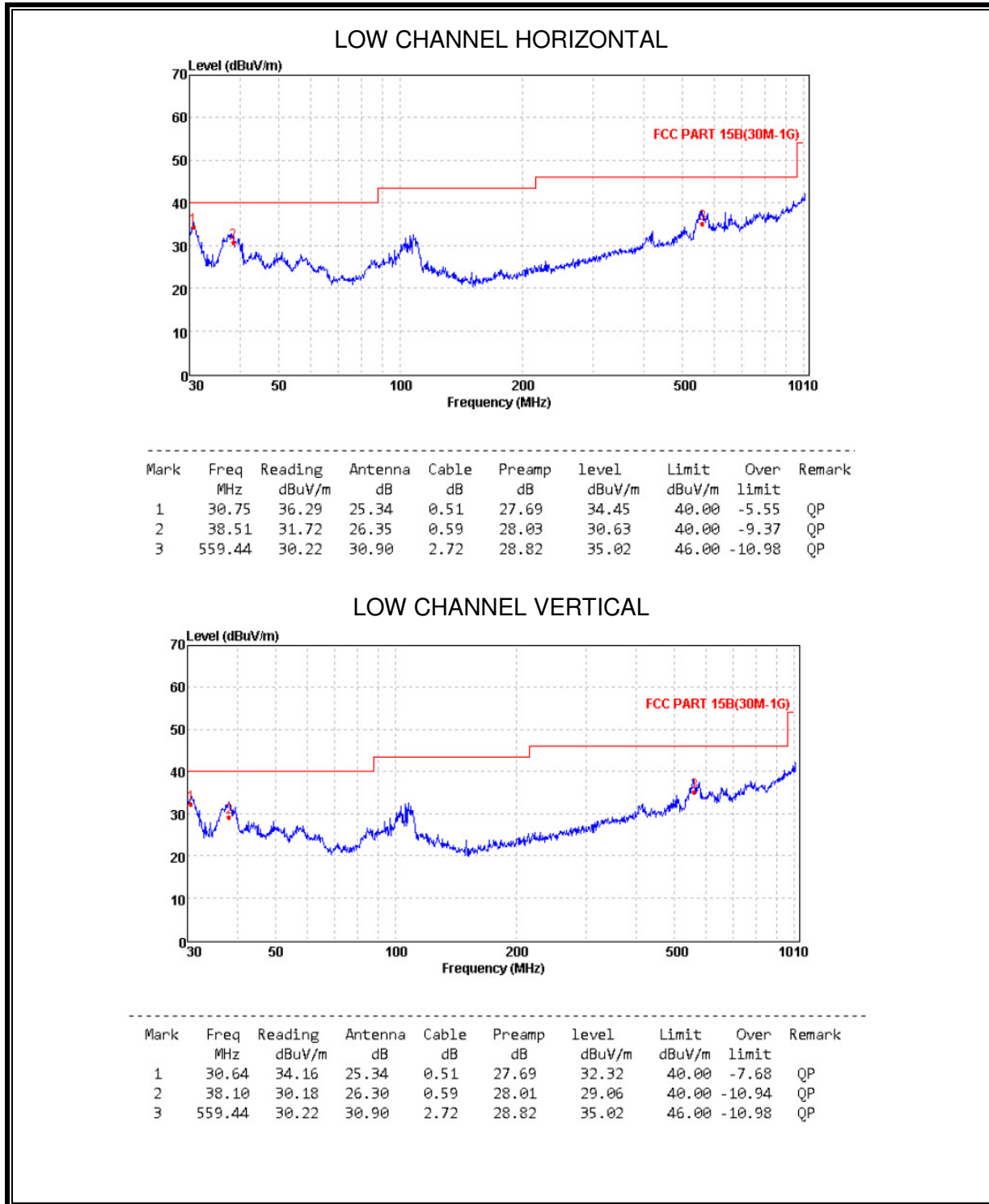
Mark	Freq MHz	Reading dBuV/m	Antenna dB	Cable dB	Preamp dB	level dBuV/m	Limit dBuV/m	Over limit	Remark
1	3280.33	39.44	28.62	8.54	37.99	38.61	74.00	-35.39	Peak
2	4098.01	41.87	29.78	8.68	38.06	42.27	74.00	-31.73	Peak
3	7966.83	34.51	36.68	11.23	38.25	44.17	74.00	-29.83	Peak
4	9809.92	33.13	38.28	12.30	38.10	45.61	74.00	-28.39	Peak
5	11400.91	31.87	39.12	13.44	37.93	46.50	74.00	-27.50	Peak
6	12687.75	31.77	39.28	13.96	38.02	46.99	74.00	-27.01	Peak

Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

8.4. SPURIOUS EMISSIONS BELOW 1 GHz

8.4.1. 802.11b MODE

SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)



Note: Signals in non-restricted bands are covered by -20 dBc antenna port spurious testing.

SPURIOUS EMISSIONS 9KHz TO 30 MHz (WORST-CASE CONFIGURATION)

The emissions don't show in following result tables are more than 20dB below the limits. The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

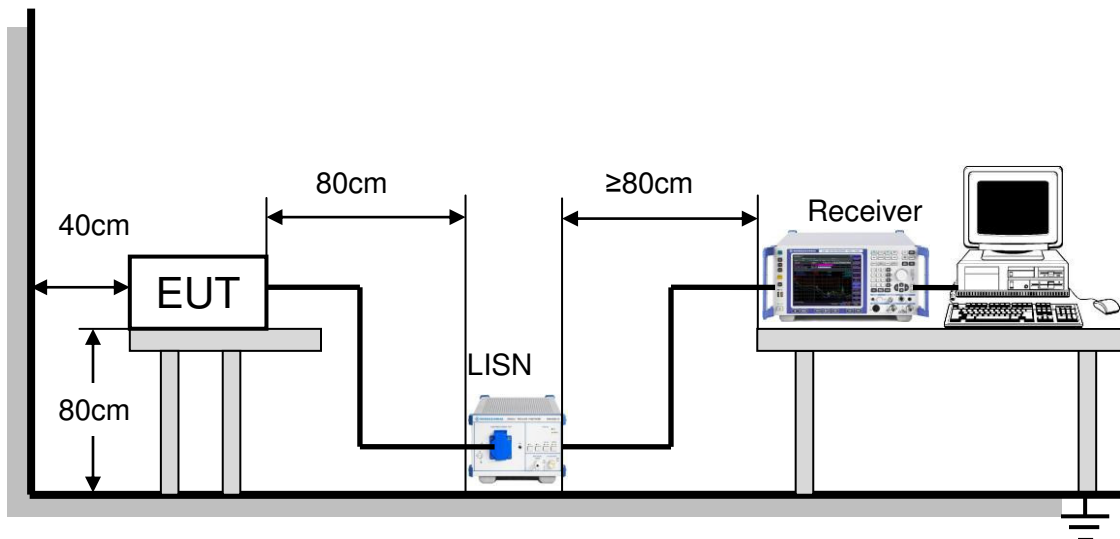
9. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

Please refer to FCC §15.207 (a) and RSS-Gen Clause 8.8

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *
0.50 -5.0	73.00	60.00	56.00	46.00
5.0 -30.0	73.00	60.00	60.00	50.00

TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 7 and 13 of ANSI C63.4-2014. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

