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

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.

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 * LOG (1/D) = dB

Where D is duty cycle of the radio transmissions

DUTY CYCLE

element

TBtTx 2018.09.13 XMit 2019.02.26

EUT:	Dual Band Wireless-AC 3160 Module			**Work Order:**	AMRN0006
Serial Number:	APT31600958			**Date:**	30-Apr-19
Customer:	American Portwell Technology			**Temperature:**	22.5 °C
Attendees:	None			**Humidity:**	53.2% RH
Project:	None			**Barometric Pres.:**	1013 mbar
Tested by:	Jonathan Kiefer	**Power:**	110VAC/60Hz	**Job Site:**	TX09

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

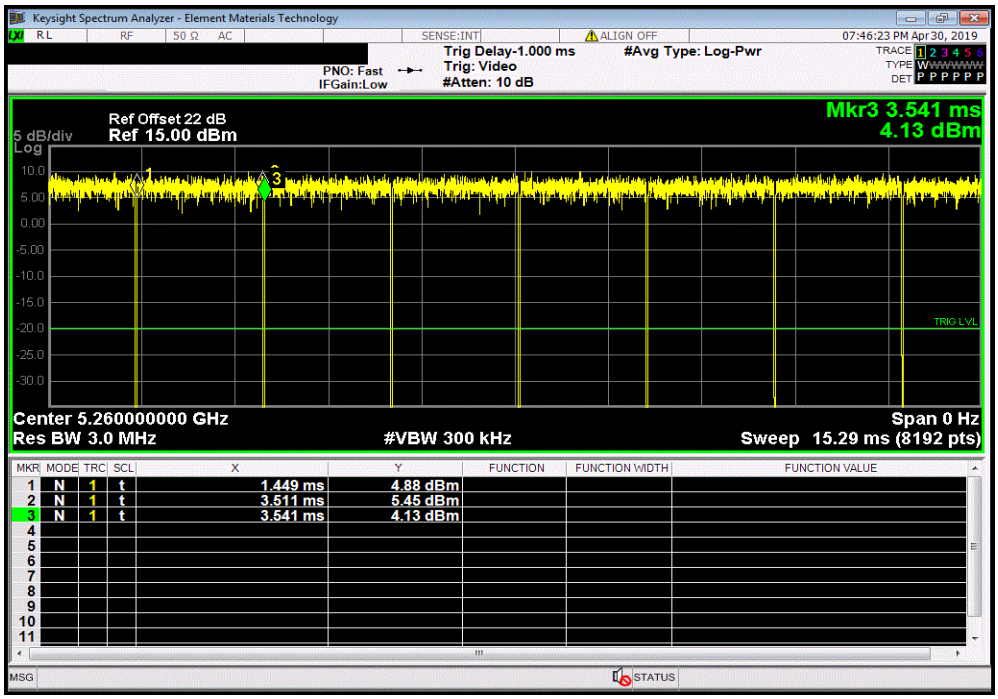
None

Configuration #	1	*Signature* Jonathan Kiefer

	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
Chain A						
5250 - 5350 MHz Band						
20 MHz BW						
802.11(a) 6 Mbps						
Low Channel, Ch 52 - 5260 MHz	2.063 ms	2.093 ms	1	98.6	N/A	N/A
Low Channel, Ch 52 - 5260 MHz	N/A	N/A	6	N/A	N/A	N/A
High Channel, Ch 64 - 5320 MHz	2.065 ms	2.094 ms	1	98.6	N/A	N/A
High Channel, Ch 64 - 5320 MHz	N/A	N/A	6	N/A	N/A	N/A
802.11(n) MCS0						
Low Channel, Ch 52 - 5260 MHz	1.921 ms	1.947 ms	1	98.7	N/A	N/A
Low Channel, Ch 52 - 5260 MHz	N/A	N/A	6	N/A	N/A	N/A
High Channel, Ch 64 - 5320 MHz	1.919 ms	1.947 ms	1	98.6	N/A	N/A
High Channel, Ch 64 - 5320 MHz	N/A	N/A	6	N/A	N/A	N/A
40 MHz BW						
802.11(n) MCS0						
Low Channel, Ch 52/56 - 5270 MHz	936.9 us	970.7 us	1	96.5	N/A	N/A
Low Channel, Ch 52/56 - 5270 MHz	N/A	N/A	6	N/A	N/A	N/A
High Channel, Ch 60/64 - 5310 MHz	936 us	970.7 us	1	96.4	N/A	N/A
High Channel, Ch 60/64 - 5310 MHz	N/A	N/A	5	N/A	N/A	N/A
80 MHz BW						
802.11(n) MCS0						
Low Channel, Ch 52-64 - 5290 MHz	432.3 us	468 us	1	92.4	N/A	N/A
Low Channel, Ch 52-64 - 5290 MHz	N/A	N/A	5	N/A	N/A	N/A
5470 - 5725 MHz Band						
20 MHz BW						
802.11(a) 6 Mbps						
Low Channel, Ch 100 - 5500 MHz	2.063 ms	2.091 ms	1	98.7	N/A	N/A
Low Channel, Ch 100 - 5500 MHz	N/A	N/A	6	N/A	N/A	N/A
Mid Channel, Ch 116 - 5580 MHz	2.063 ms	2.091 ms	1	98.7	N/A	N/A
Mid Channel, Ch 116 - 5580 MHz	N/A	N/A	6	N/A	N/A	N/A
High Channel, Ch 140 - 5700 MHz	2.063 ms	2.093 ms	1	98.6	N/A	N/A
High Channel, Ch 140 - 5700 MHz	N/A	N/A	5	N/A	N/A	N/A
802.11(n) MCS0						
Low Channel, Ch 100 - 5500 MHz	1.919 ms	1.947 ms	1	98.6	N/A	N/A
Low Channel, Ch 100 - 5500 MHz	N/A	N/A	6	N/A	N/A	N/A
Mid Channel, Ch 116 - 5580 MHz	1.919 ms	1.947 ms	1	98.6	N/A	N/A
Mid Channel, Ch 116 - 5580 MHz	N/A	N/A	6	N/A	N/A	N/A
High Channel, Ch 140 - 5700 MHz	1.919 ms	1.947 ms	1	98.6	N/A	N/A
High Channel, Ch 140 - 5700 MHz	N/A	N/A	6	N/A	N/A	N/A
40 MHz BW						
802.11(n) MCS0						
Low Channel, Ch 100/104 - 5510 MHz	936 us	970.7 us	1	96.4	N/A	N/A
Low Channel, Ch 100/104 - 5510 MHz	N/A	N/A	6	N/A	N/A	N/A
Mid Channel, Ch 116/120 - 5590 MHz	937 us	971 us	1	96.5	N/A	N/A
Mid Channel, Ch 116/120 - 5590 MHz	N/A	N/A	5	N/A	N/A	N/A
High Channel, Ch 132/136 - 5670 MHz	936 us	970 us	1	96.5	N/A	N/A
High Channel, Ch 132/136 - 5670 MHz	N/A	N/A	5	N/A	N/A	N/A
80 MHz BW						
802.11(n) MCS0						
Low Channel, Ch 100-112 - 5530 MHz	432.3 us	467.9 us	1	92.4	N/A	N/A
Low Channel, Ch 100-112 - 5530 MHz	N/A	N/A	5	N/A	N/A	N/A
Low Channel, Ch 116-128 - 5610 MHz	437.6 us	472.3 us	1	92.7	N/A	N/A
Low Channel, Ch 116-128 - 5610 MHz	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

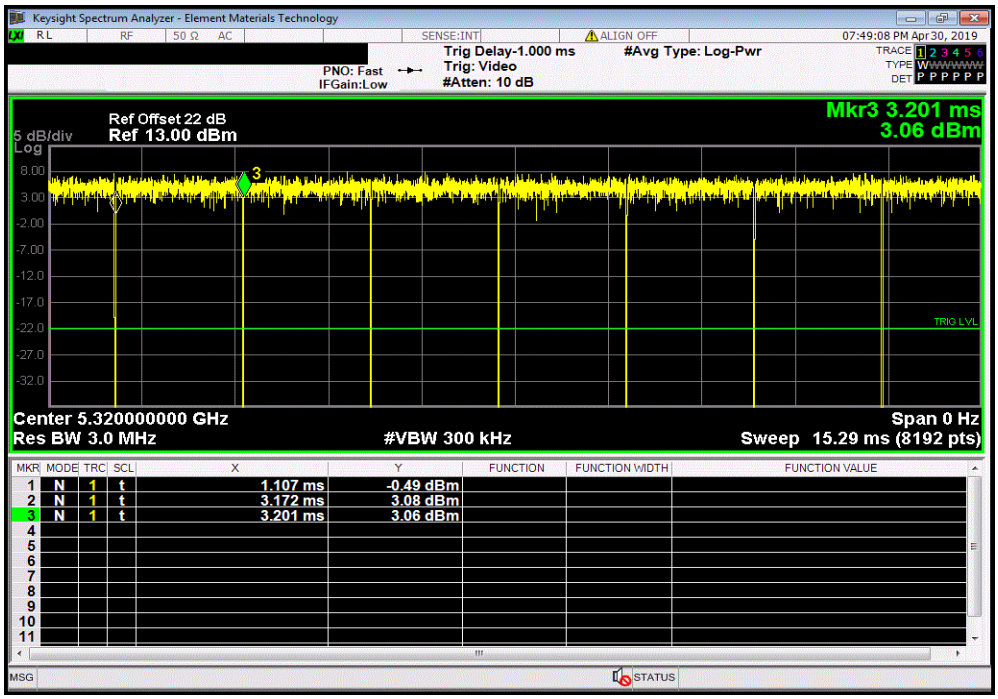
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 52 - 5260 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.063 ms	2.093 ms	1	98.6	N/A	N/A



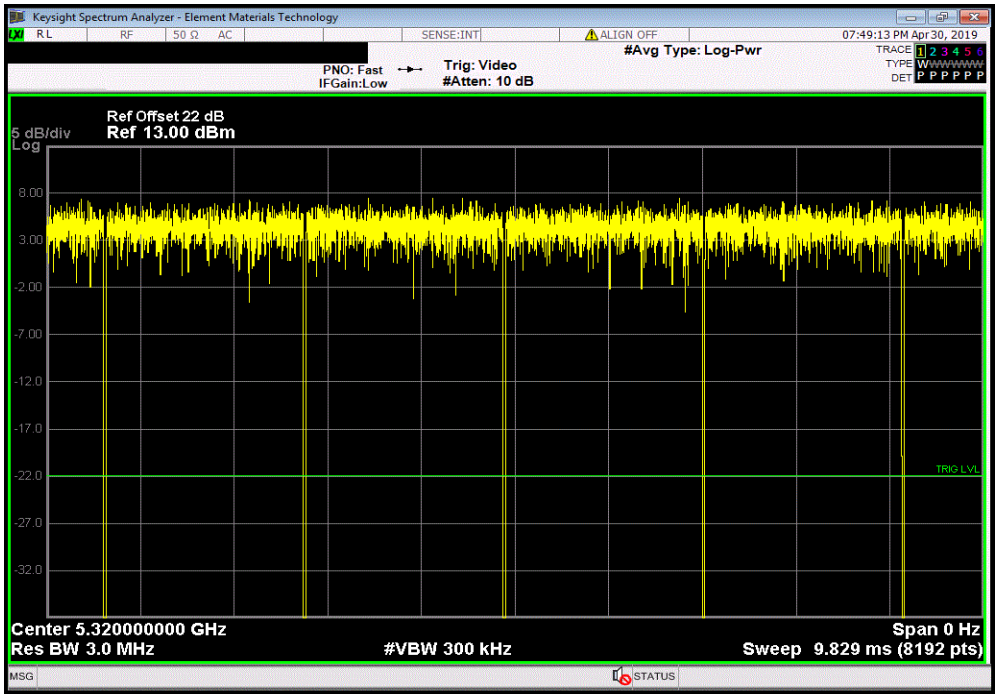
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 52 - 5260 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 64 - 5320 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.065 ms	2.094 ms	1	98.6	N/A	N/A

