



**FCC PART 15 SUBPART C  
ISED RSS-247 ISSUE 2**

**CERTIFICATION TEST REPORT**

*For*

**Videoconferencing Endpoint**

**MODEL: HUAWEI Box 900, HUAWEI Box 700, HUAWEI Box 500**

**FCC ID: QIS-BOX**

**IC: 6369A-BOX**

**REPORT NUMBER: 4788680510-3**

**ISSUE DATE: October 29, 2018**

*Prepared for*

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Revision History

Rev.	Issue Date	Revisions	Revised By
--	10/29/2018	Initial Issue	



Summary of Test Results			
Clause	Test Items	FCC/IC Rules	Test Results
1	6dB Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a)	PASS
2	Conducted Output Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (e)	PASS
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	PASS
4	Conducted Bandedge and Spurious Emission	FCC 15.247 (d) RSS-247 Clause 5.5	PASS
5	Radiated Bandedge and Spurious Emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9	PASS
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 8.3	PASS



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## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

**Company Name:** HUAWEI TECHNOLOGIES CO., LTD.  
**Address:** Administration Building, Huawei Technologies Co., Ltd.  
Bantian, Longgang District, Shenzhen, P.R. China, 518129

### Manufacturer Information

**Company Name:** HUAWEI TECHNOLOGIES CO., LTD.  
**Address:** Administration Building, Huawei Technologies Co., Ltd.  
Bantian, Longgang District, Shenzhen, P.R. China, 518129

**EUT Name:** Videoconferencing Endpoint  
**Model:** HUAWEI Box 900, HUAWEI Box 700, HUAWEI Box 500  
**Sample Status:** Normal  
**Brand:** HUAWEI  
**Sample Received:** Sep. 18, 2018  
**Date of Tested:** Sep. 19, 2018 ~ Oct. 29, 2018

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, KDB558074 D01 DTS Meas Guidance v05, KDB414788 D01 Radiated Test Site v01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

## 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<p><b>A2LA (Certificate No.: 4102.01)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with A2LA.</p> <p><b>FCC (FCC Designation No.: CN1187)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. Has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules</p> <p><b>IC(Company No.: 21320)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been registered and fully described in a report filed with ISED. The Company Number is 21320.</p> <p><b>VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)</b> UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793. Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B, the VCCI registration No. is C-20012 and T-20011</p>
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Note 1: All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China

Note 2: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



## 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 recognize national standards.

### 4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Uncertainty for Conduction emission test	2.90dB
Uncertainty for Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB
Uncertainty for Radiation Emission test (1GHz to 26GHz)( include Fundamental emission)	5.04dB(1-6GHz)
	5.30dB (6GHz-18Gz)
	5.23dB (18GHz-26Gz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	





## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

EUT Name	Videoconferencing Endpoint
Model Name	HUAWEI Box 900
Band Name	HUAWEI
Series Model	HUAWEI Box 700, HUAWEI Box 500
Model Difference	HUAWEI Box 500 use a PCB board, HUAWEI Box 700 and HUAWEI Box 900 share another PCB boards. HUAWEI Box 500 and HUAWEI Box 700 and HUAWEI Box 900 share components such as structural parts, power supplies and fans, Box 900 has two more DVI interfaces and one HDMI interface than Box 700 and three interface chips corresponding to these three interfaces. Box 900 has two more DVI interfaces and one HDMI interface and two SDI interfaces than Box 500 and five interface chips corresponding to these five interfaces.
Power Rate (AC/DC Power Supply)	Manufacturer :VAPEL Input: 100-240Vac,50/60 Hz,3A MAX Output: 12Vdc, 35W MAX; -53.5Vdc, 130W MAX
	Manufacturer : ASTEC Input: 100-240Vac,50/60 Hz,3A MAX Output: 12Vdc, 4.17A; -53.5Vdc, 2.43A

### 5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Frequency (MHz)	Channel Number	Max PK Conducted Power (dBm)
1	IEEE 802.11b	2412-2462	1-11[11]	16.76
1	IEEE 802.11g	2412-2462	1-11[11]	21.28
2	IEEE 802.11n HT20	2412-2462	1-11[11]	24.29

### 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	5	2432	9	2452	13	2472
2	2417	6	2437	10	2457		
3	2422	7	2442	11	2462		
4	2427	8	2447	12	2467		



#### 5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 01, CH 06, CH 11, CH 12,CH13	2412MHz, 2437MHz, 2462MHz, 2467MHz,2472MHz
WiFi TX(802.11g)	CH 01, CH 06, CH 11, CH 12,CH13	2412MHz, 2437MHz, 2462MHz, 2467MHz,2472MHz
WiFi TX(802.11n VHT20)	CH 01, CH 06, CH 11, CH 12,CH13	2412MHz, 2437MHz, 2462MHz, 2467MHz,2472MHz

## 5.5. DESCRIPTION OF AVAILABLE ANTENNAS

Antenna manufacturer: Sheng Lu

Chain Ant.	Frequency (MHz)	Max Antenna Gain (dBi)	Antenna Type
0	2412-2472	4.4	PIFA
1	2412-2472	4.7	PIFA

Antenna manufacturer: PCTEL

Chain Ant.	Frequency (MHz)	Max Antenna Gain (dBi)	Antenna Type
0	2412-2472	2.49	PIFA
1	2412-2472	3.13	PIFA

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 or Chain 2 can be used as transmitting/receiving antenna.
IEEE 802.11g	<input checked="" type="checkbox"/> 1TX, 1RX	Chain 1 or Chain 2 can be used as transmitting/receiving antenna.
IEEE 802.11n HT20	<input checked="" type="checkbox"/> 2TX, 2RX	Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

Directional gain				
Mode	Frequency (MHz)	Max Antenna Gain (dBi)	For power measurements Directional gain Gain (dBi)	For power spectral density (PSD) measurements Gain (dBi)
SISO	2412-2472	4.7	4.7	4.7
CDD 2TX HT20MHz	2412-2472	4.7	4.7	7.7

Note : Directional gain = GANT + Array Gain

For power spectral density (PSD) measurements on all devices,

Array Gain =  $10 \log(N_{ANT}/N_{SS})$  dB.

For power measurements on IEEE 802.11 devices, 1,2

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

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

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

Note: The antenna of the EUT is provided by two manufacturers. The antenna types of the two manufacturers are the same, Sheng lu antenna gain is greater, So the Sheng Lu antenna is selected for the test.

## 5.6. WORST-CASE CONFIGURATIONS

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		adb					
Modulation Mode	Transmit Chain	Test Channel					
		NCB: 20MHz					
		CH 1	CH 6	CH 11	CH 12	CH 13	
802.11b	0&1	14	14.5	14.5	14	10.5	
802.11g	0&1	14	14	13	9	5.5	
802.11n HT20	0&1	12	12	12	9	5.5	

IEE Std. 802.11	Modulation Technology	Modulation Type	Data Rate (Mbps)	Worst Case (Mbps)
b	DSSS	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~MCS9)	MCS0

Remarks: EUT support for SISO and CDD MIMO Transmission, only 802.11n supports CDD MIMO Mode, SISO mode sets the same power level as MIMO mode, so MIMO mode is the worst case.



## DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	P/N
1	Laptop	ThinkPad	T460S	SL10K24796 JS
2	Highpass Filter	Wi	WHKX10-2700-3000-18000-40SS	23
3	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	4

Note: Item 1 and Item 2 only use for radiated test.

### I/O CABLES

Cable No	Port	Connector Type	Shield	Cable Length(m)	Remarks
1	RJ45	RJ45	Yes	5	/

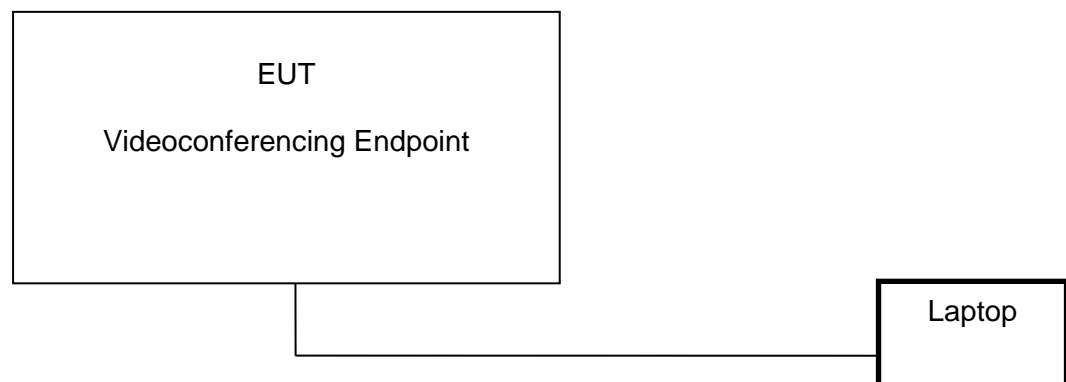
### ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

### TEST SETUP

The EUT can work in engineering mode with the inside software.

### SETUP DIAGRAM FOR TESTS





## 6. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	EMI Test Receiver	R&S	ESR3	101961	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Two-Line V-Network	R&S	ENV216	101983	Jan.16, 2018	Jan.16, 2019
<input checked="" type="checkbox"/>	Artificial Mains Networks	Schwarzbeck	NSLK 8126	8126465	Dec.12, 2017	Dec.12, 2018
Software						
Used	Description		Manufacturer	Name		Version
<input checked="" type="checkbox"/>	Test Software for Conducted disturbance		UL	Antenna port		Ver. 7.2
Radiated Emissions						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	MXE EMI Receiver	KESIGHT	N9038A	MY56400036	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Hybrid Log Periodic Antenna	TDK	HLP-3003C	130960	Jan.09, 2016	Jan.09, 2019
<input checked="" type="checkbox"/>	Preamplifier	HP	8447D	2944A09099	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	EMI Measurement Receiver	R&S	ESR26	101377	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Horn Antenna	TDK	HRN-0118	130939	Jan. 09, 2016	Jan. 09, 2019
<input checked="" type="checkbox"/>	High Gain Horn Antenna	Schwarzbeck	BBHA-9170	691	Jan.06, 2016	Jan.06, 2019
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-0118	TRS-305-00066	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Preamplifier	TDK	PA-02-2	TRS-307-00003	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Loop antenna	Schwarzbeck	1519B	00008	Mar. 26, 2016	Mar. 26, 2019
Software						
Used	Description		Manufacturer	Name		Version
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance		Farad	EZ-EMC		Ver. UL-3A1
Other instruments						
Used	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9030A	MY55410512	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Power Meter	Keysight	N9031A	MY55416024	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Power Sensor	Keysight	N9323A	MY55440013	Dec.12, 2017	Dec.12, 2018
<input checked="" type="checkbox"/>	Power Sensor	Keysight	U2021XA	MY57030004	Dec.12, 2017	Dec.12, 2018



## 7. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 DTS Meas Guidance v05	8.2
2	Peak& Average Output Power	KDB 558074 D01 DTS Meas Guidance v05	8.3.1.3/8.3.2.3
3	Power Spectral Density	KDB 558074 D01 DTS Meas Guidance v05	8.4
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 DTS Meas Guidance v05	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 DTS Meas Guidance v05	8.6
6	Band-edge	KDB 558074 D01 DTS Meas Guidance v05	8.7
7	Conducted Emission Test For AC Power Port	ANSI C63.10-2013	6.2



## 8. ANTENNA PORT TEST RESULTS

### 8.1. ON TIME AND DUTY CYCLE

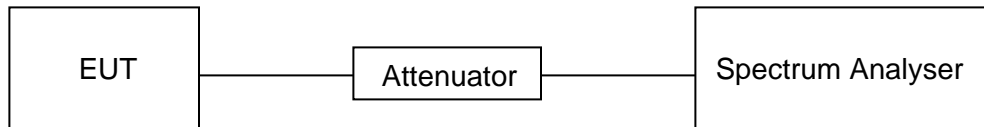
#### LIMITS

None; for reporting purposes only

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	23.4°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

#### RESULTS

##### Chain 0

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)	1/T Minimum VBW (KHz)	Final setting For VBW (KHz)
11b	8.603	8.698	0.9891	98.91	0.05	0.12	200
11g	1.421	1.527	0.9306	93.06	0.31	0.70	1
11n H20	1.330	1.436	0.9266	92.66	0.33	0.75	1

Note:

Duty Cycle Correction Factor=10log (1/x).

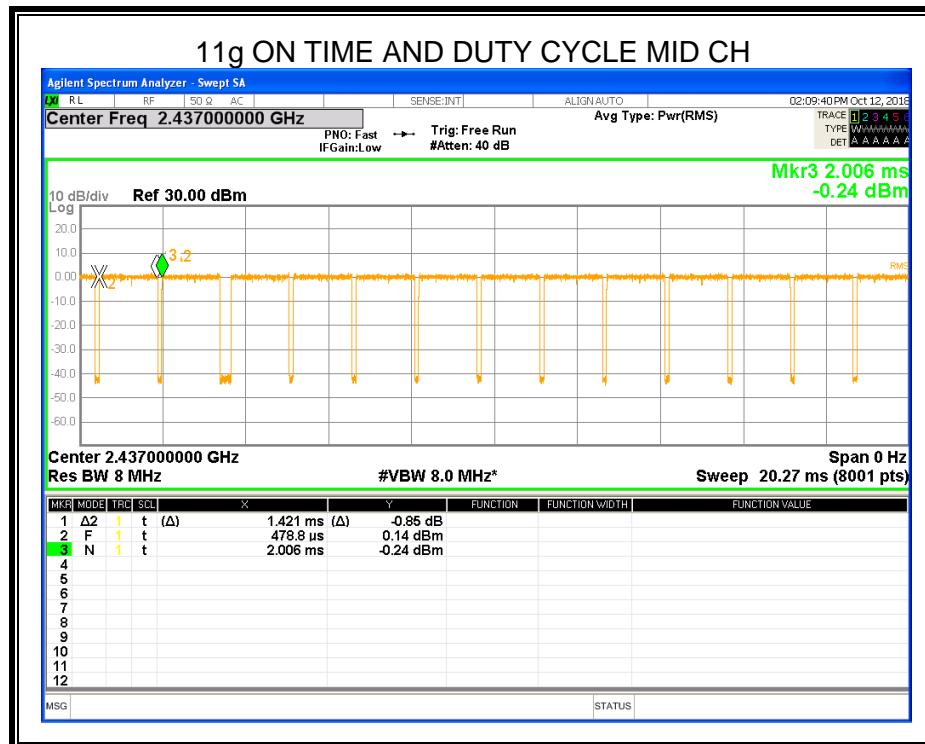
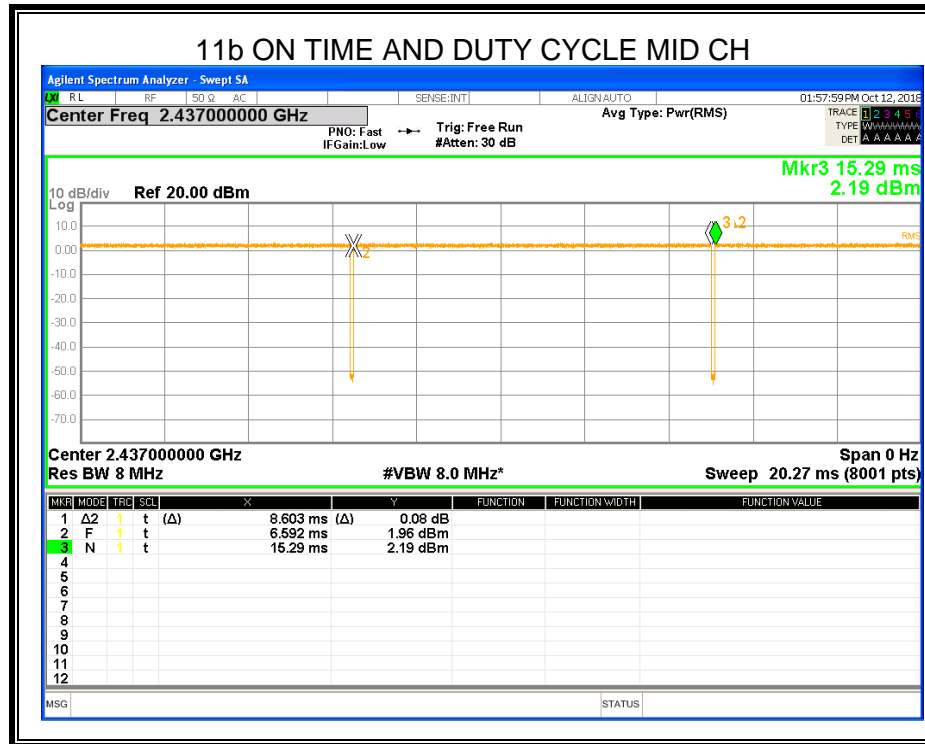
Where: x is Duty Cycle (Linear)

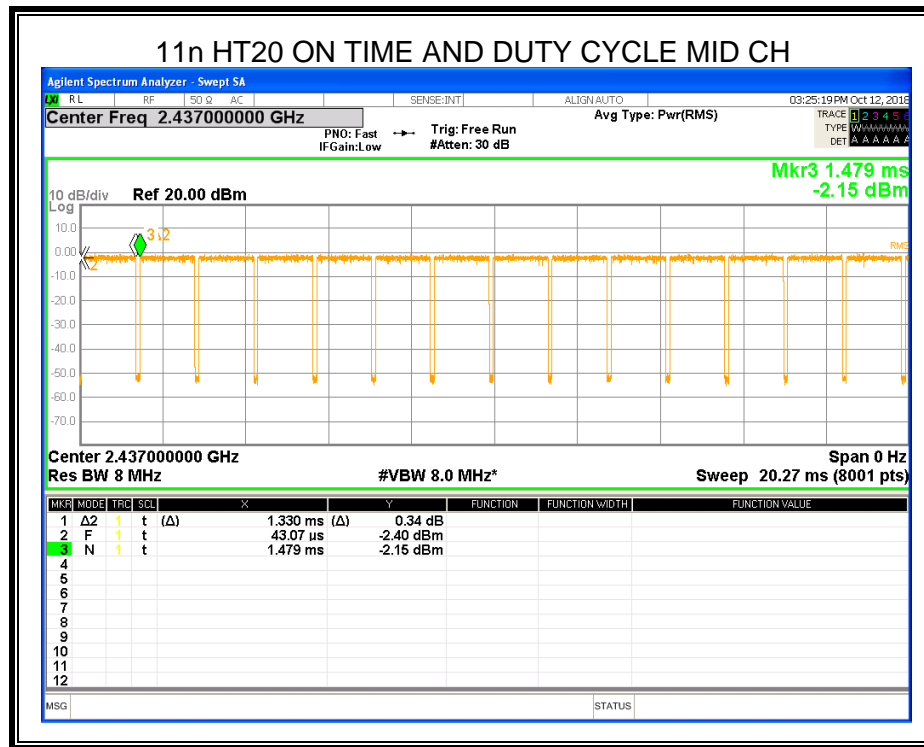
Where: T is On Time

If that calculated VBW is not available on the analyzer then the next higher value should be used.

Chain 0 and Chain 1 has the same duty cycle, only Chain 0 data show here.









## 8.2. 6 dB DTS BANDWIDTH AND 99% BANDWIDTH

### LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(a)(2) RSS-247 5.1 (a)	6 dB Bandwidth	$\geq 500\text{KHz}$	2400-2483.5
RSS-Gen Clause 6.6	99% Bandwidth	For reporting purposes only.	2400-2483.5

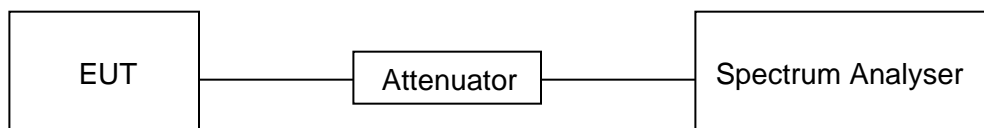
### TEST PROCEDURE

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	For 6dB Bandwidth :100K For 99% Occupied Bandwidth :1% to 5% of the occupied bandwidth
VBW	For 6dB Bandwidth : $\geq 3 \times \text{RBW}$ For 99% Occupied Bandwidth : approximately $3 \times \text{RBW}$
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 and 99% relative to the maximum level measured in the fundamental emission.

### TEST SETUP





## TEST ENVIRONMENT

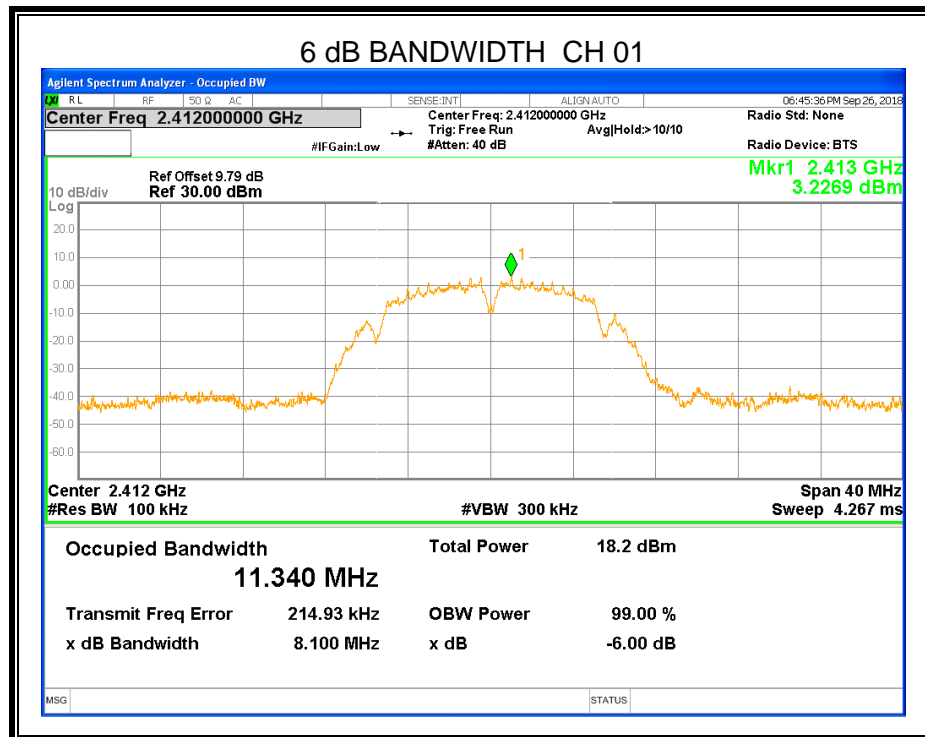
Temperature	23.4°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

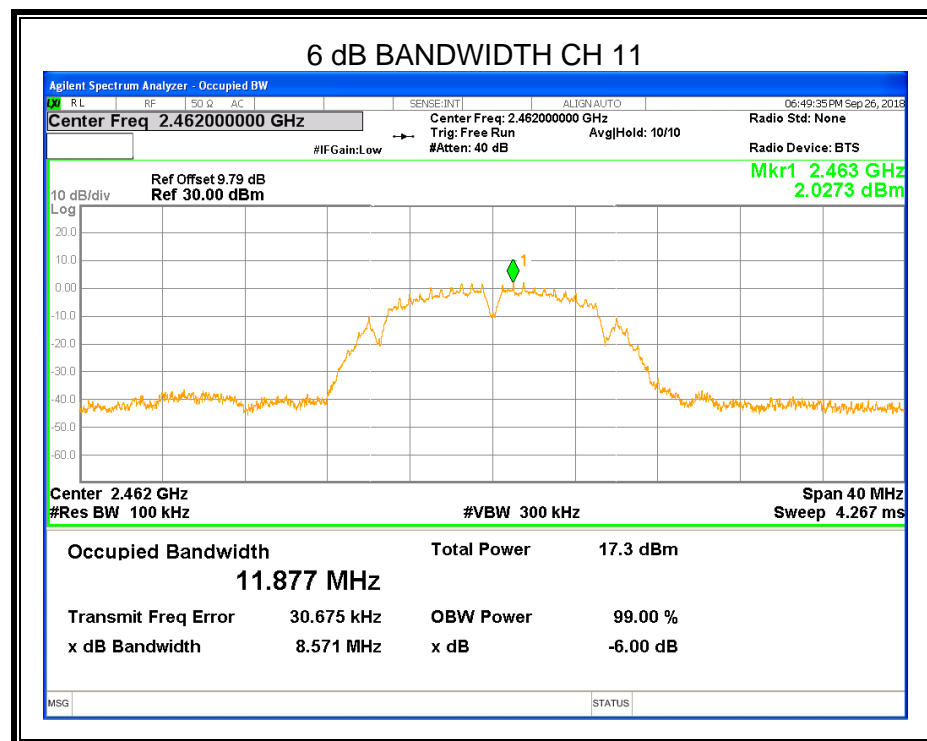
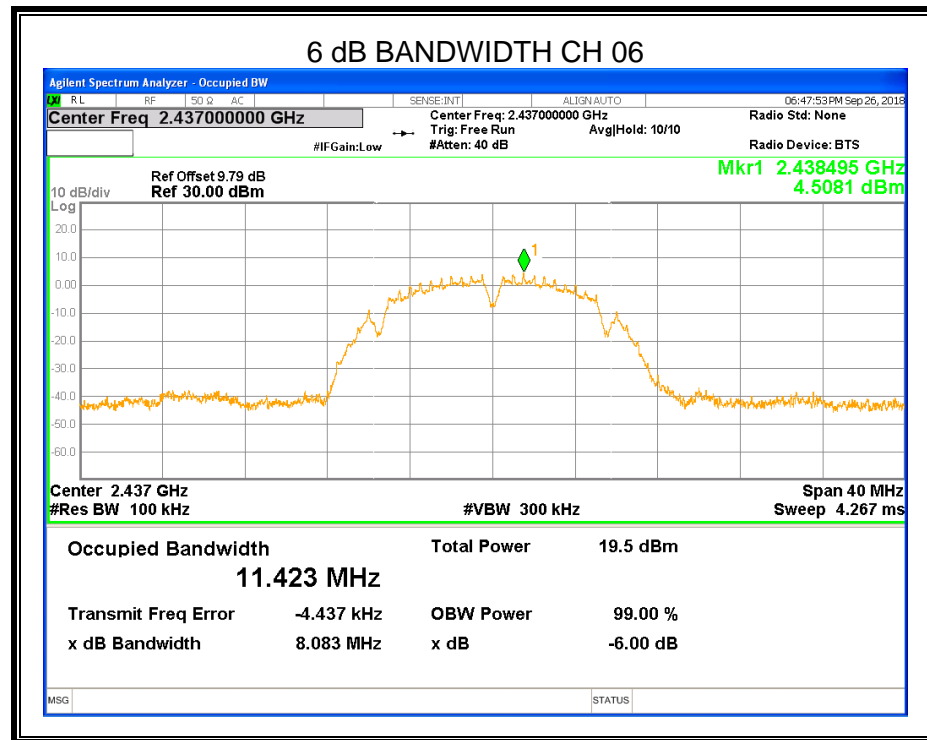
## RESULTS

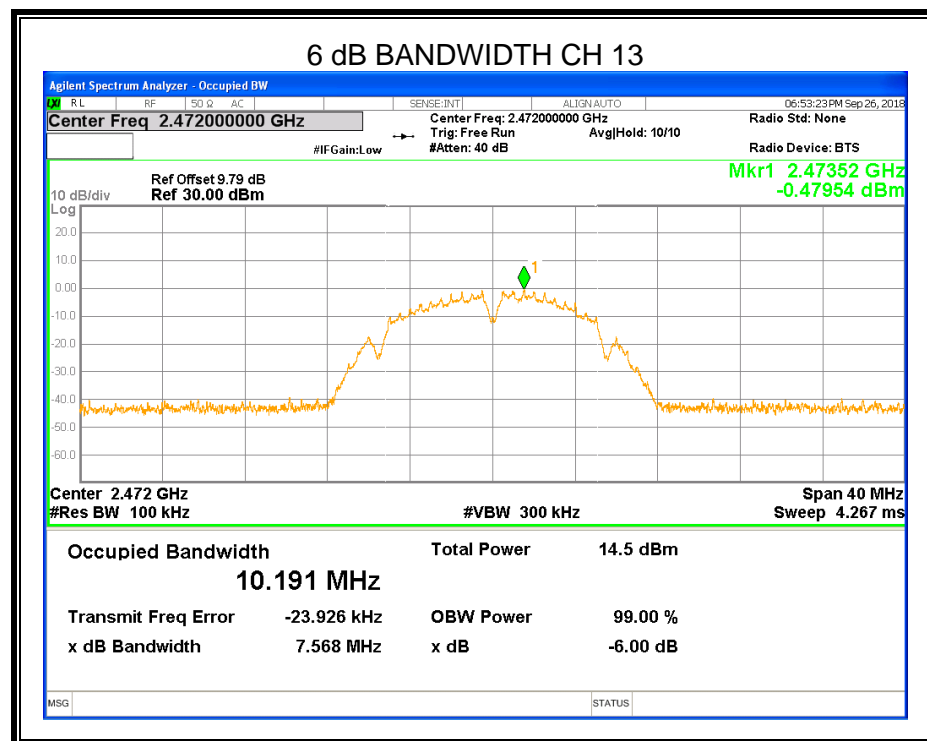
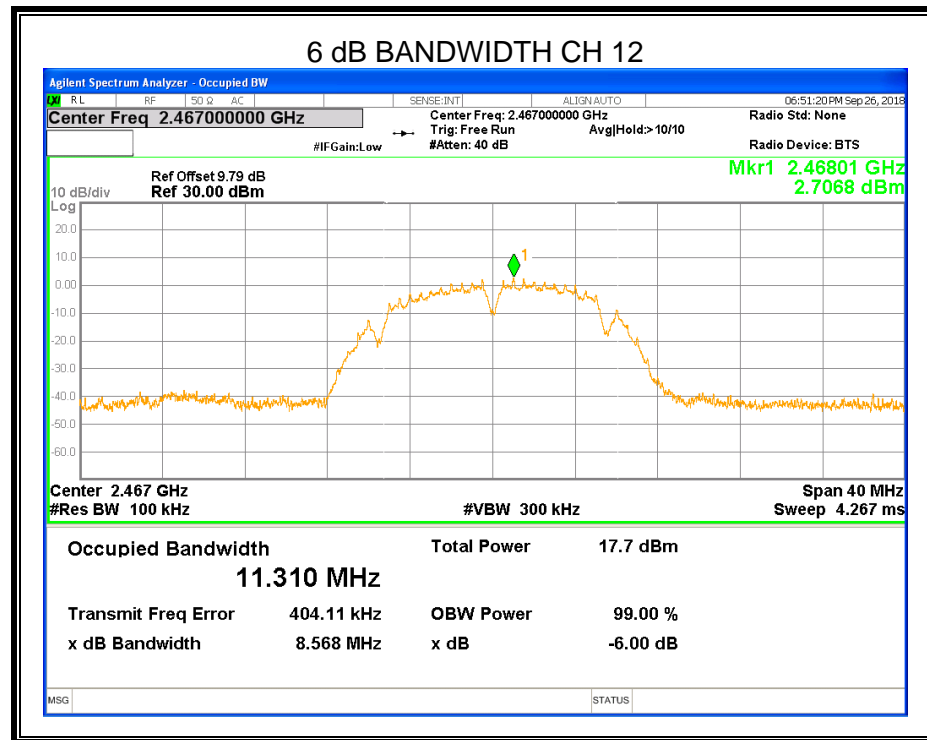
### Chain 0 (WORST-CASE CONFIGURATION)

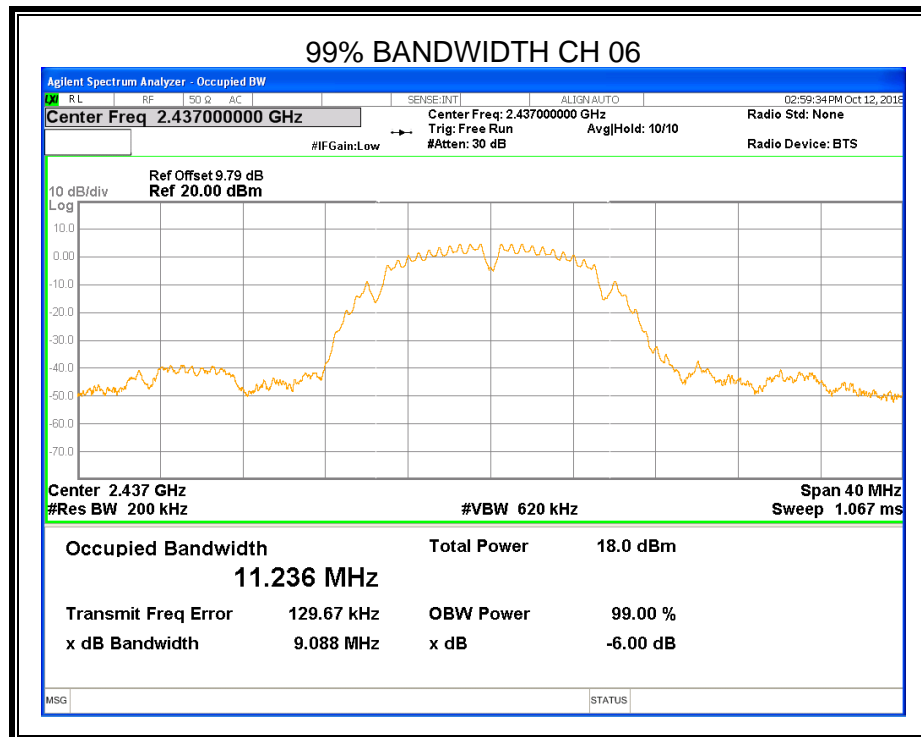
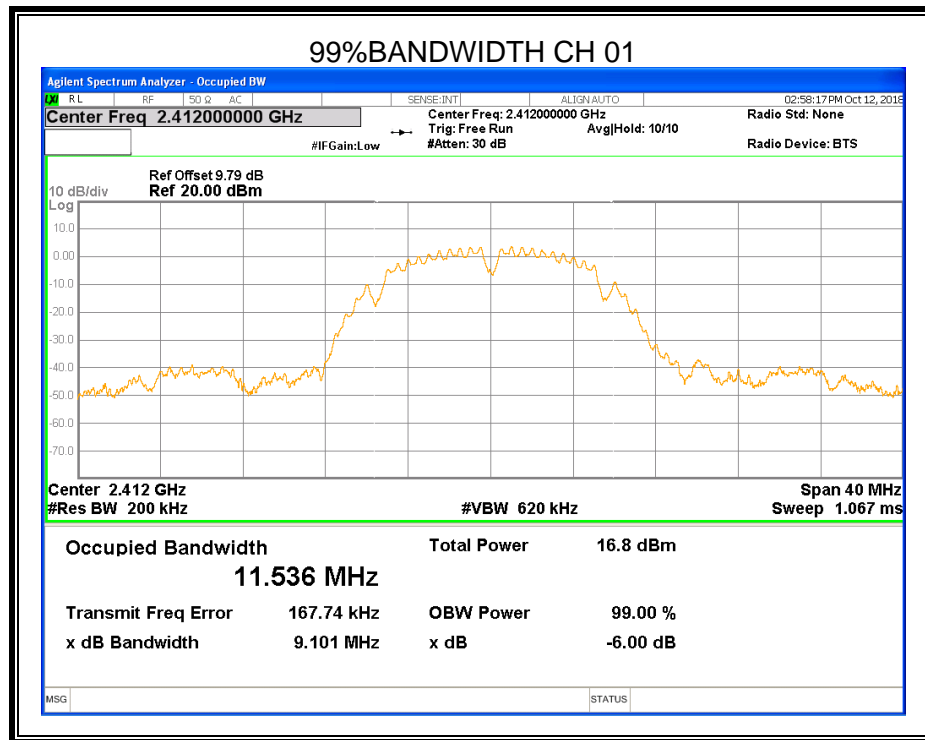
#### 8.2.1. 802.11b MODE

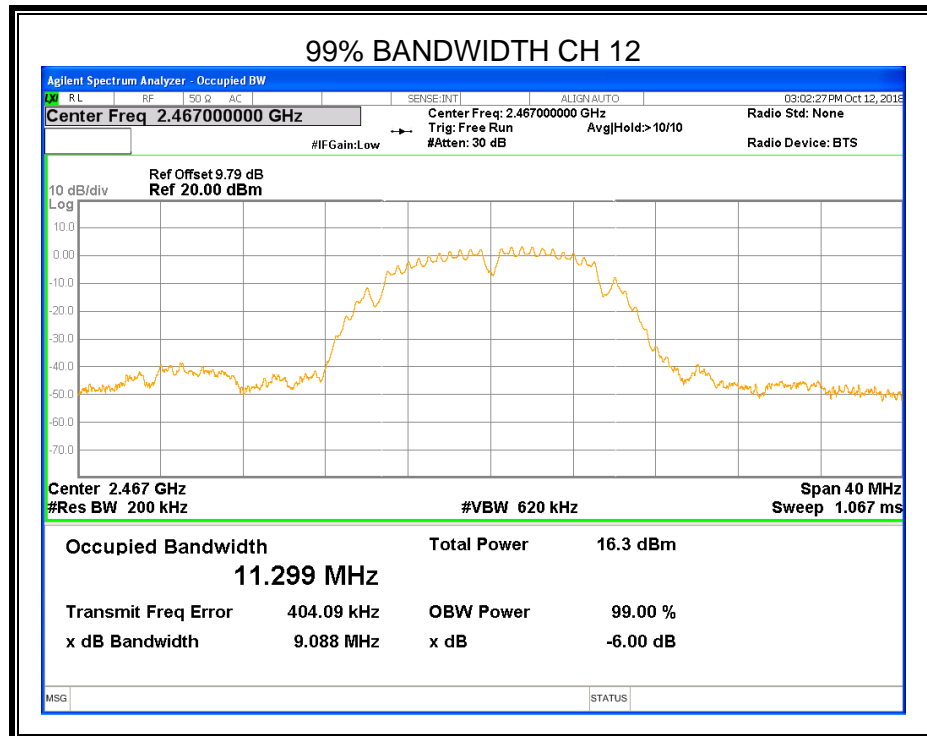
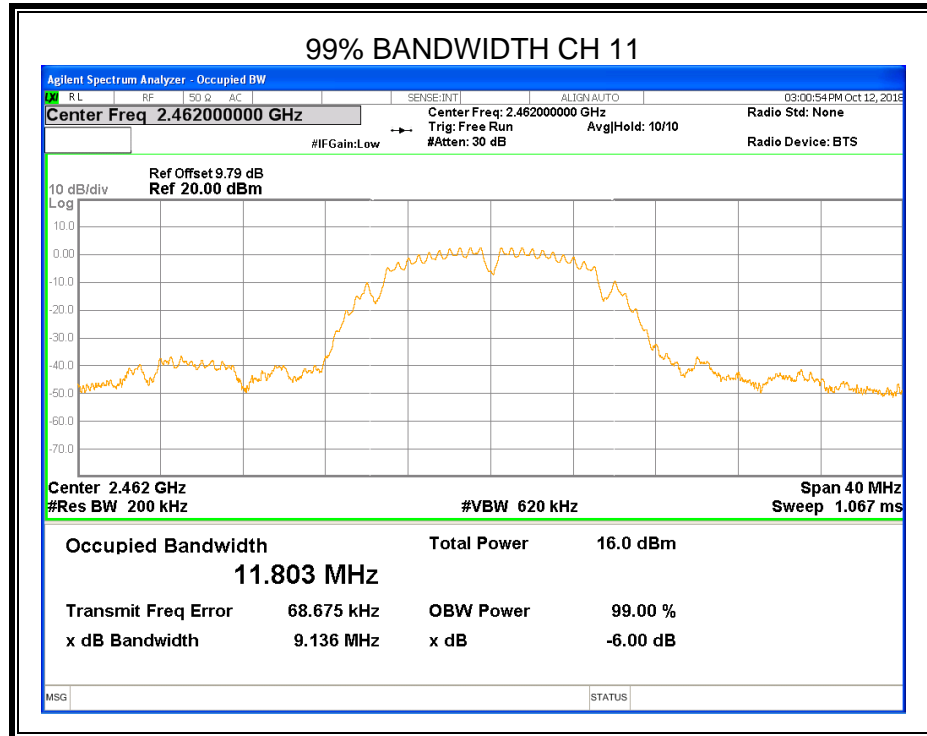
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
01	8.100	11.536	$\geq 500$	Pass
06	8.083	11.236	$\geq 500$	Pass
11	8.571	11.803	$\geq 500$	Pass
12	8.568	11.299	$\geq 500$	Pass
13	7.568	10.207	$\geq 500$	Pass