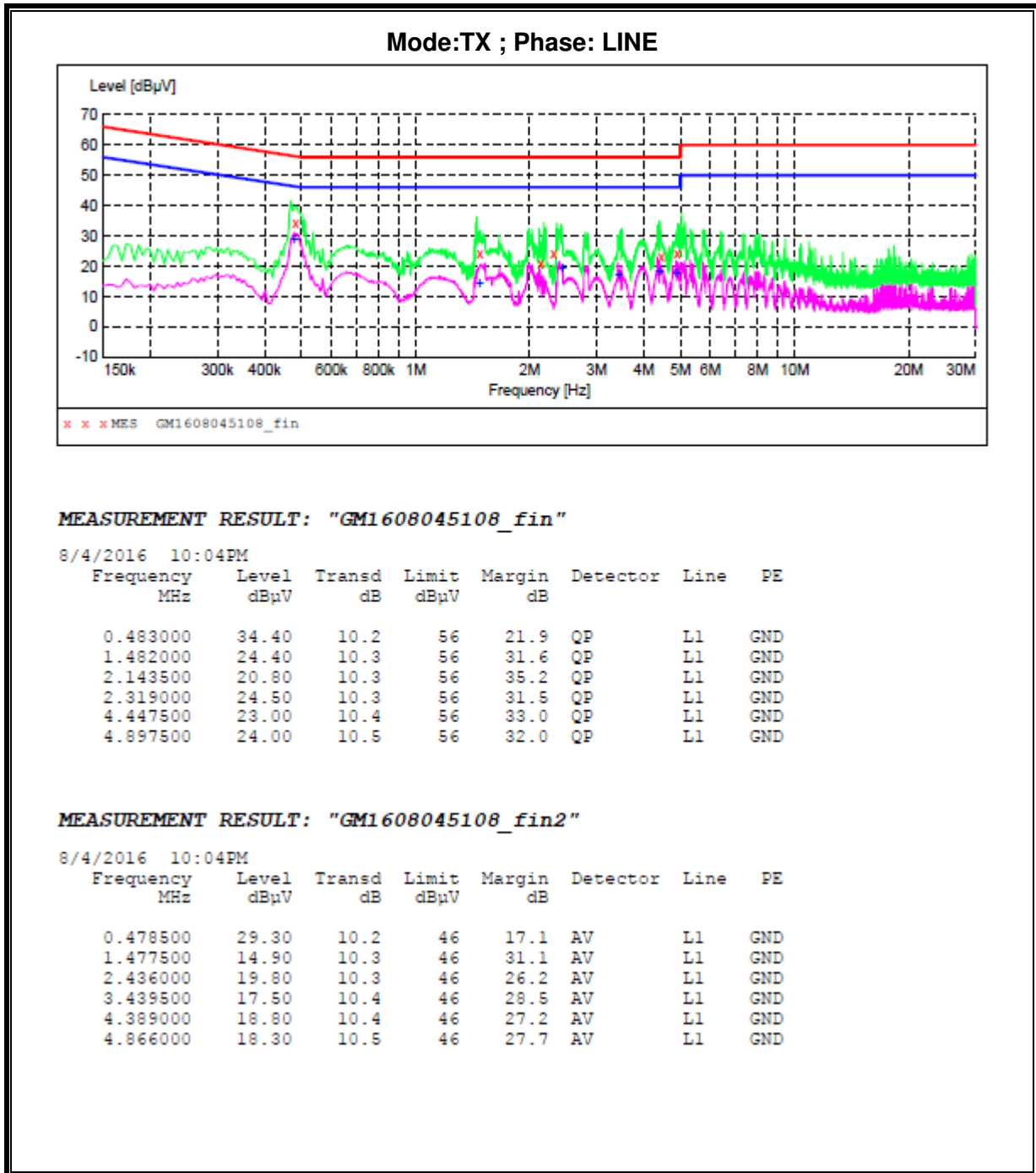
TEST CONDITIONS

Temperature: 23.8°C

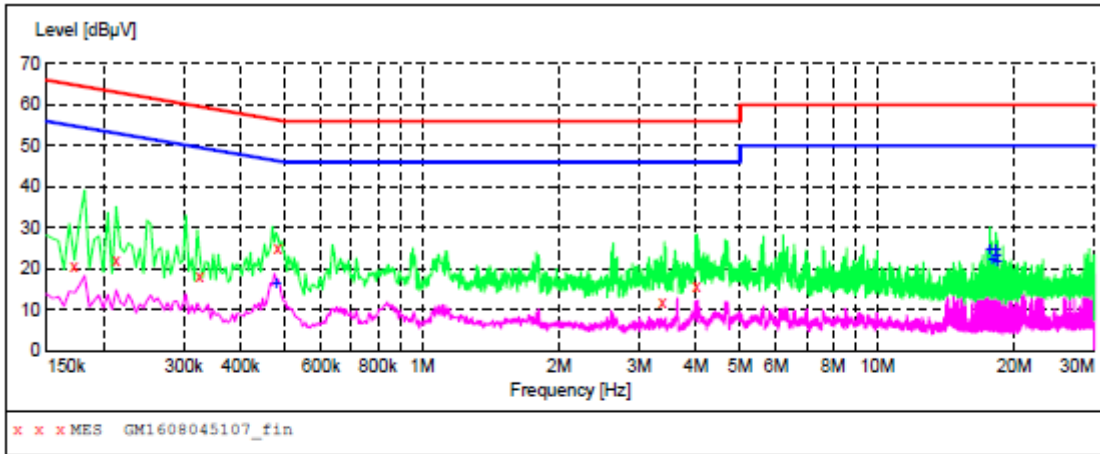
Relative Humidity: 58%

Test Voltage: AC 120V/60Hz

TEST RESULTS



Mode:TX Phase: Neutral



MEASUREMENT RESULT: "GM1608045107_fin"

8/4/2016 10:01PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.172500	20.60	10.3	65	44.2	QP	N	GND
0.213000	22.10	10.2	63	41.0	QP	N	GND
0.325500	18.20	10.2	60	41.4	QP	N	GND
0.483000	24.90	10.2	56	31.4	QP	N	GND
3.381000	11.90	10.4	56	44.1	QP	N	GND
4.011000	16.00	10.4	56	40.0	QP	N	GND

MEASUREMENT RESULT: "GM1608045107_fin2"

