

# Test Report # TR 316356 C (U-NII)

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**Equipment Under Test:** Sterling-LWB5 Module

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**Test Date(s):** February 23, 2017 to May 7, 2017

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**Prepared for:** Laird Technologies, Inc.  
Attn: Bill Steinike  
W66N220 Commerce Court  
Cedarburg, WI 53012

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**Report Issued by:** Kimberly Bay, EMC Engineer II

Signature:



Date: 5/9/2017

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**Report Reviewed by:** Adam Alger, Quality Systems Engineer

Signature:



Date: 5/9/2017

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**Report Constructed by:** Kimberly Bay, EMC Engineer II

Signature:



Date: 5/1/2017

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Company: LSR a Laird Business	Page 1 of 149	Name: Sterling-LWB5
Report: TR 316356 C (U-NII)		Model: Sterling- LWB5
Job: C-2602		Serial: 00008, 00035

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## Laird Technologies Test Services in Review

The Laird Technologies, Inc. laboratory located at W66 N220 Commerce Court Cedarburg, Wisconsin 53012 USA is recognized through the following organizations:



### **A2LA – American Association for Laboratory Accreditation**

*Accreditation based on ISO/IEC 17025: 2005 with Electrical (EMC) Scope*

*A2LA Certificate Number: 1255.01*

*Scope of accreditation includes all test methods listed herein, unless otherwise noted.*



### **Federal Communications Commission (FCC) – USA**

*Accredited recognition of two 3 meter Semi-Anechoic Chambers*

*Accredited Test Firm Registration Number: 953492*



**Government  
of Canada**

### **Innovation, Science and Economic Development Canada**

*ISED Site listing of two 3 meter Semi-Anechoic Chambers based on RSS-GEN – Issue 4*

*File Number: IC 3088A-2*

*File Number: IC 3088A-3*

Company: LSR a Laird Business	Page 3 of 149	Name: Sterling-LWB5
Report: TR 316356 C (U-NII)		Model: Sterling-LWB5
Job: C-2602		Serial: 00008, 00035

## 1 TEST REPORT SUMMARY

Between February 23, 2017 and May 7, 2017 the Equipment Under Test (EUT), Sterling-LWB5, as provided by Laird was tested to the following requirements:

Requirement	Description	Specification	Method	Result
FCC: 15.407 (e) ISED: RSS-247 5.2 (a)	5.725-5.85 GHz band minimum 6 dB bandwidth	500 kHz	ANSI C63.10	Pass
FCC: 2.1049 ISED: RSS-GEN 6.6	Occupied Bandwidth	Reported	ANSI C63.10	Reported
FCC: 15.407 (a)(2) ISED: RSS-247 6.2	Emission Bandwidth	Reported	ANSI C63.10	Reported
FCC: 15.407(a) ISED: RSS-247 6.2	Maximum Conducted Output Power	FCC 15.407 (a) RSS-247 6.2	ANSI C63.10	Pass
FCC: 15.407 (a)(5) ISED: RSS-247 6.2	Power Spectral Density	11 dBm/1 MHz 30 dBm/500 kHz	ANSI C63.10	Pass
FCC: 12.407 (b) ISED: RSS-247 6.2	Undesirable Emission Limits	FCC 12.407 (b) RSS-247 6.2	ANSI C63.10	Pass
FCC: 15.207 IC: RSS-GEN 8.8	AC Power Line Conducted Emissions	0.150-30 MHz	ANSI C63.10	Pass

### Notice:

The results relate only to the item tested and described in this report. Any modifications made to the equipment under test after the specified test date(s) may invalidate the data herein.

If the resulting measurement margin is seen to be within the uncertainty value, as listed in this report, the possibility exists that this unit may not meet the required limit specification if subsequently tested.

## 2 CLIENT INFORMATION

<b>Company Name</b>	Laird Technologies, Inc.
<b>Contact Person</b>	Bill Steinike
<b>Address</b>	W66N220 Commerce Ct., Cedarburg, WI 53012

### 2.1 Equipment Under Test (EUT) Information

The following information has been supplied by the client

<b>Product Name</b>	Sterling-LWB5
<b>Model Number</b>	Sterling-LWB5
<b>Serial Number</b>	00008, 00035

### 2.2 Product Description

The Sterling-LWB5 is a multi-standard module with support for WLAN (802.11 a/b/g/n/ac), Bluetooth 2.1+EDR, Bluetooth 3.0, and Bluetooth 4.1 (Bluetooth Low Energy) with multiple antenna options.

Chip Antenna: Johanson Part # 2450AD14A5500 peak gain 1.0 dBi (2.4 GHz) / 4.0 dBi (5.5 GHz)

U.FL Antenna port utilizes the following antenna options:

LSR Part #001-0009 2.4 GHz Dipole Antenna peak gain 2.0 dBi (2.4 GHz & 5.5 GHz)

LSR Part #001-0016 2.4 GHz FlexPIFA peak gain 2.5 dBi (2.4 GHz) / 3.0 dBi (5.5 GHz)

### 2.3 Modifications Incorporated for Compliance

None noted at time of test

### 2.4 Deviations and Exclusions from Test Specifications

None noted at time of test.

## 2.5 Additional Information

Module was powered at 3.3VDC using a variable DC power supply.

WLAN settings were programmed using Sterling WLAN RF Eval Tool Version 2.8.0.0. WLAN modes, data rates and frequencies used for testing:

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802.11a HT-20, 6 Mbps:

5180, 5200, 5220 (ISED only), 5240 (FCC only) MHz (U-NII-1)  
 5260, 5300, 5320 MHz (U-NII-2A)  
 5500, 5580, 5700 MHz (U-NII-2C)  
 5745, 5785, 5825 MHz (U-NII-3)

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802.11ac HT-20, MCS0:

5180, 5200, 5220 (ISED only), 5240 (FCC only)MHz (U-NII-1)  
 5260, 5300, 5320 MHz (U-NII-2A)  
 5500, 5580, 5720 MHz (U-NII-2C)  
 5745, 5785, 5825 MHz (U-NII-3)

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802.11ac HT-40, MCS0:

5190, 5230 MHz (U-NII-1); 5270, 5310 MHz (U-NII-2A);  
 5510, 5550, 5710 MHz (U-NII-2C); 5755, 5795 MHz (U-NII-3)

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802.11ac HT-80, MCS0:

5210 MHz (U-NII-1); 5290 MHz (U-NII-2A);  
 5530, 5610 (FCC Only), 5690 MHz (U-NII-2C); 5775 MHz (U-NII-3)

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802.11n HT-20, MCS0:

5180, 5200, 5220 (ISED only), 5240 (FCC only)MHz (U-NII-1)  
 5260, 5300, 5320 MHz (U-NII-2A)  
 5500, 5580, 5700 MHz (U-NII-2C)  
 5745, 5785, 5825 MHz (U-NII-3)

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802.11n HT-40, MCS0:

5190, 5230 MHz, (U-NII-1); 5270, 5310 MHz(U-NII-2A);  
 5510, 5550, 5670 MHz(U-NII-2C); 5755, 5795 MHz (U-NII-3)

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### 3 REFERENCES

Publication	Edition	Date	AMD 1	AMD 2	Type
47 CFR, Parts 0-15 (FCC)		2017			
RSS 247	2	2017			
RSS GEN	4	2014			
ANSI C63.10		2013			
FCC KDB 789033 D02 v01r04		2016			

## 4 UNCERTAINTY SUMMARY

Using the guidance of the following publications the calculated measurement uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level, using a coverage factor of  $k = 2$ .

References	Version / Date
CISPR 16-4-1	Ed. 2 (2009-02)
CISPR 16-4-2	Ed. 2 (2011-06)
CISPR 32	Ed. 1 (2012-01)
ANSI C63.23	2012
A2LA P103	February 4, 2016
A2LA P103c	August 10, 2015
ETSI TR 100-028	V1.3.1 (2001-03)

Measurement Type	Configuration	Uncertainty $\pm$
Radiated Emissions	Biconical Antenna	5.0 dB
Radiated Emissions	Log Periodic Antenna	5.3 dB
Radiated Emissions	Horn Antenna	4.7 dB
AC Line Conducted Emissions	Artificial Mains Network	3.4 dB
Telecom Conducted Emissions	Asymmetric Artificial Network	4.9 dB
Disturbance Power Emissions	Absorbing Clamp	4.1 dB
Radiated Immunity	3 Volts/meter	2.2 dB
Conducted Immunity	CDN/EM/BCI	2.4/3.5/3.4 dB
EFT Burst/Surge	Peak pulse voltage	164 volts
ESD Immunity	15 kV level	1377 Volts

Parameter	ETSI U.C. $\pm$	U.C. $\pm$
Radio Frequency, from F0	$1 \times 10^{-7}$	$0.55 \times 10^{-7}$
Occupied Channel Bandwidth	5 %	2 %
RF conducted Power (Power Meter)	1.5 dB	1.2 dB
RF conducted emissions (Spectrum Analyzer)	3.0 dB	1.7 dB
All emissions, radiated	6.0 dB	5.3 dB
Temperature	1° C	0.65° C
Humidity	5 %	2.9 %
Supply voltages	3 %	1 %

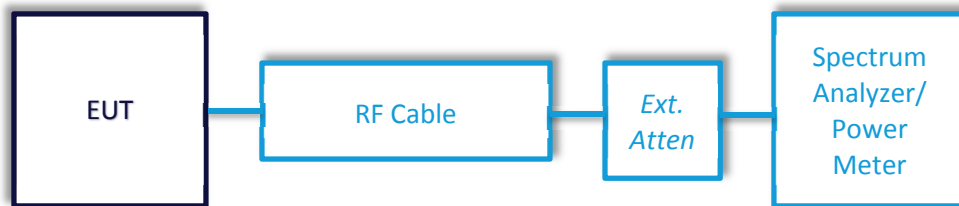


## 5 TEST DATA

### 5.1 Antenna Port Conducted Emissions

<b>Description of Measurement</b>	<p>The direct measurement of emissions at the antenna port of the EUT is achieved by use of a RF connection to a spectrum analyzer or power meter.</p> <p>The cable and attenuator factors are loaded into the analyzer or power meter allowing for direct measurement readings without the need for further corrections.</p>
<b>Example Calculations</b>	<p>Measurement (dBm) + Cable factor (dB) + External Attenuator (dB) = Corrected Reading (dBm)</p> <p>Margin (dB) = Limit (dBm) – Corrected Reading (dBm)</p>

#### Block Diagram



### 5.1.1 Antenna Port Conducted Emissions – Duty Cycle

<b>Operator</b>	Kimberly Bay
<b>QA</b>	Shane Dock
<b>Test Date</b>	U-NII-1: March 6, 2017; U-NII-2A: March 14, 2017 U-NII-2C: March 27, 2017; U-NII-3: February 23, 2017
<b>Location</b>	Conducted RF Test Bench
<b>Temp. / R.H.</b>	21°-22°C / 27%-53% R.H.
<b>Method</b>	KDB 789033 D02 v01r04 Section II.B.2.b

#### Test Parameters

<b>Settings</b>	RBW = 8 MHz, VBW = 50 MHz, Zero Span
<b>EUT</b>	1 channel each: 802.11a HT-20, 802.11ac HT-20, 802.11ac HT-40, 802.11ac HT-80, 802.11n HT-20, 802.11n HT-40
<b>Example Calculations</b>	<u>Duty Cycle</u> = (on-time)/(on-time + off-time) Ex: $(390.5 \mu s) / (390.5 \mu s + 234.5 \mu s) = 0.625$ <u>Duty Cycle Correction</u> = $10 \log (1/\text{duty cycle})$ Ex: $10 \log (1/0.625) = 2.04$

#### Instrumentation



Date: 6-Feb-2017

Type Test: Conducted RF Measurements

Job #: C-2602

Prepared By: Kim

Customer: LSR

Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification

**Table – U-NII-1 Duty Cycle and Duty Cycle Correction**

Mode	BW	Duty Cycle	Duty Cycle Correction
802.11a	HT-20	0.970	0.132
802.11ac	HT-20	0.970	0.132
802.11ac	HT-40	0.935	0.292
802.11ac	HT-80	0.880	0.555
802.11n	HT-20	0.970	0.132
802.11n	HT-40	0.935	0.292

**Table – U-NII-2A – Duty Cycle and Duty Cycle Correction**

Mode	BW	Duty Cycle	Duty Cycle Correction
802.11a	HT-20	0.970	0.132
802.11ac	HT-20	0.960	0.177
802.11ac	HT-40	0.915	0.386
802.11ac	HT-80	0.875	0.580
802.11n	HT-20	0.950	0.223
802.11n	HT-40	0.925	0.339

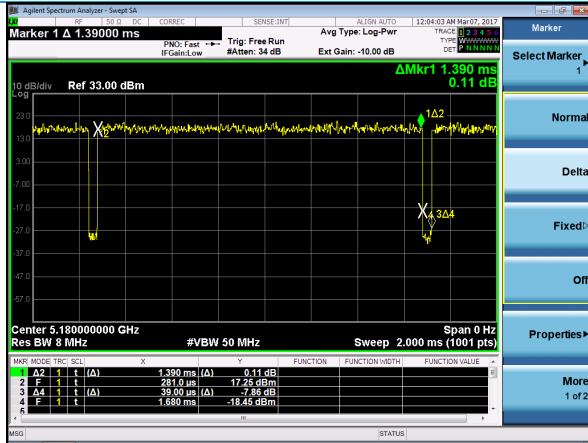
**Table – U-NII-2C – Duty Cycle and Duty Cycle Correction**