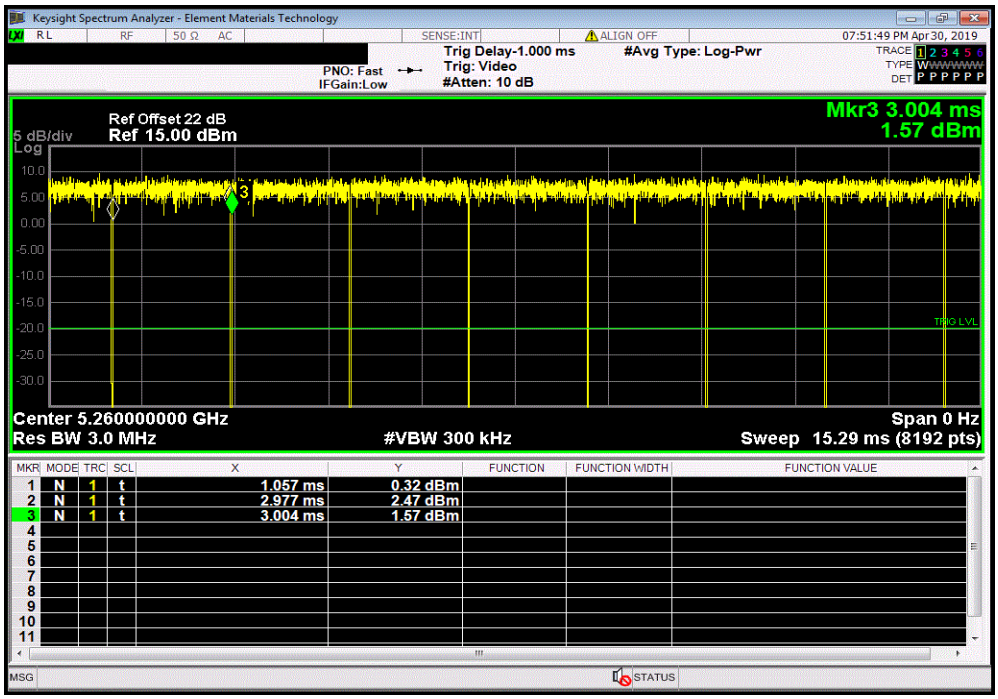


Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 64 - 5320 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

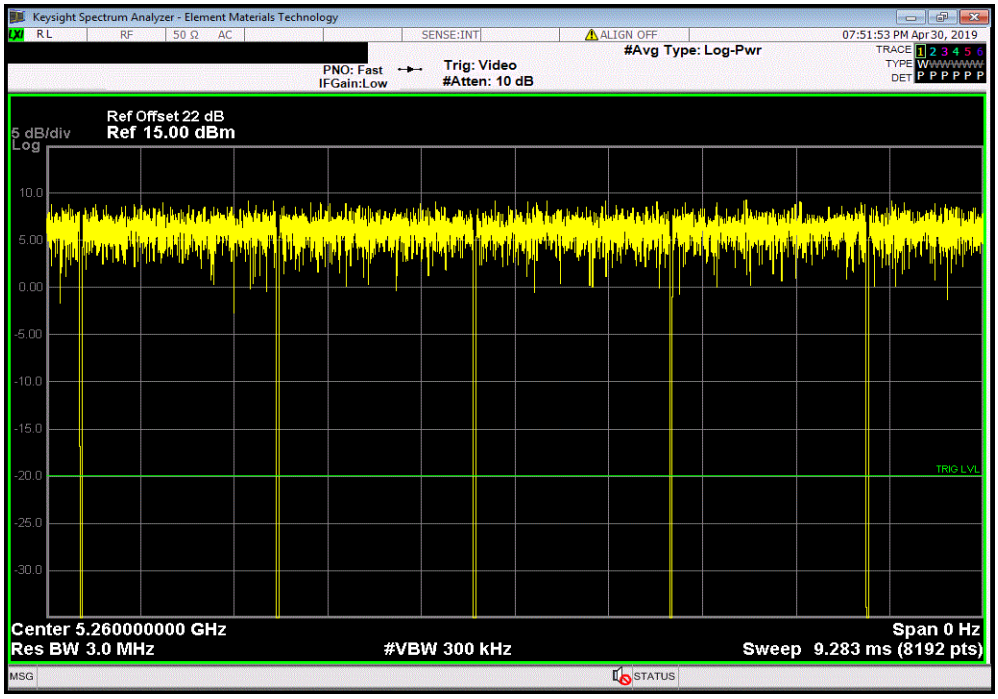


DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52 - 5260 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.921 ms	1.947 ms	1	98.7	N/A	N/A

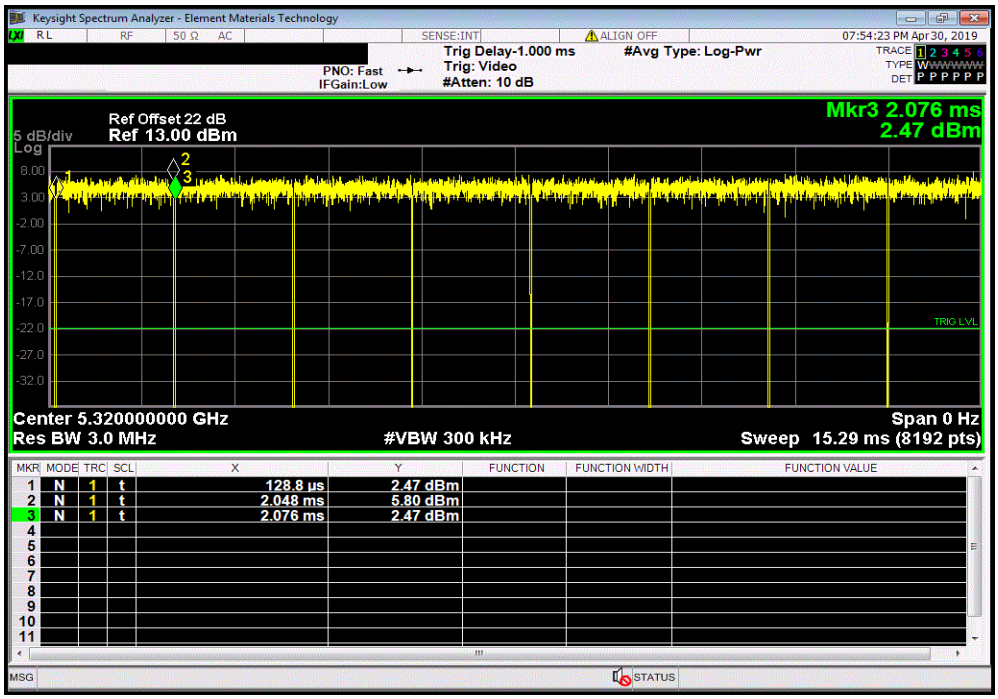


Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52 - 5260 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

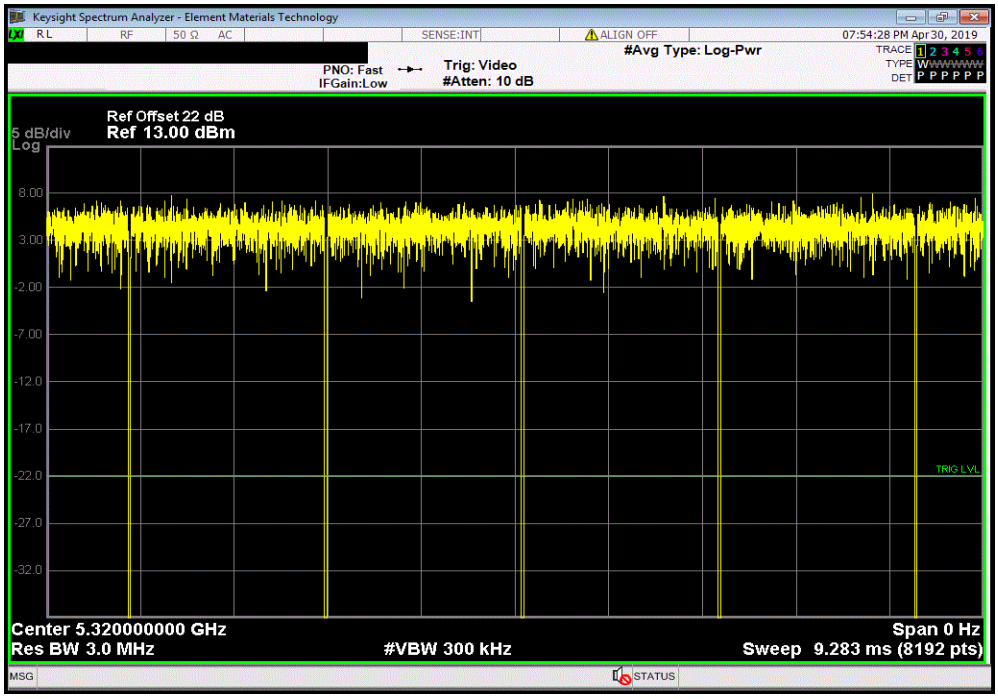


DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 64 - 5320 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.919 ms	1.947 ms	1	98.6	N/A	N/A

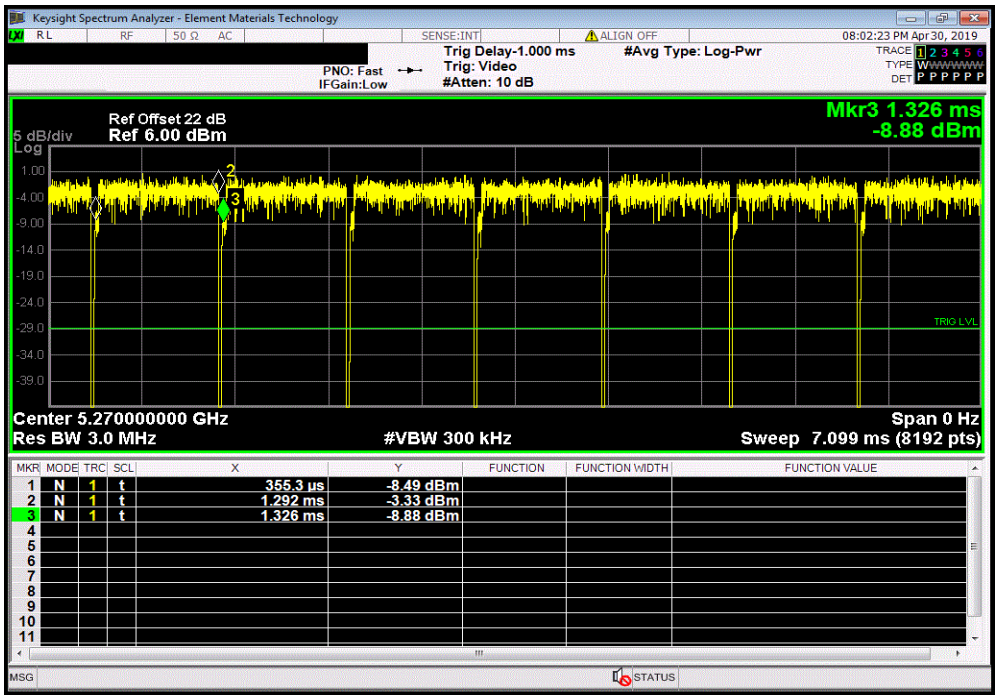


Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 64 - 5320 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

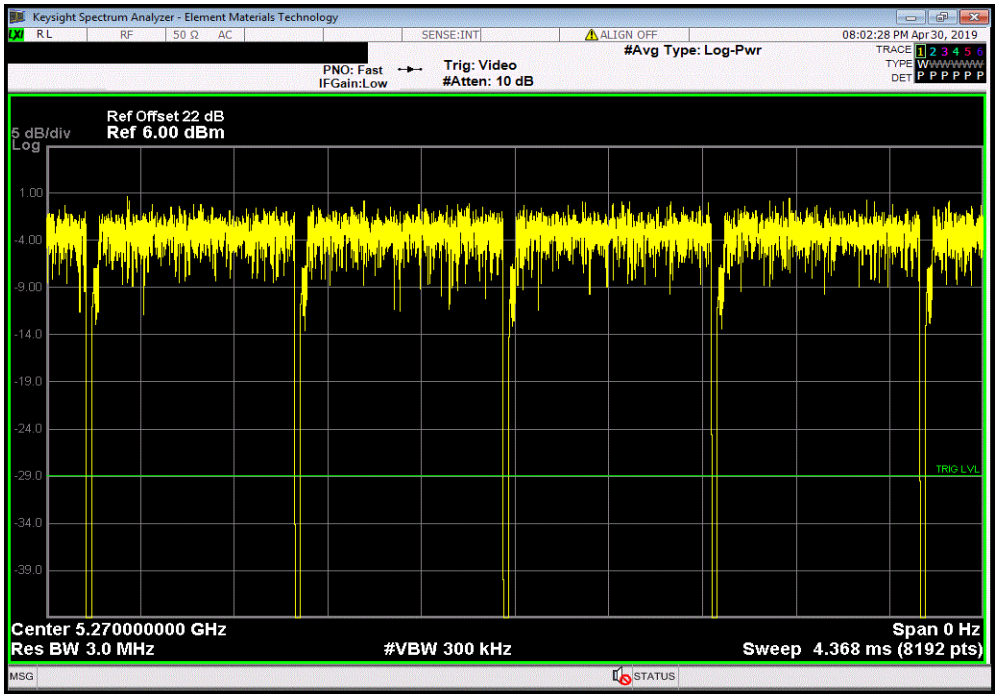


DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52/56 - 5270 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	936.9 us	970.7 us	1	96.5	N/A	N/A