8/4/2016 10:01PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.478500	16.70	10.2	46	29.7	AV	N	GND
17.695500	25.10	10.7	50	24.9	AV	N	GND
17.938500	22.50	10.7	50	27.5	AV	N	GND
18.244500	24.90	10.7	50	25.1	AV	N	GND
18.303000	23.80	10.7	50	26.2	AV	N	GND
18.366000	22.20	10.7	50	27.8	AV	N	GND

10. ANTENNA REQUIREMENTS

Applicable requirements

Please refer to FCC §15.203

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

Antenna Connector

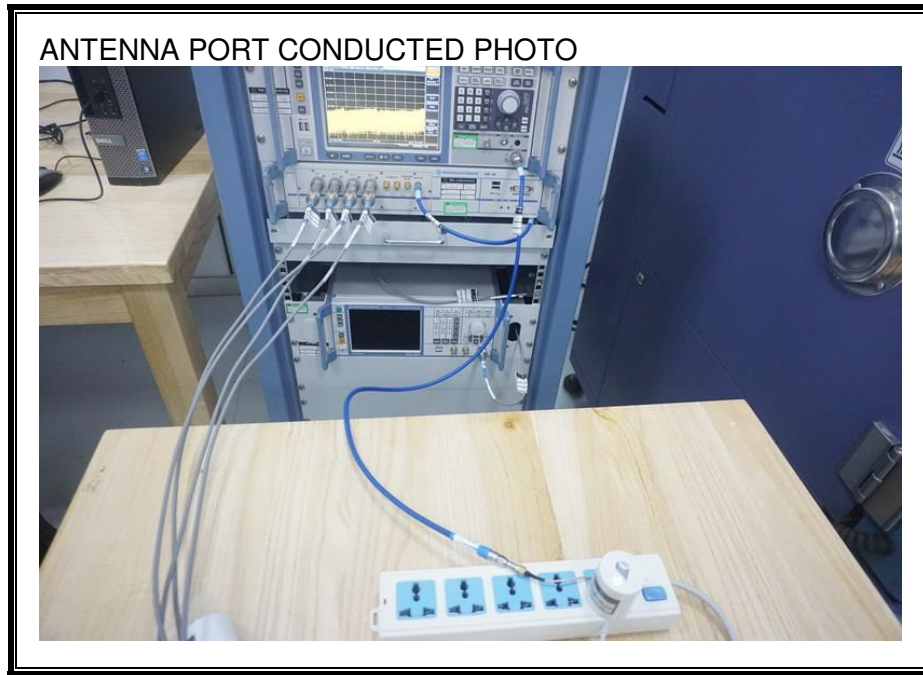
Antenna Connector is on the PCB within enclosure and not accessible to user.

