

# NORTHWEST EMC

## Summit Semiconductor LLC

Sherwood XC

FCC 15.407:2016

802.11a SISO Radio Module

Report # FOCU0212



NVLAP Lab Code: 200630-0

*This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government of the United States of America. This Report may only be duplicated in its entirety*

# CERTIFICATE OF TEST

**Last Date of Test: May 03, 2016**  
**Summit Semiconductor LLC**  
**Model: Sherwood XC**

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.407:2016	ANSI C63.10:2013, KDB 789033, KDB 905462


### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for permissive change
6.5, 6.6, 12.7	Spurious Radiated Emissions	Yes	Pass	
6.8	Frequency Stability	No	N/A	Not required for permissive change
12.2	Duty Cycle	Yes	Pass	
12.3.2.4	Maximum Conducted Output Power	Yes	Pass	
12.4.1	Emission Bandwidth	No	N/A	Not required for permissive change
12.4.2	Occupied Bandwidth	Yes	Pass	
12.4.2	Band Edge	Yes	Pass	
12.5	Maximum Power Spectral Density	Yes	Pass	
KDB 789033 -H	Measurement of Emission at Elevation Angle Higher Than 30 Degrees From Horizon	No	N/A	Not required unless the EUT is a Master device used outdoors.

### Deviations From Test Standards

None

### Approved By:



Kyle Holgate, Operations Manager

*Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.*

# REVISION HISTORY

Revision Number		Description	Date	Page Number
00		None		

# ACCREDITATIONS AND AUTHORIZATIONS

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## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Northwest EMC to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

**IC** - Recognized by Industry Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with IC.

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## European Union

**European Commission** – Validated by the European Commission as a Notified Body under the R&TTE Directive.

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## Australia/New Zealand

**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

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## Korea

**MSIP / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

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## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

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## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

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## Israel

**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

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## Hong Kong

**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

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## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

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## SCOPE

For details on the Scopes of our Accreditations, please visit:

<http://www.nwemc.com/accreditations/>  
<http://gsi.nist.gov/global/docs/cabs/designations.html>

# MEASUREMENT UNCERTAINTY

## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty ( $K=2$ ) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

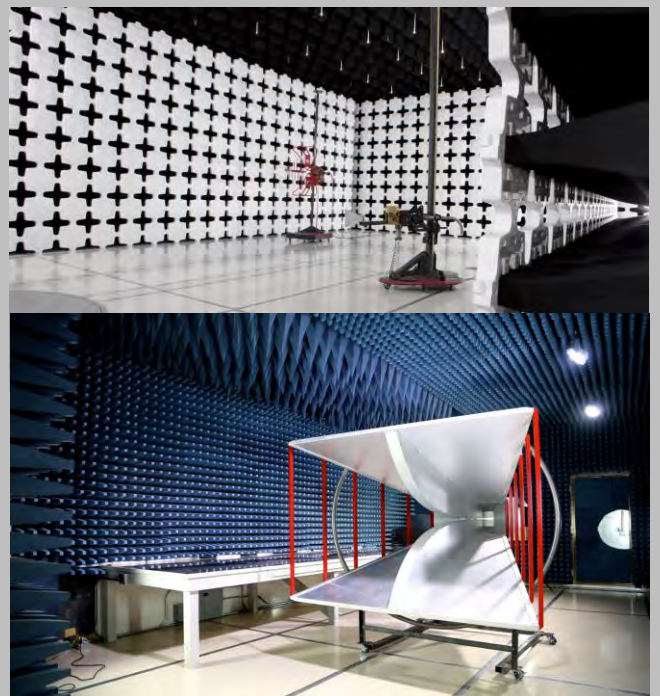
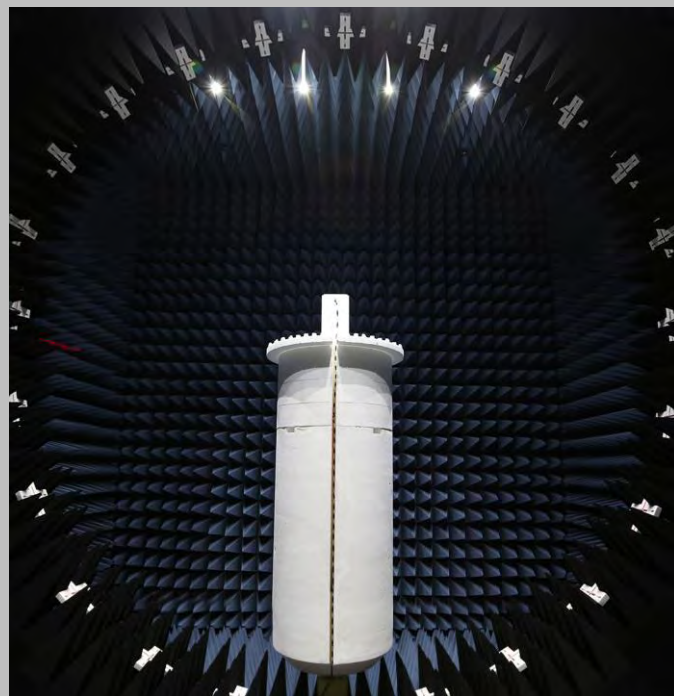
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

# FACILITIES



<b>California</b> Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>NVLAP</b>					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
<b>Industry Canada</b>					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
<b>BSMI</b>					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA</b>					
US0158	US0175	N/A	US0017	US0191	US0157





# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Summit Semiconductor LLC
<b>Address:</b>	20575 NW Von Neumann Dr., Suite 100
<b>City, State, Zip:</b>	Beaverton, OR 97006
<b>Test Requested By:</b>	Kenneth Boehlke
<b>Model:</b>	Sherwood XC
<b>First Date of Test:</b>	April 20, 2016
<b>Last Date of Test:</b>	May 04, 2016
<b>Receipt Date of Samples:</b>	April 19, 2016
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage

## Information Provided by the Party Requesting the Test

<b>Functional Description of the EUT:</b>
Master device operating in the UNII bands. The radio has 1 antenna and a monitor radio which shares the single antenna with the working radio. Previously certified under the old rules.
<b>Testing Objective:</b>
To demonstrate compliance of the 802.11a radio under FCC 15.407 for operation in the 5.8 GHz band.

# CONFIGURATIONS

## Configuration FOCU0212- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Radio Module (Sherwood XC)	Summit Semiconductor LLC	444-2251	02EA3F000C28

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop DFS (Dell)	Dell	Latitude D820	None
AC/DC Adapter DFS (DELL)	Replacement AC Adaptor	AC-PA-10	None
Sherwood XC-Bridge	Summit Semiconductor LLC	None	None
Power Supply (Master)	CONDOR	STD-1836P	SA-183A6IV
Raspberry Pi	Authentic SWAG Electronics	Model B	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power Cable (Laptop)	No	2.0m	No	AC mains	AC/DC Power Adapter (Dell)
DC Power Cable (Laptop)	Unknown	2.0m	Yes	AC/DC Power Adapter (Dell)	Laptop
Serial Cable	No	1.6m	No	Sherwood XC-Bridge	Laptop DFS
AC Power Cable (Sherwood XC)	No	0.8m	No	AC/DC Power Adapter	AC mains
DC Power Cable (Sherwood XC)	No	1.6m	Yes	Sherwood XC-Bridge	AC/DC Power Adapter
I/O Cable	No	0.9m	No	Raspberry Pi	Development Board (Sherwood XC)
USB Cable	Yes	1.2m	No	Raspberry Pi	Laptop
DC USB Power	Yes	1.0m	No	Raspberry Pi	AC/DC Power Adapter
Ethernet Cable	No	1.5m	No	Raspberry Pi	Laptop



# CONFIGURATIONS

## Configuration FOCU0212- 2

Software/Firmware Running during test	
Description	Version
RA	2.4.1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Radio Module (Sherwood XC)	Summit Semiconductor LLC	444-2251	02EA3F0009AB

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Power Supply (Master)	CONDOR	STD-1836P	SA-183A6IV

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power Cable (Sherwood XC)	No	0.8m	No	AC/DC Power Adapter	AC mains
DC Power Cable (Sherwood XC)	No	1.6m	Yes	Sherwood XC-Bridge	AC/DC Power Adapter

# MODIFICATIONS

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/20/2016	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
2	4/20/2016	Maximum Conducted Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
3	4/20/2016	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
4	4/20/2016	Band Edge	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
5	4/20/2016	Maximum Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Northwest EMC following the test.
6	5/03/2016	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## CHANNELS OF OPERATION

High Channel, 5825 MHz

Mid Channel, 5785 MHz

Low Channel, 5745 MHz

## MODES OF OPERATION

6 Mbps

18 Mbps

36 Mbps

## CONFIGURATIONS INVESTIGATED

FOCU0212 - 2

## FREQUENCY RANGE INVESTIGATED

Start Frequency 30 MHz

Stop Frequency 40000 MHz

## SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Attenuator	S.M. Electronics	SA18N-06/SM4032	REE	10/1/2015	12 mo
Meter - Power	Gigatronics	8651A	SPM	5/25/2015	12 mo
Power Sensor	Gigatronics	80701A	SPL	5/25/2015	12 mo
Generator - Signal	Keysight	N5182B	TFU	NCR	0 mo
Cable	ESM Cable Corp.	TTBJ-141-KMKM-72	EV3	6/24/2015	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2/3/2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	4/22/2016	12 mo
Cable	ESM Cable Corp.	KMKM-72	EVE	6/6/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	JSW45-26004000-40-5P	PAE	6/6/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-10	AIW	NCR	0 mo
Cable	ESM Cable Corp.	KMKM-72	EVY	11/4/2015	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	11/4/2015	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Cable	None	Standard Gain Horns Cable	EVF	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVC	3/11/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Attenuator	Coaxicom	3910-20	AXZ	5/24/2015	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	3/11/2016	12 mo
Antenna - Double Ridge	EMCO	3115	AHC	6/13/2014	24 mo
Cable	N/A	Bilog Cables	EVA	3/11/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	3/11/2016	12 mo
Antenna - Biconilog	EMCO	3141	AXE	8/29/2014	24 mo

## TEST DESCRIPTION

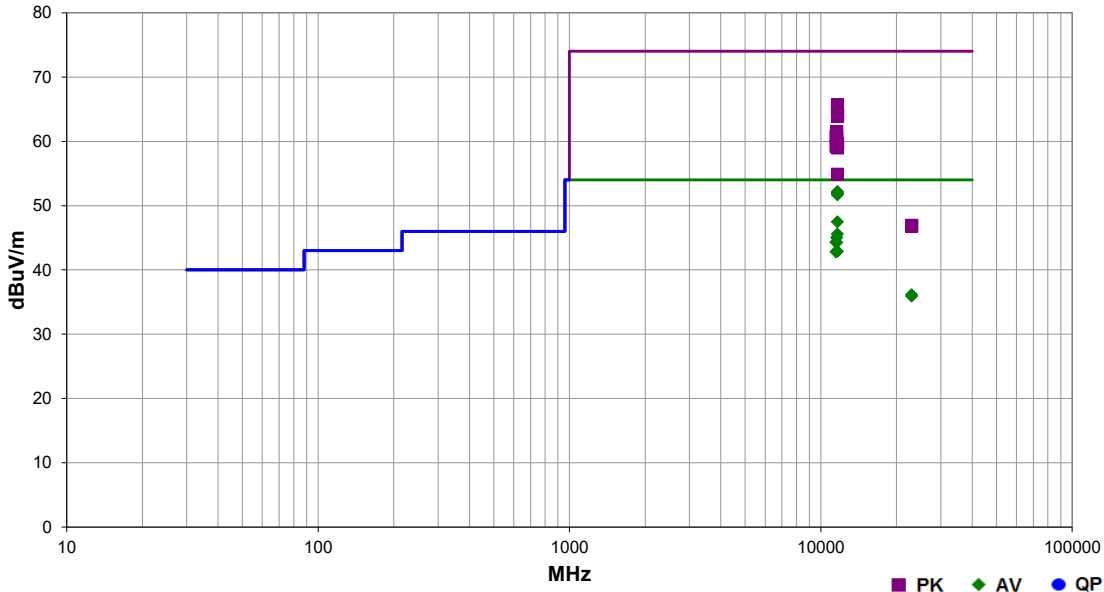
The highest gain antenna of each type to be used with the EUT were tested. The EUT was configured for the lowest, a middle, and the highest transmit frequency in each operational band. For each configuration, the spectrum was scanned throughout the specified range. Measurements were made to satisfy the three requirements of 47 CFR 15.407: Field strength under 1GHz, Restricted Bands of 47 CFR 15.205, and EIRP of 47 CFR 15.407.

While scanning, emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis, and adjusting the measurement antenna height and polarization (per ANSI C63.10:2009). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Work Order:	FOCU0212	Date:	05/03/16	<i>Rod Pelouquin</i>
Project:	None	Temperature:	22.7 °C	
Job Site:	EV01	Humidity:	46.1% RH	
Serial Number:	02EA3F0009AB	Barometric Pres.:	1020 mbar	
EUT:	Sherwood XC			
Configuration:	2			
Customer:	Summit Semiconductor LLC			
Attendees:	David Schilling			
EUT Power:	110VAC/60Hz			
Operating Mode:	Tx			
Deviations:	None			
Comments:	Please reference data comments for EUT orientation, data rate and frequency.			

Test Specifications	Test Method
FCC 15.407:2016	ANSI C63.10:2013

Run #	14	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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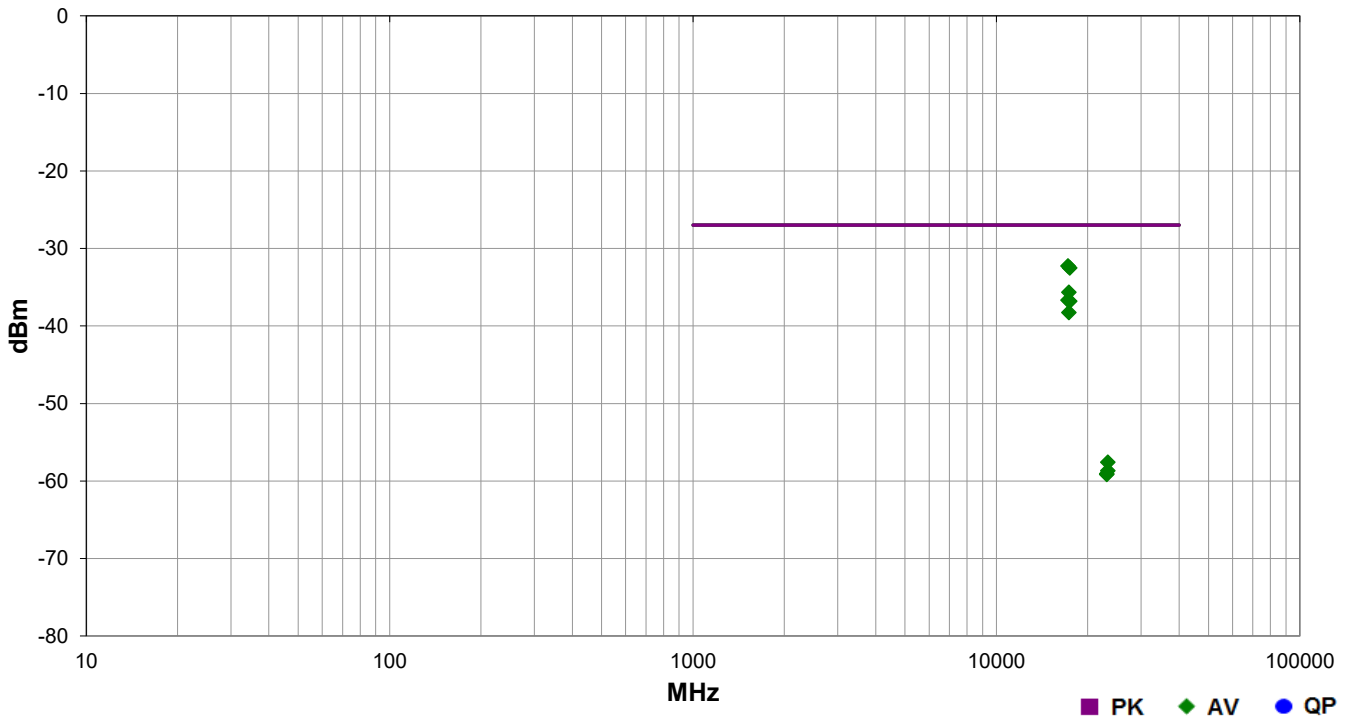


Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
11648.530	50.2	2.0	1.8	327.0	3.0	0.0	Horz	AV	0.0	52.2	54.0	-1.8	EUT On Side, High Channel, 6 Mbps
11648.620	50.0	2.0	2.0	238.0	3.0	0.0	Vert	AV	0.0	52.0	54.0	-2.0	EUT Horizontal, High Channel, 6 Mbps
11648.580	49.9	2.0	1.6	328.0	3.0	0.0	Horz	AV	0.0	51.9	54.0	-2.1	EUT On Side, High Channel, 18 Mbps
11648.680	49.7	2.0	1.6	329.0	3.0	0.0	Horz	AV	0.0	51.7	54.0	-2.3	EUT On Side, High Channel, 36 Mbps
11648.580	45.5	2.0	1.4	278.0	3.0	0.0	Vert	AV	0.0	47.5	54.0	-6.5	EUT Vertical, High Channel, 6 Mbps
11648.730	63.7	2.0	1.8	327.0	3.0	0.0	Horz	PK	0.0	65.7	74.0	-8.3	EUT On Side, High Channel, 6 Mbps
11648.580	43.6	2.0	2.4	203.0	3.0	0.0	Horz	AV	0.0	45.6	54.0	-8.4	EUT Horizontal, High Channel, 6 Mbps
11648.480	63.1	2.0	2.0	238.0	3.0	0.0	Vert	PK	0.0	65.1	74.0	-8.9	EUT Horizontal, High Channel, 6 Mbps
11568.560	43.8	1.2	1.8	328.0	3.0	0.0	Horz	AV	0.0	45.0	54.0	-9.0	EUT On Side, Mid Channel, 6 Mbps
11488.580	43.9	0.4	2.1	224.0	3.0	0.0	Vert	AV	0.0	44.3	54.0	-9.7	EUT Horizontal, Low Channel, 6 Mbps
11571.080	43.0	1.2	2.1	234.0	3.0	0.0	Vert	AV	0.0	44.2	54.0	-9.8	EUT Horizontal, Mid Channel, 6 Mbps
11651.680	62.2	2.0	1.6	328.0	3.0	0.0	Horz	PK	0.0	64.2	74.0	-9.8	EUT On Side, High Channel, 18 Mbps
11649.090	61.9	2.0	1.6	329.0	3.0	0.0	Horz	PK	0.0	63.9	74.0	-10.1	EUT On Side, High Channel, 36 Mbps
11648.530	40.9	2.0	1.1	276.0	3.0	0.0	Vert	AV	0.0	42.9	54.0	-11.1	EUT On Side, High Channel, 6 Mbps
11488.520	42.4	0.4	1.5	328.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	EUT On side, Low Channel, 6 Mbps
11569.590	60.3	1.2	1.8	328.0	3.0	0.0	Horz	PK	0.0	61.5	74.0	-12.5	EUT On Side, Mid Channel, 6 Mbps
11491.820	60.3	0.5	2.1	224.0	3.0	0.0	Vert	PK	0.0	60.8	74.0	-13.2	EUT Horizontal, Low Channel, 6 Mbps
11567.980	59.2	1.2	2.1	234.0	3.0	0.0	Vert	PK	0.0	60.4	74.0	-13.6	EUT Horizontal, Mid Channel, 6 Mbps
11652.430	57.6	2.0	2.4	203.0	3.0	0.0	Horz	PK	0.0	59.6	74.0	-14.4	EUT Horizontal, High Channel, 6 Mbps
11491.870	58.8	0.5	1.5	328.0	3.0	0.0	Horz	PK	0.0	59.3	74.0	-14.7	EUT On side, Low Channel, 6 Mbps
11647.850	57.0	2.0	1.4	278.0	3.0	0.0	Vert	PK	0.0	59.0	74.0	-15.0	EUT Vertical, High Channel, 6 Mbps
22977.720	34.5	1.6	1.6	242.0	3.0	0.0	Horz	AV	0.0	36.1	54.0	-17.9	EUT On Side, Low Channel, 6 Mbps
22976.270	34.3	1.6	1.6	186.0	3.0	0.0	Vert	AV	0.0	35.9	54.0	-18.1	EUT Horizontal, Low Channel, 6 Mbps
11649.080	52.9	2.0	1.1	276.0	3.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1	EUT On Side, High Channel, 6 Mbps
22979.580	45.3	1.6	1.6	242.0	3.0	0.0	Horz	PK	0.0	46.9	74.0	-27.1	EUT On Side, Low Channel, 6 Mbps
22979.080	45.2	1.6	1.6	186.0	3.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	EUT Horizontal, Low Channel, 6 Mbps


Work Order:	FOCU0212	Date:	05/03/16	<i>Rod Pelouquin</i>
Project:	None	Temperature:	22.7 °C	
Job Site:	EV01	Humidity:	46.1% RH	
Serial Number:	02EA3F0009AB	Barometric Pres.:	1020 mbar	
EUT:	Sherwood XC			Tested by: Luke Richardson, Rod Pelouquin
Configuration:	2			
Customer:	Summit Semiconductor LLC			
Attendees:	David Schilling			
EUT Power:	110VAC/60Hz			
Operating Mode:	Tx			
Deviations:	None			
Comments:	Please reference data comments for EUT orientation, data rate and frequency.			