Mode	BW	Duty Cycle	Duty Cycle Correction
802.11a	HT-20	1.000	0.000
802.11ac	HT-20	1.000	0.000
802.11ac	HT-40	1.000	0.000
802.11ac	HT-80	0.930	0.315
802.11n	HT-20	0.875	0.580
802.11n	HT-40	0.930	0.315

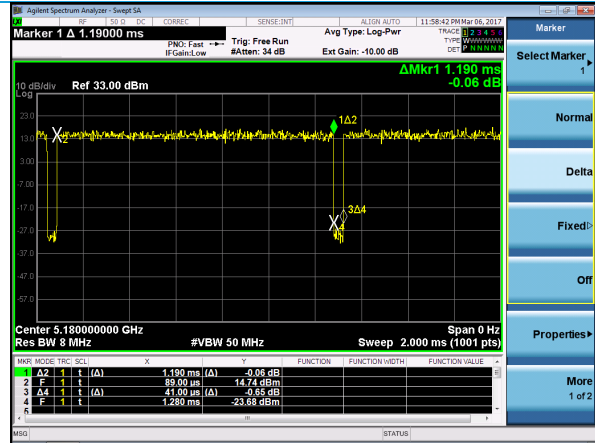
**Table – U-NII-3 – Duty Cycle and Duty Cycle Correction**

Mode	BW	Duty Cycle	Duty Cycle Correction
802.11a	HT-20	0.970	0.132
802.11ac	HT-20	0.965	0.155
802.11ac	HT-40	0.930	0.315
802.11ac	HT-80	0.880	0.555
802.11n	HT-20	0.960	0.177
802.11n	HT-40	0.930	0.315