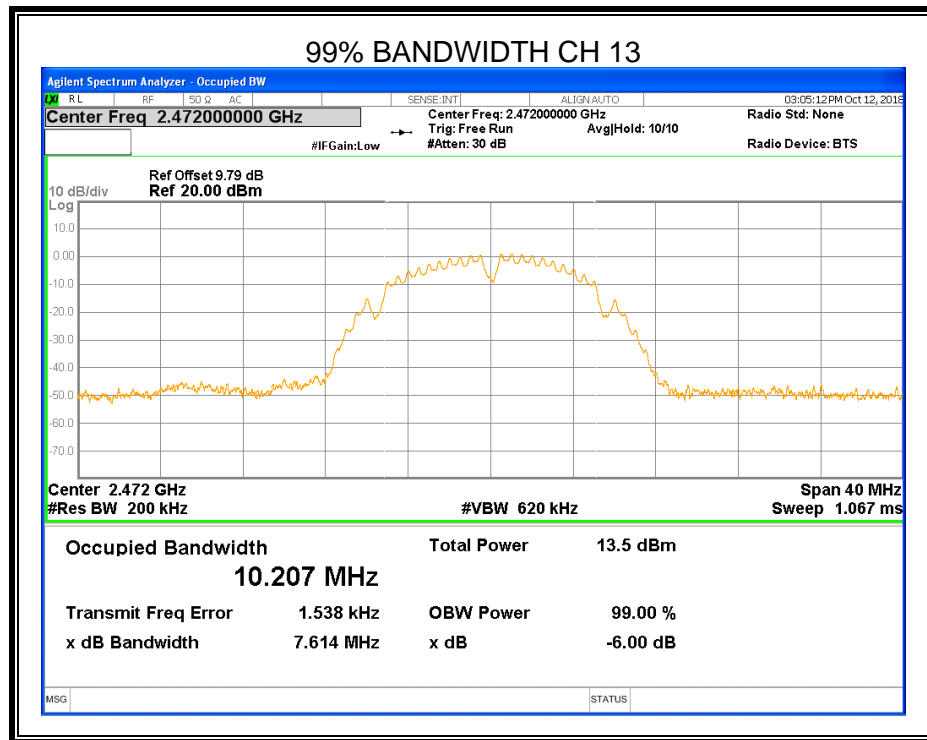








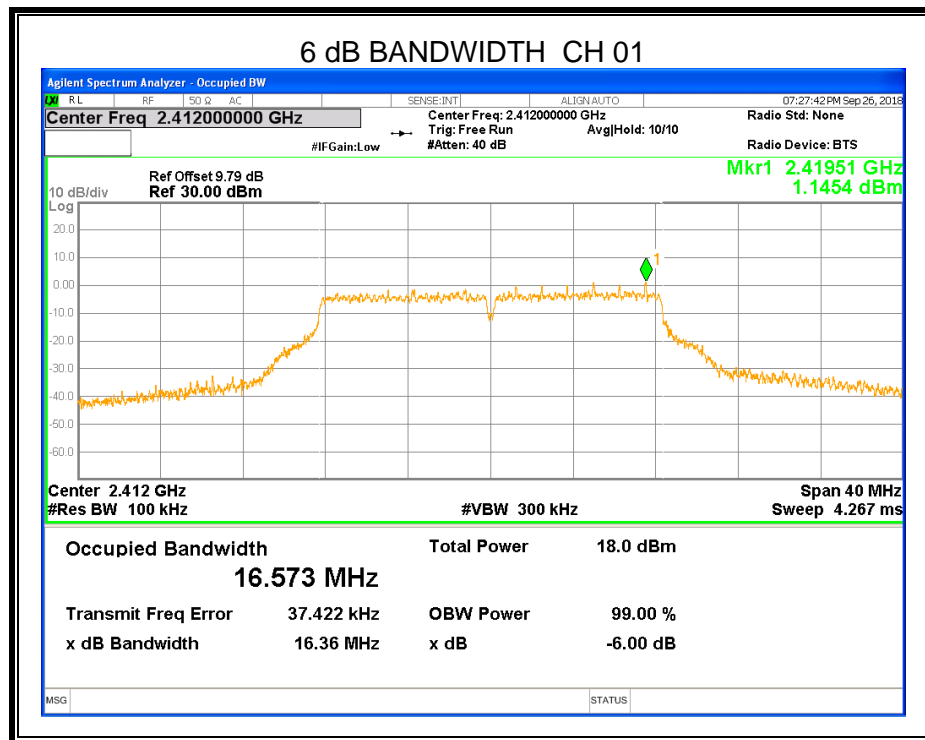


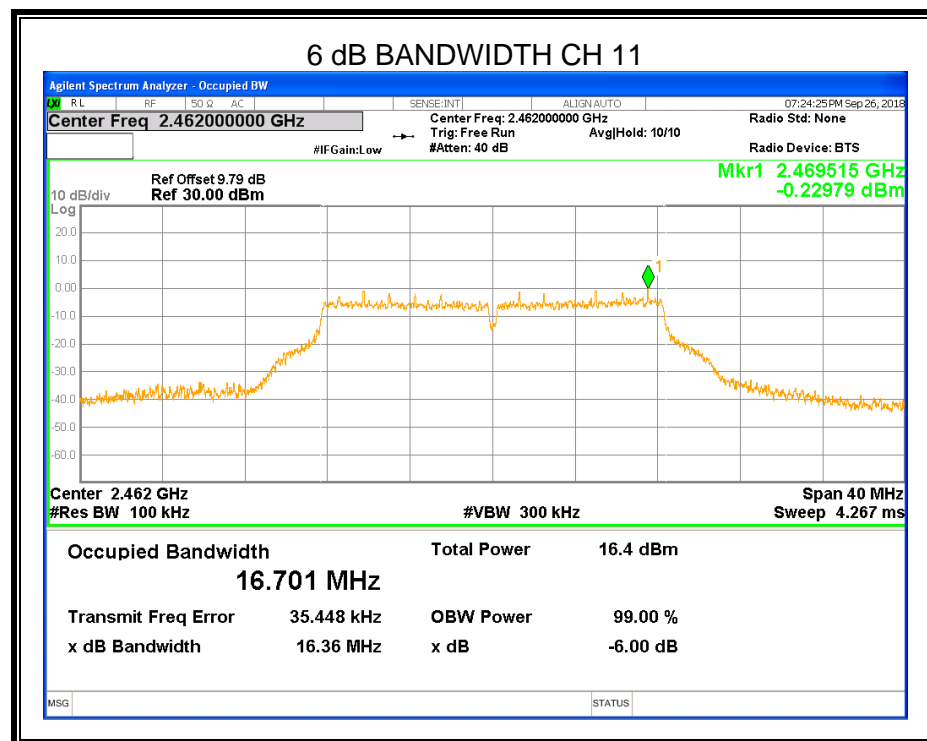
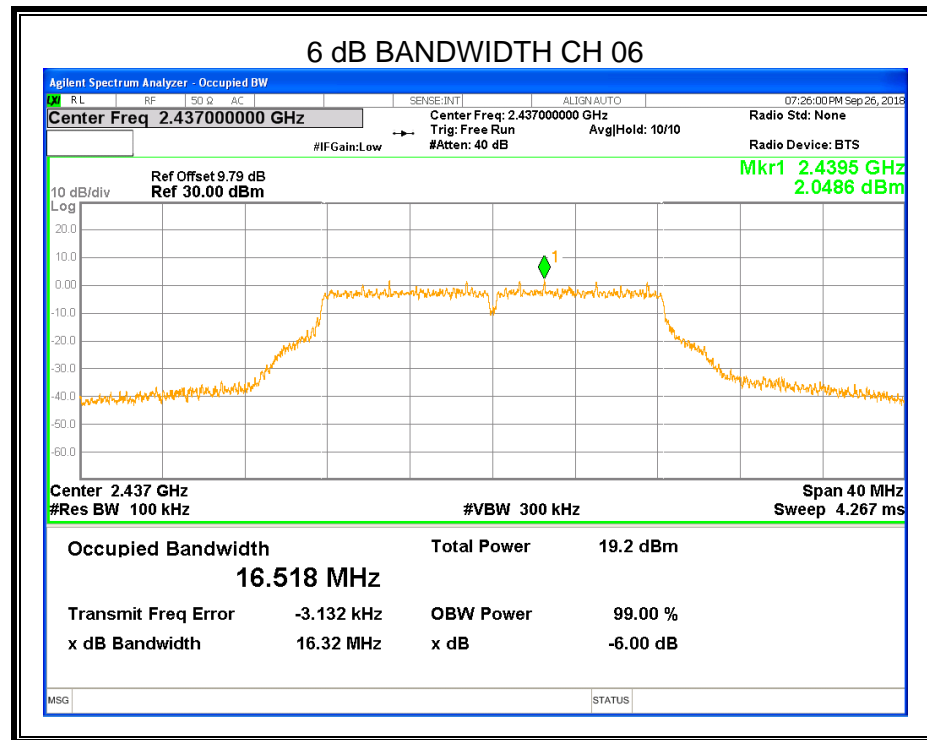


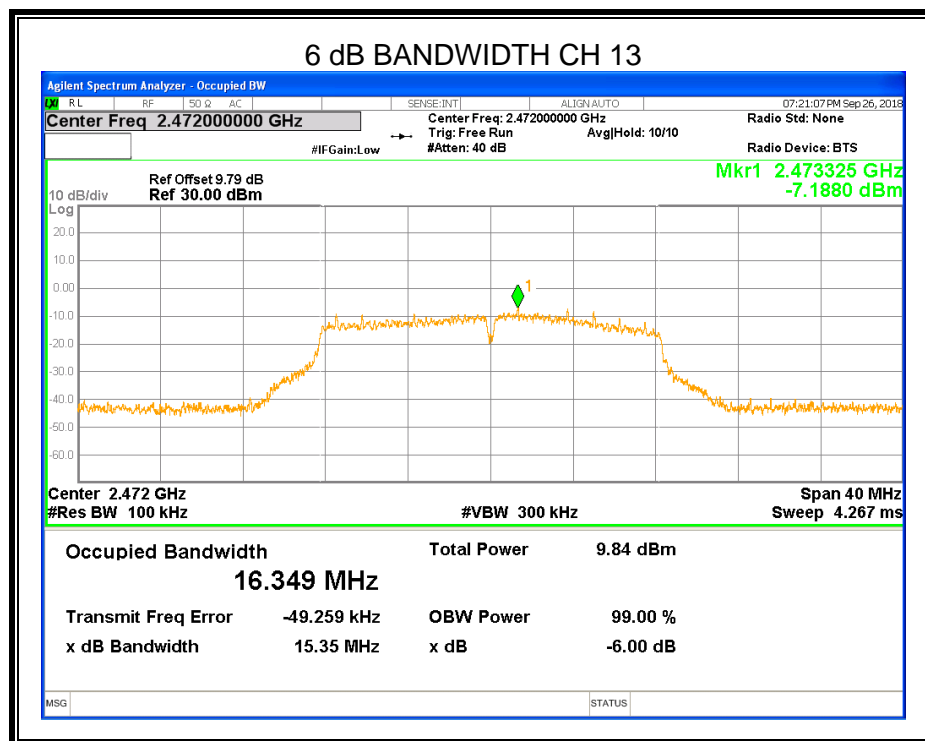
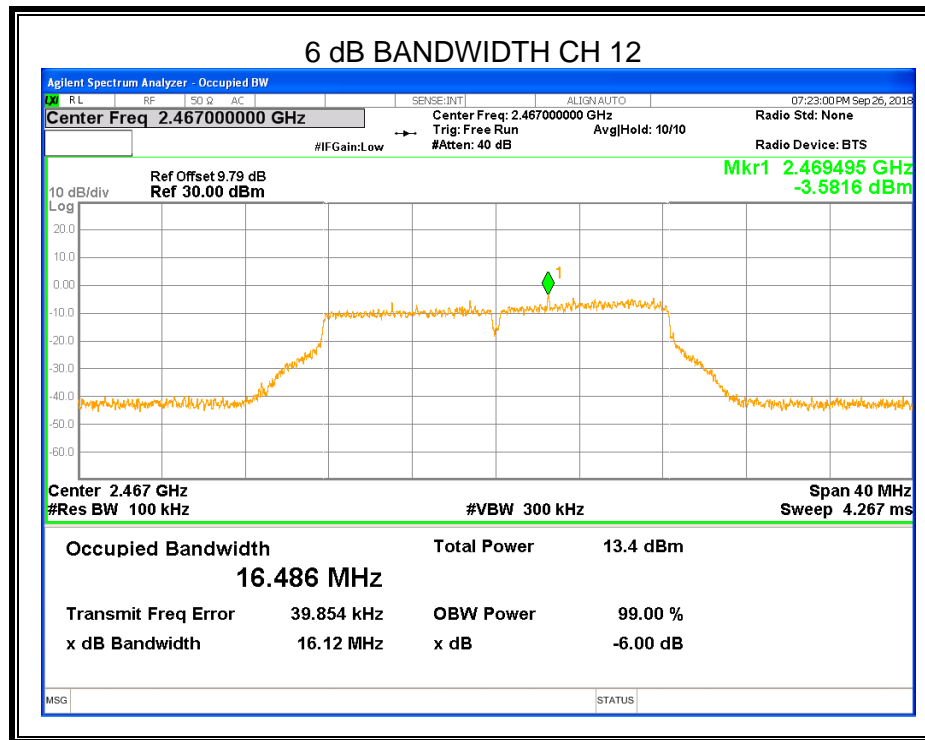


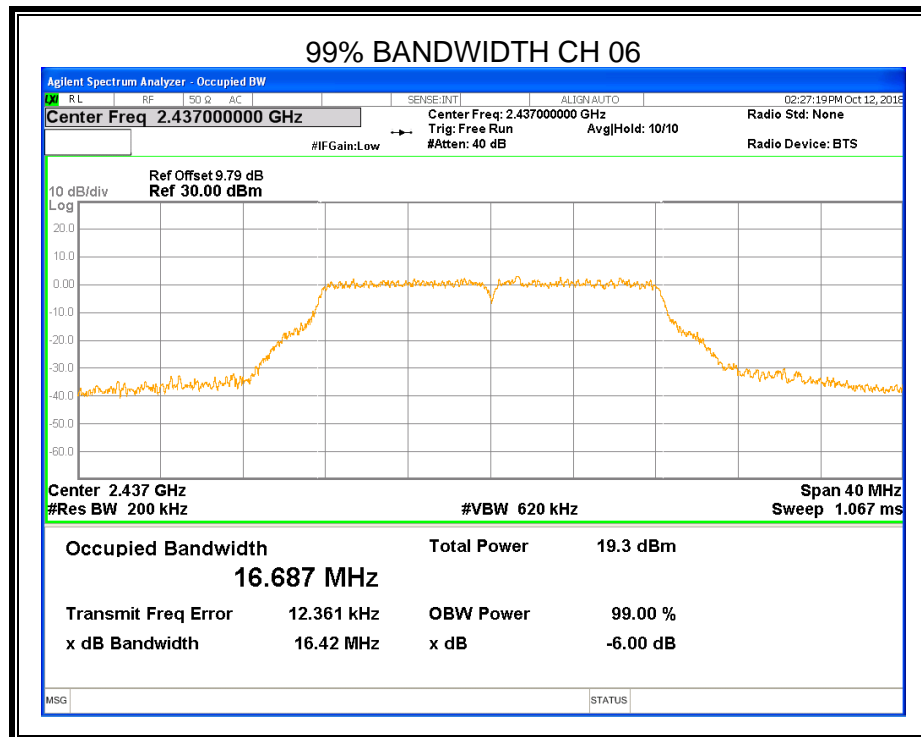
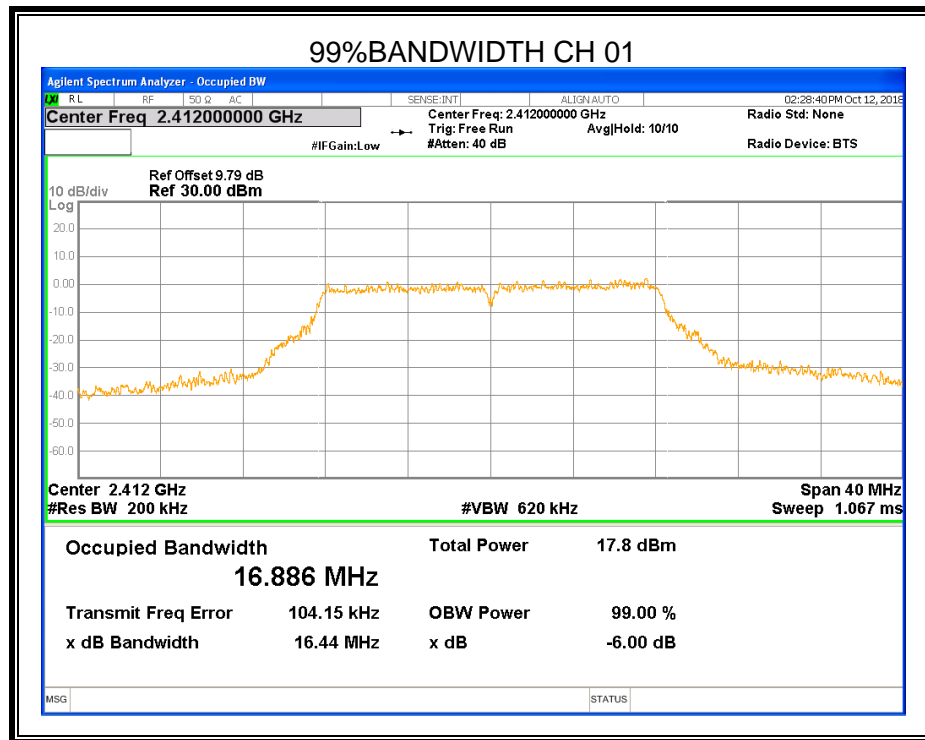
### 8.2.2. 802.11g MODE

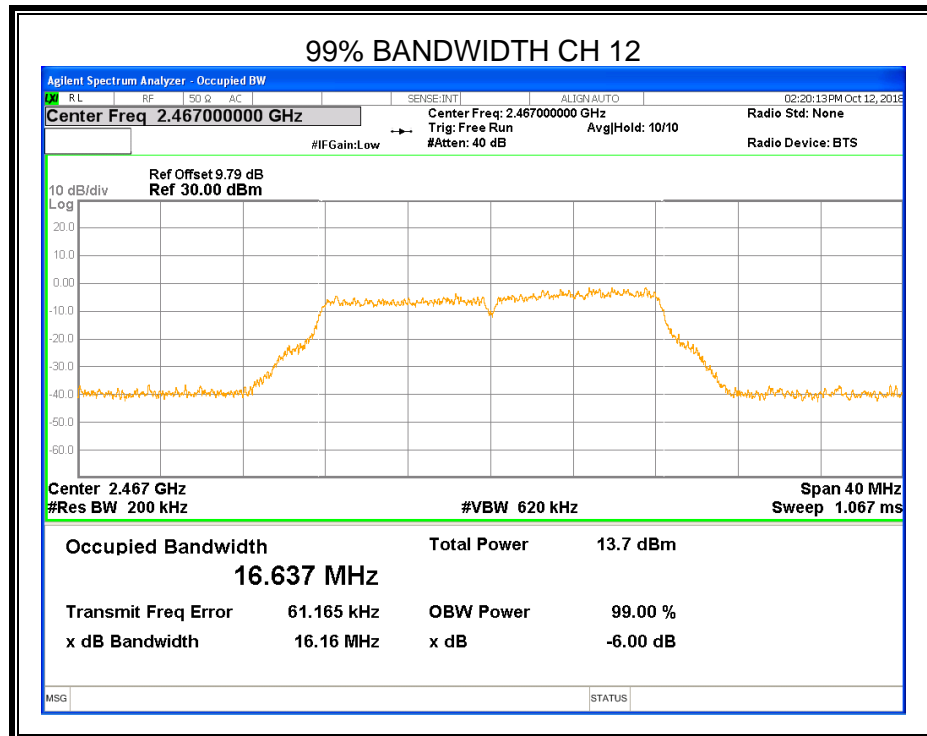
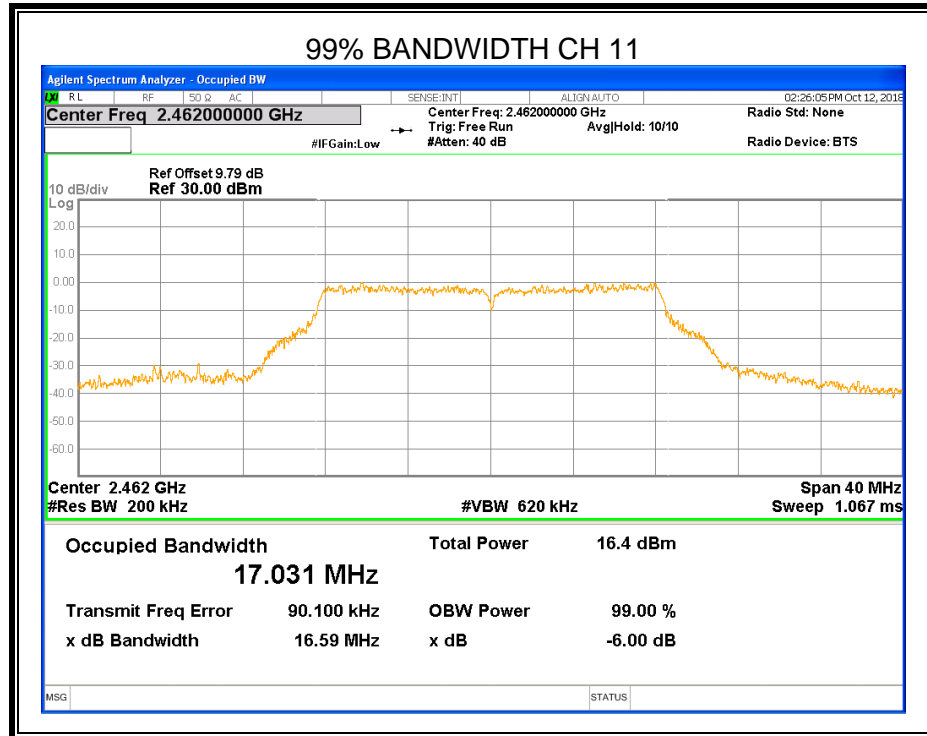
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
01	16.36	16.886	$\geq 500$	Pass
06	16.32	16.687	$\geq 500$	Pass
11	16.36	17.031	$\geq 500$	Pass
12	16.12	16.637	$\geq 500$	Pass
13	15.35	16.411	$\geq 500$	Pass

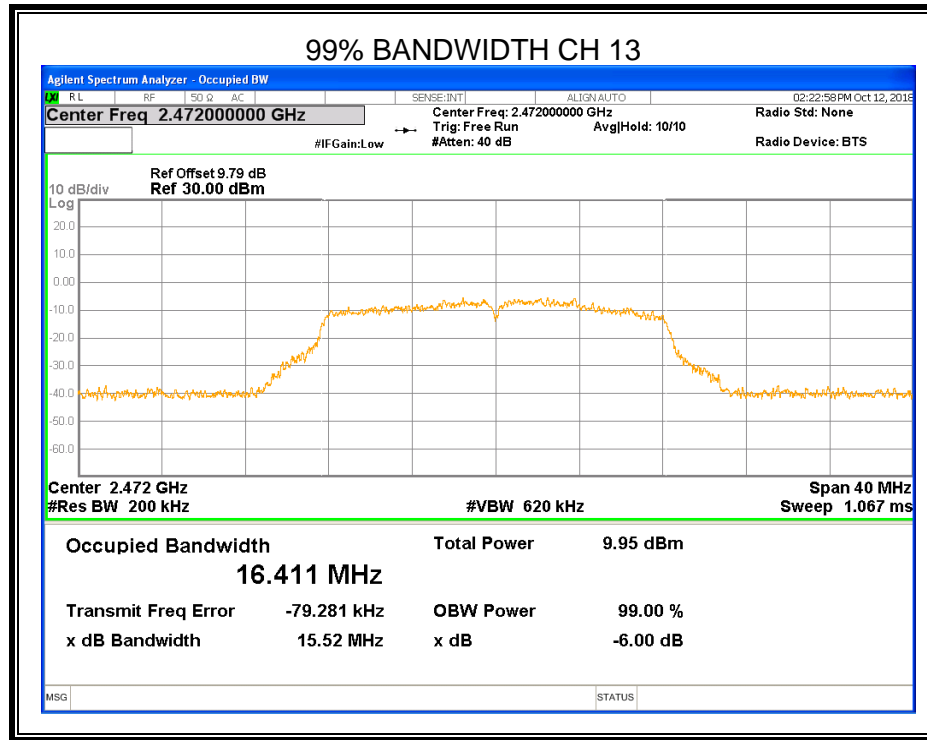








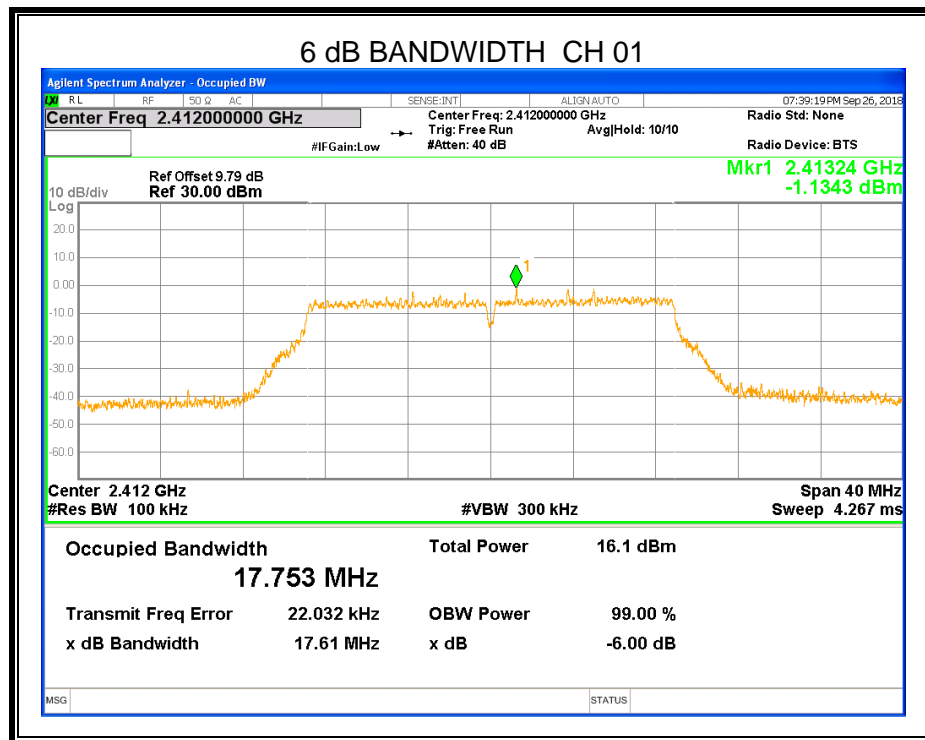




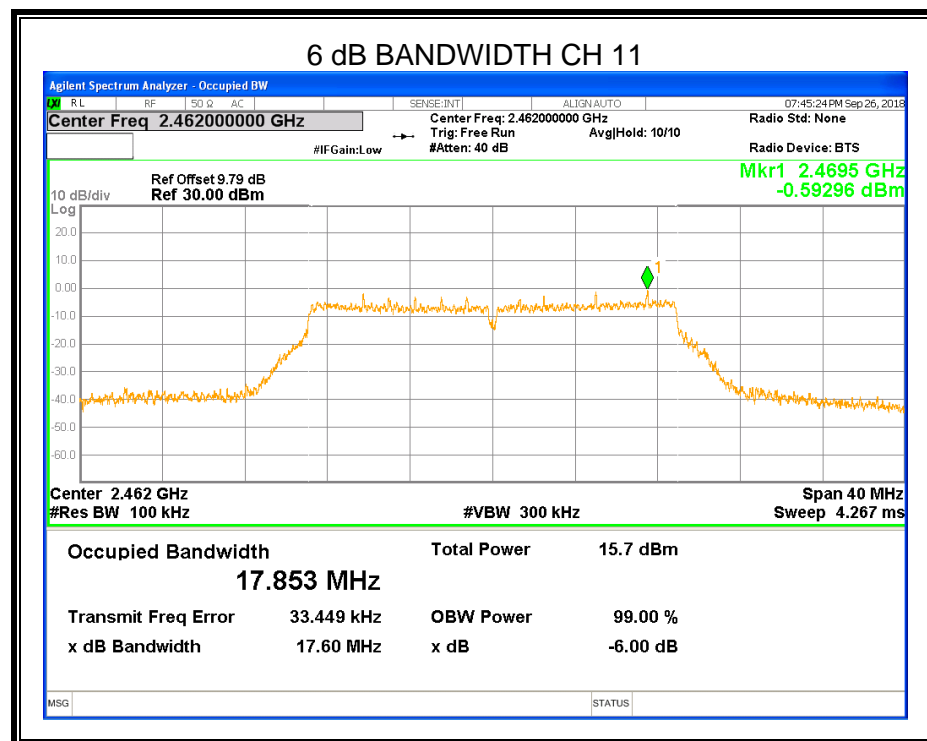
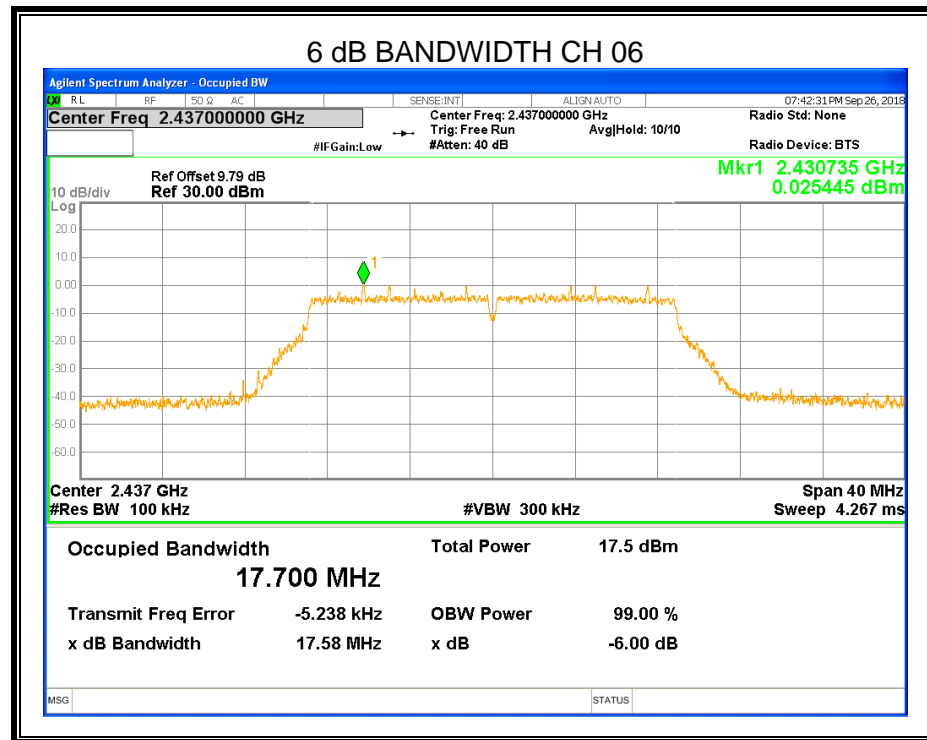


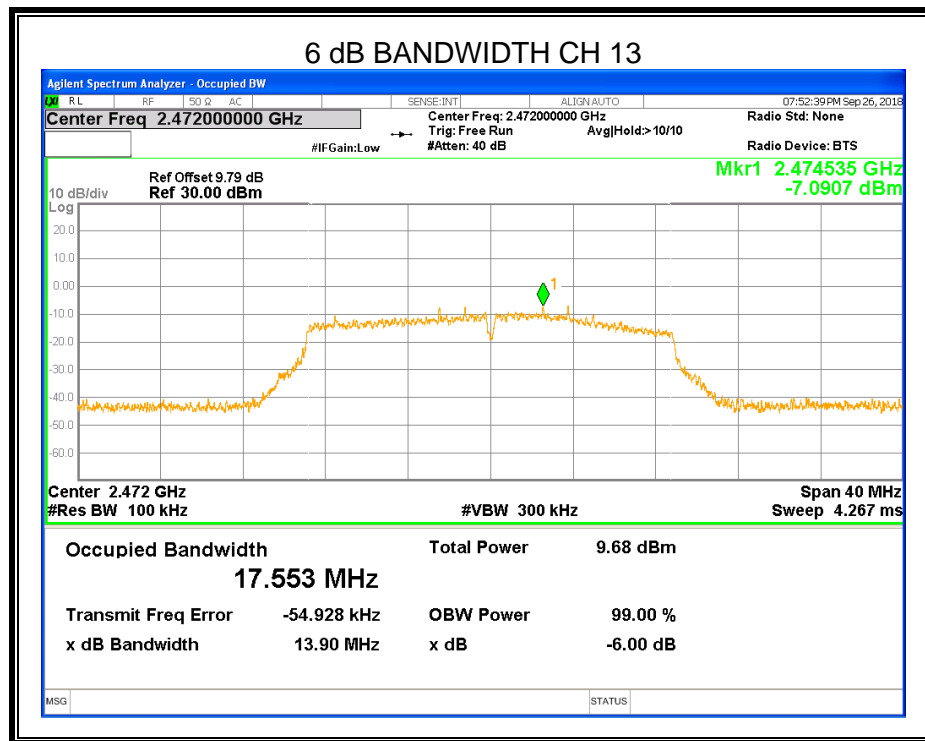
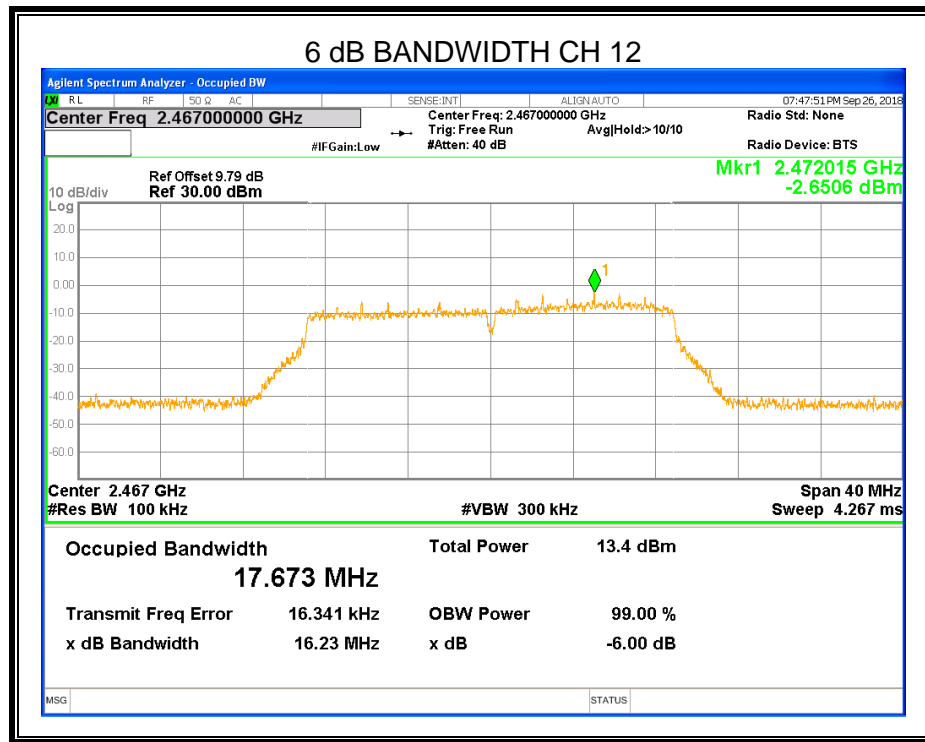
### 8.2.3. 802.11n HT20 MODE

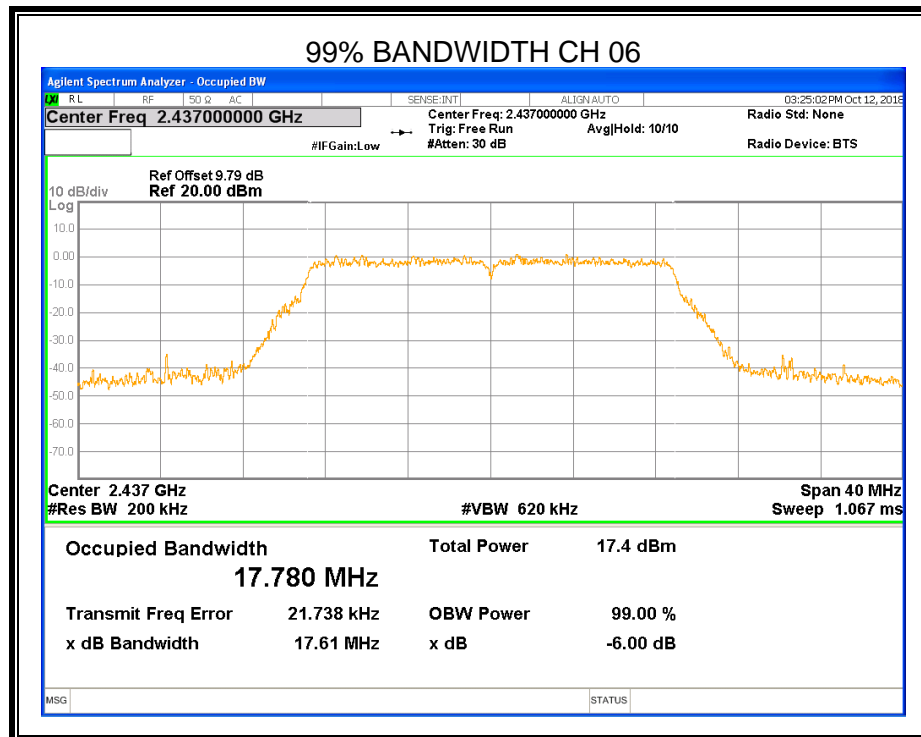
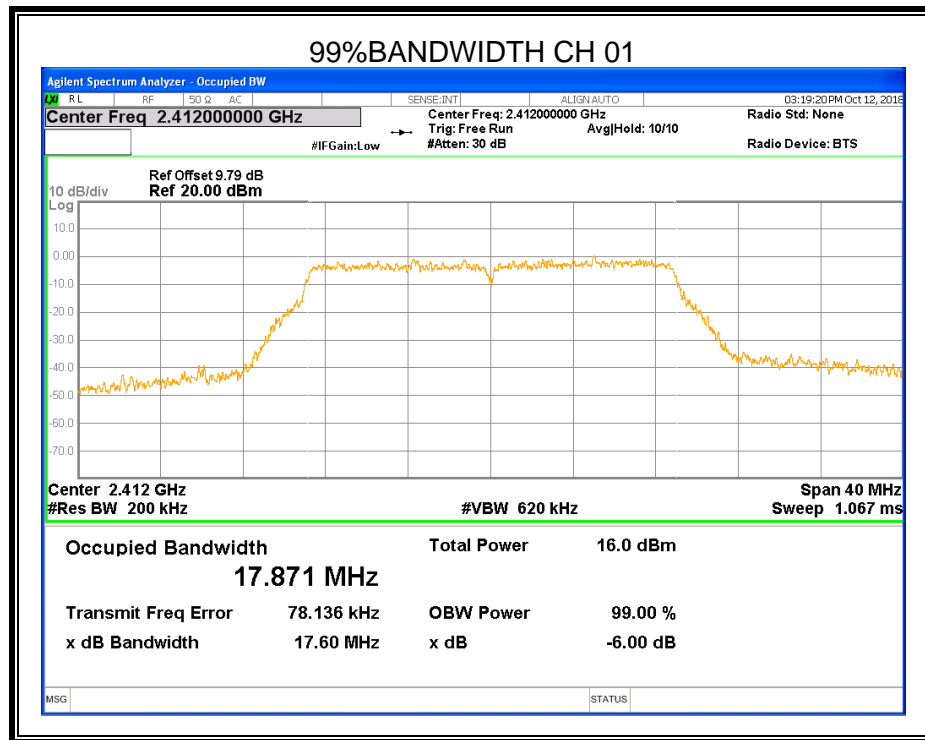
Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Limit (kHz)	Result
01	17.61	17.871	$\geq 500$	Pass
06	17.58	17.780	$\geq 500$	Pass
11	17.60	18.023	$\geq 500$	Pass
12	16.23	17.765	$\geq 500$	Pass
13	13.90	17.483	$\geq 500$	Pass

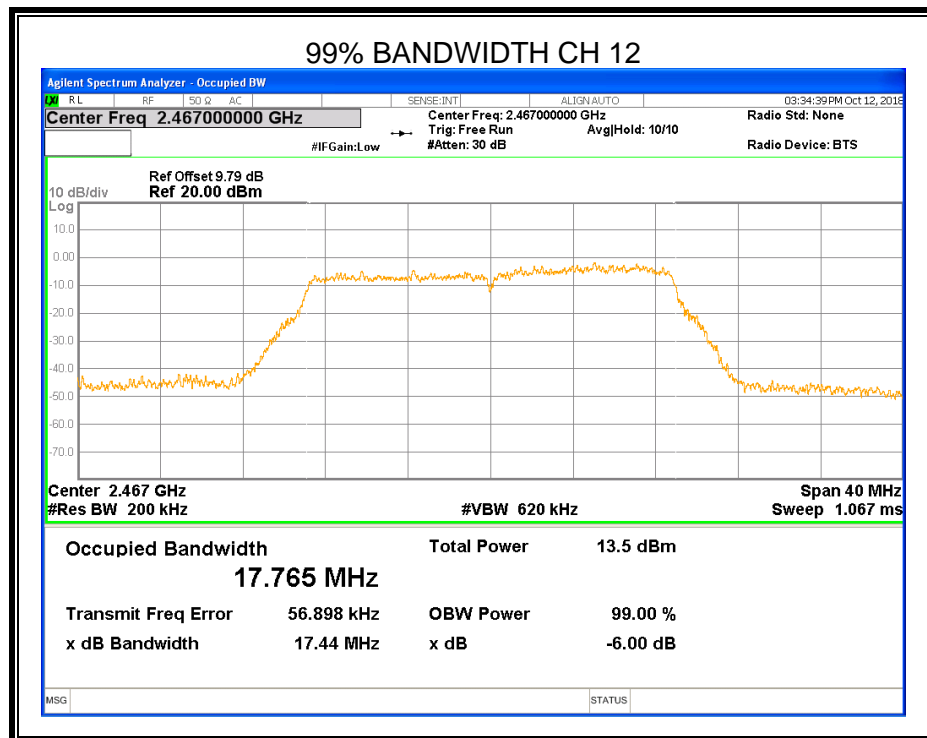
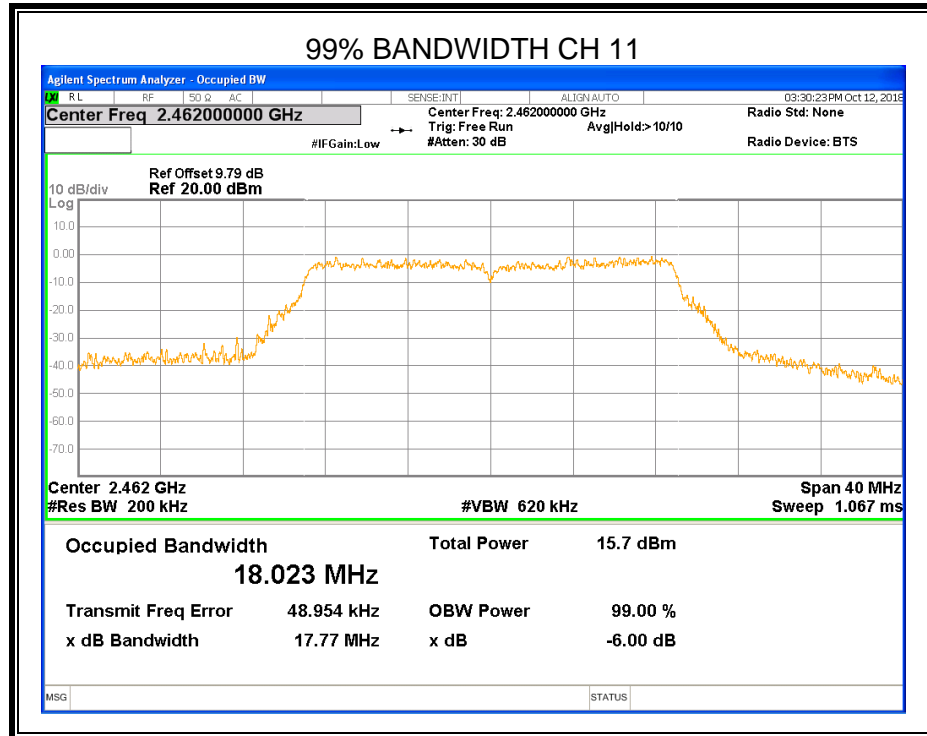


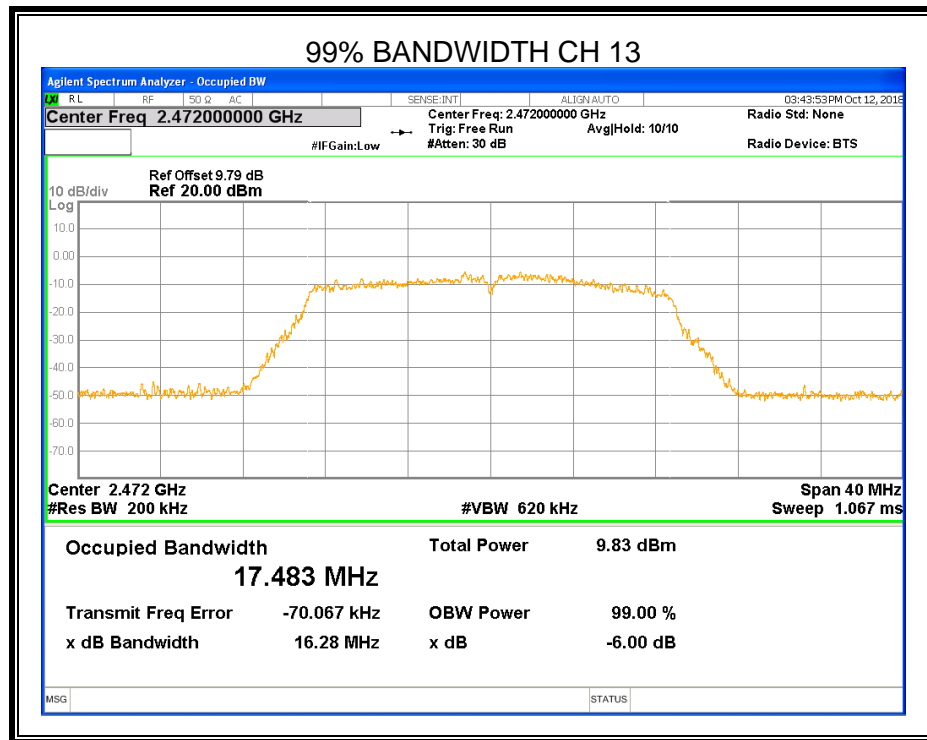














### 8.3. Maximum conducted (Average and Peak) output power

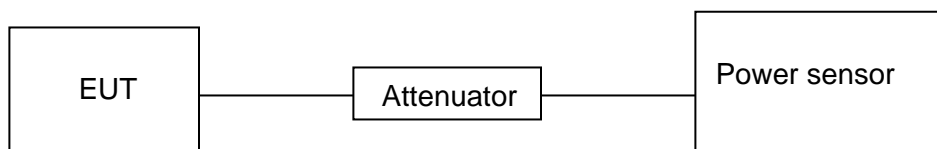
#### LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) RSS-247 5.4 (e)	Conducted Output Power	1 watt or 30dBm (See Note 1/2)	2400-2483.5
Note:	1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. 2. Limit=30dBm – (Directional gain -6)dBi Directional gain: Please refer to the description in section 5.4.		

#### TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.  
Measure peak power each channel.  
Peak Detector use for Peak result.  
AVG Detector use for AVG result.

#### TEST SETUP



#### TEST ENVIRONMENT

Temperature	23.4°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

**RESULTS****Maximum Conducted AVG Outpower**

Mode: SISO for 802.11b and 802.11g, MIMO CDD for 802.11n						
Mode	Channel	Chain	Maximum Conducted AVG Outpower [dBm]		Limit [dBm]	Verdict
			Single	Total		
802.11b	01	0	12.52		30	PASS
		1	13.19			
	06	0	13.11		30	PASS
		1	13.58			
	11	0	11.31		30	PASS
		1	12.93			
	12	0	11.17		30	PASS
		1	12.01			
	13	0	8.04		30	PASS
		1	7.61			
802.11g	01	0	12.79		30	PASS
		1	13.02			
	06	0	13.22		30	PASS
		1	13.53			
	11	0	10.77		30	PASS
		1	12.15			
	12	0	7.43		30	PASS
		1	7.85			
	13	0	3.81		30	PASS
		1	3.43			
802.11n HT20	01	0	10.74	14.03	30	PASS
		1	11.29			
	06	0	11.49	14.56	30	PASS
		1	11.61			
	11	0	10.05	13.65	30	PASS
		1	11.15			
	12	0	7.41	10.66	30	PASS
		1	7.88			
	13	0	4.52	7.40	30	PASS
		1	4.25			

Note: All the modulation and antennas had been tested, but only the worst data recorded in the report.



Maximum Conducted Peak Outpower

Mode: SISO for 802.11b and 802.11g, MIMO CDD for 802.11n						
Mode	Channel	Chain	Maximum Conducted Peak Outpower [dBm]		Limit [dBm]	Verdict
			Single	Total		
802.11b	01	0	15.65		30	PASS
		1	16.58			
	06	0	16.29		30	PASS
		1	16.76			
	11	0	14.40		30	PASS
		1	16.18			
	12	0	14.44		30	PASS
		1	15.61			
	13	0	11.35		30	PASS
		1	10.74			
802.11g	01	0	21.23		30	PASS
		1	21.96			
	06	0	22.24		30	PASS
		1	22.66			
	11	0	19.84		30	PASS
		1	21.82			
	12	0	16.62		30	PASS
		1	17.6			
	13	0	14.03		30	PASS
		1	13.89			
802.11n HT20	01	0	20.45	23.61	30	PASS
		1	20.75			
	06	0	21.21	24.29	30	PASS
		1	21.34			
	11	0	19.13	22.86	30	PASS
		1	20.46			
	12	0	17.54	20.60	30	PASS
		1	17.64			
	13	0	13.71	16.59	30	PASS
		1	13.45			

Note: All the modulation and antennas had been tested, but only the worst data recorded in the report.





## 8.4. POWER SPECTRAL DENSITY

### LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5
Note:	1. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi. 2. Limit=8dBm – (Directional gain -6)dBi Directional gain: Please refer to the description in section 5.4.		

### TEST PROCEDURE

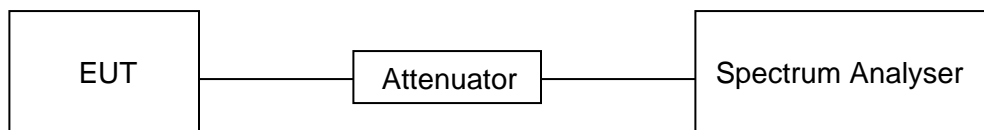
Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The center 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	$1.5 \times \text{DTS bandwidth}$
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



**TEST ENVIRONMENT**

Temperature	23.4°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

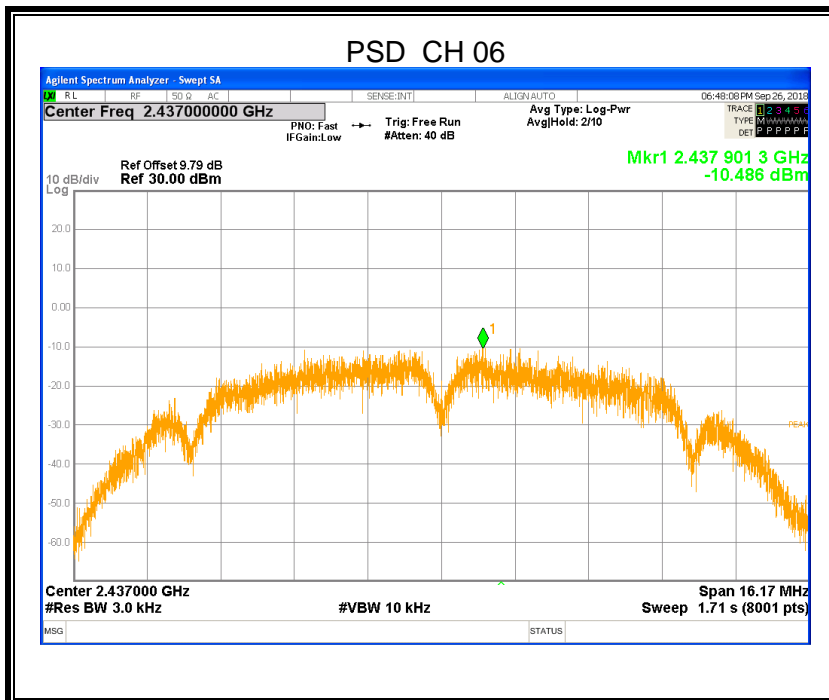
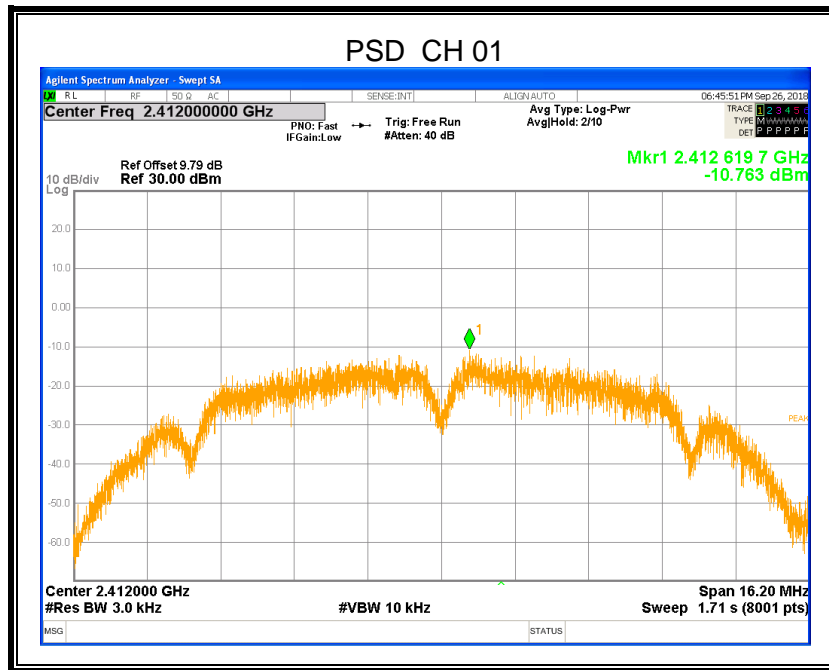
**RESULTS**

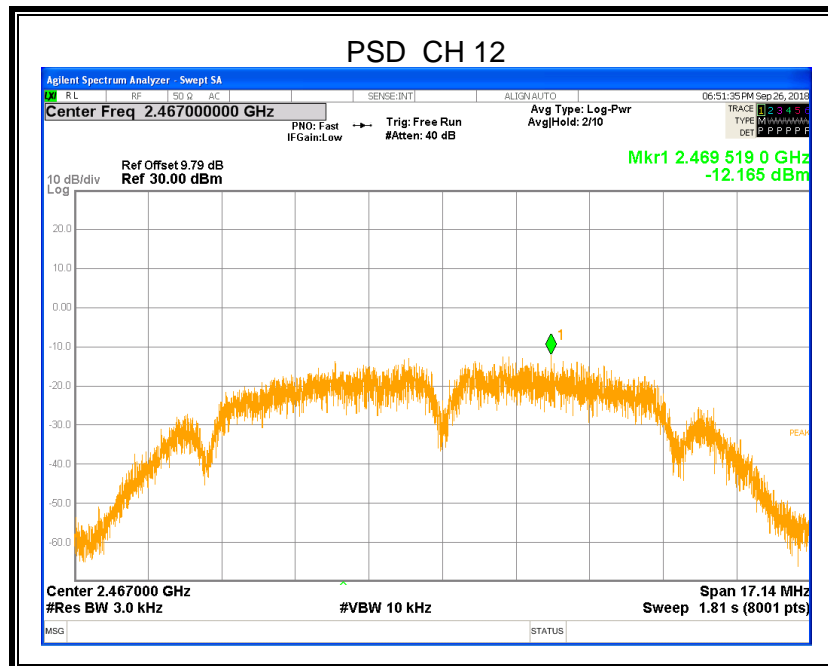
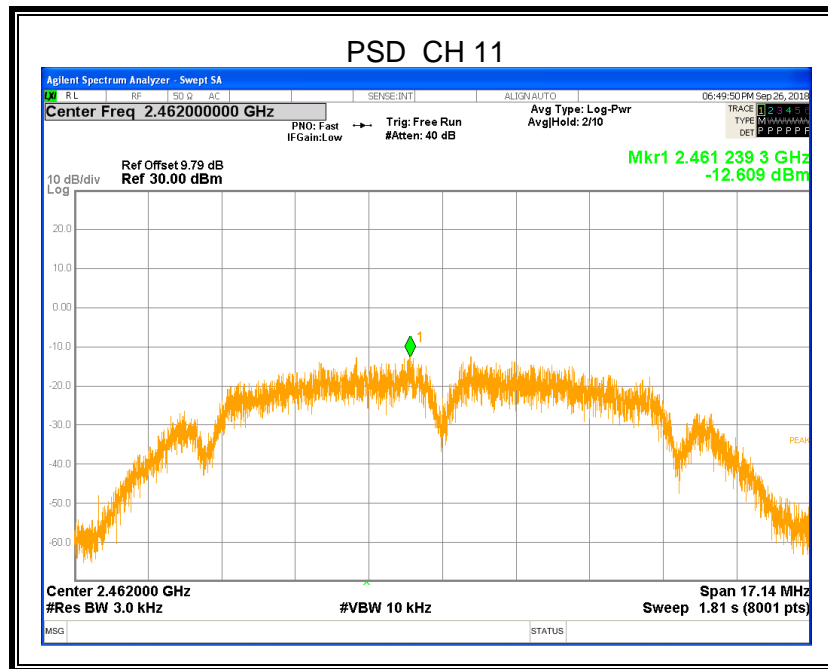
Mode: SISO for 802.11b and 802.11g, MIMO CDD for 802.11n						
Mode	Channel	Chain	Meas.Level [dBm/3kHz]	Total [dBm/3kHz]	Limit (dBm/3KHz)	Verdict
802.11b	01	0	-10.763		8	PASS
		1	11.601			
	06	0	-10.486		8	PASS
		1	-9.598			
	11	0	-12.609		8	PASS
		1	-10.131			
	12	0	-12.165		8	PASS
		1	-12.016			
	13	0	-15.649		8	PASS
		1	-15.215			
802.11g	01	0	-14.054		8	PASS
		1	-13.008			
	06	0	-12.591		8	PASS
		1	-12.200			
	11	0	-15.315		8	PASS
		1	-12.919			
	12	0	-17.161		8	PASS
		1	-17.934			
	13	0	-21.145		8	PASS
		1	-22.371			
802.11n HT20	01	0	-16.160	-13.07	5.3	PASS
		1	-16.007			
	06	0	-14.729	-11.48	5.3	PASS
		1	-14.266			
	11	0	-16.095	-12.60	5.3	PASS
		1	-15.182			
	12	0	-18.441	-15.12	5.3	PASS
		1	-17.840			
	13	0	-20.707	-18.11	5.3	PASS
		1	-21.572			

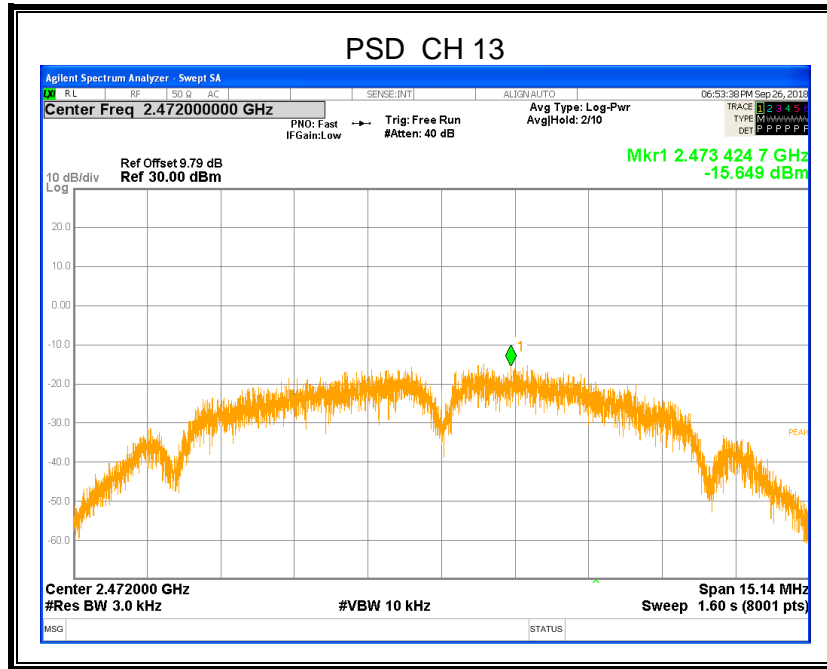


#### 8.4.1. 802.11b

##### Chain 0

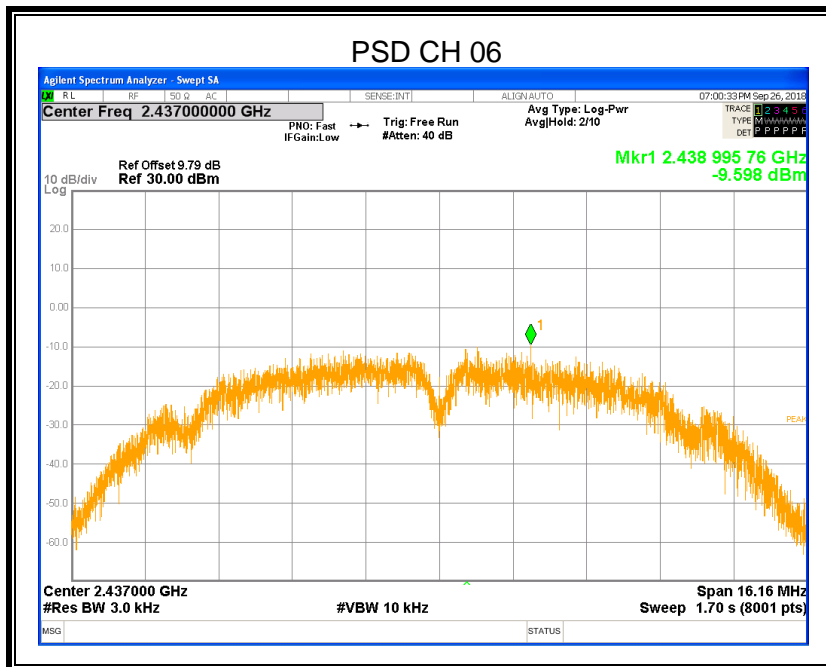
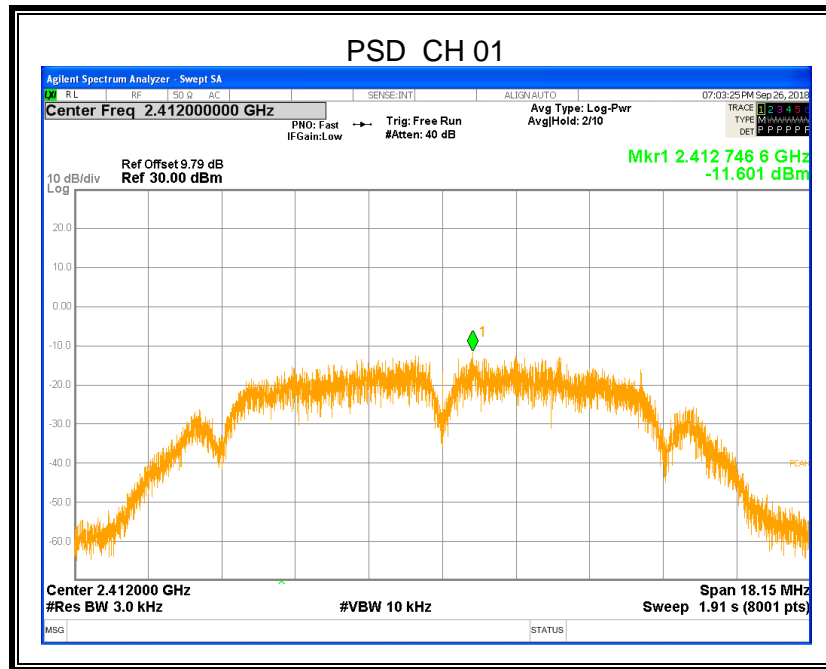


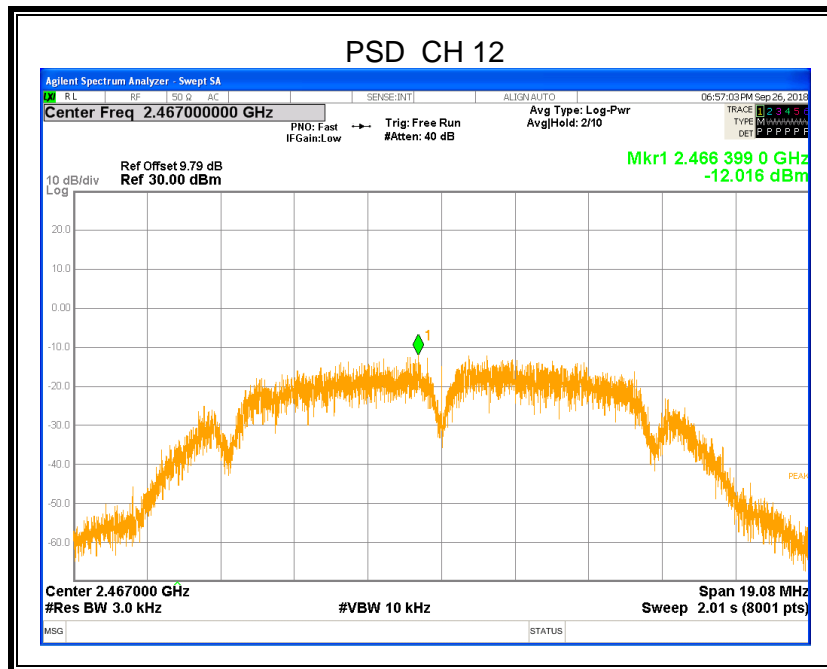
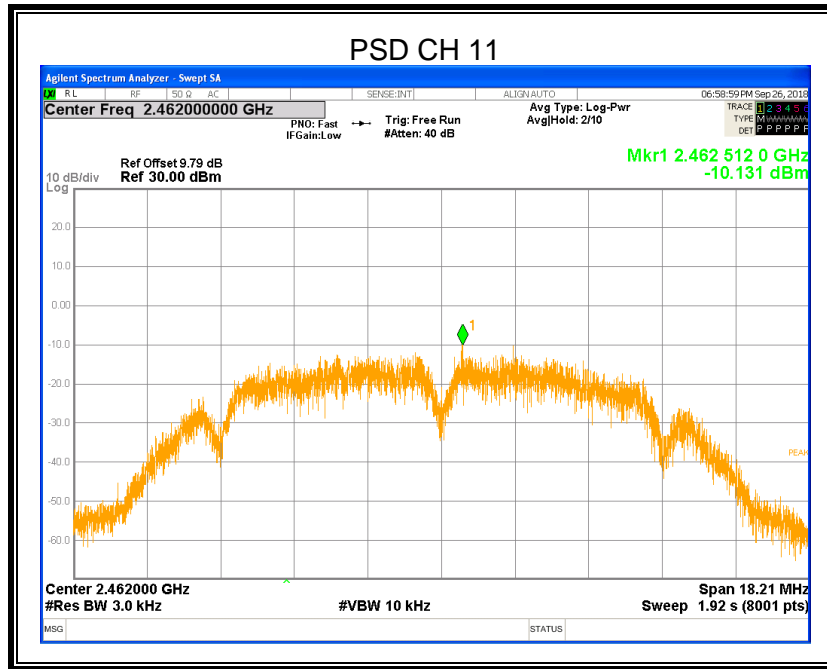


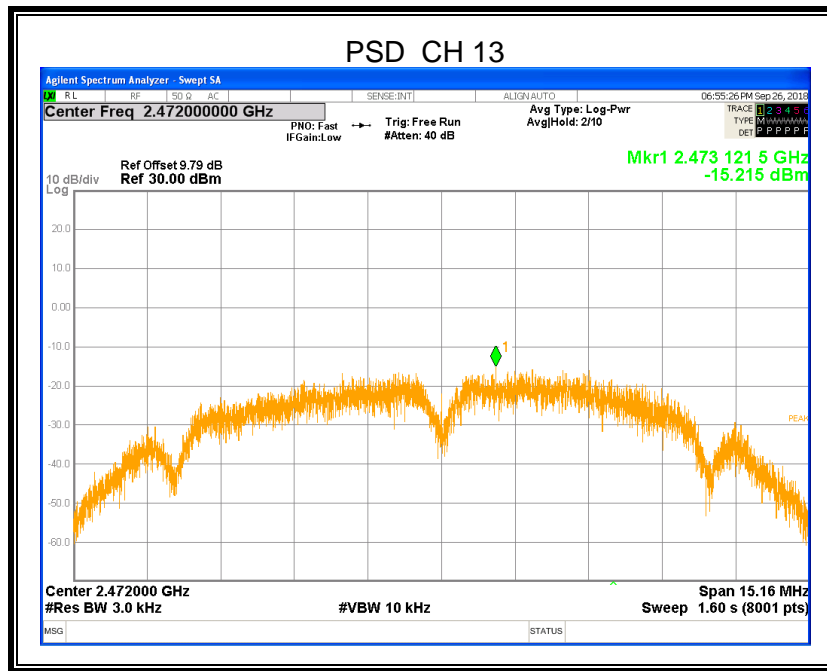




Chain 1





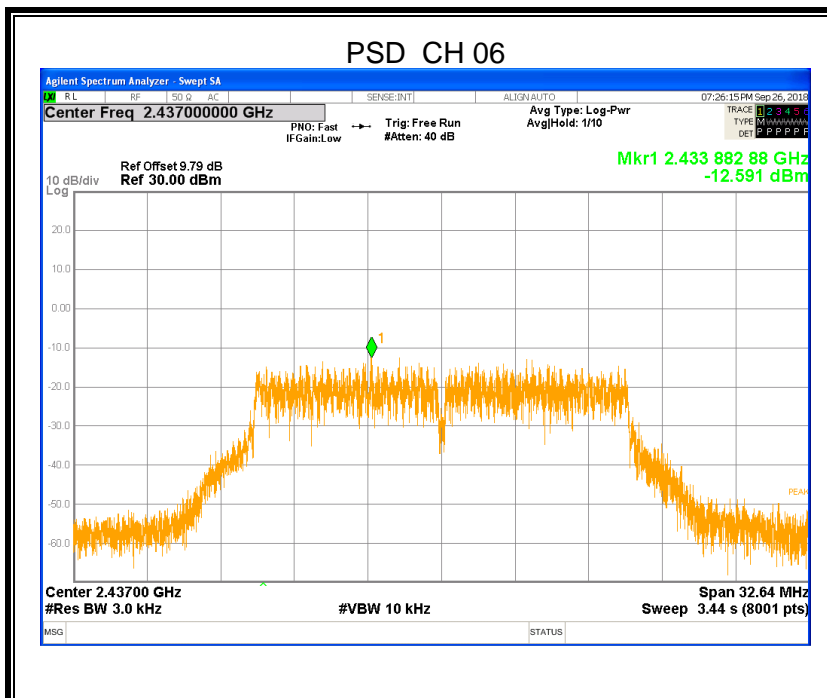
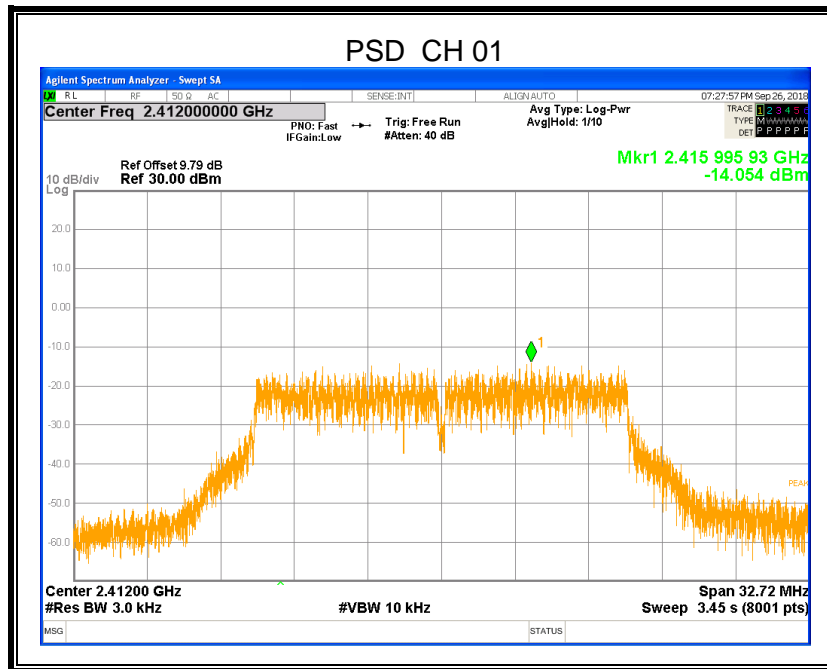


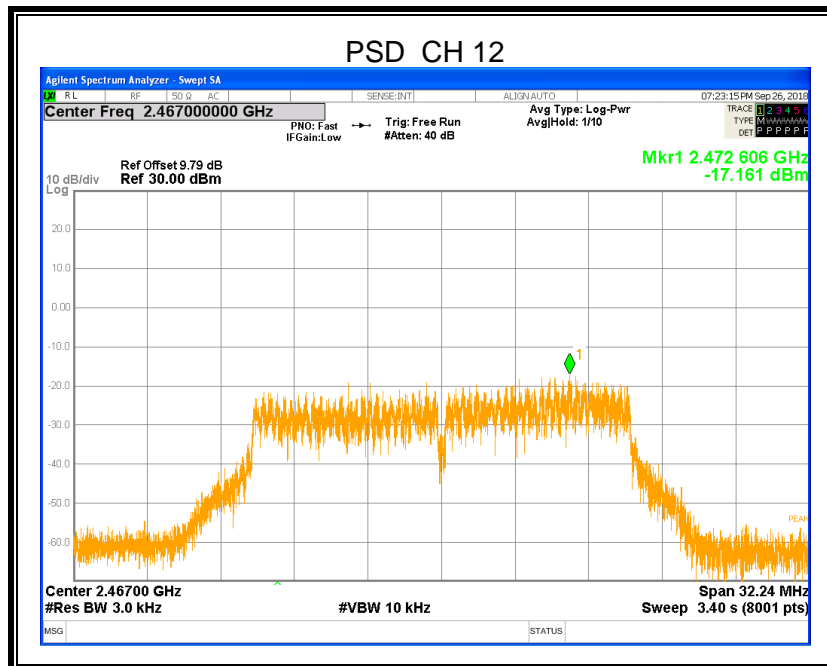
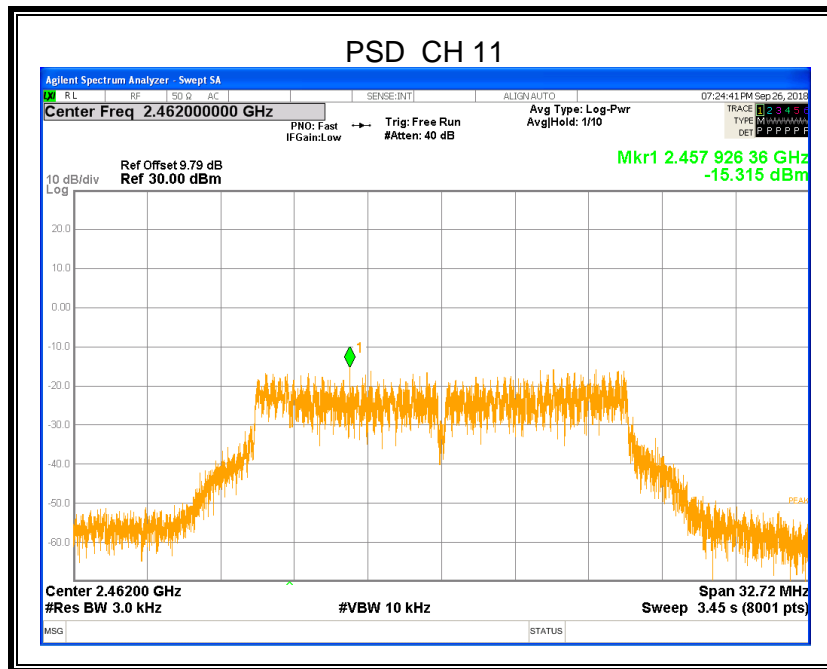


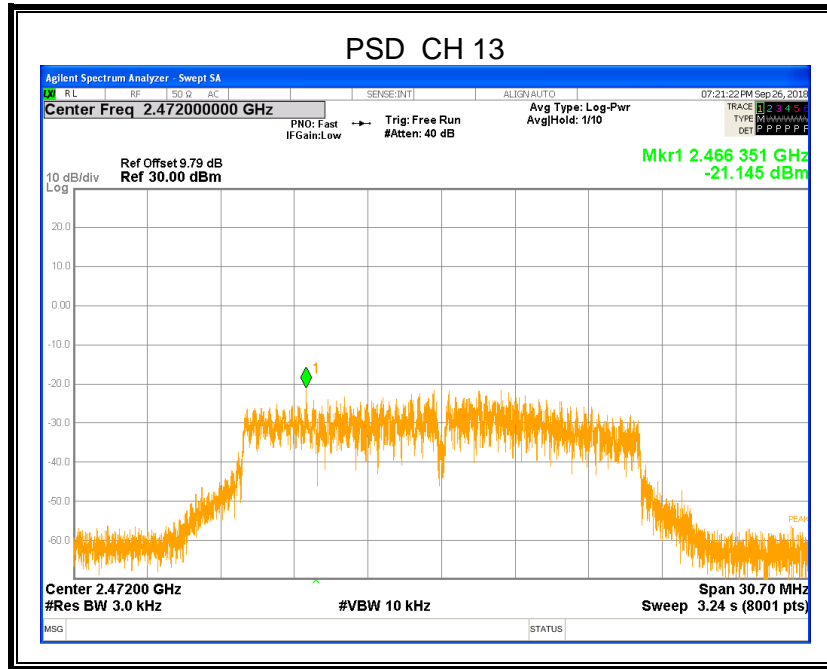


## 8.4.2. 802.11g

### Chain 0

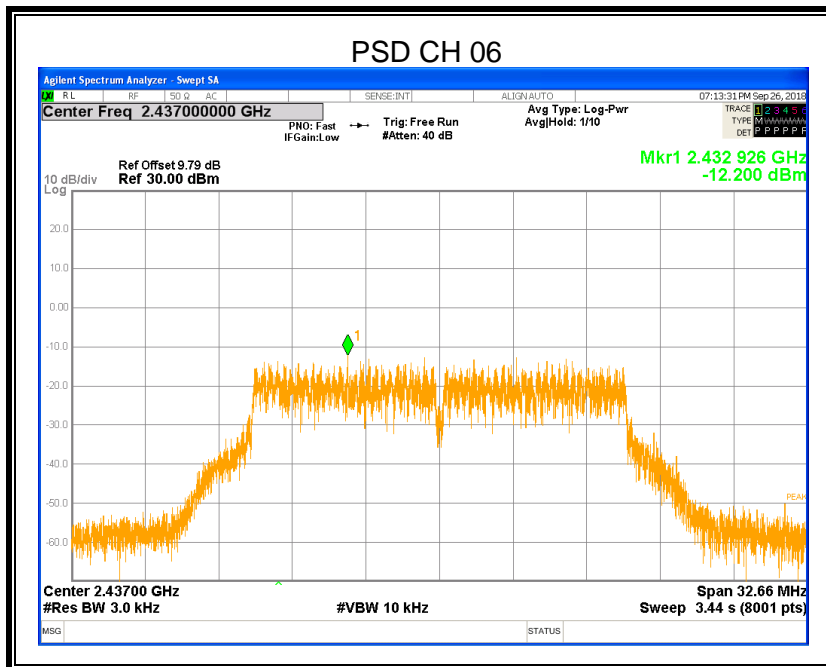
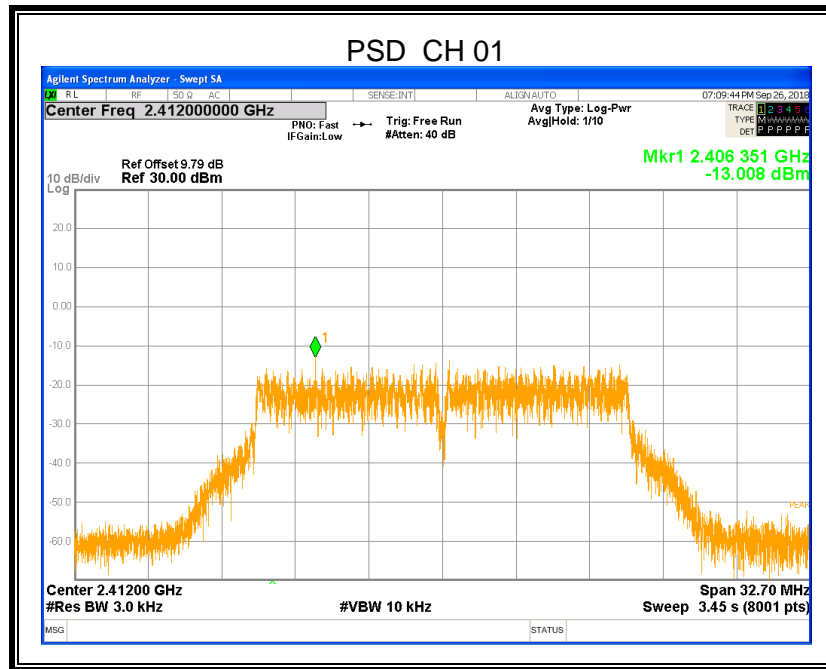


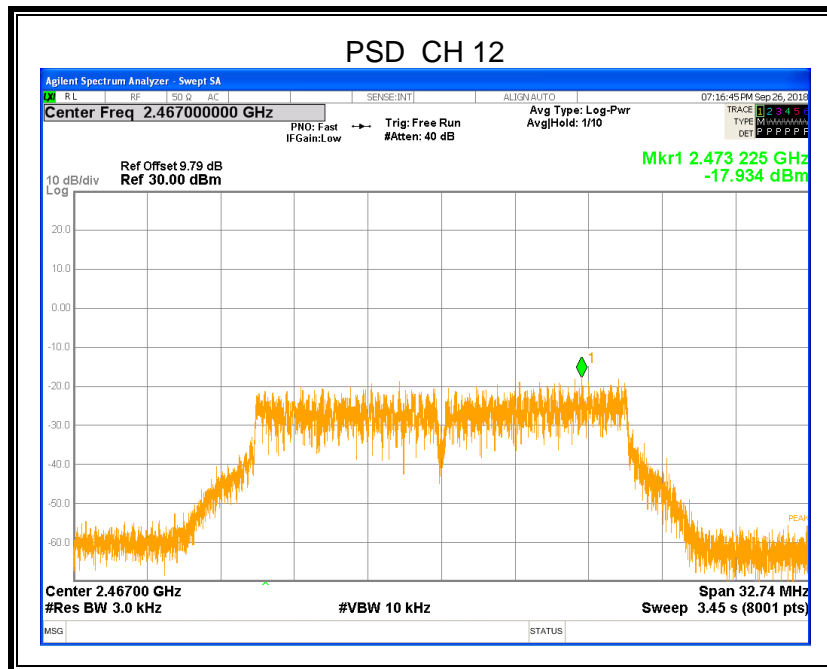
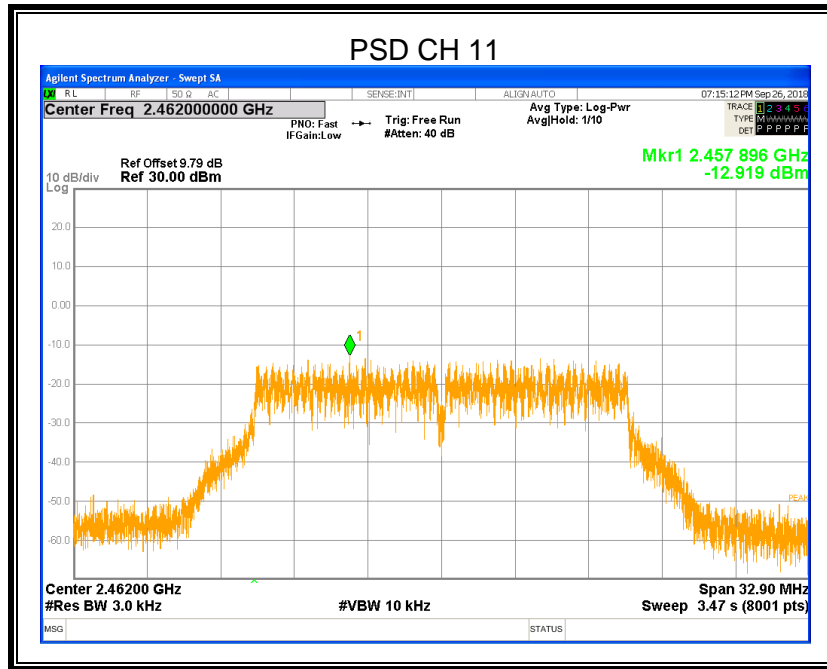