Test Specifications	Test Method
FCC 15.407:2016	ANSI C63.10:2013

Run #	18	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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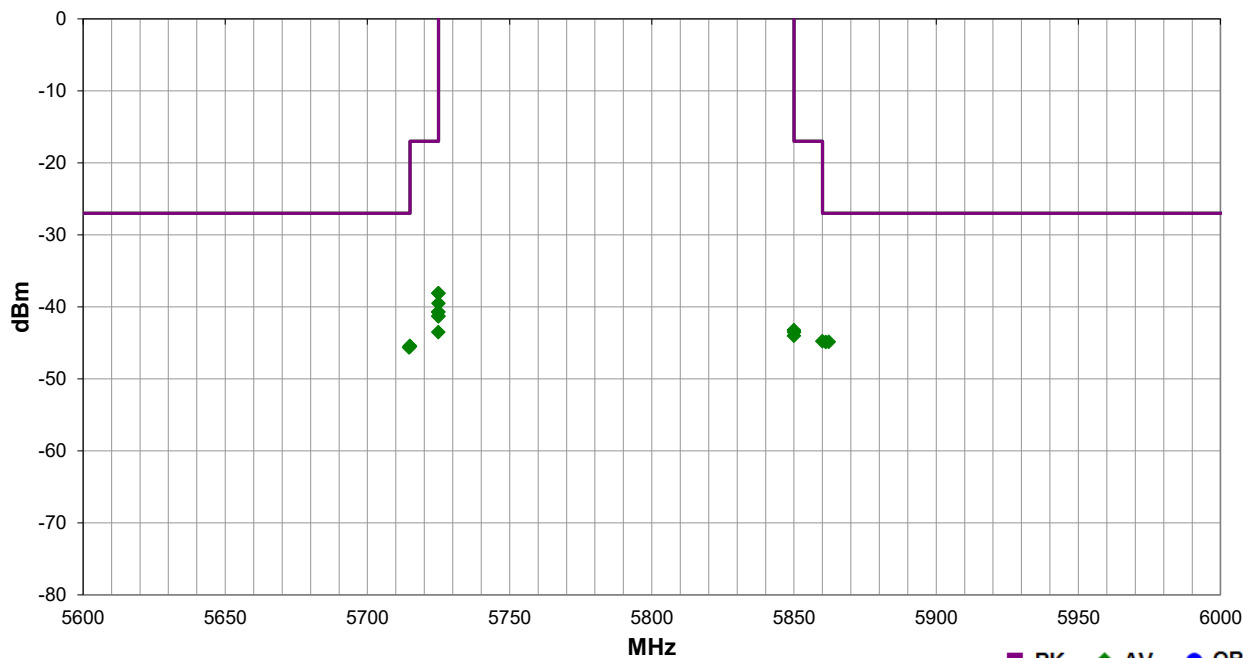


Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
17234.870	1.6	261.0	Horz	AV	5.93E-07	-32.3	-27.0	-5.3	EUT On Side, Mid Channel, 6 Mbps
17474.920	1.5	248.0	Horz	AV	5.60E-07	-32.5	-27.0	-5.5	EUT On Side, High Channel, 6 Mbps
17350.920	1.5	250.0	Horz	AV	2.71E-07	-35.7	-27.0	-8.7	EUT On Side, Mid Channel, 6 Mbps
17234.970	1.7	301.0	Vert	AV	2.15E-07	-36.7	-27.0	-9.7	EUT Horizontal, Low Channel, 6 Mbps
17474.930	1.7	305.0	Vert	AV	2.08E-07	-36.8	-27.0	-9.8	EUT On Side, Mid Channel, 6 Mbps
17351.150	1.7	321.0	Vert	AV	1.49E-07	-38.3	-27.0	-11.3	EUT Horizontal, Mid Channel, 6 Mbps
23297.530	1.6	217.0	Horz	AV	1.74E-09	-57.6	-27.0	-30.6	High Channel, EUT On Side, 6 Mbps
23298.590	1.6	264.0	Vert	AV	1.35E-09	-58.7	-27.0	-31.7	High Channel, EUT Horizontal, 6 Mbps
23139.170	1.7	4.0	Horz	AV	1.24E-09	-59.1	-27.0	-32.1	Mid Channel, EUT On Side, 6 Mbps
23138.630	1.7	169.0	Vert	AV	1.21E-09	-59.2	-27.0	-32.2	Mid Channel, EUT Horizontal, 6 Mbps

<b>Work Order:</b>	FOCU0212	<b>Date:</b>	05/04/16	
<b>Project:</b>	None	<b>Temperature:</b>	23.1 °C	
<b>Job Site:</b>	EV01	<b>Humidity:</b>	44.7% RH	
<b>Serial Number:</b>	02EA3F0009AB	<b>Barometric Pres.:</b>	1019 mbar	
<b>EUT:</b>	Sherwood XC			<b>Tested by:</b> Luke Richardson, Rod Peloquin
<b>Configuration:</b>	2			
<b>Customer:</b>	Summit Semiconductor LLC			
<b>Attendees:</b>	David Schilling			
<b>EUT Power:</b>	110VAC/60Hz			
<b>Operating Mode:</b>	Tx			
<b>Deviations:</b>	None			
<b>Comments:</b>	Please reference data comments for EUT orientation, data rate and frequency.			

Test Specifications	Test Method
FCC 15.407:2016	ANSI C63.10:2013

Run #	30	Test Distance (m)	1	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Antenna Height (meters)	Azimuth (degrees)	Polarity/ Transducer Type	Detector	EIRP (Watts)	EIRP (dBm)	Spec. Limit (dBm)	Compared to Spec. (dB)	Comments
5860.013	2.0	0.0	Vert	AV	3.32E-08	-44.8	-27.0	-17.8	EUT Horizontal, Low Channel, 6 Mbps
5862.260	1.8	360.0	Vert	AV	3.25E-08	-44.9	-27.0	-17.9	EUT Horizontal, Low Channel, 18 Mbps
5861.167	1.8	360.0	Vert	AV	3.25E-08	-44.9	-27.0	-17.9	EUT Horizontal, Low Channel, 36 Mbps
5714.913	1.8	335.0	Vert	AV	2.86E-08	-45.4	-27.0	-18.4	EUT Horizontal, Low Channel, 6 Mbps
5714.947	1.9	353.0	Vert	AV	2.79E-08	-45.5	-27.0	-18.5	EUT Horizontal, Low Channel, 18 Mbps
5714.647	1.7	0.0	Vert	AV	2.73E-08	-45.6	-27.0	-18.6	EUT Horizontal, Low Channel, 36 Mbps
5724.927	2.0	315.0	Vert	AV	1.54E-07	-38.1	-17.0	-21.1	EUT On Side, Low Channel, 6 Mbps
5724.987	1.6	215.0	Vert	AV	1.54E-07	-38.1	-17.0	-21.1	EUT Vertical, Low Channel, 6 Mbps
5724.980	1.8	334.0	Horz	AV	1.12E-07	-39.5	-17.0	-22.5	EUT Horizontal, Low Channel, 6 Mbps
5724.933	1.7	226.0	Horz	AV	8.47E-08	-40.7	-17.0	-23.7	EUT Vertical, Low Channel, 6 Mbps
5724.960	1.6	221.0	Horz	AV	8.47E-08	-40.7	-17.0	-23.7	EUT On Side, Low Channel, 6 Mbps
5724.987	1.9	15.0	Vert	AV	7.37E-08	-41.3	-17.0	-24.3	EUT Horizontal, Low Channel, 18 Mbps
5724.920	1.9	9.0	Vert	AV	7.37E-08	-41.3	-17.0	-24.3	EUT Horizontal, Low Channel, 6 Mbps
5850.007	1.8	340.0	Vert	AV	4.75E-08	-43.2	-17.0	-26.2	EUT Horizontal, High Channel, 6 Mbps
5724.947	2.0	4.0	Vert	AV	4.44E-08	-43.5	-17.0	-26.5	EUT Horizontal, Low Channel, 36 Mbps
5850.040	1.8	337.0	Vert	AV	4.43E-08	-43.5	-17.0	-26.5	EUT Horizontal, Low Channel, 6 Mbps
5850.007	2.0	360.0	Vert	AV	3.95E-08	-44.0	-17.0	-27.0	EUT Horizontal, Low Channel, 18 Mbps

# DUTY CYCLE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

Per ANSI C63.10, all measurements are to be performed with the EUT operating at 100% duty cycle at its maximum power level. In the event the EUT cannot be operated at 100% duty cycle, the transmission pulse duration (T) and Duty Cycle (x) are required to be measured for each of the EUT operating modes.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.


If the transmit duty cycle < 98 percent, a duty cycle correction factor in dB can be calculated to add to power measurements if required in the test method guidance using the following formula

$$10 * \text{LOG} (1/D) = \text{dB}$$

Where D is duty cycle of the radio transmissions

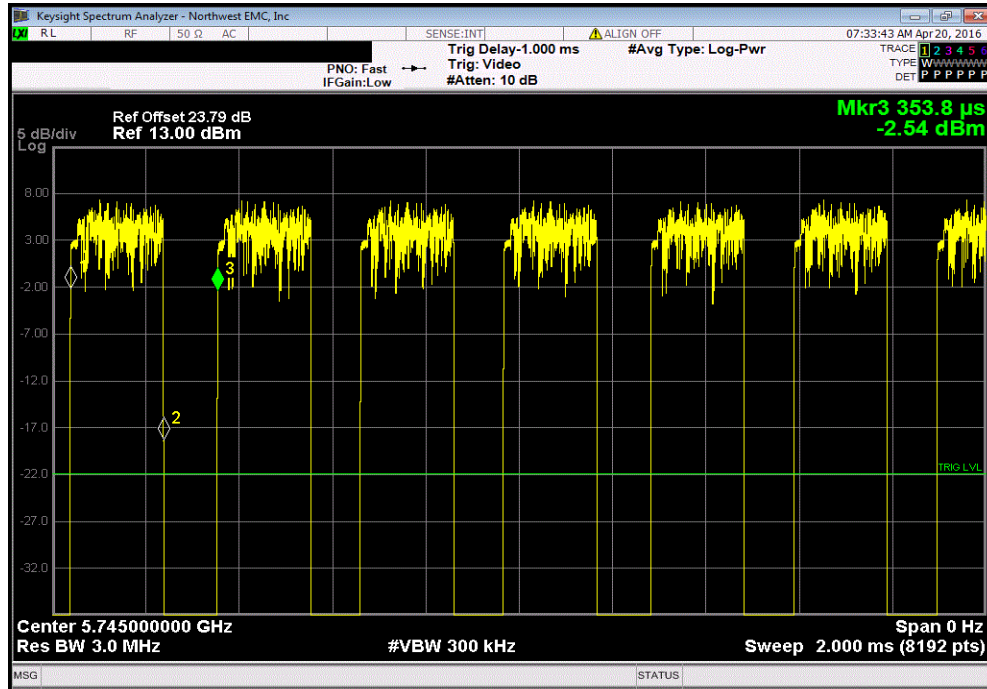


# DUTY CYCLE

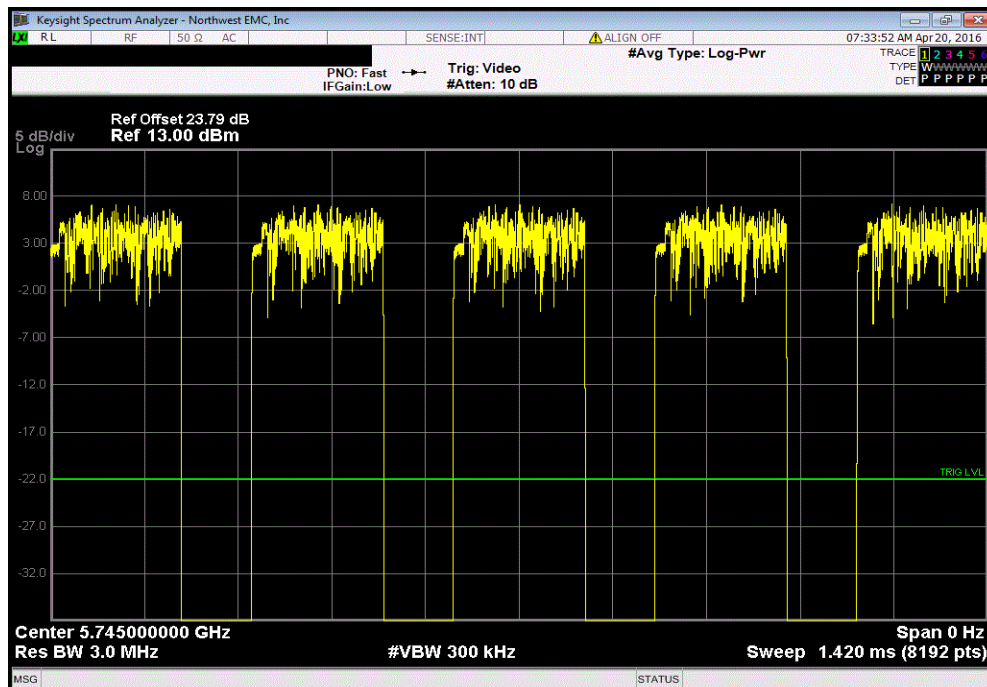
EUT: Sherwood XC		Work Order: FOCU0212	
Serial Number: 02EA3F000C28		Date: 04/20/16	
Customer: Summit Semiconductor LLC		Temperature: 22.8°C	
Attendees: David Schilling		Humidity: 46%	
Project: None		Barometric Pres.: 1010.7	
Tested by: Brandon Hobbs		Power: 1.2VDC/3.3VDC via 110VAC/60Hz	
Job Site: EV06			
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2016		ANSI C63.10:2013	
COMMENTS			
The product was operating in non-isoc mode.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Pulse Width	Period
		Number of Pulses	Value (%)
		Limit (%)	Results
Normal Conditions			
802.11(a) 6 Mbps			
	Low channel, Ch.30, 5745 MHz	199.5 us	315.5 us
	Low channel, Ch.30, 5745 MHz	N/A	N/A
	Mid channel, Ch.32, 5785 MHz	199.5 us	306.2 us
	Mid channel, Ch.32, 5785 MHz	N/A	N/A
	High channel, Ch.34, 5825 MHz	199.7 us	306.4 us
	High channel, Ch.34, 5825 MHz	N/A	N/A
802.11(a) 18 Mbps			
	Low channel, Ch.30, 5745 MHz	87.7 us	206.8 us
	Low channel, Ch.30, 5745 MHz	N/A	N/A
	Mid channel, Ch.32, 5785 MHz	87.9 us	205.8 us
	Mid channel, Ch.32, 5785 MHz	N/A	N/A
	High channel, Ch.34, 5825 MHz	87.6 us	206.8 us
	High channel, Ch.34, 5825 MHz	N/A	N/A
802.11(a) 36 Mbps			
	Low channel, Ch.30, 5745 MHz	59.9 us	183.2 us
	Low channel, Ch.30, 5745 MHz	N/A	N/A
	Mid channel, Ch.32, 5785 MHz	59.6 us	191.4 us
	Mid channel, Ch.32, 5785 MHz	N/A	N/A
	High channel, Ch.34, 5825 MHz	59.8 us	192.4 us
	High channel, Ch.34, 5825 MHz	N/A	N/A

# DUTY CYCLE

Normal Conditions, 802.11(a) 6 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
199.5 us	315.5 us	1	63.2	N/A	N/A	

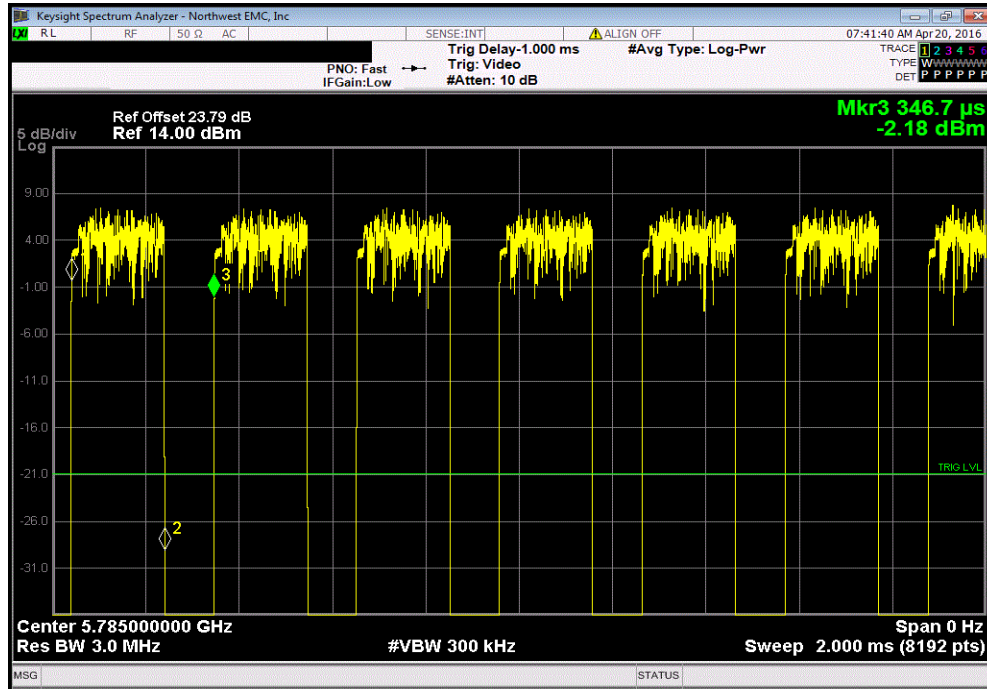


Normal Conditions, 802.11(a) 6 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

