



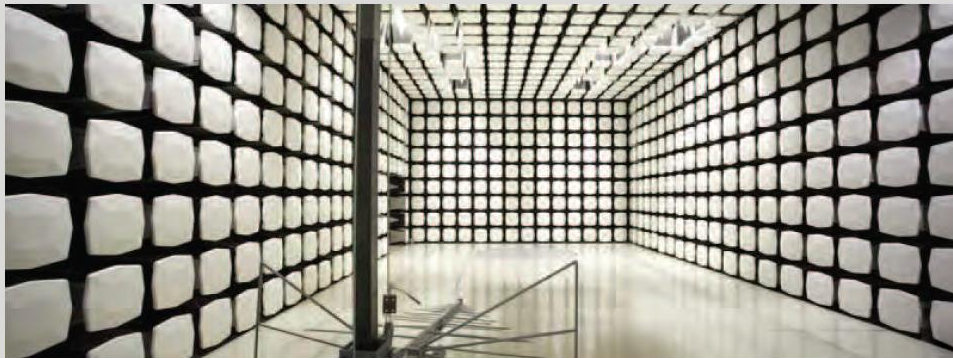
American Portwell Technology

Dual Band Wireless-AC 3160 Module

FCC 15.407:2019

802.11an, ac SISO Radio

Report # AMRN0006.1



NVLAP LAB CODE: 201049-0



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CERTIFICATE OF TEST



Last Date of Test: May 1, 2019
American Portwell Technology
Model: Dual Band Wireless-AC 3160 Module

Radio Equipment Testing

Standards

Specification	Method
FCC 15.407:2019	ANSI C63.10:2013, KDB 789033, KDB 905462
FCC 15.205:2019	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for C2PC based on product description
6.5, 6.6, 12.7	Spurious Radiated Emissions	Yes	Pass	
6.8	Frequency Stability	No	N/A	Not required for C2PC based on product description
12.2	Duty Cycle	Yes	Pass	
12.3.2.4	Maximum Conducted Output Power	Yes	Pass	
12.3.2.4	Equivalent Isotropic Radiated Power (EIRP)	Yes	Pass	
12.4.1	Emission Bandwidth	No	N/A	Not required for C2PC based on product description
12.4.2	Occupied Bandwidth	No	N/A	Not required for C2PC based on product description
12.4.2	Band Edge	No	N/A	Not required for C2PC based on product description
12.5	Maximum Power Spectral Density	No	N/A	Not required for C2PC based on product description
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:

Jeremiah Darden, 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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.

REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

ACCREDITATIONS AND AUTHORIZATIONS



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 Element to certify transmitters to FCC and IC specifications.

NVLAP - Each laboratory is accredited by NVLAP to ISO 17025

Canada

ISED - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

European Union

European Commission – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

Australia/New Zealand

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

Korea

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

Japan

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

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.

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

SCOPE

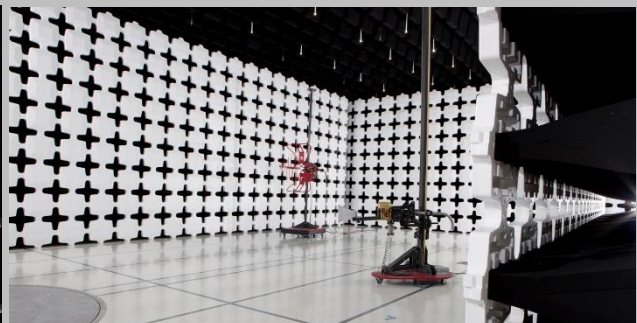
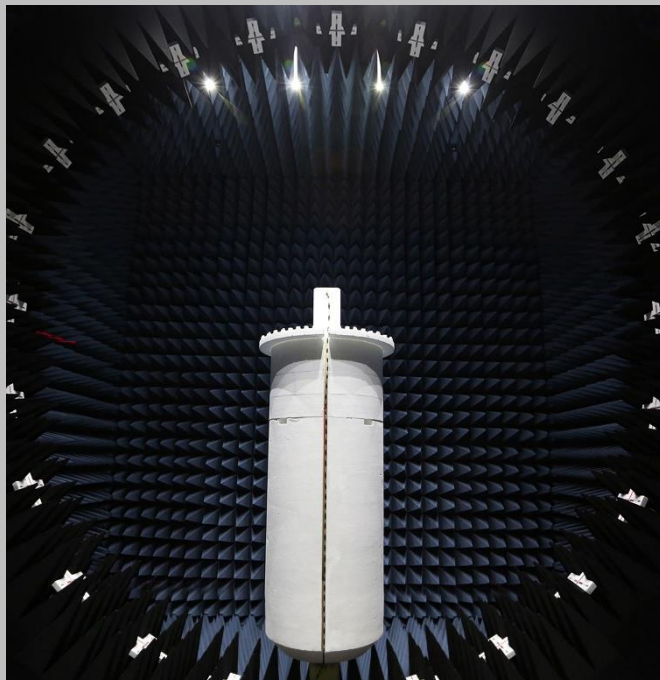
For details on the Scopes of our Accreditations, please visit:

<https://www.nwemc.com/emc-testing-accreditations>

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP				
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA				
US0158	US0175	US0017	US0191	US0157



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.

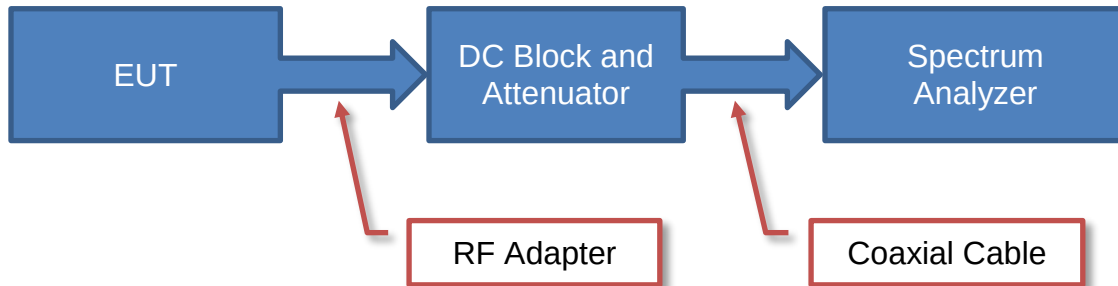
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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.

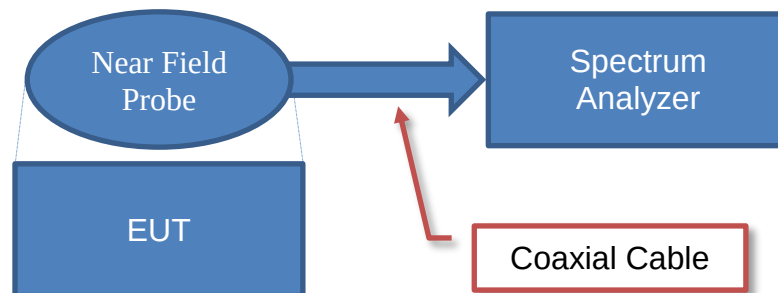
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.1 dB	-5.1 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

TEST SETUP BLOCK DIAGRAMS

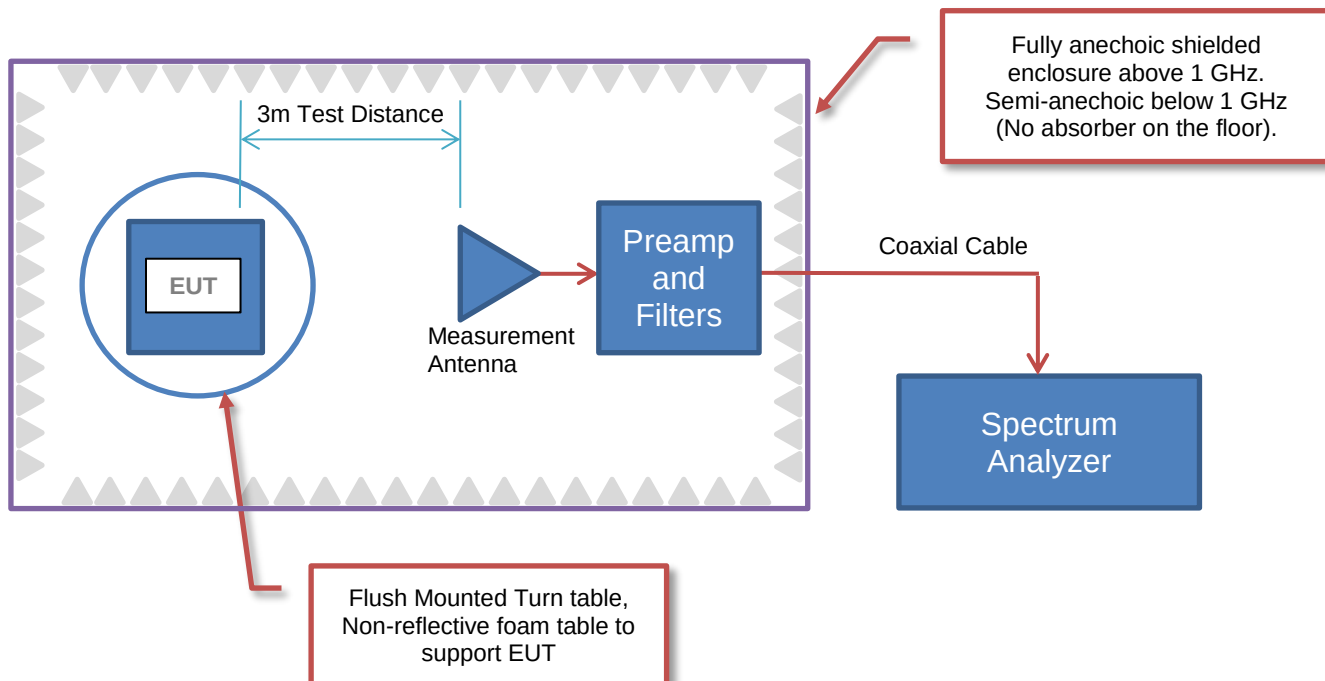
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



POWER TABLE

US – UNII (5GHz) Transmit Power Table

5.2GHz Sub-band

Mode	BW (MHz)	Channel Frequency (MHz)	RF Output Power at Main RF (dBm)
802.11a	20	5180	14.5
		5200	15.5
		5240	15
802.11n	20	5180	14.5
		5200	15.5
		5240	15
802.11n	40	5190	10.5
		5230	16.5
802.11ac	80	5210	9

5.3GHz Sub-band

Mode	BW (MHz)	Channel Frequency (MHz)	RF Output Power at Main RF (dBm)
802.11a	20	5260	16.5
		5320	14.5
802.11n	20	5260	16.5
		5320	14.5
802.11n	40	5270	10.5
		5310	12
802.11ac	80	5290	11.5

POWER TABLE

5.6GHz Sub-band

Mode	BW (MHz)	Channel Frequency (MHz)	RF Output Power at Main RF (dBm)
802.11a	20	5500	14.5
		5580	16.5
		5700	14
802.11n	20	5500	14.5
		5580	16.5
		5700	14
802.11n	40	5510	11.5
		5590	16.5
		5670	16.5
802.11ac	80	5530	10
		5610	15

5.8GHz Sub-band

Mode	BW (MHz)	Channel Frequency (MHz)	RF Output Power at Main RF (dBm)
802.11a	20	5745	16.5
		5785	16.5
		5825	16.5
802.11n	20	5745	16.5
		5785	16.5
		5825	16.5
802.11n	40	5755	16.5
		5795	16.5
802.11ac	80	5775	15

PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	American Portwell Technology
Address:	44200 Christy Street
City, State, Zip:	FREMONT, CA 94538
Test Requested By:	Brian Zhang
Model:	Dual Band Wireless-AC 3160 Module
First Date of Test:	April 30, 2019
Last Date of Test:	May 1, 2019
Receipt Date of Samples:	April 30, 2019
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The equipment under test (EUT) consists of an Intel Atom Nano 6060 motherboard combined with an Intel dual band wireless module, 2.5" SATA 128 GB SSD, 8Gb DDR3L memory and GPIO connection for enabling and disabling the WiFi. The dual band wireless radio is a pre-certified unit (FCC ID: 2AMLS-MWISP). This report is to support the C1PC or C2PC change of the antennas to an omni version with a lower gain than the one on the current grant of 2dBi. The radio module was tested outside of its normal aluminum chassis in a standalone configuration, where applicable.

Testing Objective:

To demonstrate compliance of the 802.11 radio under FCC 15.407 for operation in the 5.2 GHz, 5.3 GHz, 5.6 GHz and 5.8 GHz band(s). for a C1PC or C2PC

CONFIGURATIONS

Configuration AMRN0006- 1

Software/Firmware Running during test	
Description	Version
Intel DRTU Tool	1.7.7-02972

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
WiFi Radio Module	American Portwell Technology	810301	APT31600958

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
WISP Module	American Portwell Technology	MWISP6060	1903G01160
LCD Monitor	NEC	E224Wi-BK	41103516NA
USB Mouse	Microsoft	1113	91705-523-2412291-21449
USB Keyboard	Lenovo	KB1021	0002649
AC/DC Adapter	FSP Group Inc.	9NA0605338	H8311001100
Wireless Switch	Unknown	Unknown	None
USB Hub	Toshiba	PA3627U-1ETC	EG7000152

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power (Monitor)	No	2.4m	No	AC Mains	LCD Monitor
DisplayPort	Yes	1.75m	No	LCD Monitor	WISP Module
USB (Mouse)	Yes	1.85m	Yes	USB Mouse	WISP Module
USB (Keyboard)	Yes	1.75m	No	USB Keyboard	WISP Module
AC Power (Adapter)	No	1.7m	No	AC Mains	AC/DC Adapter
DC Power (Adapter)	No	1.0m	Yes	AC/DC Adapter	WISP Module
Wireless Switch Control	No	1.45m	No	Wireless Switch	WISP Module
u.FL to RP-SMA 1	Yes	0.17m	No	WiFi Radio Module	50 ohm termination
USB (USB Hub)	Yes	1.5m	No	SB Hub	WiFi Radio Module

CONFIGURATIONS

Configuration AMRN0006- 2

Software/Firmware Running during test	
Description	Version
Intel DRTU Tool	1.7.7-02972

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
WiFi Radio Module	American Portwell Technology	810301	APT31600958

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
WISP Module	American Portwell Technology	MWISP6060	1903G01160
AC/DC Adapter	FSP Group Inc.	9NA0605338	H8311001100
Wireless Switch	Unknown	Unknown	None
Dipole Antenna x2	Aristotle Enterprises Inc.	RFA-25-L2M2	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
LCD Monitor	NEC	E224Wi-BK	41103516NA
USB Mouse	Microsoft	1113	91705-523-2412291-21449
USB Keyboard	Lenovo	KB1021	0002649
USB Hub	Toshiba	PA3627U-1ETC	EG7000152

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power (Monitor)	No	2.4m	No	AC Mains	LCD Monitor
DisplayPort	Yes	1.75m	No	LCD Monitor	WISP Module
USB (Mouse)	Yes	1.85m	Yes	USB Mouse	WISP Module
USB (Keyboard)	Yes	1.75m	No	USB Keyboard	WISP Module
AC Power (Adapter)	No	1.7m	No	AC Mains	AC/DC Adapter
DC Power (Adapter)	No	1.0m	Yes	AC/DC Adapter	WISP Module
Wireless Switch Control	No	1.45m	No	Wireless Switch	WISP Module
u.FI to RP-SMA x2	Yes	0.17m	No	WiFi Radio Module	RP-SMA to SMA cable
RP-SMA to SMA x2	Yes	0.5m	No	u.FL to RP-SMA cable	Dipole Antenna
USB (USB Hub)	Yes	1.5m	No	SB Hub	WiFi Radio Module

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-04-30	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2019-04-30	Maximum Conducted Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2019-04-30	Equivalent Isotropic Radiated Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2019-05-01	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2019.02.26

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.