Antenna Gain

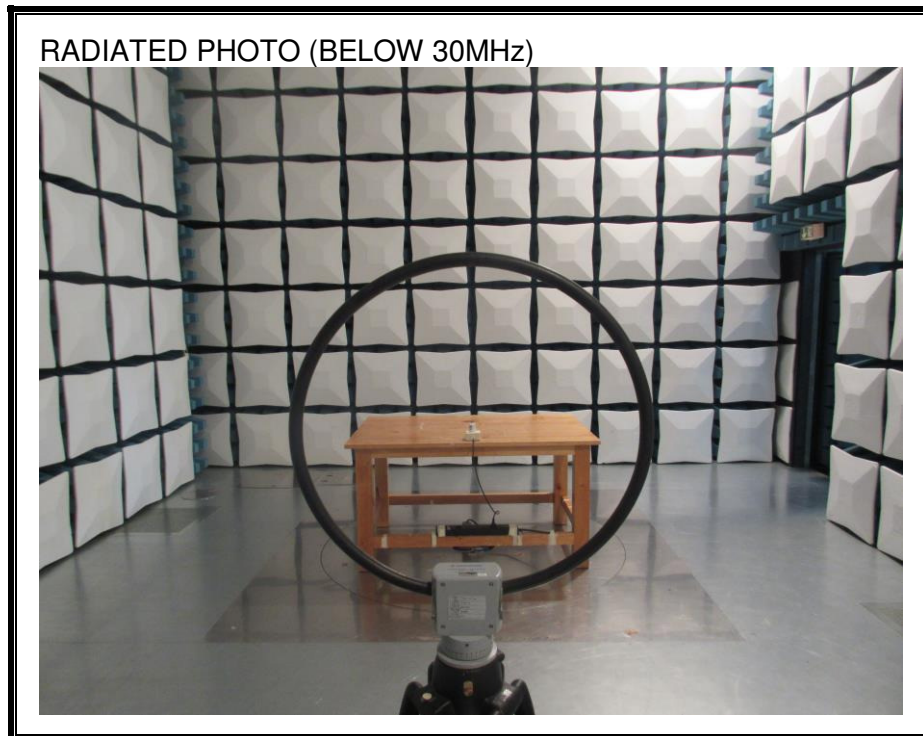
The antenna gain of EUT is less than 6 dBi.