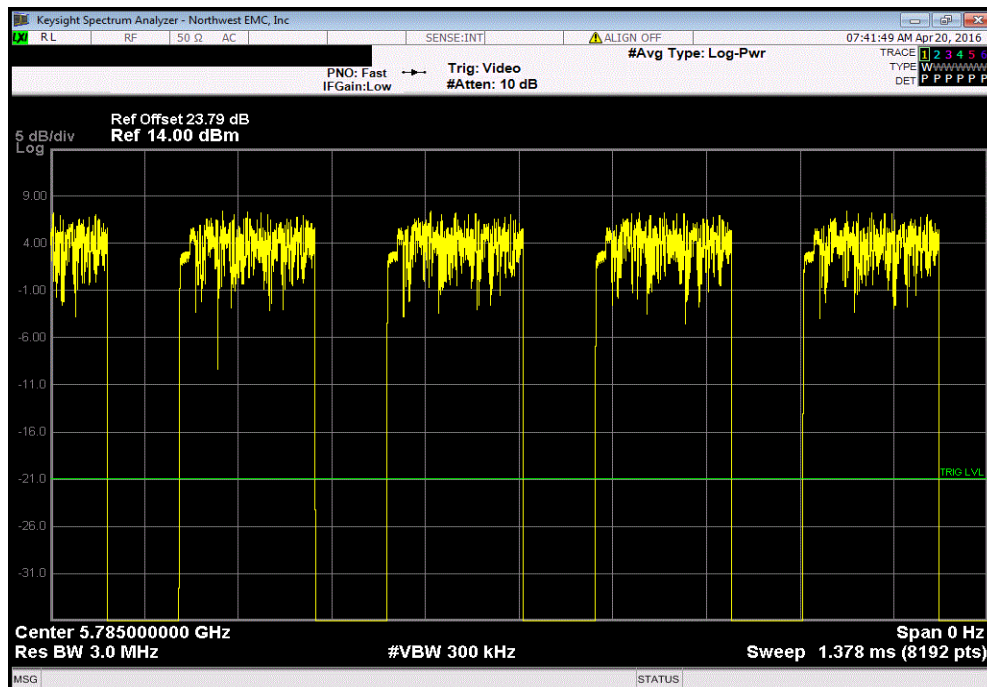


# DUTY CYCLE

Normal Conditions, 802.11(a) 6 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
199.5 us	306.2 us	1	65.2	N/A	N/A	

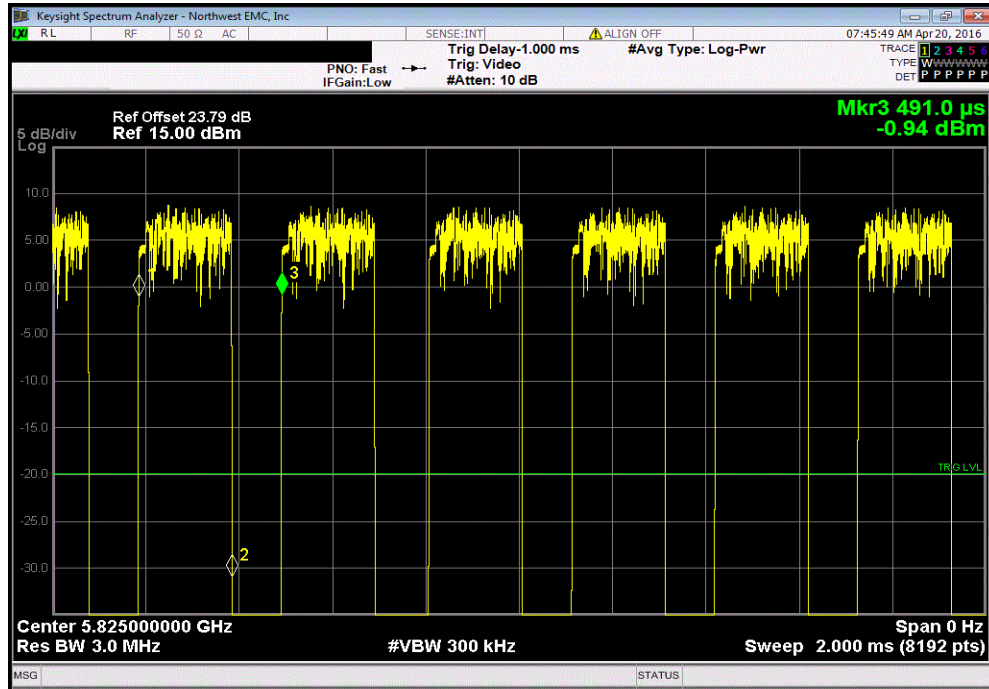


Normal Conditions, 802.11(a) 6 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



# DUTY CYCLE

Normal Conditions, 802.11(a) 6 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
199.7 us	306.4 us	1	65.2	N/A	N/A	

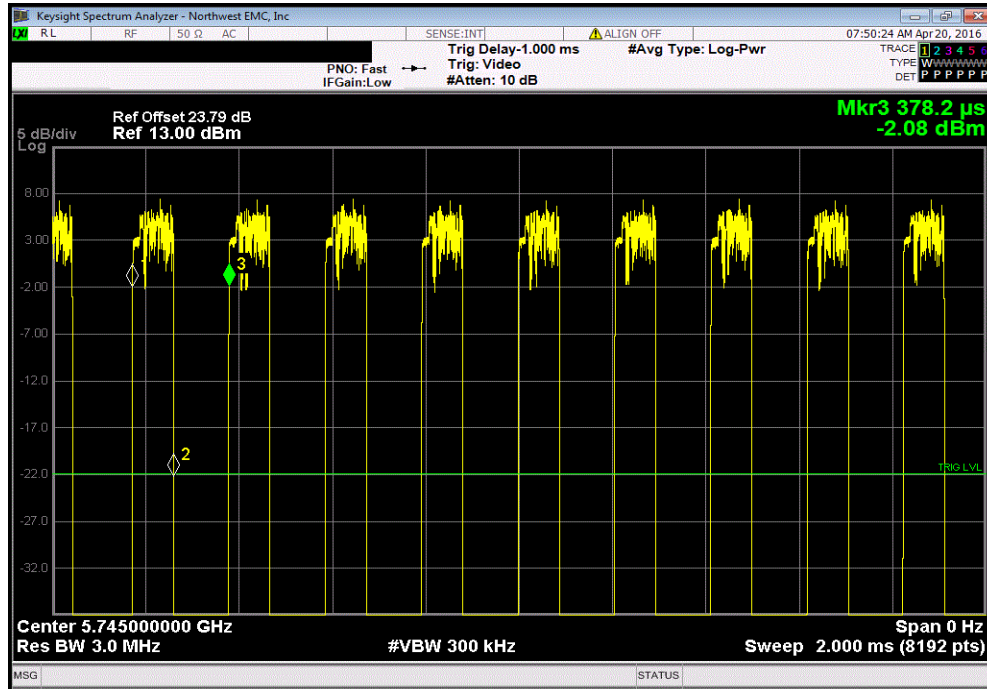


Normal Conditions, 802.11(a) 6 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

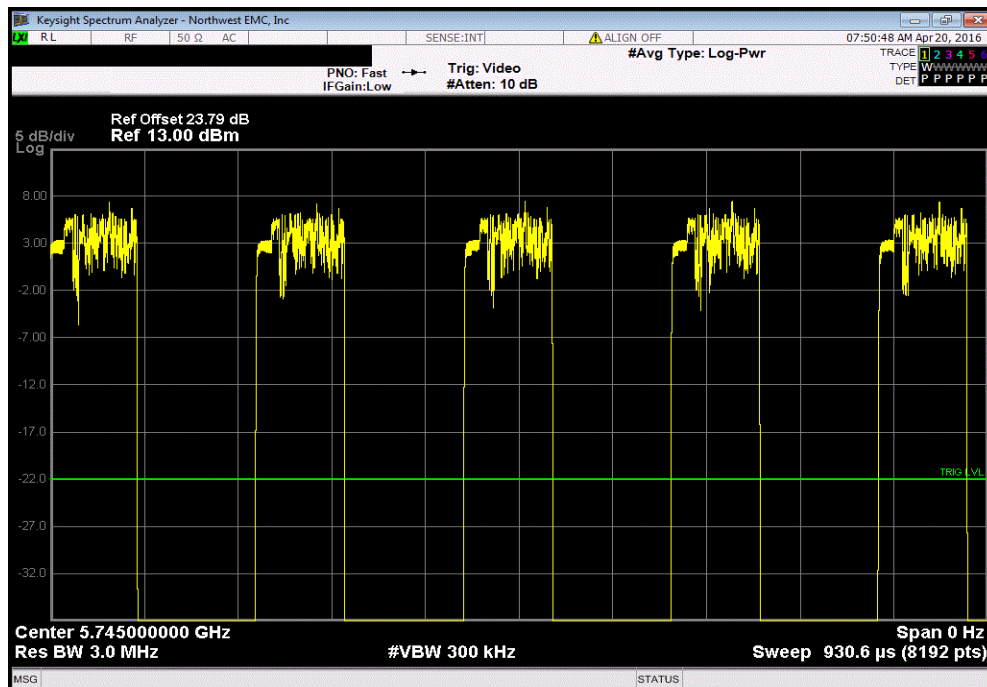


# DUTY CYCLE

Normal Conditions, 802.11(a) 18 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
87.7 us	206.8 us	1	42.4	N/A	N/A	

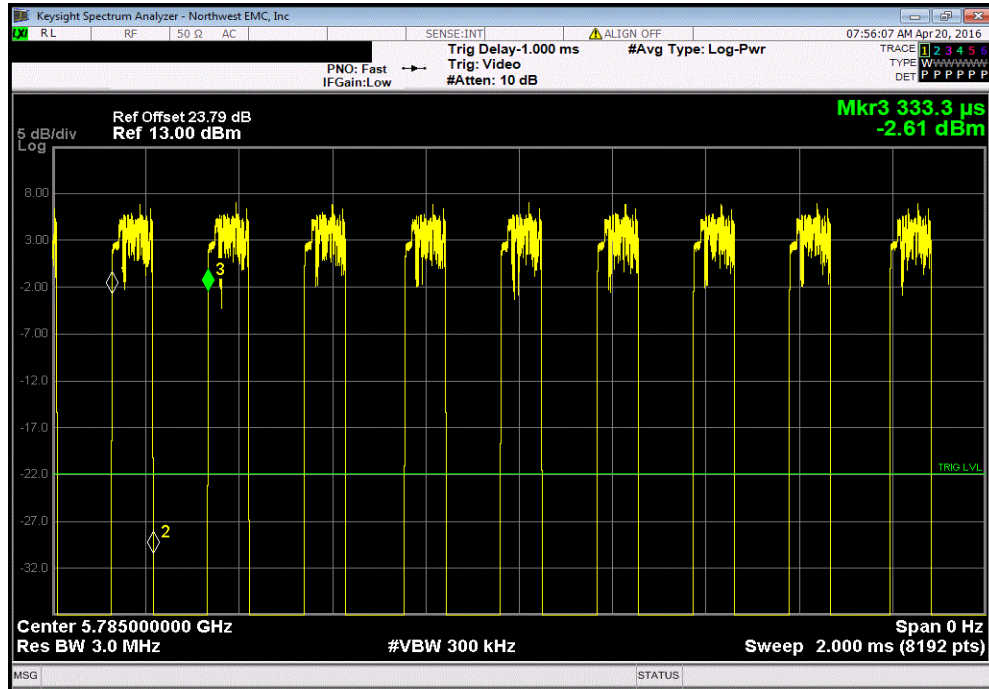


Normal Conditions, 802.11(a) 18 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

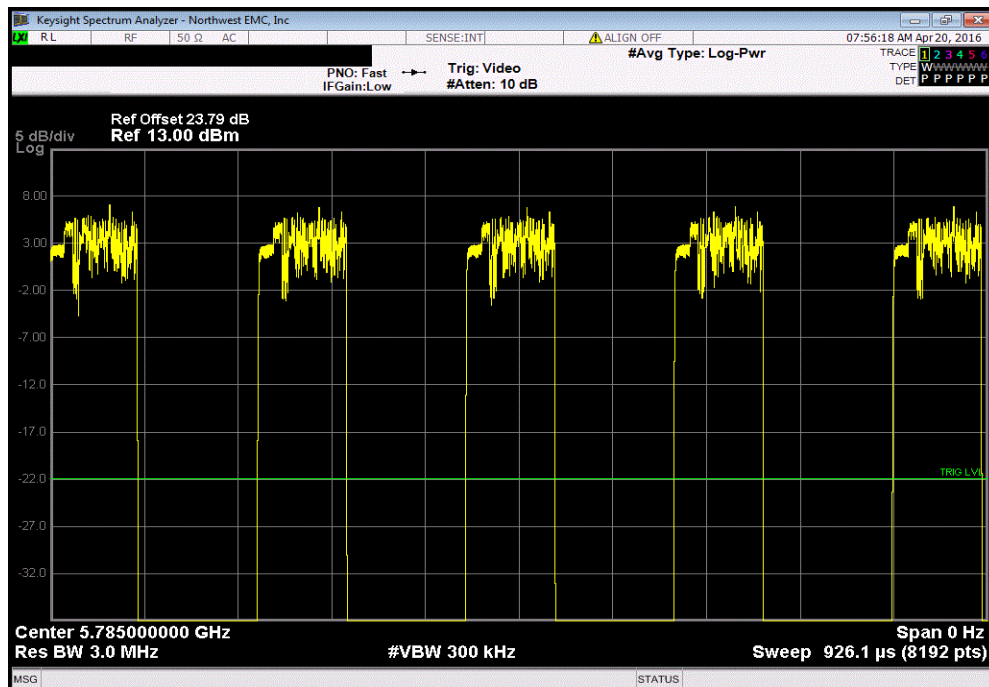


# DUTY CYCLE

Normal Conditions, 802.11(a) 18 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
87.9 us	205.8 us	1	42.7	N/A	N/A	



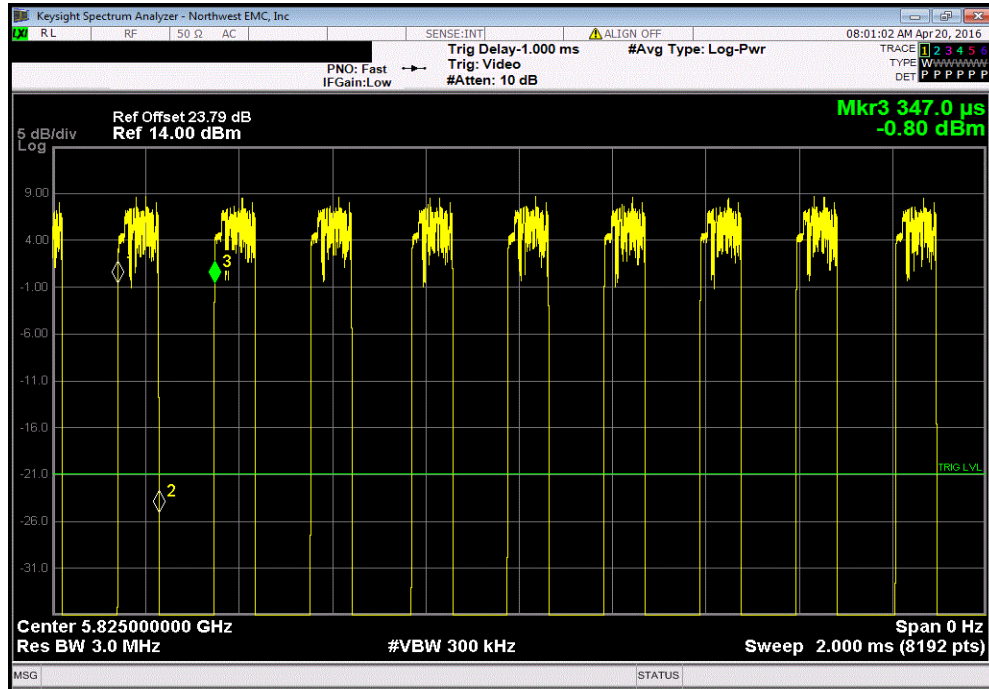
Normal Conditions, 802.11(a) 18 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



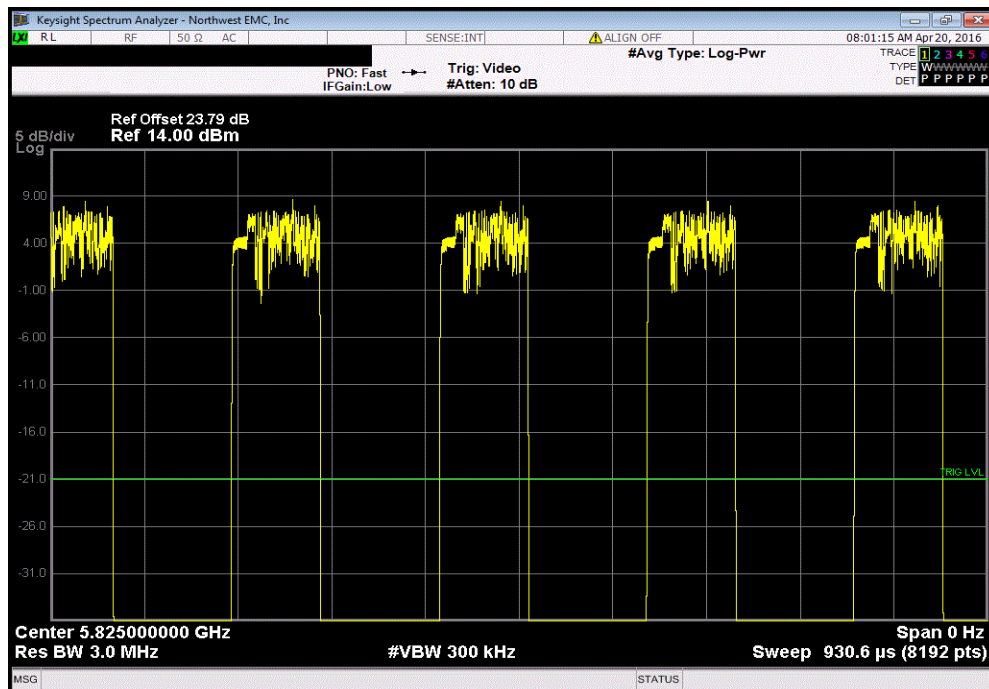


# DUTY CYCLE

Normal Conditions, 802.11(a) 18 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
87.6 us	206.8 us	1	42.4	N/A	N/A	



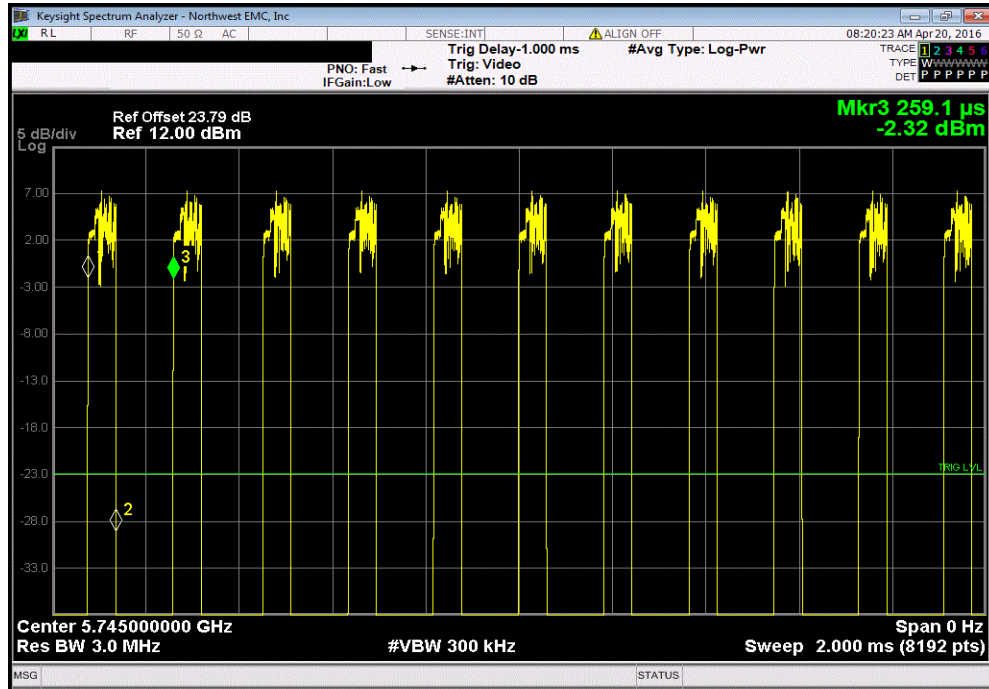
Normal Conditions, 802.11(a) 18 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