MODES OF OPERATION

Continuously Transmitting at High Ch 165 (5825MHz)
Continuously Transmitting at Low Ch 149 (5745MHz)
Continuously Transmitting at Low Ch 100 (5500MHz)
Continuously Transmitting at High Ch 64 (5320MHz)
Continuously Transmitting at Low Ch 36 (5180MHz)
Continuously Transmitting at Low Ch 52 (5260MHz)
Continuously Transmitting at Low Ch 149 (5745MHz), Mid Ch 157 (5785MHz), High Ch 165 (5825MHz)
Continuously Transmitting at Low Ch 100 (5500MHz), Mid Ch 116 (5580MHz), High Ch 140 (5700MHz)
Continuously Transmitting at Low Ch 52 (5260MHz), High Ch 64 (5320MHz)
Continuously Transmitting at Low Ch 36 (5180MHz), High Ch 48 (5240MHz)

POWER SETTINGS INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

AMRN0006 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	40000 MHz
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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
Cable	Fairview Microwave	FMTC401-72	TXF	9-Oct-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	JSDWK42-18004000-60-5P	PAM	10-Oct-2018	12 mo
Antenna - Double Ridge	A.H. Systems, Inc.	SAS-574	AXW	21-Aug-2018	24 mo
Cable	Northwest EMC	18-40GHz	TXE	10-Oct-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	PAL	9-Oct-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AJG	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	PAK	9-Oct-2018	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AJF	NCR	0 mo
Cable	Northwest EMC	8-18GHz	TXD	17-Mar-2019	12 mo
Filter - Band Pass/Notch	Micro-Tronics	BRC50705	HFQ	17-Mar-2019	12 mo
Filter - Band Pass/Notch	Micro-Tronics	BRC50704	HGB	17-Mar-2019	12 mo
Filter - Band Pass/Notch	Micro-Tronics	BRC50703	HGH	11-Jun-2018	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAJ	17-Mar-2019	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJL	11-Oct-2018	24 mo
Cable	Northwest EMC	1-8.2 GHz	TXC	17-Mar-2019	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	HHV	3-Aug-2018	12 mo
Amplifier - Pre-Amplifier	Fairview Microwave	FMAM63001	PAS	24-Jan-2019	12 mo
Cable	Northwest EMC	RE 9kHz - 1GHz	TXB	22-Aug-2018	12 mo
Antenna - Biconilog	ETS Lindgren	3143B	AYF	10-May-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	27-Feb-2019	12 mo
Generator - Signal	Keysight	N5171B-506	TEW	2-May-2018	36 mo
Power Sensor	Gigatronics	80701A	SRC	9-Oct-2018	12 mo
Meter - Power	Gigatronics	8652A	SOZ	9-Oct-2018	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJN	11-Oct-2018	24 mo

TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies in each operational band and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual 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 if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector
PK = Peak Detector
AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

6 Mbps data rate was used since it was the worst-case from previous testing.

SPURIOUS RADIATED EMISSIONS

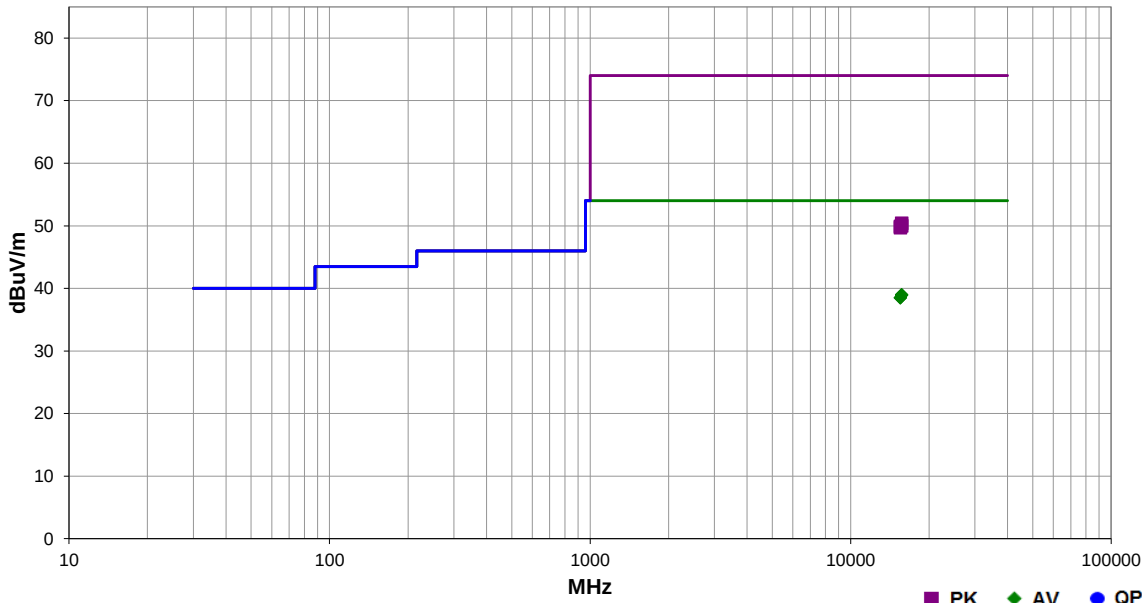


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	<i>Jonathan Kiefer</i>
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
EUT: Dual Band Wireless-AC 3160 Module				Tested by: Jonathan Kiefer
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 36 (5180MHz), High Ch 48 (5240MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.2GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	23	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
15719.010	26.8	12.2	1.2	15.0	3.0	0.0	Horz	AV	0.0	39.0	54.0	-15.0	High Ch 48, EUT Horz, 6 Mbps
15719.760	26.7	12.2	1.3	205.0	3.0	0.0	Vert	AV	0.0	38.9	54.0	-15.1	High Ch 48, EUT Horz, 6 Mbps
15539.650	26.4	12.1	1.3	151.0	3.0	0.0	Horz	AV	0.0	38.5	54.0	-15.5	Low Ch 36, EUT Horz, 6 Mbps
15540.130	26.4	12.1	1.3	236.0	3.0	0.0	Vert	AV	0.0	38.5	54.0	-15.5	Low Ch 36, EUT Horz, 6 Mbps
15719.140	38.2	12.2	1.2	15.0	3.0	0.0	Horz	PK	0.0	50.4	74.0	-23.6	High Ch 48, EUT Horz, 6 Mbps
15720.850	37.8	12.2	1.3	205.0	3.0	0.0	Vert	PK	0.0	50.0	74.0	-24.0	High Ch 48, EUT Horz, 6 Mbps
15540.430	37.8	12.1	1.3	236.0	3.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	Low Ch 36, EUT Horz, 6 Mbps
15540.180	37.6	12.1	1.3	151.0	3.0	0.0	Horz	PK	0.0	49.7	74.0	-24.3	Low Ch 36, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS



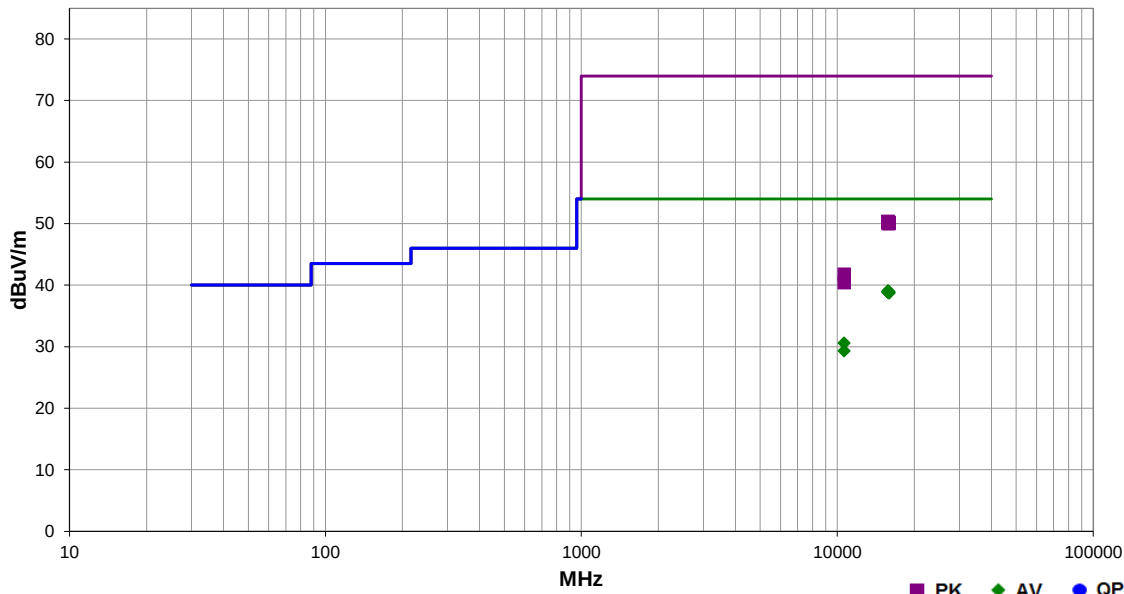
EmR5 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by: Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 52 (5260MHz), High Ch 64 (5320MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.3GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	22	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
15781.260	26.8	12.3	1.3	291.9	3.0	0.0	Horz	AV	0.0	39.1	54.0	-14.9	Low Ch 52, EUT Horz, 6 Mbps
15779.140	26.6	12.3	1.2	188.0	3.0	0.0	Vert	AV	0.0	38.9	54.0	-15.1	Low Ch 52, EUT Horz, 6 Mbps
15781.450	26.6	12.3	1.2	240.0	3.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low Ch 52, EUT Vert, 6 Mbps
15780.150	26.6	12.3	1.3	3.0	3.0	0.0	Vert	AV	0.0	38.9	54.0	-15.1	Low Ch 52, EUT Vert, 6 Mbps
15780.020	26.6	12.3	1.3	171.0	3.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	Low Ch 52, EUT On Side, 6 Mbps
15779.400	26.6	12.3	3.8	225.9	3.0	0.0	Vert	AV	0.0	38.9	54.0	-15.1	Low Ch 52, EUT On Side, 6 Mbps
15959.220	26.0	12.9	1.2	50.0	3.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	High Ch 64, EUT Horz, 6 Mbps
15960.480	25.8	12.9	3.9	36.0	3.0	0.0	Vert	AV	0.0	38.7	54.0	-15.3	High Ch 64, EUT Horz, 6 Mbps
10639.820	33.0	-2.4	1.2	254.0	3.0	0.0	Vert	AV	0.0	30.6	54.0	-23.4	High Ch 64, EUT Horz, 6 Mbps
15779.210	38.1	12.3	1.3	291.9	3.0	0.0	Horz	PK	0.0	50.4	74.0	-23.6	Low Ch 52, EUT Horz, 6 Mbps
15780.010	38.0	12.3	3.8	225.9	3.0	0.0	Vert	PK	0.0	50.3	74.0	-23.7	Low Ch 52, EUT On Side, 6 Mbps
15779.800	37.9	12.3	1.2	188.0	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	Low Ch 52, EUT Horz, 6 Mbps
15780.140	37.9	12.3	1.3	3.0	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	Low Ch 52, EUT Vert, 6 Mbps
15958.930	37.3	12.9	3.9	36.0	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	High Ch 64, EUT Horz, 6 Mbps
15779.890	37.8	12.3	1.2	240.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	Low Ch 52, EUT Vert, 6 Mbps
15780.310	37.7	12.3	1.3	171.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Low Ch 52, EUT On Side, 6 Mbps
15960.640	37.1	12.9	1.2	50.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	High Ch 64, EUT Horz, 6 Mbps
10640.700	31.7	-2.4	1.2	300.0	3.0	0.0	Horz	AV	0.0	29.3	54.0	-24.7	High Ch 64, EUT Horz, 6 Mbps
10641.490	44.2	-2.4	1.2	254.0	3.0	0.0	Vert	PK	0.0	41.8	74.0	-32.2	High Ch 64, EUT Horz, 6 Mbps
10639.750	42.8	-2.4	1.2	300.0	3.0	0.0	Horz	PK	0.0	40.4	74.0	-33.6	High Ch 64, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

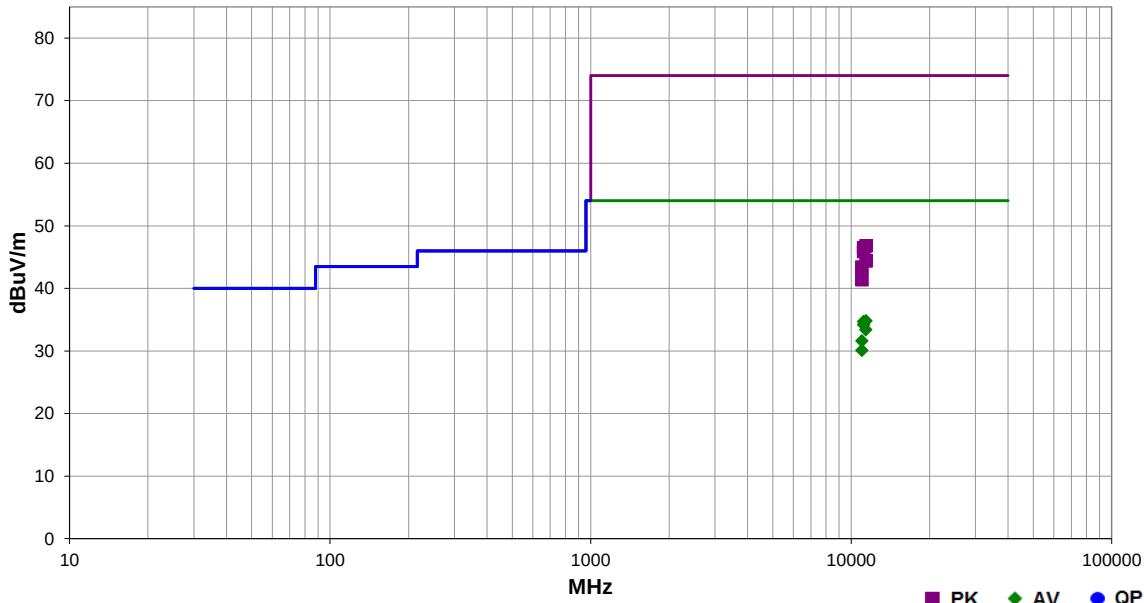


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
		Tested by: Jonathan Kiefer		
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 100 (5500MHz), Mid Ch 116 (5580MHz), High Ch 140 (5700MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.6GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	25	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
11400.700	37.3	-2.5	2.2	327.0	3.0	0.0	Horz	AV	0.0	34.8	54.0	-19.2	High Ch 140, EUT Horz, 6 Mbps
11159.980	37.2	-2.5	3.4	327.9	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	Mid Ch 116, EUT Horz, 6 Mbps
11160.480	36.7	-2.5	1.1	278.0	3.0	0.0	Horz	AV	0.0	34.2	54.0	-19.8	Mid Ch 116, EUT Horz, 6 Mbps
11400.030	35.9	-2.5	3.8	327.9	3.0	0.0	Vert	AV	0.0	33.4	54.0	-20.6	High Ch 140, EUT Horz, 6 Mbps
11000.380	34.2	-2.6	1.3	66.0	3.0	0.0	Horz	AV	0.0	31.6	54.0	-22.4	Low Ch 100, EUT Horz, 6 Mbps
11000.160	32.7	-2.6	1.3	337.0	3.0	0.0	Vert	AV	0.0	30.1	54.0	-23.9	Low Ch 100, EUT Horz, 6 Mbps
11400.830	49.3	-2.5	2.2	327.0	3.0	0.0	Horz	PK	0.0	46.8	74.0	-27.2	High Ch 140, EUT Horz, 6 Mbps
11160.700	49.0	-2.5	3.4	327.9	3.0	0.0	Vert	PK	0.0	46.5	74.0	-27.5	Mid Ch 116, EUT Horz, 6 Mbps
11161.320	48.4	-2.5	1.1	278.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	Mid Ch 116, EUT Horz, 6 Mbps
11400.610	46.9	-2.5	3.8	327.9	3.0	0.0	Vert	PK	0.0	44.4	74.0	-29.6	High Ch 140, EUT Horz, 6 Mbps
11000.540	46.0	-2.6	1.3	66.0	3.0	0.0	Horz	PK	0.0	43.4	74.0	-30.6	Low Ch 100, EUT Horz, 6 Mbps
10999.260	44.0	-2.6	1.3	337.0	3.0	0.0	Vert	PK	0.0	41.4	74.0	-32.6	Low Ch 100, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

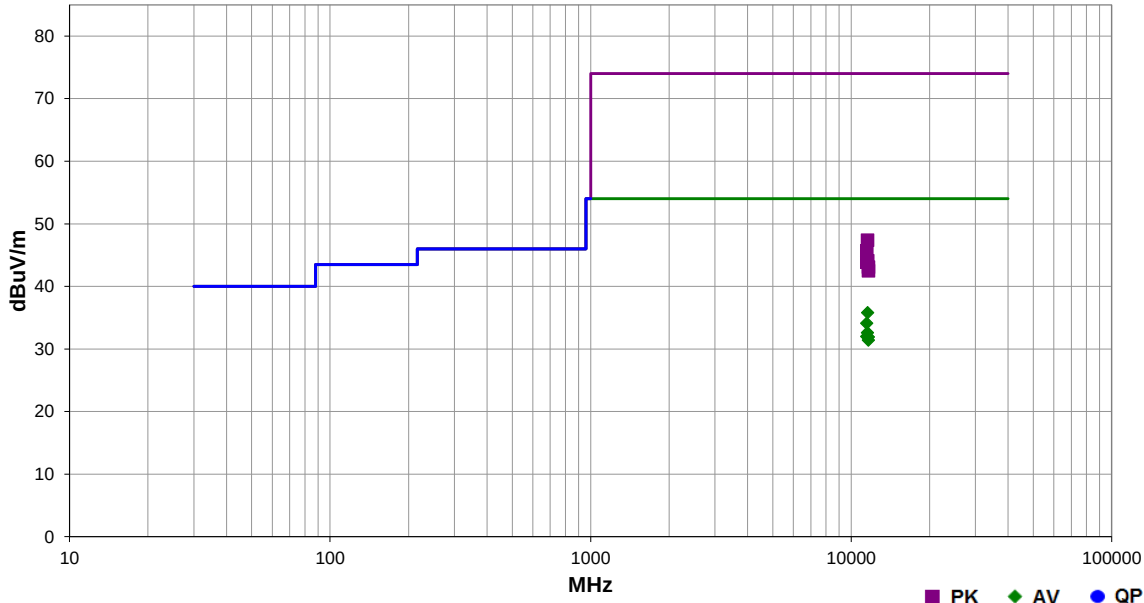


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by: Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 149 (5745MHz), Mid Ch 157 (5785MHz), High Ch 165 (5825MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.8GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	24	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
11570.120	38.4	-2.6	1.3	308.0	3.0	0.0	Horz	AV	0.0	35.8	54.0	-18.2	Mid Ch 157, EUT Horz, 6 Mbps
11489.970	36.7	-2.6	1.2	74.0	3.0	0.0	Horz	AV	0.0	34.1	54.0	-19.9	Low Ch 149, EUT Horz, 6 Mbps
11569.820	35.2	-2.6	1.3	0.0	3.0	0.0	Vert	AV	0.0	32.6	54.0	-21.4	Mid Ch 157, EUT Horz, 6 Mbps
11490.380	34.6	-2.6	1.2	70.9	3.0	0.0	Vert	AV	0.0	32.0	54.0	-22.0	Low Ch 149, EUT Horz, 6 Mbps
11649.900	34.0	-2.1	1.0	40.9	3.0	0.0	Vert	AV	0.0	31.9	54.0	-22.1	High Ch 165, EUT Horz, 6 Mbps
11649.370	33.5	-2.1	1.2	346.9	3.0	0.0	Horz	AV	0.0	31.4	54.0	-22.6	High Ch 165, EUT Horz, 6 Mbps
11568.850	50.0	-2.6	1.3	308.0	3.0	0.0	Horz	PK	0.0	47.4	74.0	-26.6	Mid Ch 157, EUT Horz, 6 Mbps
11491.720	48.3	-2.6	1.2	74.0	3.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	Low Ch 149, EUT Horz, 6 Mbps
11570.360	46.7	-2.6	1.3	0.0	3.0	0.0	Vert	PK	0.0	44.1	74.0	-29.9	Mid Ch 157, EUT Horz, 6 Mbps
11492.240	46.5	-2.6	1.2	70.9	3.0	0.0	Vert	PK	0.0	43.9	74.0	-30.1	Low Ch 149, EUT Horz, 6 Mbps
11650.190	45.2	-2.1	1.0	40.9	3.0	0.0	Vert	PK	0.0	43.1	74.0	-30.9	High Ch 165, EUT Horz, 6 Mbps
11651.180	44.6	-2.1	1.2	346.9	3.0	0.0	Horz	PK	0.0	42.5	74.0	-31.5	High Ch 165, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS



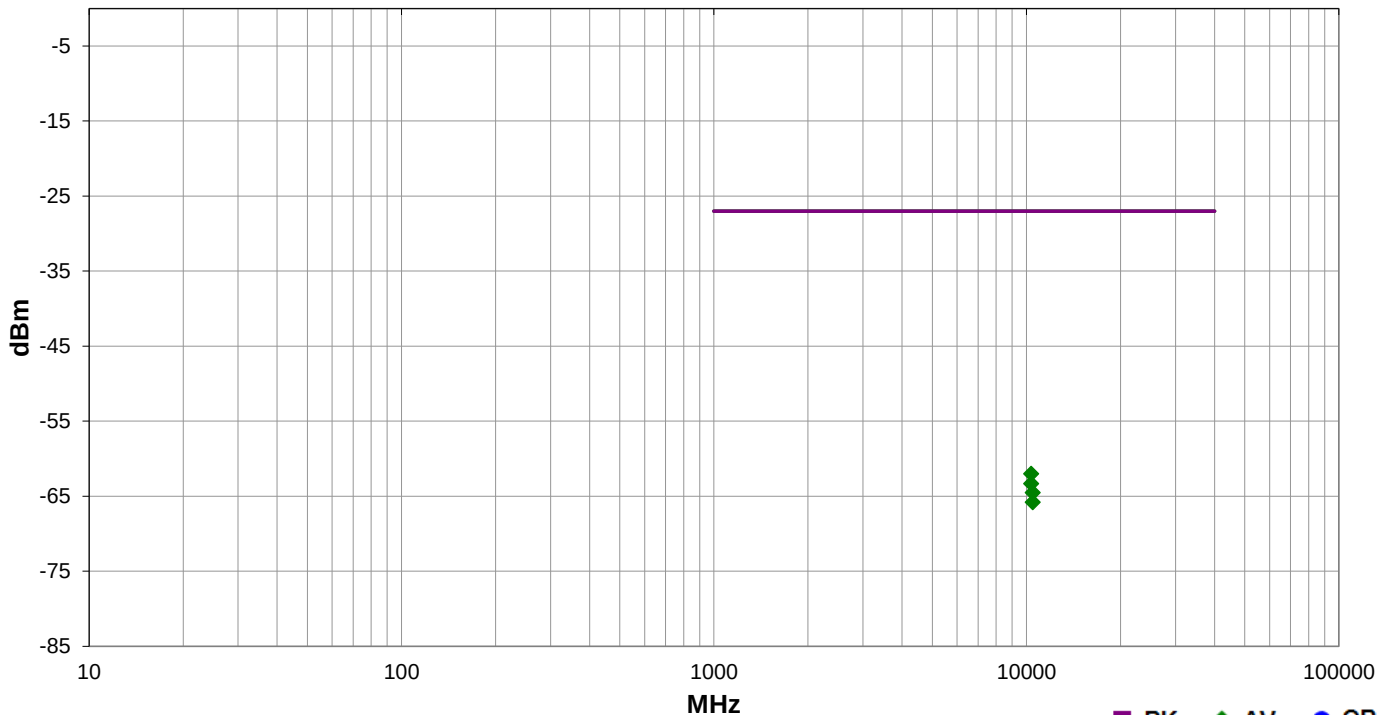
EmiRS 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019		
Project:	None	Temperature:	22.7 °C		
Job Site:	TX02	Humidity:	53.9% RH		
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by:	Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module				
Configuration:	2				
Customer:	American Portwell Technology				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continuously Transmitting at Low Ch 36 (5180MHz), High Ch 48 (5240MHz)				
Deviations:	None				
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.2GHz Band. -27dBm EIRP limit.				

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	28	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
10361.450	1.3	344.0	Vert	AV	6.27E-10	-62.0	-27.0	-35.0	Low Ch 36, EUT Horz, 6 Mbps
10359.800	1.3	57.0	Horz	AV	4.65E-10	-63.3	-27.0	-36.3	Low Ch 36, EUT Horz, 6 Mbps
10480.500	3.1	195.0	Vert	AV	3.52E-10	-64.5	-27.0	-37.5	High Ch 48, EUT Horz, 6 Mbps
10480.460	1.2	70.9	Horz	AV	2.61E-10	-65.8	-27.0	-38.8	High Ch 48, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS



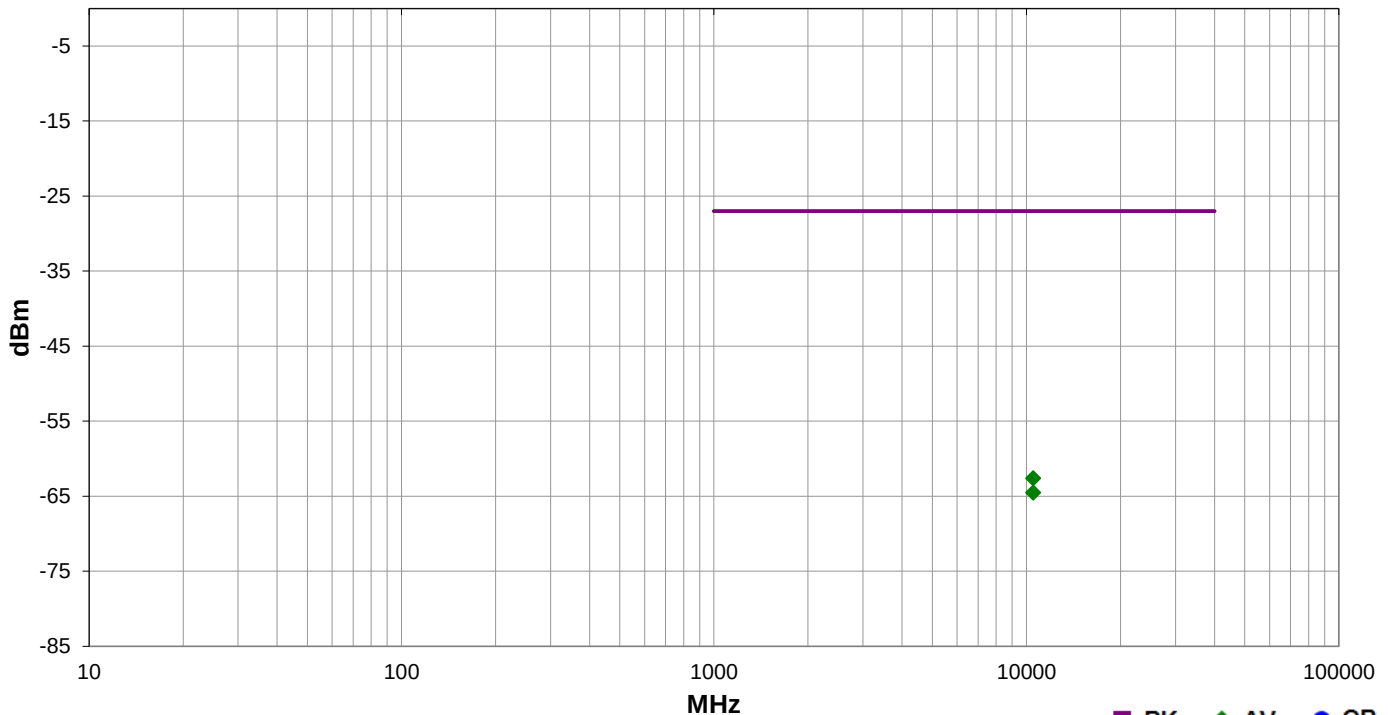
EmiRS 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019		
Project:	None	Temperature:	22.7 °C		
Job Site:	TX02	Humidity:	53.9% RH		
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by:	Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module				
Configuration:	2				
Customer:	American Portwell Technology				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continuously Transmitting at Low Ch 52 (5260MHz)				
Deviations:	None				
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.3GHz Band. -27dBm EIRP limit.				

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	27	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
10520.090	1.3	357.9	Vert	AV	5.46E-10	-62.6	-27.0	-35.6	Low Ch 52, EUT Horz, 6 Mbps
10520.440	1.3	331.0	Horz	AV	3.52E-10	-64.5	-27.0	-37.5	Low Ch 52, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS



EmiR5 2018.09.26

PSA-ESCI 2019.02.26

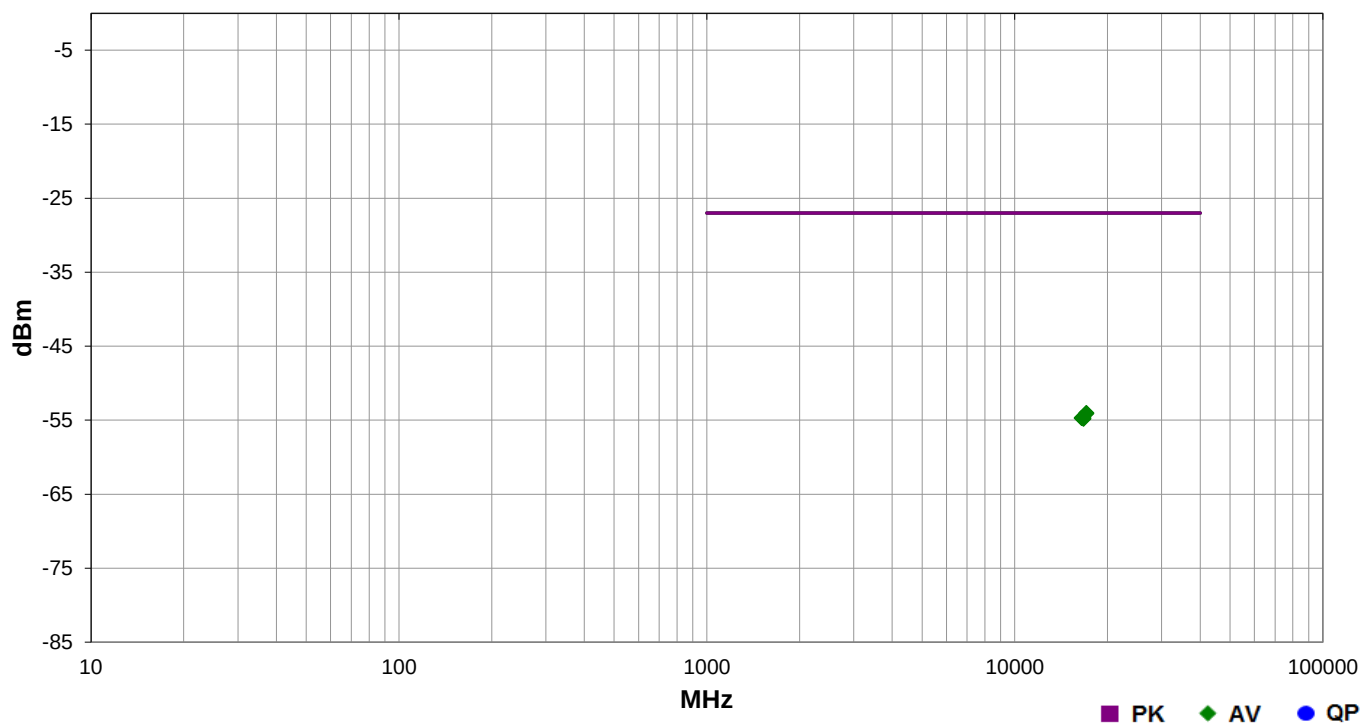
EMFG 2018.09.26

PSA-ESC 2019.02.2

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
Tested by:	Jonathan Kiefer			
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 100 (5500MHz), Mid Ch 116 (5580MHz), High Ch 140 (5700MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.6GHz Band. -27dBm EIRP limit.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	29	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
17100.880	3.3	39.0	Vert	AV	3.95E-09	-54.0	-27.0	-27.0	High Ch 140, EUT Horz, 6 Mbps
17098.660	1.3	265.0	Horz	AV	3.86E-09	-54.1	-27.0	-27.1	High Ch 140, EUT Horz, 6 Mbps
16499.950	1.3	141.9	Horz	AV	3.37E-09	-54.7	-27.0	-27.7	Low Ch 100, EUT Horz, 6 Mbps
16499.740	1.3	333.9	Vert	AV	3.37E-09	-54.7	-27.0	-27.7	Low Ch 100, EUT Horz, 6 Mbps
16739.820	1.3	248.0	Horz	AV	3.37E-09	-54.7	-27.0	-27.7	Mid Ch 116, EUT Horz, 6 Mbps
16738.530	1.3	338.0	Vert	AV	3.29E-09	-54.8	-27.0	-27.8	Mid Ch 116, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS



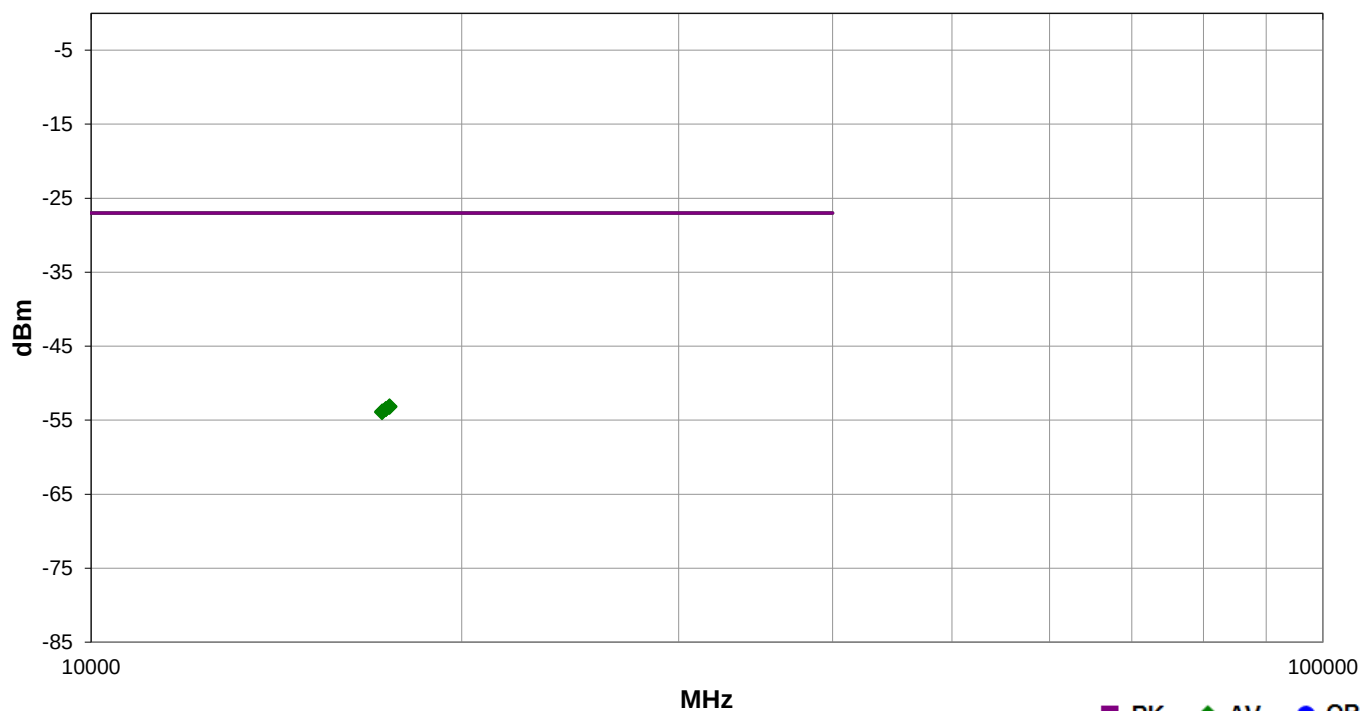
EmiR5 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019		
Project:	None	Temperature:	22.7 °C		
Job Site:	TX02	Humidity:	53.9% RH		
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar		
EUT:	Dual Band Wireless-AC 3160 Module			Tested by:	Jonathan Kiefer
Configuration:	2				
Customer:	American Portwell Technology				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continuously Transmitting at Low Ch 149 (5745MHz), Mid Ch 157 (5785MHz), High Ch 165 (5825MHz)				
Deviations:	None				
Comments:	See Power Table for output power settings used. Harmonics for 20 MHz channel bandwidths, 5.8GHz Band. -27dBm EIRP limit.				