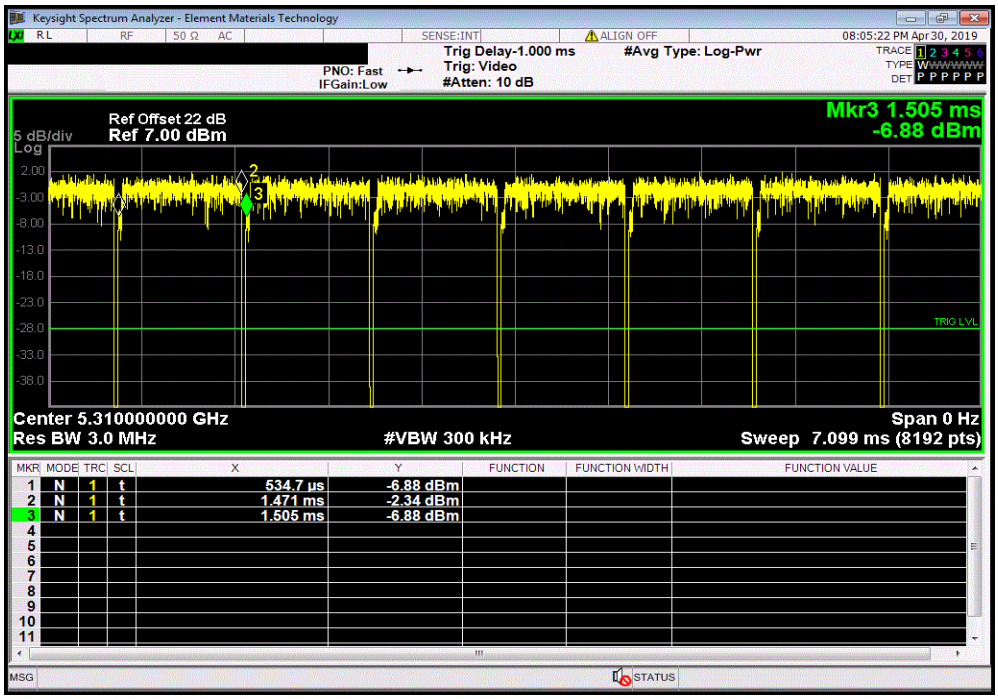


Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52/56 - 5270 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

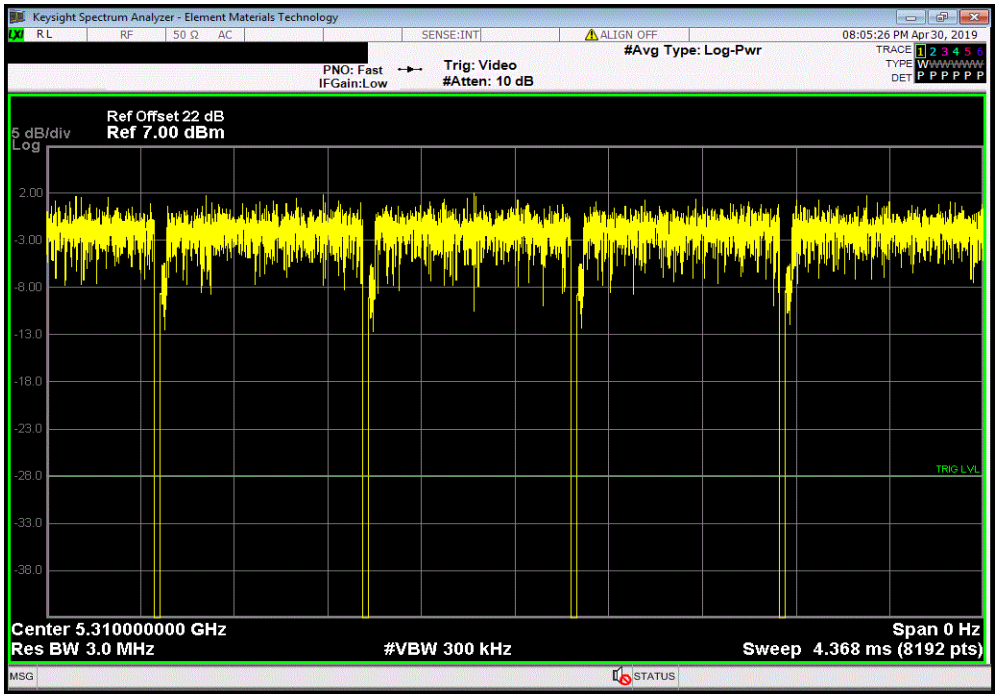


DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 60/64 - 5310 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	936 us	970.7 us	1	96.4	N/A	N/A

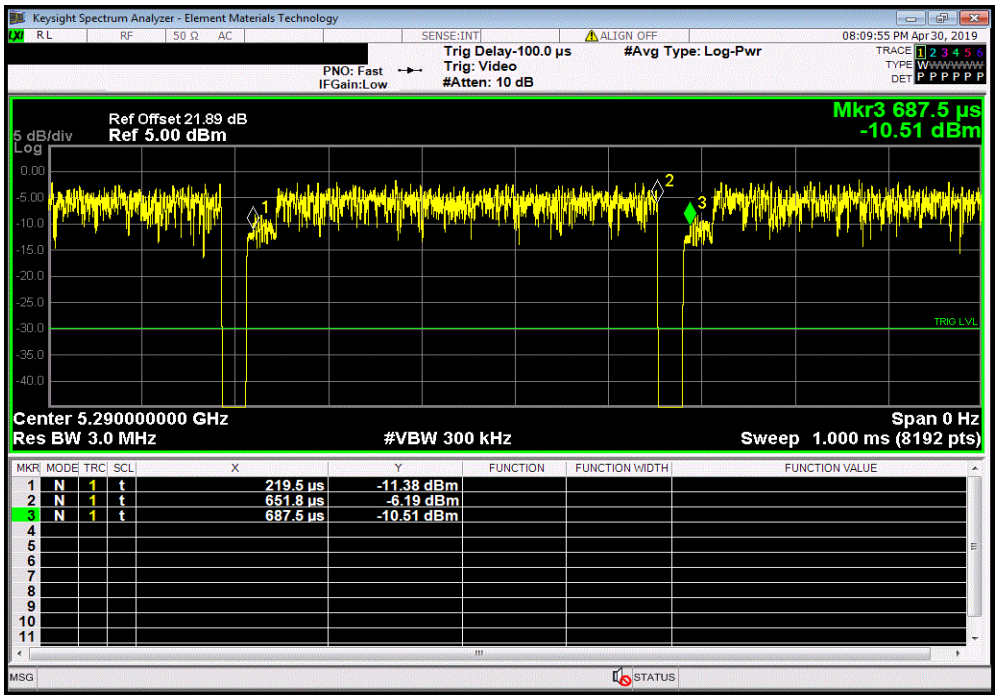


Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 60/64 - 5310 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

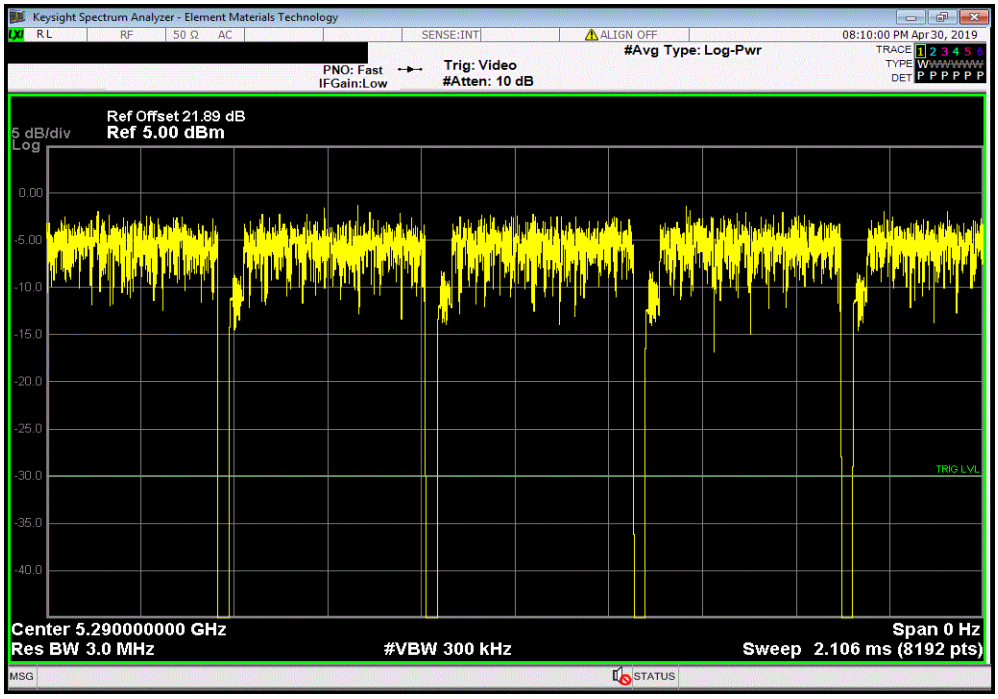


DUTY CYCLE

Chain A, 5250 - 5350 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52-64 - 5290 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	432.3 us	468 us	1	92.4	N/A	N/A

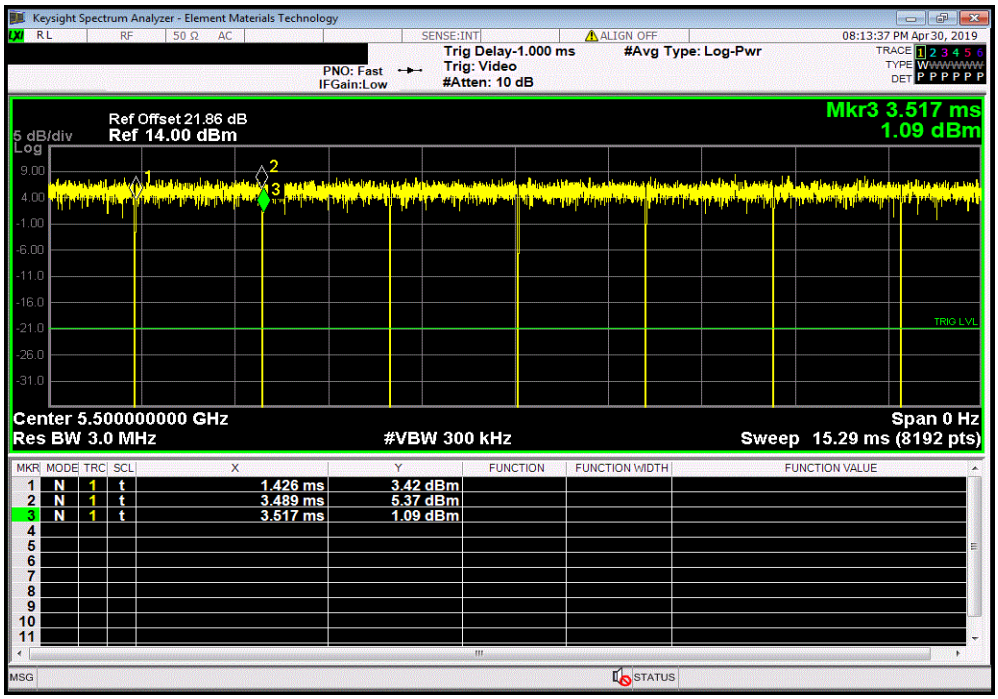


Chain A, 5250 - 5350 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52-64 - 5290 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

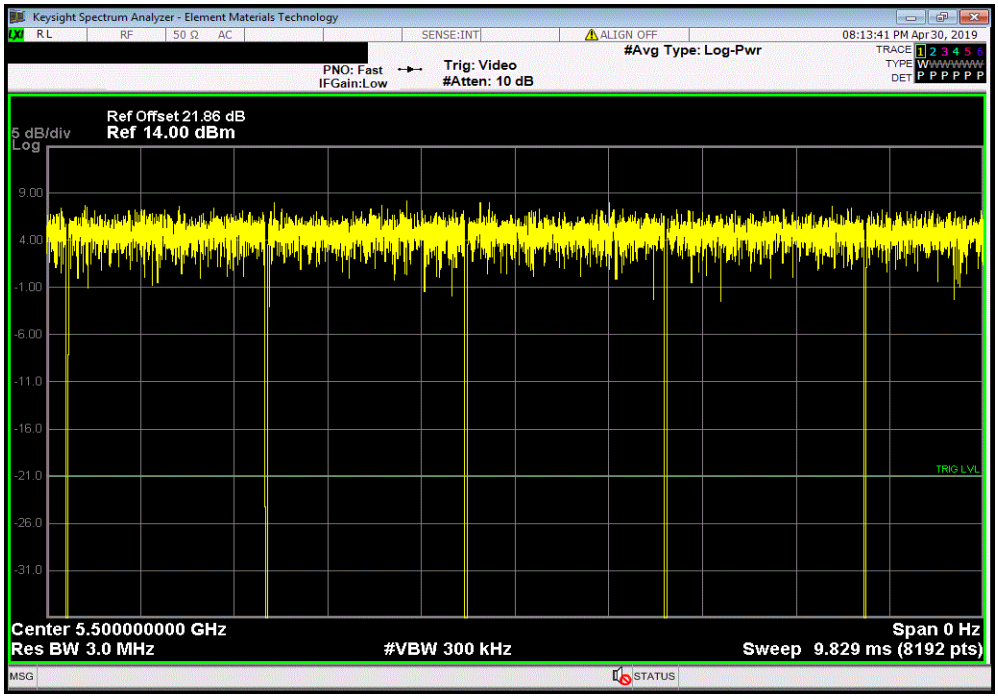


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 100 - 5500 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.063 ms	2.091 ms	1	98.7	N/A	N/A