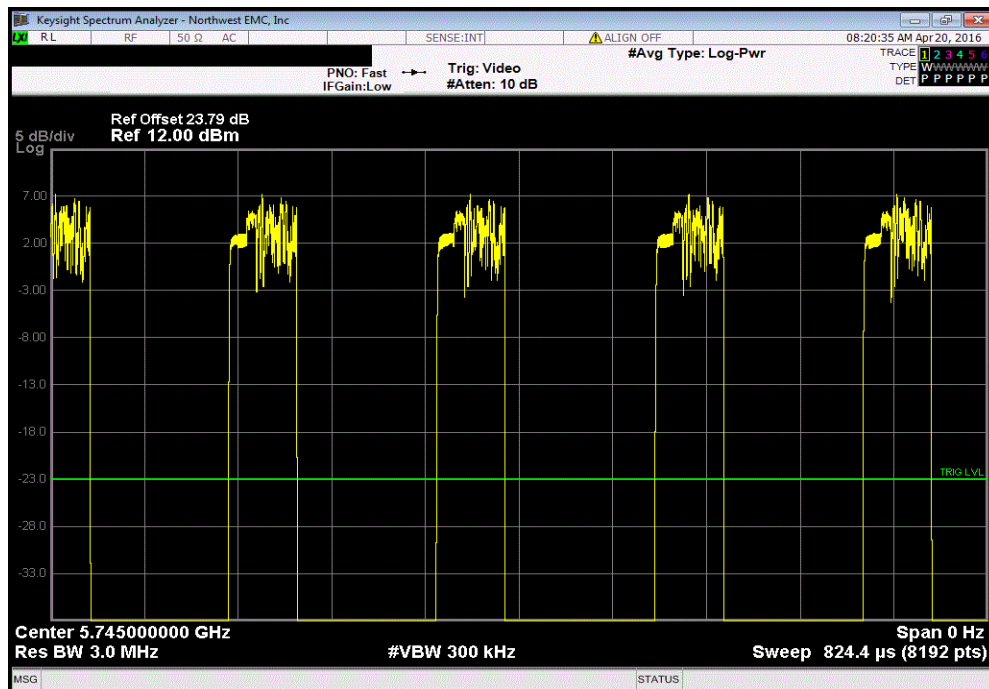


# DUTY CYCLE

Normal Conditions, 802.11(a) 36 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
59.9 us	183.2 us	1	32.7	N/A	N/A	

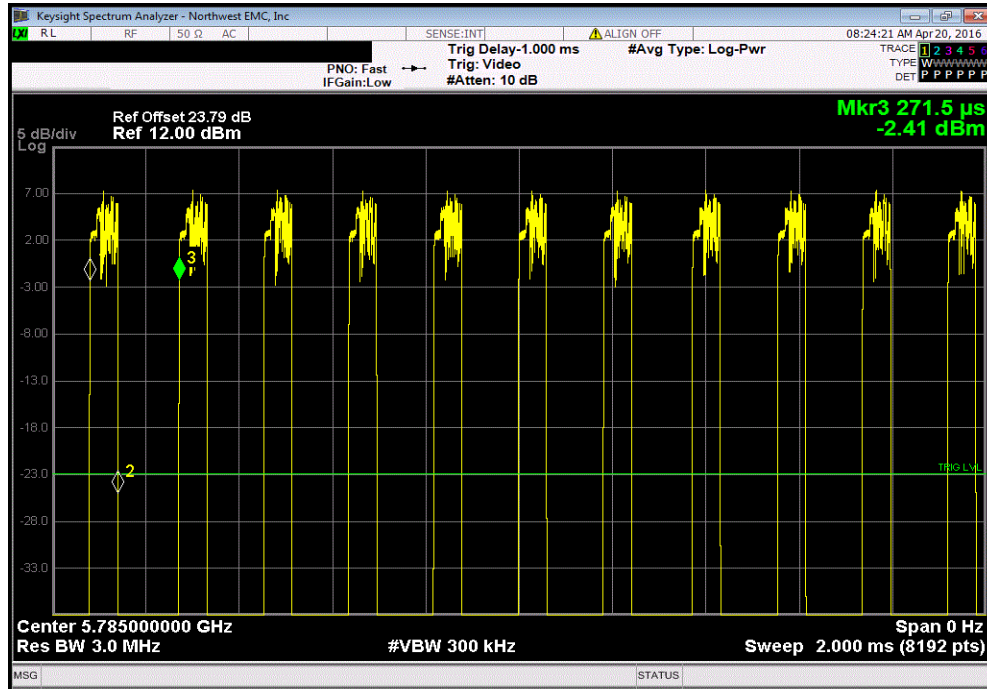


Normal Conditions, 802.11(a) 36 Mbps, Low channel, Ch.30, 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

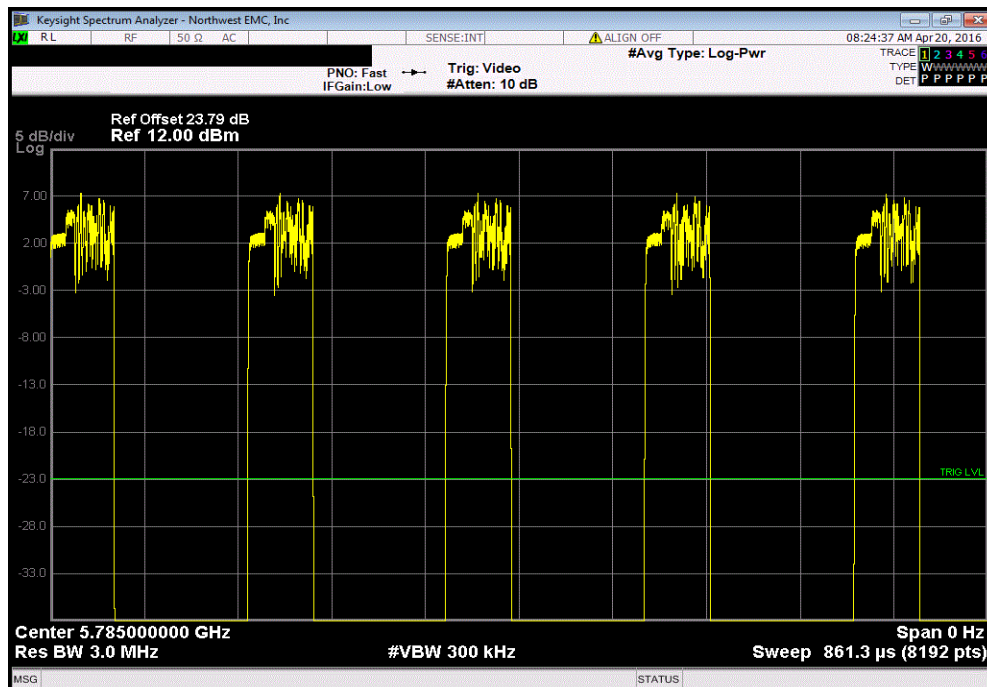


# DUTY CYCLE

Normal Conditions, 802.11(a) 36 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
59.6 us	191.4 us	1	31.1	N/A	N/A	

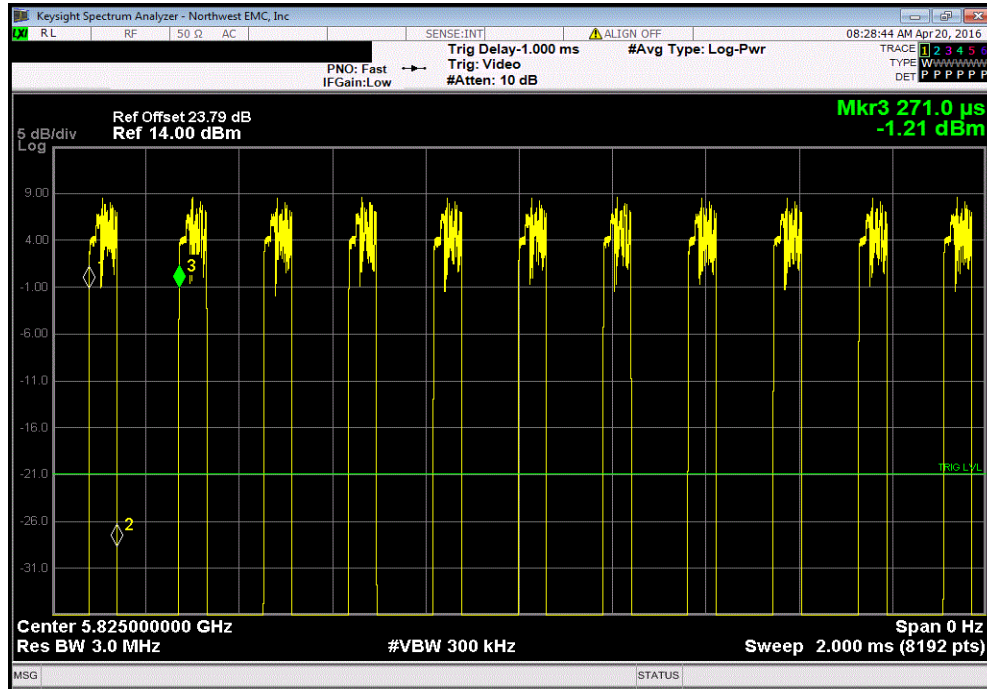


Normal Conditions, 802.11(a) 36 Mbps, Mid channel, Ch.32, 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

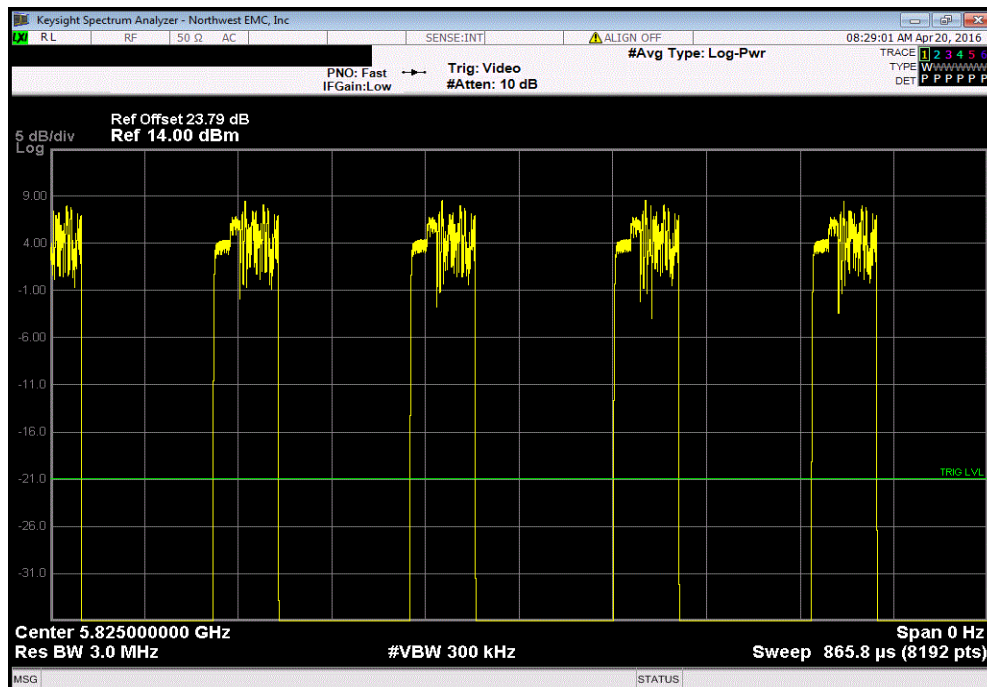


# DUTY CYCLE

Normal Conditions, 802.11(a) 36 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
59.8 us	192.4 us	1	31.1	N/A	N/A	



Normal Conditions, 802.11(a) 36 Mbps, High channel, Ch.34, 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



# MAXIMUM CONDUCTED OUTPUT POWER

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. The radio was operated in the modes as shown in the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer.

Prior to measuring maximum transmit power; the emission bandwidth (B) and the transmission pulse duration (T) were measured. The method of measuring the emission bandwidth and the associated data are found elsewhere in this test report. The transmission pulse duration (T) was measured using a zero span on the spectrum analyzer to see the pulses in the time domain.

The maximum conducted output power was measured using ANSI C63.10, Method SA-2 (RMS detection and trace averaging across the on and off times of the EUT transmission and use of a duty cycle correction factor).

The spectrum analyzer settings were set per the guidance as well as the following specifics:

- RMS Detector

- Trace average 100 traces in power averaging mode.


- Power was integrated across "B", by using the channel power function of the analyzer.

A duty cycle correction factor was added to the measurement using the results of the formula of  $10 \cdot \log(1/D)$  where D is the duty cycle.

# MAXIMUM CONDUCTED OUTPUT POWER

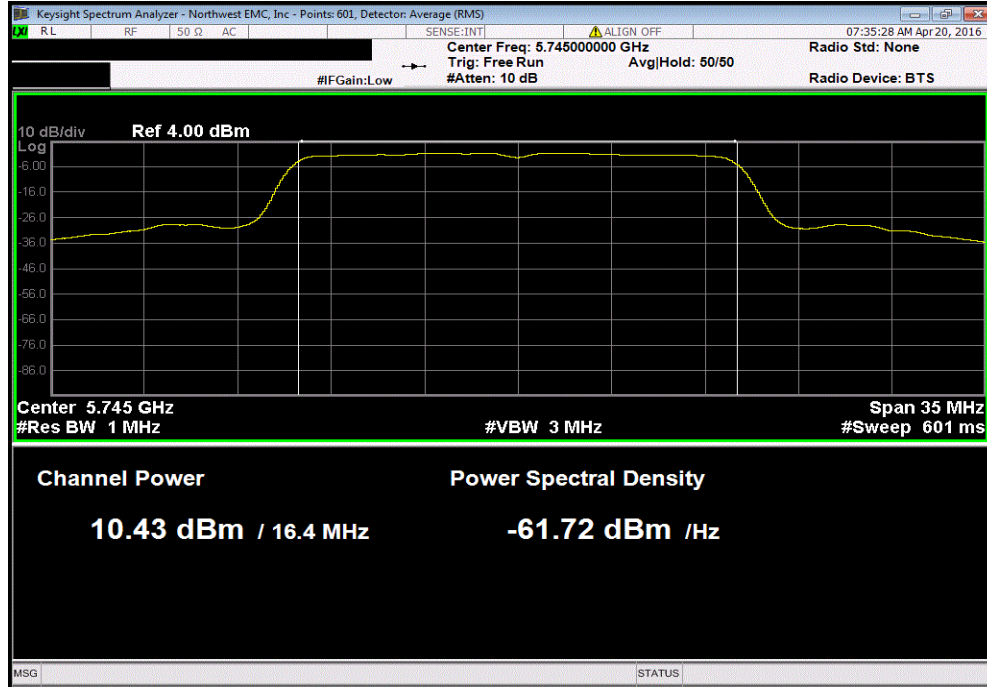


XMR 2015.01.14

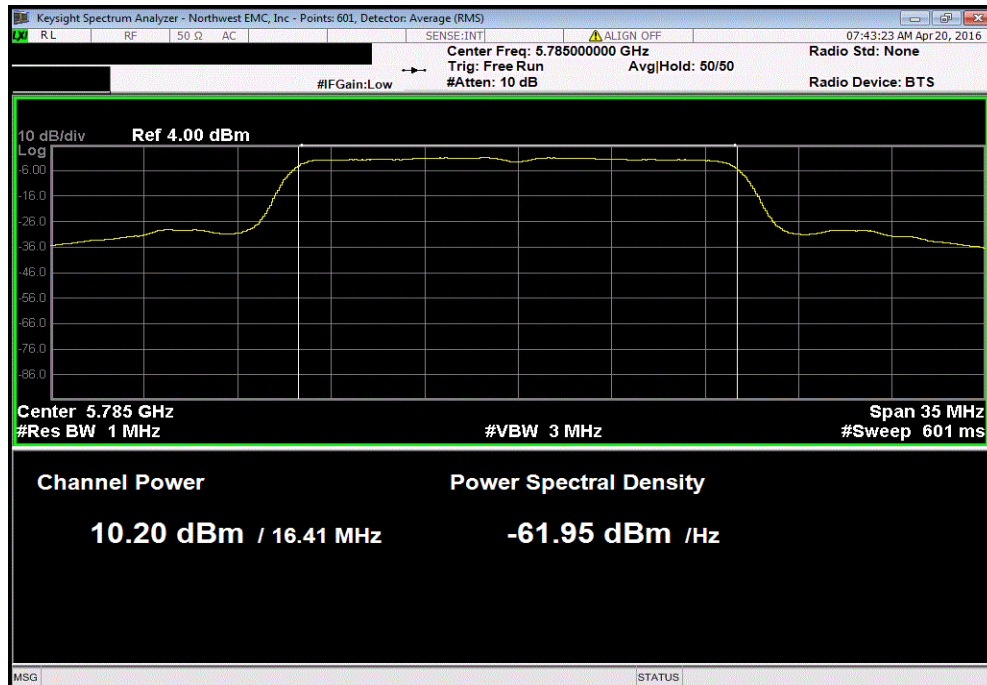
EUT: Sherwood XC		Work Order: FOCU0212	
Serial Number: 02EA3F000C28		Date: 04/20/16	
Customer: Summit Semiconductor LLC		Temperature: 22.8°C	
Attendees: David Schilling		Humidity: 46%	
Project: None		Barometric Pres.: 1010.7	
Tested by: Brandon Hobbs		Power: 1.2VDC/3.3VDC via 110VAC/60Hz	
Job Site: EV06			
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2016		ANSI C63.10:2013	
COMMENTS			
The product was operating in non-isoc mode.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)
		Value (dBm)	Limit (dBm)
			Results
Normal Conditions			
802.11(a) 6 Mbps			
	Low channel, Ch.30, 5745 MHz	10.428	2
	Mid channel, Ch.32, 5785 MHz	10.204	1.9
	High channel, Ch.34, 5825 MHz	11.45	1.9
802.11(a) 18 Mbps			
	Low channel, Ch.30, 5745 MHz	8.673	3.7
	Mid channel, Ch.32, 5785 MHz	8.098	3.7
	High channel, Ch.34, 5825 MHz	9.819	3.7
802.11(a) 36 Mbps			
	Low channel, Ch.30, 5745 MHz	7.244	4.9
	Mid channel, Ch.32, 5785 MHz	7.126	5.1
	High channel, Ch.34, 5825 MHz	8.409	5.1

# MAXIMUM CONDUCTED OUTPUT POWER

Normal Conditions, 802.11(a) 6 Mbps, Low channel, Ch.30, 5745 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
10.428	2	12.4	30	Pass		