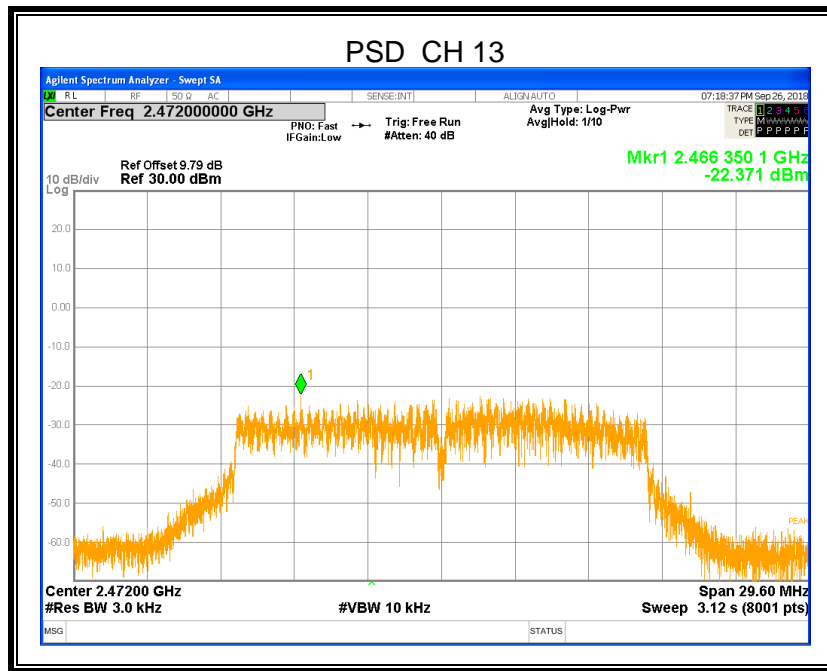




Chain 1



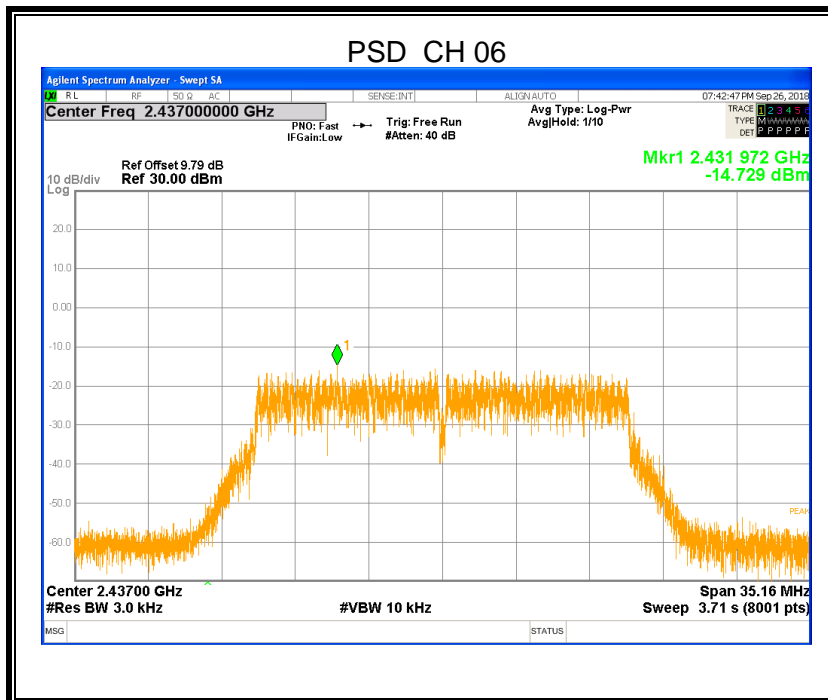
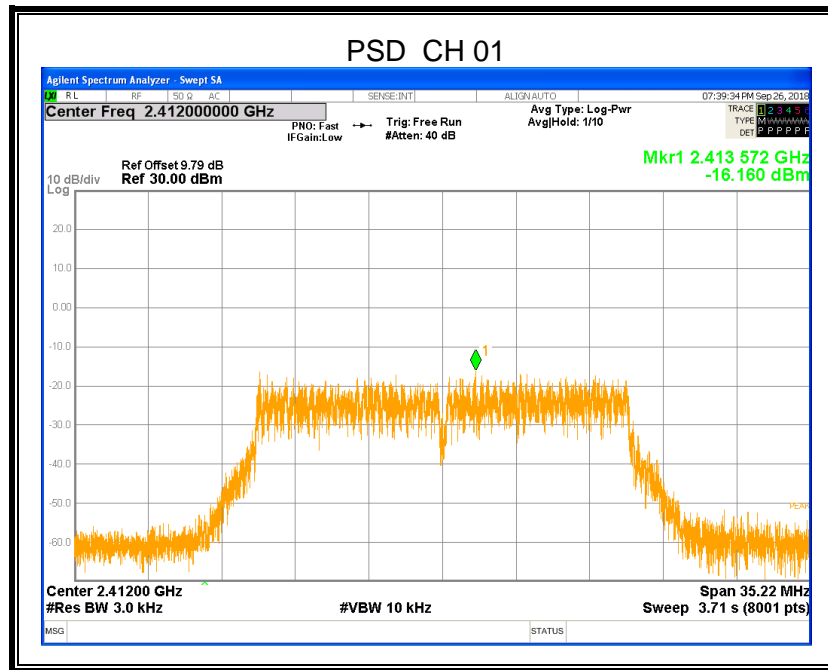


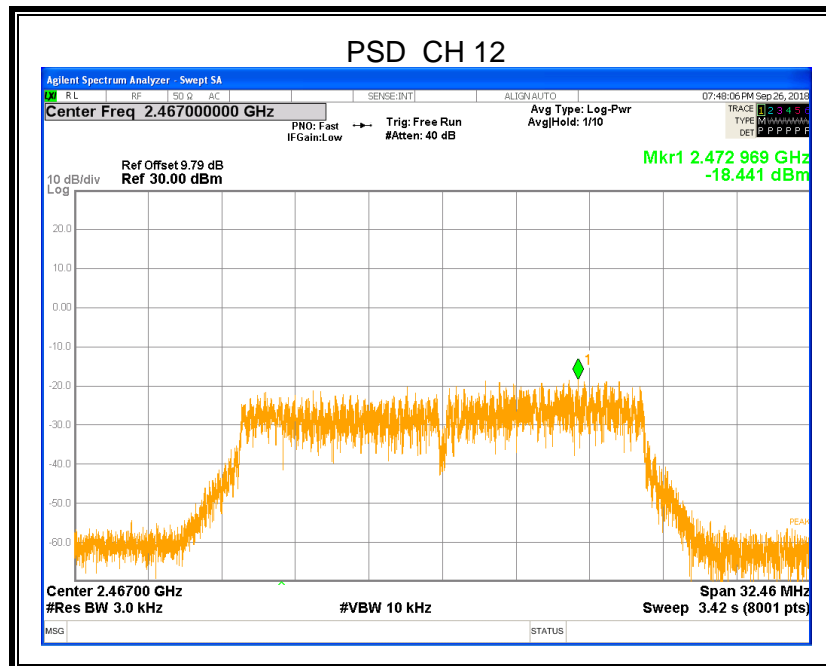
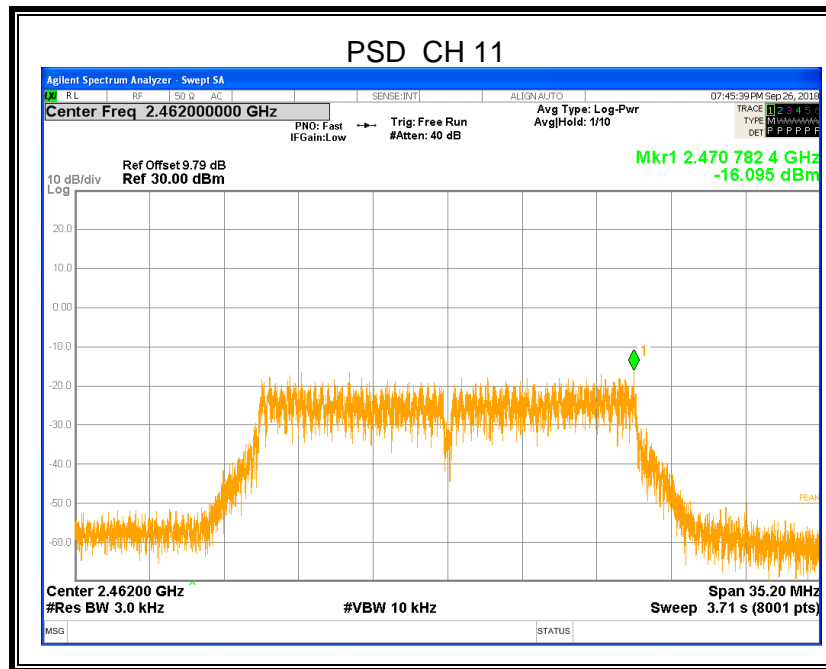




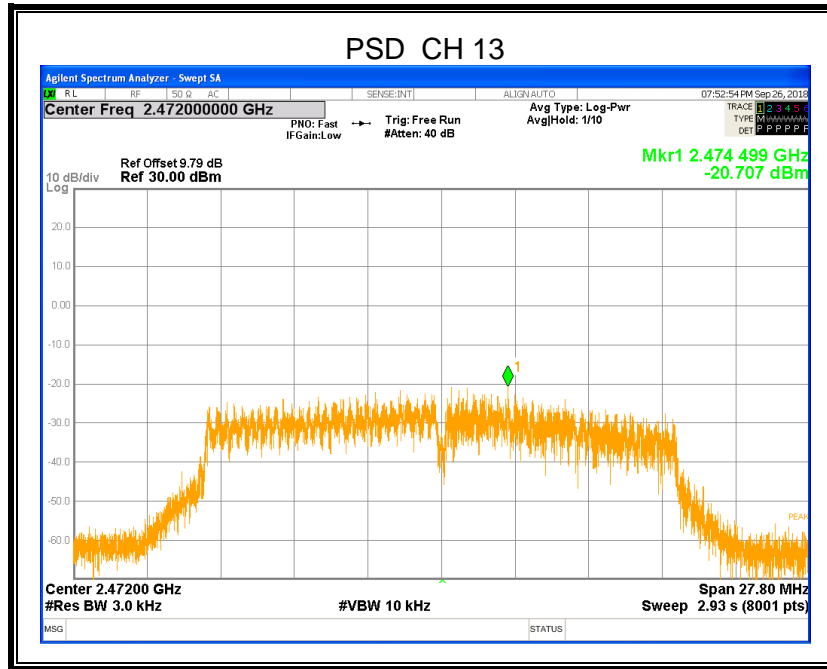
### 8.4.3. 802.11n HT20

#### Chain 0



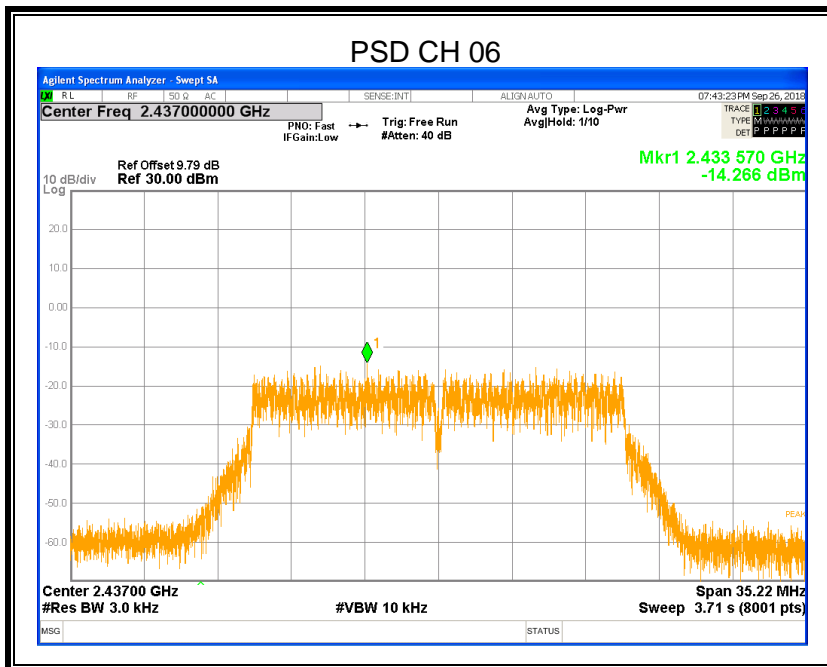
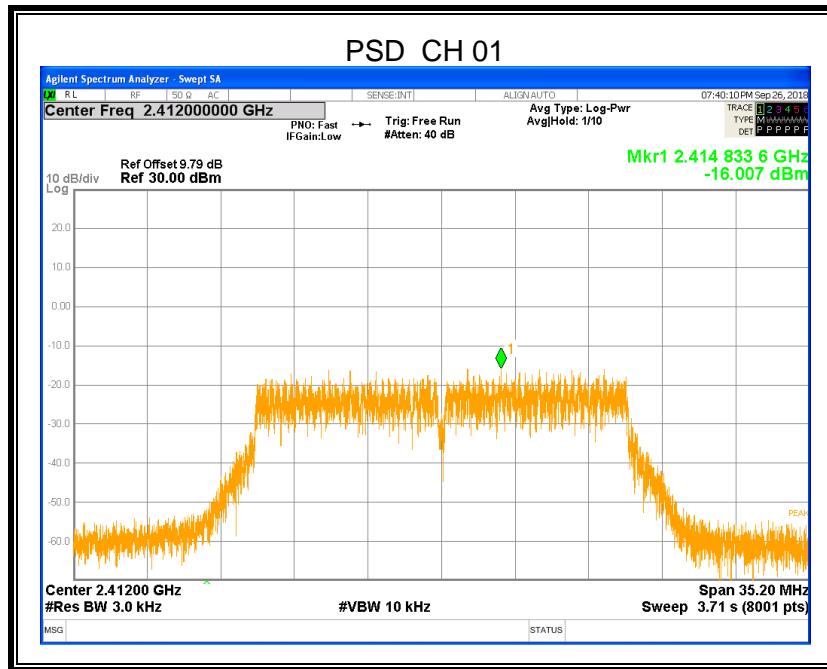


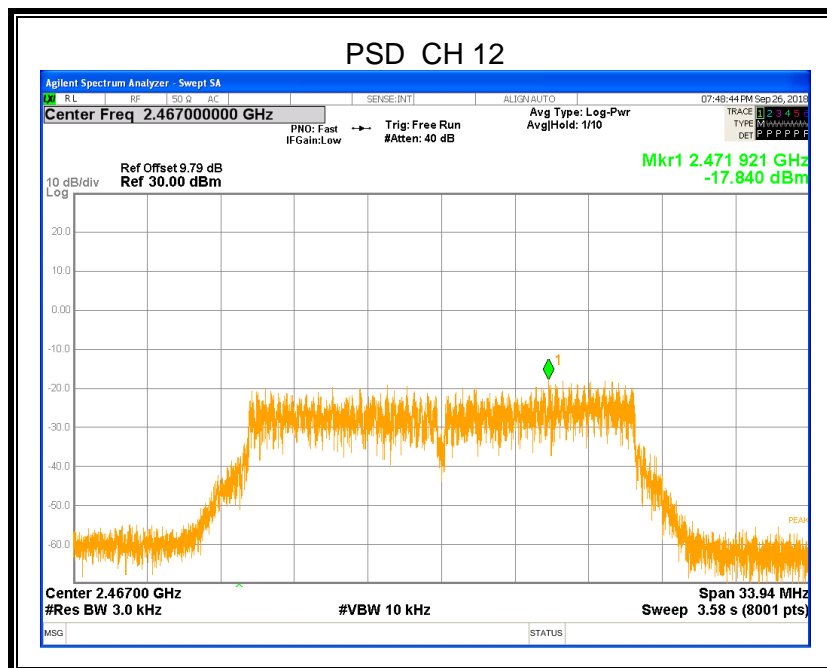
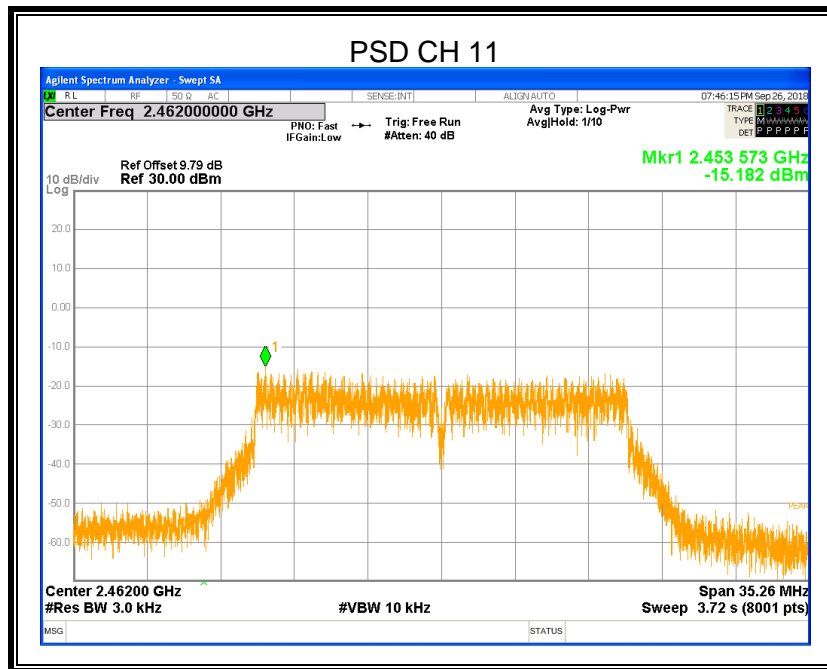


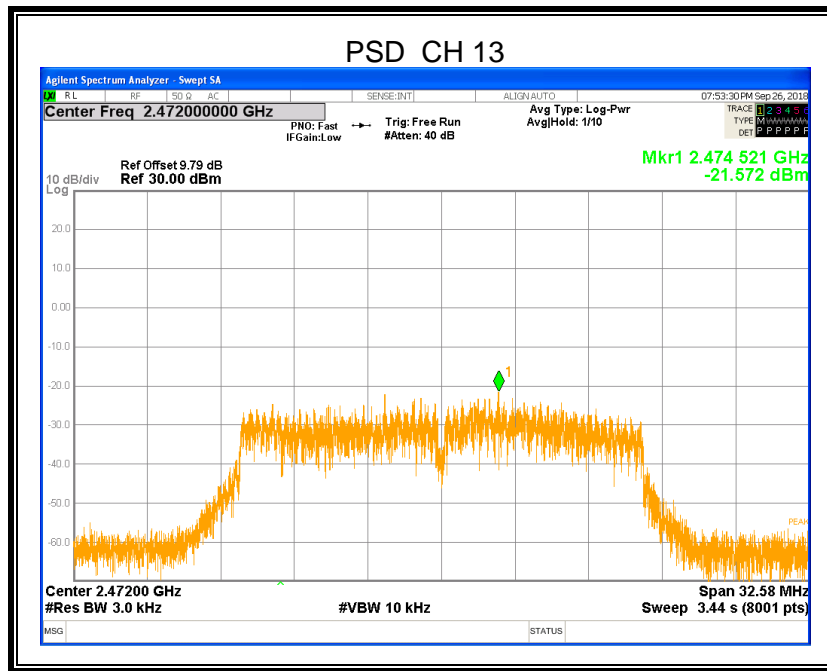




Chain 1









## 8.1. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

### LIMITS

FCC Part15 (15.247) Subpart C RSS-247 ISSUE 2		
Section	Test Item	Limit
FCC §15.247 (d) 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:

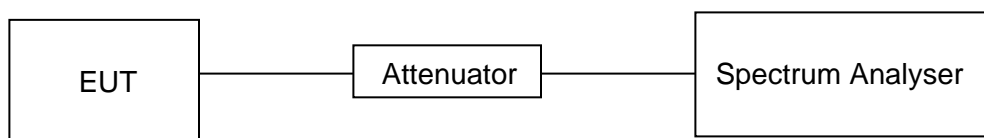
Center Frequency	The center frequency of the channel under test
Detector	Peak
RBW	100K
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

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





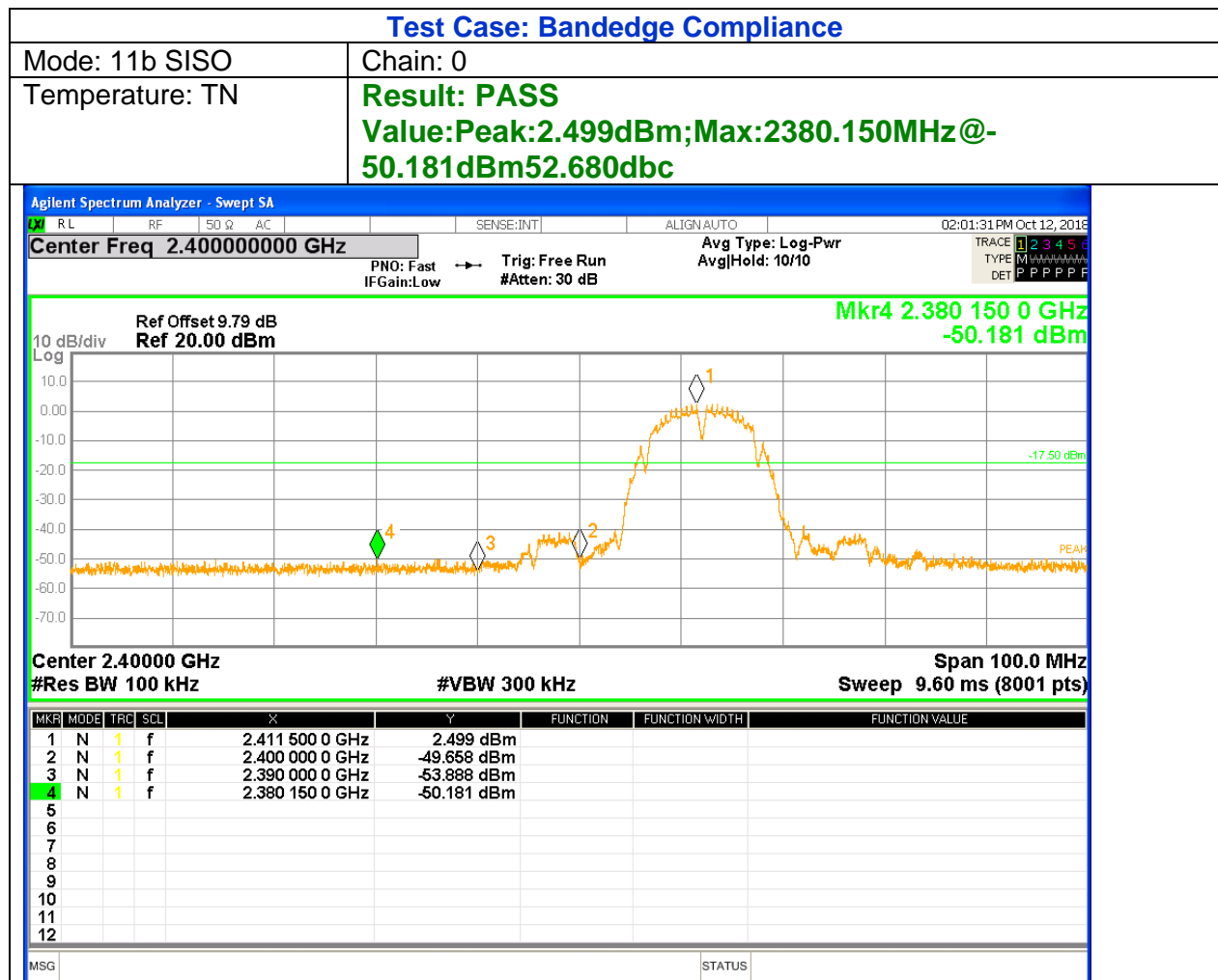
## TEST ENVIRONMENT

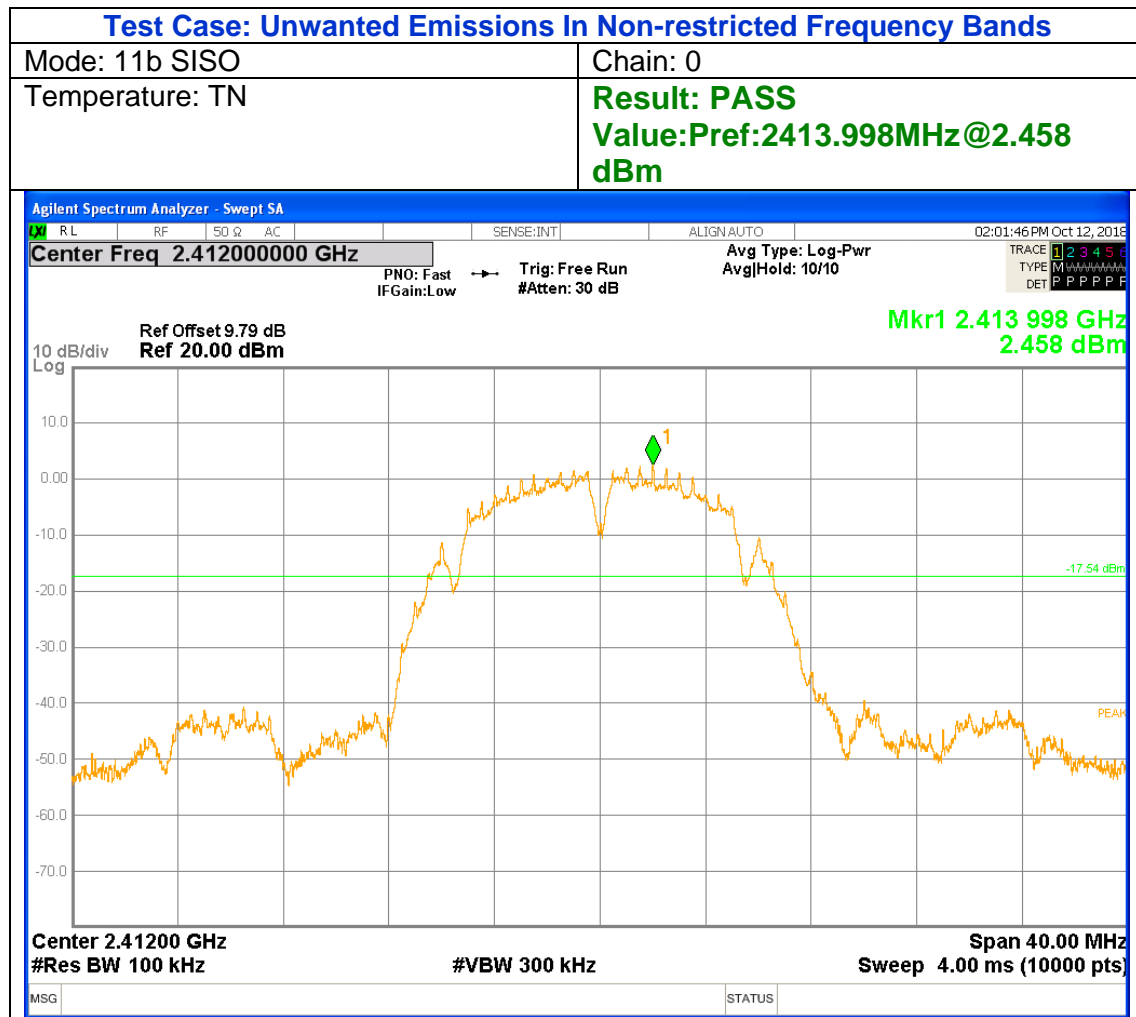
Temperature	23.4°C	Relative Humidity	60%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