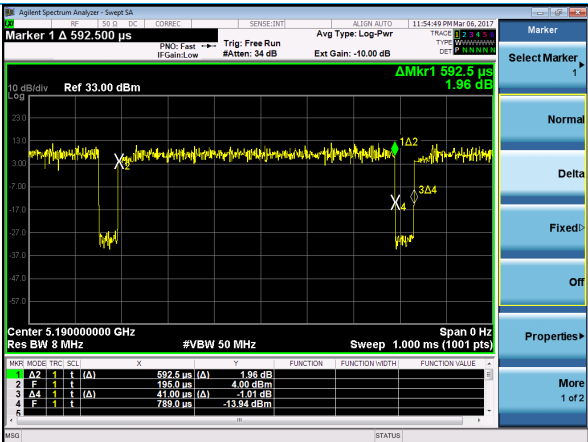
### Plots – U-NII-1 Duty Cycle



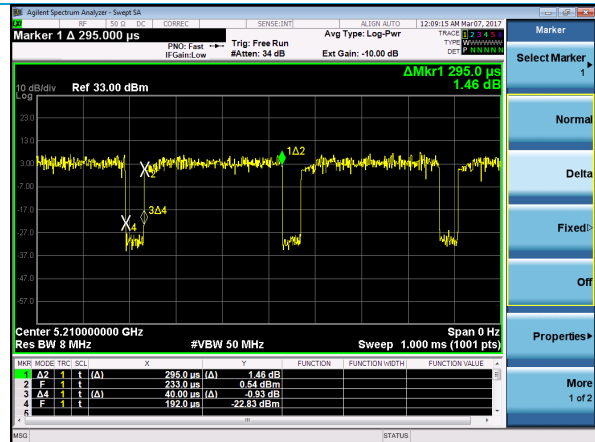
802.11a HT-20 – On & Off-Times



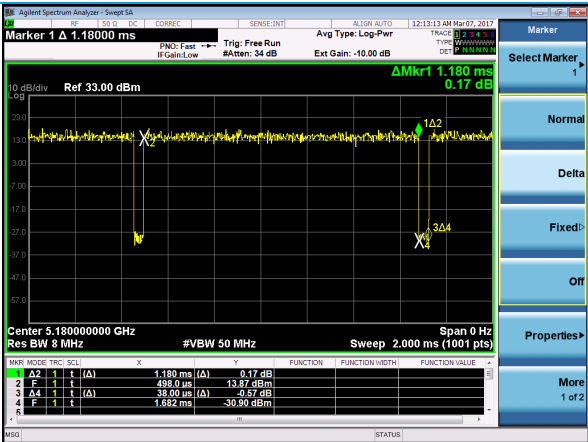
802.11ac HT-20 – On & Off-Times



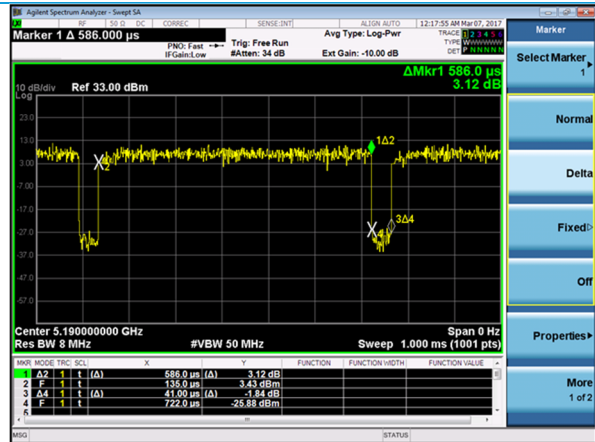
802.11ac HT-40 – On & Off-Times



802.11ac HT-80 – On & Off-Times

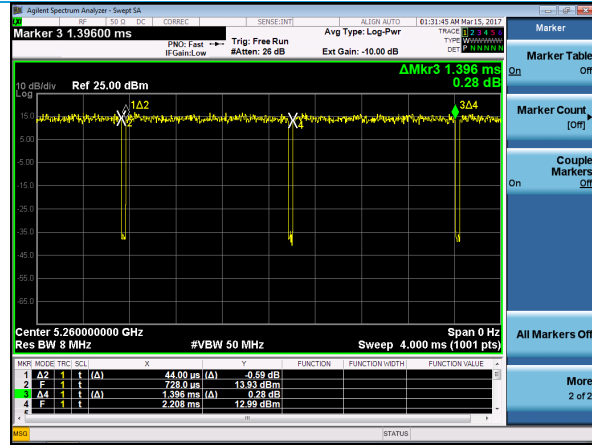


802.11n HT-20 – On & Off-Times

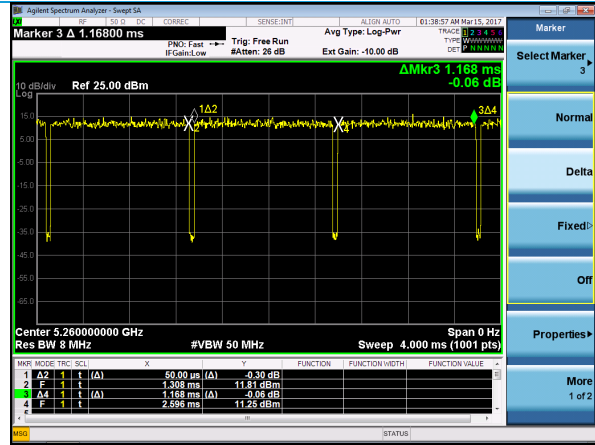


802.11n HT-40 – On & Off-Times

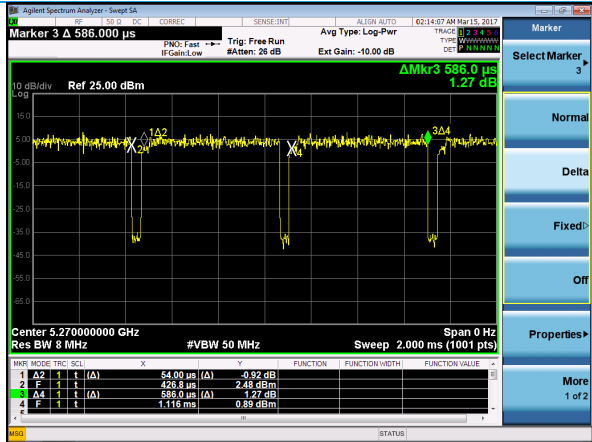
### Plots – U-NII-2A Duty Cycle



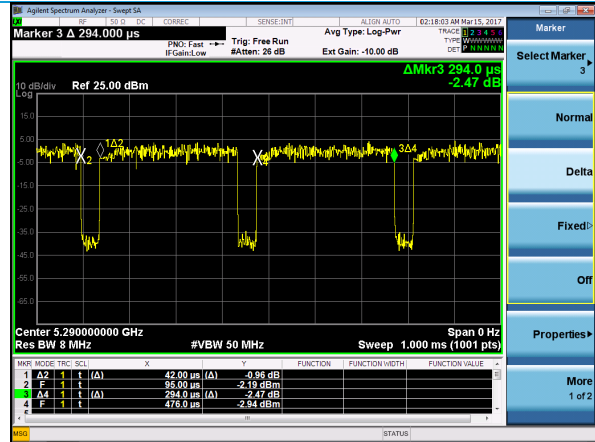
802.11a HT-20 – On & Off-Times



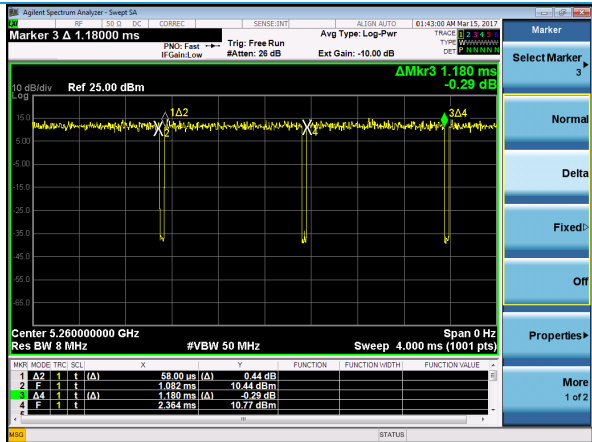
802.11ac HT-20 – On & Off-Times



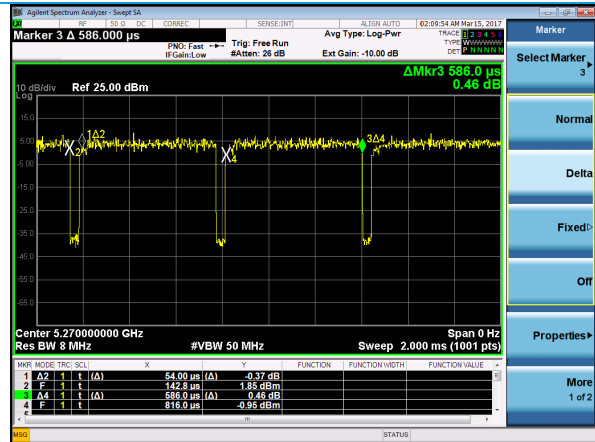
802.11ac HT-40 – On & Off-Times



802.11ac HT-80 – On & Off-Times

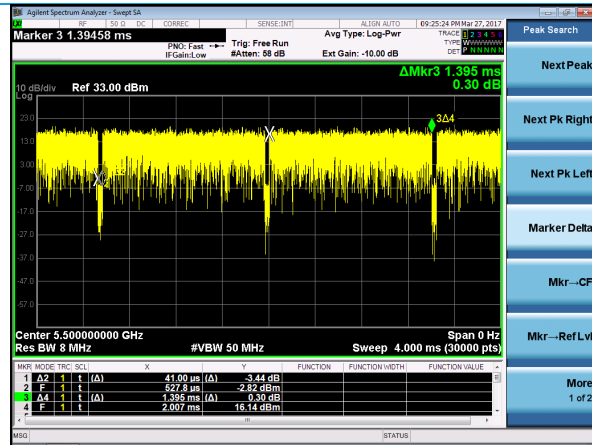


802.11n HT-20 – On & Off-Times

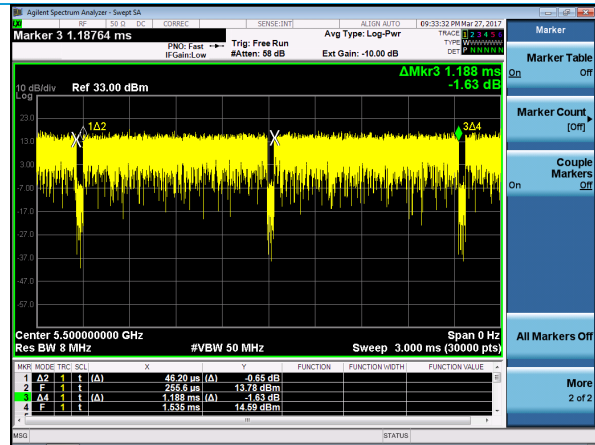


802.11n HT-40 – On & Off-Times

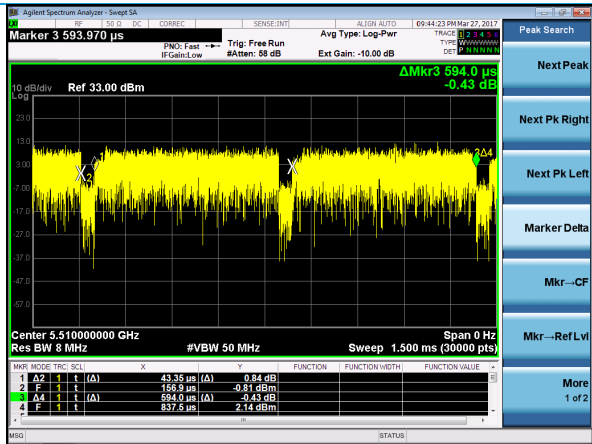
### Plots – U-NII-2C Duty Cycle



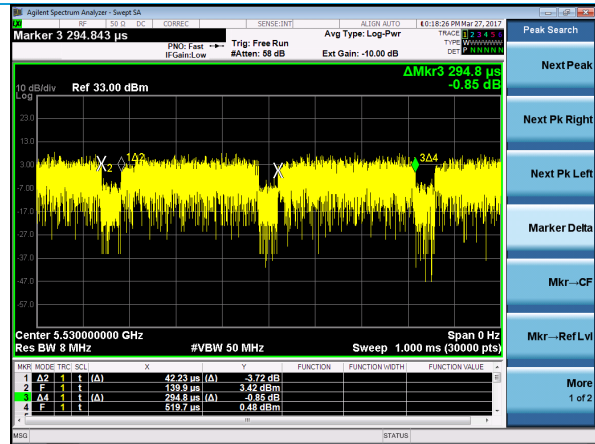
802.11a HT-20 – On & Off-Times



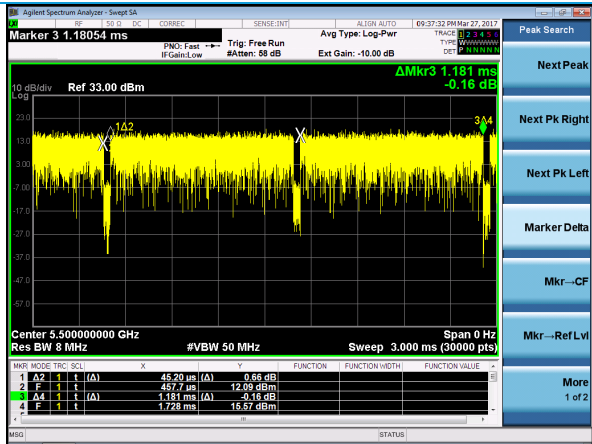
802.11ac HT-20 – On & Off-Times



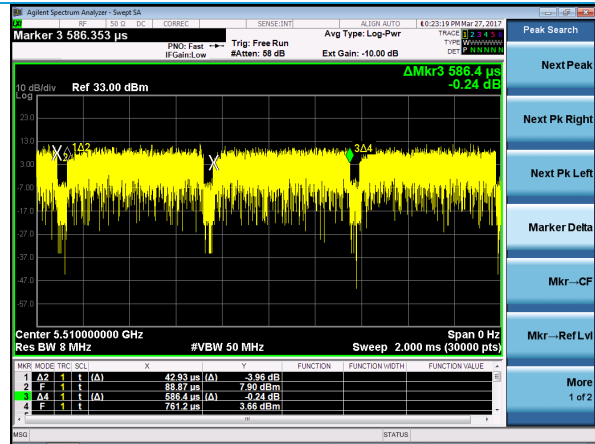
802.11ac HT-40 – On & Off-Times



802.11ac HT-80 – On & Off-Times

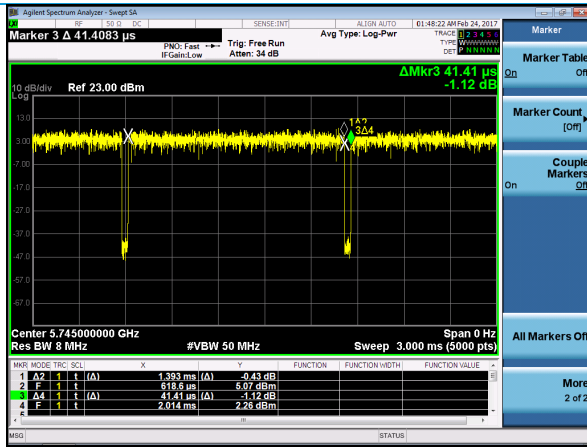


802.11n HT-20 – On & Off-Times

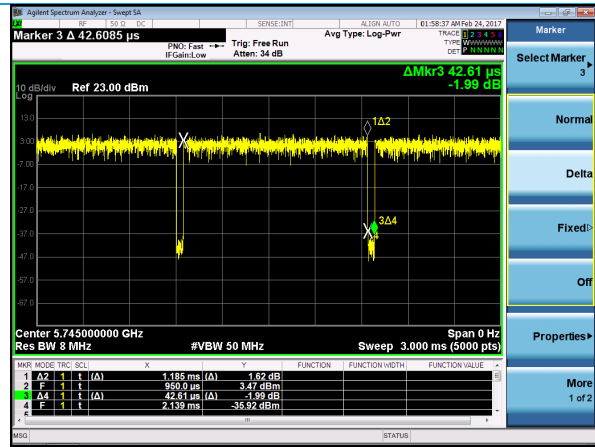


802.11n HT-40 – On & Off-Times

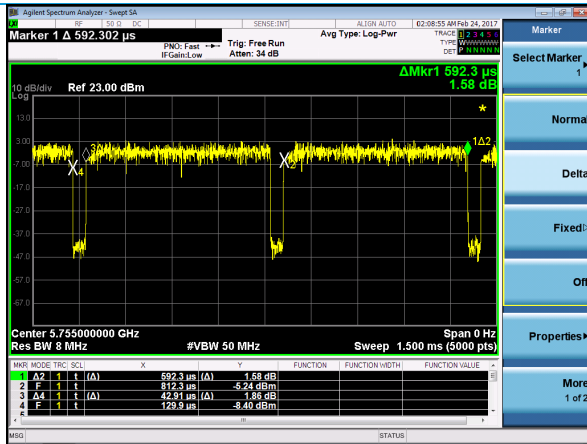
### Plots – U-NII-3 Duty Cycle



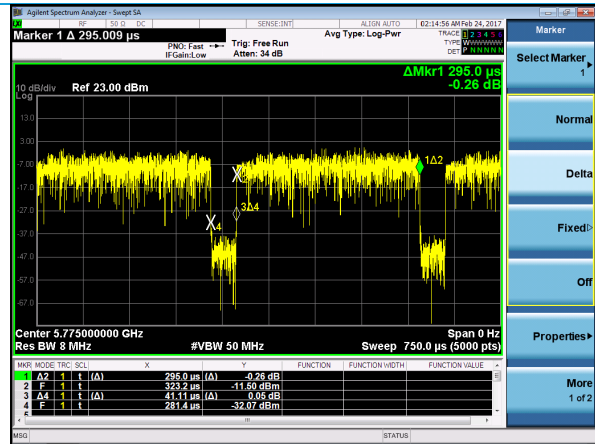
802.11a HT-20 – On & Off-Times



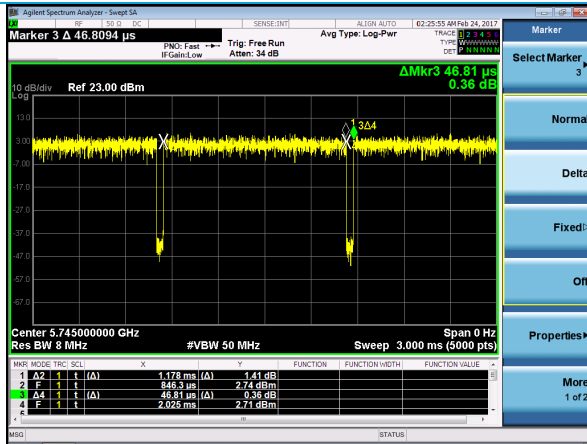
802.11ac HT-20 – On & Off-times



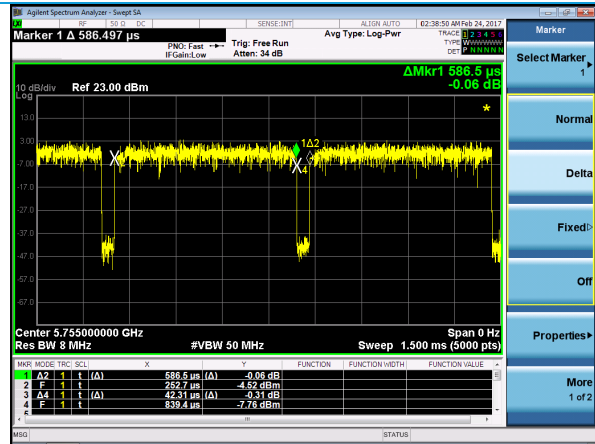
802.11ac HT-40 – On & Off-Times



802.11ac HT-80 – On & Off-Times



802.11n HT-20 – On & Off-Times



802.11n HT-40 – On & Off-Times

### 5.1.2 Antenna Port Conducted Emissions – Bandwidth

<b>Operator</b>	Kimberly Bay
<b>QA</b>	Aidi Zainal / Shane Dock
<b>Test Date</b>	U-NII-1: March 6, 2017; U-NII-2A: March 14, 2017 U-NII-2C: March 27, 2017; U-NII-3: February 23-24, 2017
<b>Location</b>	Conducted RF Test Bench
<b>Temp. / R.H.</b>	21°-22°C / 27%-53% R.H.
<b>Requirement</b>	EBW: FCC 15.407 (a)(2) / RSS-247 Section 6.2 Minimum 6 dB BW for the band 5.725-5.85GHz: FCC 15.407 (e)
<b>Method</b>	EBW: KDB 789033 D02 v01r04 Section II.C.1 Minimum 6dB BW: KDB 789033 D02 v01r04 Section II.C.2 OBW: KDB 789033 D02 v01r04 Section II.D

**Limits:**

Bandwidth Type	U-NII Band	Limit
EBW (26 dB)	All	N/A
Minimum 6 dB	U-NII-3	≥ 500 kHz
OBW	All	N/A



## Test Parameters

<b>Settings</b>	<u>802.11a HT-20, 6 Mbps:</u> 5180, 5200, 5220 (ISED only), 5240 (FCC only) MHz (U-NII-1) 5260, 5300, 5320 MHz (U-NII-2A) 5500, 5580, 5700 MHz (U-NII-2C) 5745, 5785, 5825 MHz (U-NII-3)
<b>Settings</b>	<u>802.11ac HT-20, MCSO:</u> 5180, 5200, 5220 (ISED only), 5240 (FCC only)MHz (U-NII-1) 5260, 5300, 5320 MHz (U-NII-2A) 5500, 5580, 5720 MHz (U-NII-2C) 5745, 5785, 5825 MHz (U-NII-3)
<b>Settings</b>	<u>802.11ac HT-40, MCSO:</u> 5190, 5230 MHz (U-NII-1); 5270, 5310 MHz (U-NII-2A); 5510, 5550, 5710 MHz (U-NII-2C); 5755, 5795 MHz (U-NII-3)
<b>Settings</b>	<u>802.11ac HT-80, MCSO:</u> 5210 MHz (U-NII-1); 5290 MHz (U-NII-2A); 5530, 5610 (FCC Only), 5690 MHz (U-NII-2C); 5775 MHz (U-NII-3)
<b>Settings</b>	<u>802.11n HT-20, MCSO:</u> 5180, 5200, 5220 (ISED only), 5240 (FCC only)MHz (U-NII-1) 5260, 5300, 5320 MHz (U-NII-2A) 5500, 5580, 5700 MHz (U-NII-2C) 5745, 5785, 5825 MHz (U-NII-3)
<b>Settings</b>	<u>802.11n HT-40, MCSO:</u> 5190, 5230 MHz, (U-NII-1); 5270, 5310 MHz(U-NII-2A); 5510, 5550, 5670 MHz(U-NII-2C); 5755, 5795 MHz (U-NII-3)
<b>Note</b>	U-NII-1, U-NII-2A, and U-NII-3 each have only two HT-40 channels and one HT-80 channel.
<b>Note</b>	U-NII-2C 802.11ac HT-80 channel 5610 MHz tested here, but not used in Canada. U-NII-2C 802.11ac HT-80 has only two available ISED channels.