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	30	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
17473.920	1.3	325.0	Vert	AV	4.87E-09	-53.1	-27.0	-26.1	High Ch 165, EUT Horz, 6 Mbps
17474.430	1.3	33.9	Horz	AV	4.75E-09	-53.2	-27.0	-26.2	High Ch 165, EUT Horz, 6 Mbps
17355.650	1.3	4.9	Horz	AV	4.44E-09	-53.5	-27.0	-26.5	Mid Ch 157, EUT Horz, 6 Mbps
17354.600	1.3	346.9	Vert	AV	4.44E-09	-53.5	-27.0	-26.5	Mid Ch 157, EUT Horz, 6 Mbps
17235.250	1.3	338.0	Vert	AV	4.14E-09	-53.8	-27.0	-26.8	Low Ch 149, EUT Horz, 6 Mbps
17234.680	1.9	352.9	Horz	AV	4.05E-09	-53.9	-27.0	-26.9	Low Ch 149, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

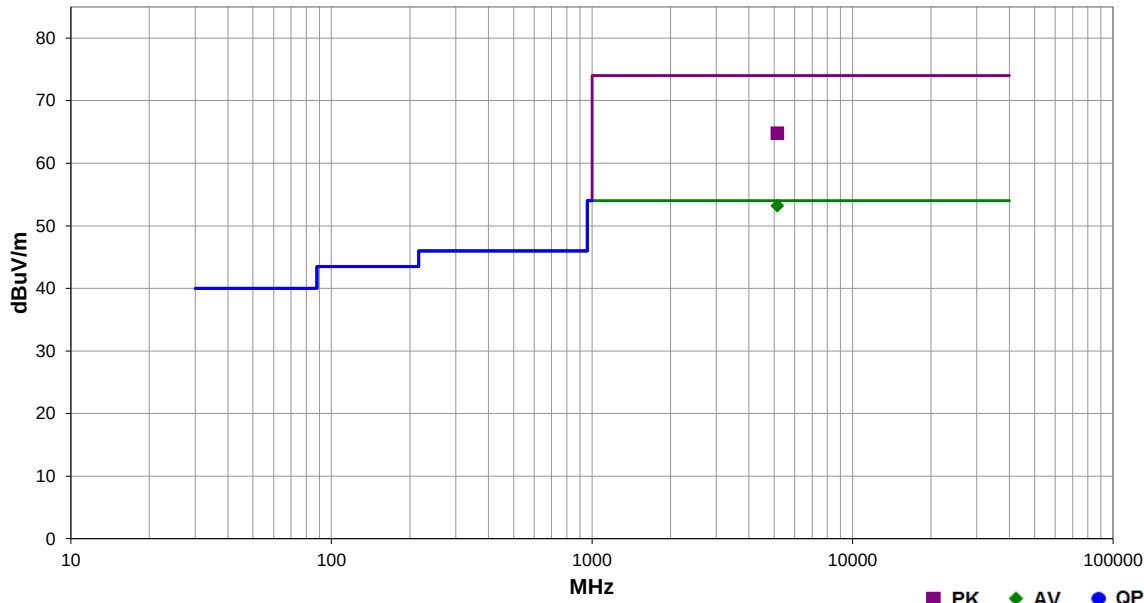


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by: Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 36 (5180MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Transmit Band Edge for 20 MHz channel bandwidths, 5.2 GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	34	Test Distance (m)	1	Antenna Height(s)	1.5(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
5149.053	27.0	35.7	1.5	218.0	1.0	0.0	Horz	AV	-9.5	53.2	54.0	-0.8	Low Ch 36, EUT Horz, 6 Mbps
5148.690	38.6	35.7	1.5	218.0	1.0	0.0	Horz	PK	-9.5	64.8	74.0	-9.2	Low Ch 36, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

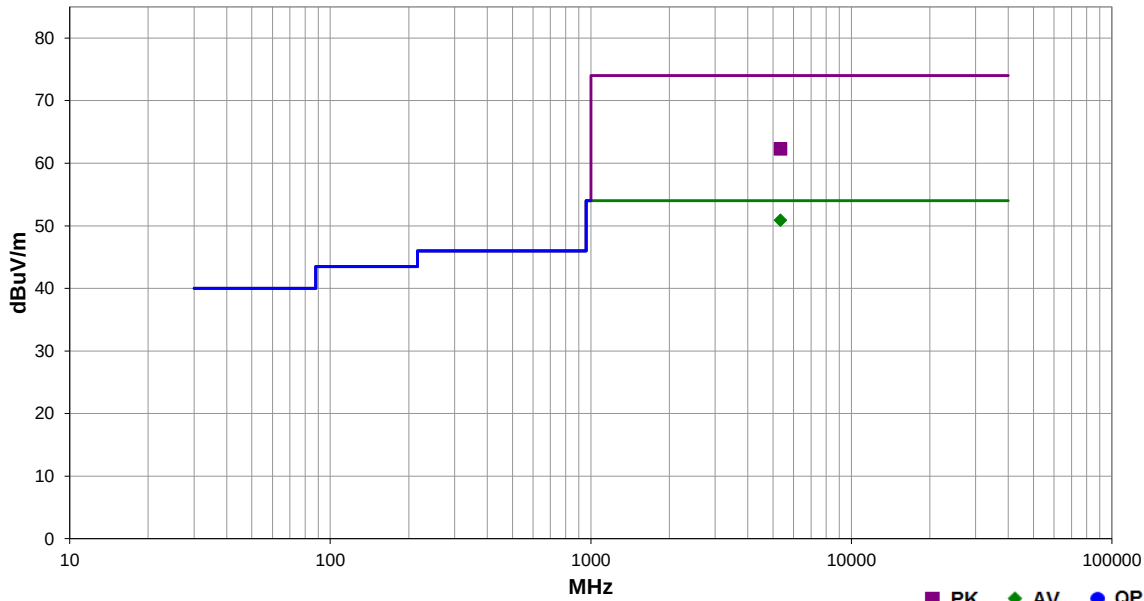


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
		Tested by: Jonathan Kiefer		
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at High Ch 64 (5320MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Transmit Band Edge for 20 MHz channel bandwidths, 5.3 GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	33	Test Distance (m)	1	Antenna Height(s)	1.5(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
5350.457	24.2	36.2	1.5	3.9	1.0	0.0	Horz	AV	-9.5	50.9	54.0	-3.1	High Ch 64, EUT Horz, 6 Mbps
5350.983	35.6	36.2	1.5	3.9	1.0	0.0	Horz	PK	-9.5	62.3	74.0	-11.7	High Ch 64, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

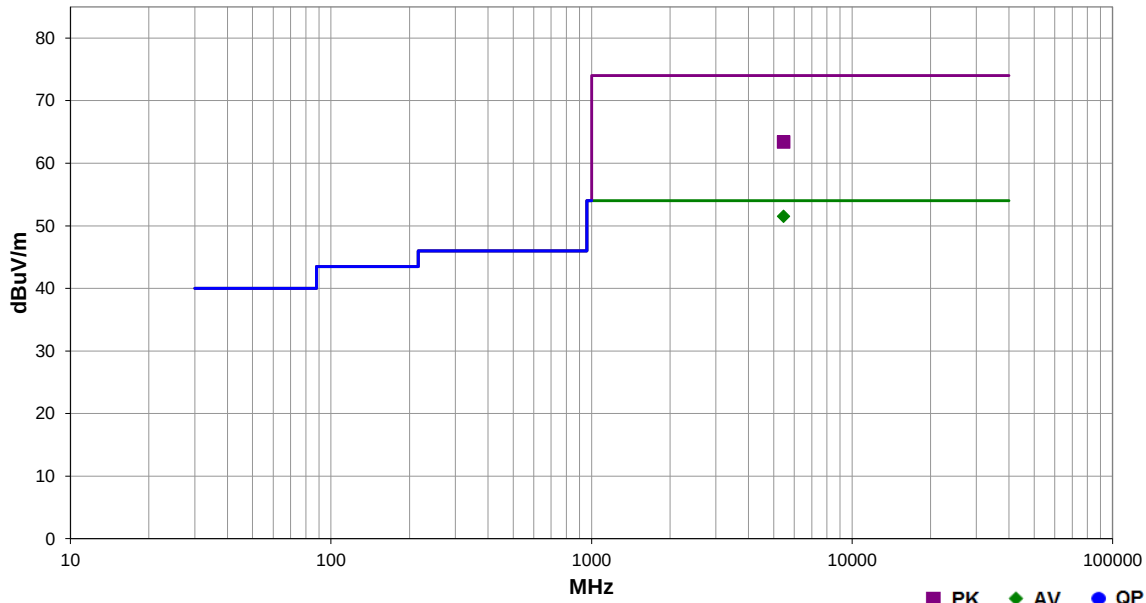


EmiRS 2018.09.26 PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
		Tested by: Jonathan Kiefer		
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 100 (5500MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Transmit Band Edge for 20 MHz channel bandwidths, 5.6 GHz Band. PK and AVG(RMS) data.			

Test Specifications	Test Method
FCC 15.407:2019	ANSI C63.10:2013

Run #	32	Test Distance (m)	1	Antenna Height(s)	1.5(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
5458.833	24.5	36.5	1.5	186.0	1.0	0.0	Horz	AV	-9.5	51.5	54.0	-2.5	Low Ch 100, EUT Horz, 6 Mbps
5459.150	36.4	36.5	1.5	186.0	1.0	0.0	Horz	PK	-9.5	63.4	74.0	-10.6	Low Ch 100, EUT Horz, 6 Mbps

SPURIOUS RADIATED EMISSIONS

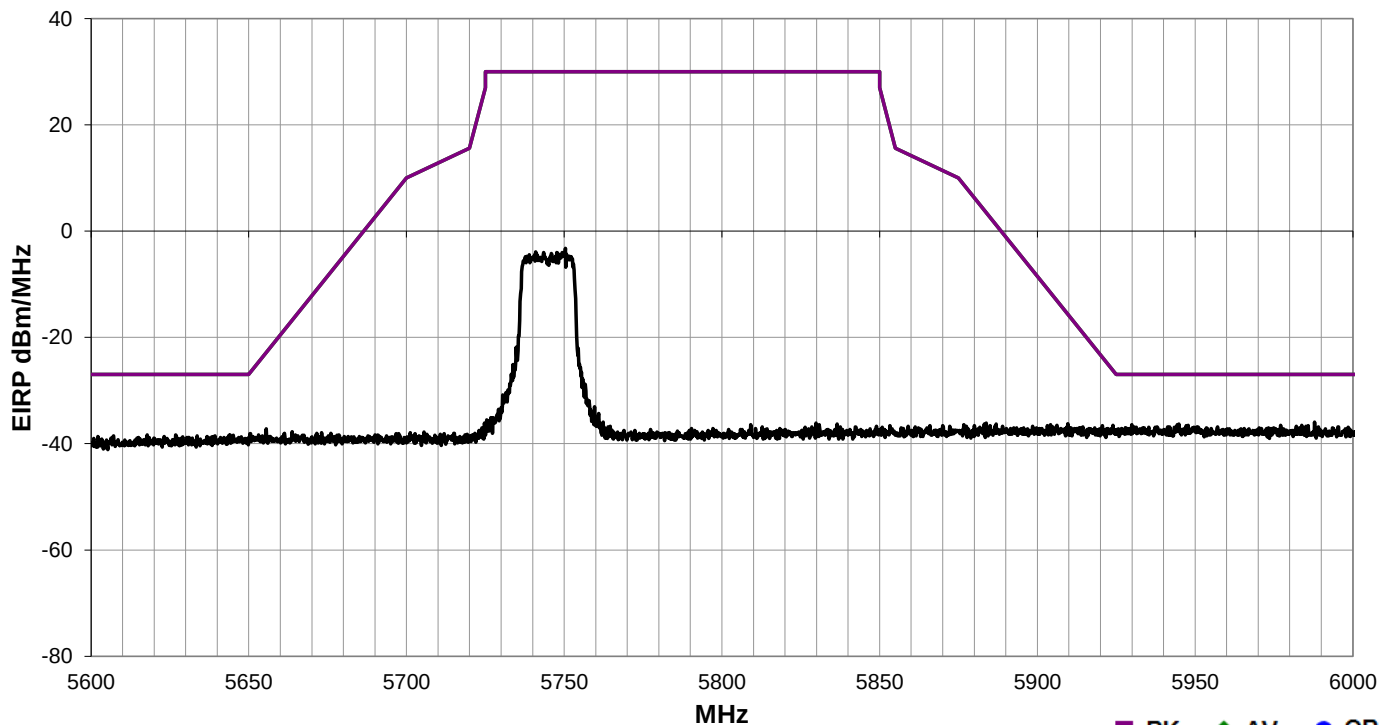


EmiRS 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019	
Project:	None	Temperature:	22.7 °C	
Job Site:	TX02	Humidity:	53.9% RH	
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	
		Tested by:	Jonathan Kiefer	
EUT:	Dual Band Wireless-AC 3160 Module			
Configuration:	2			
Customer:	American Portwell Technology			
Attendees:	None			
EUT Power:	110VAC/60Hz			
Operating Mode:	Continuously Transmitting at Low Ch 149 (5745MHz)			
Deviations:	None			
Comments:	See Power Table for output power settings used. Transmit Band Edge for 20 MHz channel bandwidths, 5.8GHz Band.			

Test Specifications				Test Method	
FCC 15.407:2019, FCC 15.205:2019				ANSI C63.10:2013	
Run #	32	Test Distance (m)	1	Antenna Height(s)	1.25 (m)
					Results Pass



Freq (MHz)	Antenna Height (meters)	Transducer (dB)	Polarity/Transducer Type	Detector	EIRP (Watts/MHz)	EIRP (dBm/MHz)	Spec. Limit (dBm/MHz)	Compared to Spec. (dB)	Comments
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All emissions were below the limit (see graph above).

SPURIOUS RADIATED EMISSIONS



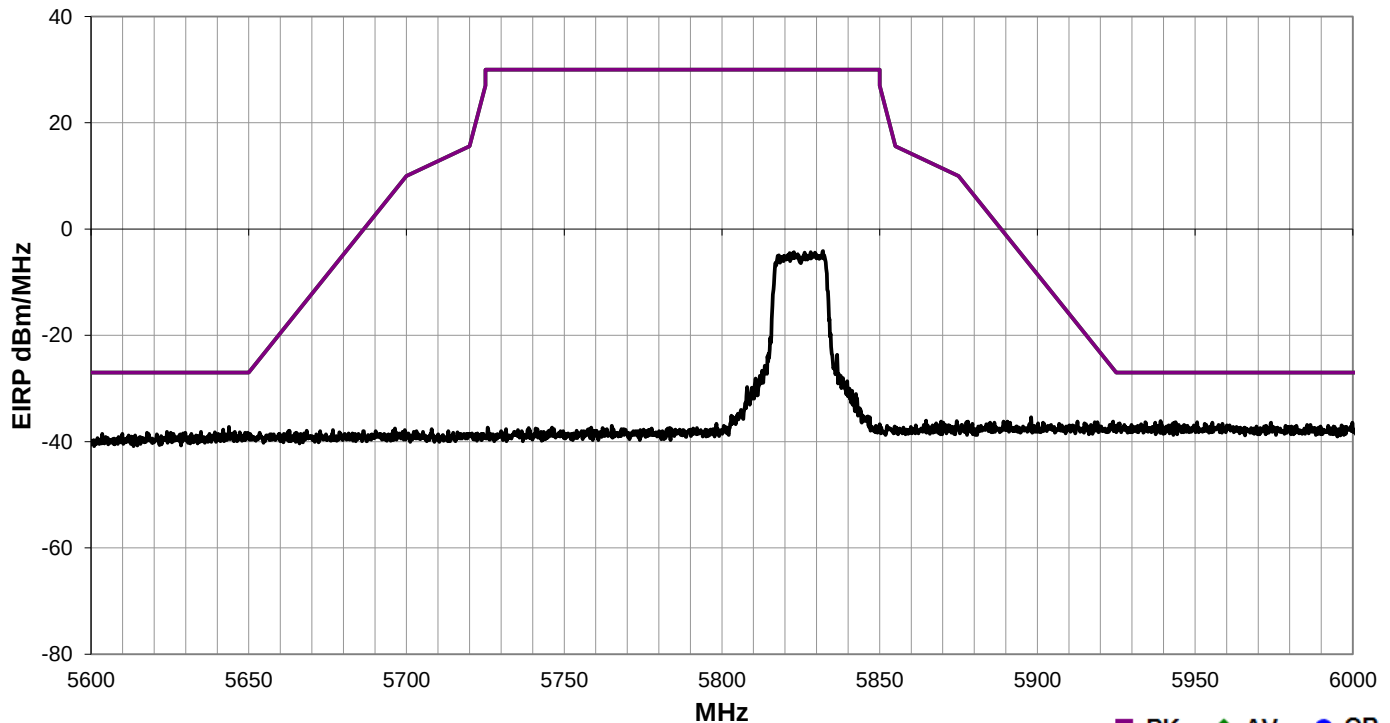
EmiRS 2018.09.26

PSA-ESCI 2019.02.26

Work Order:	AMRN0006	Date:	1-May-2019		
Project:	None	Temperature:	22.7 °C		
Job Site:	TX02	Humidity:	53.9% RH		
Serial Number:	APT31600958	Barometric Pres.:	1016 mbar	Tested by:	Jonathan Kiefer
EUT:	Dual Band Wireless-AC 3160 Module				
Configuration:	2				
Customer:	American Portwell Technology				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Continuously Transmitting at High Ch 165 (5825MHz)				
Deviations:	None				
Comments:	See Power Table for output power settings used. Transmit Band Edge for 20 MHz channel bandwidths, 5.8GHz Band.				