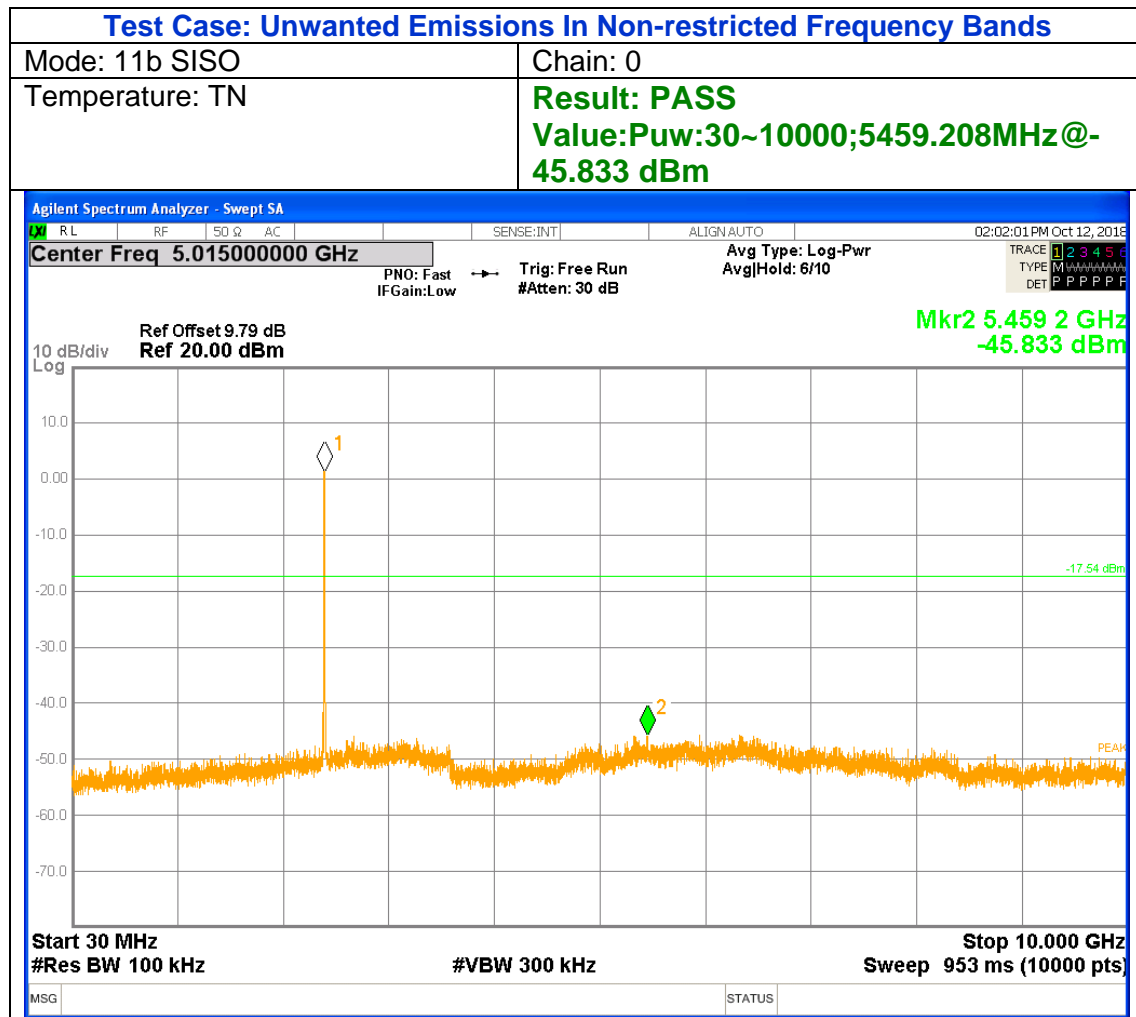
## RESULTS

### 8.1.1. 802.11b MODE

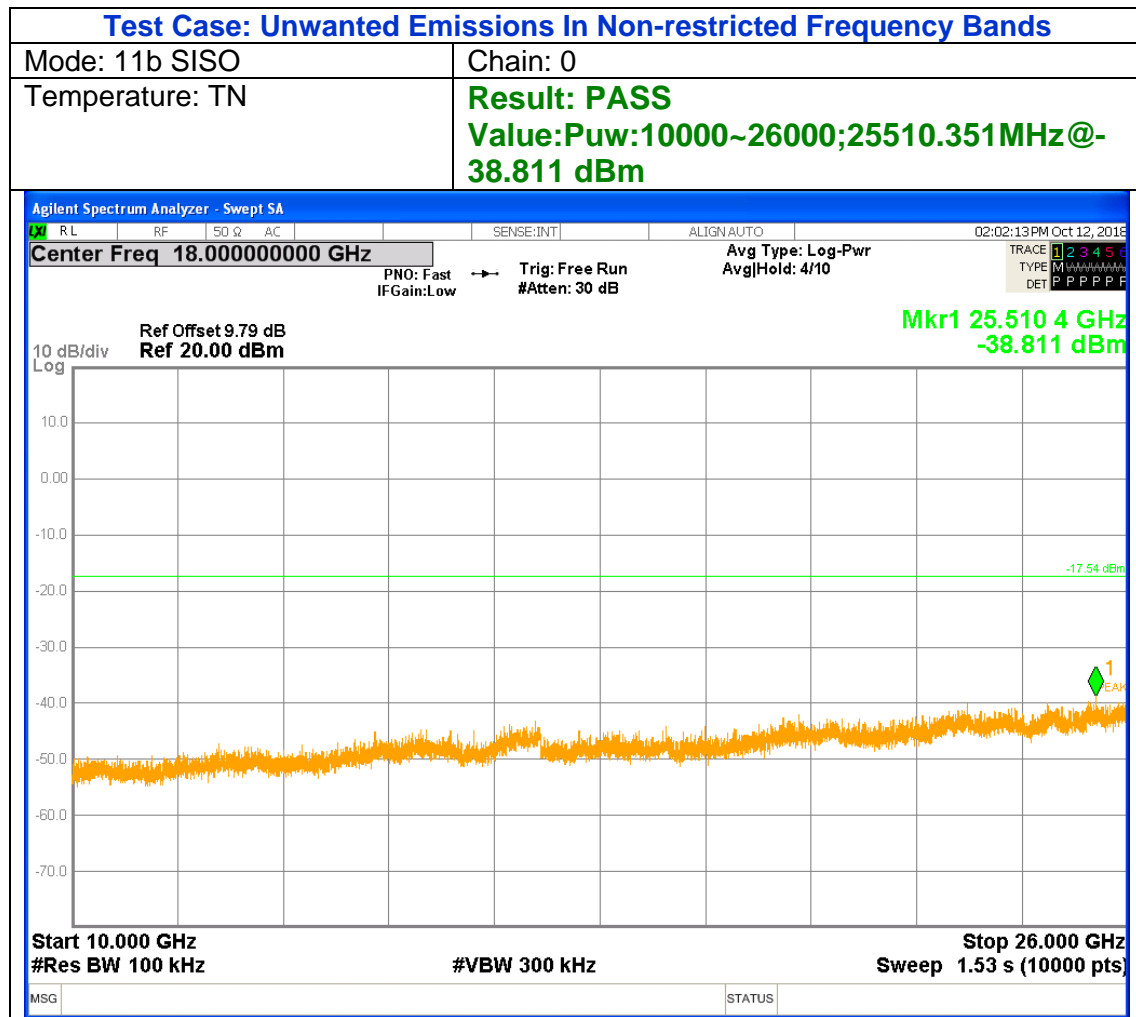
#### Low Channel 01









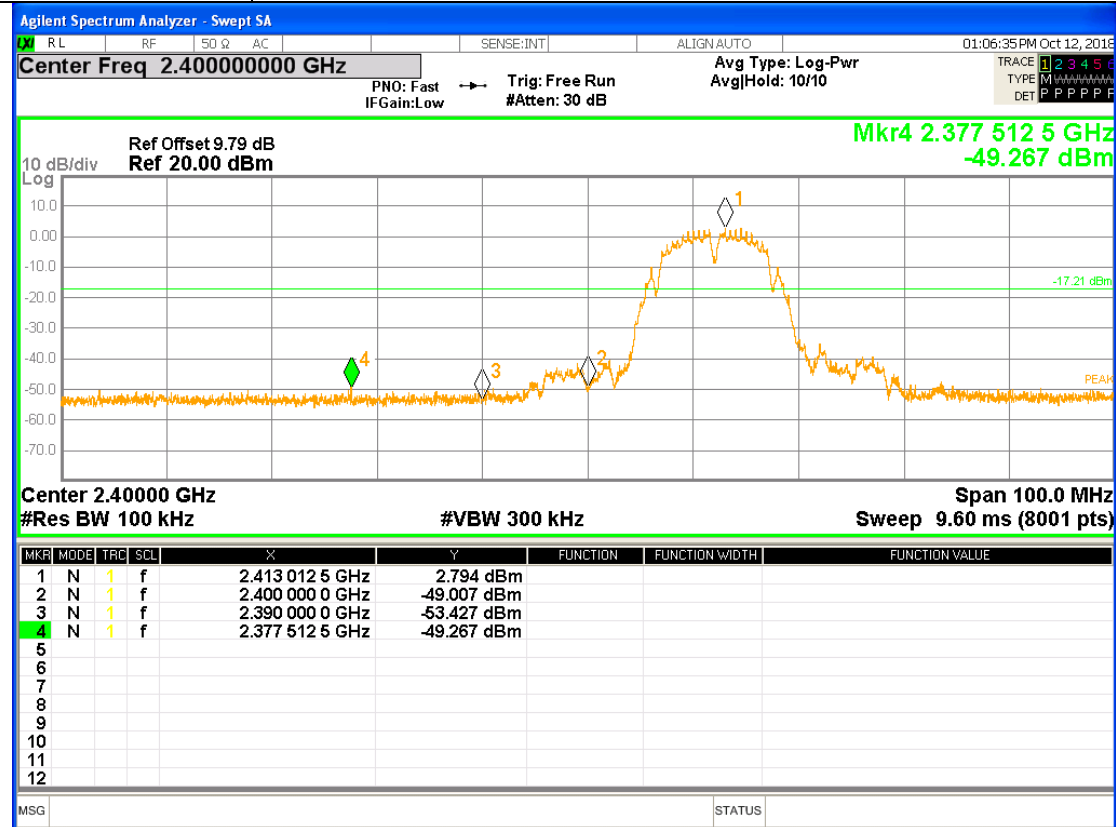


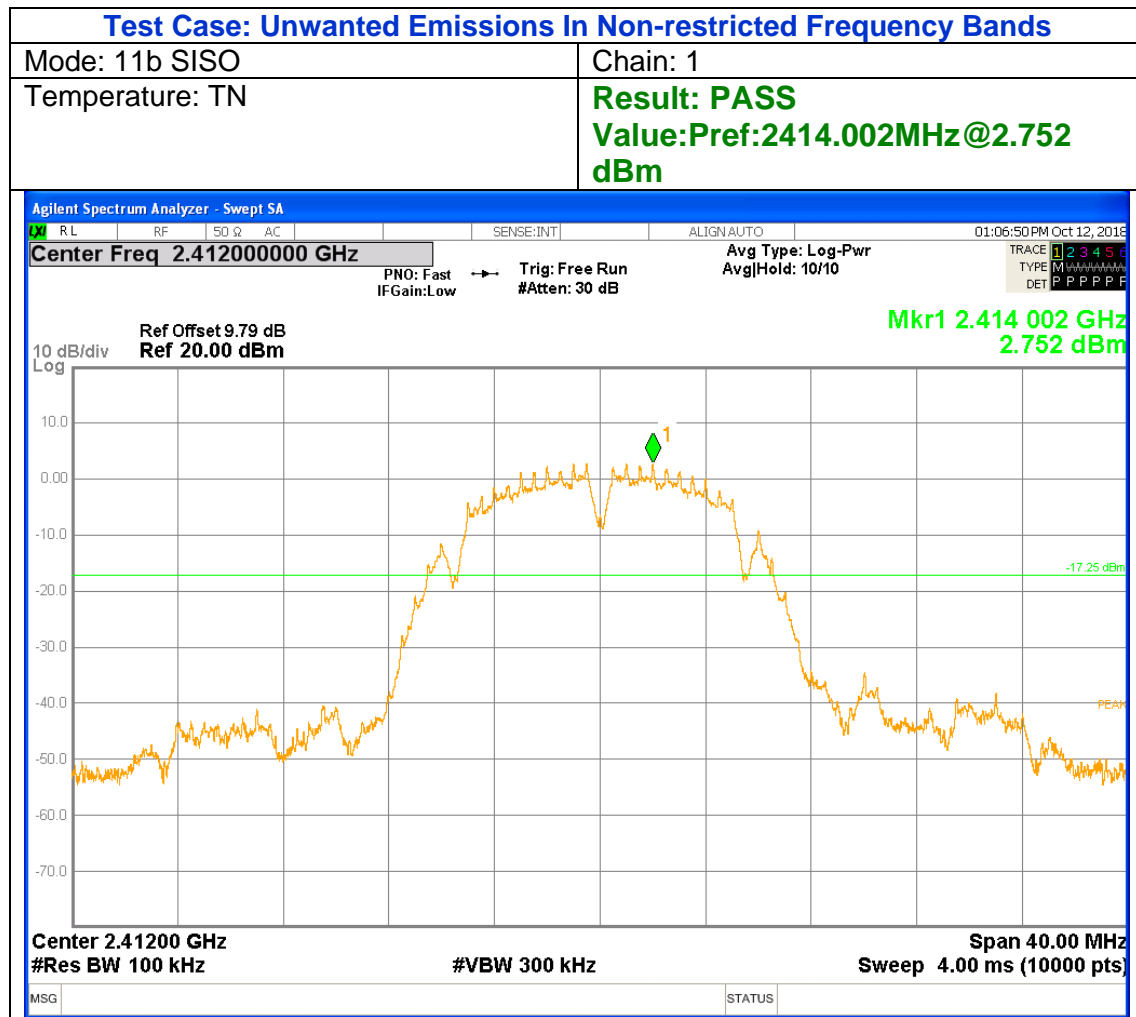
**Test Case: Bandedge Compliance**

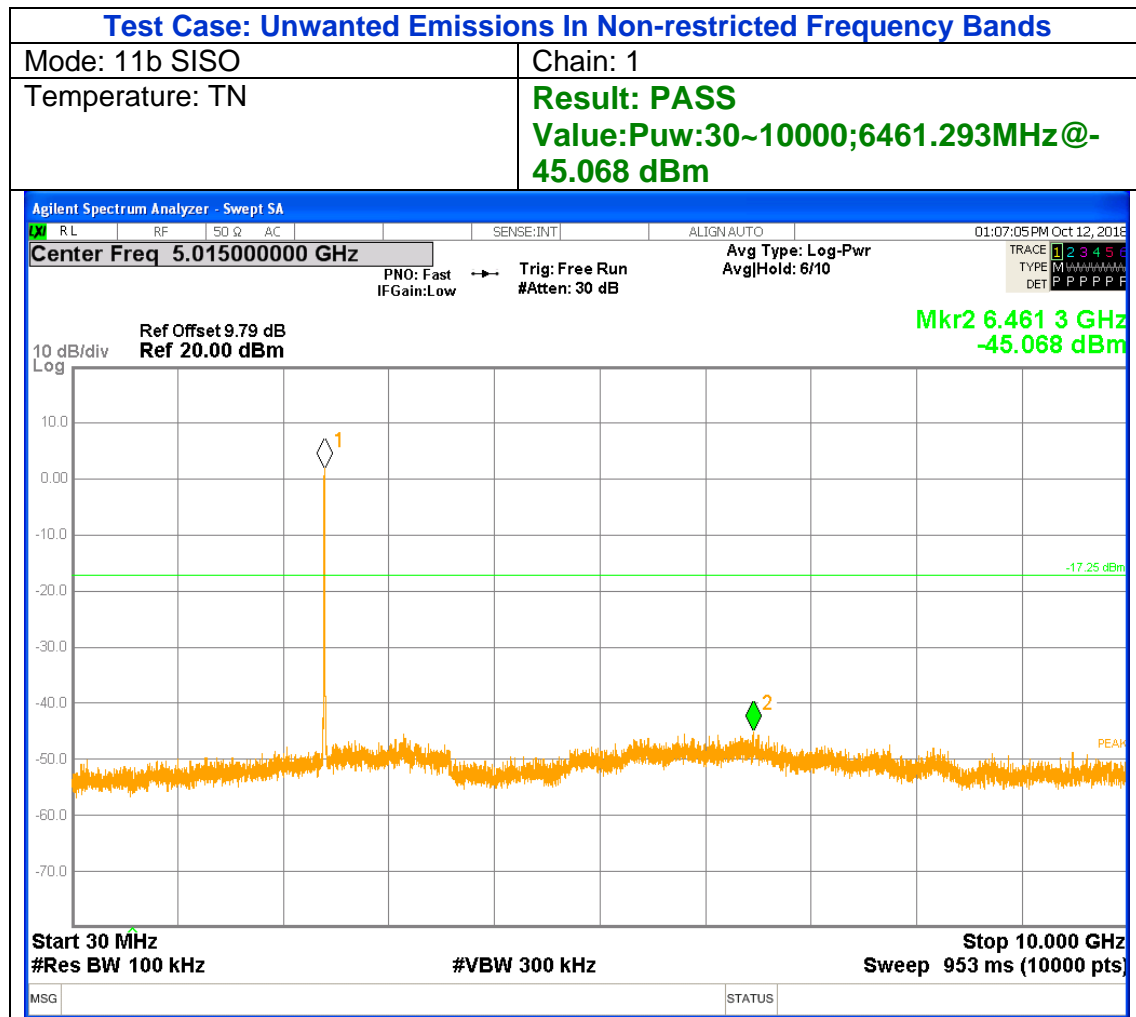
Mode: 11b SISO

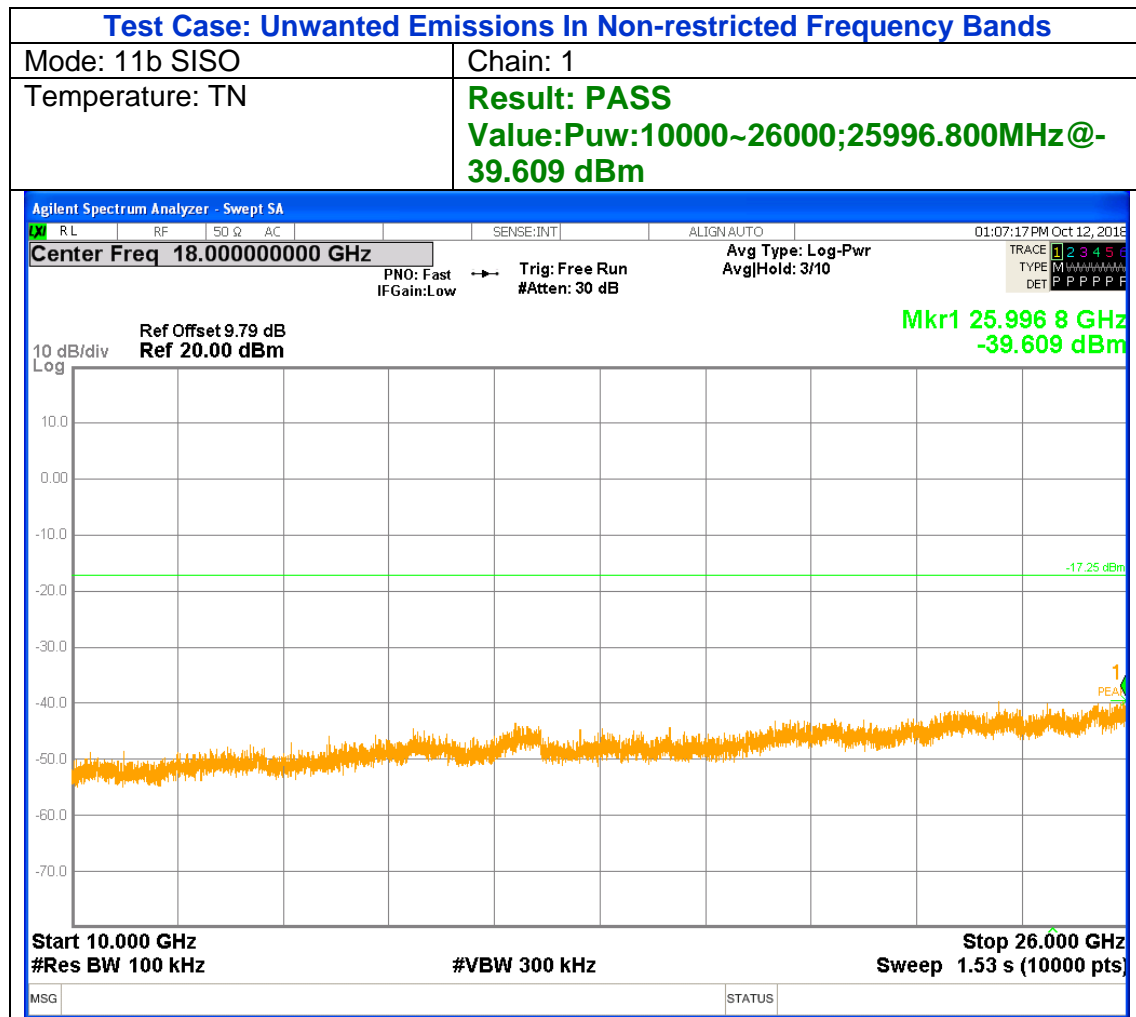
Chain: 1

Temperature: TN

**Result: PASS****Value: Peak: 2.794 dBm; Max: 2377.513 MHz @ -49.267 dBm 52.061 dbc**



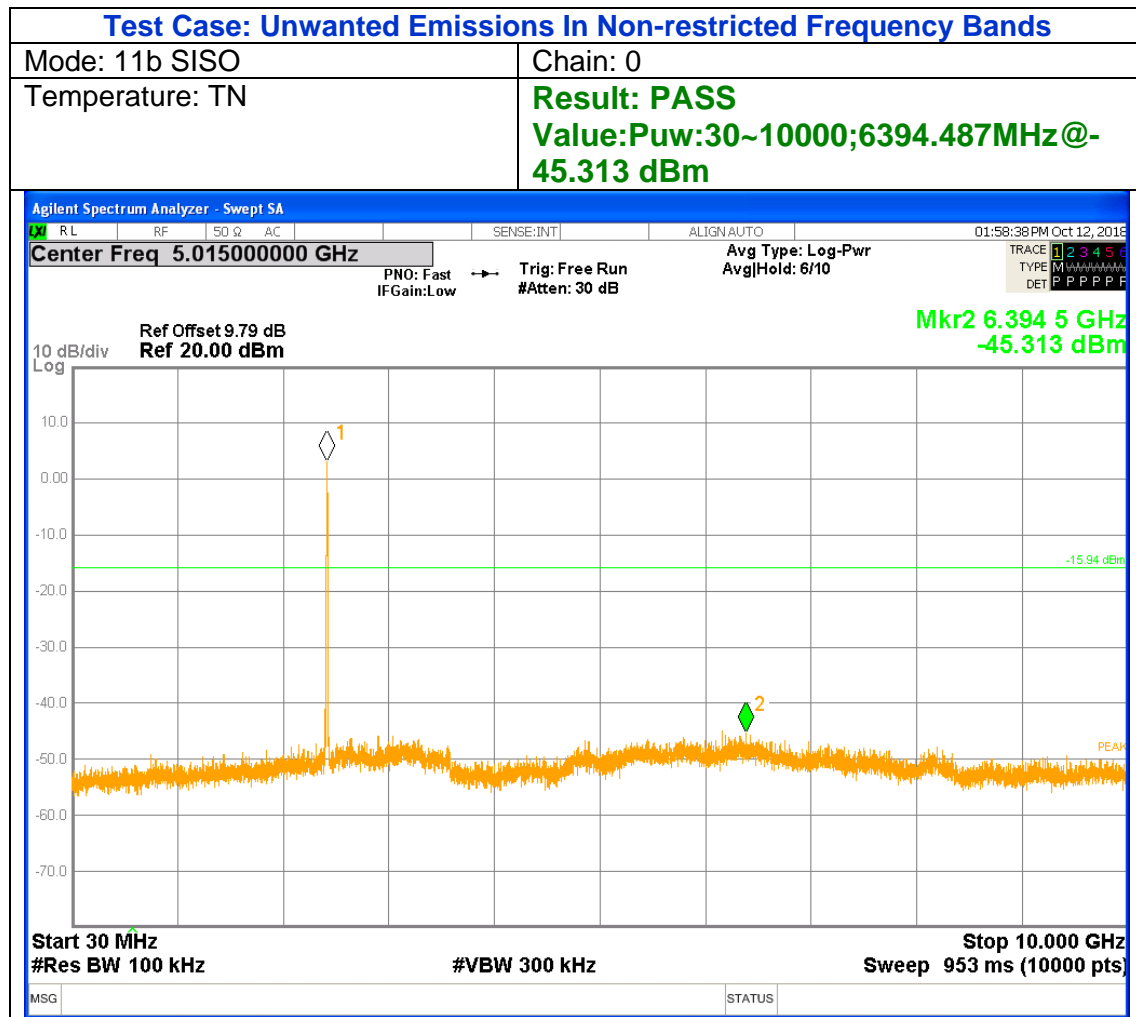


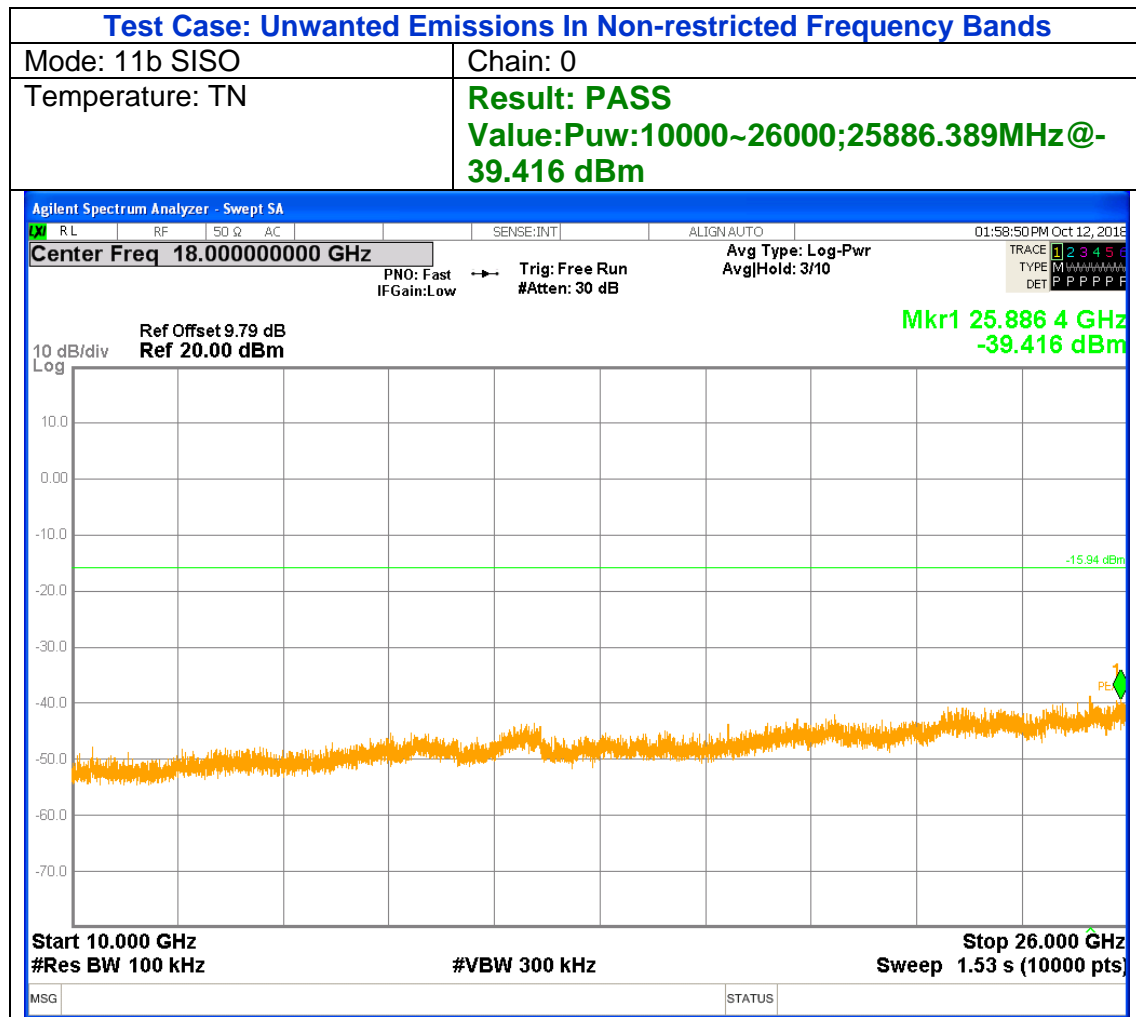




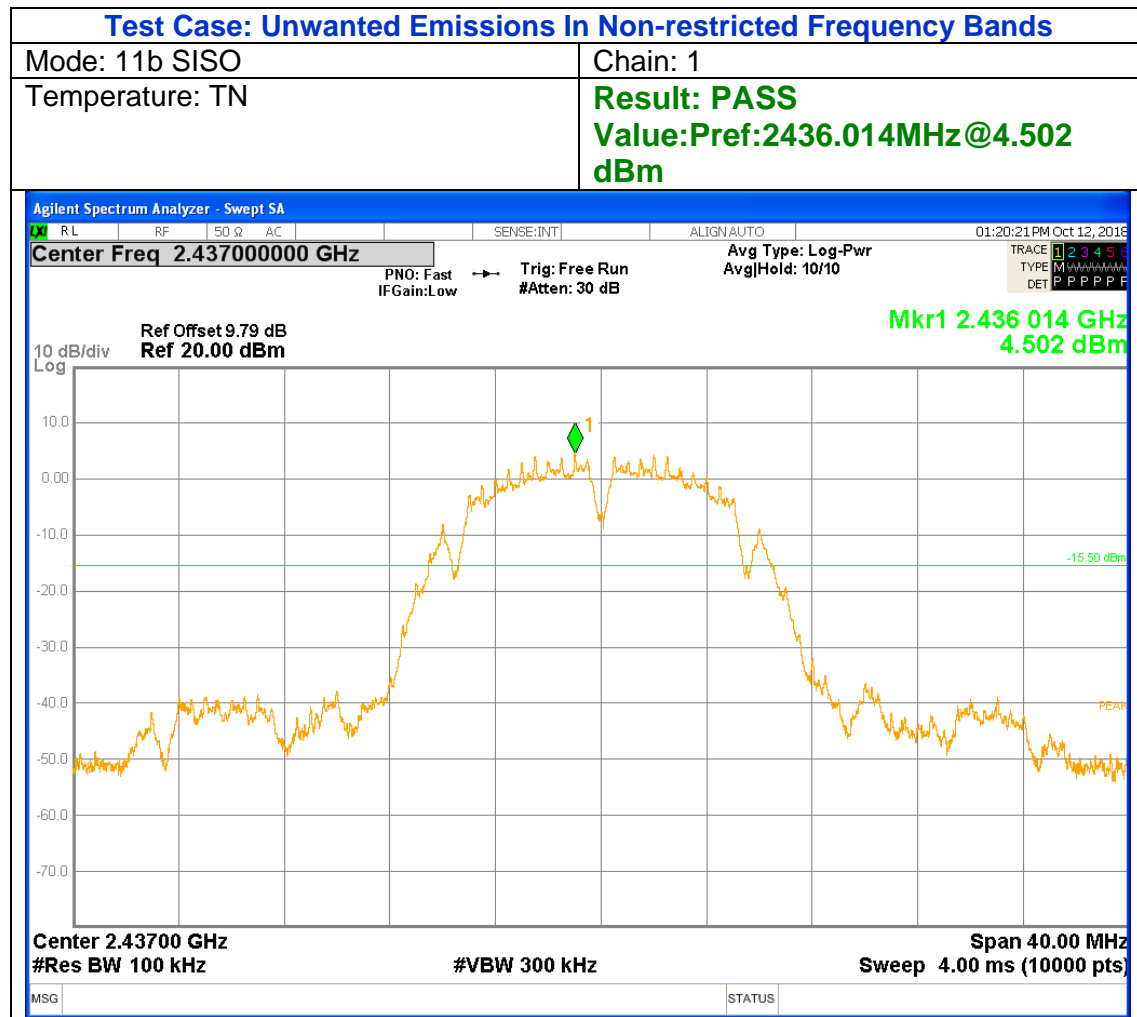
**Middle Channel 06**

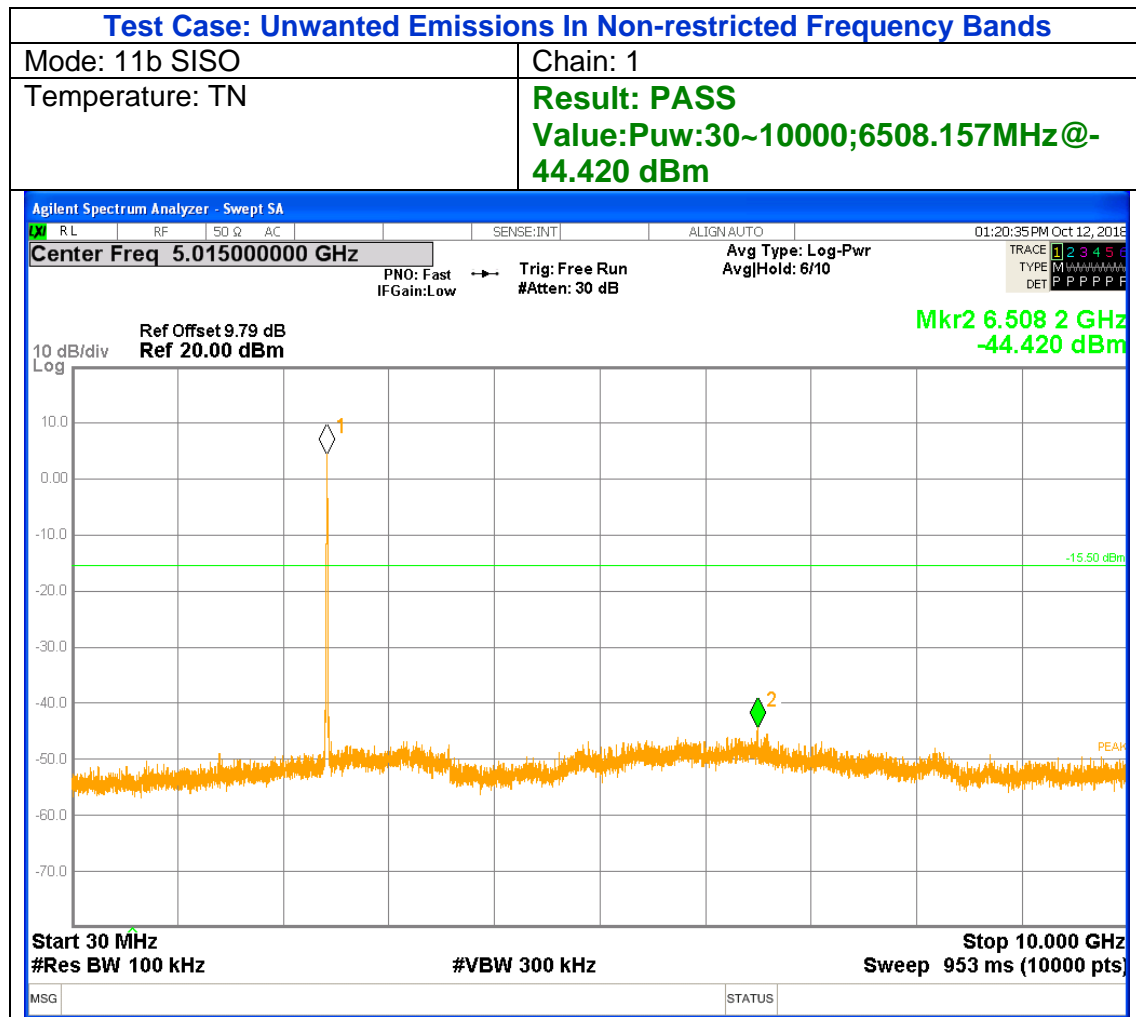


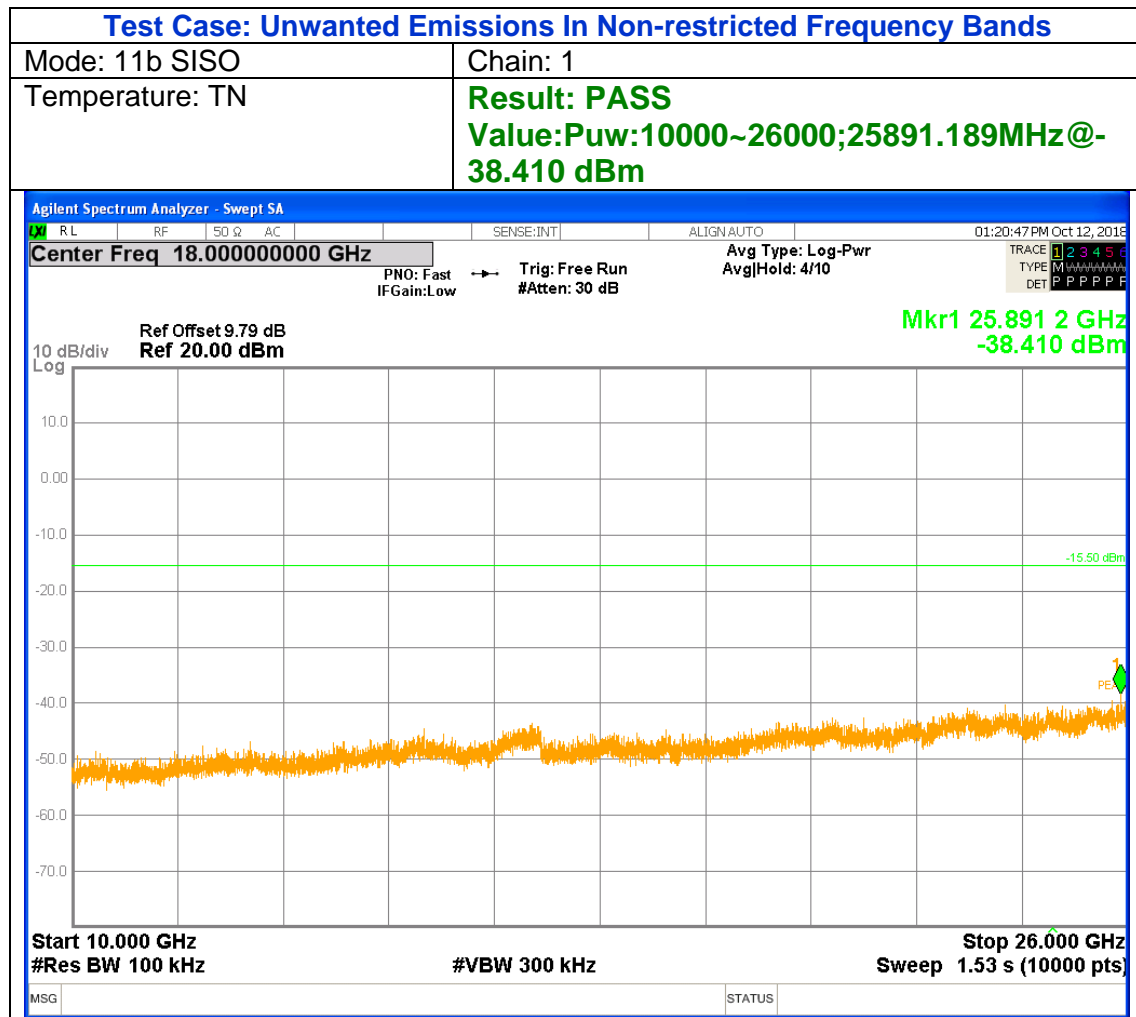














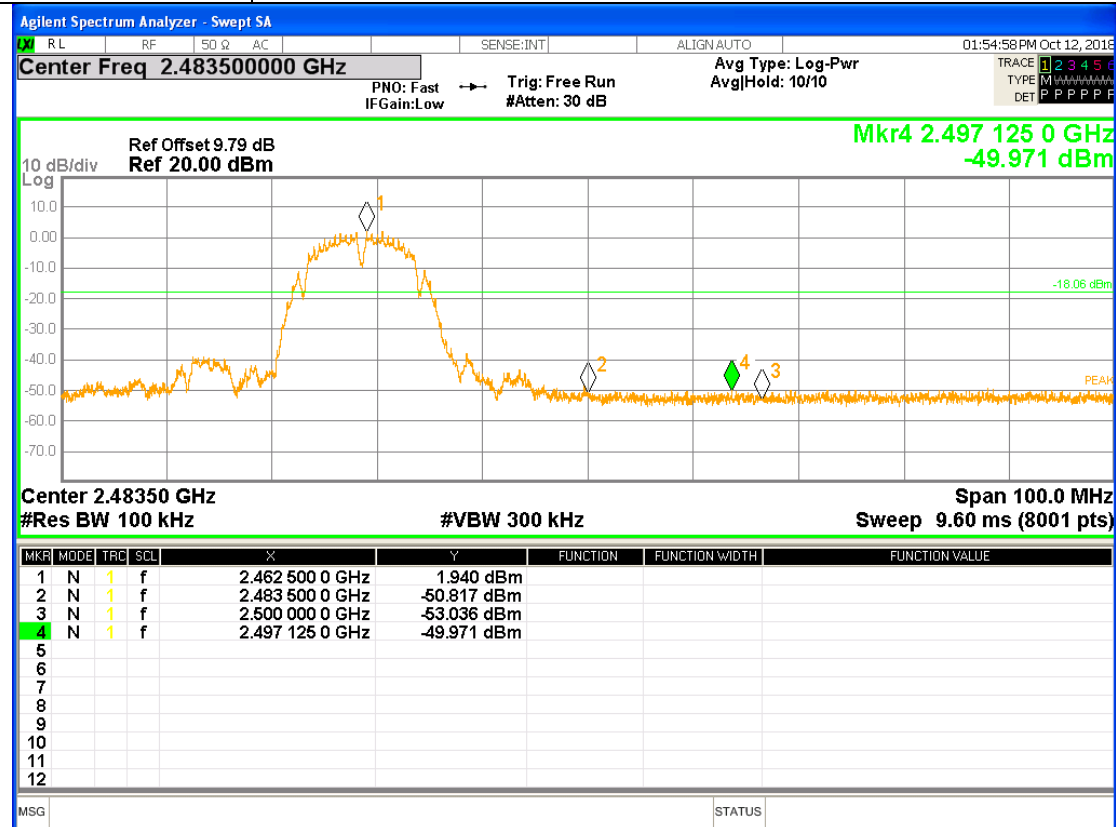
### High Channel 11

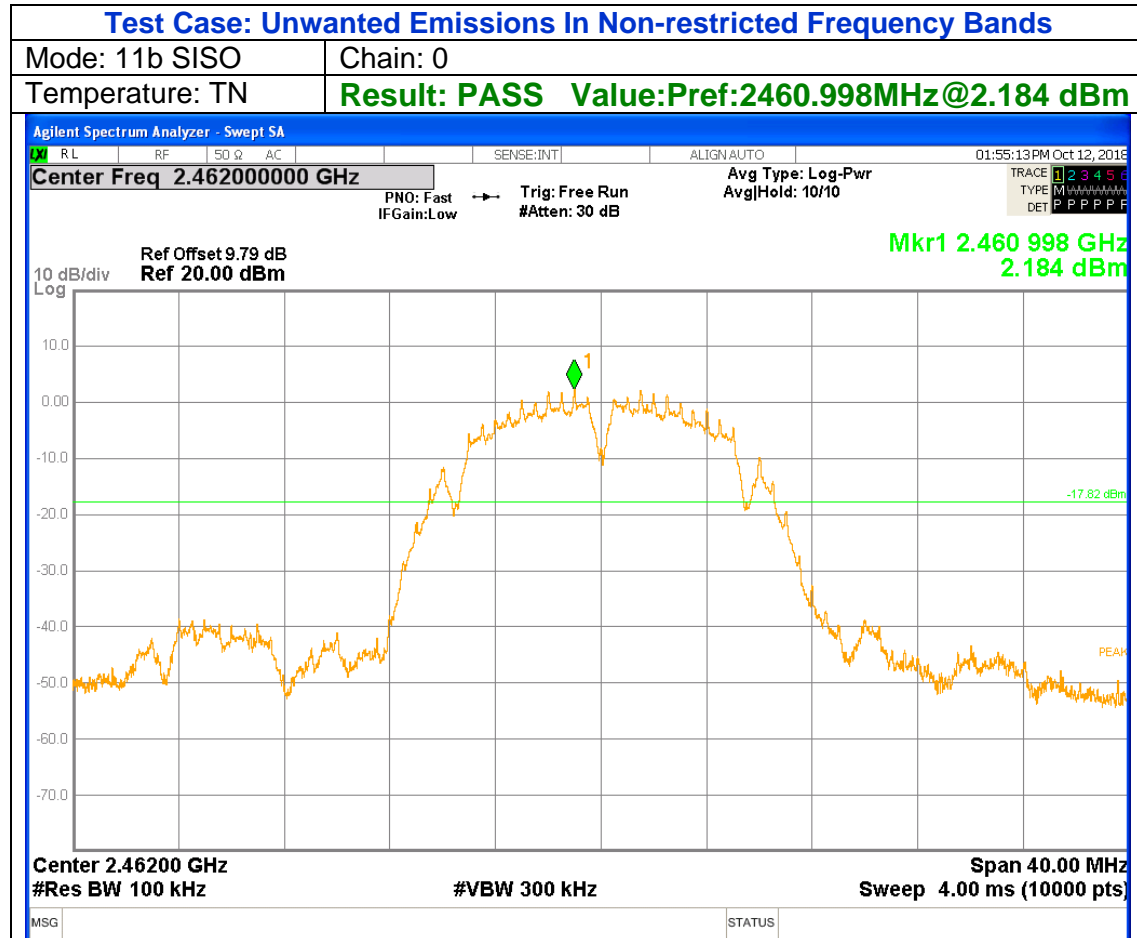
#### Test Case: Bandedge Compliance

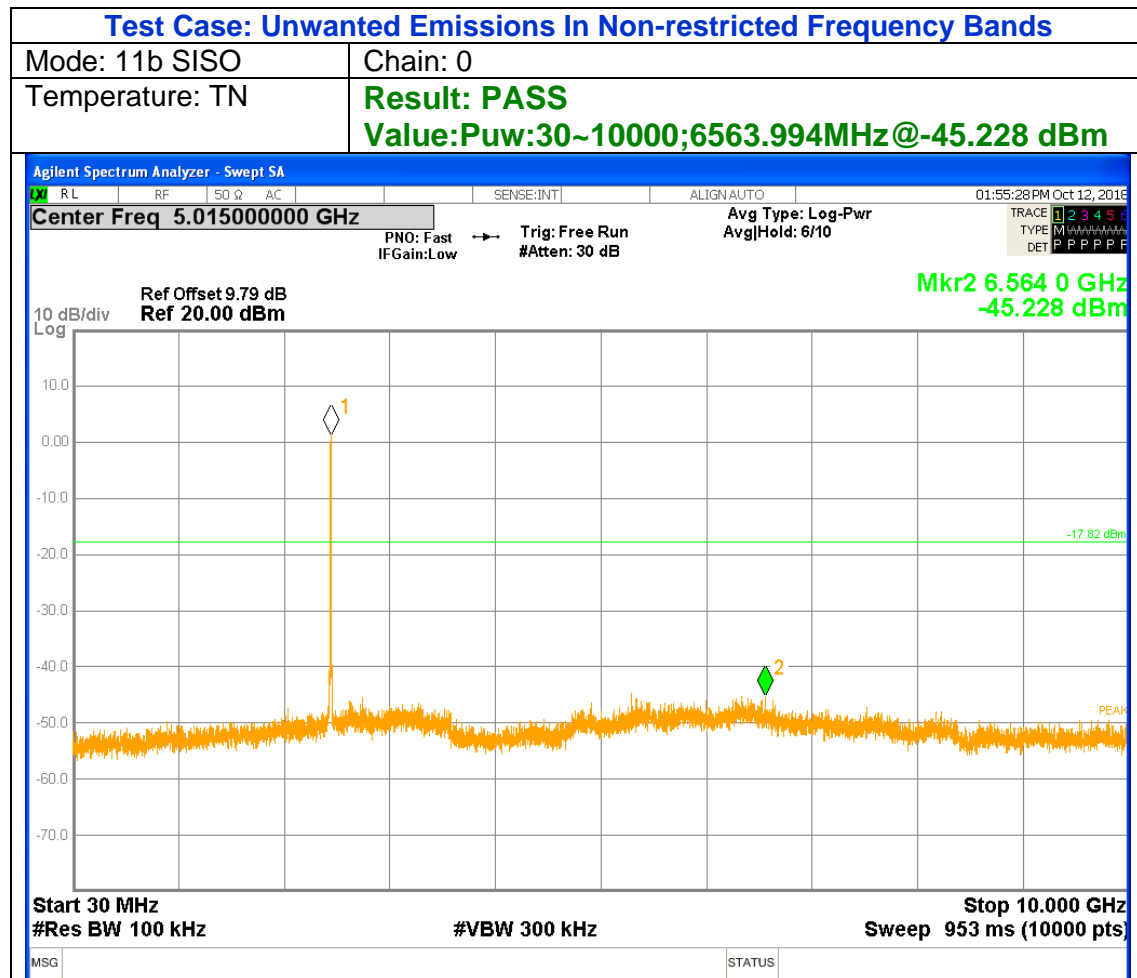
Mode: 11b SISO Chain: 0

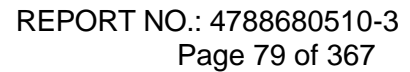
Temperature: TN

**Result: PASS**  
**Value: Peak: 1.940 dBm; Max: 2497.125 MHz @ -49.971 dBm 51.911 dbc**









Mode: 11b SISO Chain: 0

Temperature: TN

Result: PASS  
Value: Puw: 10000~26000; 25769.577MHz @ -38.661 dBm

Agilent Spectrum Analyzer - Swept SA

Center Freq 18.00000000 GHz

PNO: Fast IFGain: Low Trig: Free Run #Atten: 30 dB

Avg Type: Log-Pwr AvgHold: 3/10

01:55:40 PM Oct 12, 2018

Ref Offset 9.79 dB  
Ref 20.00 dBm

Mkr1 25.769 6 GHz  
-38.661 dBm

10 dB/div  
Log

Start 10.000 GHz  
#Res BW 100 kHz

#VBW 300 kHz

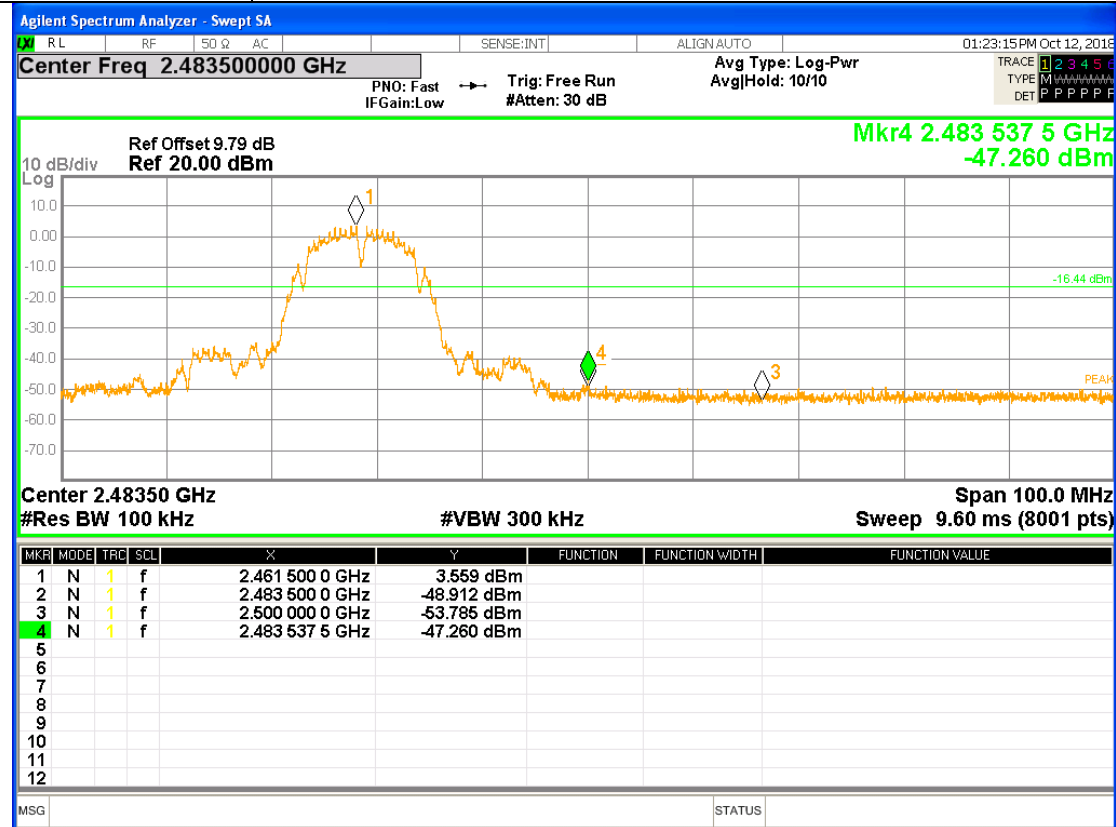
Stop 26.000 GHz  
Sweep 1.53 s (10000 pts)