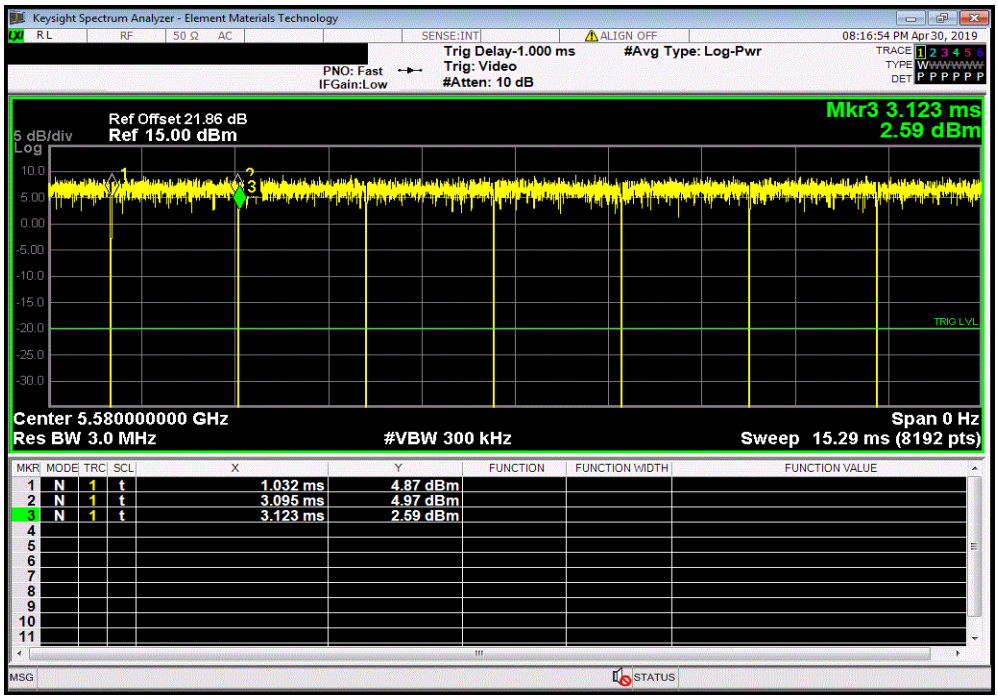


Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 100 - 5500 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

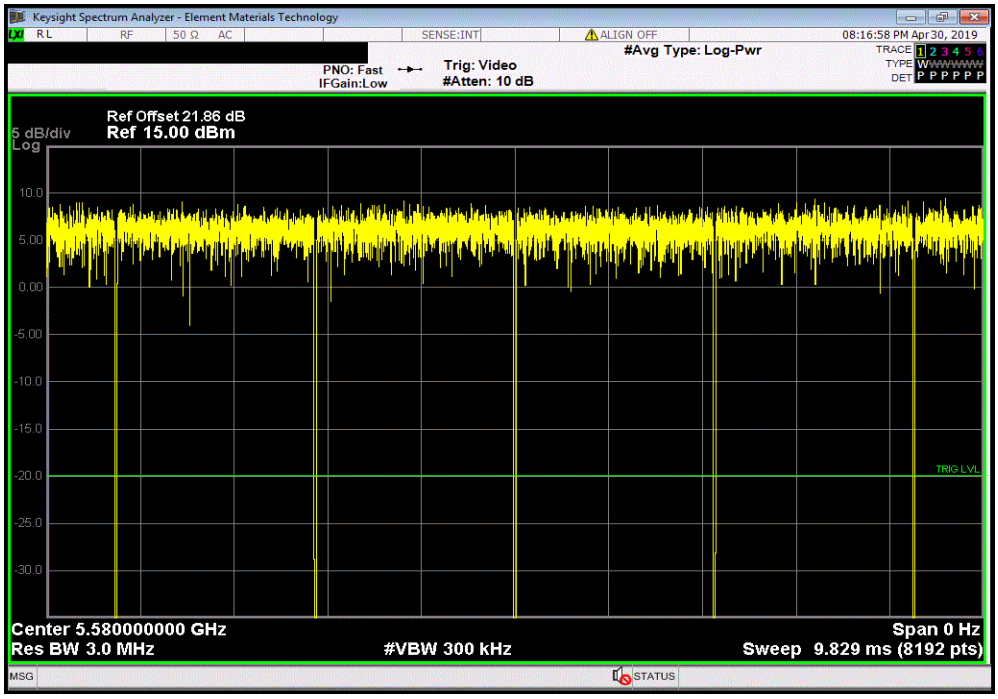


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 116 - 5580 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.063 ms	2.091 ms	1	98.7	N/A	N/A

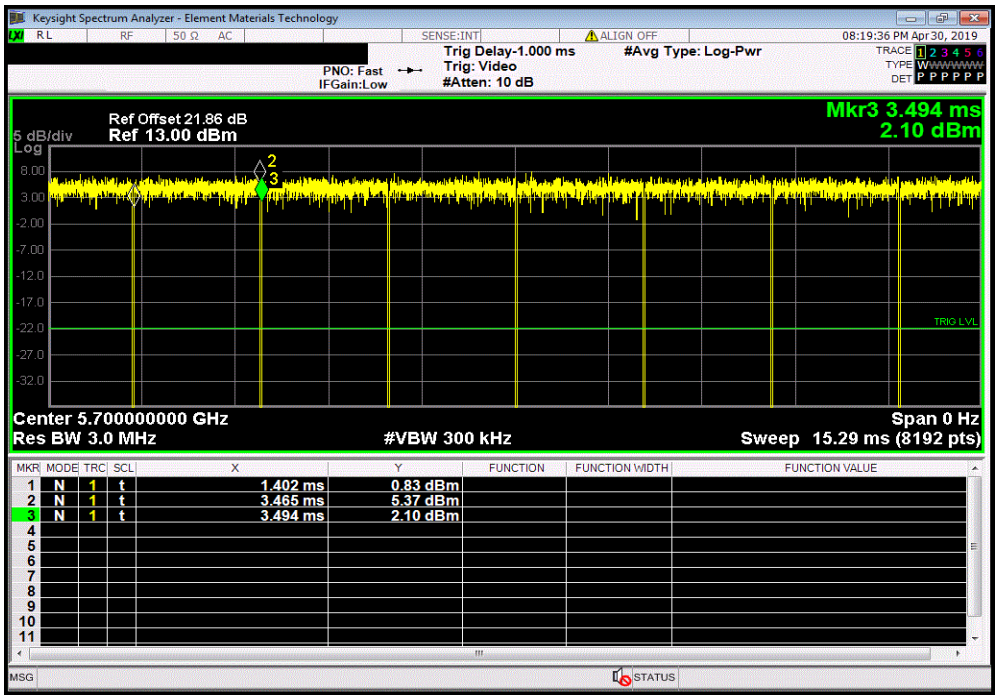


Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 116 - 5580 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



DUTY CYCLE

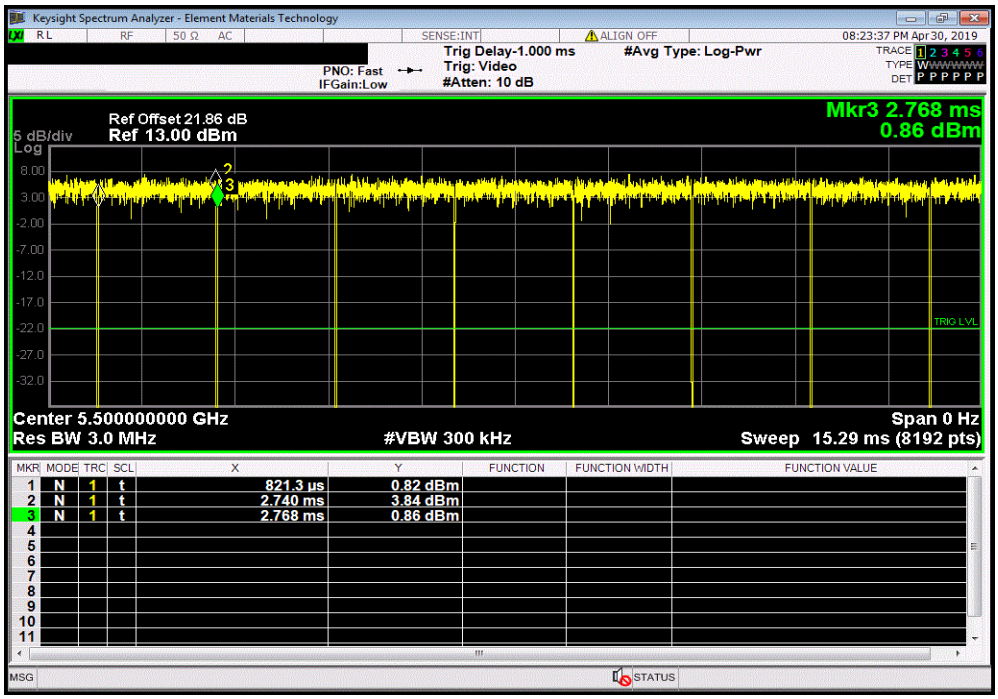
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 140 - 5700 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.063 ms	2.093 ms	1	98.6	N/A	N/A



Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 140 - 5700 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

DUTY CYCLE

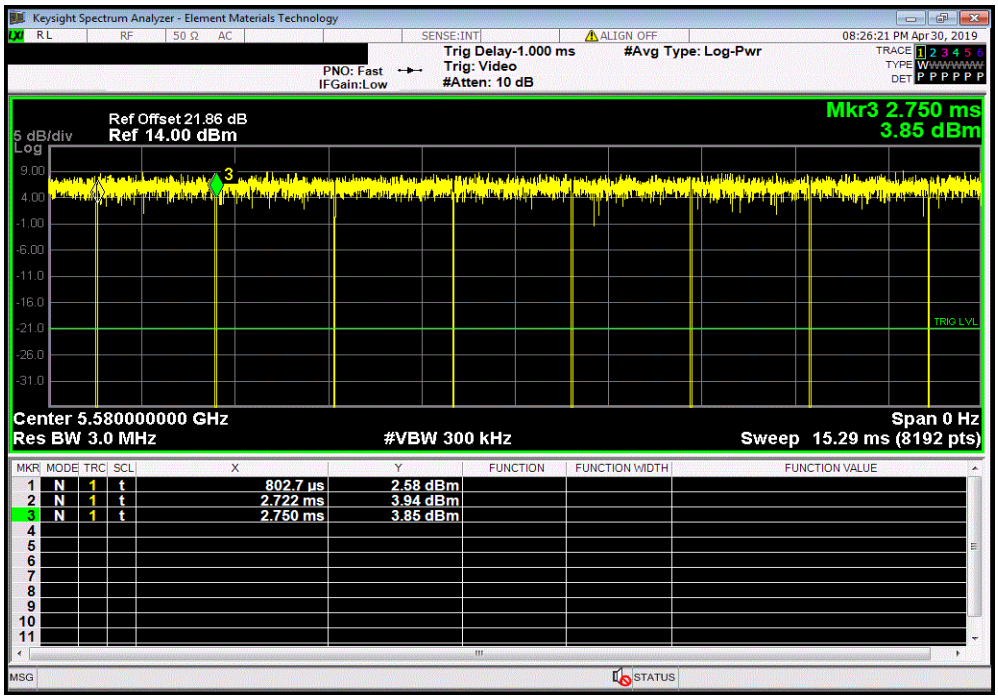
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100 - 5500 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.919 ms	1.947 ms	1	98.6	N/A	N/A