Test Specifications	Test Method
FCC 15.407:2019, FCC 15.205:2019	ANSI C63.10:2013

Run #	31	Test Distance (m)	1	Antenna Height(s)	1.25 (m)	Results	Pass
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Freq (MHz)	Antenna Height (meters)	Transducer (dB)	Polarity/Transducer Type	Detector	EIRP (Watts/MHz)	EIRP (dBm/MHz)	Spec. Limit (dBm/MHz)	Compared to Spec. (dB)	Comments
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All emissions were below the limit (see graph above).

DUTY CYCLE



XMIT 2019.02.26

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.	Cal. Due
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	10-Oct-18	10-Oct-19
Block - DC	Fairview Microwave	SD3379	AMM	17-Mar-19	17-Mar-20
Attenuator	Fairview Microwave	SA4018-20	TYW	17-Mar-19	17-Mar-20
Generator - Signal	Keysight	N5171B-506	TEW	2-May-18	2-May-21
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	19-Mar-19	19-Mar-20

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

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.

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, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

DUTY CYCLE



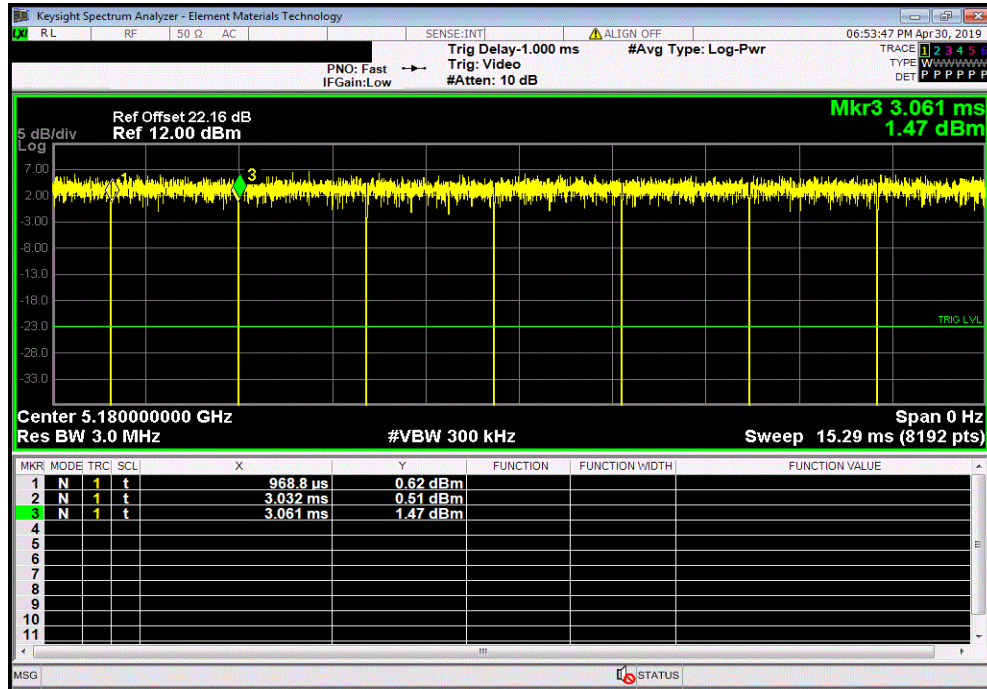
EUT: Dual Band Wireless-AC 3160 Module				Work Order: AMRN0006	
Serial Number: APT31600958				Date: 30-Apr-19	
Customer: American Portwell Technology				Temperature: 22.3 °C	
Attendees: None				Humidity: 53.4% RH	
Project: None				Barometric Pres.: 1013 mbar	
Tested by: Jonathan Kiefer				Job Site: TX09	
Power: 110VAC/60Hz					
TEST SPECIFICATIONS				Test Method	
FCC 15.407:2019				ANSI C63.10:2013	
COMMENTS					
See Power Table for output power settings used.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature <i>Jonathan Kiefer</i>			

DUTY CYCLE

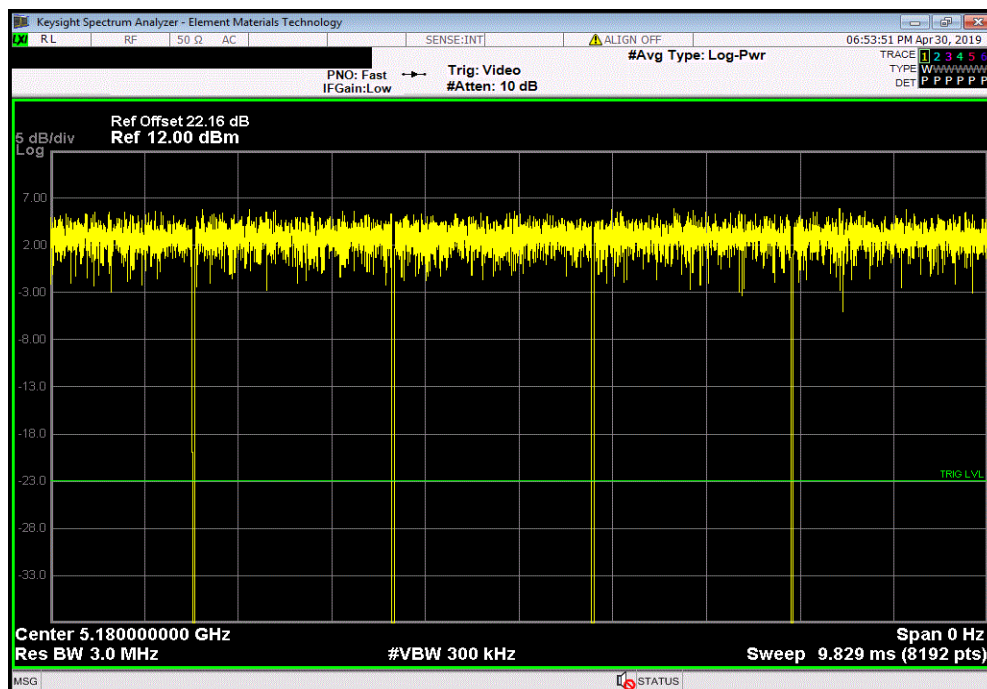


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 36 - 5180 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.063 ms	2.093 ms	1	98.6	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 36 - 5180 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

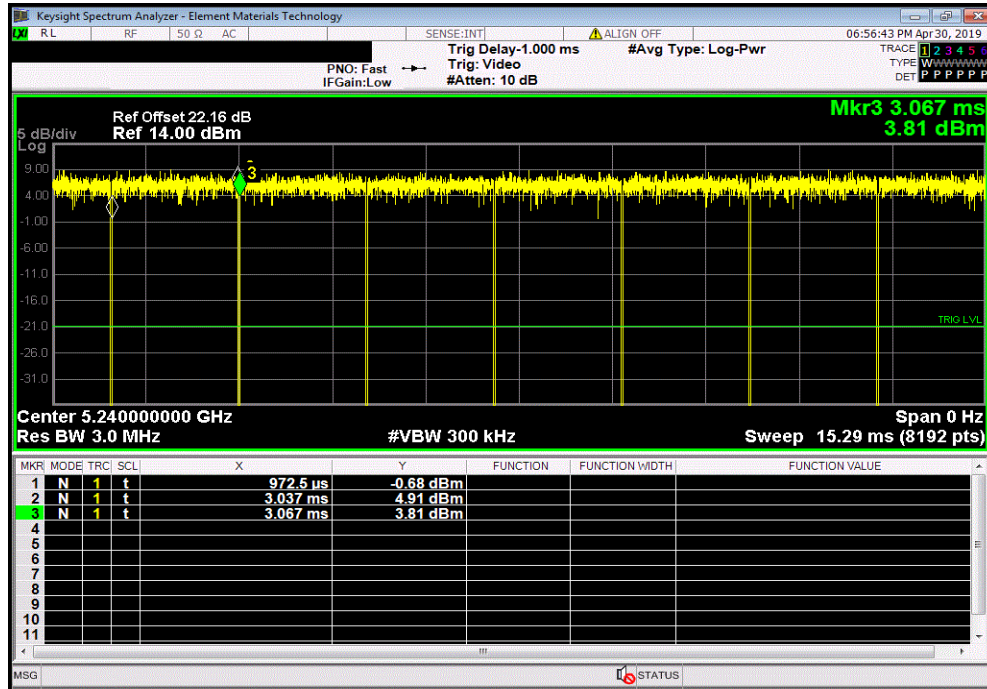


DUTY CYCLE

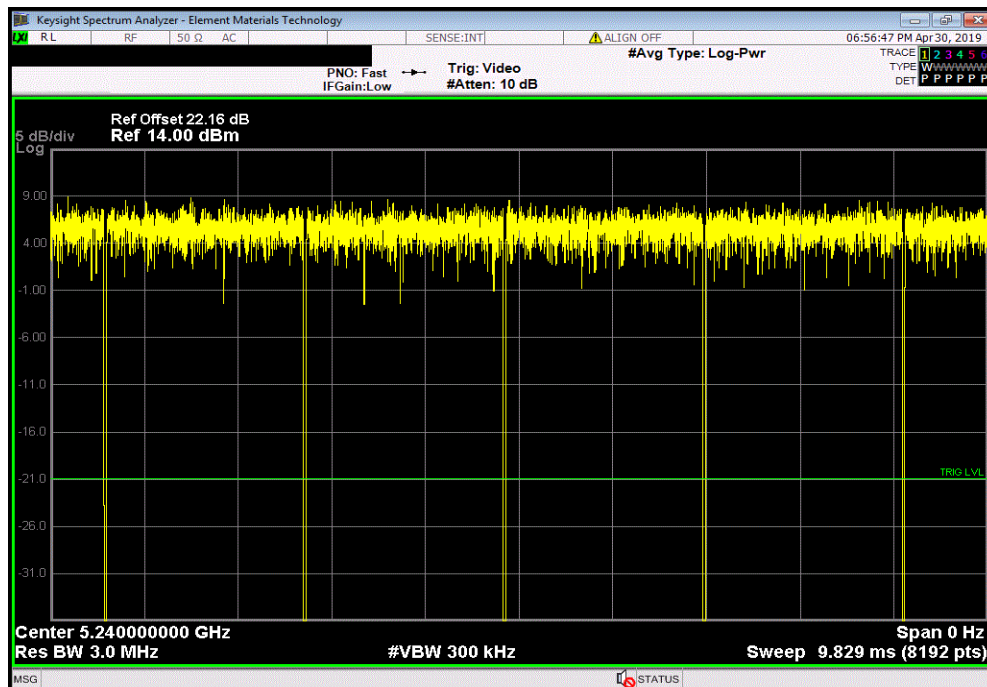


TMTx 2018.09.13 XMTx 2019.02.26

Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 48 - 5240 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.065 ms	2.094 ms	1	98.6	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 48 - 5240 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

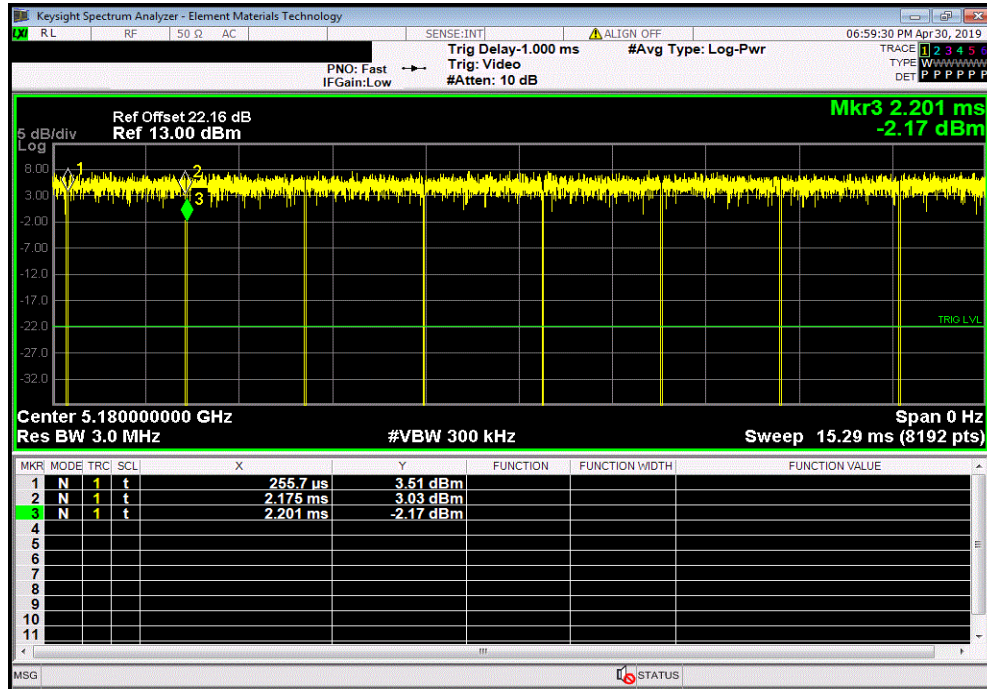


DUTY CYCLE

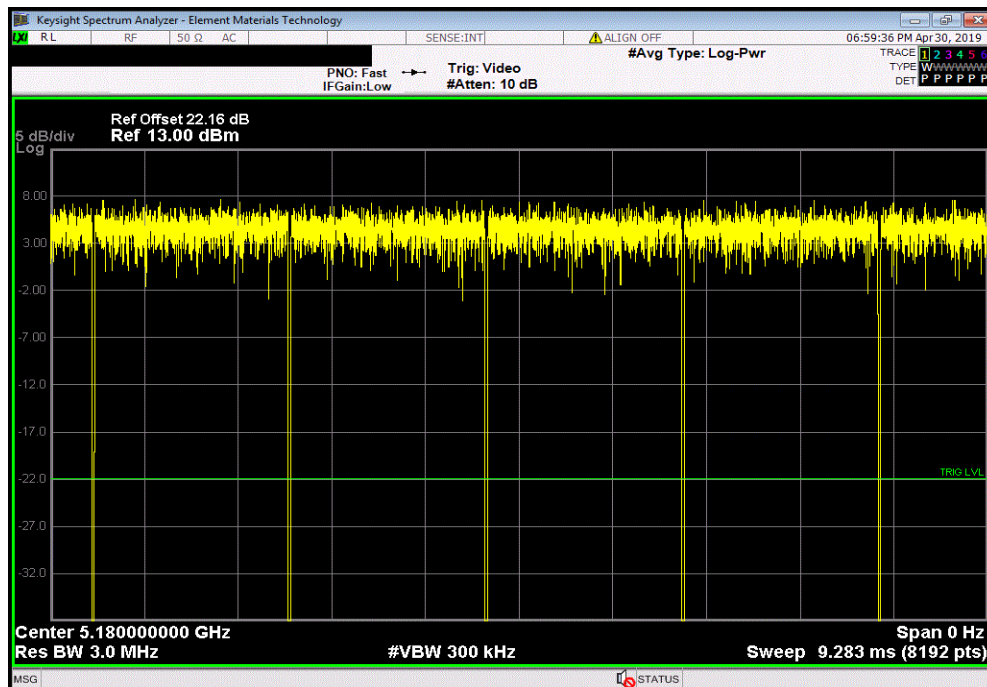


TMTx 2018.09.13 XMTx 2019.02.26

Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36 - 5180 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.919 ms	1.945 ms	1	98.7	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36 - 5180 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