## Instrumentation



Date : 6-Feb-2017

Type Test : Conducted RF Measurements

Job # : C-2602

Prepared By: Kim

Customer : LSR

Quote #: 316356

No.	Asset #	Description	Manufacturer	Model #	Serial #	Cal Date	Cal Due Date	Equipment Status
1	EE 960087	Spectrum Analyzer	Agilent	N9010A	MY53400296	12/22/2016	12/22/2017	Active Calibration
2	AA 960143	Phaseflex	Gore	EKD01D01048.0	5546519	6/26/2015	6/25/2017	Active Calibration
3	AA 960172	Cable - low loss 1m	A.H. Systems, Inc	SAC-26G-1	387	5/16/2016	5/16/2017	Active Verification

**Table – U-NII-1 EBW (26 dB BW) and OBW (99% BW)**

Mode	Frequency (MHz)	Data Rate	BW	EBW (MHz)	OBW (MHz)
802.11a	5180	6 Mbps	HT-20	21.66	16.81
802.11a	5200	6 Mbps	HT-20	21.61	16.82
802.11a	5220 (ISED)	6 Mbps	HT-20	21.27	16.79
802.11a	5240 (FCC)	6 Mbps	HT-20	21.67	16.83
802.11ac	5180	MCS0	HT-20	21.65	17.99
802.11ac	5200	MCS0	HT-20	21.85	18.00
802.11ac	5220 (ISED)	MCS0	HT-20	21.8	17.99
802.11ac	5240 (FCC)	MCS0	HT-20	21.77	17.99
802.11ac	5190	MCS0	HT-40	39.81	36.35
802.11ac	5230	MCS0	HT-40	39.76	36.38
802.11ac	5210	MCS0	HT-80	81.52	75.78
802.11n	5180	MCS0	HT-20	21.81	17.99
802.11n	5200	MCS0	HT-20	21.87	17.97
802.11n	5220 (ISED)	MCS0	HT-20	21.86	17.97
802.11n	5240 (FCC)	MCS0	HT-20	21.78	17.95
802.11n	5190	MCS0	HT-40	39.94	36.38
802.11n	5230	MCS0	HT-40	40.32	36.36

**Table – U-NII-2A EBW (26 dB BW) and OBW (99% BW)**

Mode	Frequency (MHz)	Data Rate	BW	EBW (MHz)	OBW (MHz)
802.11a	5260	6 Mbps	HT-20	21.68	16.85
802.11a	5300	6 Mbps	HT-20	21.94	17.02
802.11a	5320	6 Mbps	HT-20	21.93	16.93
802.11ac	5260	MCS0	HT-20	21.82	18.00
802.11ac	5300	MCS0	HT-20	22.06	18.09
802.11ac	5320	MCS0	HT-20	22.05	18.07
802.11ac	5270	MCS0	HT-40	40.09	36.37
802.11ac	5310	MCS0	HT-40	40.11	36.40
802.11ac	5290	MCS0	HT-80	81.57	75.66
802.11n	5260	MCS0	HT-20	22.38	18.08
802.11n	5300	MCS0	HT-20	22.01	18.03
802.11n	5320	MCS0	HT-20	21.88	18.04
802.11n	5270	MCS0	HT-40	39.81	36.38
802.11n	5310	MCS0	HT-40	39.97	36.37

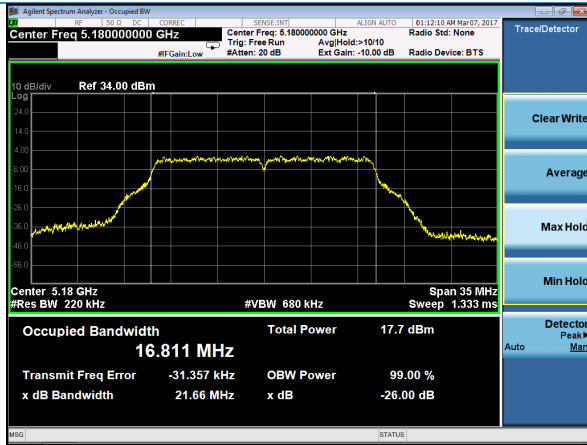
**Table – U-NII-2C EBW (26 dB BW) and OBW (99% BW)**

Mode	Frequency (MHz)	Data Rate	BW	EBW (MHz)	OBW (MHz)
802.11a	5500	6 Mbps	HT-20	21.58	16.80
802.11a	5580	6 Mbps	HT-20	21.62	16.81
802.11a	5700	6 Mbps	HT-20	21.46	16.87
802.11ac	5500	MCS0	HT-20	21.83	18.02
802.11ac	5580	MCS0	HT-20	21.81	17.99
802.11ac	5720	MCS0	HT-20	21.85	17.98
802.11ac	5510	MCS0	HT-40	39.99	36.43
802.11ac	5550	MCS0	HT-40	39.88	36.42
802.11ac	5710	MCS0	HT-40	40.27	36.39
802.11ac	5530	MCS0	HT-80	81.72	75.83
802.11ac	5610	MCS0	HT-80	81.55	75.68
802.11ac	5690	MCS0	HT-80	81.43	75.65
802.11n	5500	MCS0	HT-20	21.93	17.98
802.11n	5580	MCS0	HT-20	21.88	18.02
802.11n	5700	MCS0	HT-20	21.83	17.96
802.11n	5510	MCS0	HT-40	40.03	36.35
802.11n	5550	MCS0	HT-40	39.81	36.45
802.11n	5670	MCS0	HT-40	40.09	36.37

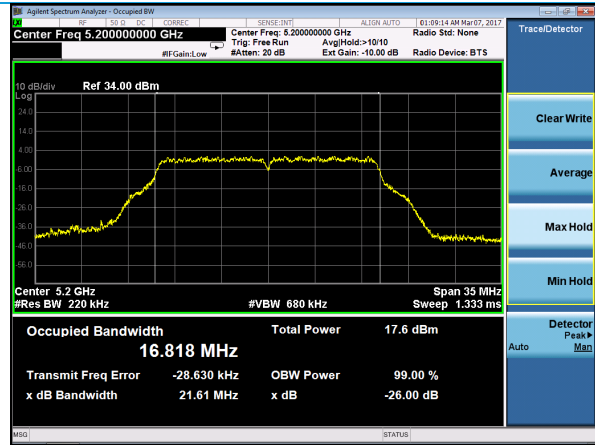
**Table – U-NII-3 EBW (26 dB BW), OBW (99% BW), and Minimum 6 dB BW**

Mode	Frequency (MHz)	Data Rate	BW	EBW (MHz)	OBW (MHz)	6 dB BW (MHz)
802.11a	5745	6 Mbps	HT-20	21.51	16.81	16.46
802.11a	5785	6 Mbps	HT-20	21.70	16.86	16.39
802.11a	5825	6 Mbps	HT-20	21.72	16.83	16.39
802.11ac	5745	MCS0	HT-20	21.88	18.03	17.61
802.11ac	5785	MCS0	HT-20	21.75	18.01	17.59
802.11ac	5825	MCS0	HT-20	21.82	18.01	17.60
802.11ac	5755	MCS0	HT-40	40.38	36.41	36.48
802.11ac	5795	MCS0	HT-40	40.16	36.39	36.46
802.11ac	5775	MCS0	HT-80	81.49	75.69	75.87
802.11n	5745	MCS0	HT-20	21.79	17.94	17.62
802.11n	5785	MCS0	HT-20	21.74	18.00	17.61
802.11n	5825	MCS0	HT-20	21.89	18.02	17.63
802.11n	5755	MCS0	HT-40	40.12	36.36	36.48
802.11n	5795	MCS0	HT-40	40.00	36.36	36.48

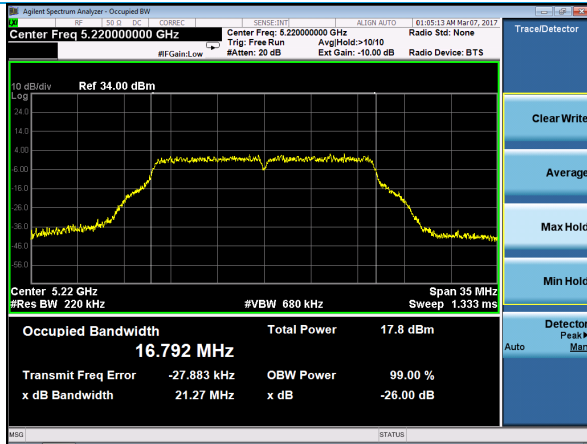
Plots – U-NII-1 EBW (26 dB BW) and OBW (99% BW)



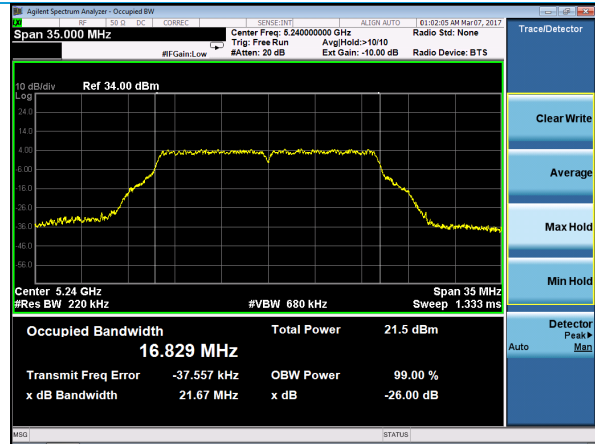
Low Channel – 802.11a HT-20



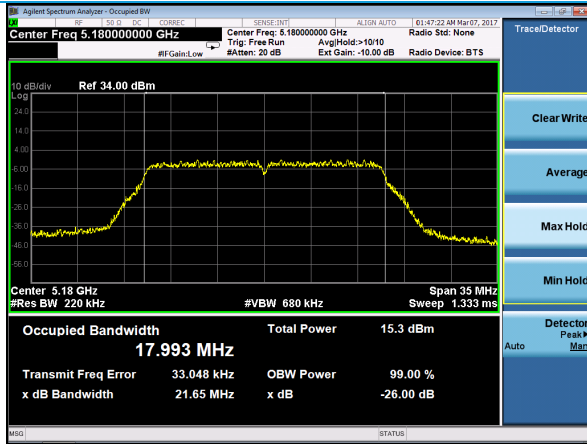
Mid Channel – 802.11a HT-20



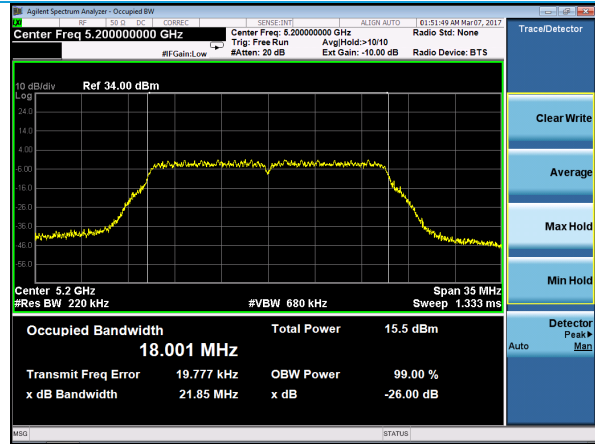
ISED High Channel – 802.11a HT-20



FCC High Channel – 802.11a HT-20



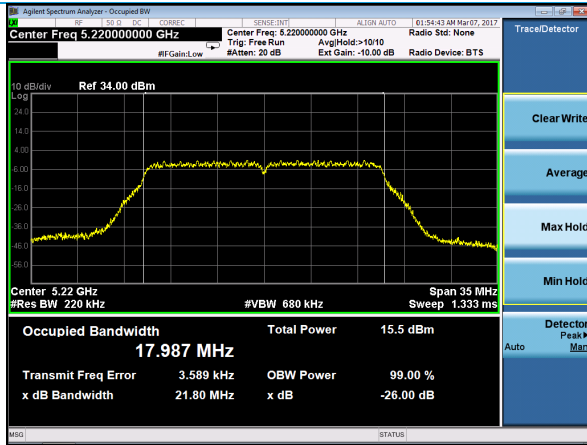
Low Channel – 802.11ac HT-20



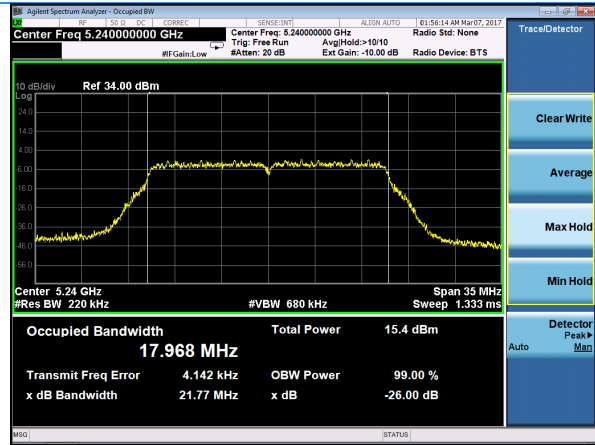
Mid Channel – 802.11ac HT-20



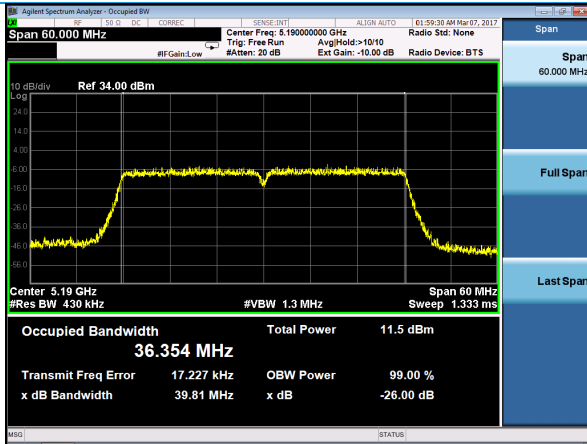
Plots – U-NII-1 EBW (26 dB BW) and OBW (99% BW), continued