**Test Case: Bandedge Compliance**

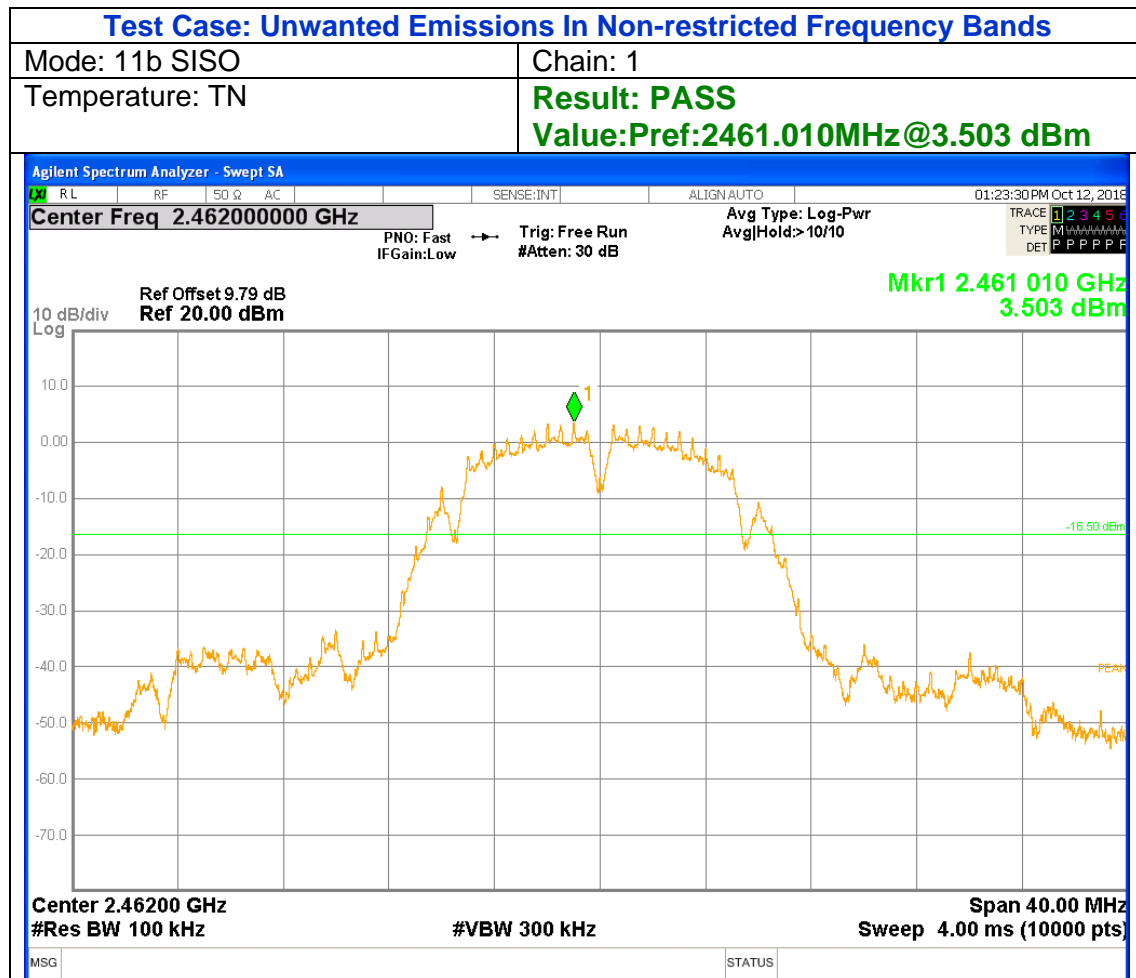
Mode: 11b SISO

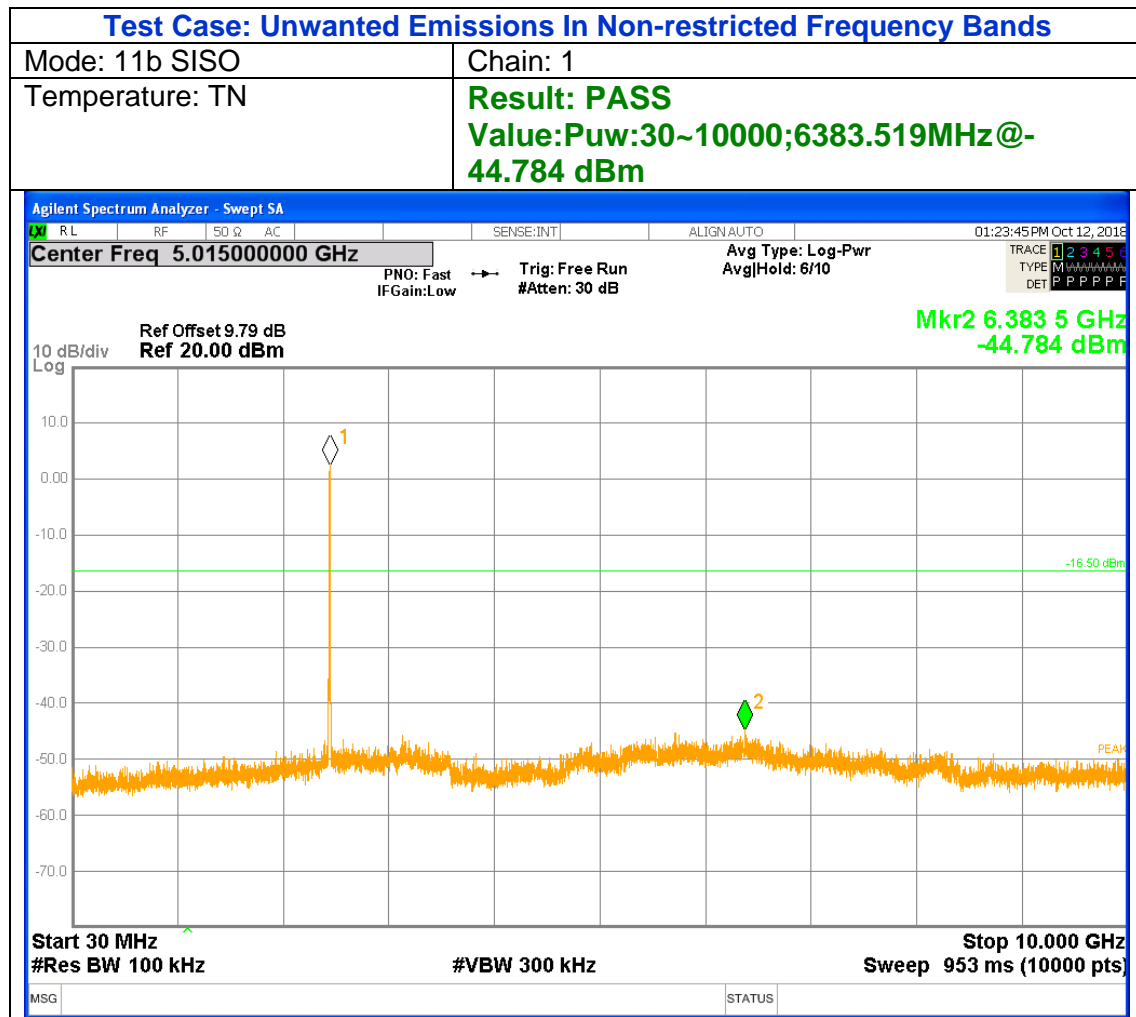
Chain: 1

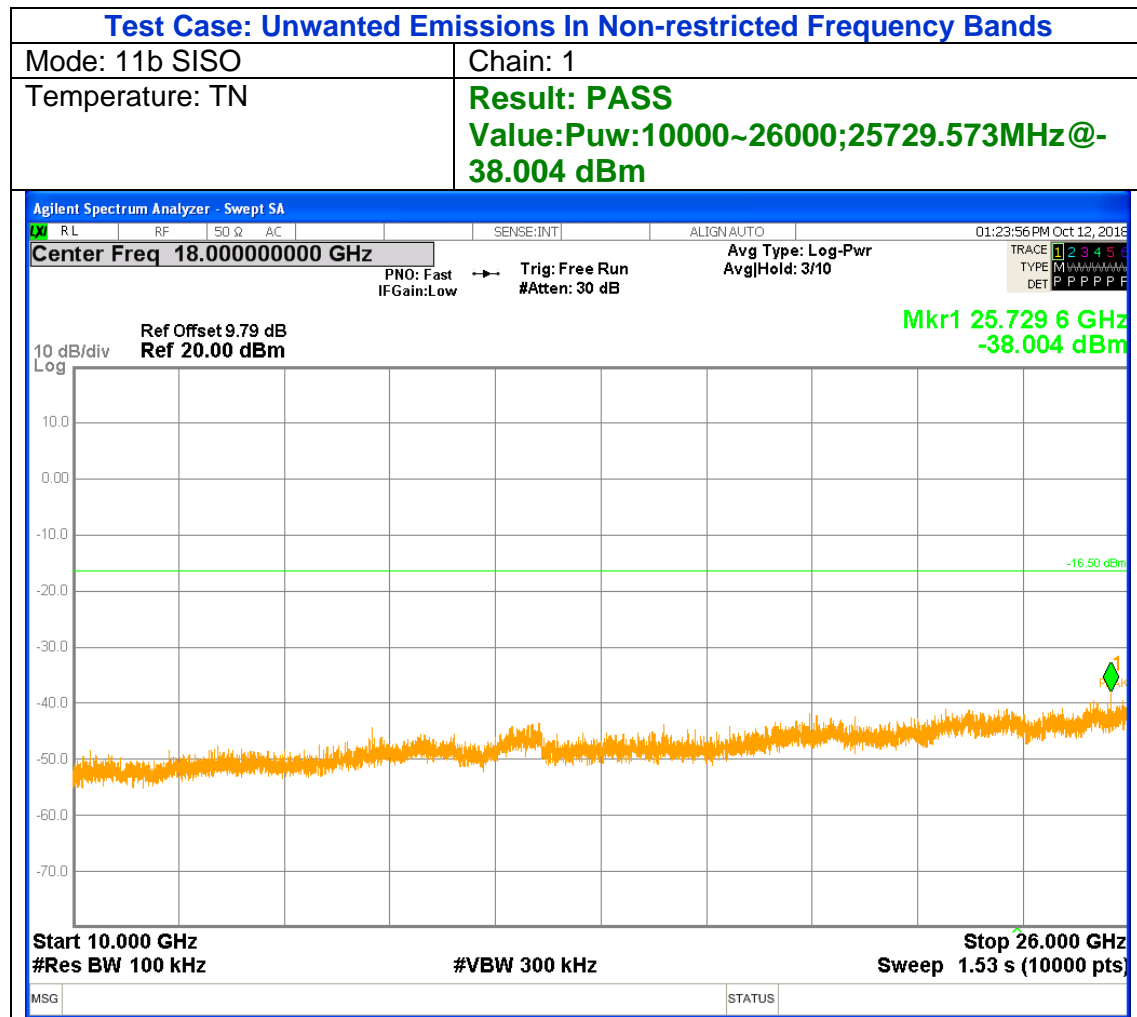
Temperature: TN

**Result: PASS****Value: Peak: 3.559 dBm; Max: 2483.538 MHz @ -47.260 dBm 50.819 dbc**











## High Channel 12

### Test Case: Bandedge Compliance

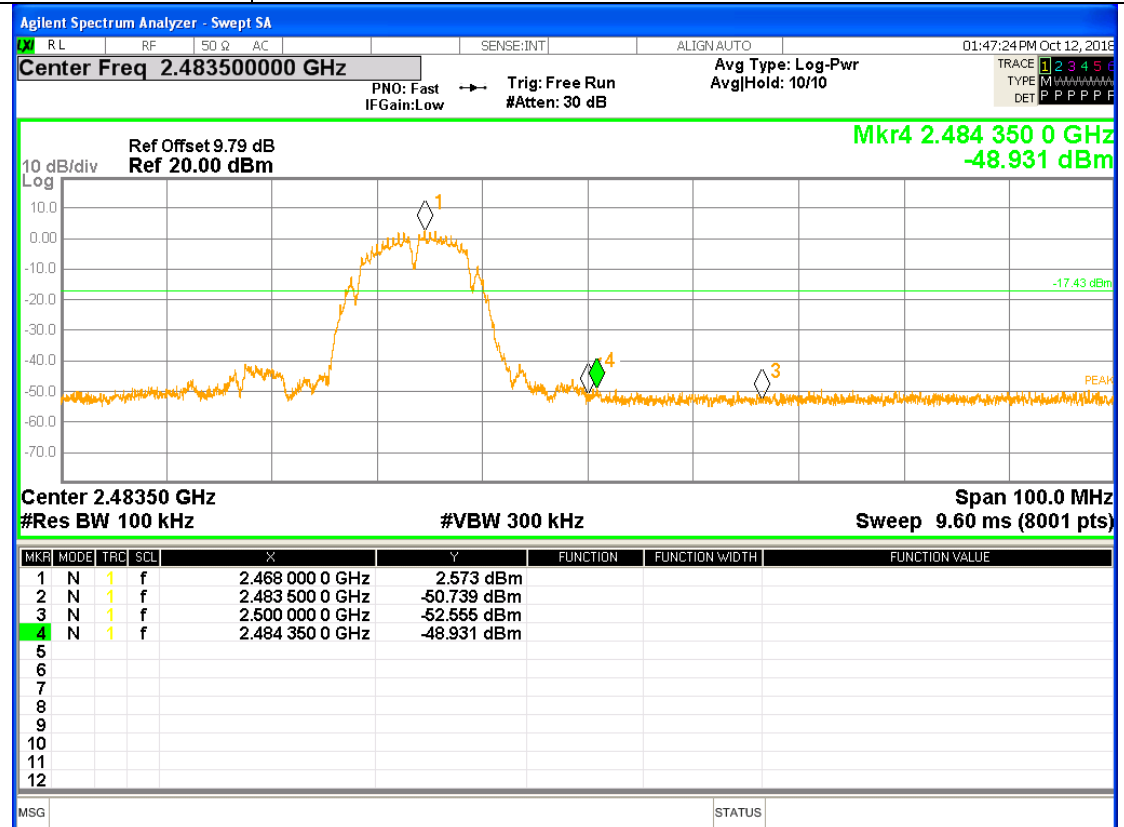
Mode: 11b SISO

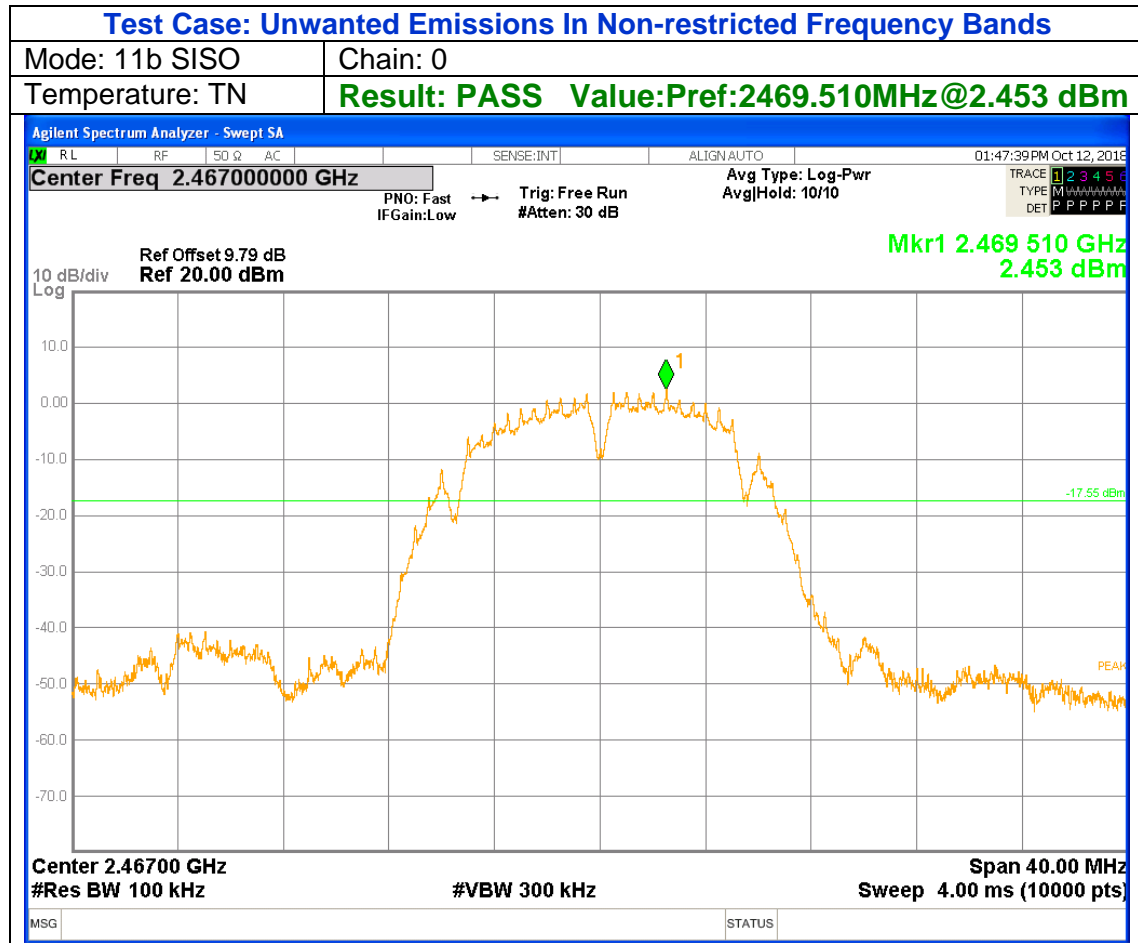
Chain: 0

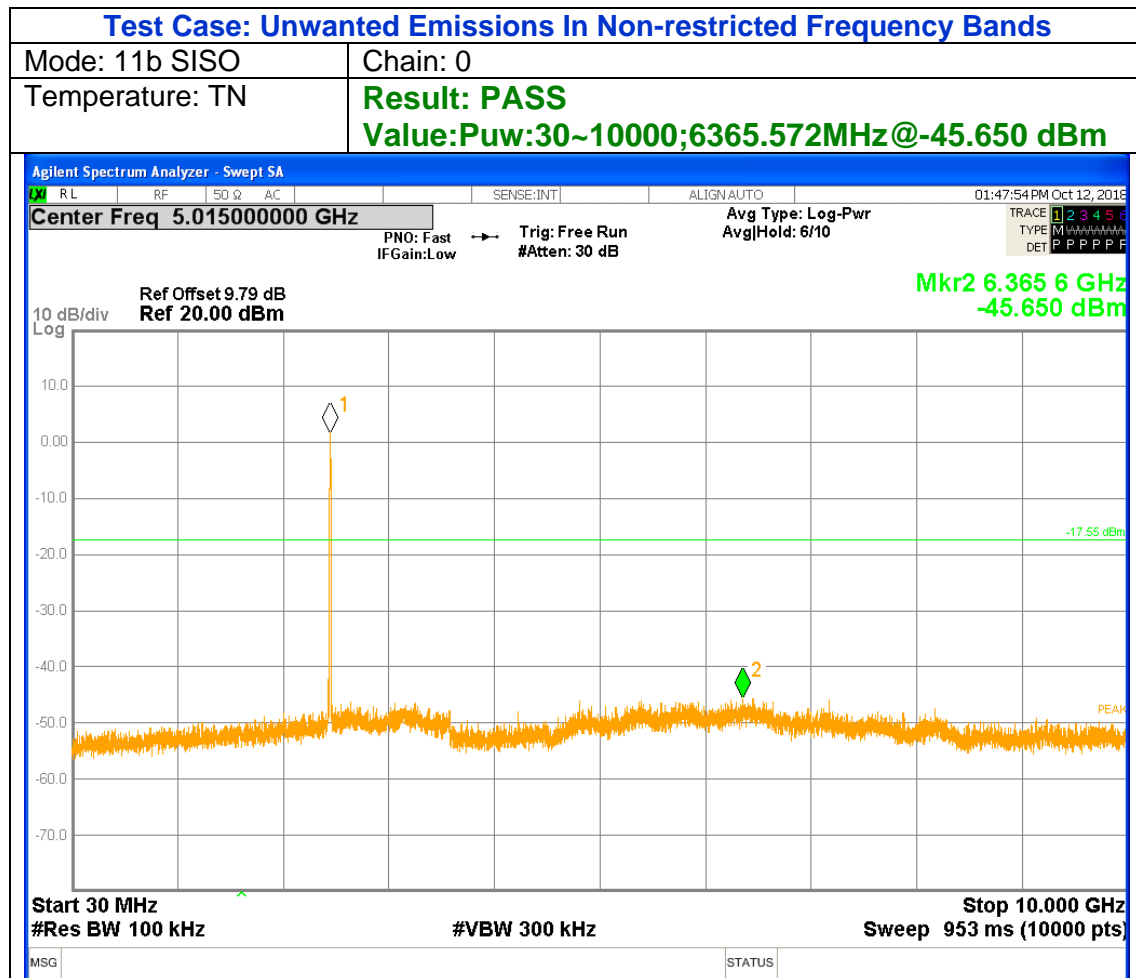
Temperature: TN

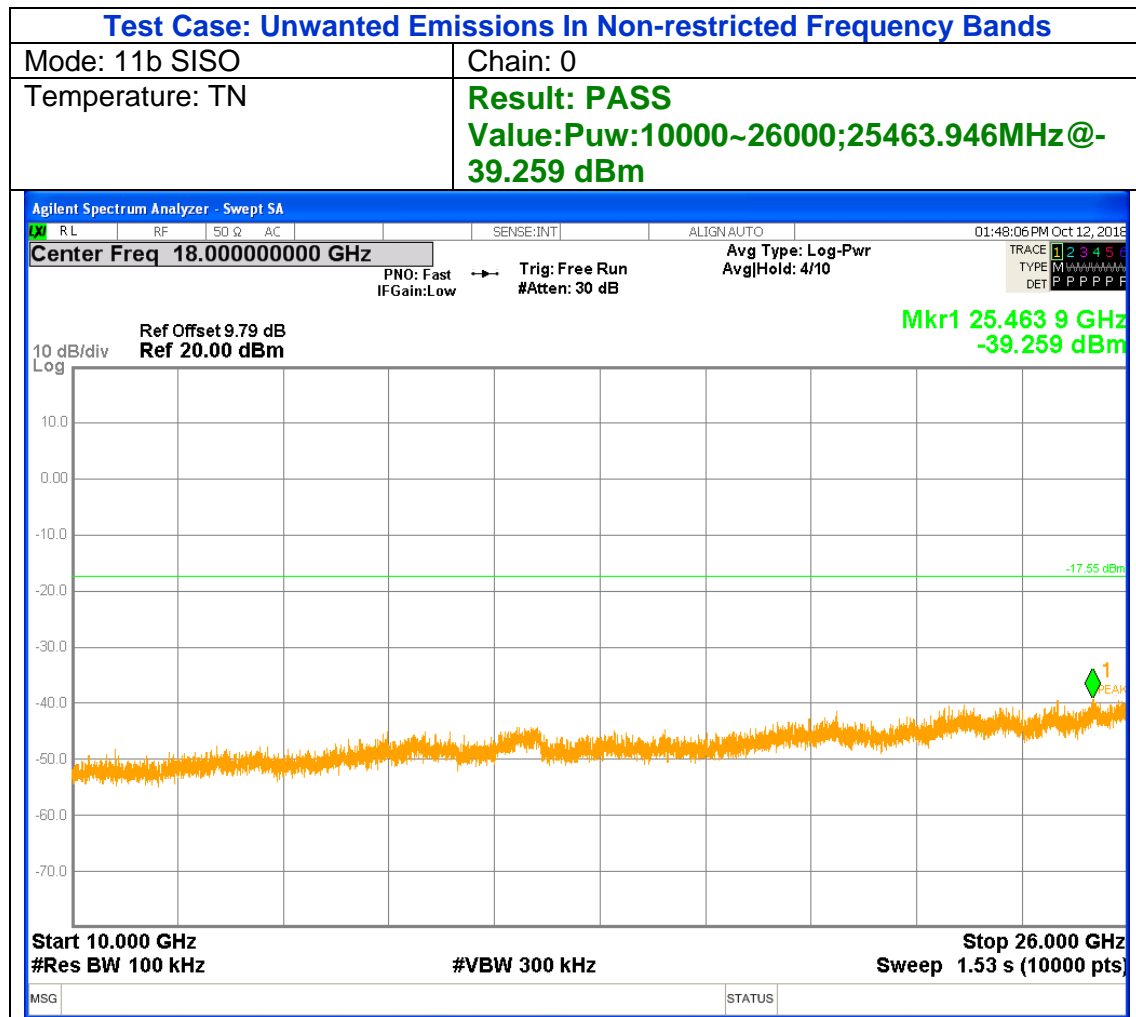
**Result: PASS**

**Value: Peak: 2.573 dBm; Max: 2484.350 MHz @ -48.931 dBm 51.504 dbc**







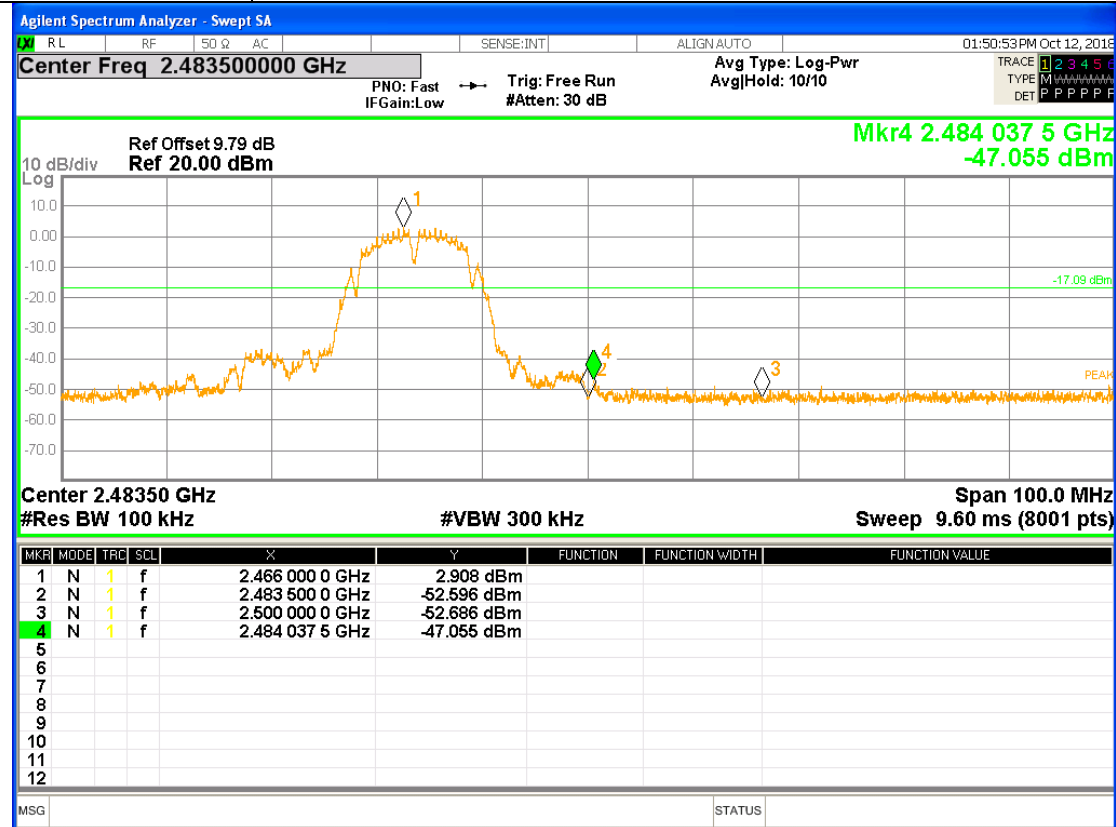


**Test Case: Bandedge Compliance**

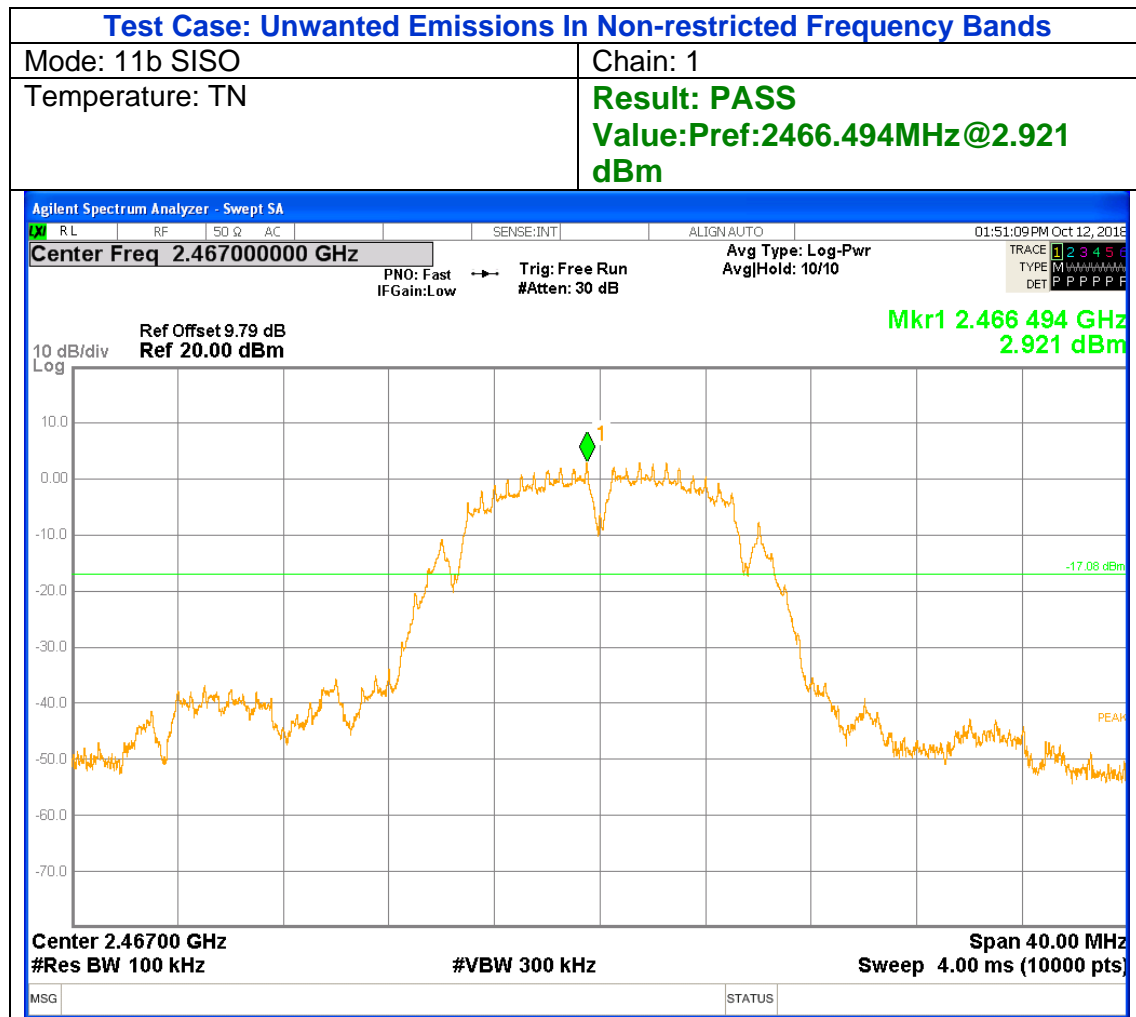
Mode: 11b SISO

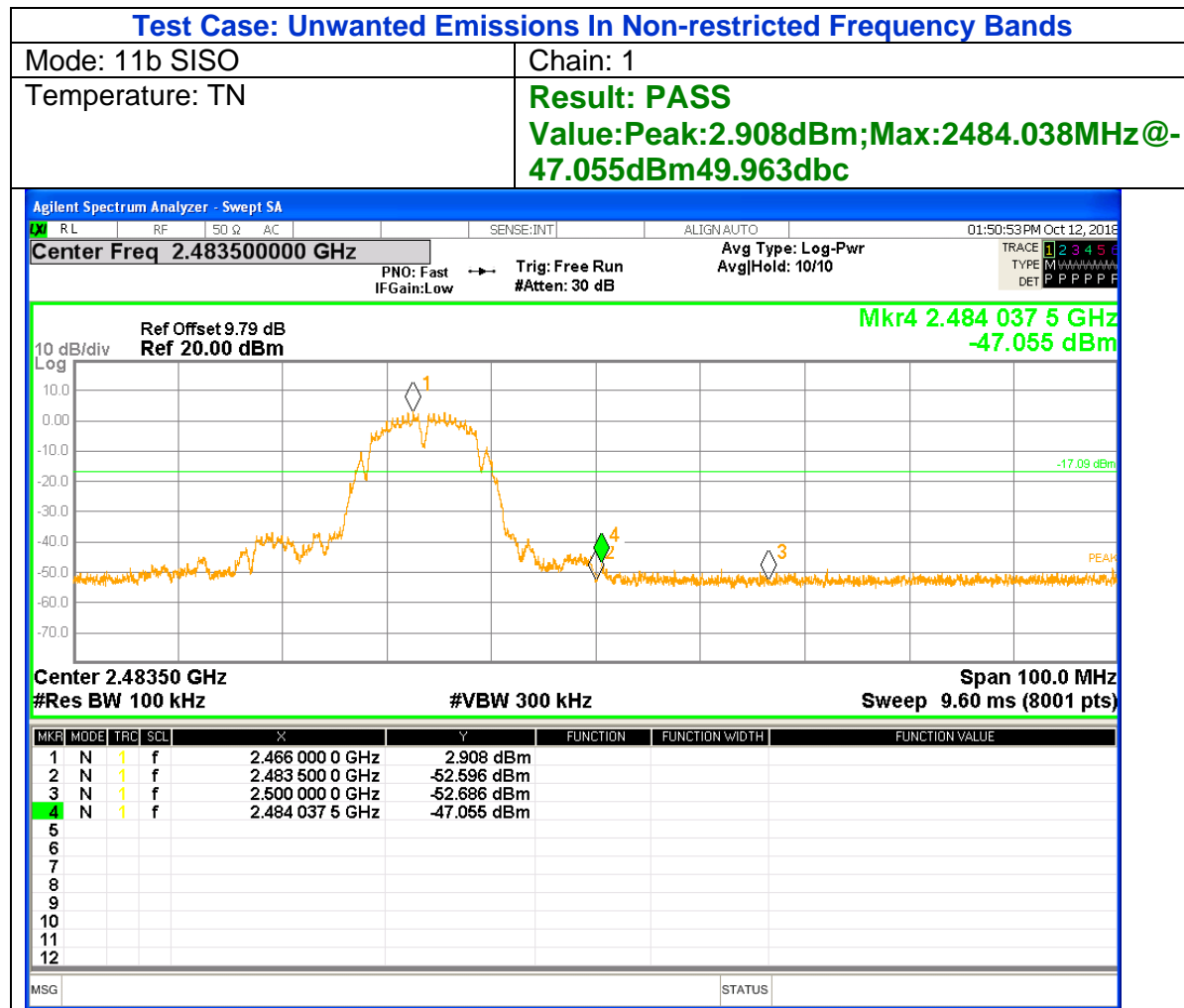
Chain: 1

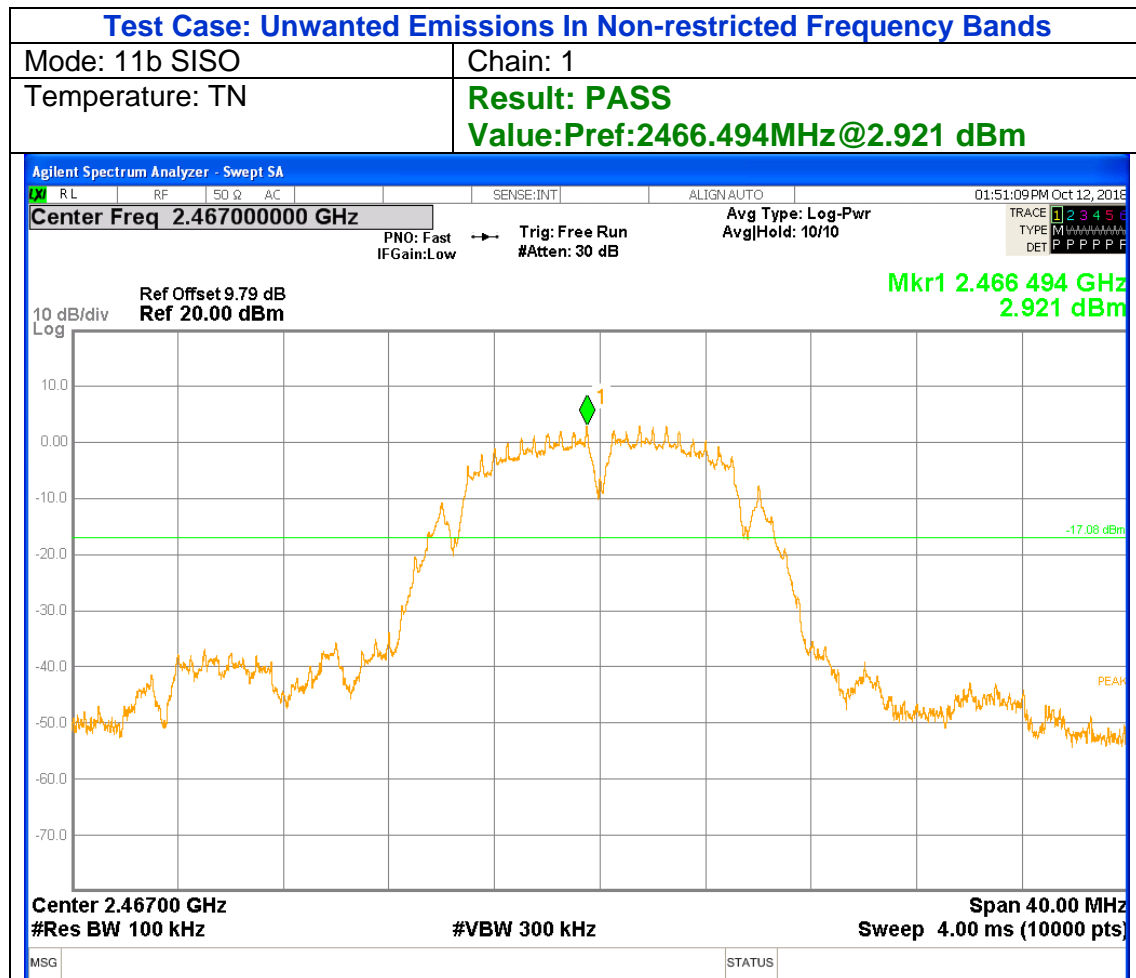
Temperature: TN

**Result: PASS****Value: Peak: 2.908 dBm; Max: 2484.038 MHz @ -47.055 dBm 49.963 dbc**











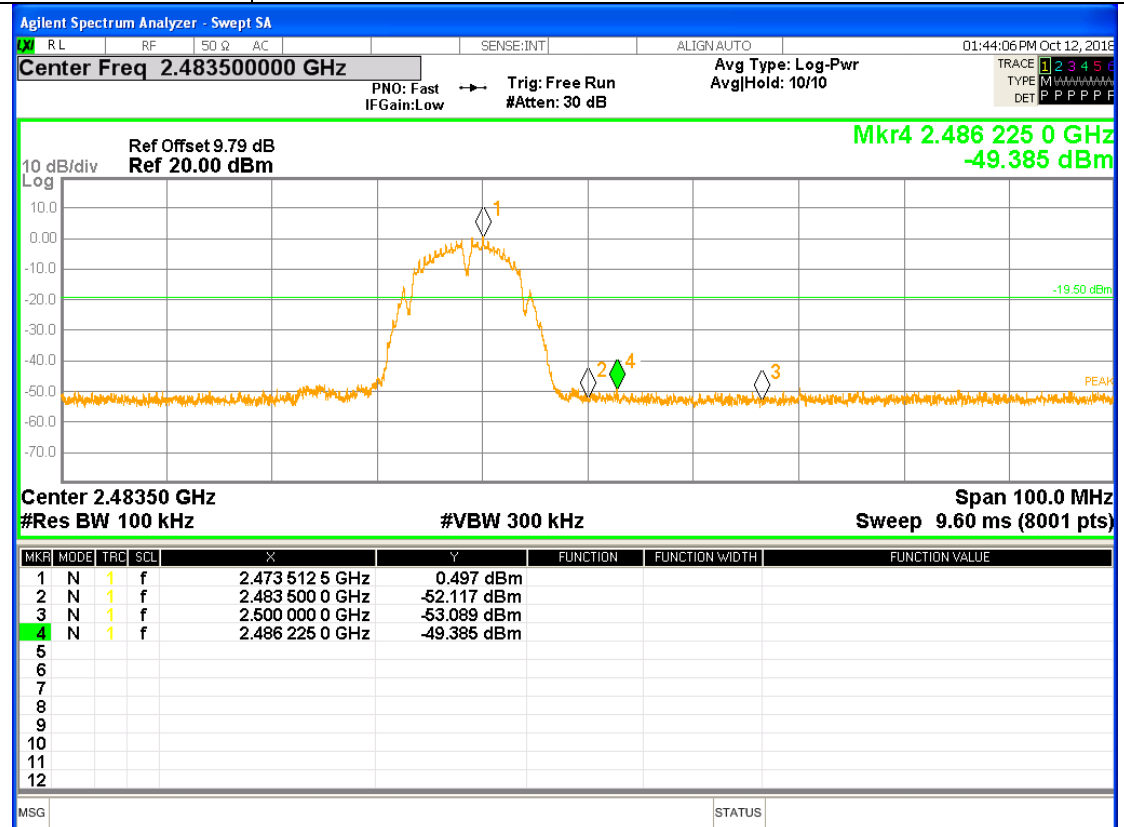
### High Channel 13

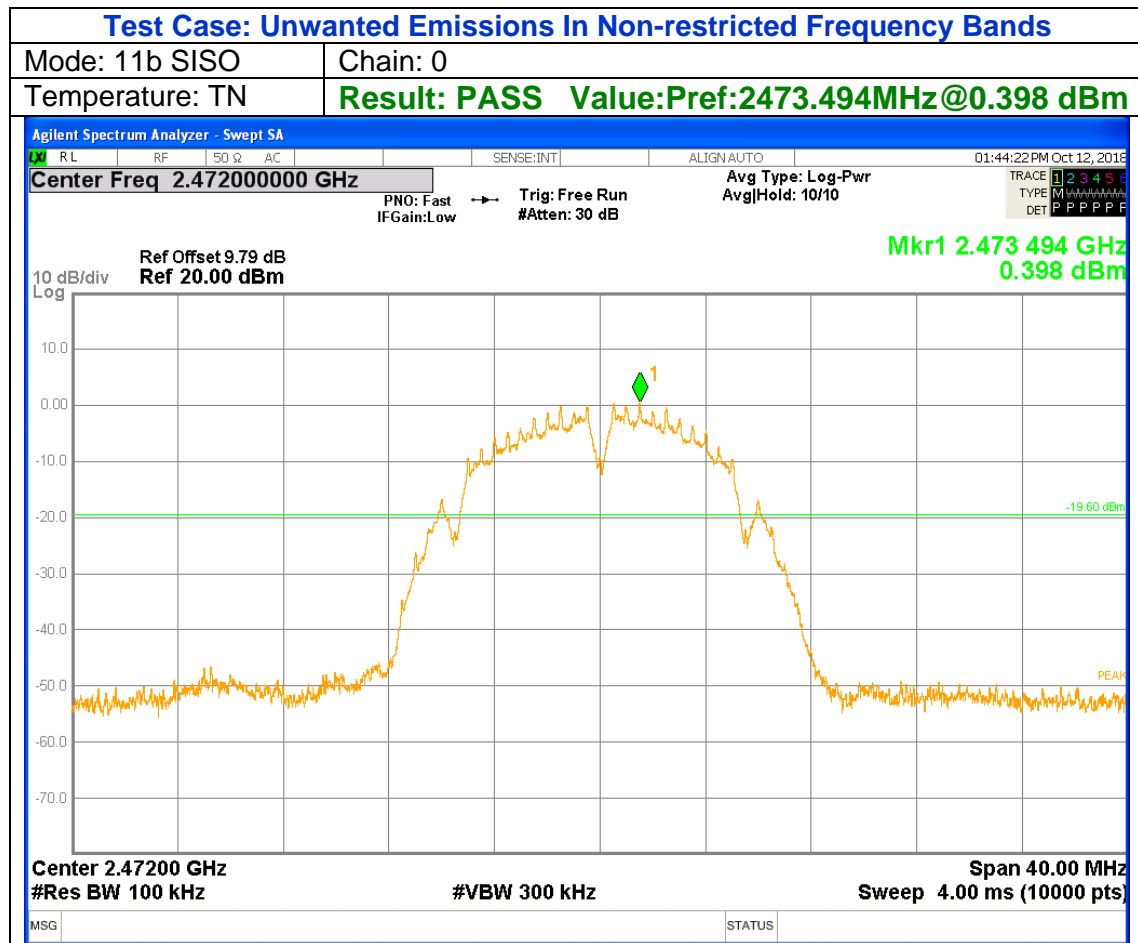
#### Test Case: Bandedge Compliance

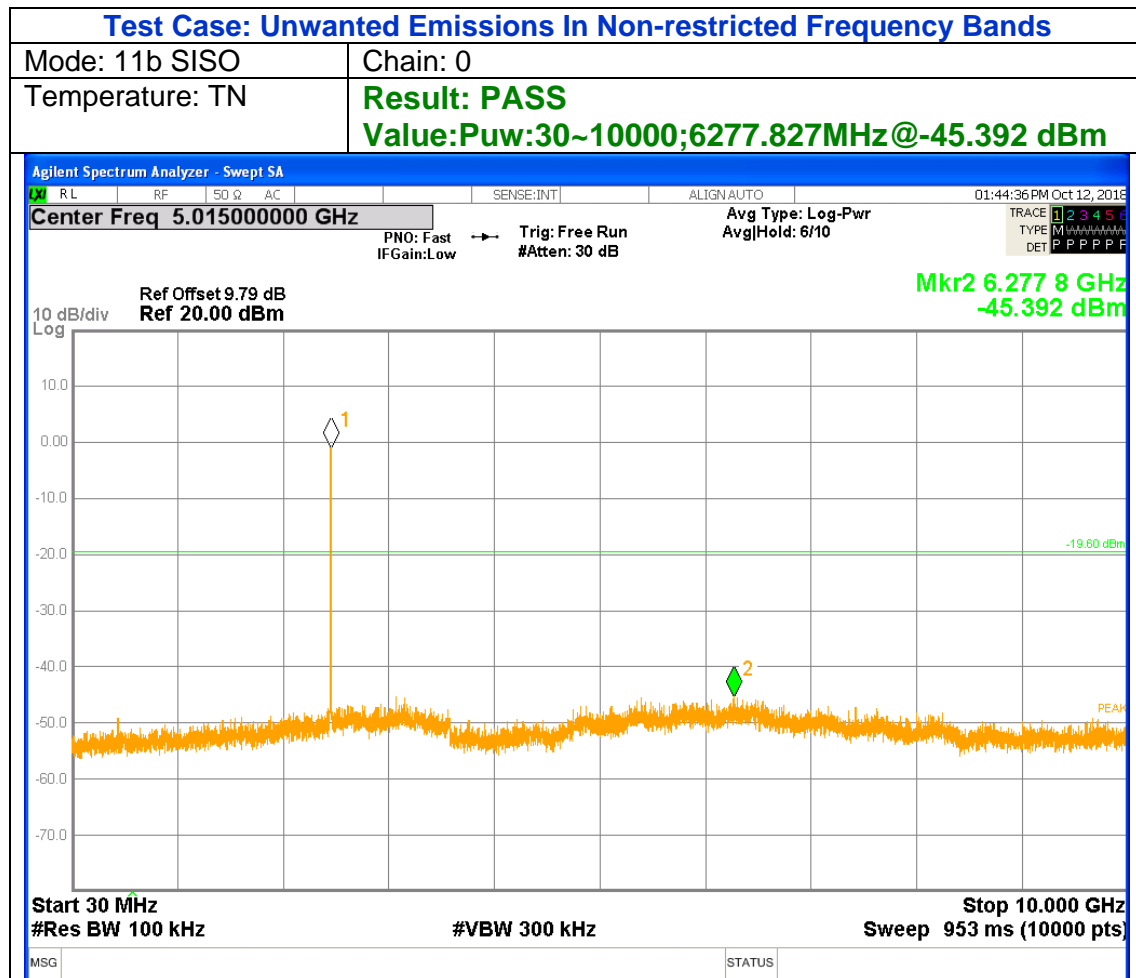
Mode: 11b SISO Chain: 0

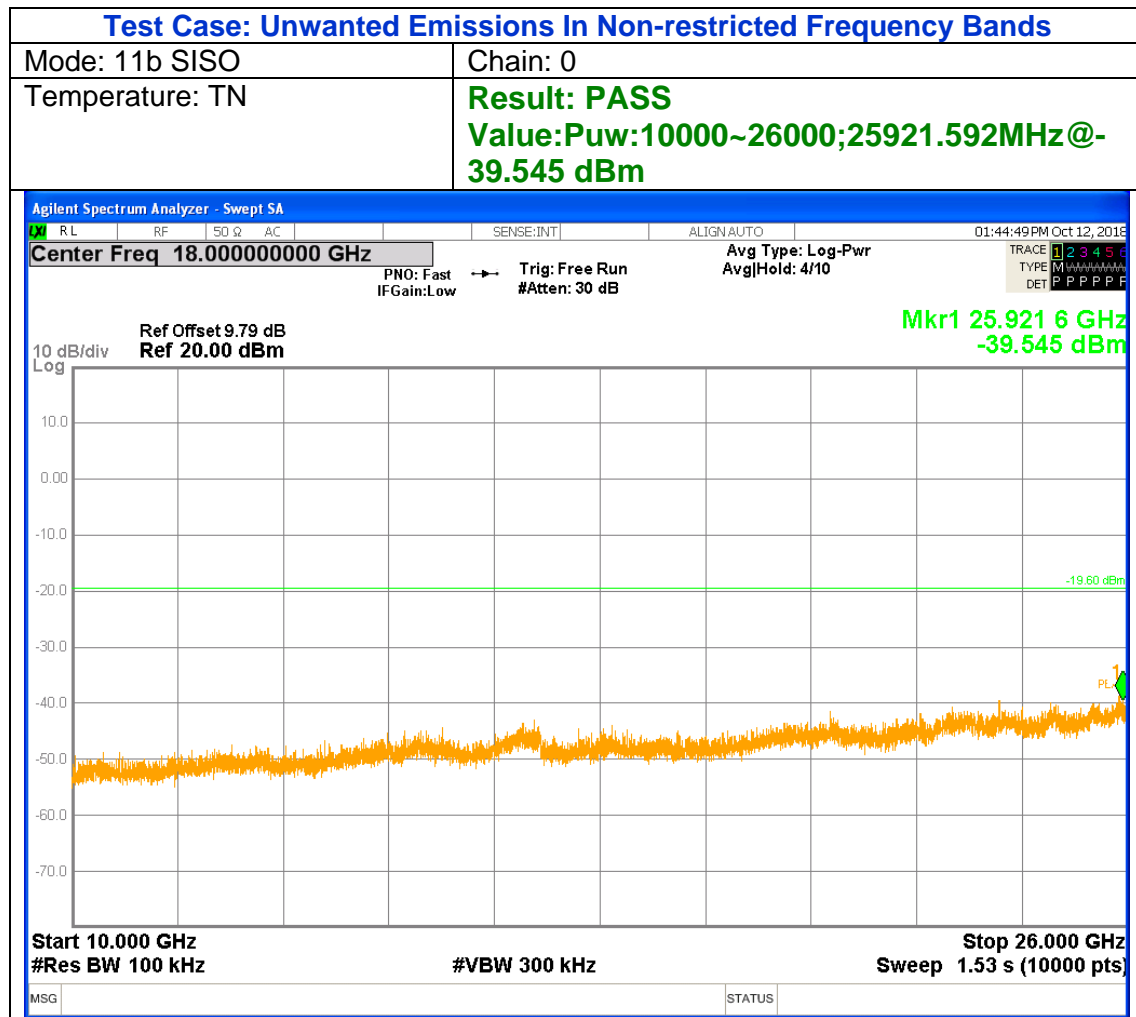
Temperature: TN

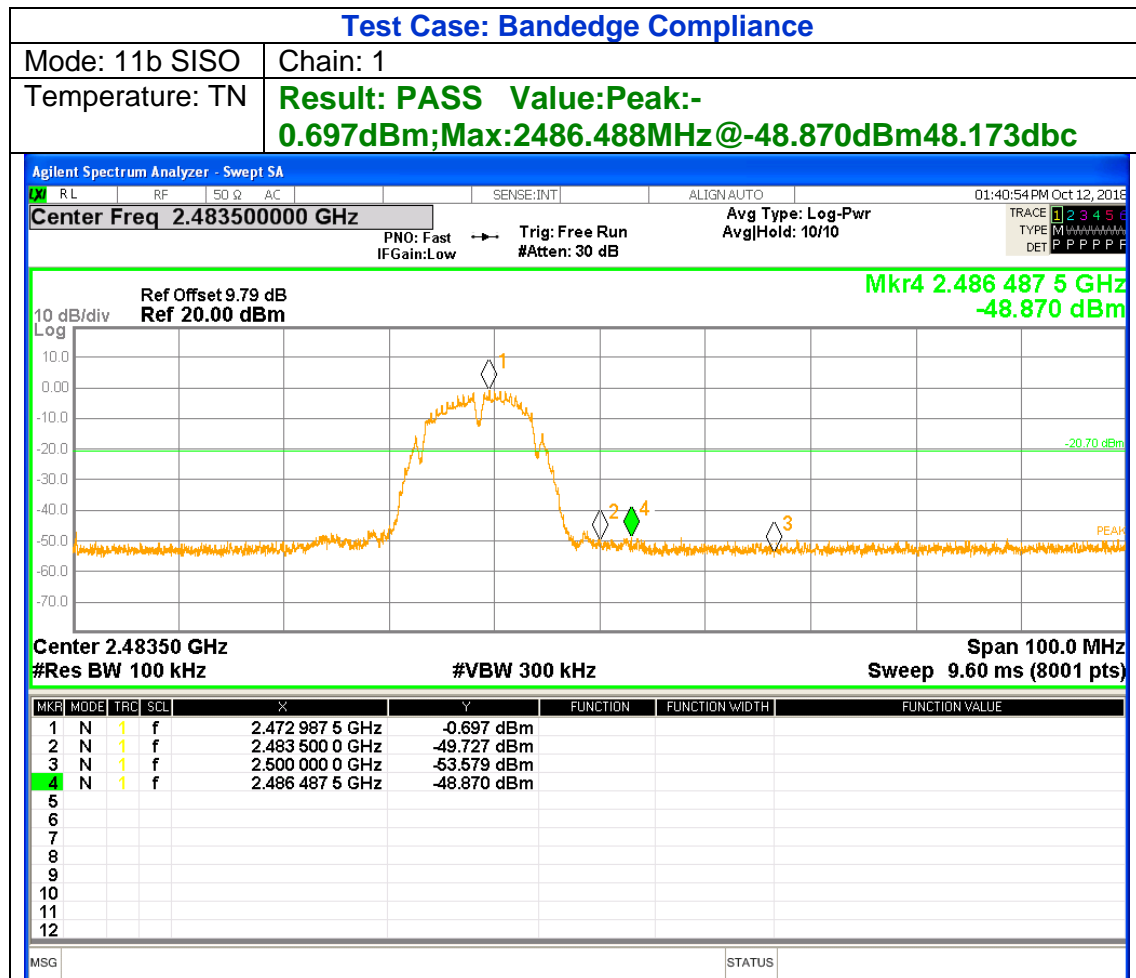
**Result: PASS**  
**Value: Peak: 0.497 dBm; Max: 2486.225 MHz @ -49.385 dBm 49.882 dbc**