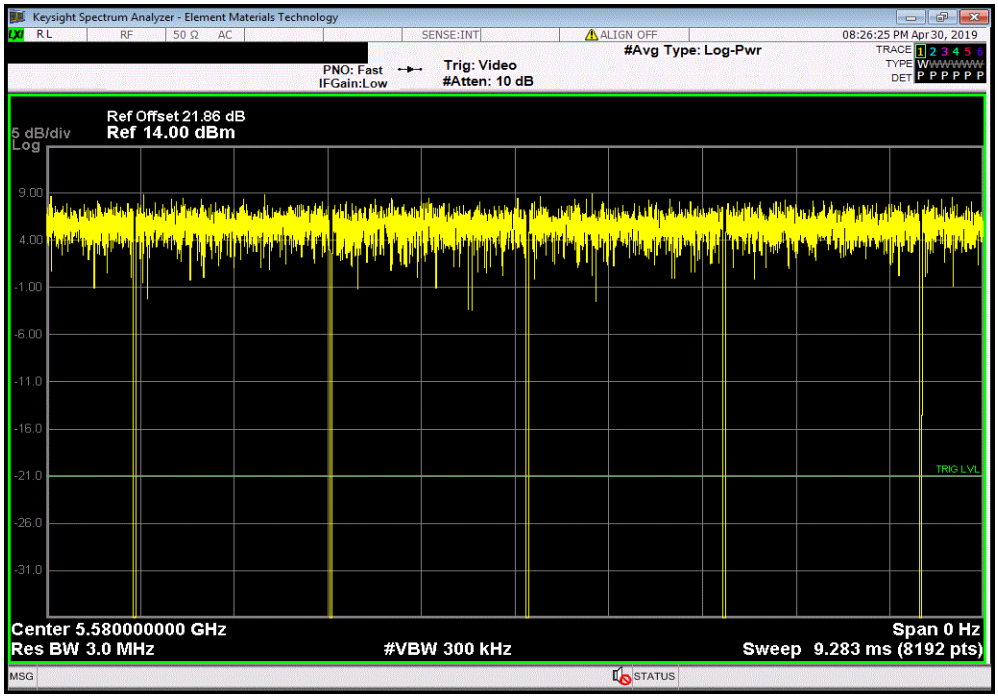
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100 - 5500 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116 - 5580 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.919 ms	1.947 ms	1	98.6	N/A	N/A

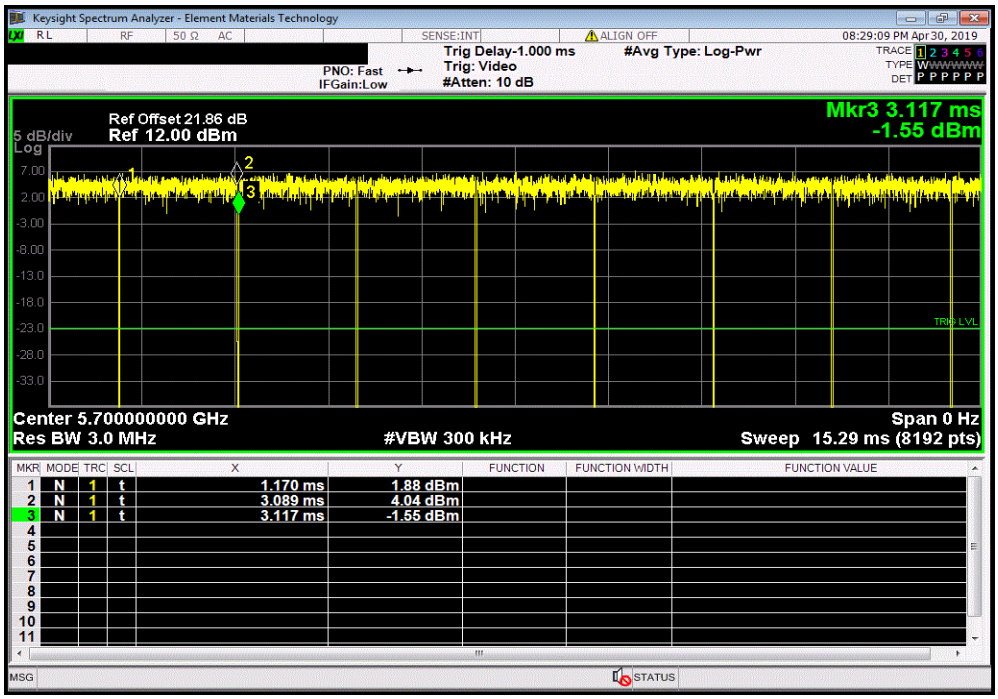


Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116 - 5580 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

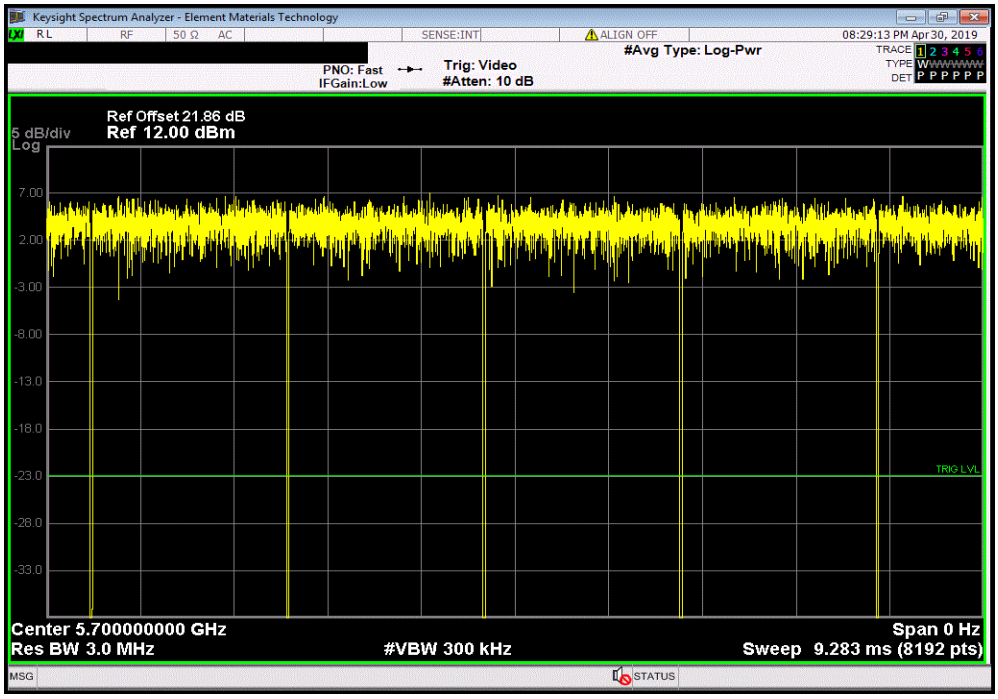


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 140 - 5700 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	1.919 ms	1.947 ms	1	98.6	N/A	N/A

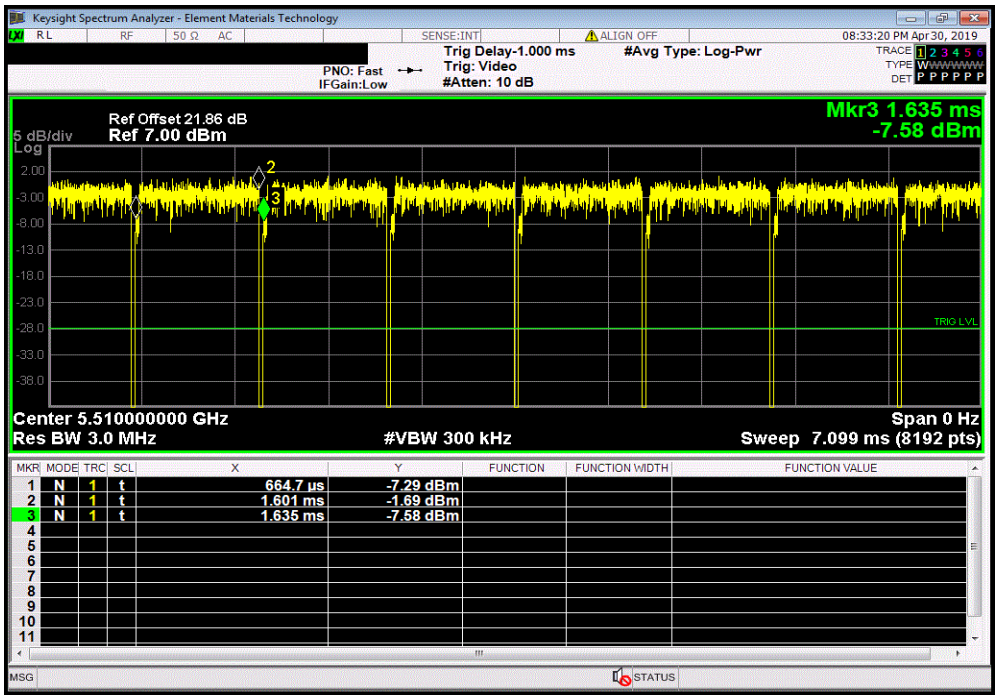


Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 140 - 5700 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

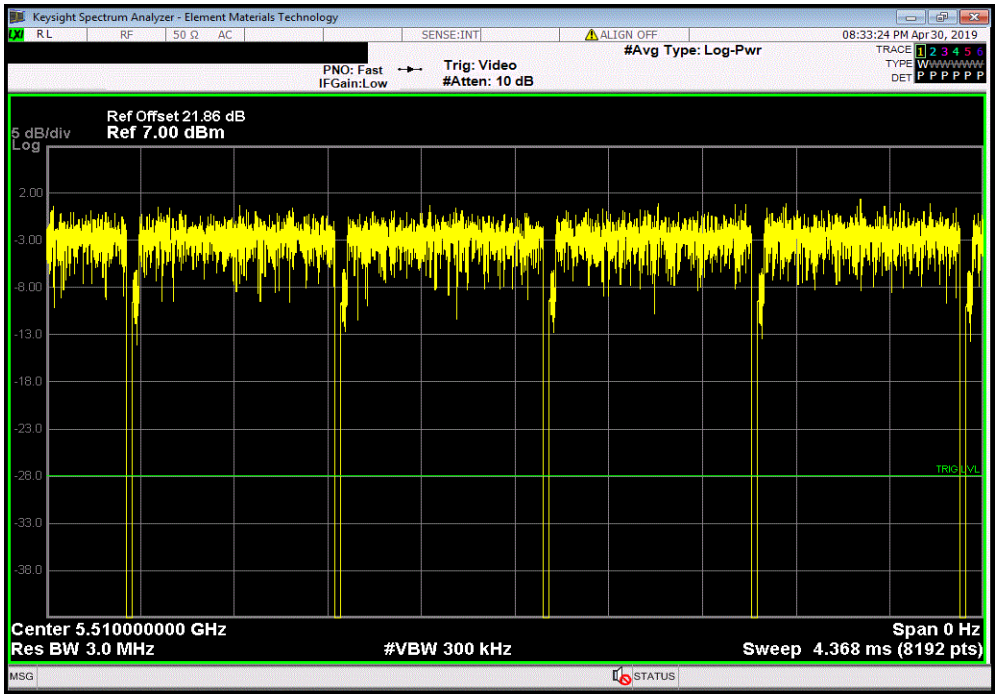


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100/104 - 5510 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	936 us	970.7 us	1	96.4	N/A	N/A

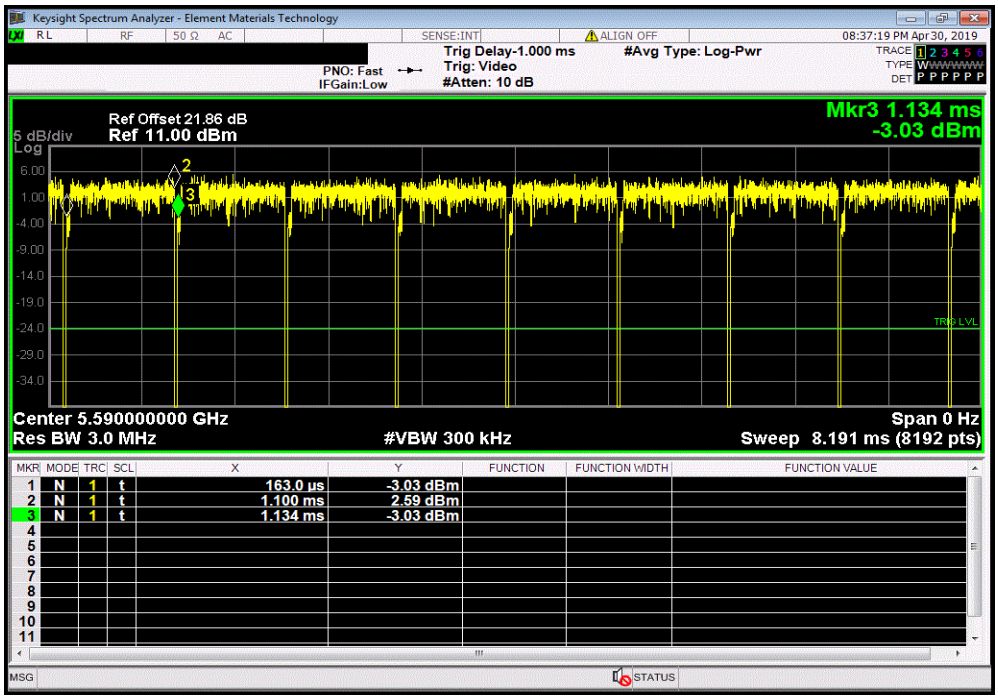


Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100/104 - 5510 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