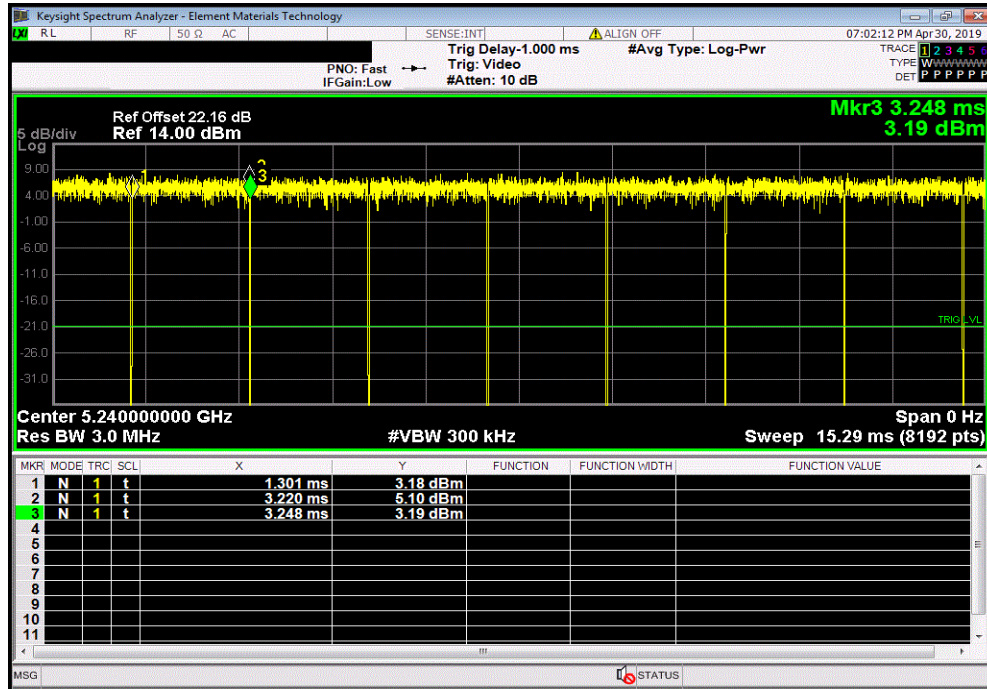


DUTY CYCLE

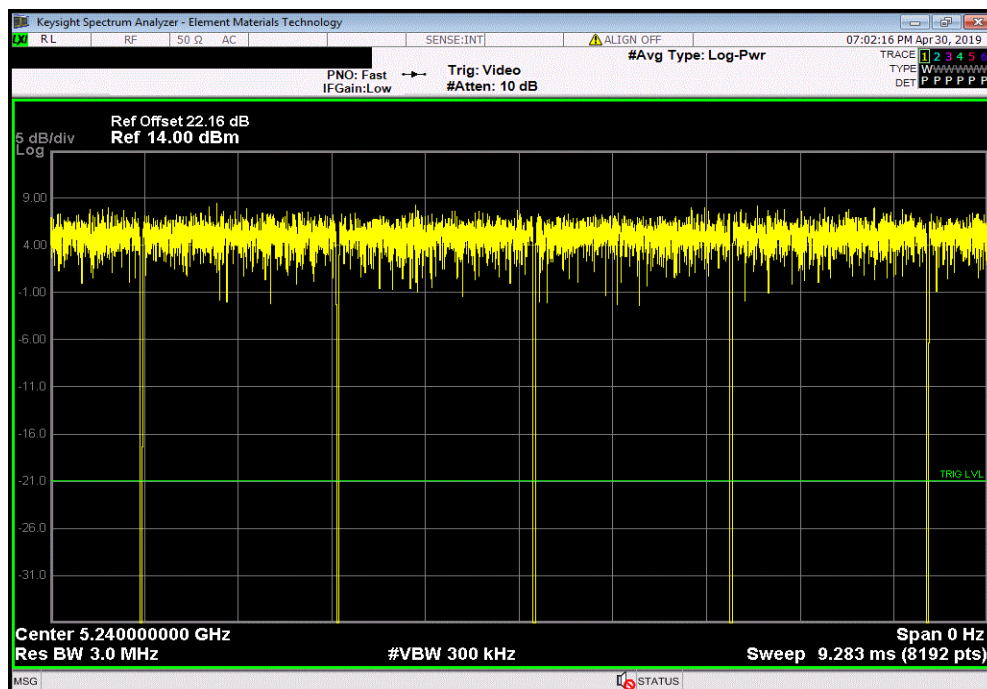


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 48 - 5240 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.919 ms	1.947 ms	1	98.6	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 48 - 5240 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

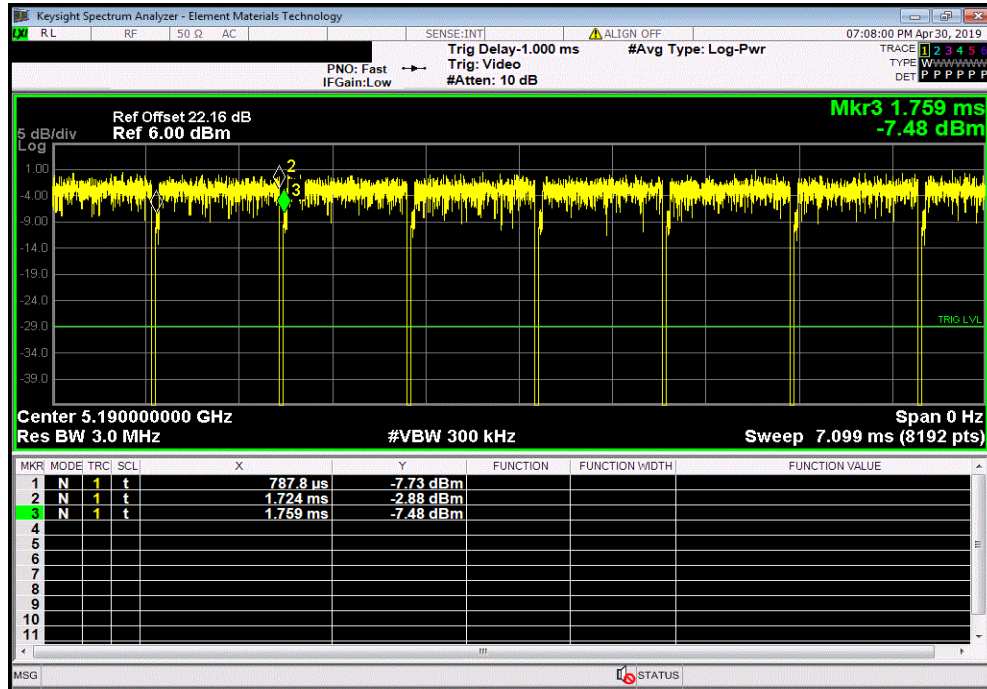


DUTY CYCLE

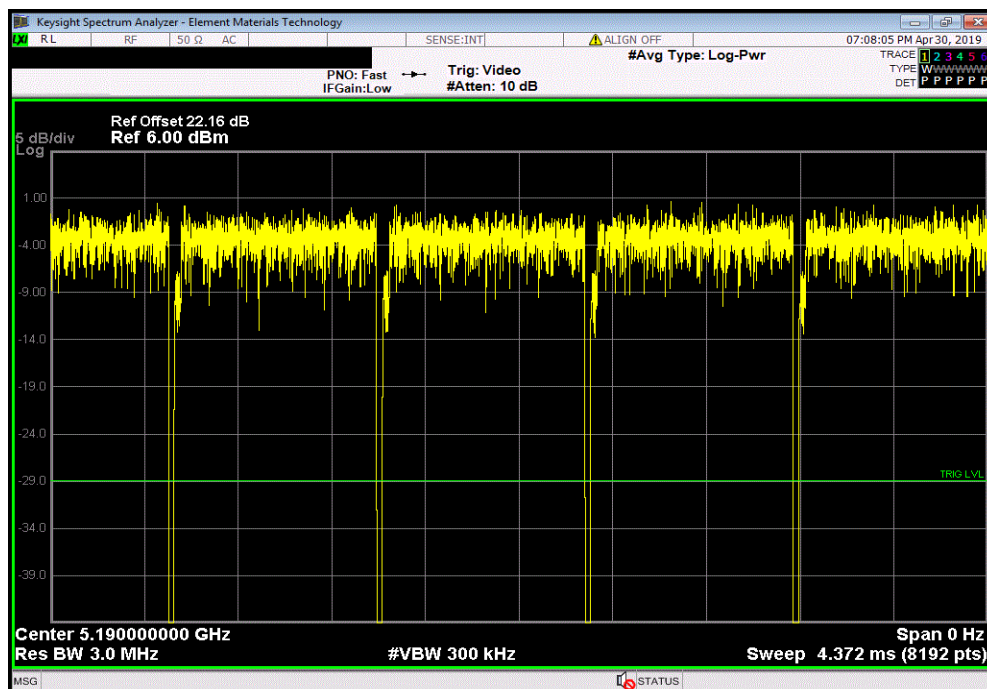


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36/40 - 5190 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
936 us	971.5 us	1	96.3	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36/40 - 5190 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

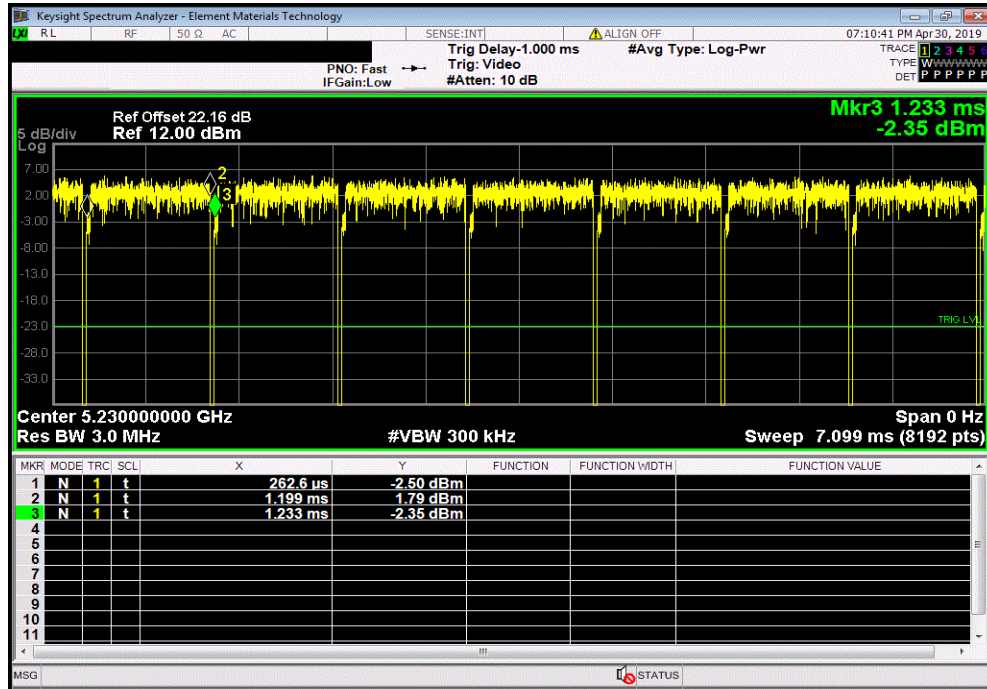


DUTY CYCLE

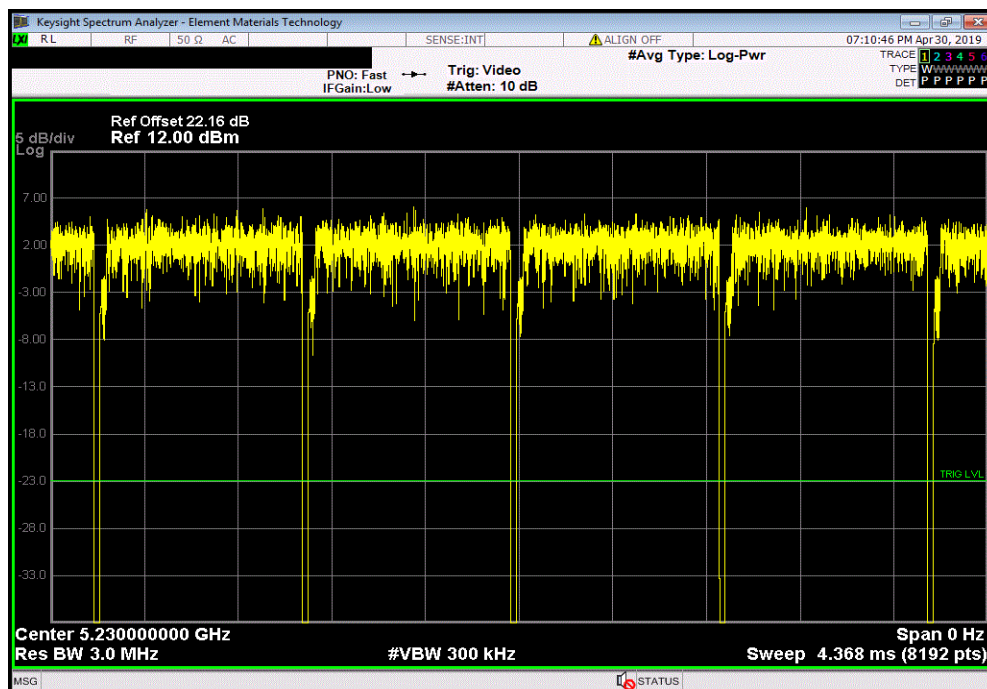


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 44/48 - 5230 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
936 us	970.7 us	1	96.4	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 44/48 - 5230 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

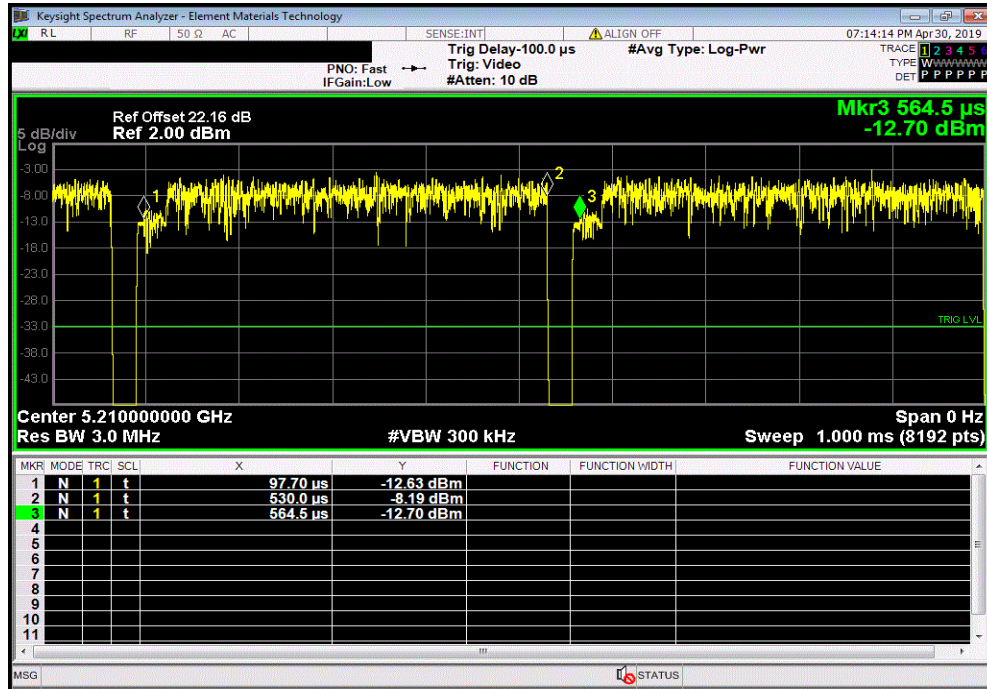


DUTY CYCLE

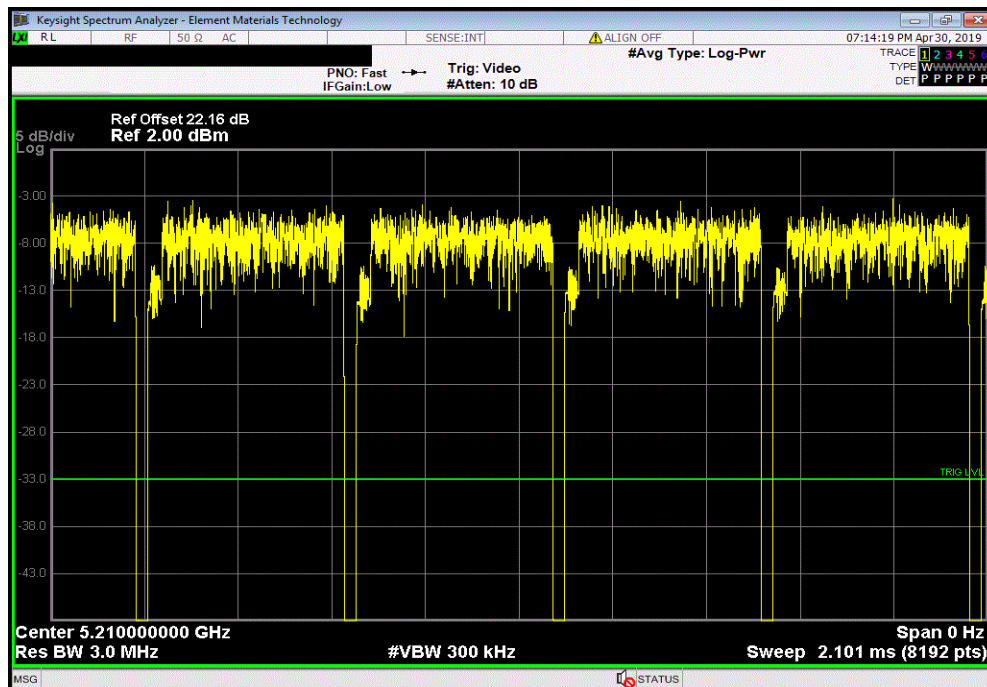


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5150 - 5250 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36-48 - 5210 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
432.3 μ s	466.8 μ s	1	92.6	N/A	N/A	



Chain A, 5150 - 5250 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36-48 - 5210 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	



Keysight Spectrum Analyzer - Element Materials Technology

SENSE:INT1 ALIGN OFF 07:22:37 PM Apr 30, 2019

RL RF 50 Ω AC PNO: Fast IFGain: Low Trig Delay: 1.000 ms Trig: Video #Avg Type: Log-Pwr Mkr3 2.602 ms 0.19 dBm

TRACE 1 2 3 4 5 6
TYPE W W W W W W W W
DET P P P P P P P P

Ref Offset 22 dB
Ref 15.00 dBm

5 dB/div
Log

Center 5.745000000 GHz Span 0 Hz
Res BW 3.0 MHz #VBW 300 kHz Sweep 15.29 ms (8192 pts)

MKR	MODE	TRC	SCL	X	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	511.5 μs	4.67 dBm			
2	N	1	t	2.574 ms	7.08 dBm			
3	N	1	t	2.602 ms	0.19 dBm			
4								
5								
6								
7								
8								
9								
10								
11								