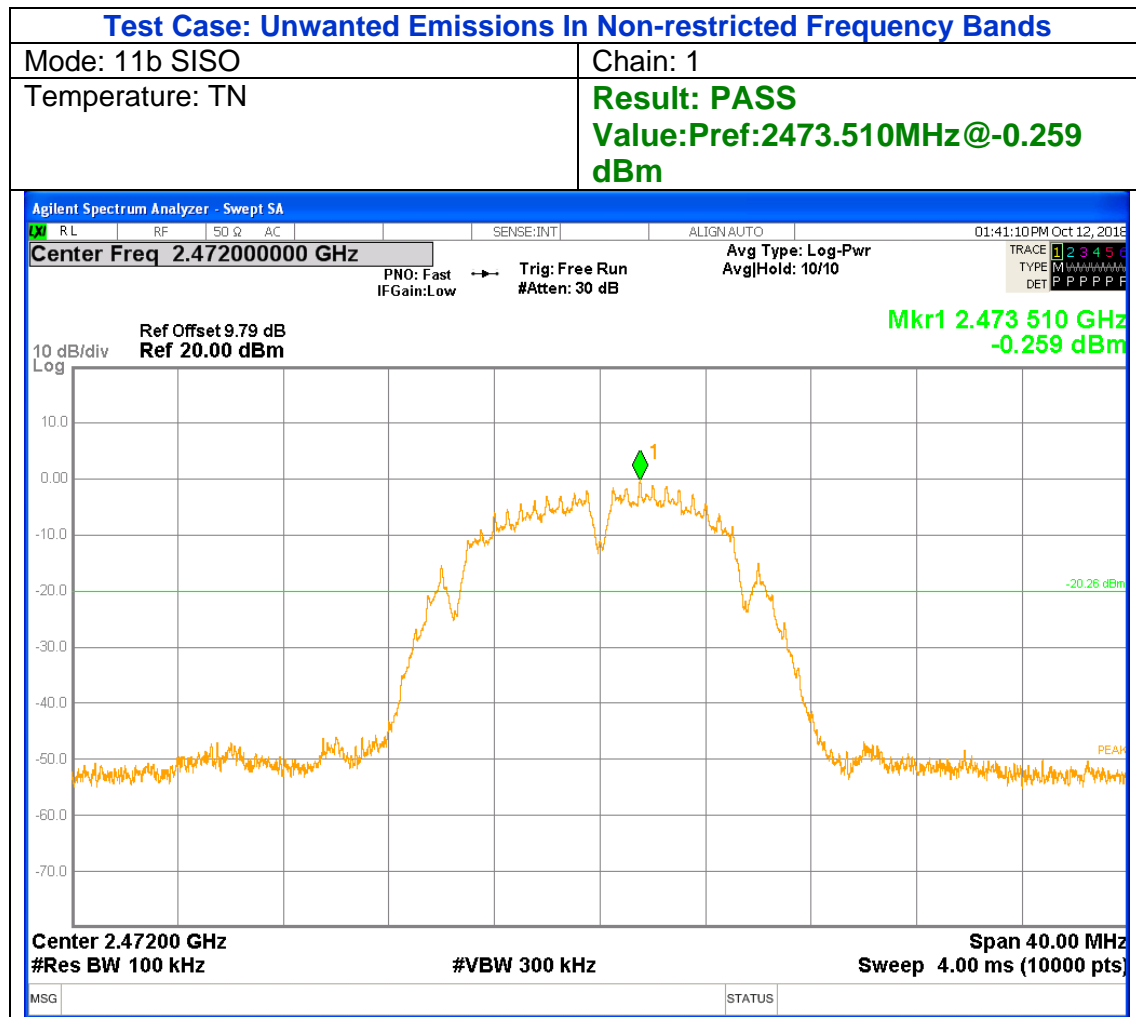


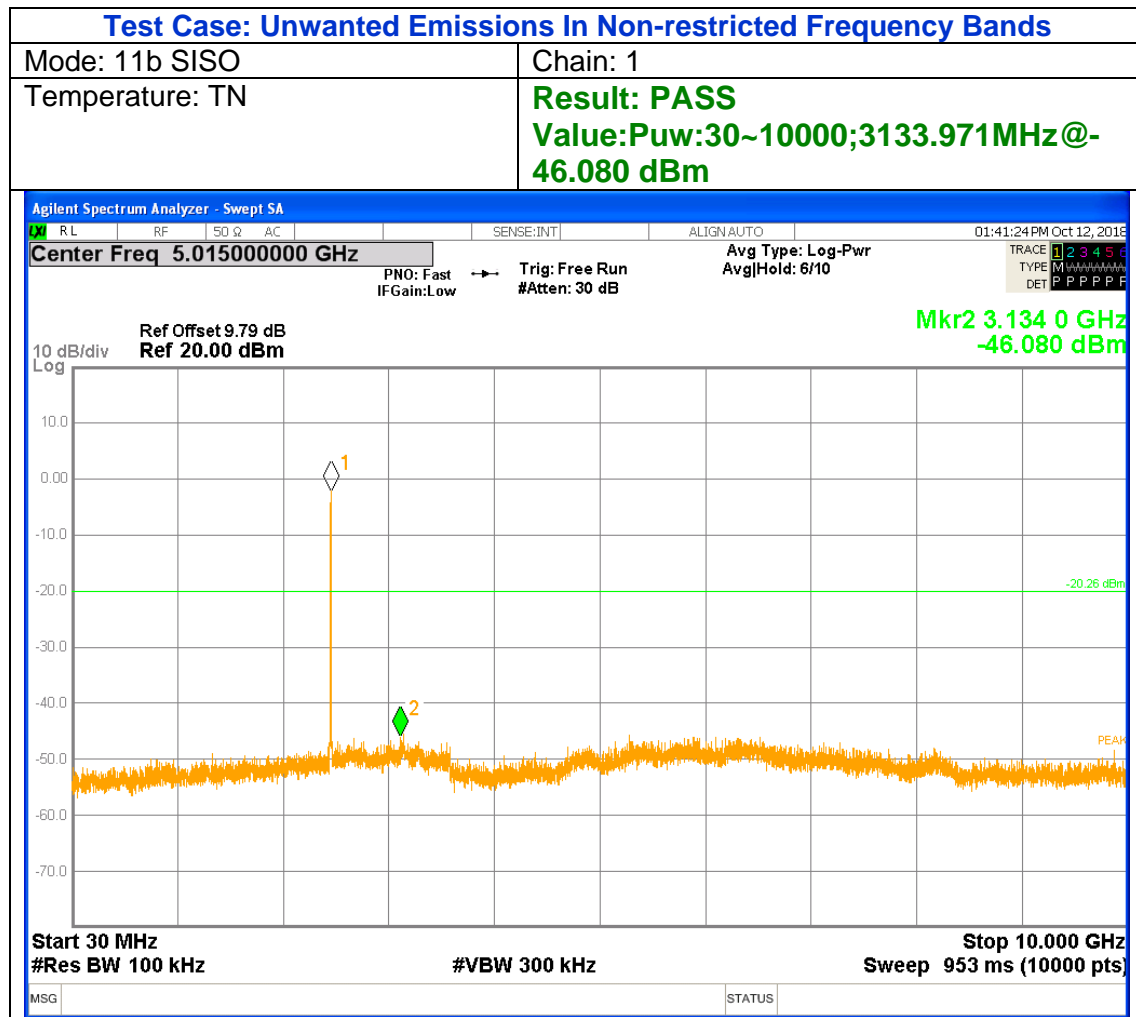


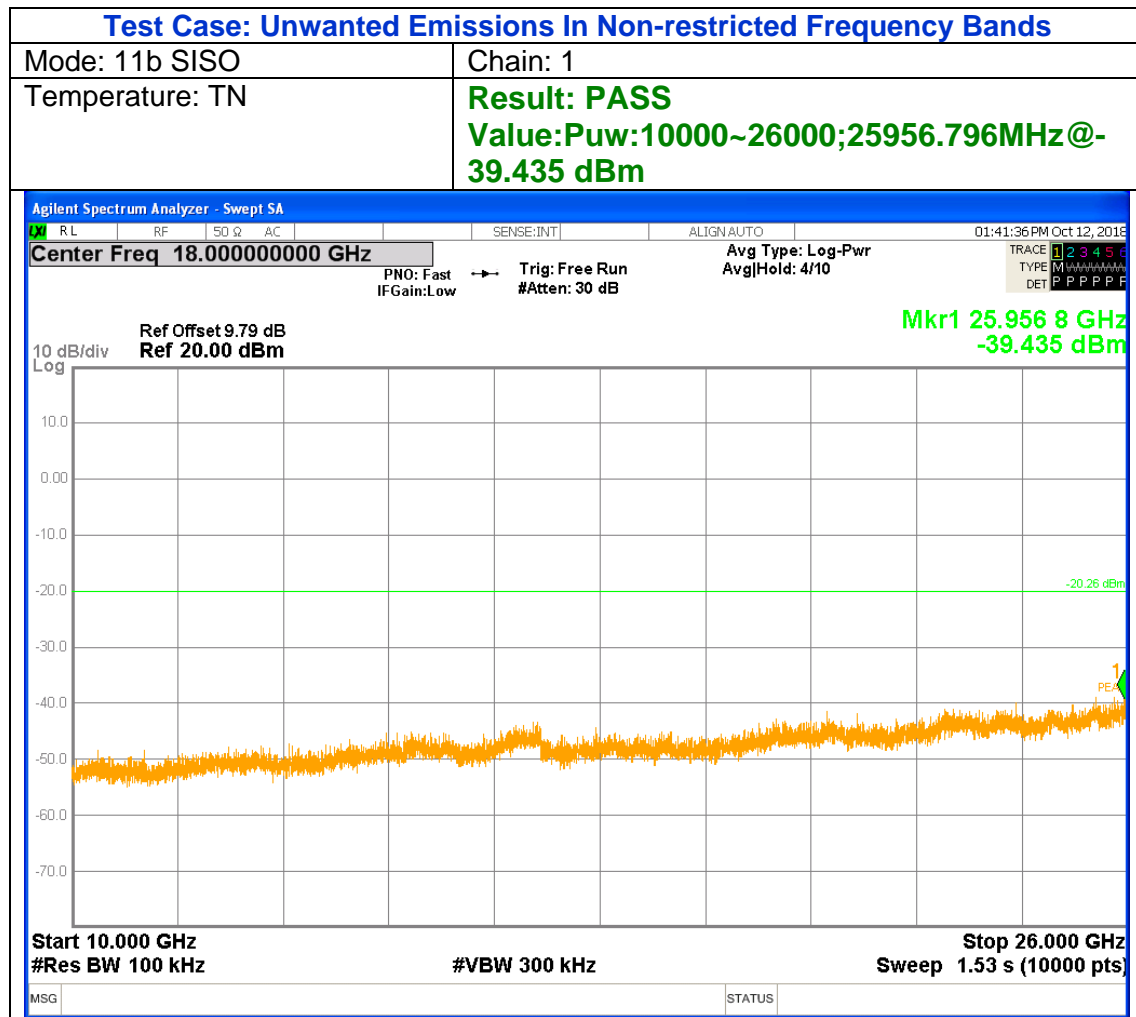








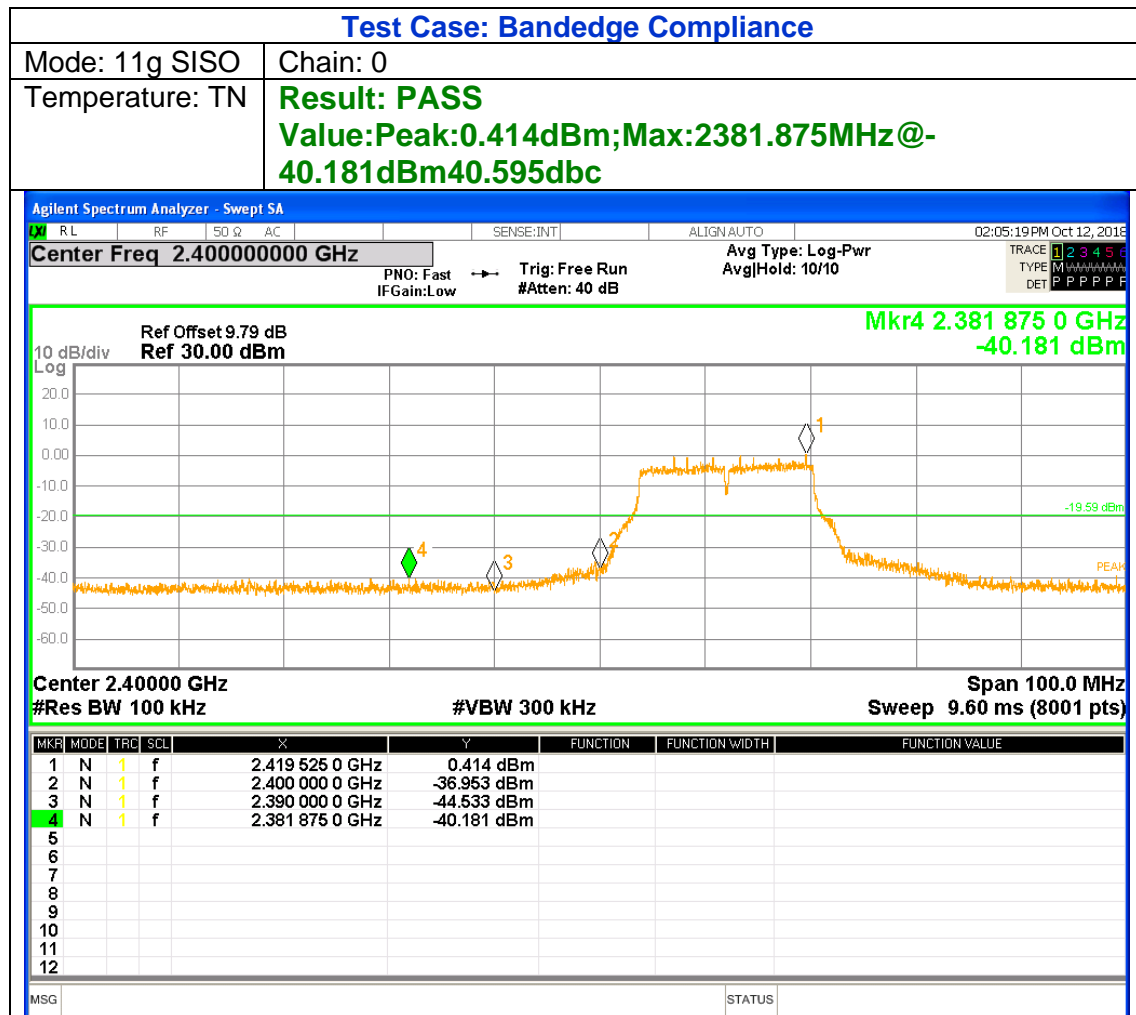


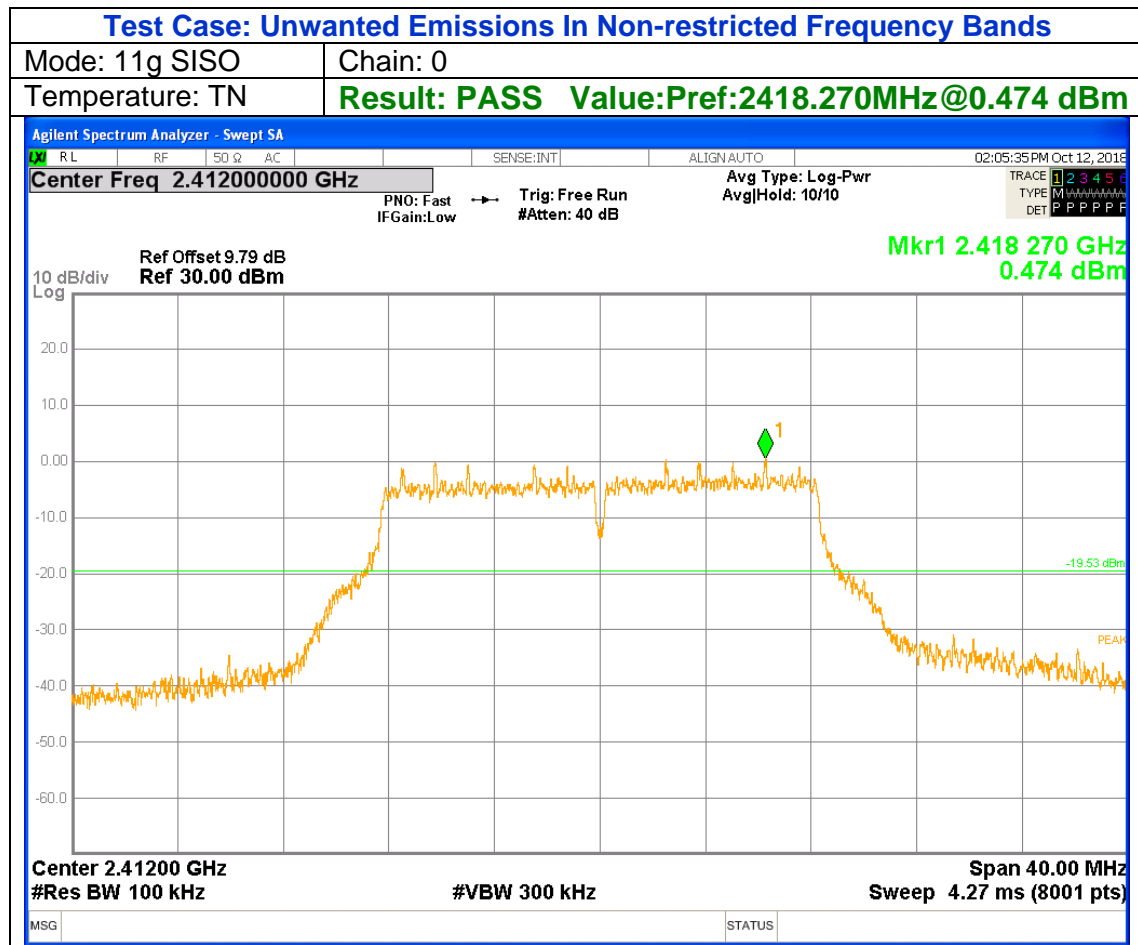


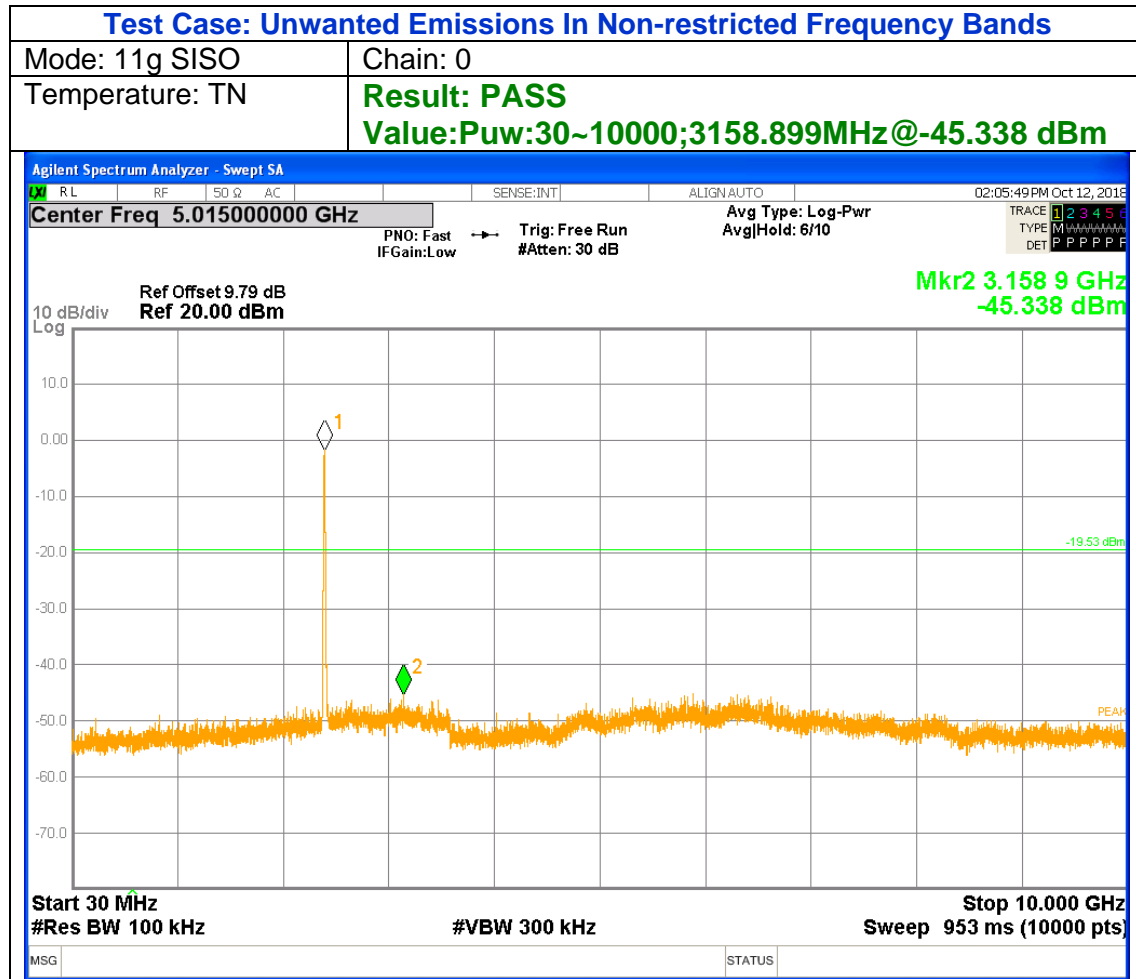


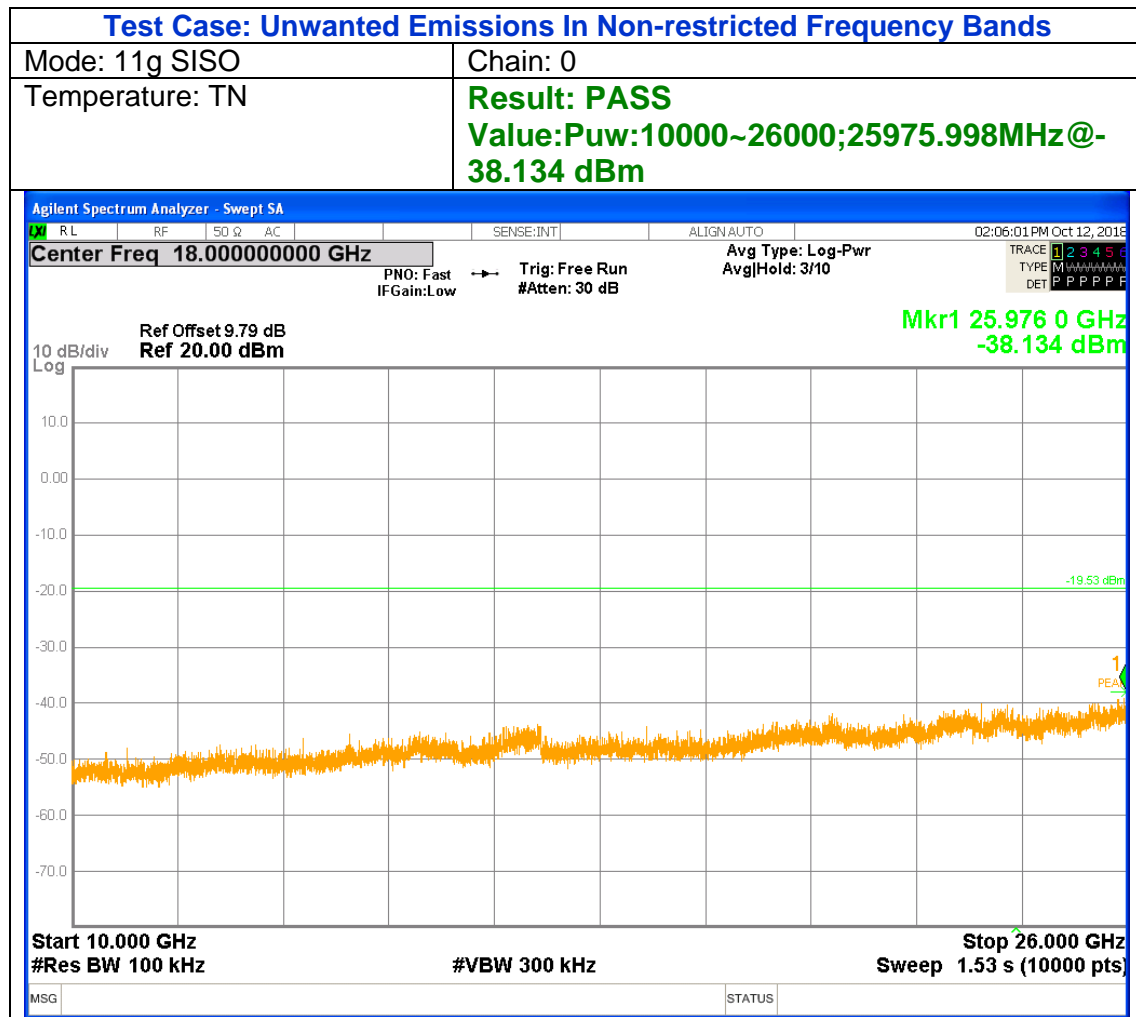
## 8.1.2. 802.11g MODE

### Low Channel 01







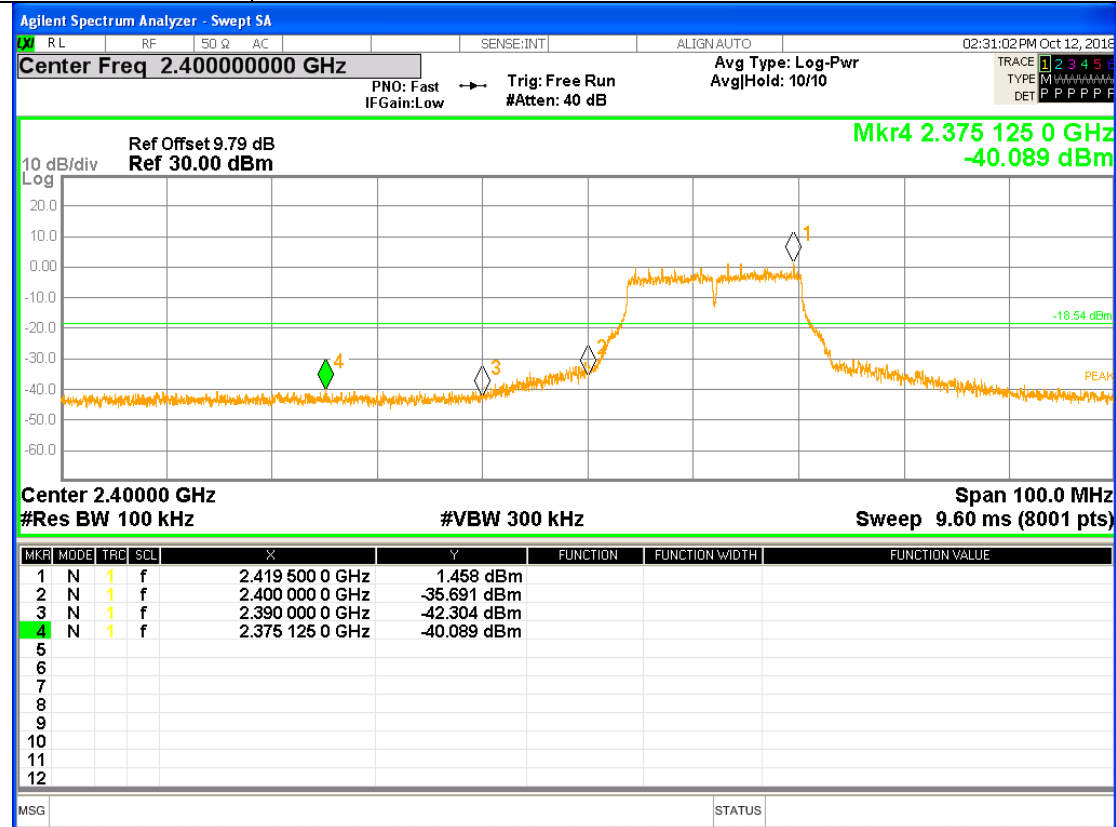


**Test Case: Bandedge Compliance**

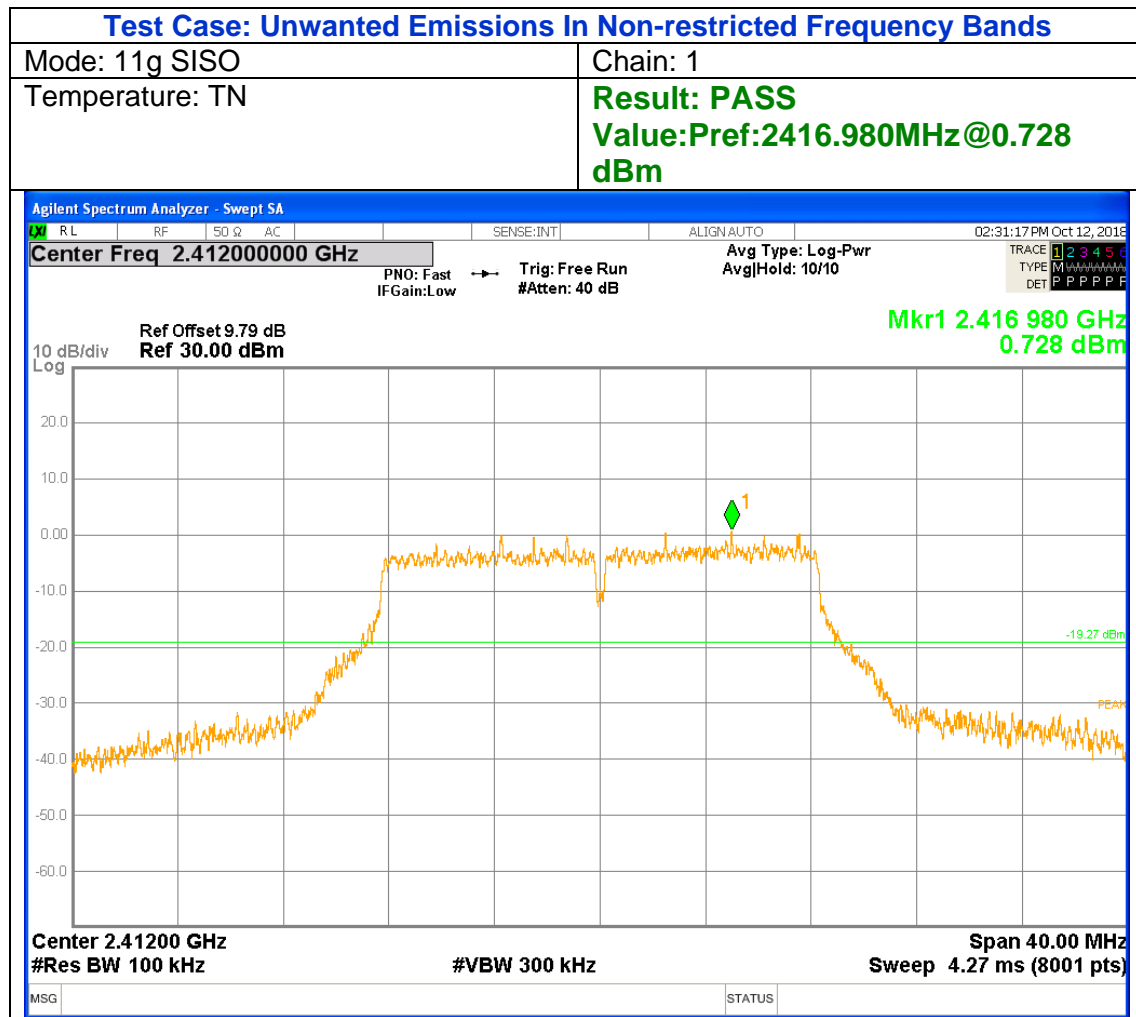
Mode: 11g SISO

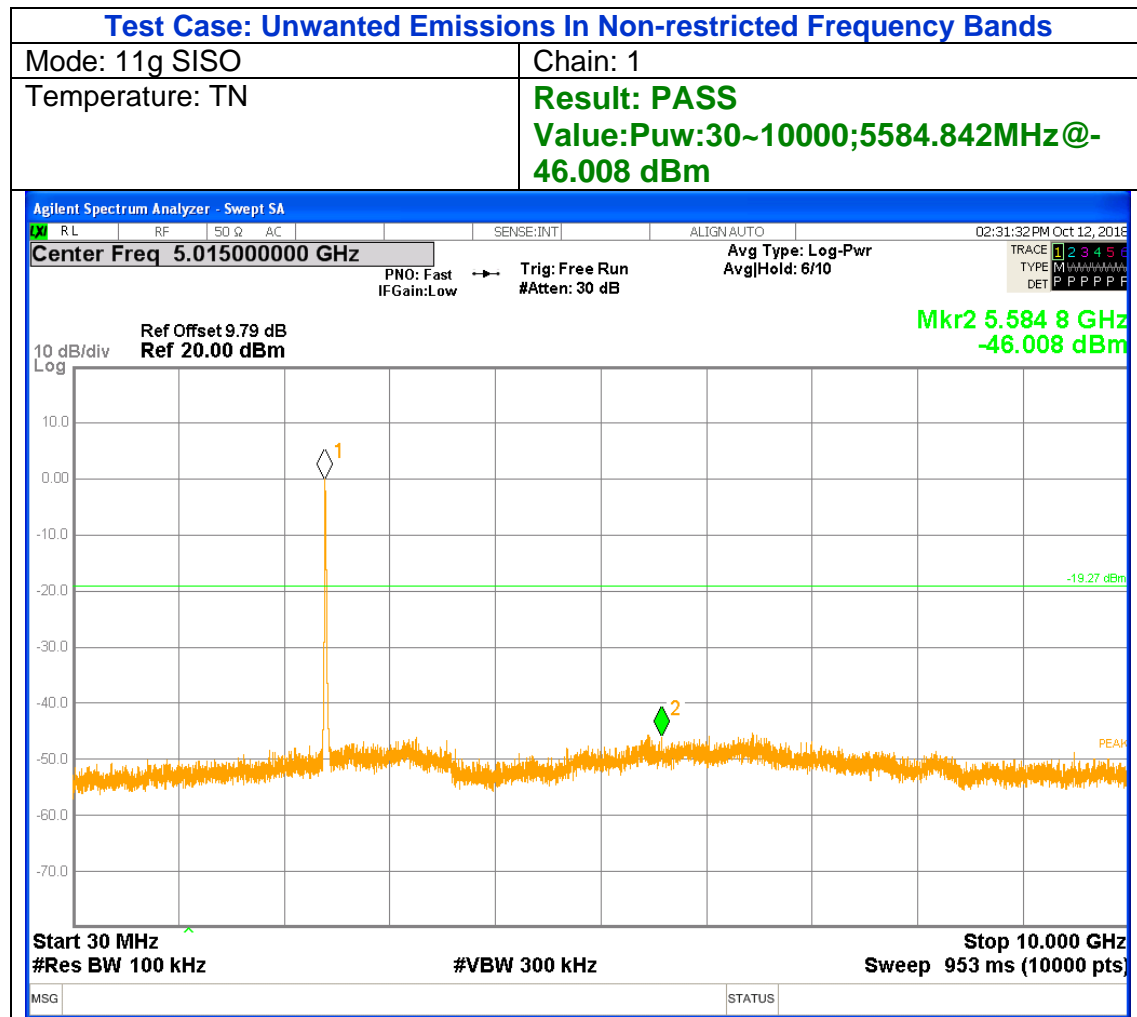
Chain: 1

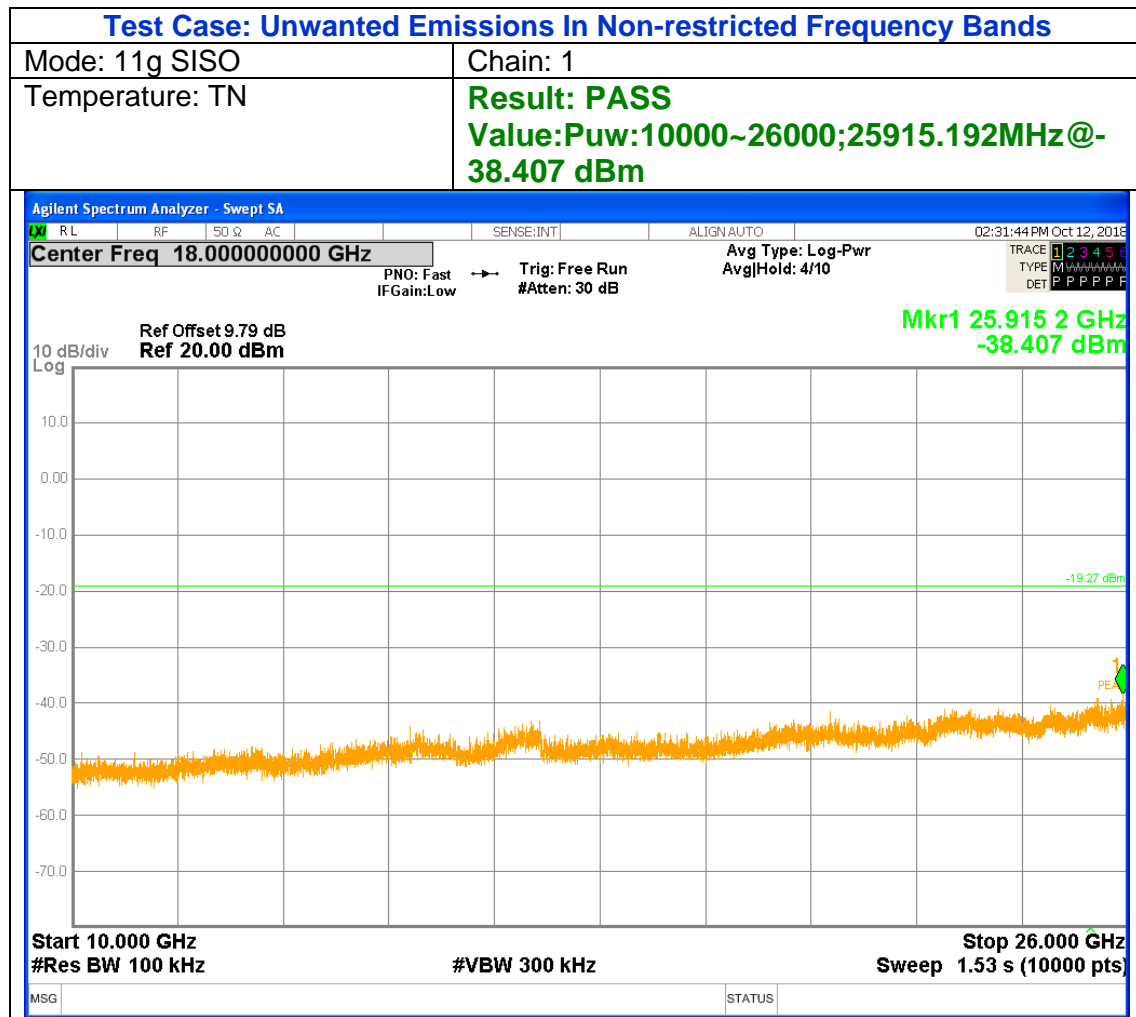
Temperature: TN

**Result: PASS****Value: Peak: 1.458 dBm; Max: 2375.125 MHz @ -40.089 dBm 41.547 dbc**



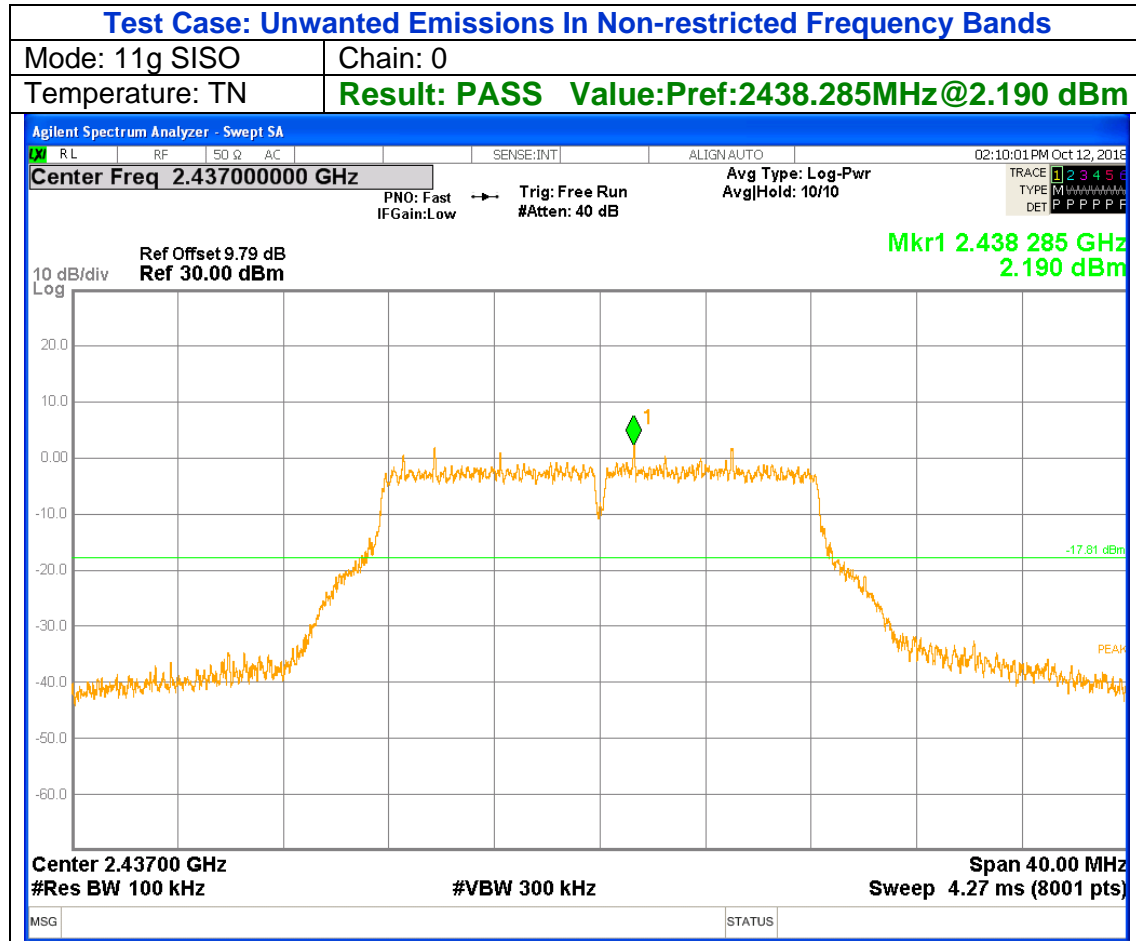