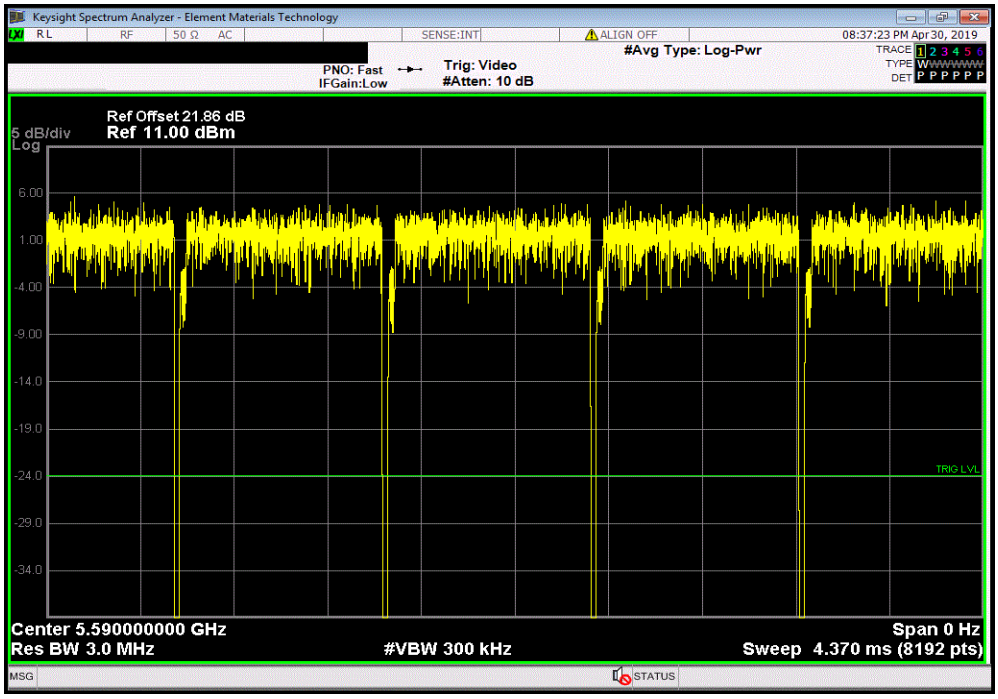


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116/120 - 5590 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	937 us	971 us	1	96.5	N/A	N/A

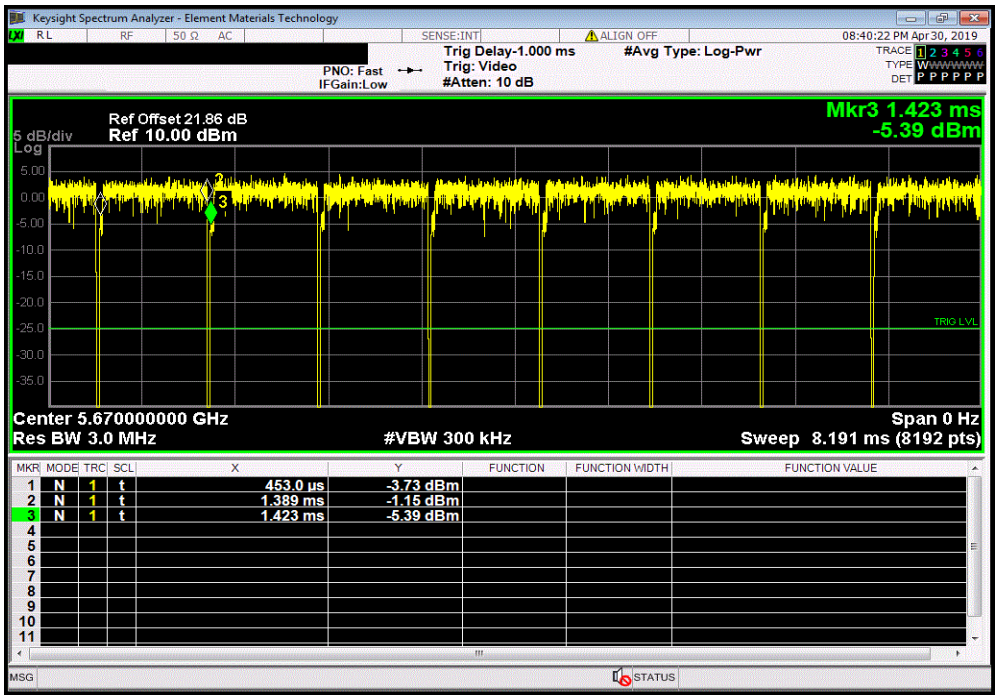


Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116/120 - 5590 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

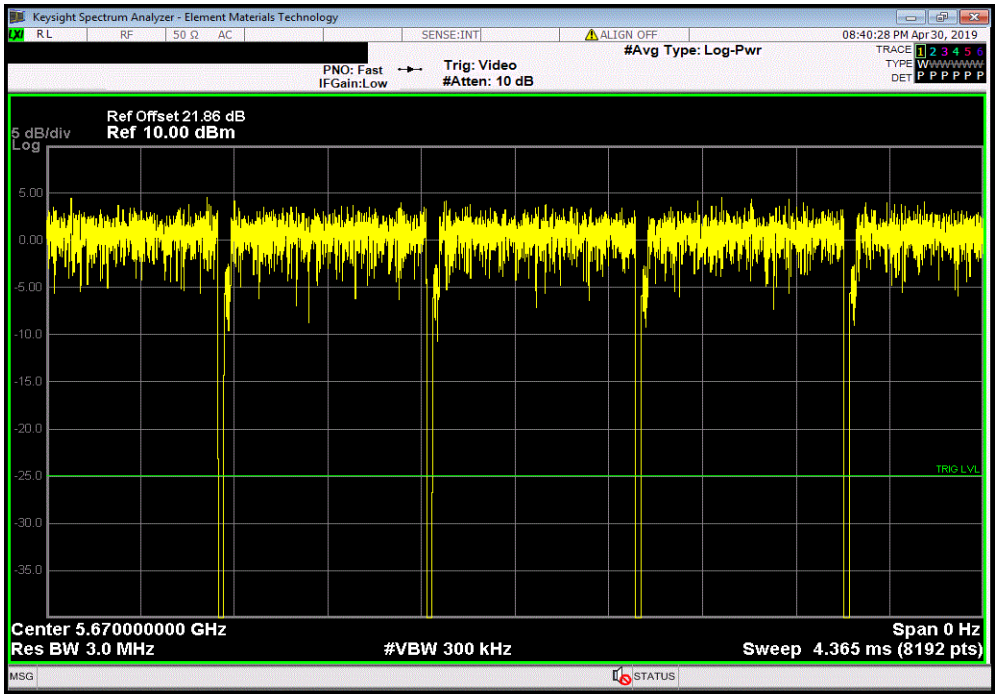


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 132/136 - 5670 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	936 us	970 us	1	96.5	N/A	N/A

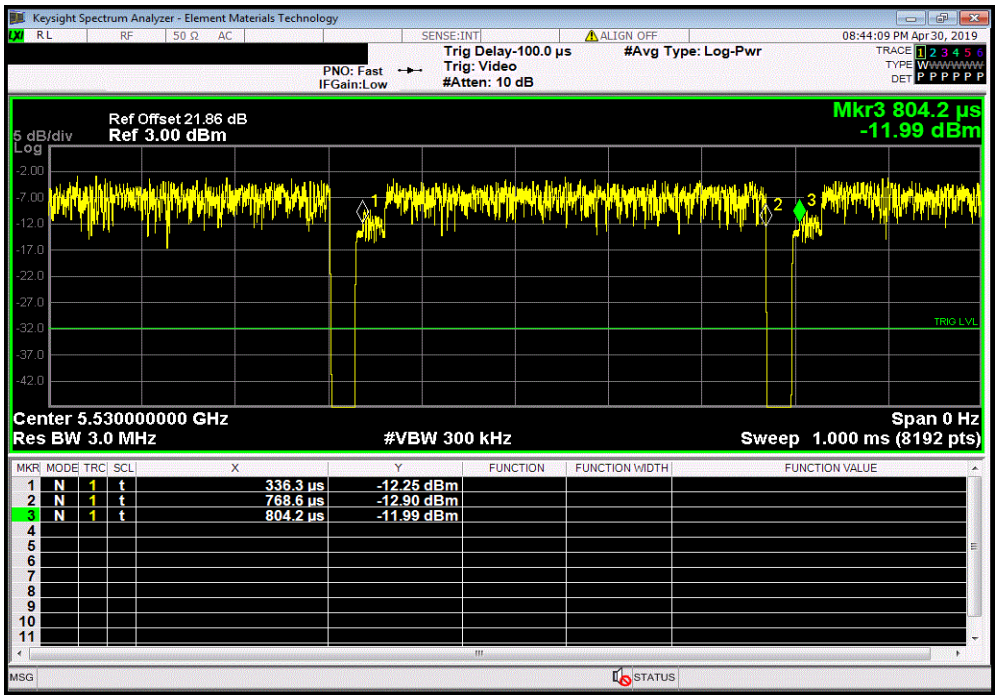


Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 132/136 - 5670 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

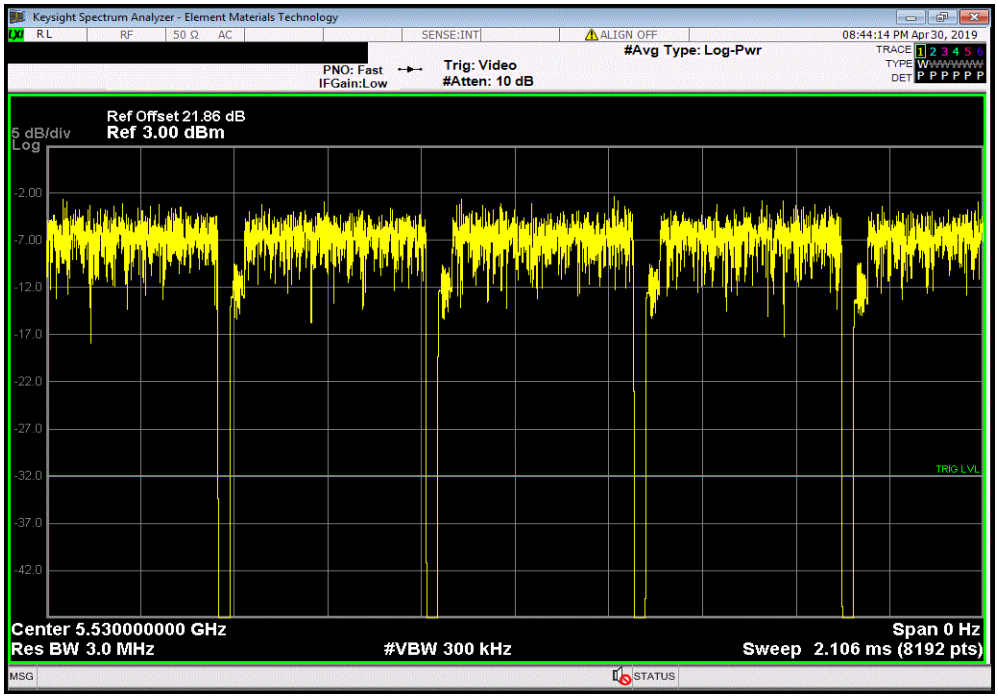


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100-112 - 5530 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	432.3 us	467.9 us	1	92.4	N/A	N/A

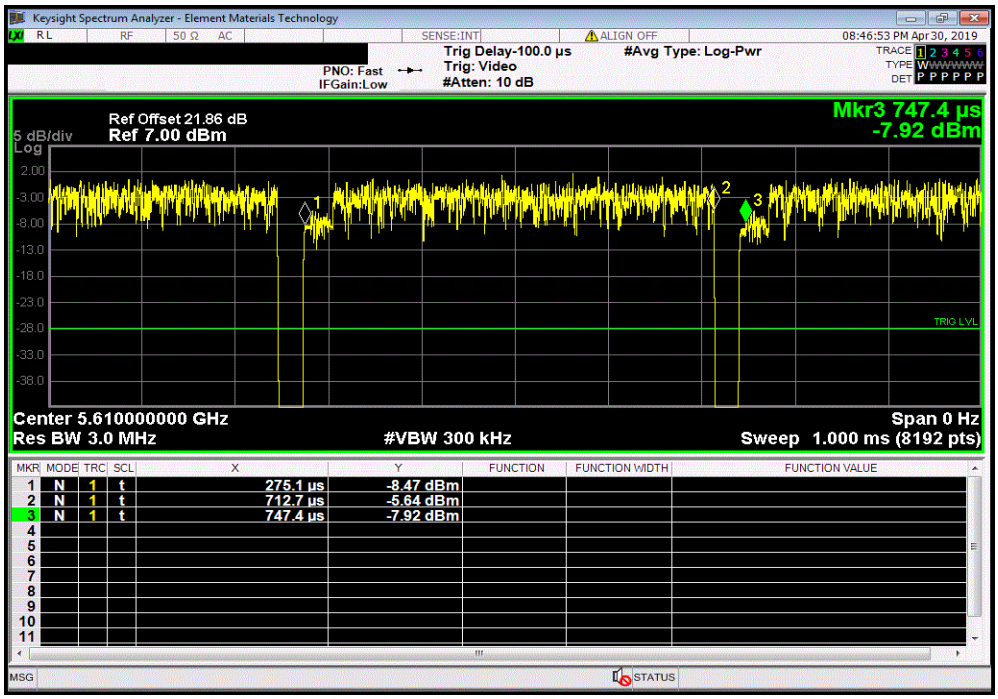


Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100-112 - 5530 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