MSG STATUS

Keysight Spectrum Analyzer - Element Materials Technology

RL RF 50 Ω AC SENSE:INT ALIGN OFF 07:22:42 PM Apr 30, 2019

PNO: Fast Trg: Video #Avg Type: Log-Pwr
IFGain:Low #Atten: 10 dB

TRACE 1 2 3 4 5 6
TYPE W W W W W W W W
DET P P P P P P P P

Ref Offset 22 dB
Ref 15.00 dBm

5 dB/div
Log

Center 5.74500000 GHz
Res BW 300 kHz

Span 0 Hz
Sweep 9.829 ms (8192 pts)

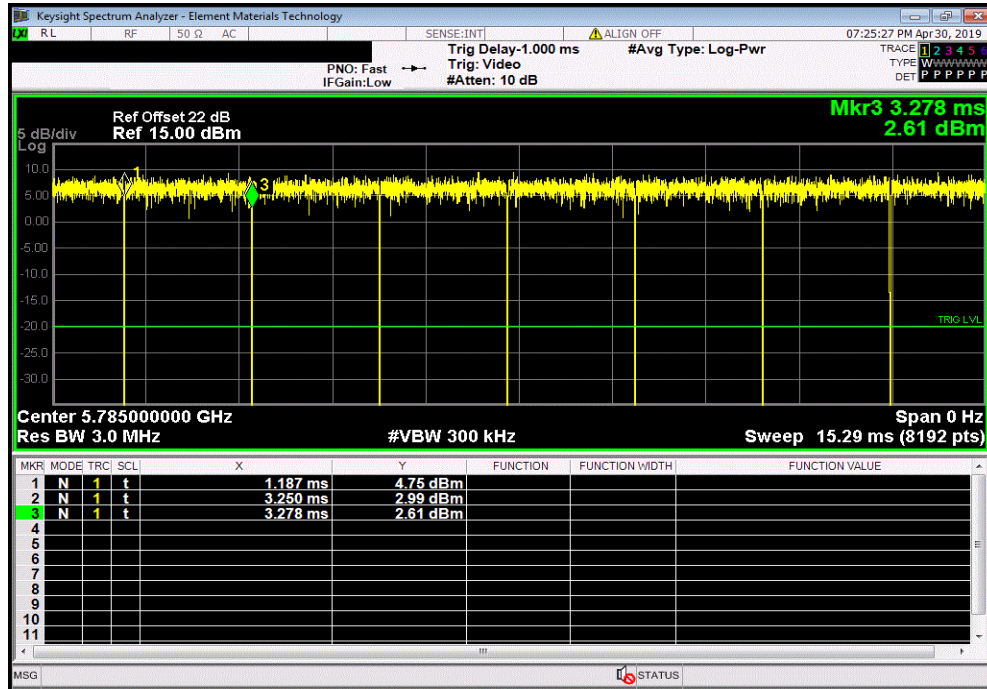
MSG STATUS

DUTY CYCLE

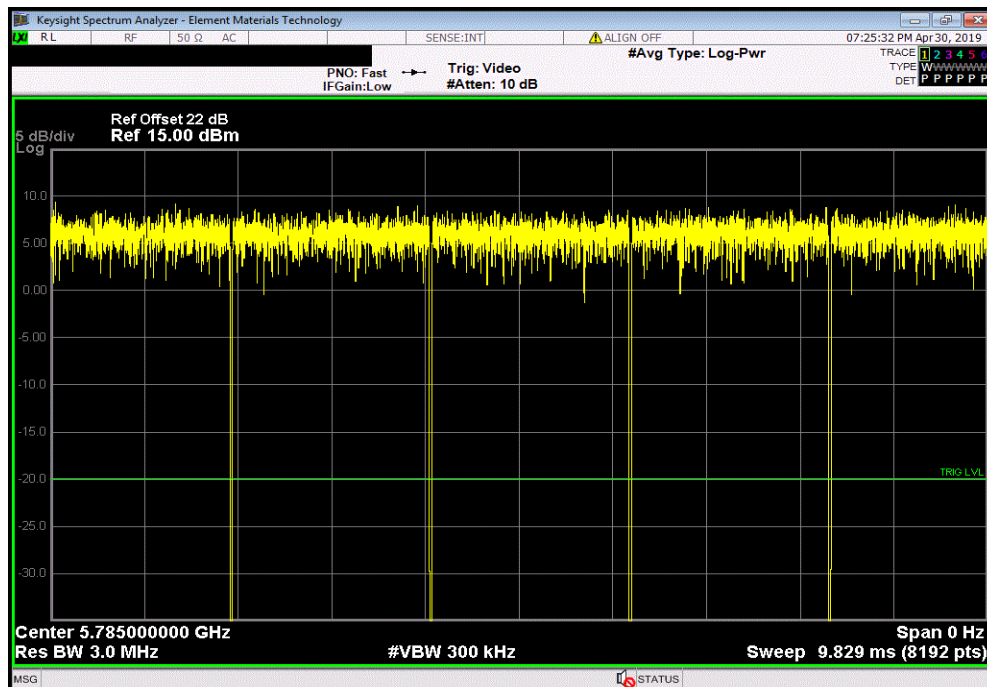


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 157 - 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.063 ms	2.091 ms	1	98.7	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 157 - 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

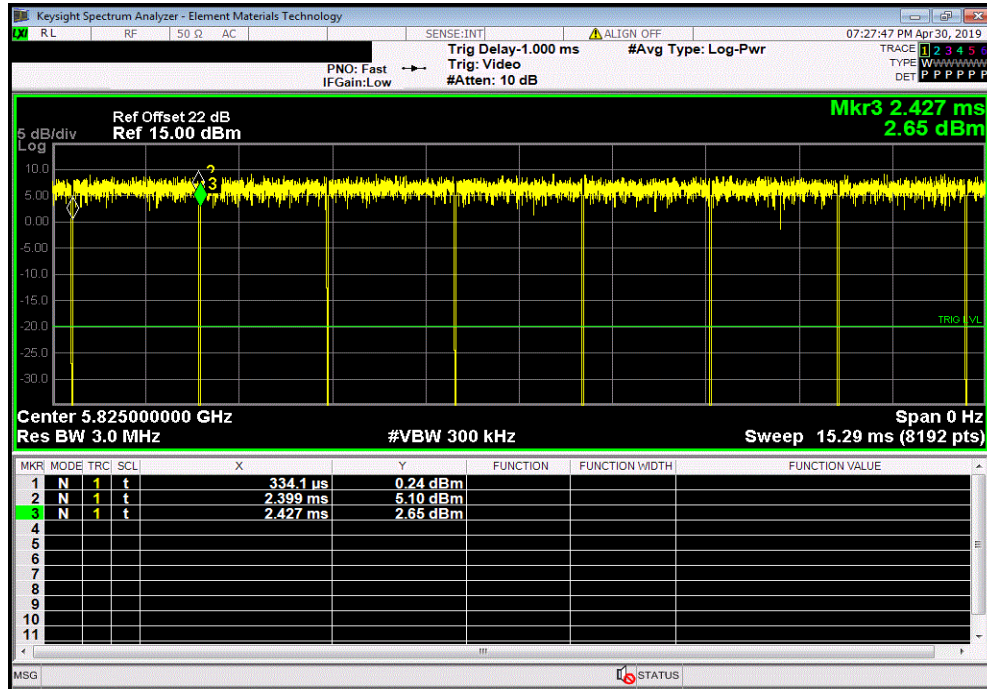


DUTY CYCLE

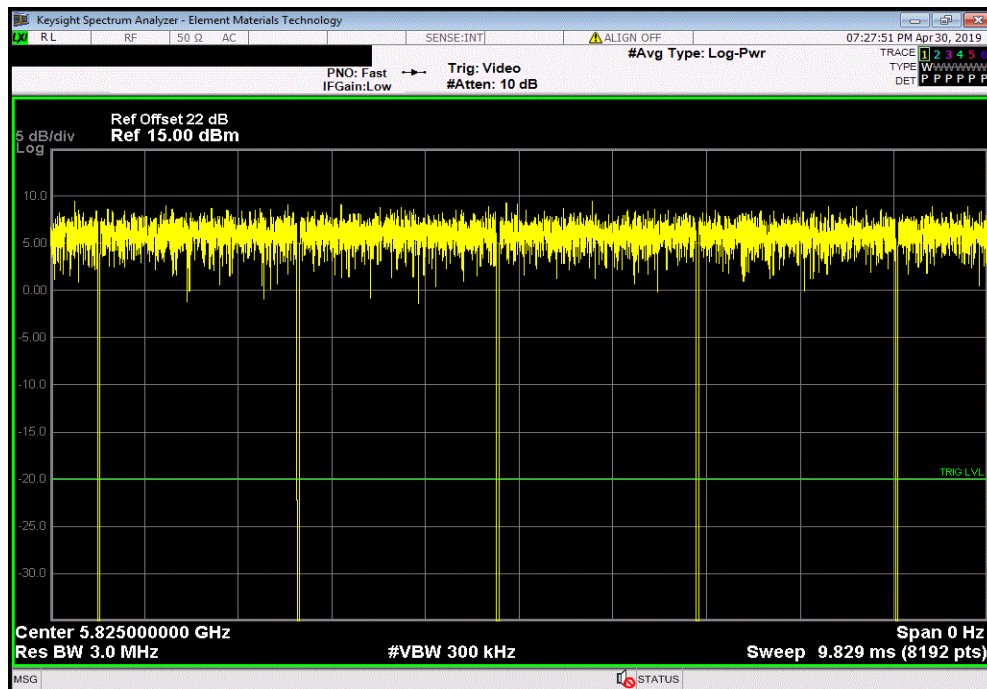


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 165 - 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.065 ms	2.093 ms	1	98.7	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 165 - 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

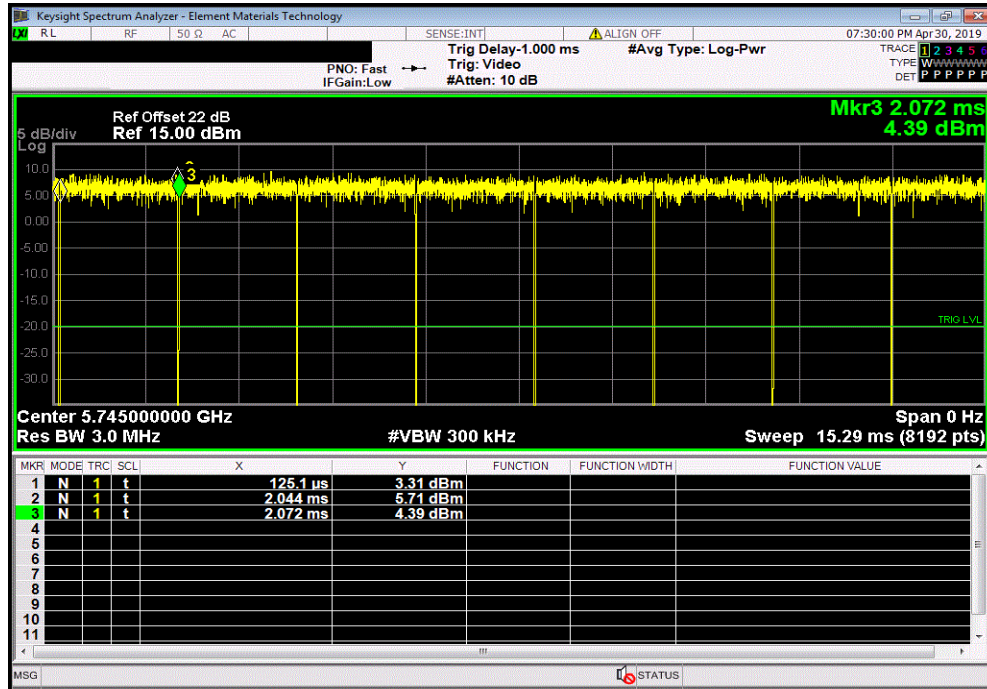


DUTY CYCLE

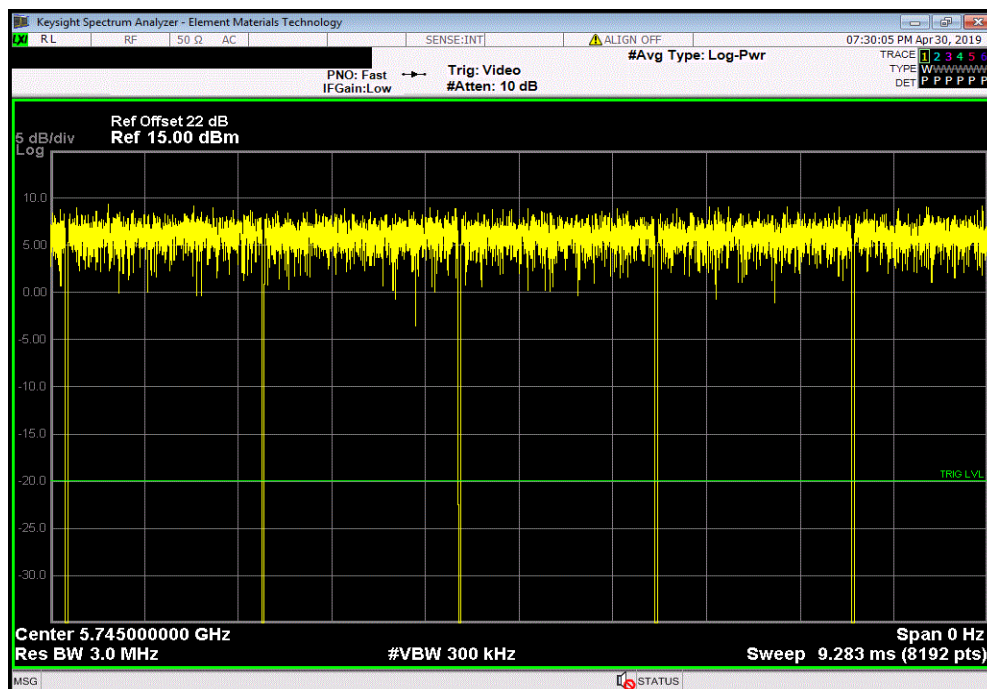


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149 - 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.919 ms	1.947 ms	1	98.6	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149 - 5745 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

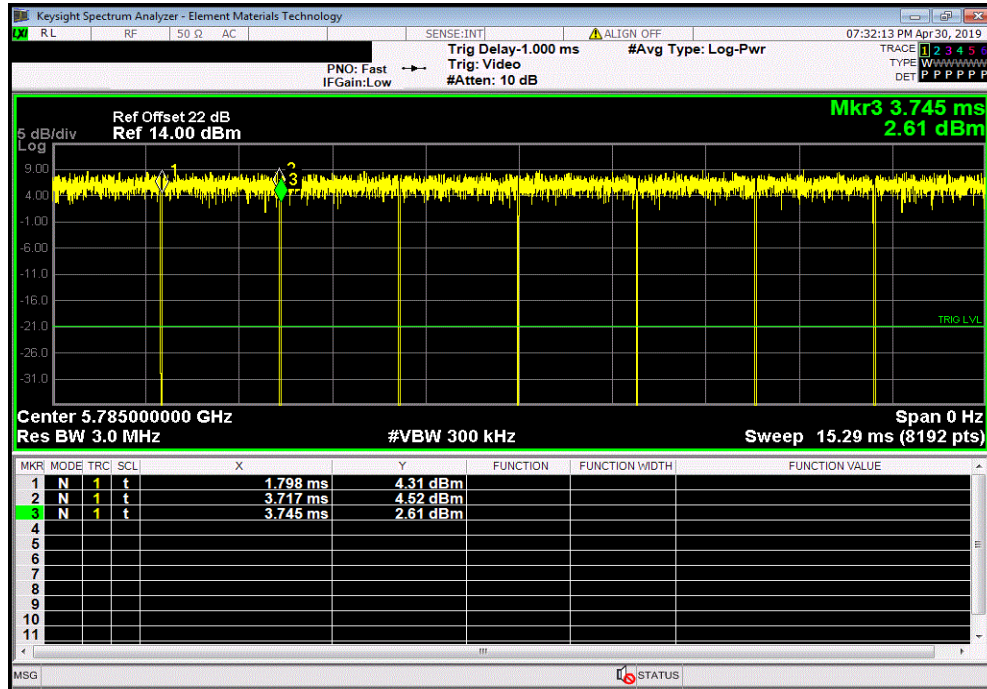


DUTY CYCLE

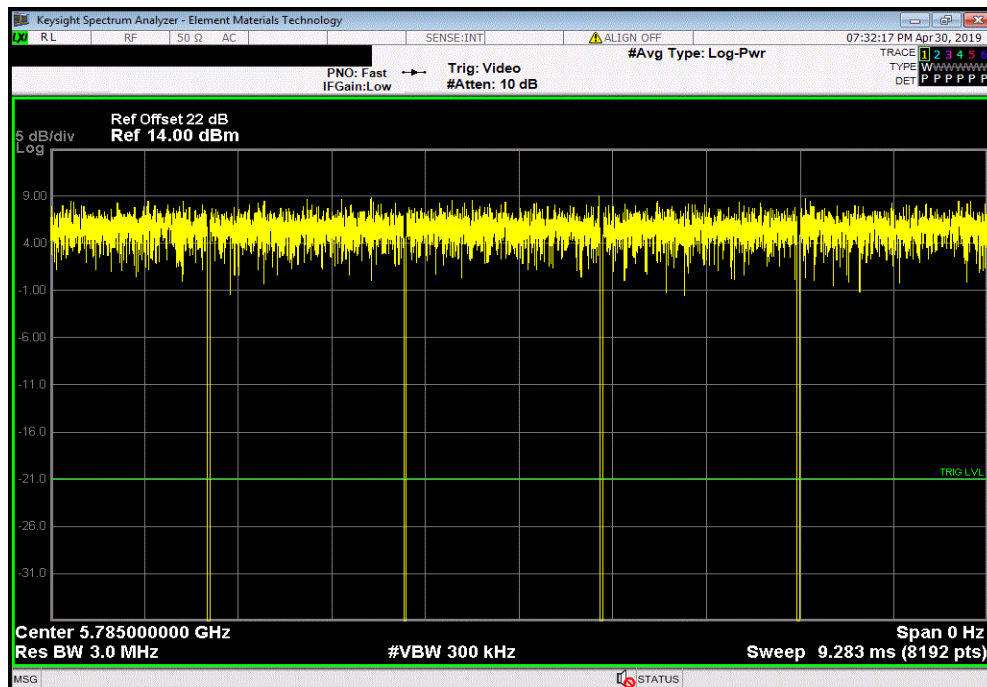


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 157 - 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.919 ms	1.947 ms	1	98.6	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 157 - 5785 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