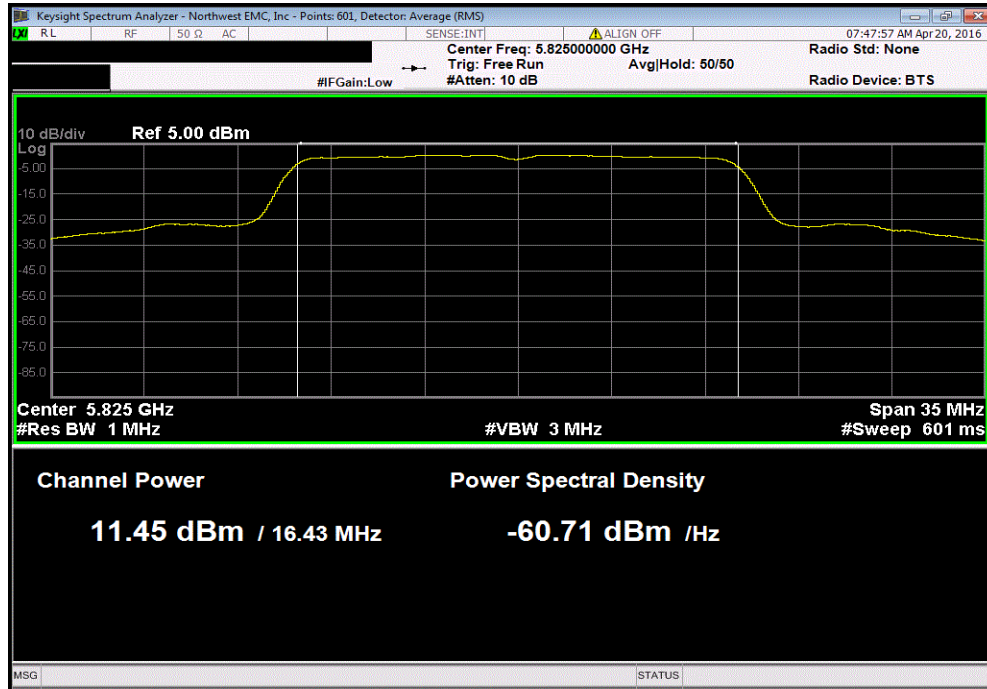
Normal Conditions, 802.11(a) 6 Mbps, Mid channel, Ch.32, 5785 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
10.204	1.9	12.1	30	Pass		



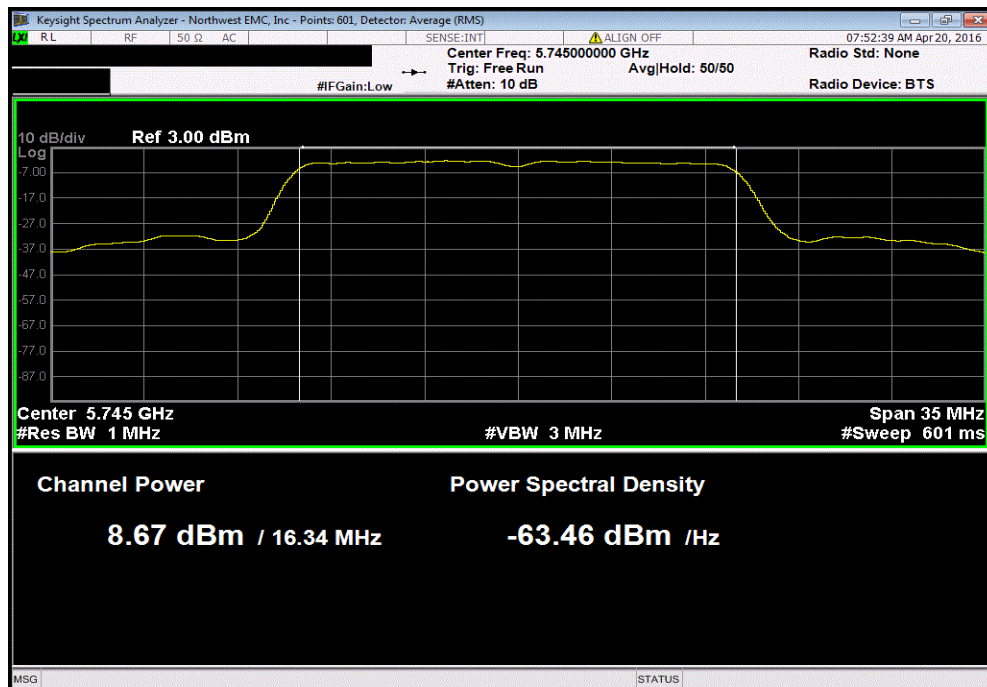


# MAXIMUM CONDUCTED OUTPUT POWER

Normal Conditions, 802.11(a) 6 Mbps, High channel, Ch.34, 5825 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
11.45	1.9	13.3	30	Pass		



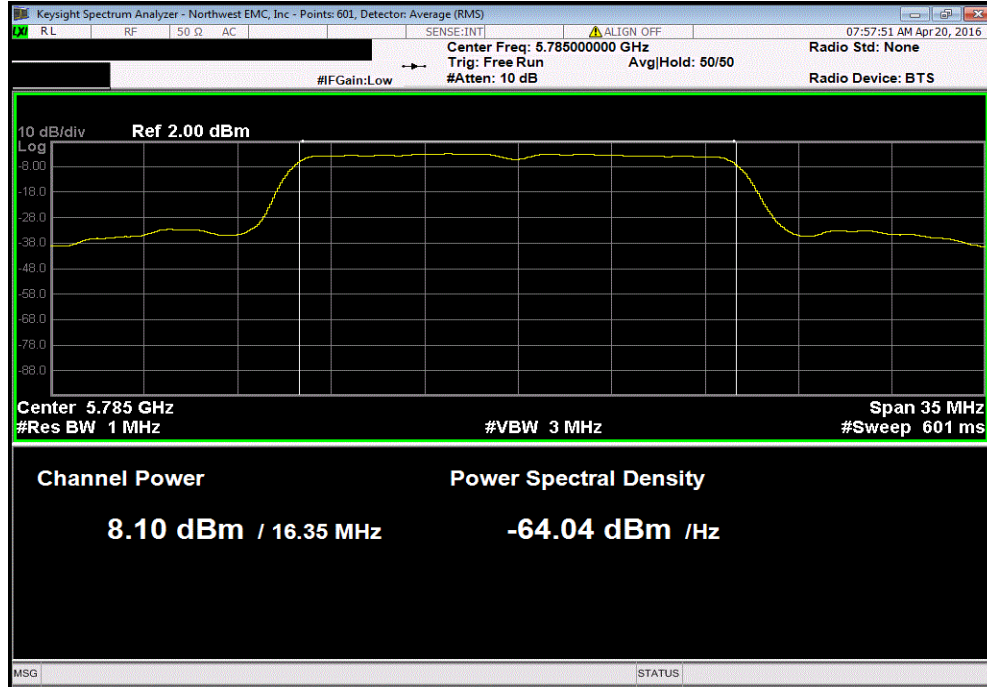
Normal Conditions, 802.11(a) 18 Mbps, Low channel, Ch.30, 5745 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
8.673	3.7	12.4	30	Pass		



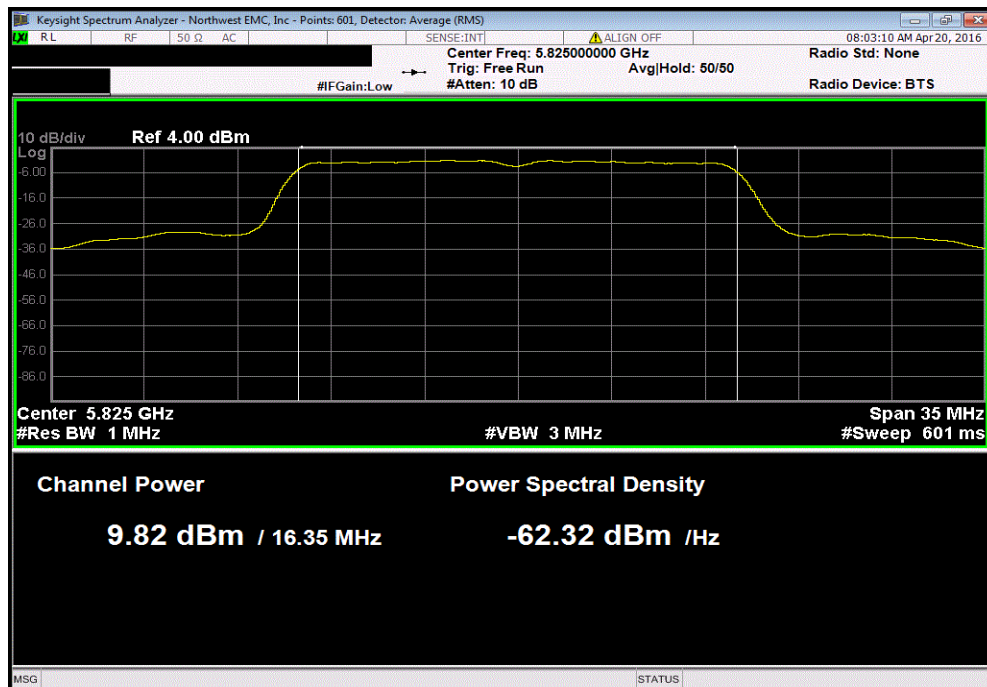


# MAXIMUM CONDUCTED OUTPUT POWER

Normal Conditions, 802.11(a) 18 Mbps, Mid channel, Ch.32, 5785 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
8.098	3.7	11.8	30	Pass		

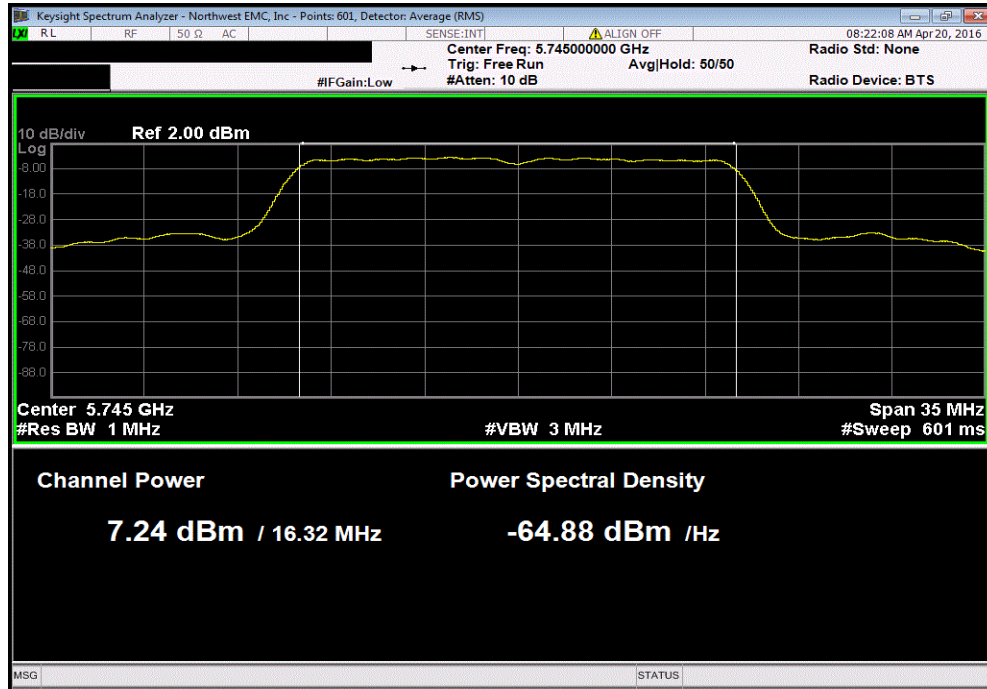


Normal Conditions, 802.11(a) 18 Mbps, High channel, Ch.34, 5825 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
9.819	3.7	13.5	30	Pass		

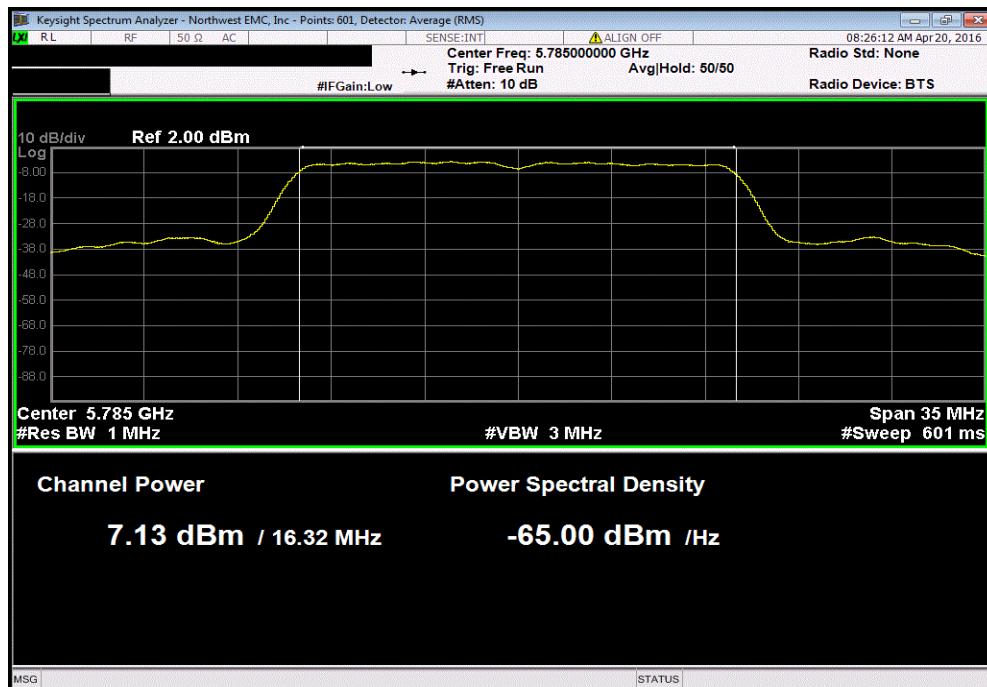


# MAXIMUM CONDUCTED OUTPUT POWER

Normal Conditions, 802.11(a) 36 Mbps, Low channel, Ch.30, 5745 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
7.244	4.9	12.1	30	Pass		

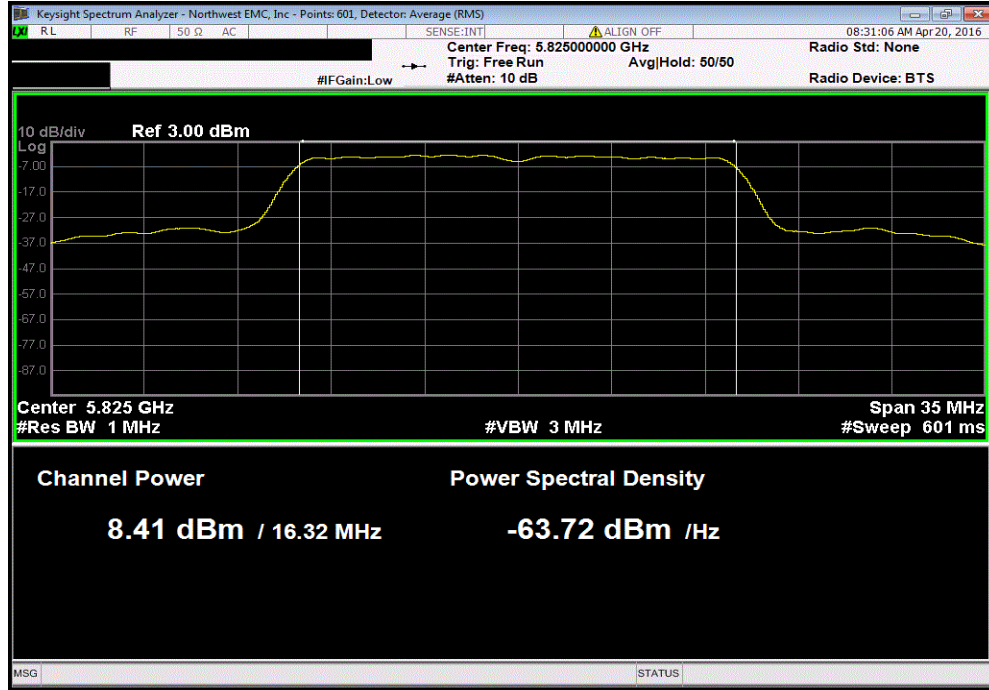


Normal Conditions, 802.11(a) 36 Mbps, Mid channel, Ch.32, 5785 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
7.126	5.1	12.2	30	Pass		



# MAXIMUM CONDUCTED OUTPUT POWER

Normal Conditions, 802.11(a) 36 Mbps, High channel, Ch.34, 5825 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	Limit (dBm)	Results		
8.409	5.1	13.5	30	Pass		



# OCCUPIED BANDWIDTH

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AUY	7/14/2015	12
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

The transmit frequencies and data rates listed in the datasheet were measured in each band utilized by the radio. The transmit power was set to its default maximum.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Per ANSI C63.10, the spectrum analyzer settings were as follows:

-RBW = 100 kHz

-VBW =  $\geq 3 \times$  RBW


-Detector = Peak

-Trace mode = max hold

The spectrum analyzer occupied bandwidth measurement function was then used to measure the 6 dB emission bandwidth.

The 99.0% occupied bandwidth was also measured at the same time to be used for setting the channel power integration bandwidth during conducted output power testing.