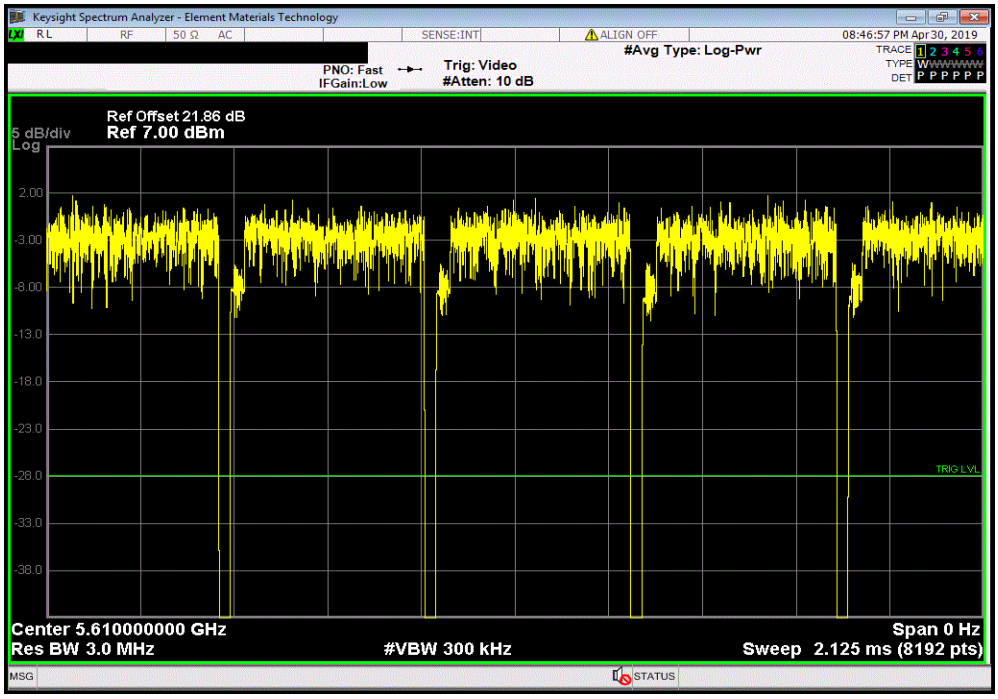


DUTY CYCLE

Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 116-128 - 5610 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	437.6 us	472.3 us	1	92.7	N/A	N/A



Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 116-128 - 5610 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

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 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.

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*LOG(1/D) where D is the duty cycle.

MAXIMUM CONDUCTED OUTPUT POWER

element

TitleTx 2018.09.13 XMit 2019.02.26

EUT:	Dual Band Wireless-AC 3160 Module			**Work Order:**	AMRN0006
Serial Number:	APT31600958			**Date:**	30-Apr-19
Customer:	American Portwell Technology			**Temperature:**	22.2 °C
Attendees:	None			**Humidity:**	56% RH
Project:	None			**Barometric Pres.:**	1013 mbar
Tested by:	Jonathan Kiefer	**Power:**	110VAC/60Hz	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 15.407:2019	ANSI C63.10:2013

COMMENTS

See Power Table for output power settings used. External dipole antennas are used. Assembly gain = 2.0 dBi antenna gain - 1.1 dB cable loss = 0.9 dBi.

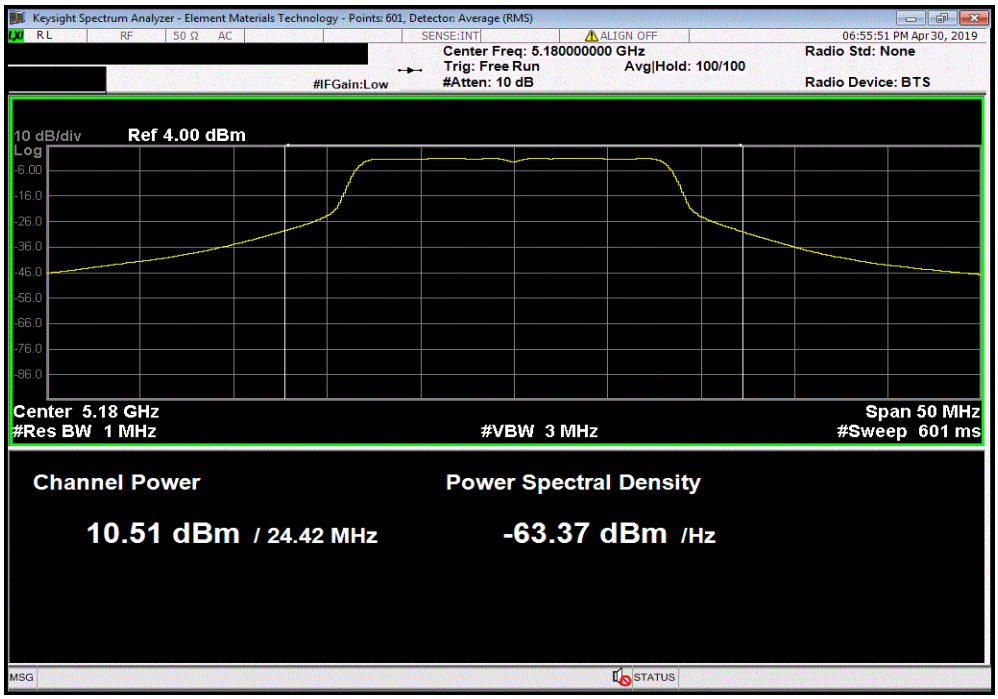
DEVIATIONS FROM TEST STANDARD

None

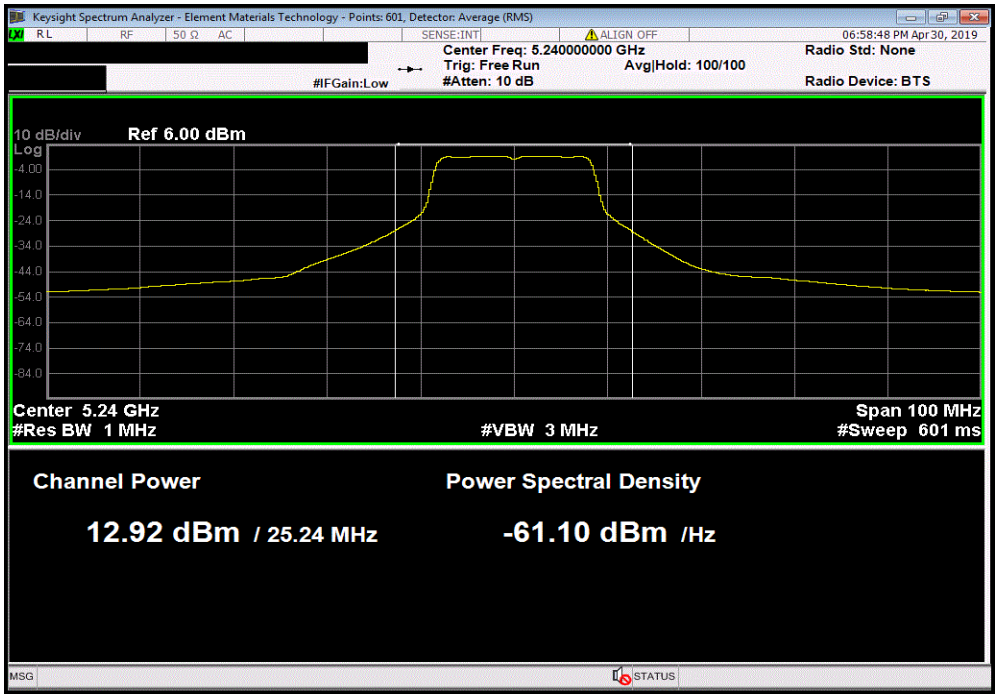
Configuration #	1	Signature Jonathan Kiefer

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
Chain A					
5150 - 5250 MHz Band					
20 MHz BW					
802.11(a) 6 Mbps					
Low Channel, Ch 36 - 5180 MHz	10.508	0.1	10.6	24	Pass
High Channel, Ch 48 - 5240 MHz	12.923	0.1	13	24	Pass
802.11(n) MCS0					
Low Channel, Ch 36 - 5180 MHz	12.325	0.1	12.4	24	Pass
High Channel, Ch 48 - 5240 MHz	12.87	0.1	12.9	24	Pass
40 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 36/40 - 5190 MHz	8.547	0.2	8.7	24	Pass
High Channel, Ch 44/48 - 5230 MHz	13.782	0.2	13.9	24	Pass
80 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 36-48 - 5210 MHz	7.594	0.3	7.9	24	Pass
5725 - 5785 MHz Band					
20 MHz BW					
802.11(a) 6 Mbps					
Low Channel, Ch 149 - 5745 MHz	13.438	0.1	13.5	30	Pass
Mid Channel, Ch 157 - 5785 MHz	13.491	0.1	13.5	30	Pass
High Channel, Ch 165 - 5825 MHz	13.471	0.1	13.5	30	Pass
802.11(n) MCS0					
Low Channel, Ch 149 - 5745 MHz	13.771	0.1	13.8	30	Pass
Mid Channel, Ch 157 - 5785 MHz	13.426	0.1	13.5	30	Pass
High Channel, Ch 165 - 5825 MHz	13.43	0.1	13.5	30	Pass
40 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 149/153 - 5755 MHz	13.446	0.2	13.6	30	Pass
High Channel, Ch 157/161 - 5795 MHz	13.258	0.2	13.4	30	Pass
80 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 149-161 - 5775 MHz	12.482	0.3	12.8	30	Pass

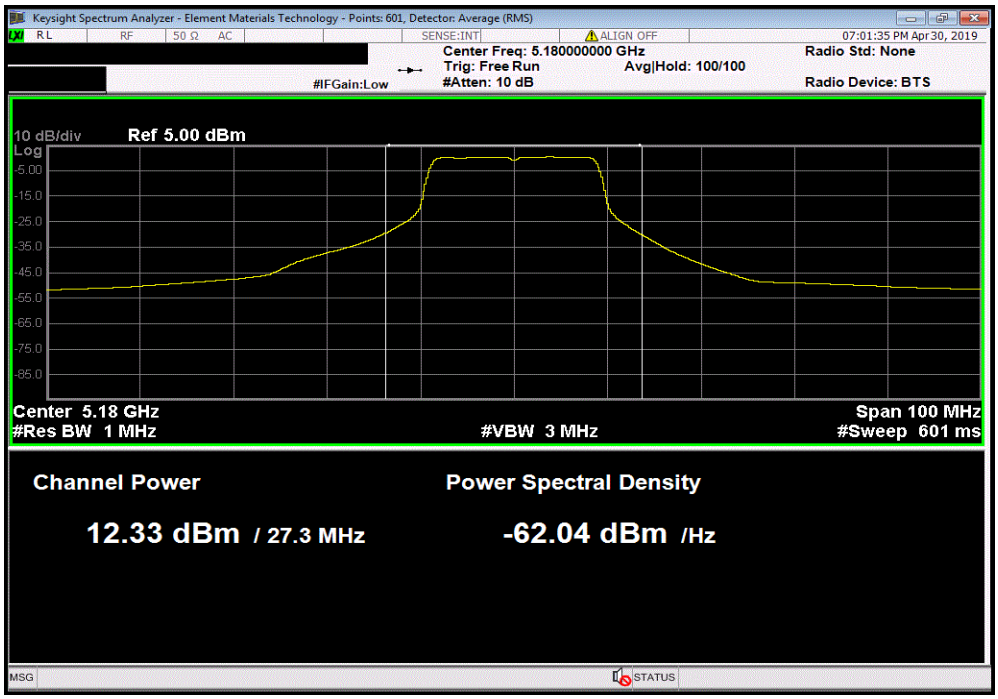
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 36 - 5180 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		10.508	0.1	10.6	24	Pass