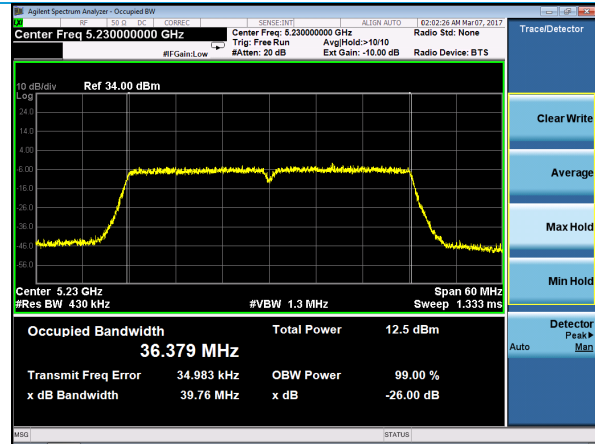
ISED High Channel – 802.11ac HT-20



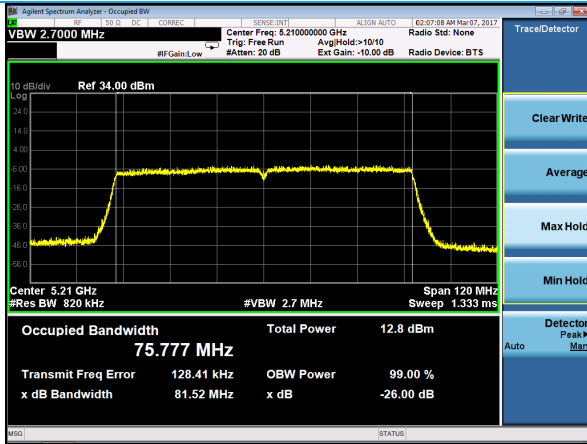
FCC High Channel – 802.11ac HT-20



Low Channel – 802.11ac HT-40



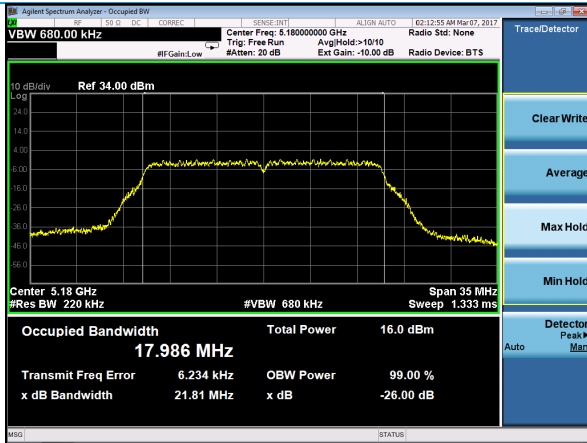
High Channel – 802.11ac HT-40



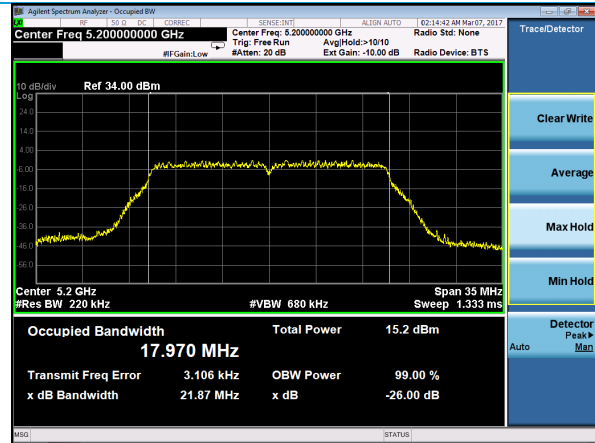
Only Channel – 802.11ac HT-80

Company: LSR a Laird Business	Page 23 of 149	Name: Sterling-LWB5
Report: TR 316356 C (U-NII)		Model: Sterling-LWB5
Job: C-2602		Serial: 00008, 00035

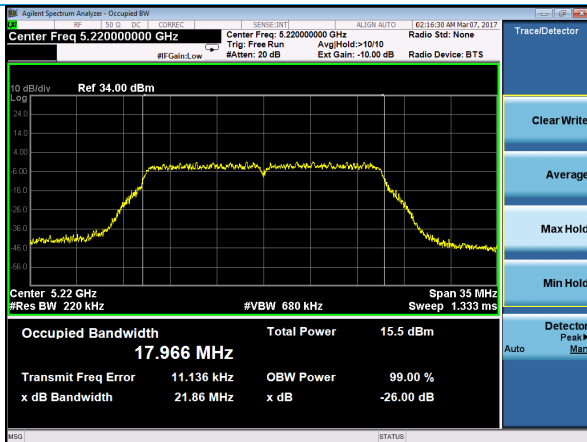
Plots – U-NII-1 EBW (26 dB BW) and OBW (99% BW), continued



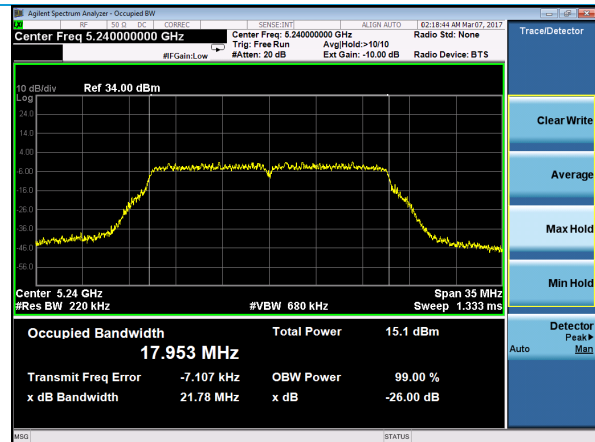
Low Channel – 802.11n HT-20



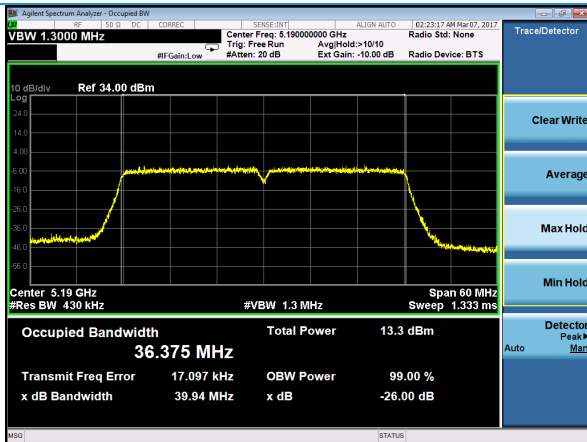
Mid Channel – 802.11n HT-20



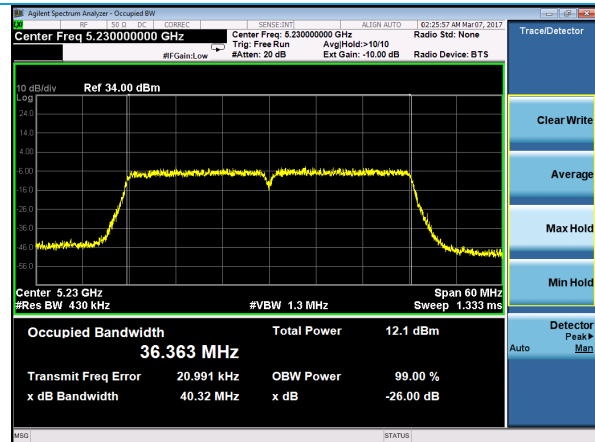
ISED High Channel – 802.11n HT-20



FCC High Channel – 802.11n HT-20



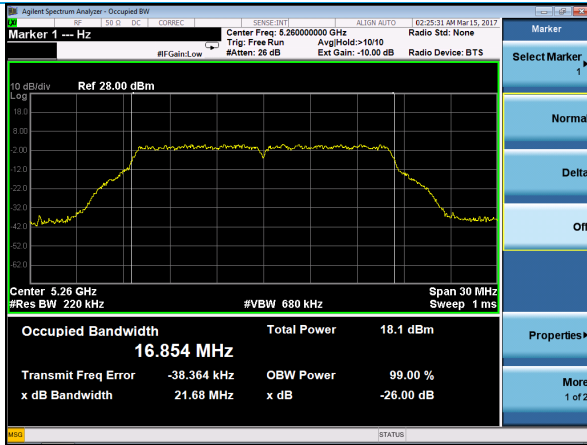
Low Channel – 802.11n HT-40



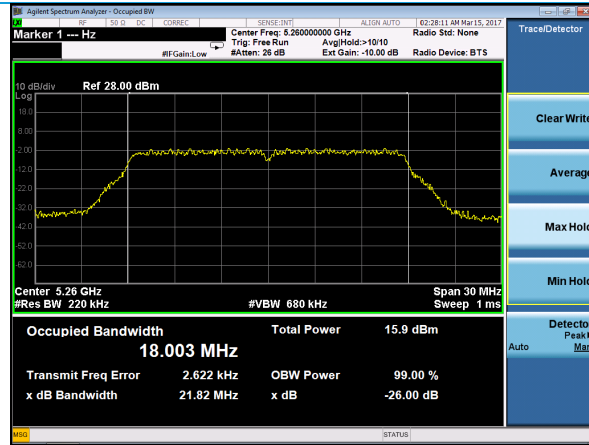
High Channel – 802.11n HT-40



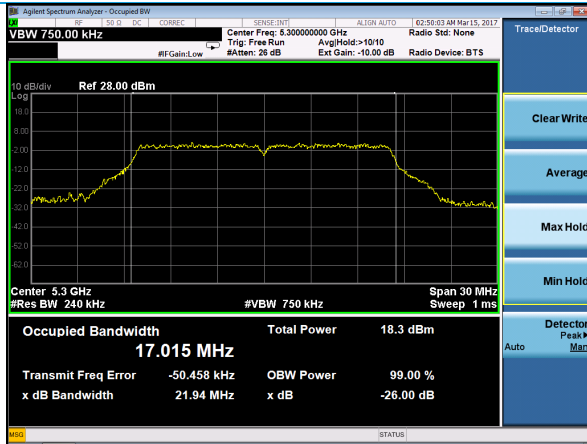
### Plots – U-NII-2A EBW (26 dB BW) and OBW (99% BW)



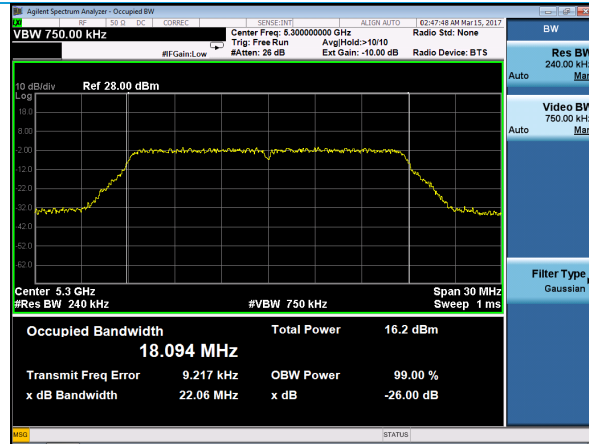
Low Channel – 802.11a HT-20



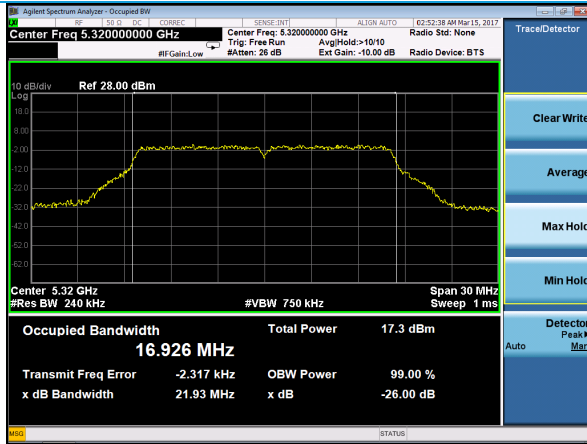
Low Channel 802.11ac HT-20



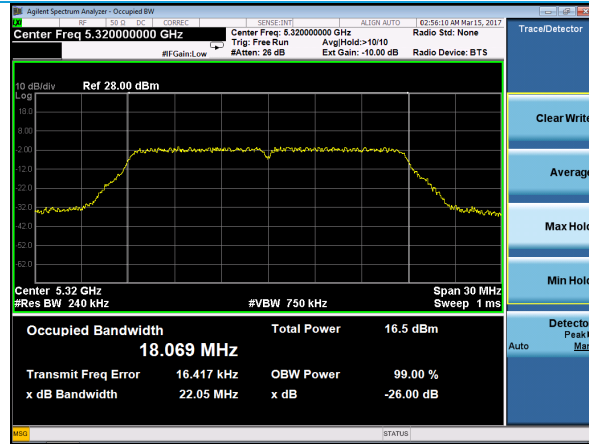
Mid Channel – 802.11a HT-20



Mid Channel – 802.11ac HT-20

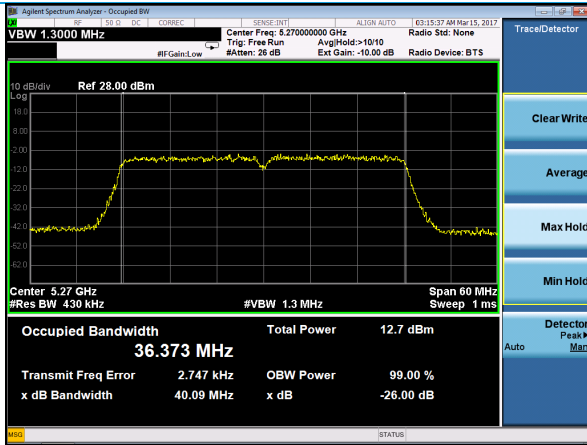


High Channel – 802.11a HT-20

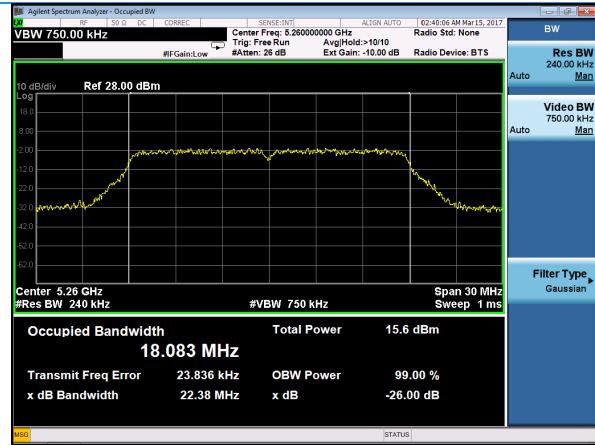


High Channel – 802.11ac HT-20

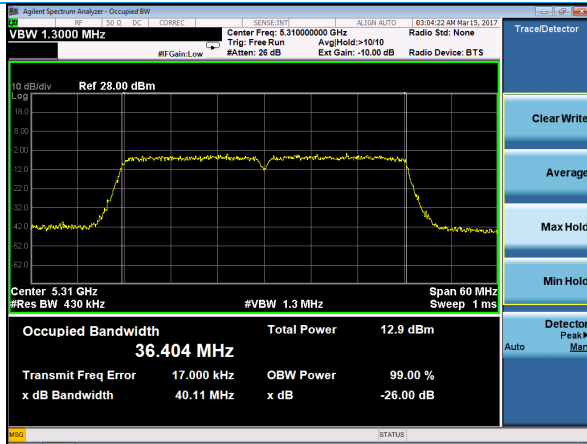
## Plots – U-NII-2A EBW (26 dB BW) and OBW (99% BW), continued