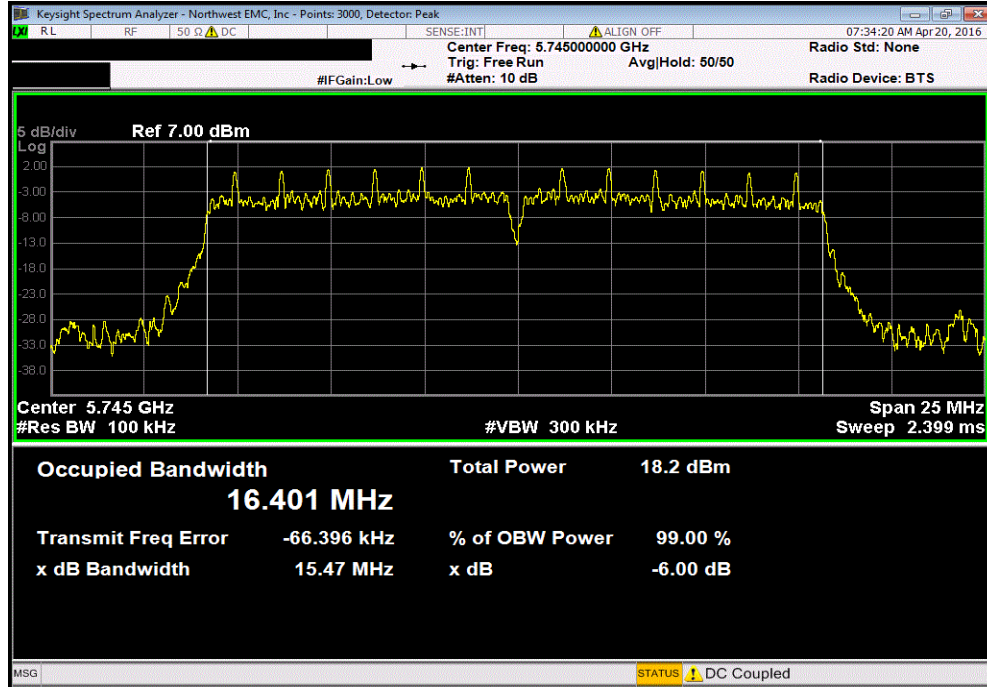
# OCCUPIED BANDWIDTH

EUT: Sherwood XC		Work Order: FOCU0212	
Serial Number: 02EA3F000C28		Date: 04/20/16	
Customer: Summit Semiconductor LLC		Temperature: 22.8°C	
Attendees: David Schilling		Humidity: 46%	
Project: None		Barometric Pres.: 1010.7	
Tested by: Brandon Hobbs		Power: 1.2VDC/3.3VDC via 110VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2016		ANSI C63.10:2013	
COMMENTS			
The product was operating in non-isoc mode.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (>) Result
Normal Conditions			
802.11(a) 6 Mbps			
	Low channel, Ch.30, 5745 MHz	15.474 MHz	500 kHz Pass
	Mid channel, Ch.32, 5785 MHz	15.47 MHz	500 kHz Pass
	High channel, Ch.34, 5825 MHz	15.468 MHz	500 kHz Pass
802.11(a) 18 Mbps			
	Low channel, Ch.30, 5745 MHz	15.155 MHz	500 kHz Pass
	Mid channel, Ch.32, 5785 MHz	15.156 MHz	500 kHz Pass
	High channel, Ch.34, 5825 MHz	15.16 MHz	500 kHz Pass
802.11(a) 36 Mbps			
	Low channel, Ch.30, 5745 MHz	15.154 MHz	500 kHz Pass
	Mid channel, Ch.32, 5785 MHz	15.154 MHz	500 kHz Pass
	High channel, Ch.34, 5825 MHz	15.153 MHz	500 kHz Pass

# OCCUPIED BANDWIDTH

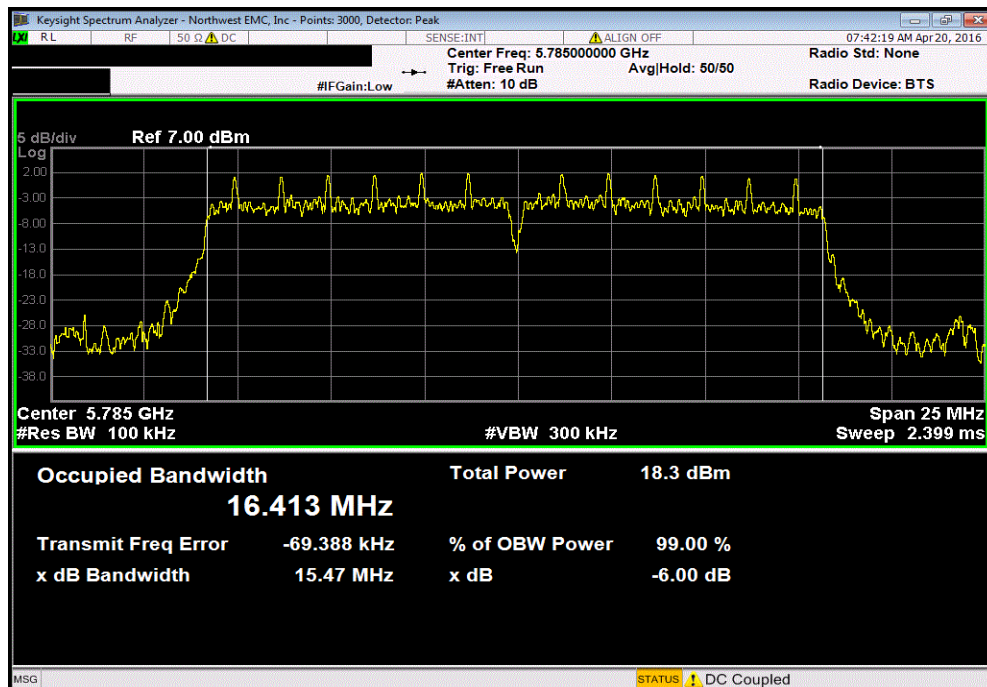
Normal Conditions, 802.11(a) 6 Mbps, Low channel, Ch.30, 5745 MHz

	Value	Limit	Result
	15.474 MHz	(>) 500 kHz	Pass



Normal Conditions, 802.11(a) 6 Mbps, Mid channel, Ch.32, 5785 MHz

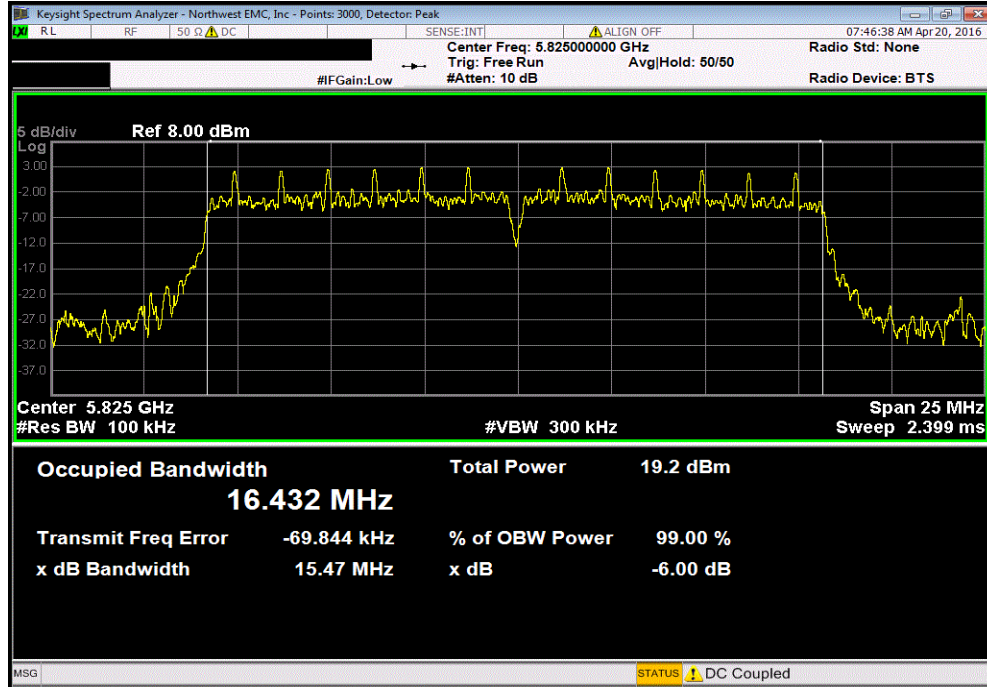
	Value	Limit	Result
	15.47 MHz	(>) 500 kHz	Pass



# OCCUPIED BANDWIDTH

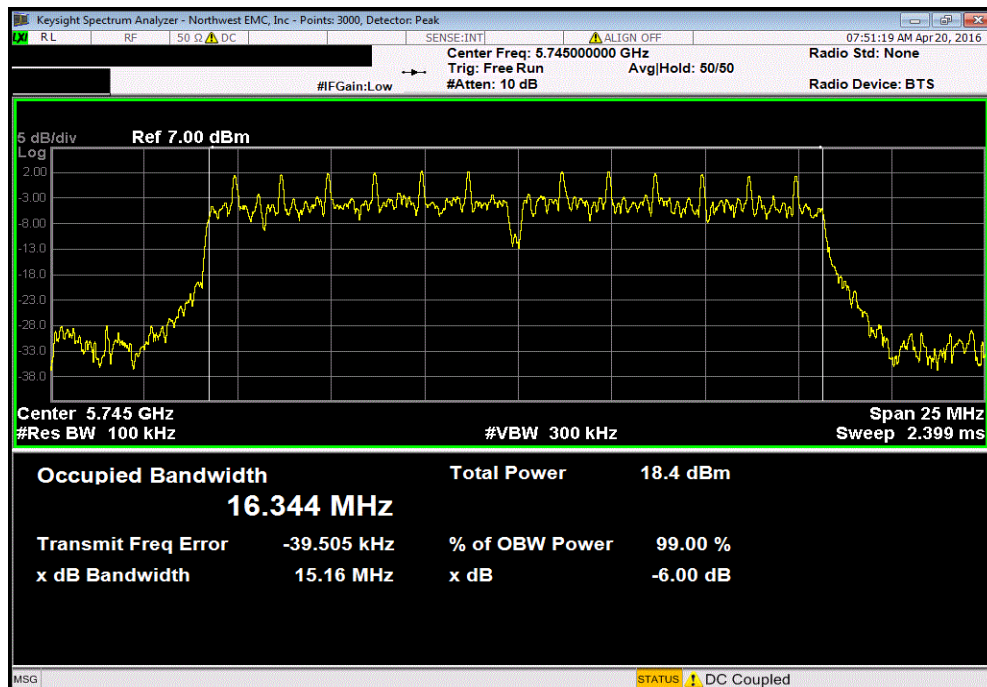
Normal Conditions, 802.11(a) 6 Mbps, High channel, Ch.34, 5825 MHz

				Value	Limit	Result
				15.468 MHz	500 kHz	Pass



Normal Conditions, 802.11(a) 18 Mbps, Low channel, Ch.30, 5745 MHz

				Value	Limit	Result
				15.155 MHz	500 kHz	Pass

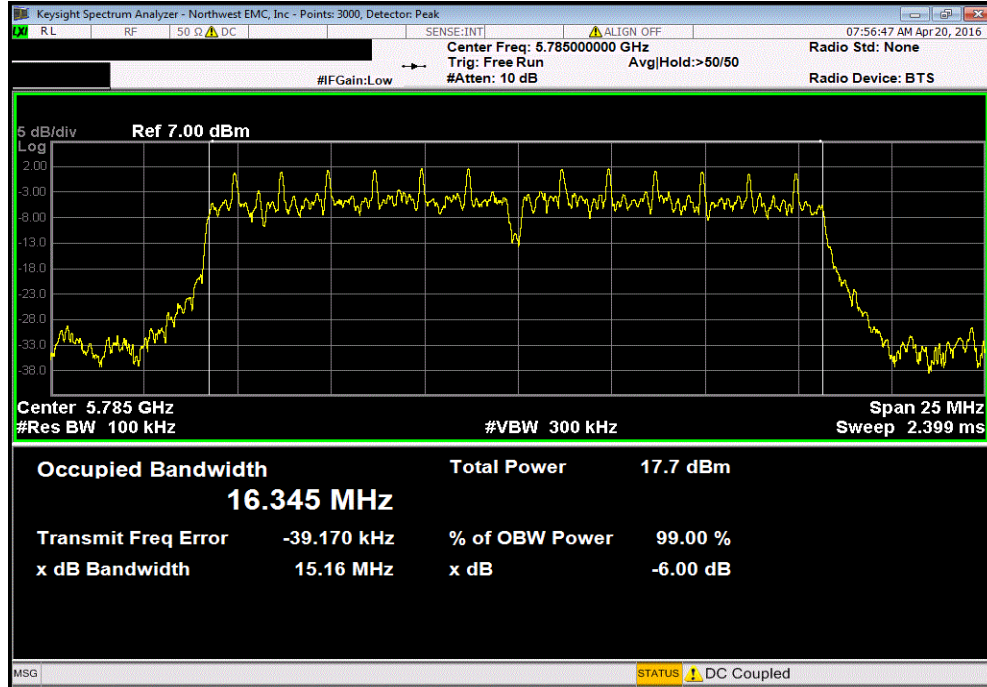




# OCCUPIED BANDWIDTH

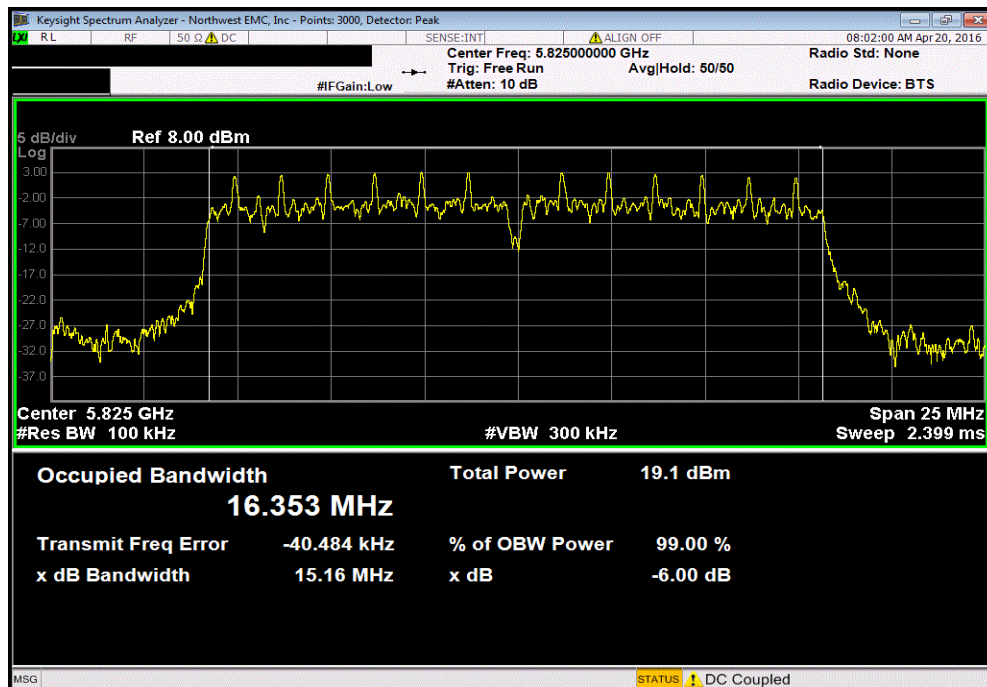
Normal Conditions, 802.11(a) 18 Mbps, Mid channel, Ch.32, 5785 MHz

	Value	Limit	Result
	15.156 MHz	(>) 500 kHz	Pass



Normal Conditions, 802.11(a) 18 Mbps, High channel, Ch.34, 5825 MHz

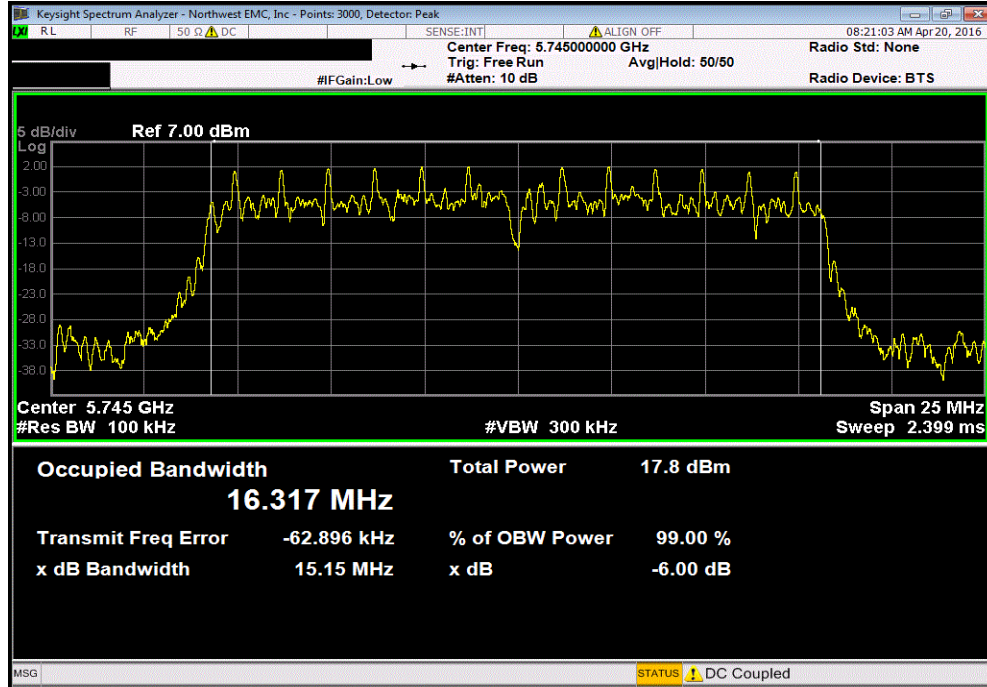
	Value	Limit	Result
	15.16 MHz	(>) 500 kHz	Pass



# OCCUPIED BANDWIDTH

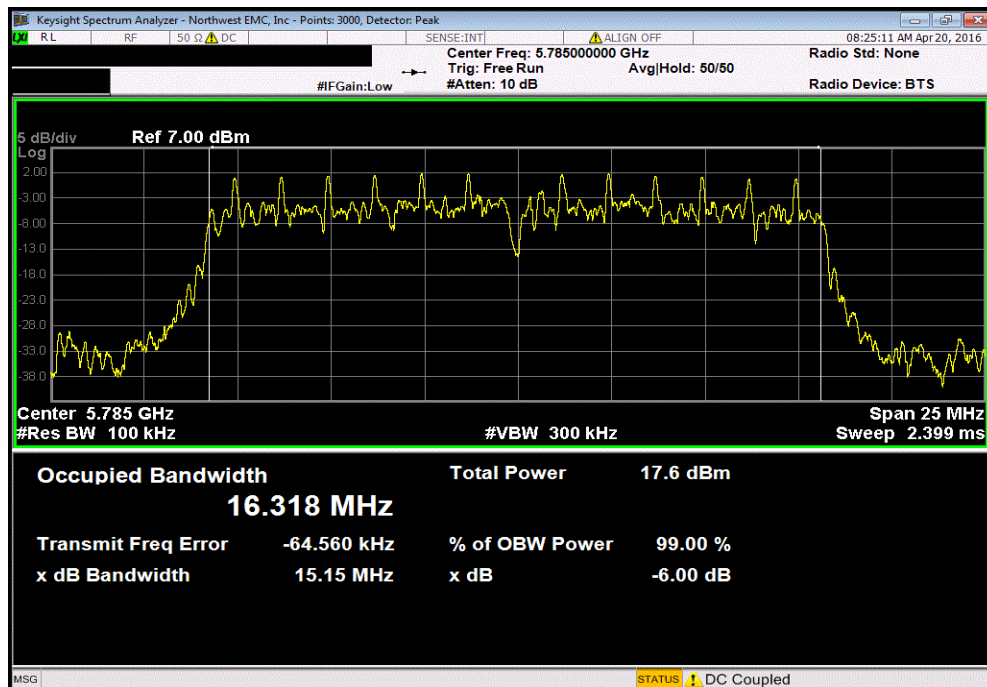
Normal Conditions, 802.11(a) 36 Mbps, Low channel, Ch.30, 5745 MHz

	Value	Limit	Result
	15.154 MHz	500 kHz	Pass



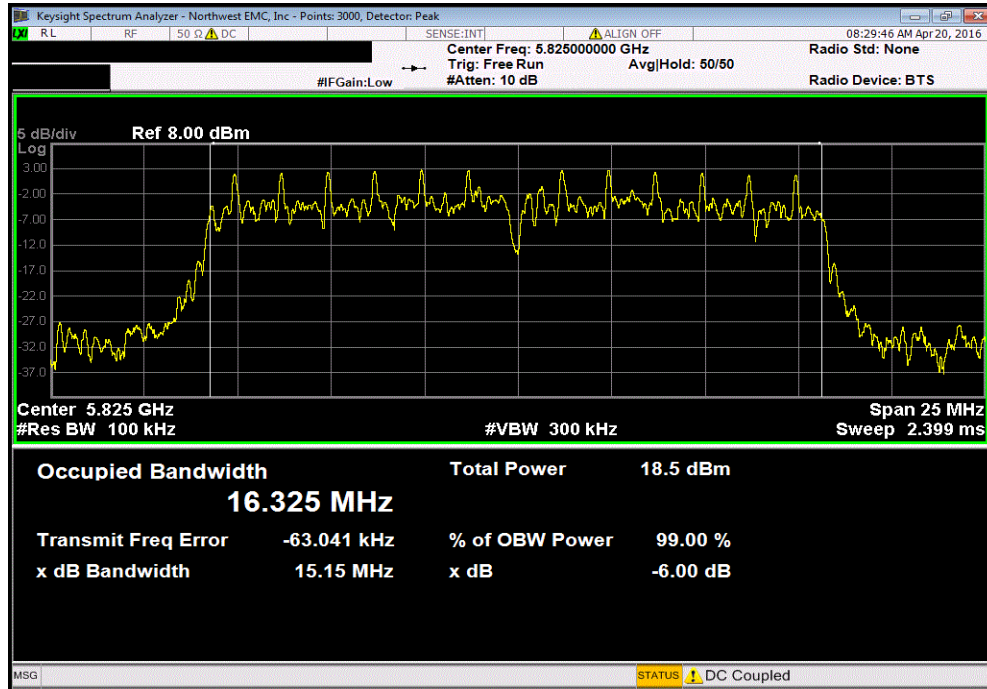
Normal Conditions, 802.11(a) 36 Mbps, Mid channel, Ch.32, 5785 MHz

	Value	Limit	Result
	15.154 MHz	500 kHz	Pass



# OCCUPIED BANDWIDTH

Normal Conditions, 802.11(a) 36 Mbps, High channel, Ch.34, 5825 MHz						
Value				Limit	Result	
15.153 MHz				(>) 500 kHz	Pass	



# BAND EDGE

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12


## TEST DESCRIPTION

The 99% occupied bandwidth of the carrier was measured to ensure that no part of the emission of the carrier operating in a non-DFS band was operating in a band where DFS testing is required. This test is done with the U-NII-1 band (5.2 GHz band) to ensure no portion of the carrier is contained within the U-NII-2A band and with the U-NII-3 band (5.8 GHz band) to ensure no portion of the carrier is contained in the U-NII-2C band.