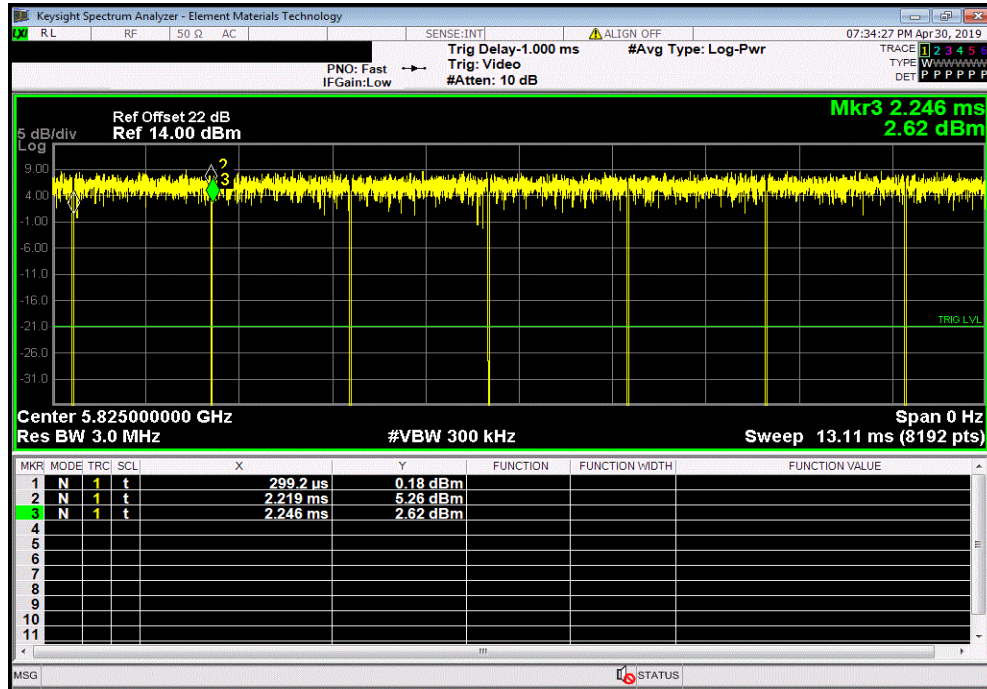


DUTY CYCLE

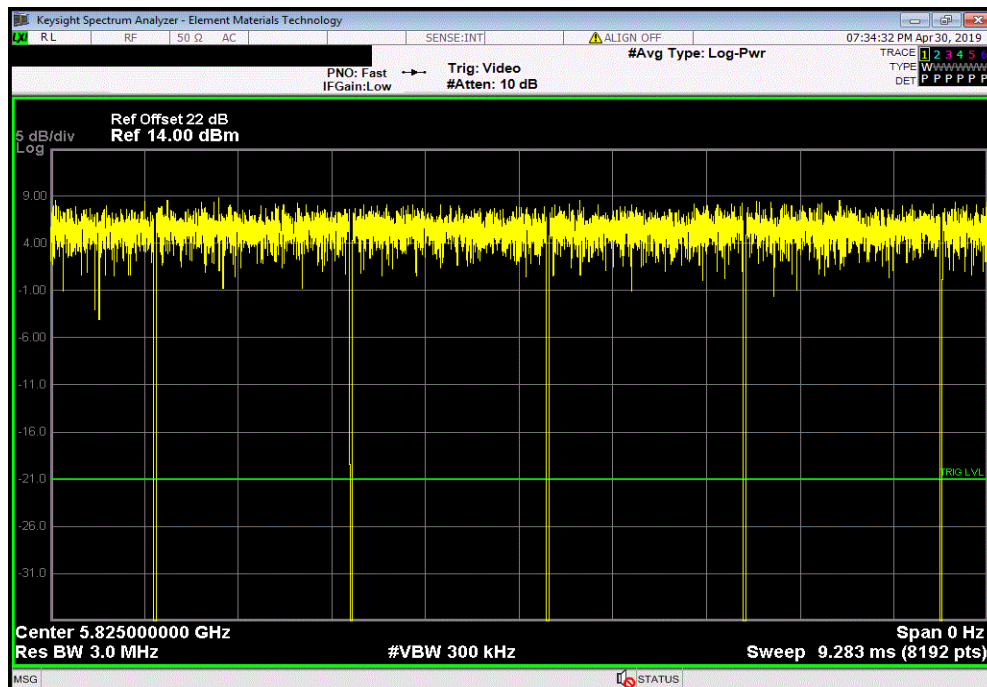


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 165 - 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
1.92 ms	1.947 ms	1	98.6	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 165 - 5825 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	6	N/A	N/A	N/A	

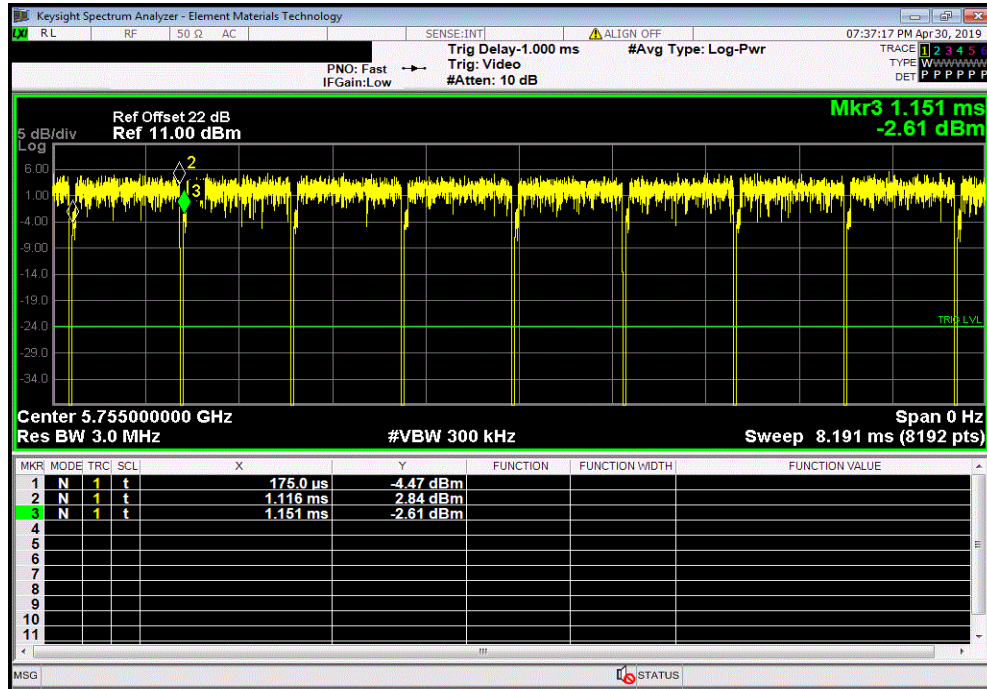


DUTY CYCLE

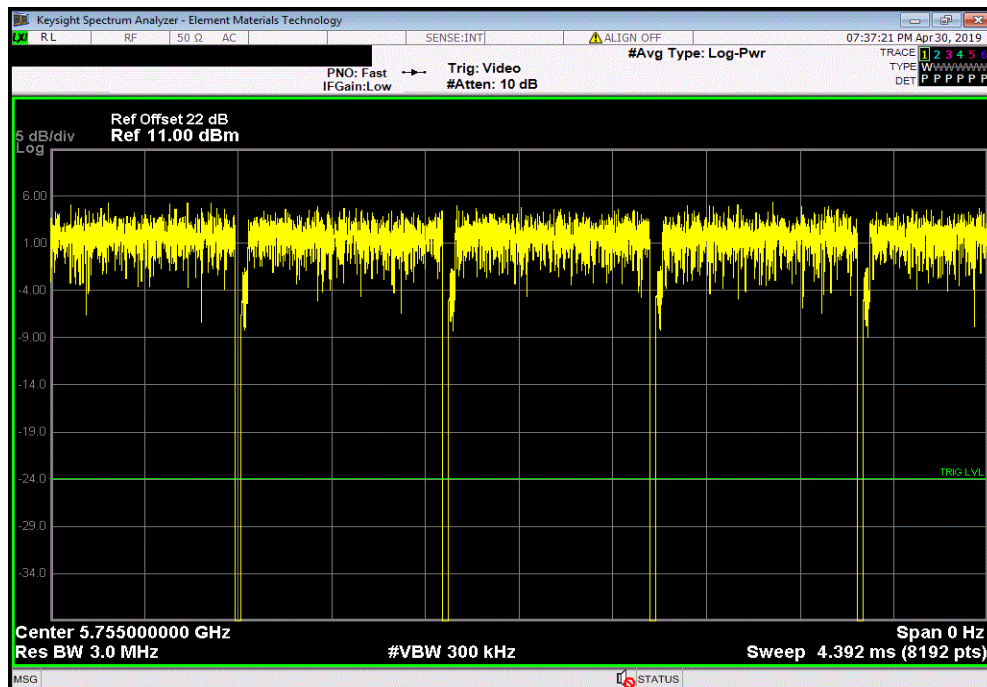


TMTx 2018.09.13 XMTx 2019.02.26

Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149/153 - 5755 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
941 us	976 us	1	96.4	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149/153 - 5755 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

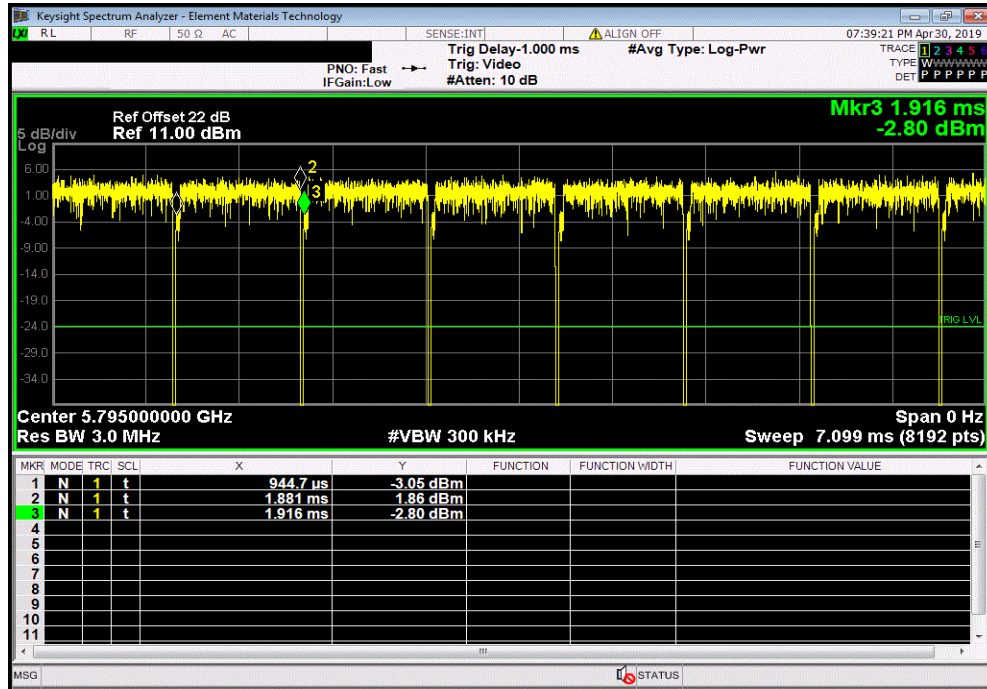


DUTY CYCLE

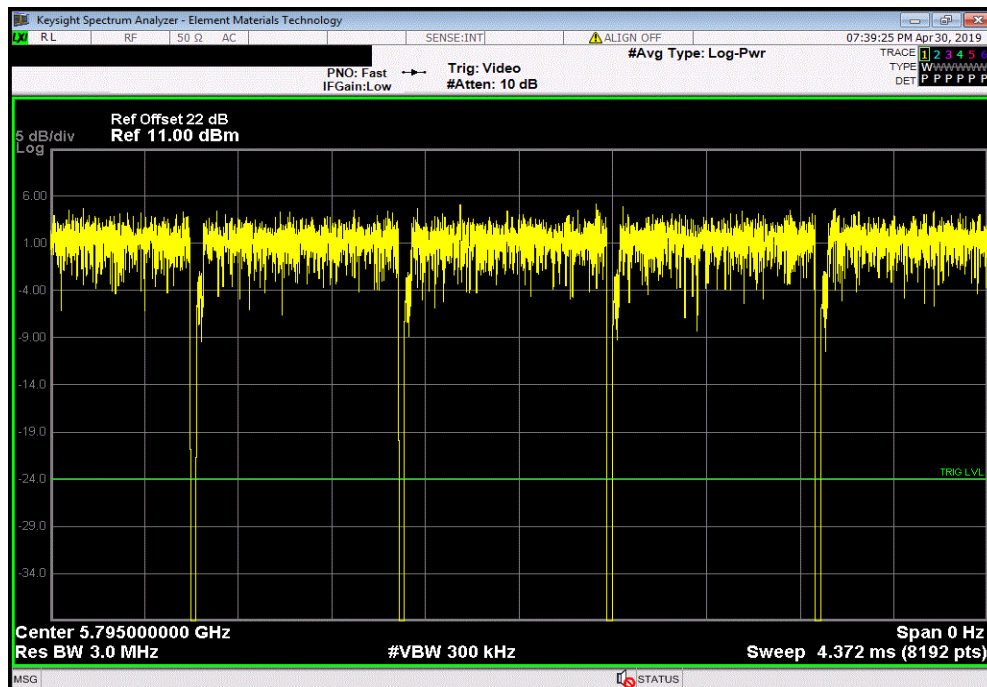


TMTx 2018.09.13 XMI 2019.02.26

Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 157/161 - 5795 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
936 us	971.5 us	1	96.3	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 157/161 - 5795 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

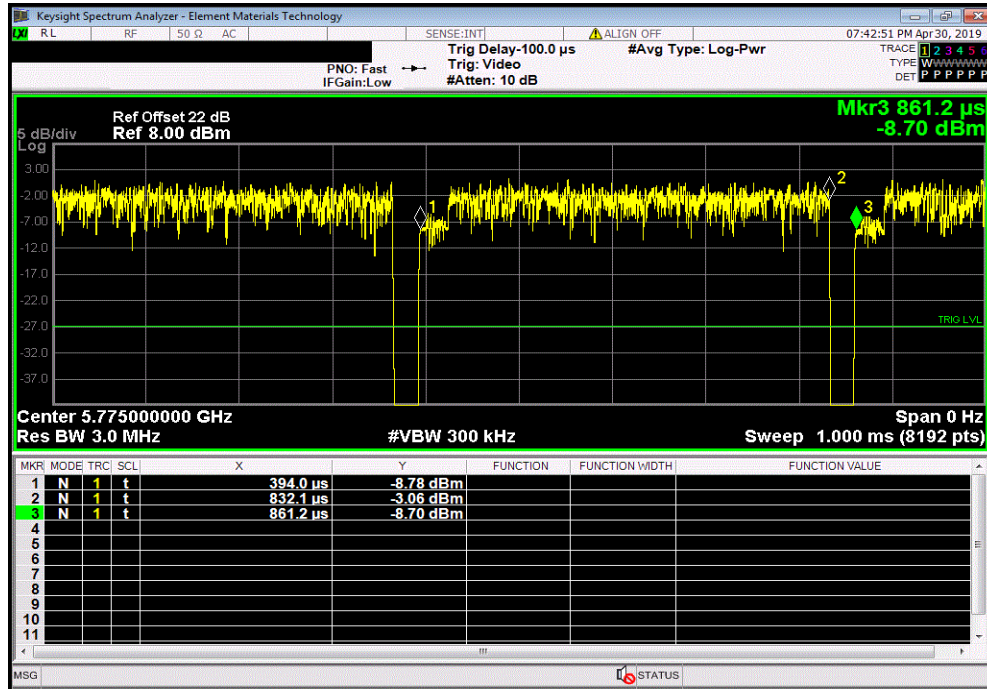


DUTY CYCLE



TMTx 2018.09.13 XMt 2019.02.26

Chain A, 5725 - 5785 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149-161 - 5775 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
438.1 us	467.2 us	1	93.8	N/A	N/A	



Chain A, 5725 - 5785 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149-161 - 5775 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	