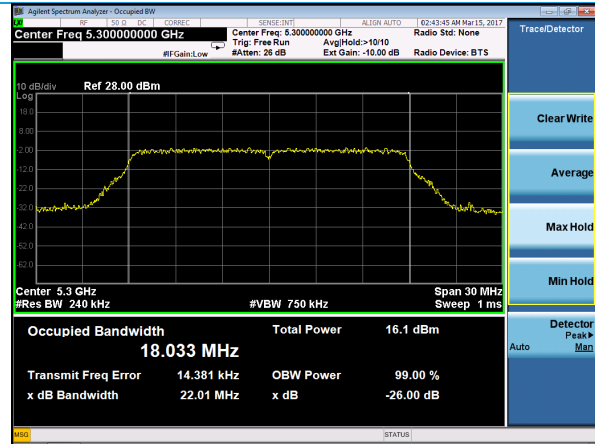
Low Channel – 802.11ac HT-40



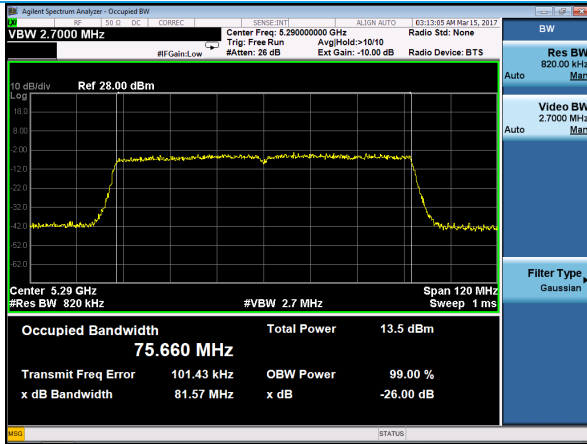
Low Channel – 802.11n HT-20



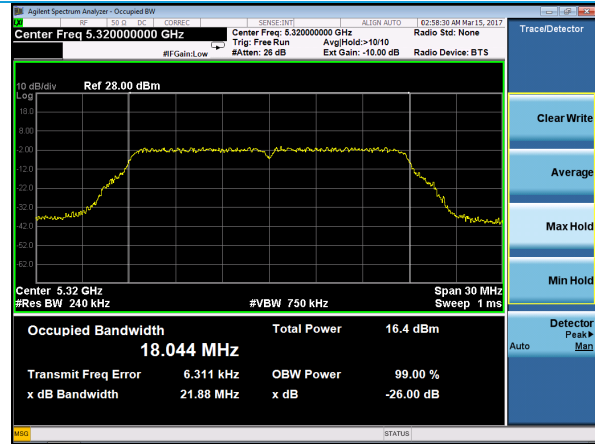
High Channel – 802.11ac HT-40



Mid Channel – 802.11n HT-20

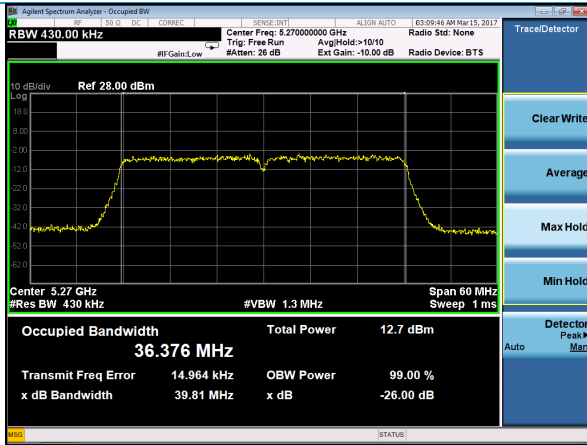


Only Channel – 802.11ac HT-80

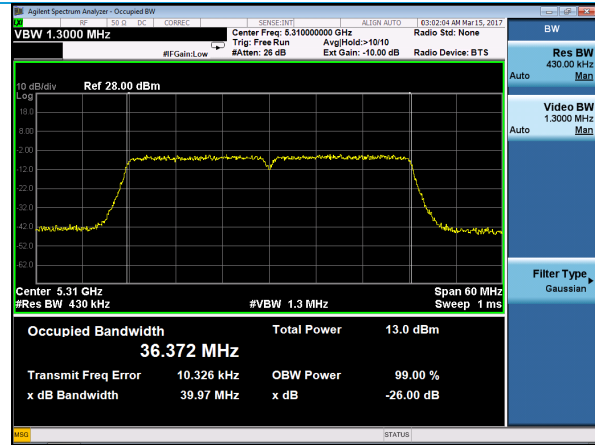


High Channel – 802.11n HT-20

Plots – U-NII-2A EBW (26 dB BW) and OBW (99% BW), continued

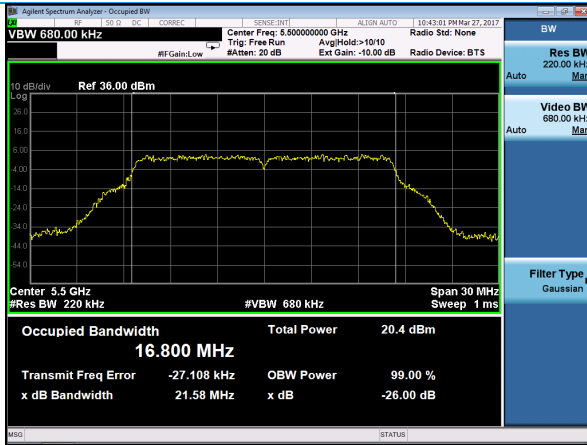


Low Channel – 802.11n HT-40

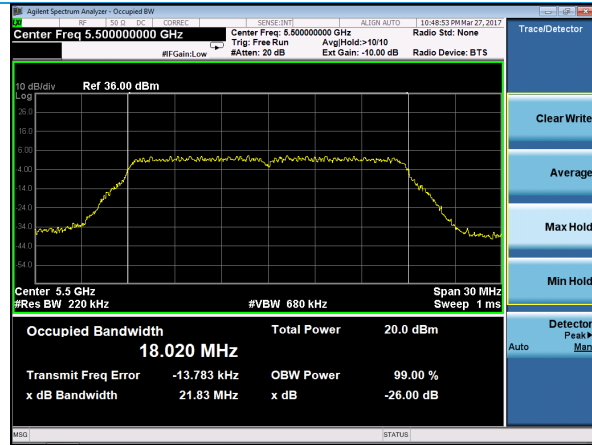


High Channel – 802.11n HT-40

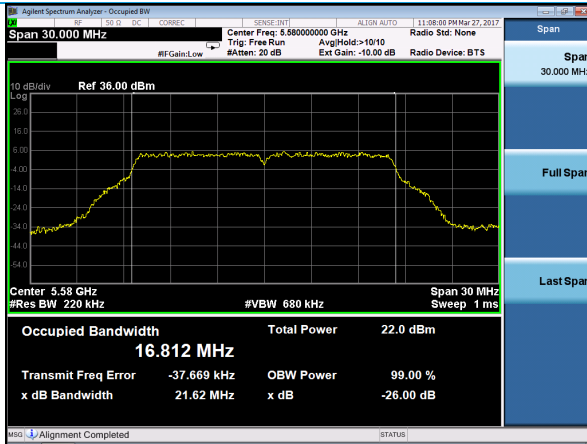
## Plots – U-NII-2C EBW (26 dB BW) and OBW (99% BW)



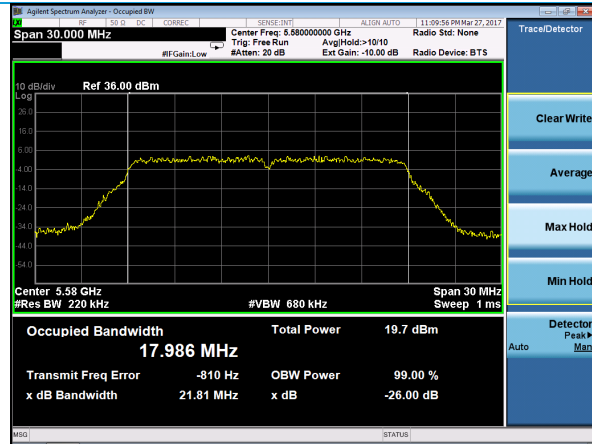
Low Channel – 802.11a HT-20



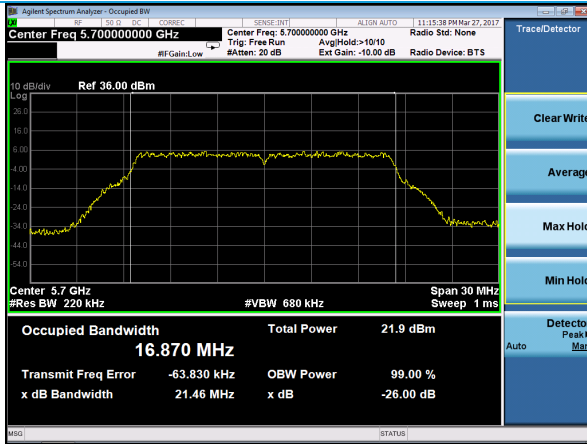
Low Channel – 802.11ac HT-20



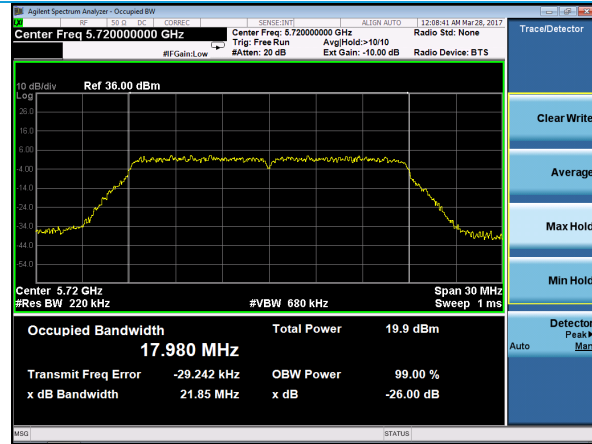
Mid Channel – 802.11a HT-20



Mid Channel – 802.11ac HT-20

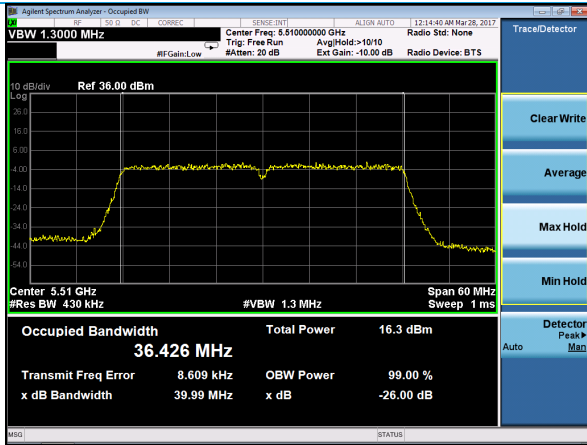


High Channel – 802.11a HT-20

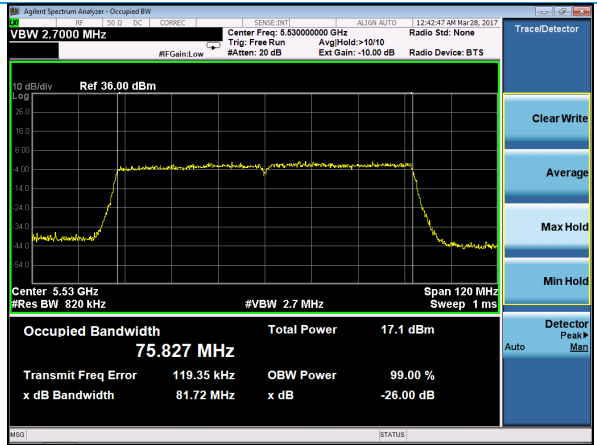


High Channel – 802.11ac HT-20

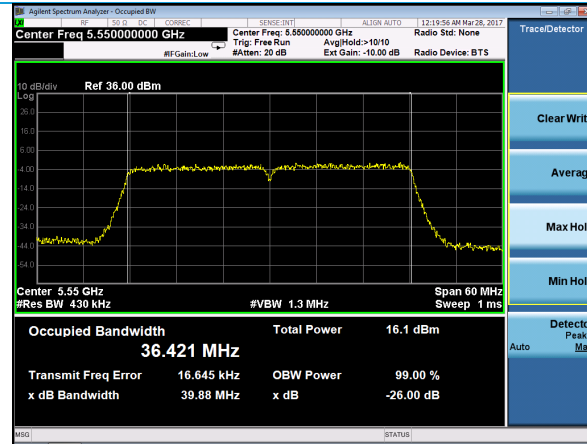
Plots – U-NII-2C EBW (26 dB BW) and OBW (99% BW), continued