The transmit frequencies and data rates listed in the datasheet were measured. The transmit power was set to its default maximum.

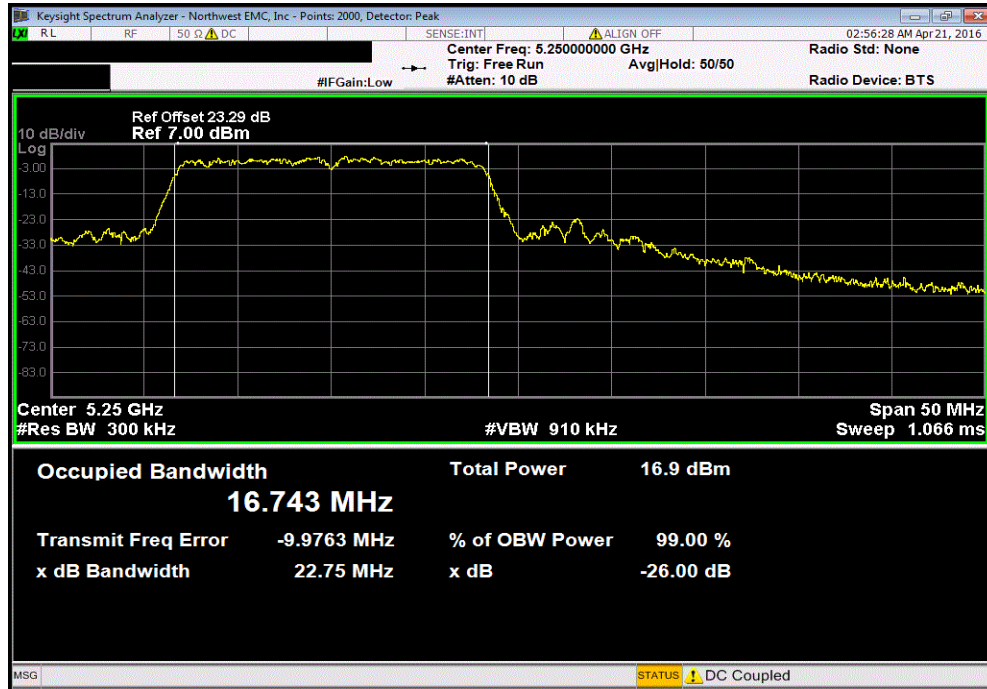
A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

# BAND EDGE

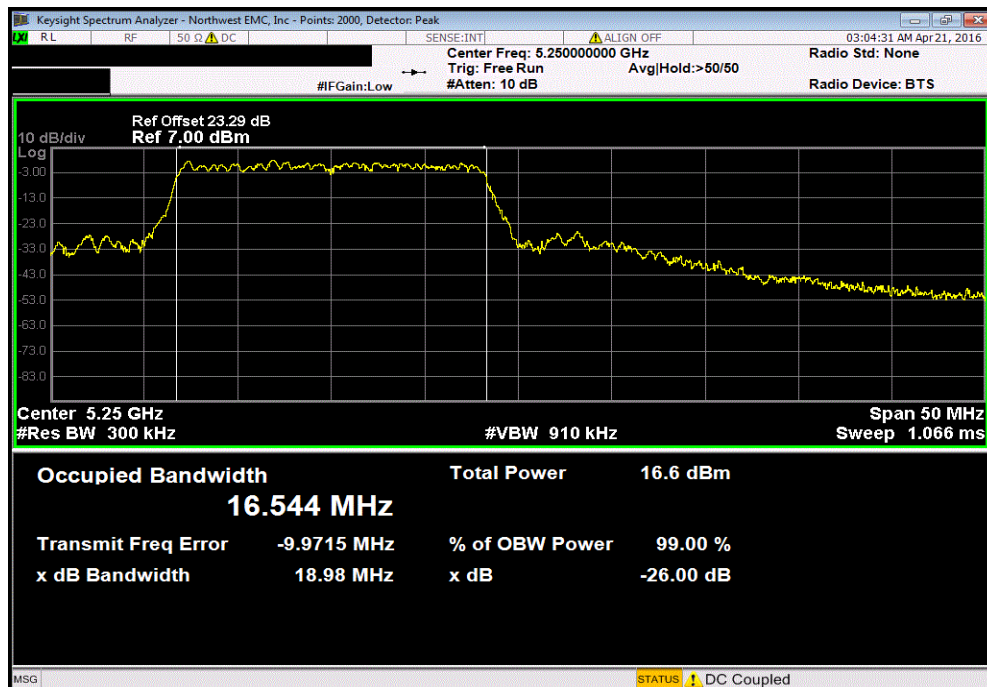
EUT: Sherwood XC		Work Order: FOCU0212	
Serial Number: 02EA3F000C28		Date: 04/20/16	
Customer: Summit Semiconductor LLC		Temperature: 22.8°C	
Attendees: David Schilling		Humidity: 46%	
Project: None		Barometric Pres.: 1010.7	
Tested by: Brandon Hobbs		Power: 1.2VDC/3.3VDC via 110VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2016		ANSI C63.10:2013	
COMMENTS			
The product was operating in non-isoc mode.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		OBW Within Band	Band Edge (MHz)
5150 - 5250 MHz Band			Result
High Channel, Ch 14 - 5240 MHz			
802.11(a) 6 Mbps		Yes	5250 Pass
802.11(a) 18 Mbps		Yes	5250 Pass
802.11(a) 36 Mbps		Yes	5250 Pass
5725 - 5825 MHz Band			
Low Channel, Ch 30 - 5745 MHz			
802.11(a) 6 Mbps		Yes	5725 Pass
802.11(a) 18 Mbps		Yes	5725 Pass
802.11(a) 36 Mbps		Yes	5725 Pass

# BAND EDGE

5150 - 5250 MHz Band, High Channel, Ch 14 - 5240 MHz, 802.11(a) 6 Mbps						
	OBW	Band Edge				
	Within Band	(MHz)	Result			
	Yes	5250	Pass			

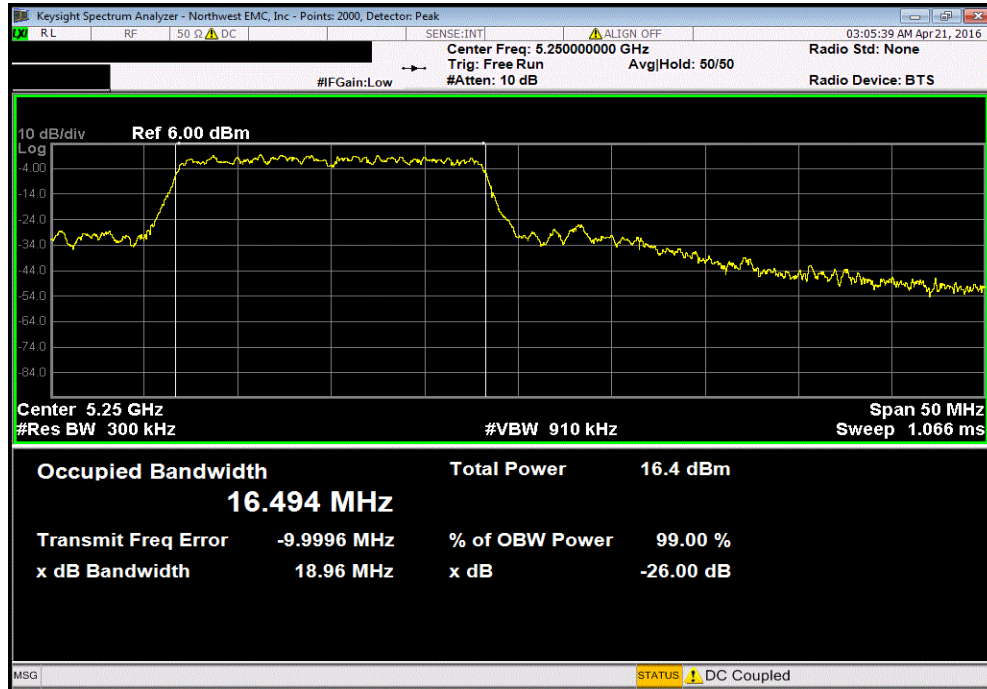


5150 - 5250 MHz Band, High Channel, Ch 14 - 5240 MHz, 802.11(a) 18 Mbps						
	OBW	Band Edge				
	Within Band	(MHz)	Result			
	Yes	5250	Pass			

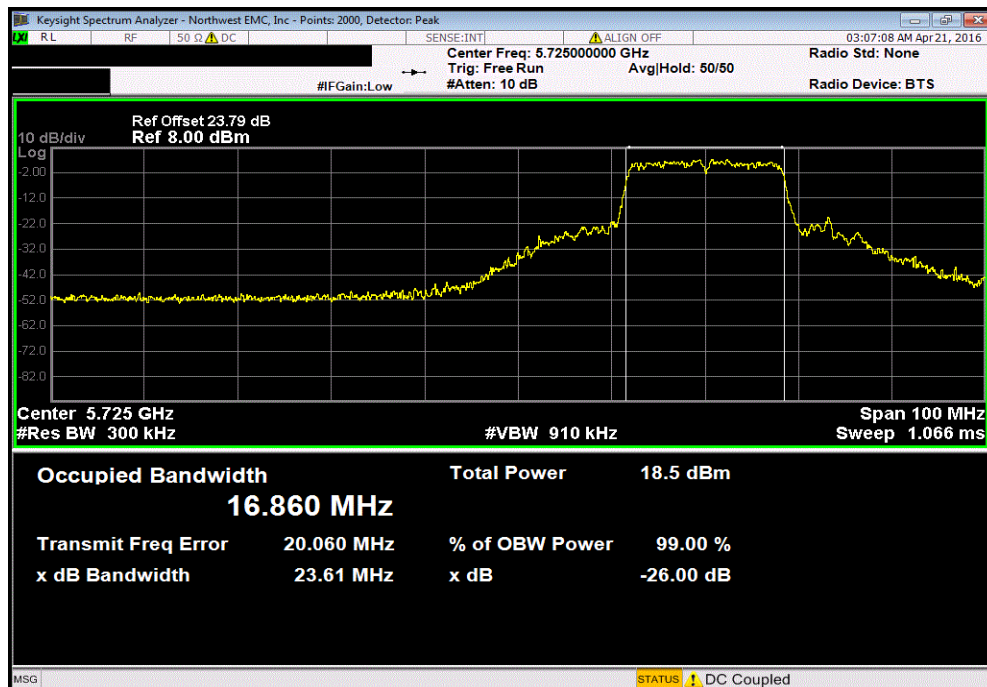


# BAND EDGE

5150 - 5250 MHz Band, High Channel, Ch 14 - 5240 MHz, 802.11(a) 36 Mbps						
	OBW	Band Edge	Result			
	Within Band	(MHz)				
	Yes	5250	Pass			



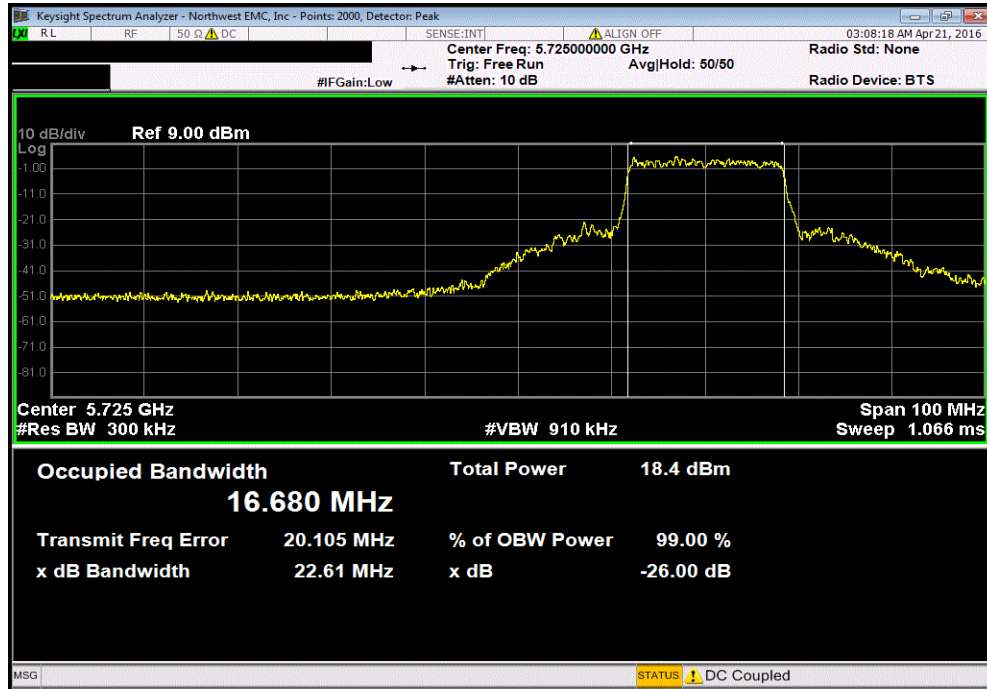
5725 - 5825 MHz Band, Low Channel, Ch 30 - 5745 MHz, 802.11(a) 6 Mbps						
	OBW	Band Edge	Result			
	Within Band	(MHz)				
	Yes	5725	Pass			



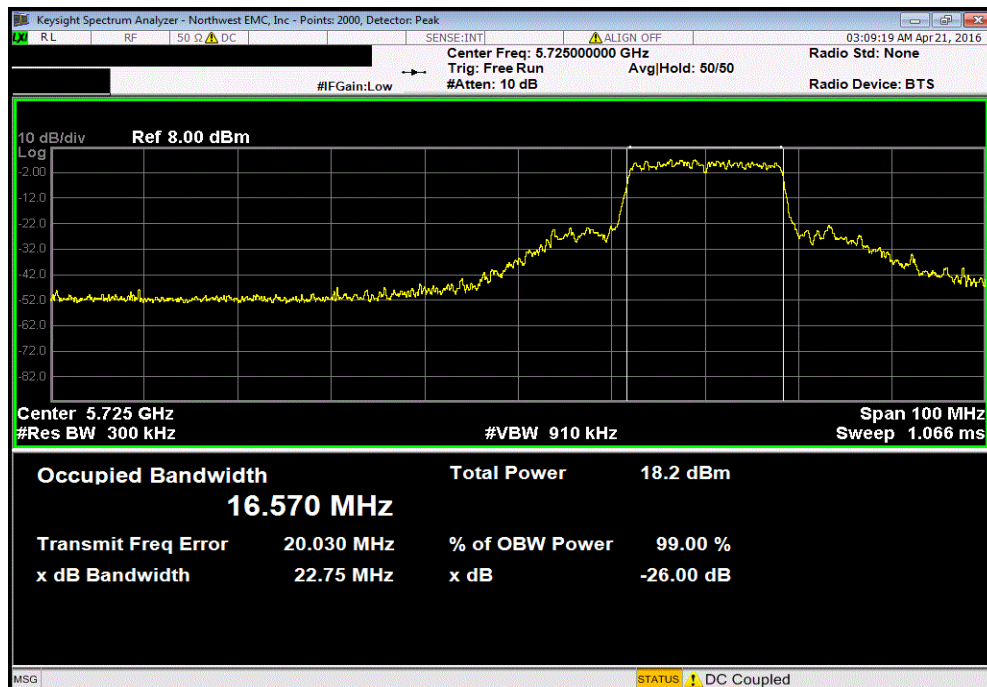


# BAND EDGE

5725 - 5825 MHz Band, Low Channel, Ch 30 - 5745 MHz, 802.11(a) 18 Mbps						
OBW				Band Edge	Result	
Within Band				(MHz)		
Yes				5725	Pass	



5725 - 5825 MHz Band, Low Channel, Ch 30 - 5745 MHz, 802.11(a) 36 Mbps						
OBW				Band Edge	Result	
Within Band				(MHz)		
Yes				5725	Pass	



# MAXIMUM POWER SPECTRAL DENSITY

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval (mo)
Generator - Signal	Keysight	N5182B	TFU	NCR	0
Cable	ESM Cable Corp.	TT	EV1	NCR	0
Block - DC	Fairview Microwave	SD3379	AMQ	6/18/2015	12
Attenuator	S.M. Electronics	SA26B-20	AWU	NCR	0
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	2/13/2016	12

## TEST DESCRIPTION

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum. The radio was operated in the modes as shown in the following data sheets.

A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used. The reference level offset on the spectrum analyzer was adjusted to compensate for cable loss and the external attenuation used between the RF output and the spectrum analyzer input.

Prior to measuring maximum power spectral density, the emission bandwidth (B) was measured. The method of measuring the emission bandwidth and the associated data are found elsewhere in this test report

The maximum power spectral density was measured using ANSI C63.10, Method SA-2 (RMS detection and trace averaging across the on and off times of the EUT transmission and use of a duty cycle correction factor), consistent with the method used for maximum conducted output power.

The spectrum analyzer settings were set per the guidance as well as the following specifics:

-Resolution Bandwidth of 510 kHz


-RMS Detector

-Trace average 100 traces in power averaging mode

The peak power spectral density (PPSD) was determined to be the highest level found across the emission in the reference bandwidth after 100 sweeps of power averaging (not video averaging).

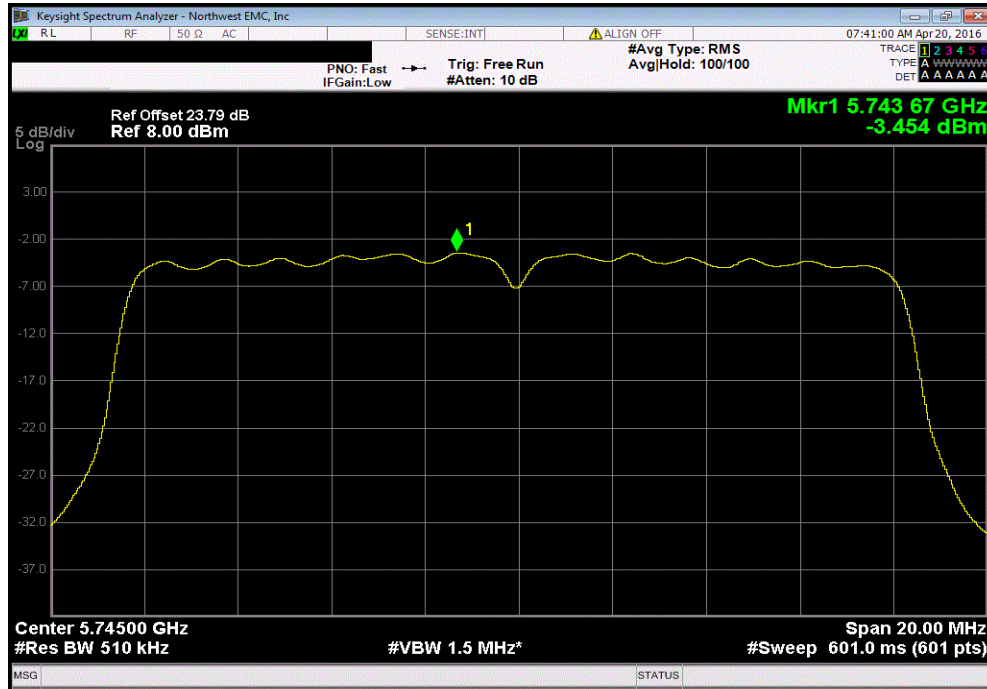
A duty cycle correction factor was added to the measurement using the results of the formula of  $10 \cdot \log(1/D)$  where D is the duty cycle.