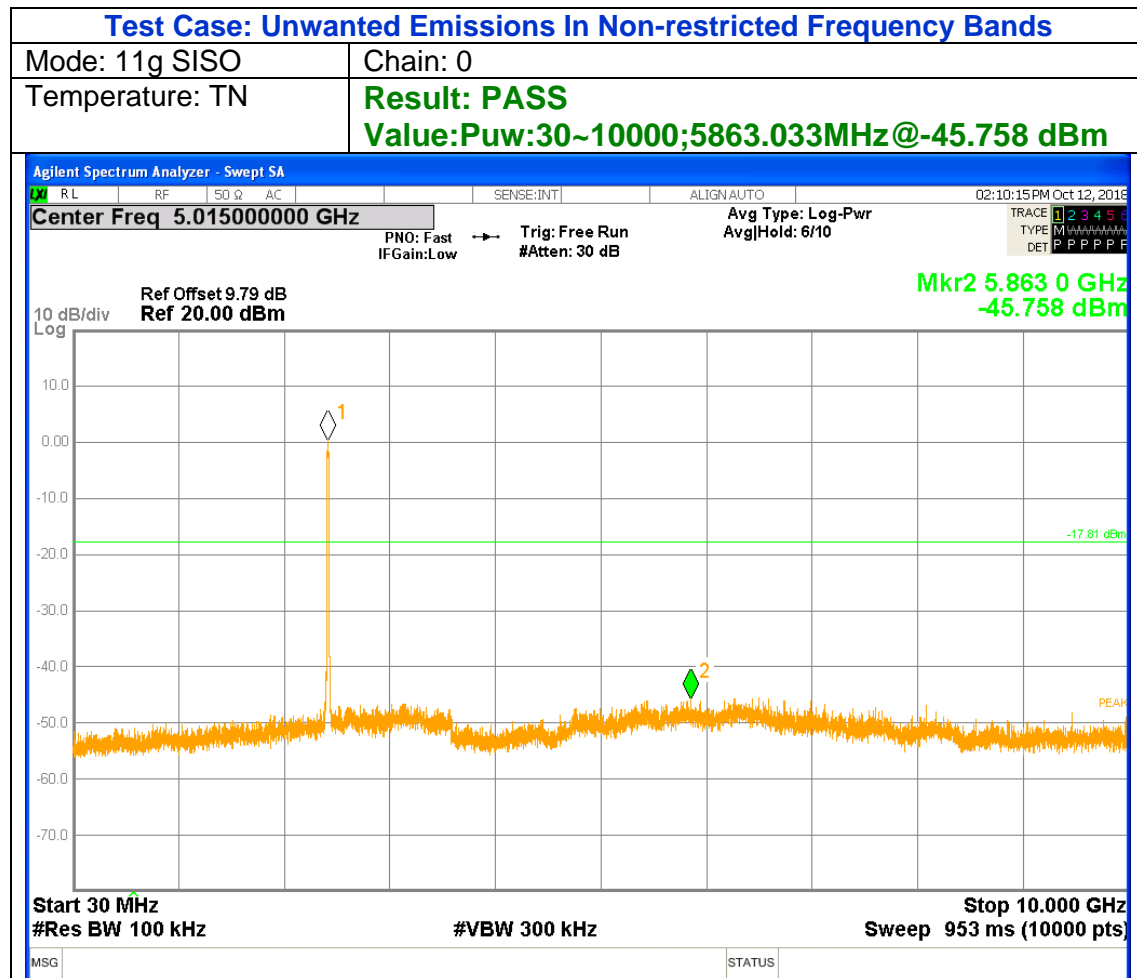


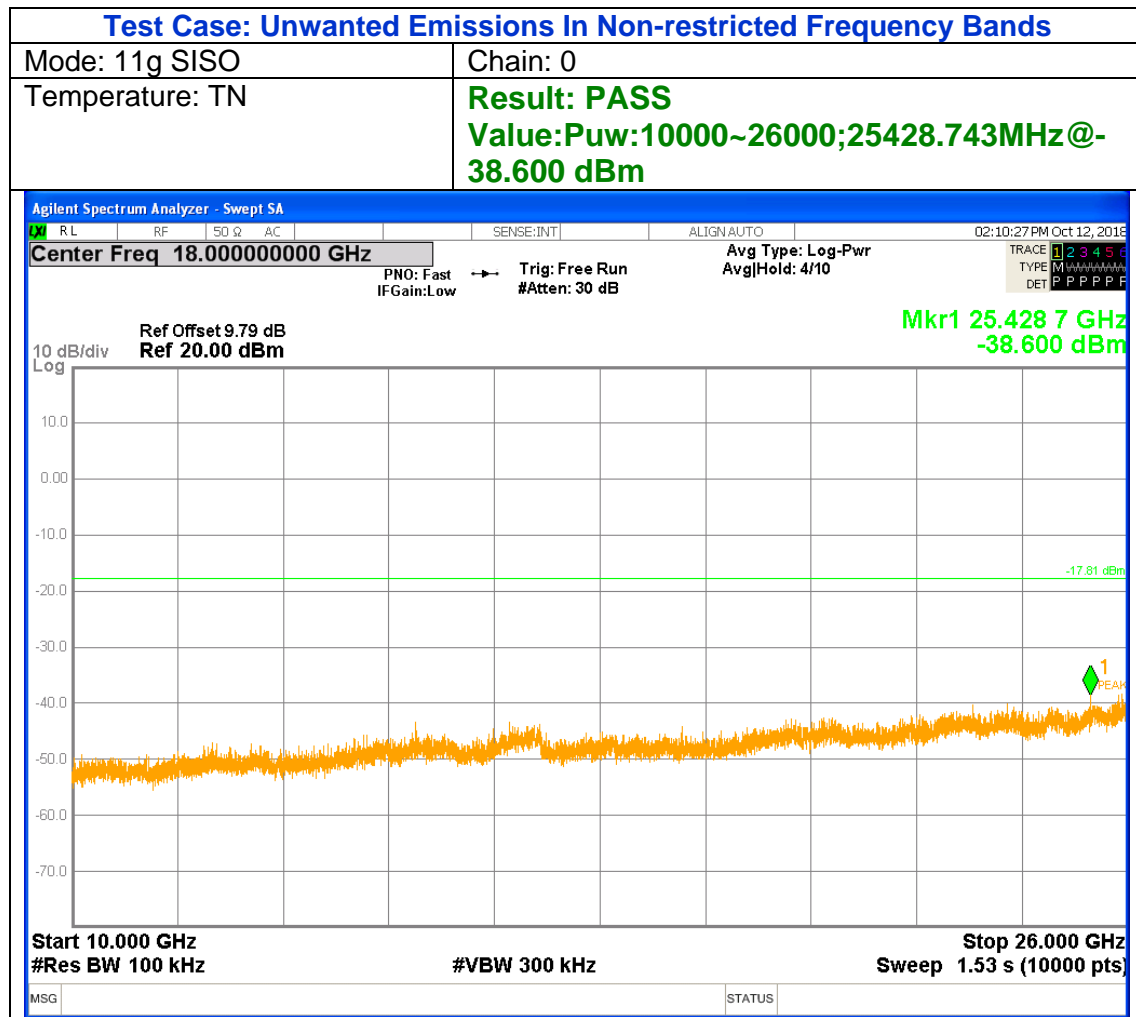


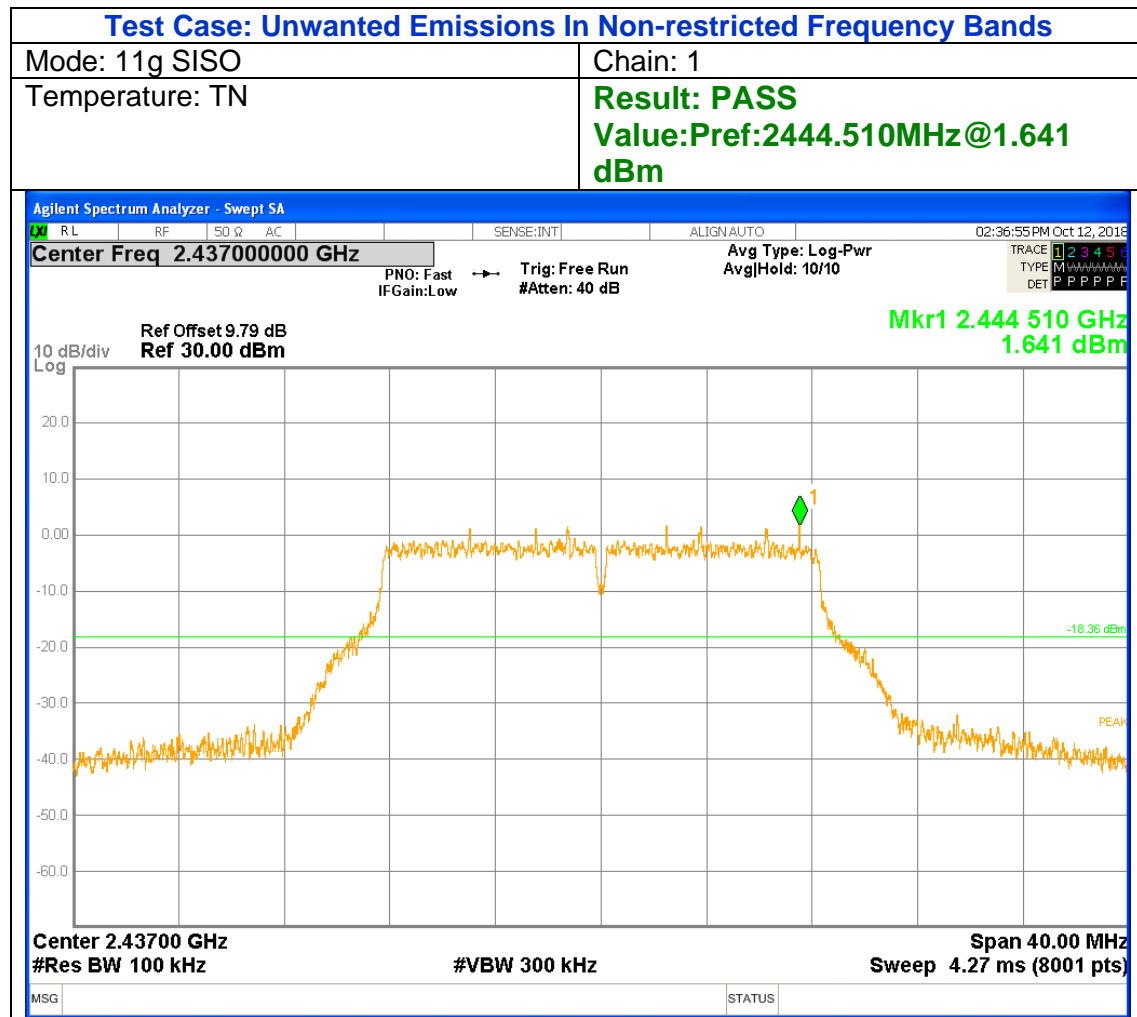


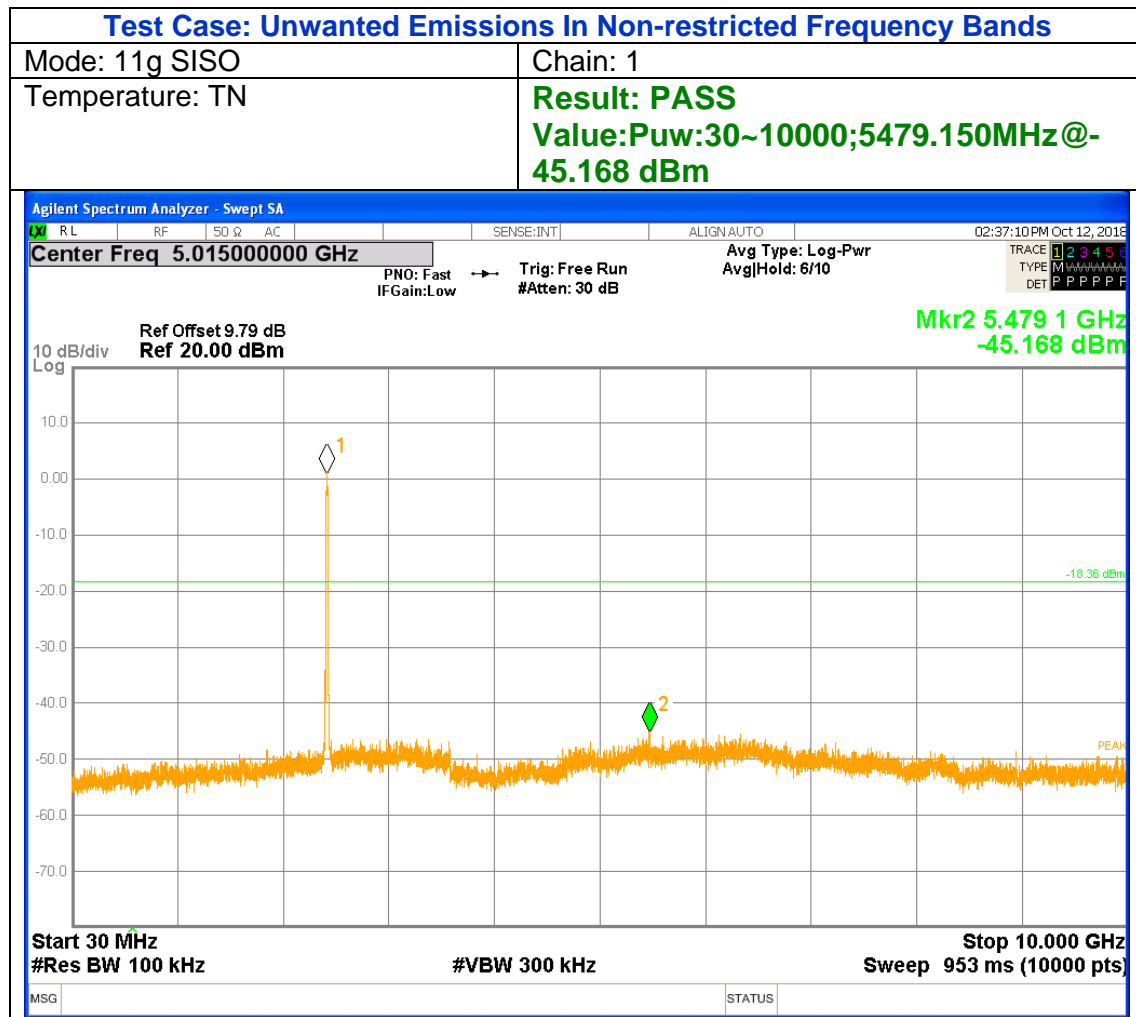
**Middle Channel 06**



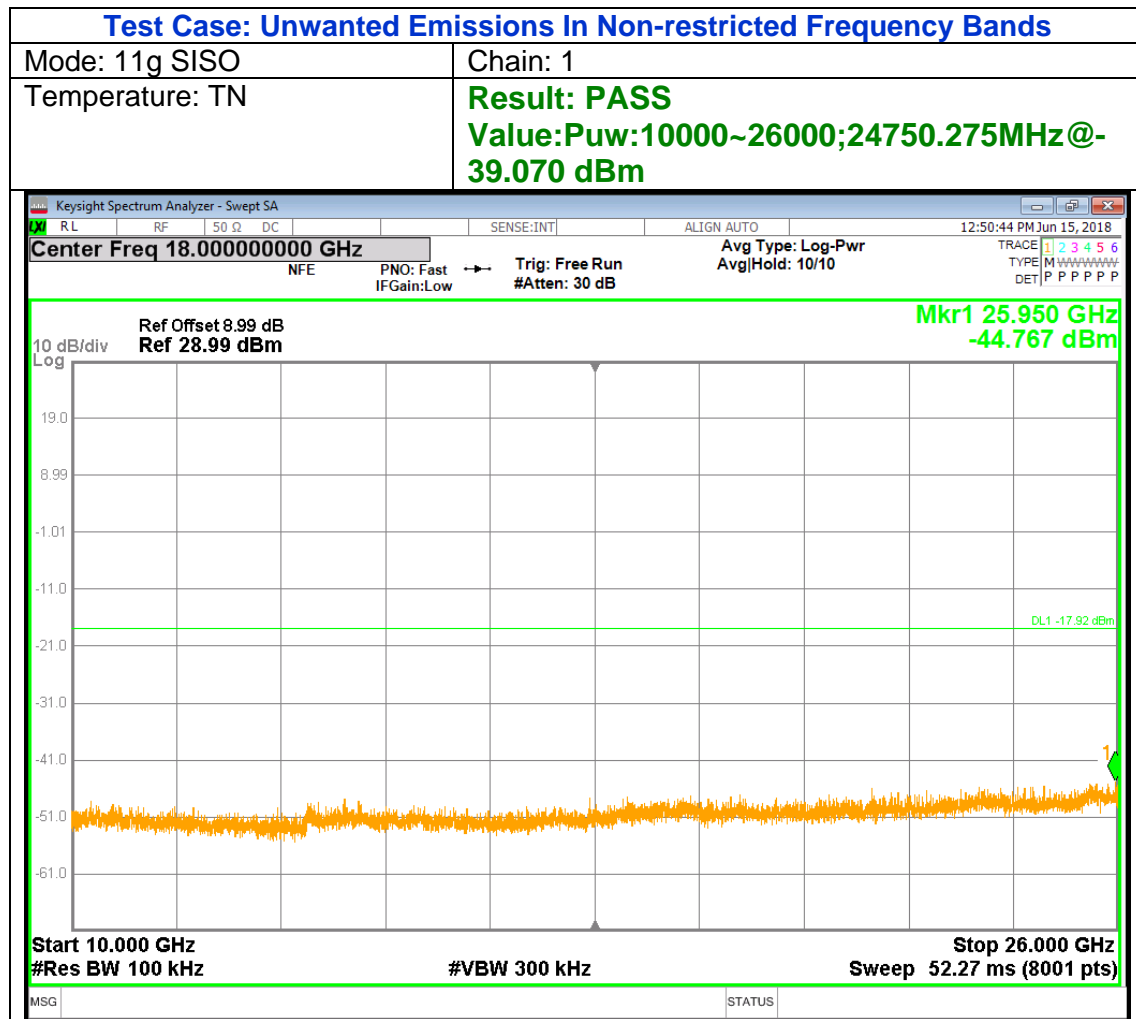






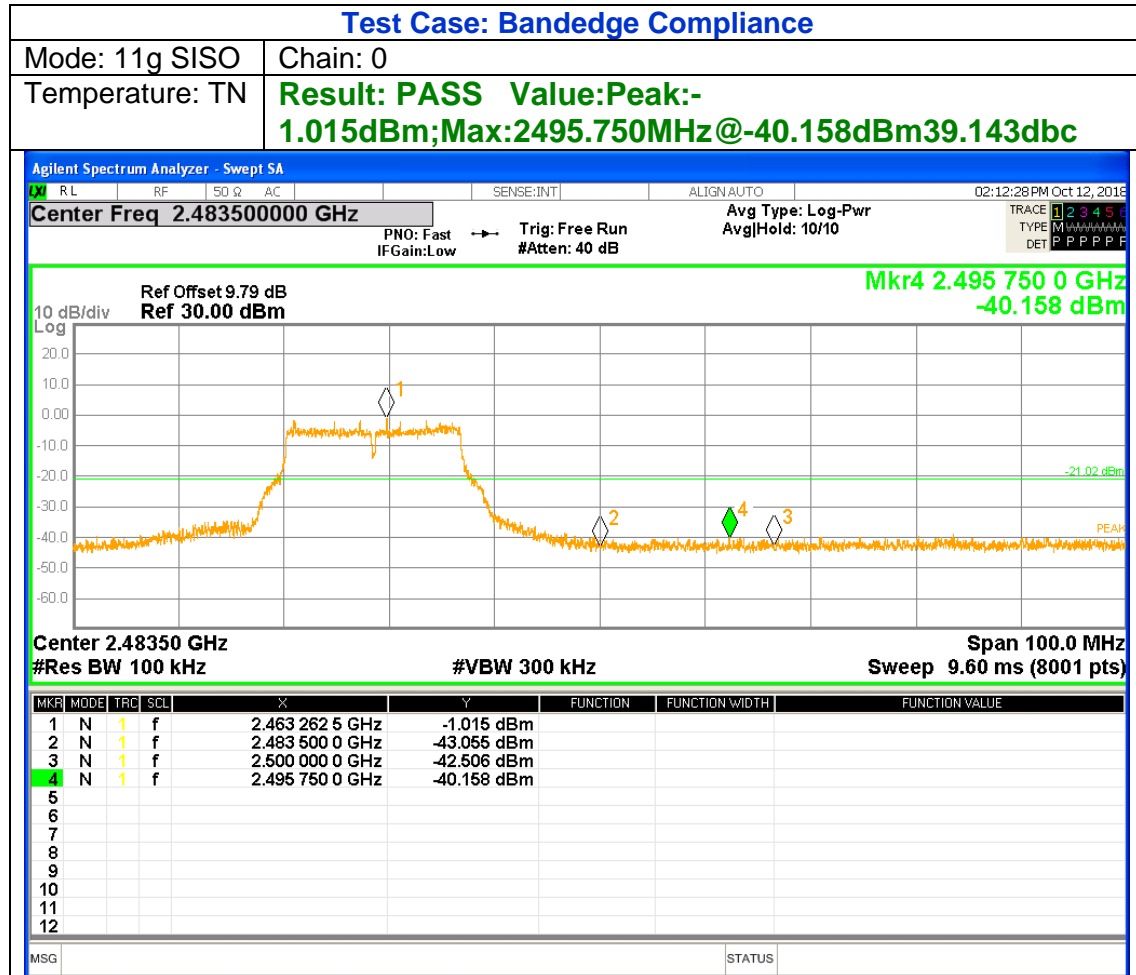


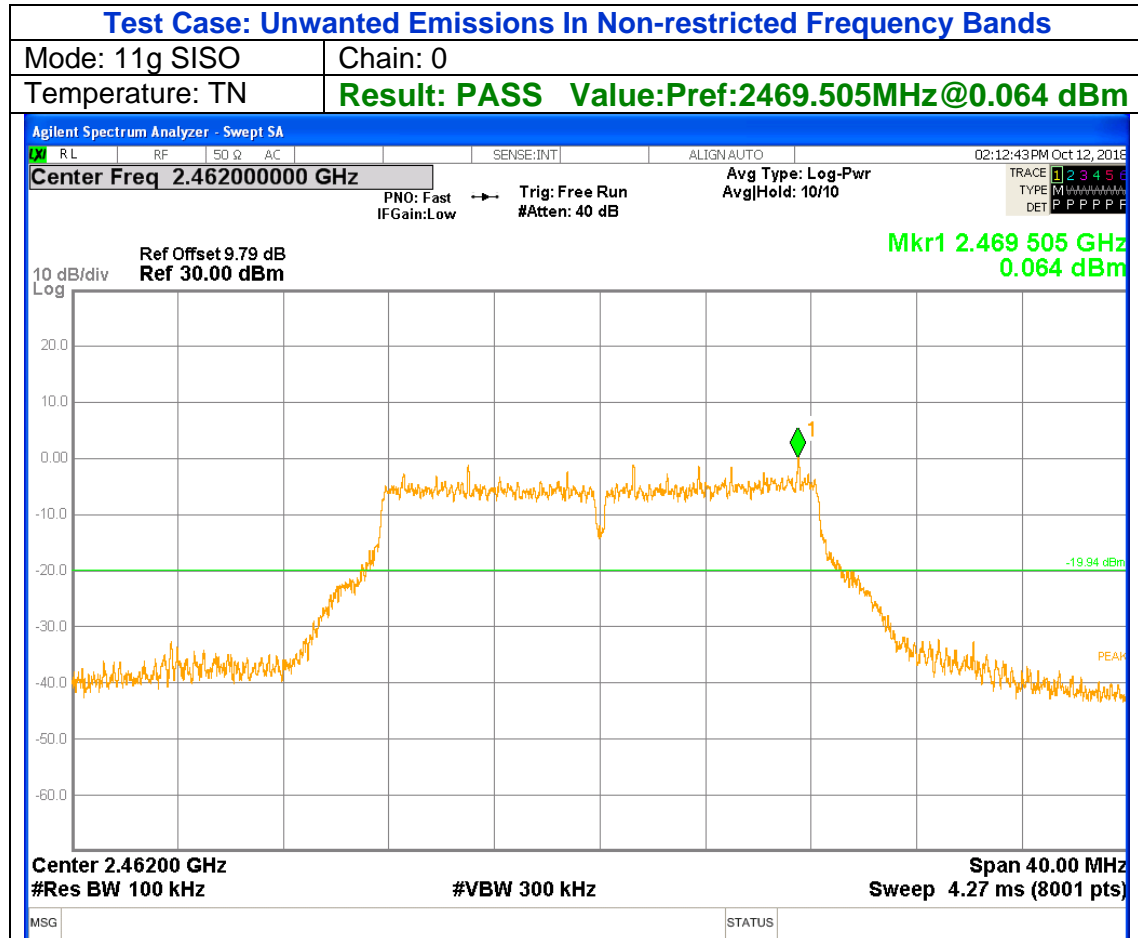


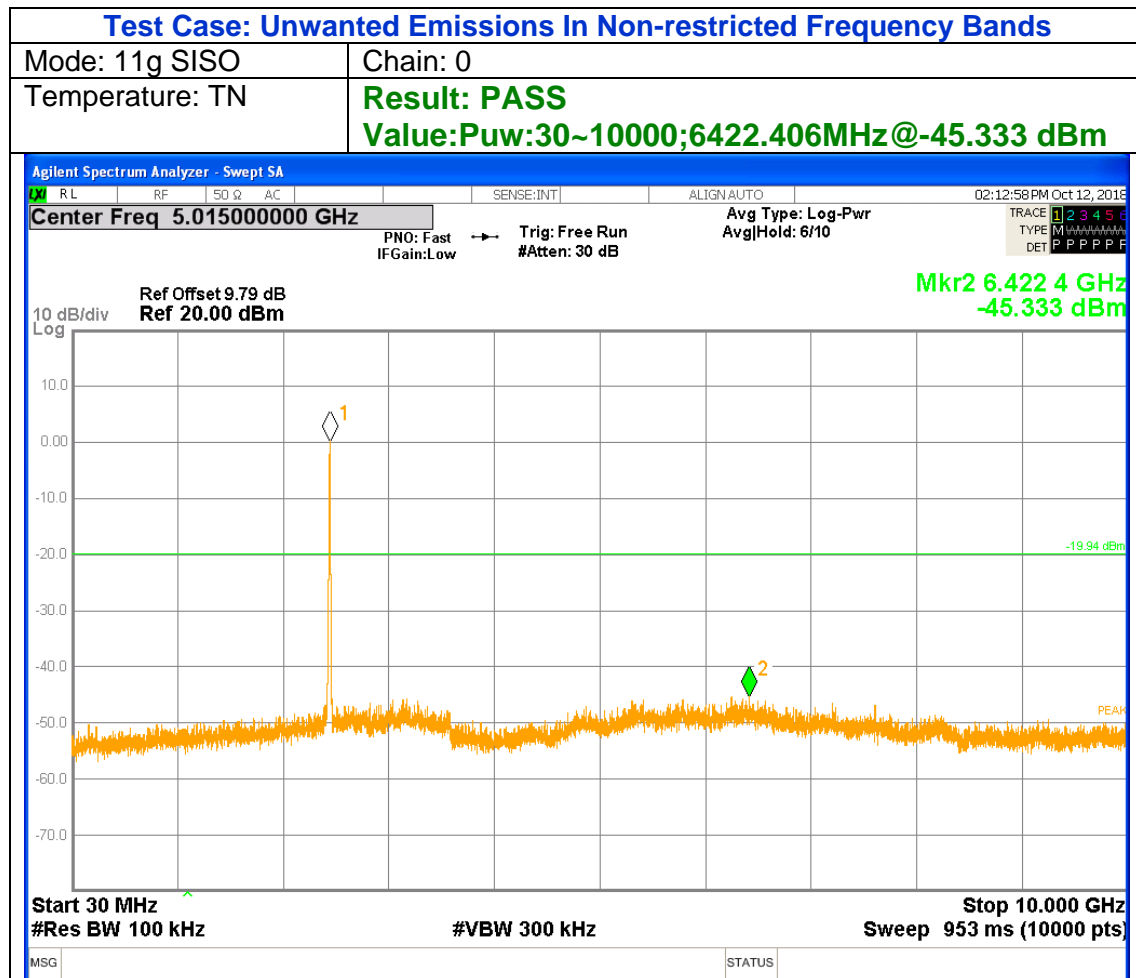


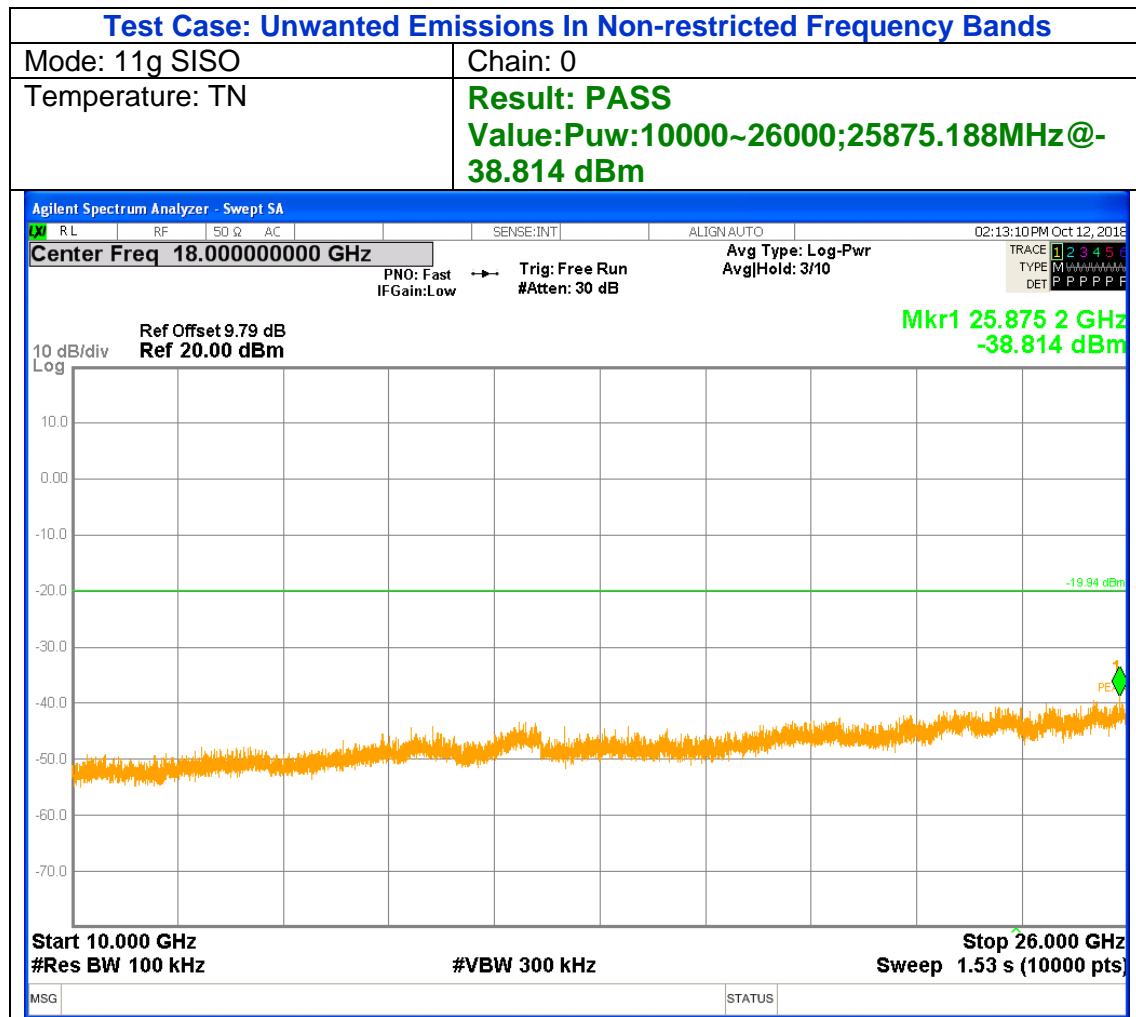


### High Channel 11









**Test Case: Bandedge Compliance**

Mode: 11g SISO

Chain: 1

Temperature: TN

**Result: PASS****Value: Peak: 0.074 dBm; Max: 2483.863 MHz @ -39.327 dBm 39.401 dbc**