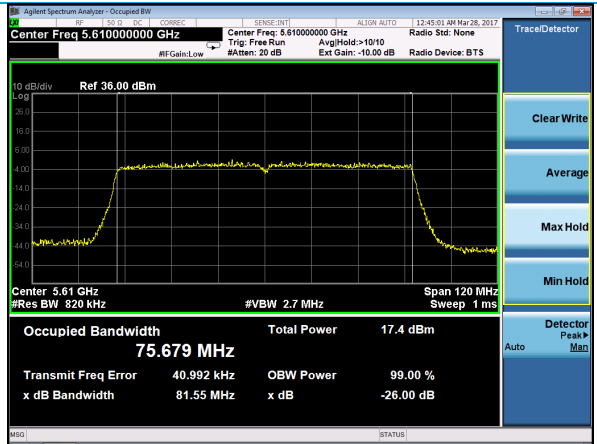
Low Channel – 802.11ac HT-40



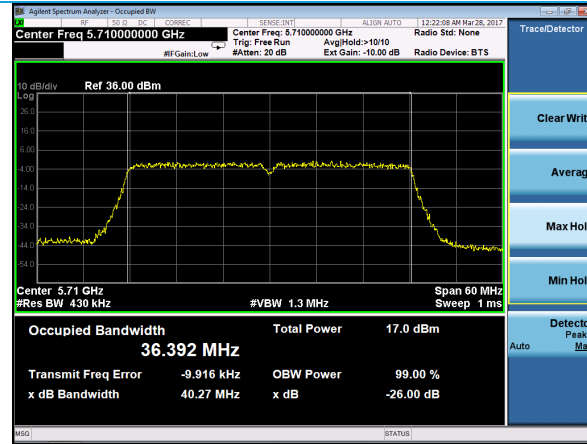
Low Channel – 802.11ac HT-80



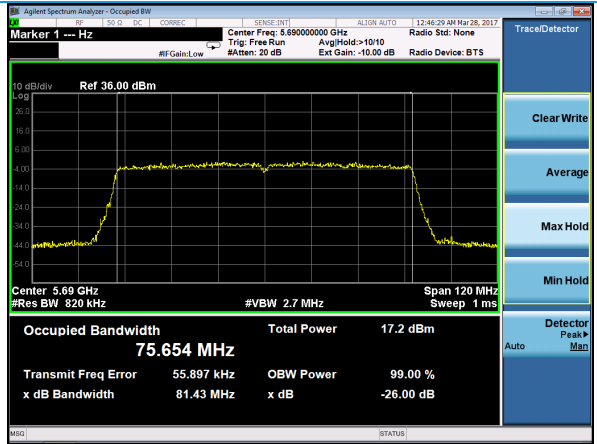
Mid Channel – 802.11ac HT-40



Mid Channel – 802.11ac HT-80

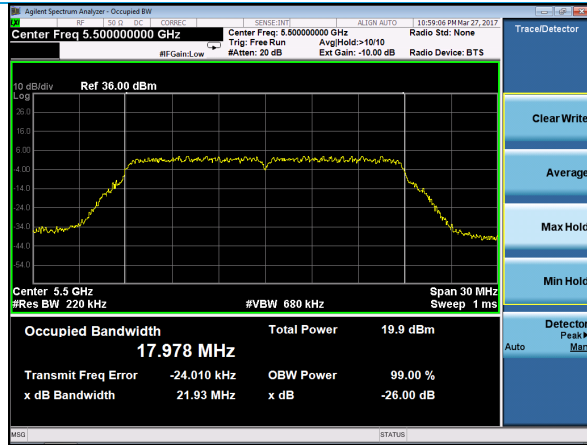


High Channel – 802.11ac HT-40

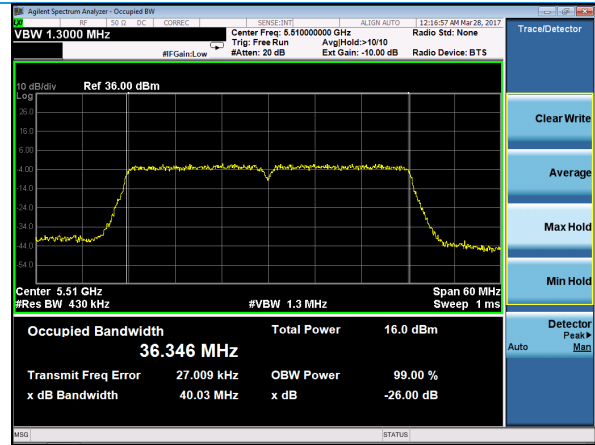


High Channel – 802.11ac HT-80

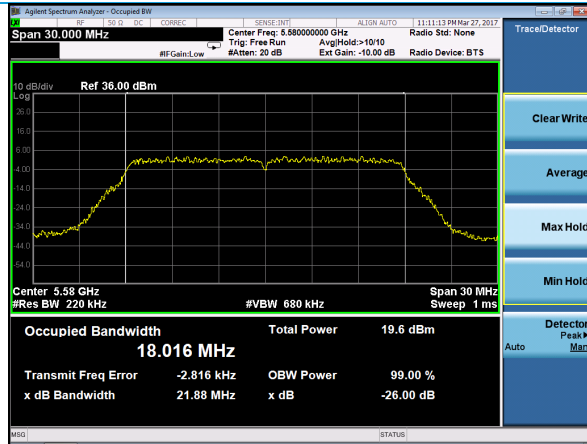
Plots – U-NII-2C EBW (26 dB BW) and OBW (99% BW), continued



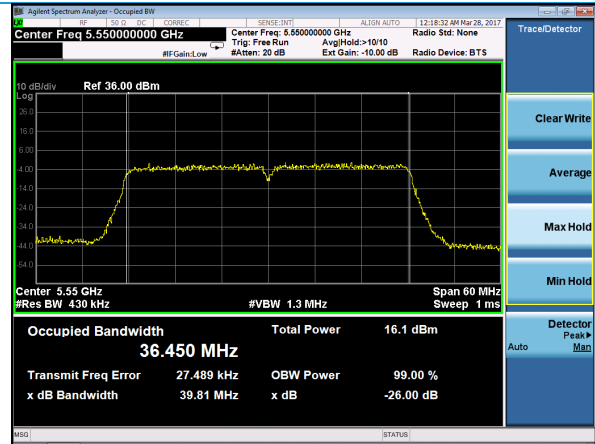
Low Channel – 802.11n HT-20



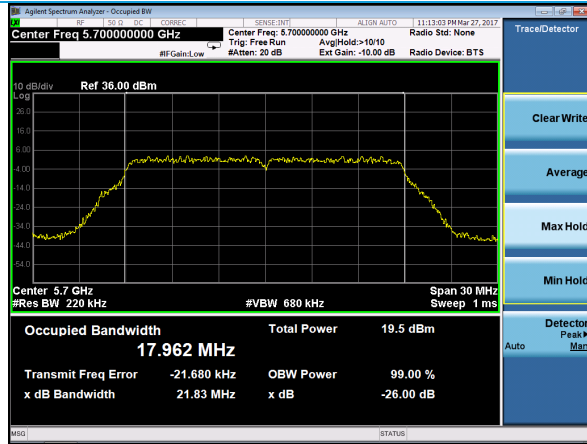
Low Channel – 802.11n HT-40



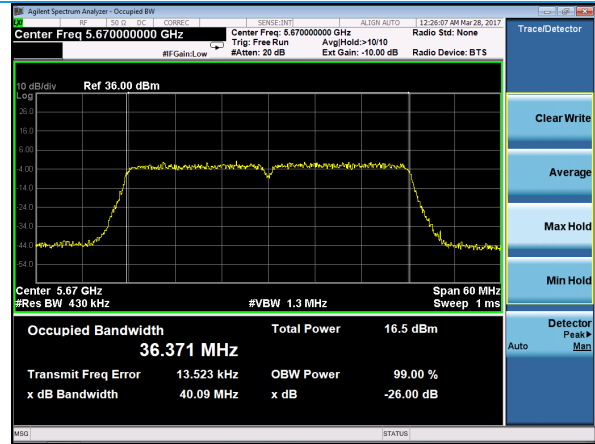
Mid Channel – 802.11n HT-20



Mid Channel – 802.11n HT-40

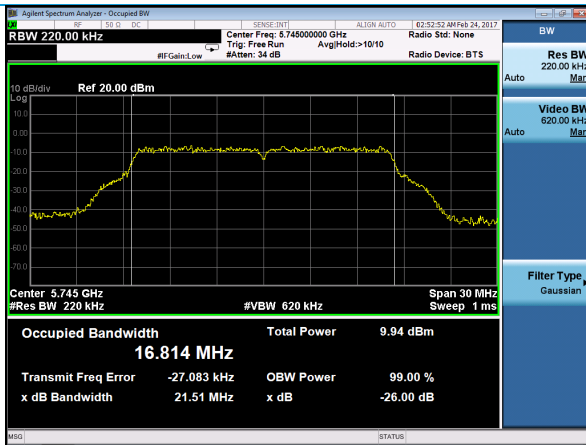


High Channel – 802.11n HT-20

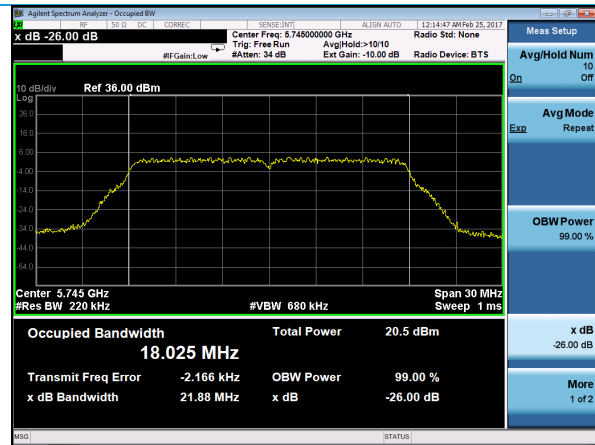


High Channel – 802.11n HT-40

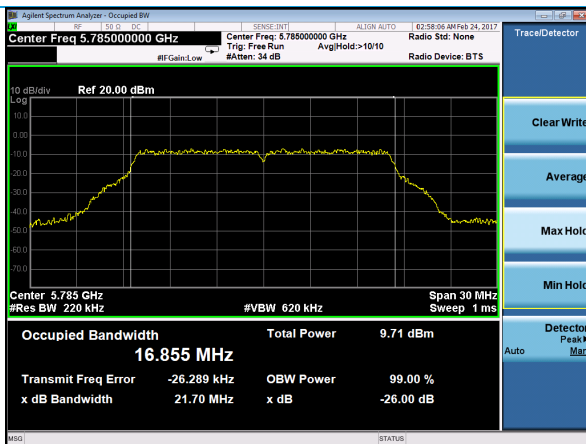
## Plots – U-NII-3 EBW (26 dB BW) and OBW (99% BW)