# MAXIMUM POWER SPECTRAL DENSITY

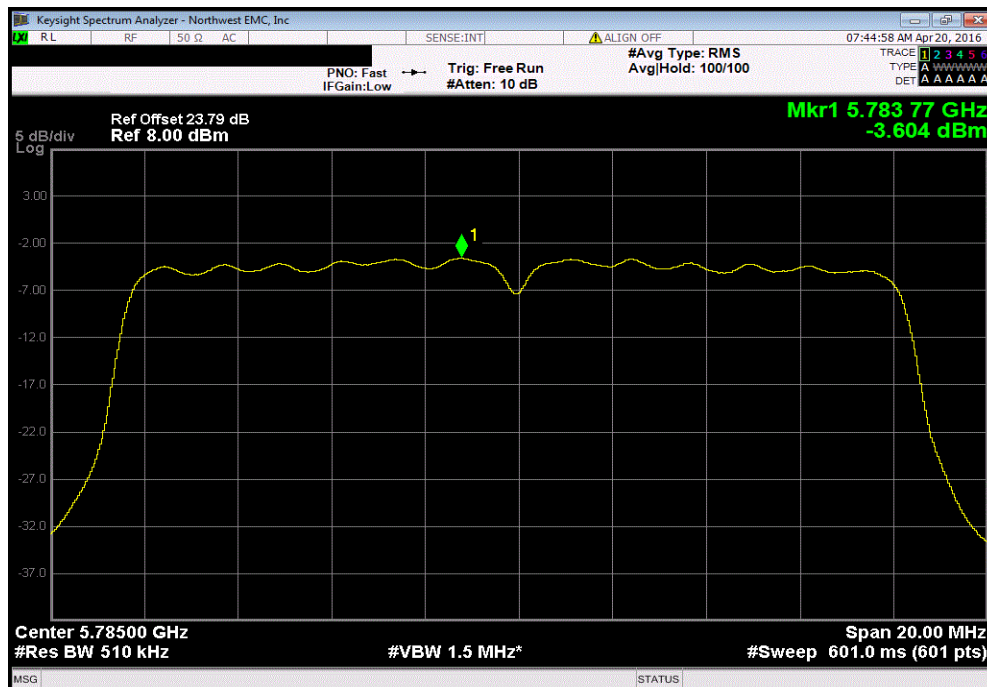
EUT: Sherwood XC		Work Order: FOCU0212	
Serial Number: 02EA3F000C28		Date: 04/20/16	
Customer: Summit Semiconductor LLC		Temperature: 22.8°C	
Attendees: David Schilling		Humidity: 46%	
Project: None		Barometric Pres.: 1010.7	
Tested by: Brandon Hobbs		Power: 1.2VDC/3.3VDC via 110VAC/60Hz	
		Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.407:2016		ANSI C63.10:2013	
COMMENTS			
The product was operating in non-isoc mode.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Power (dBm/MHz)	Duty Cycle Factor (dB)
		Density (dBm/MHz)	Limit ≤ (dBm / Ref BW)
Results			
Normal Conditions			
802.11(a) 6 Mbps			
	Low channel, Ch.30, 5745 MHz	-3.454	2
	Mid channel, Ch.32, 5785 MHz	-3.604	1.9
	High channel, Ch.34, 5825 MHz	-1.884	1.9
802.11(a) 18 Mbps			
	Low channel, Ch.30, 5745 MHz	-4.615	3.7
	Mid channel, Ch.32, 5785 MHz	-4.978	3.7
	High channel, Ch.34, 5825 MHz	-3.455	3.7
802.11(a) 36 Mbps			
	Low channel, Ch.30, 5745 MHz	-5.386	4.9
	Mid channel, Ch.32, 5785 MHz	-5.515	5.1
	High channel, Ch.34, 5825 MHz	-4.188	5.1

# MAXIMUM POWER SPECTRAL DENSITY

Normal Conditions, 802.11(a) 6 Mbps, Low channel, Ch.30, 5745 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-3.454	2	-1.5	30	Pass		

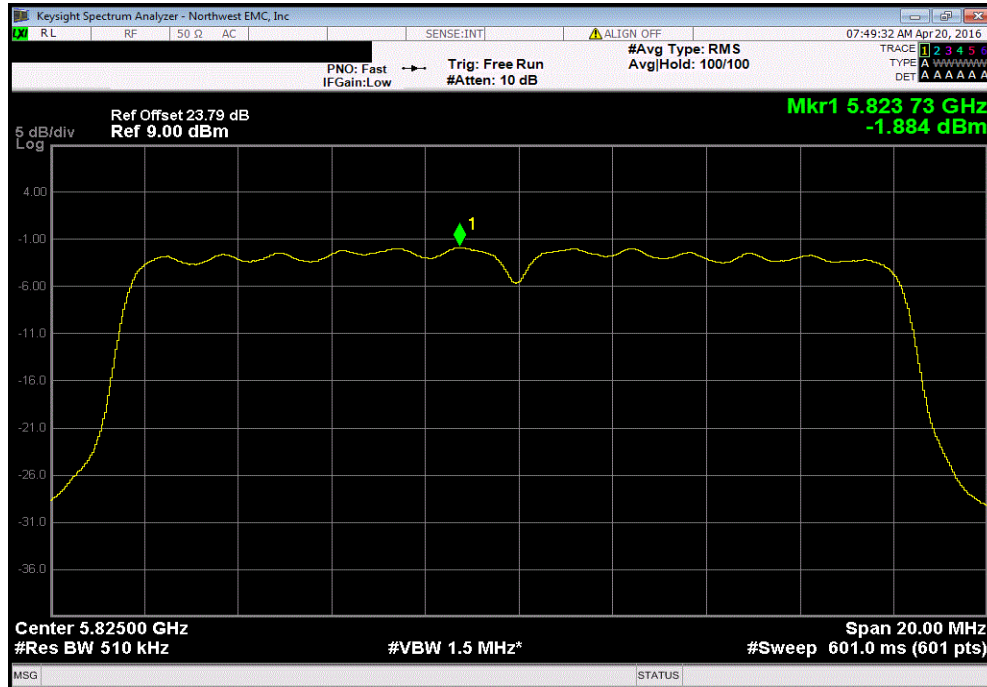


Normal Conditions, 802.11(a) 6 Mbps, Mid channel, Ch.32, 5785 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-3.604	1.9	-1.7	30	Pass		

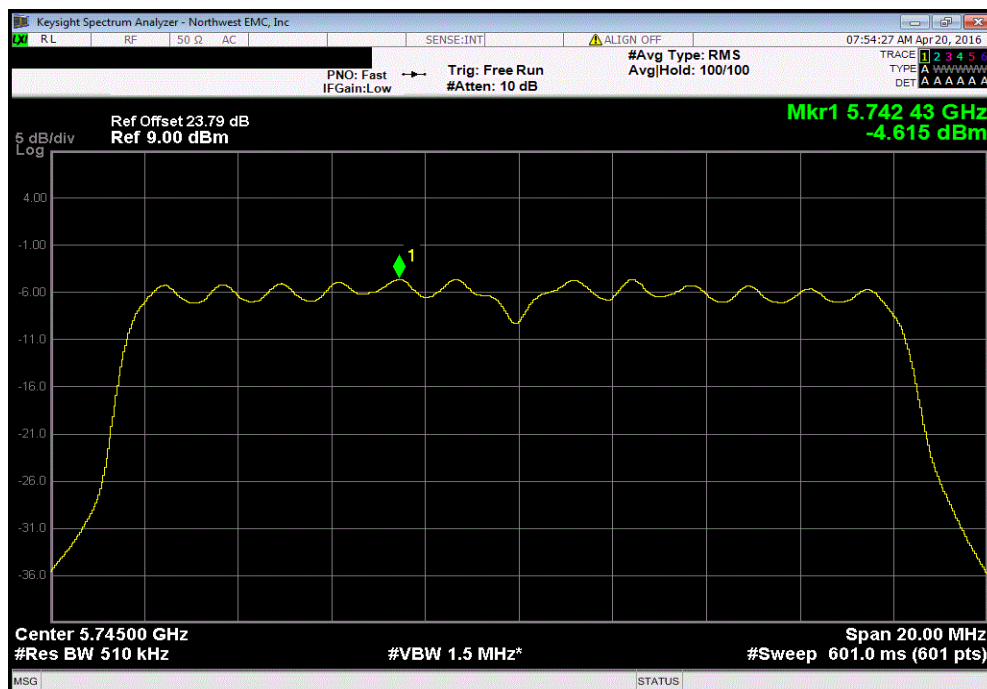


# MAXIMUM POWER SPECTRAL DENSITY

Normal Conditions, 802.11(a) 6 Mbps, High channel, Ch.34, 5825 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-1.884	1.9	0	30	Pass		

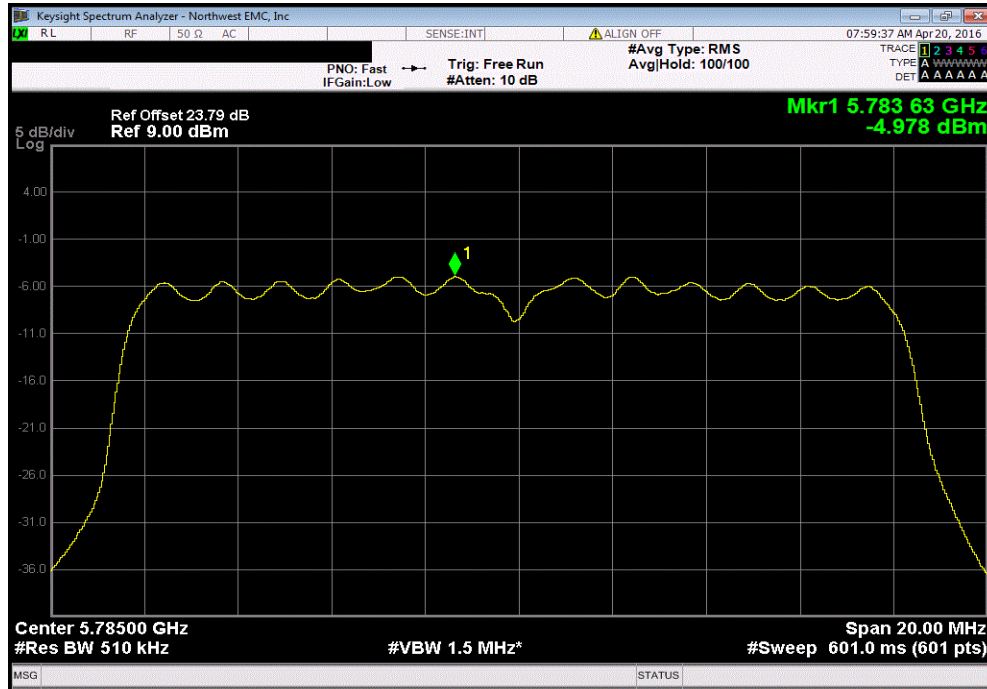


Normal Conditions, 802.11(a) 18 Mbps, Low channel, Ch.30, 5745 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-4.615	3.7	-0.9	30	Pass		

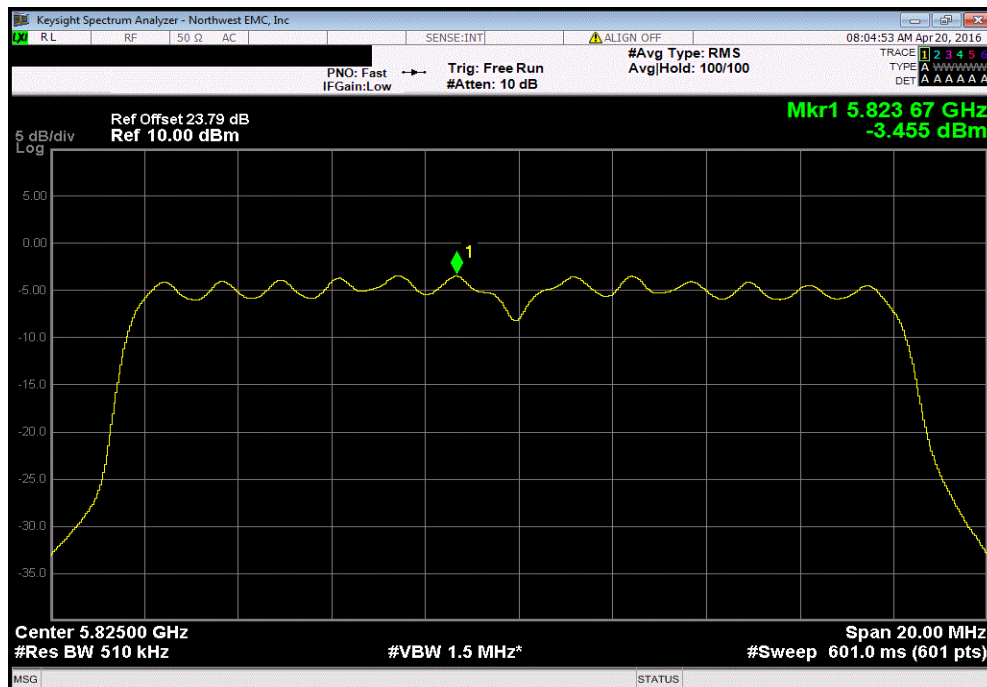


# MAXIMUM POWER SPECTRAL DENSITY

Normal Conditions, 802.11(a) 18 Mbps, Mid channel, Ch.32, 5785 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-4.978	3.7	-1.3	30	Pass		



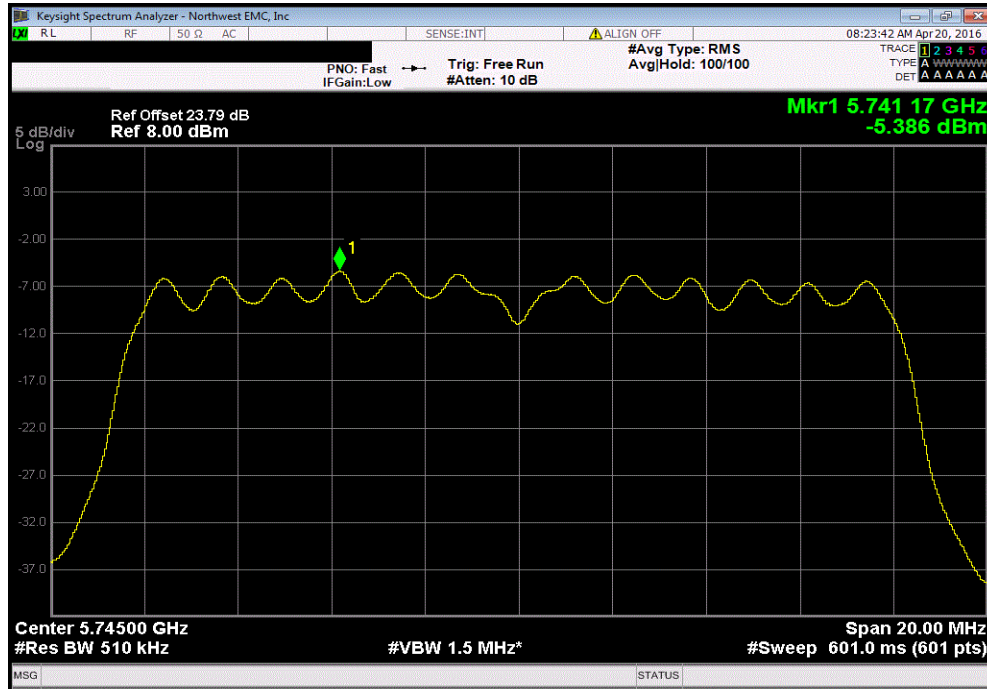
Normal Conditions, 802.11(a) 18 Mbps, High channel, Ch.34, 5825 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results		
-3.455	3.7	0.3	30	Pass		



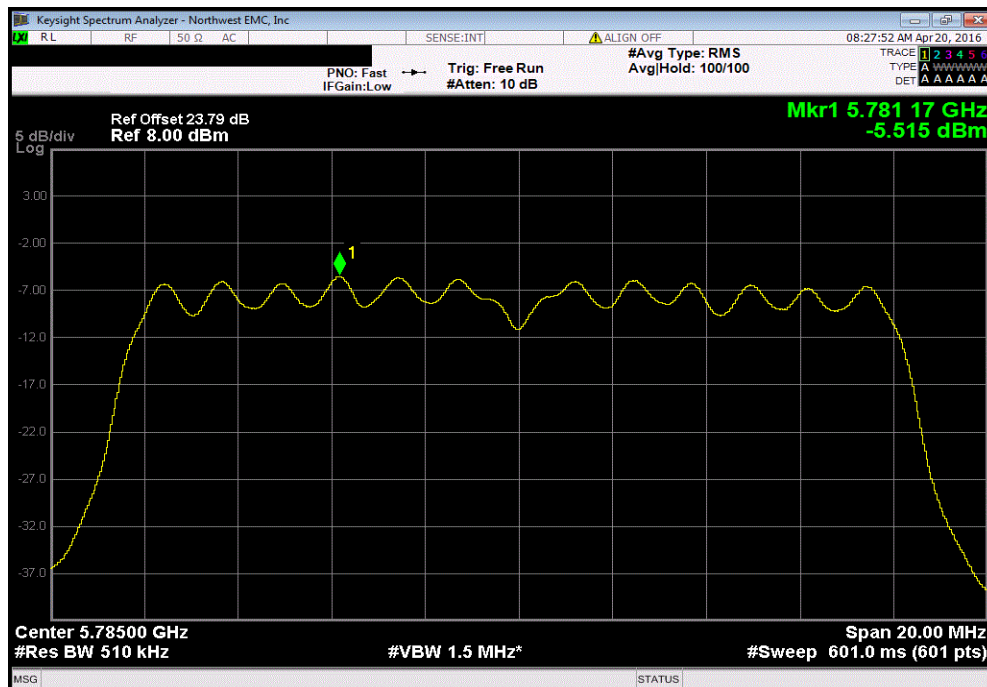


# MAXIMUM POWER SPECTRAL DENSITY

Normal Conditions, 802.11(a) 36 Mbps, Low channel, Ch.30, 5745 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ε (dBm / Ref BW)	Results		
-5.386	4.9	-0.5	30	Pass		



Normal Conditions, 802.11(a) 36 Mbps, Mid channel, Ch.32, 5785 MHz						
Power (dBm/MHz)	Duty Cycle Factor (dB)	Density (dBm/MHz)	Limit ε (dBm / Ref BW)	Results		
-5.515	5.1	-0.4	30	Pass		





# MAXIMUM POWER SPECTRAL DENSITY

Normal Conditions, 802.11(a) 36 Mbps, High channel, Ch.34, 5825 MHz						
	Power (dBm/MHz)	Duty Cycle Factor (dB)		Density (dBm/MHz)	Limit ± (dBm / Ref BW)	Results
	-4.188	5.1		0.9	30	Pass