11. SETUP PHOTOS

11.1. ANTENNA PORT CONDUCTED RF MEASUREMENT SETUP



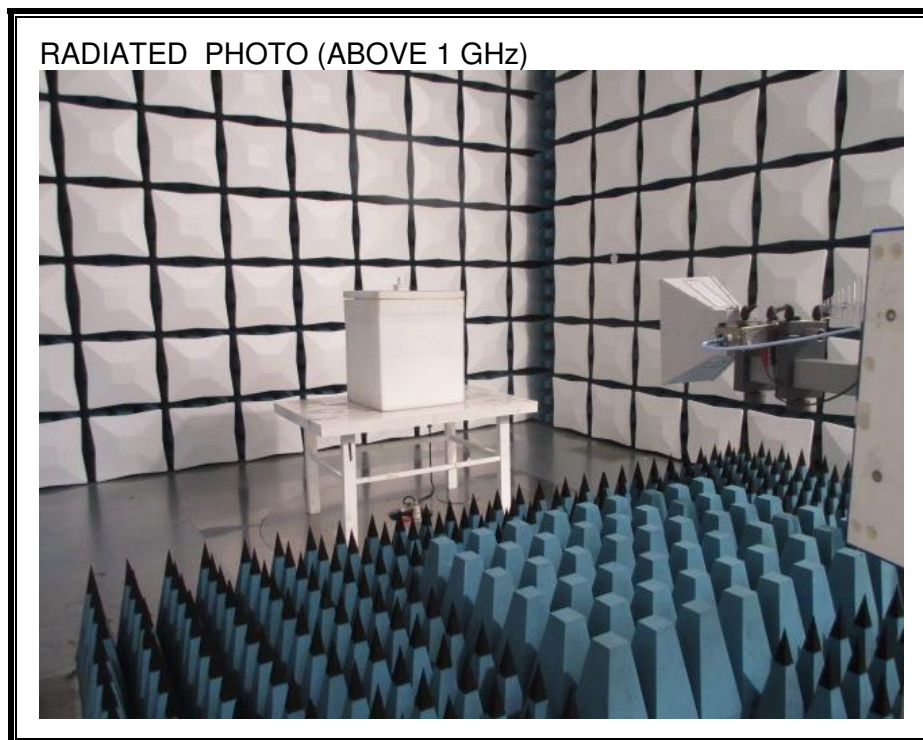
11.1. RADIATED RF MEASUREMENT SETUP (BELOW 30MHz)



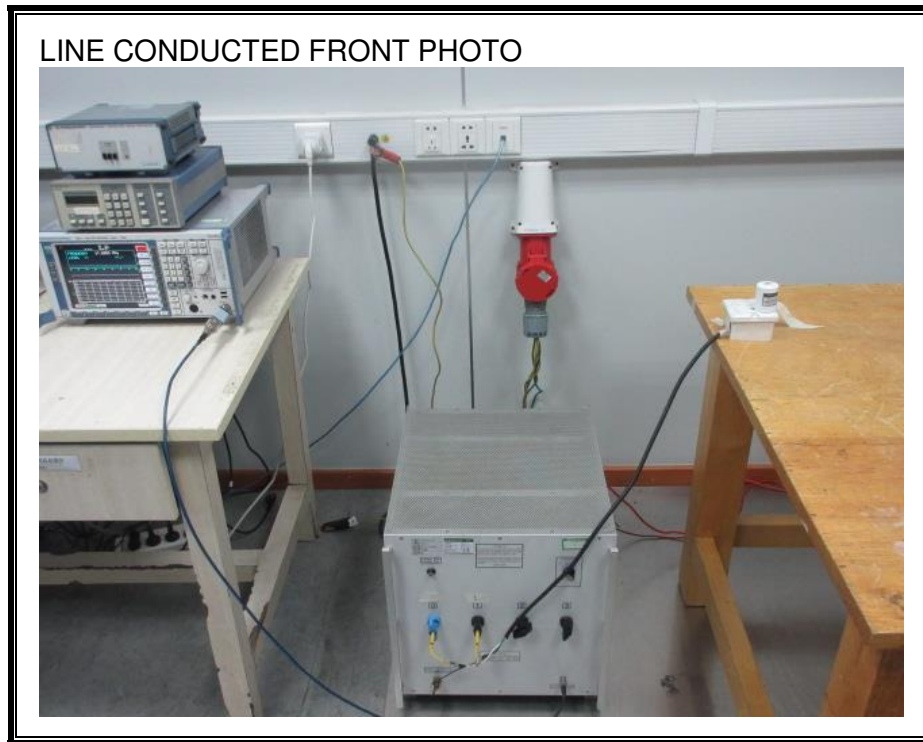
11.2. RADIATED RF MEASUREMENT SETUP (BELOW 1GHz)



11.3. RADIATED RF MEASUREMENT SETUP (ABOVE 1GHz)



11.4. POWERLINE CONDUCTED EMISSIONS MEASUREMENT SETUP



END OF REPORT