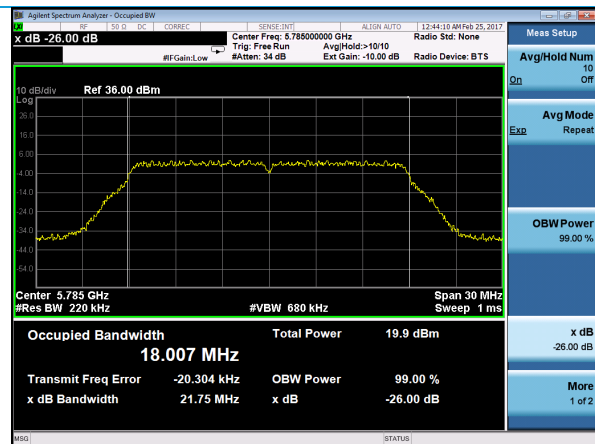
Low Channel – 802.11a HT-20



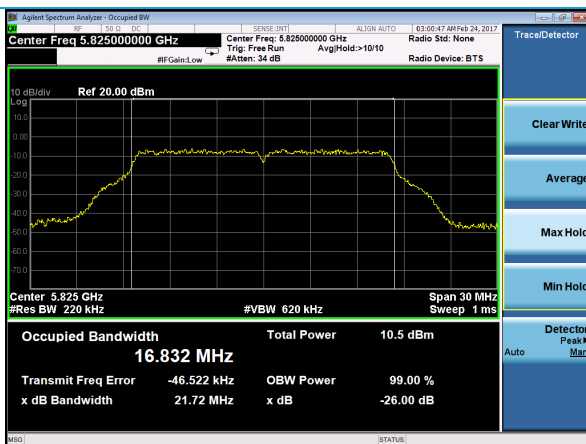
Low Channel – 802.11ac HT-20



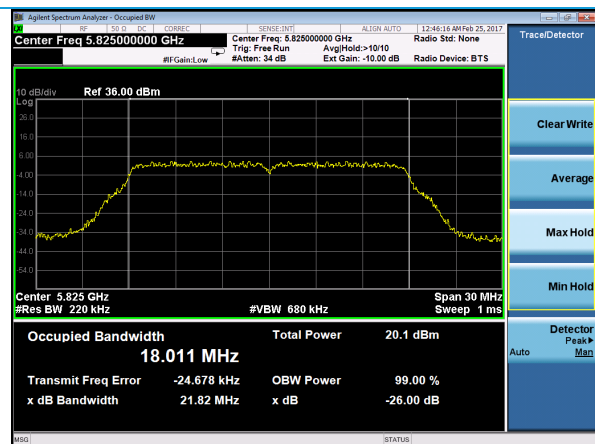
Mid Channel – 802.11a HT-20



Mid Channel – 802.11ac HT-20

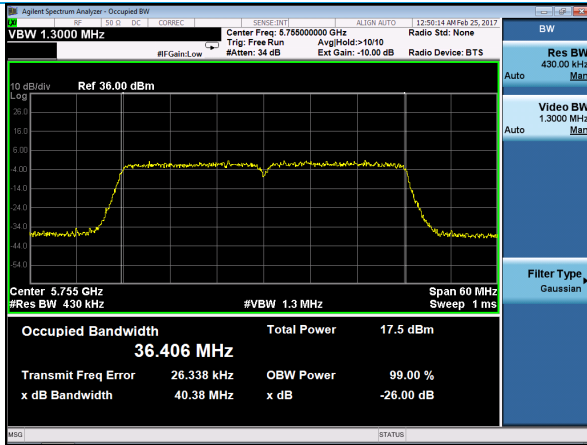


High Channel – 802.11a HT-20

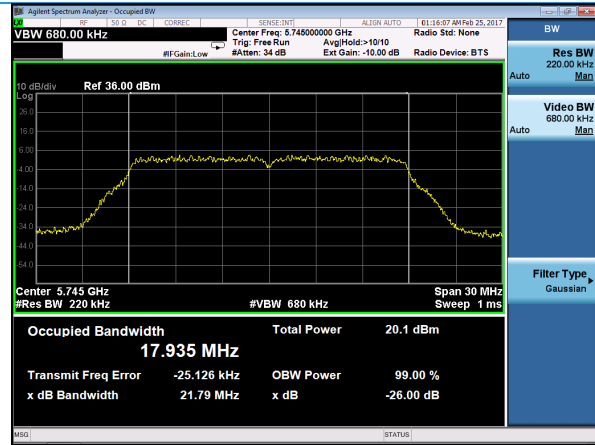


High Channel – 802.11ac HT-20

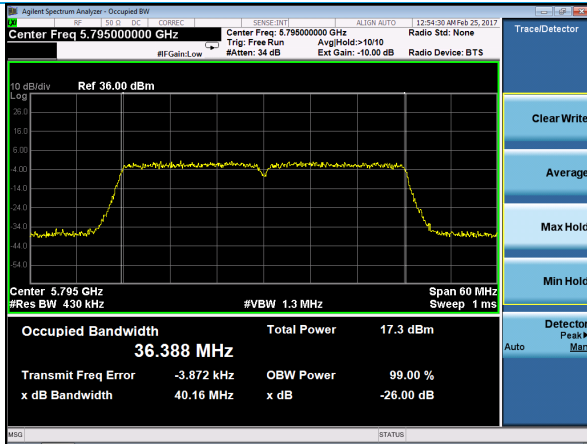
Plots – U-NII-3 EBW (26 dB BW) and OBW (99% BW), continued



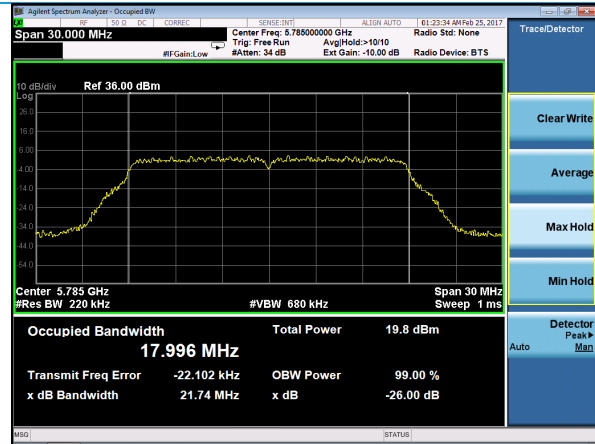
Low Channel – 802.11ac HT-40



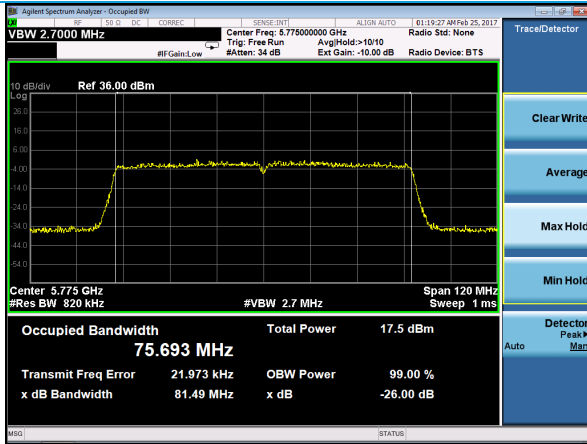
Low Channel – 802.11n HT-20



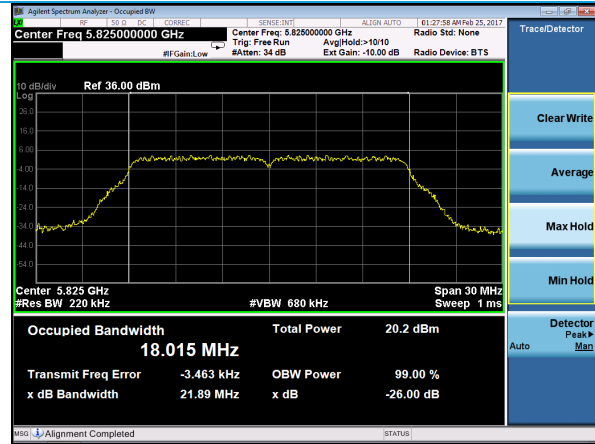
High Channel – 802.11ac HT-40



Mid Channel – 802.11n HT-20



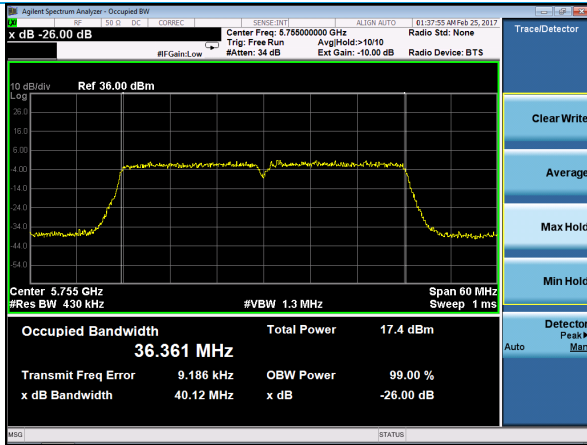
Only Channel – 802.11ac HT-80



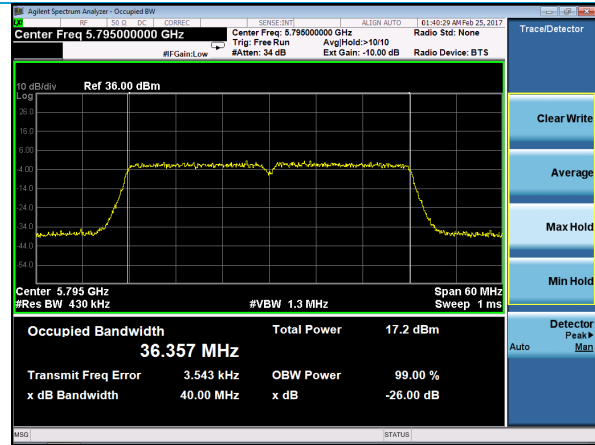
High Channel – 802.11n HT-20



Plots – U-NII-3 EBW (26 dB BW) and OBW (99% BW), continued



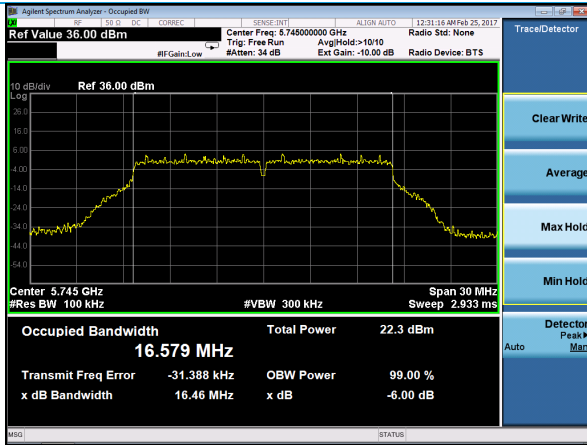
Low Channel – 802.11n HT-40



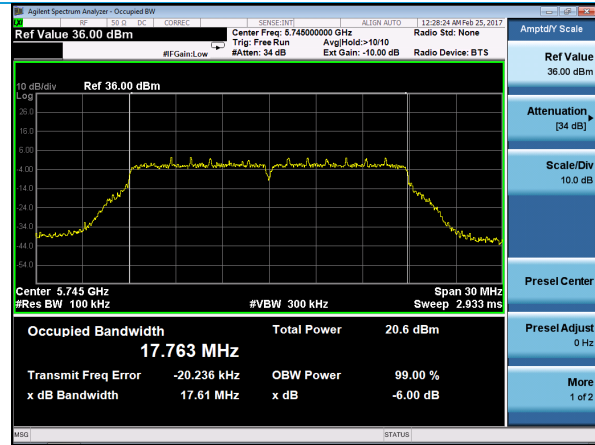
High Channel – 802.11n HT-40

Company: LSR a Laird Business	Page 33 of 149	Name: Sterling-LWB5
Report: TR 316356 C (U-NII)		Model: Sterling-LWB5
Job: C-2602		Serial: 00008, 00035

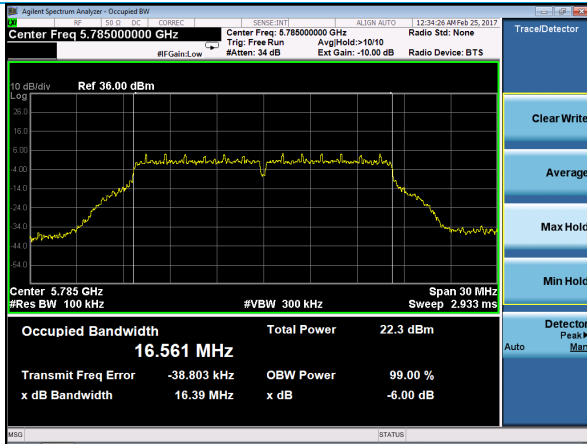
### Plots – U-NII-3 Minimum 6 dB BW



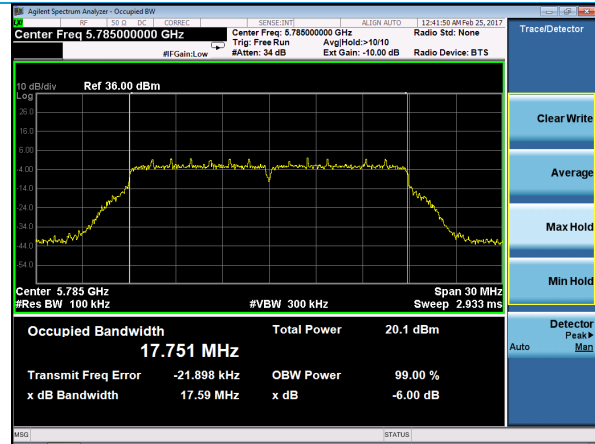
Low Channel – 802.11a HT-20



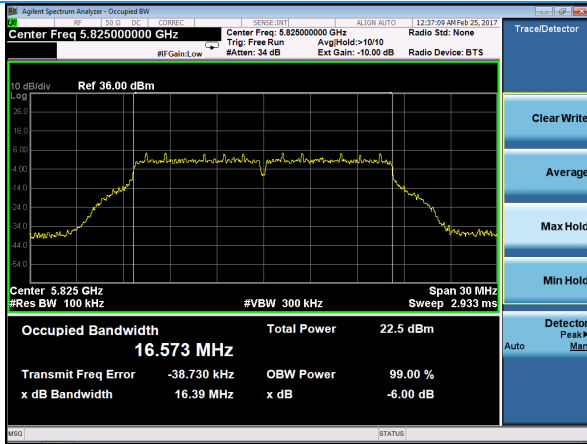
Low Channel – 802.11ac HT-20



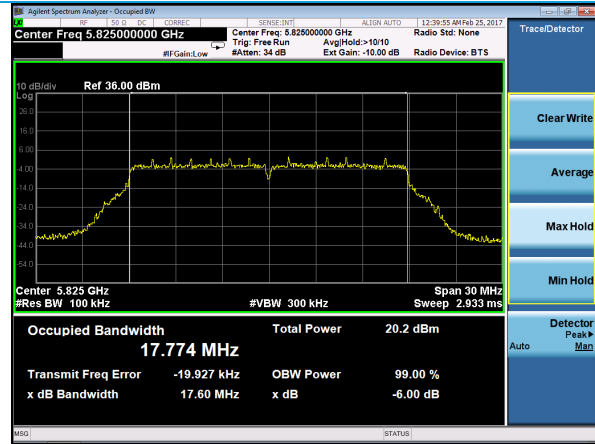
Mid Channel – 802.11a HT-20



Mid Channel – 802.11ac HT-20



High Channel – 802.11a HT-20



High Channel – 802.11ac HT-20