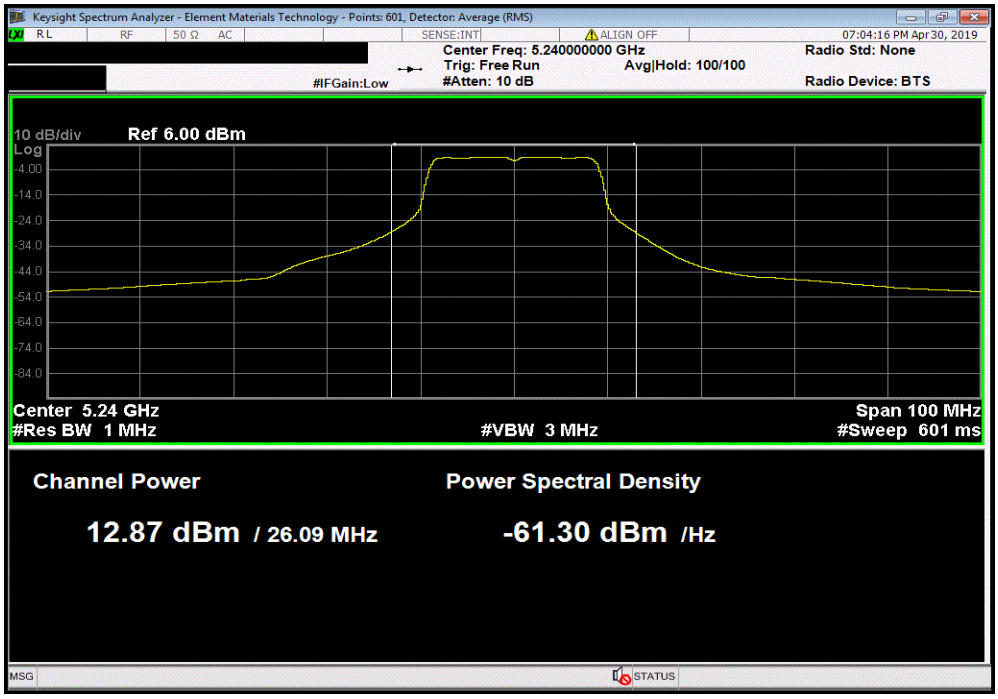
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 48 - 5240 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.923	0.1	13	24	Pass



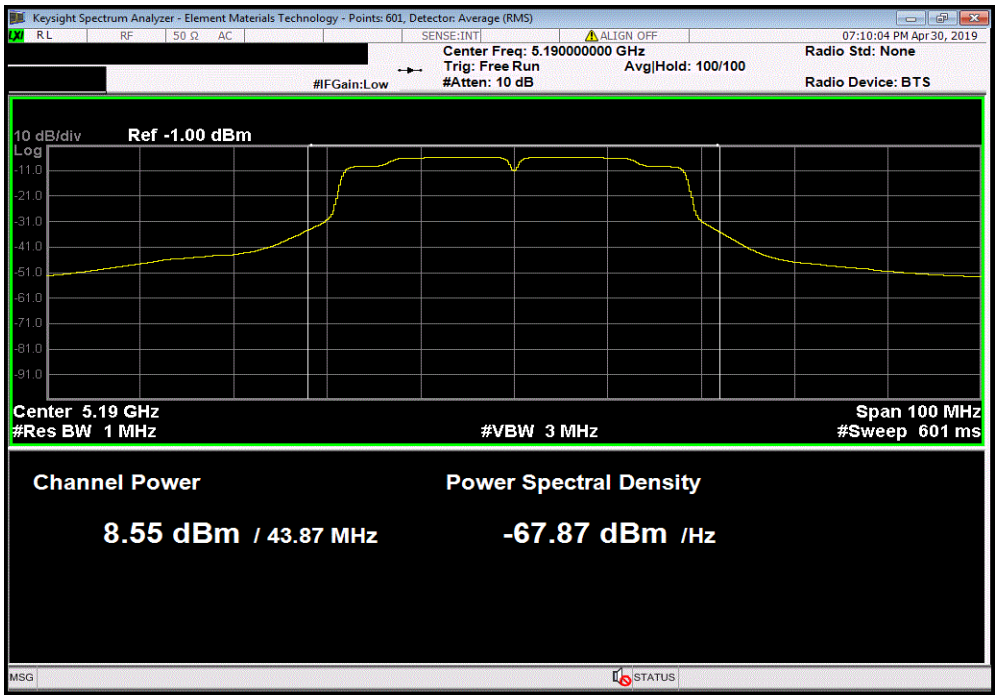
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36 - 5180 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.325	0.1	12.4	24	Pass



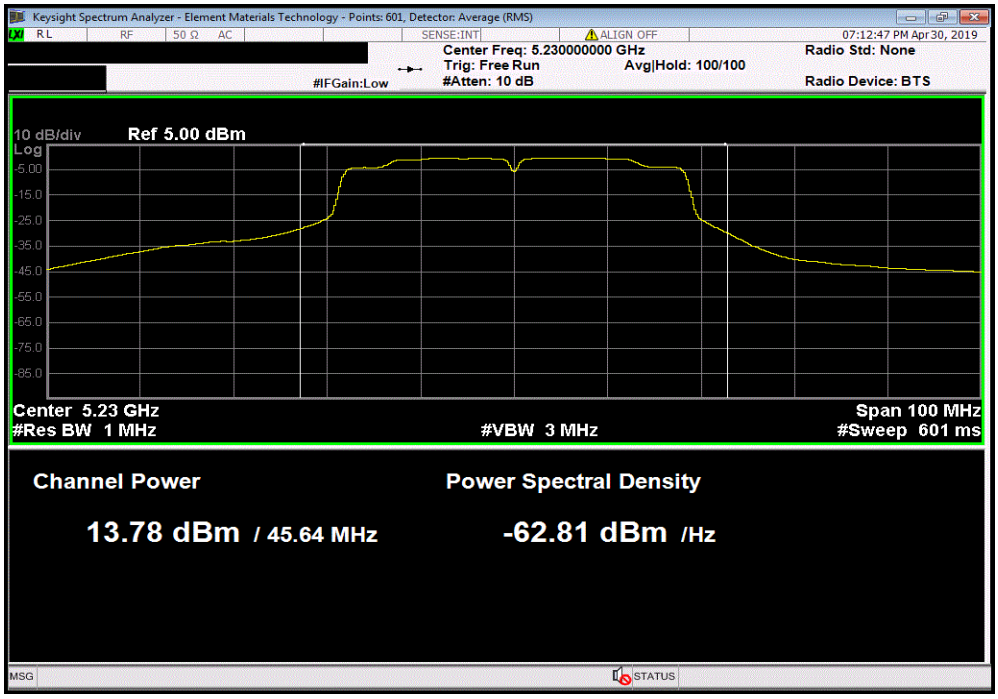
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 48 - 5240 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.87	0.1	12.9	24	Pass



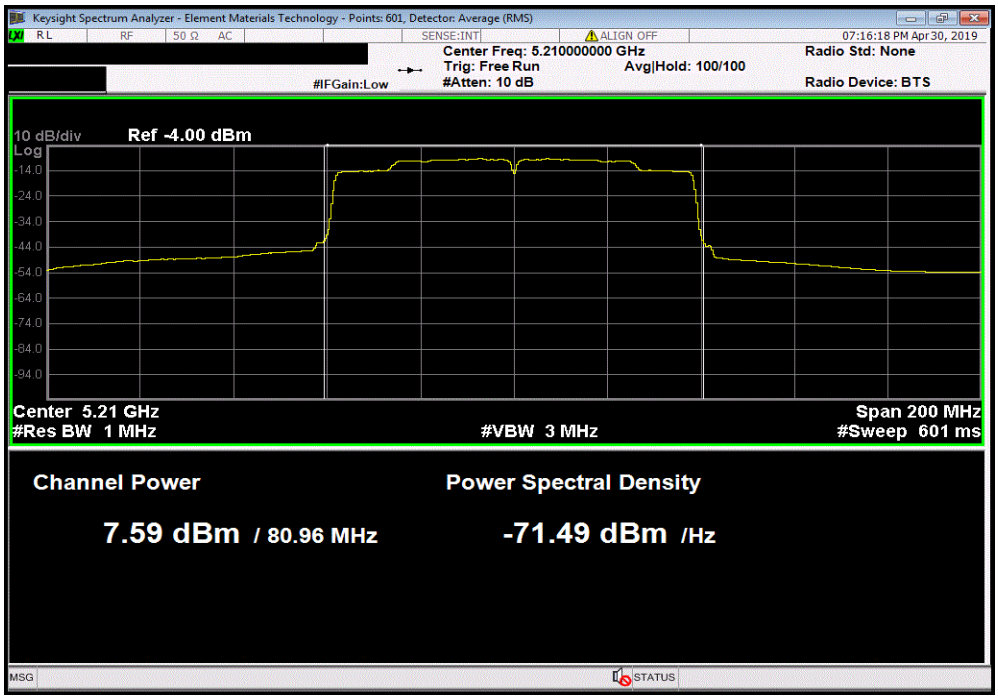
Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36/40 - 5190 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		8.547	0.2	8.7	24	Pass



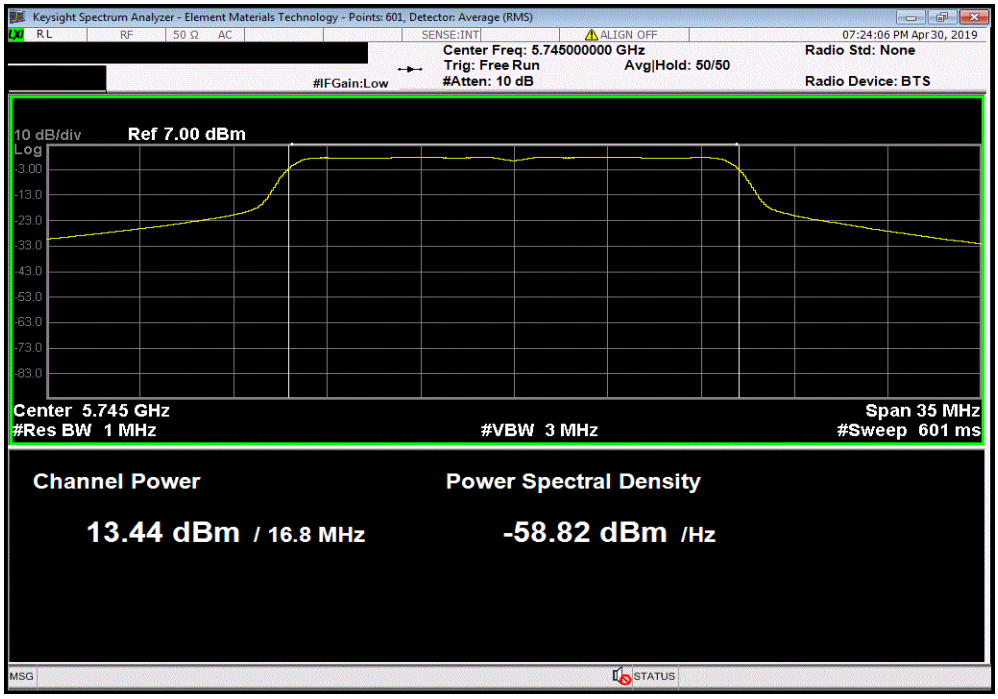
Chain A, 5150 - 5250 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 44/48 - 5230 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.782	0.2	13.9	24	Pass



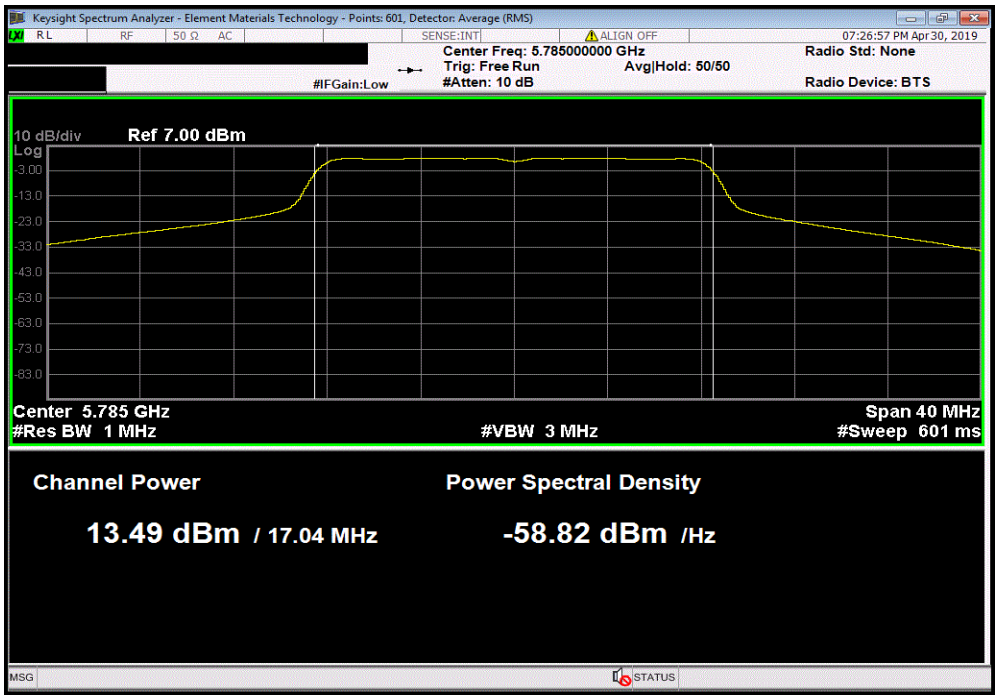
Chain A, 5150 - 5250 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 36-48 - 5210 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		7.594	0.3	7.9	24	Pass



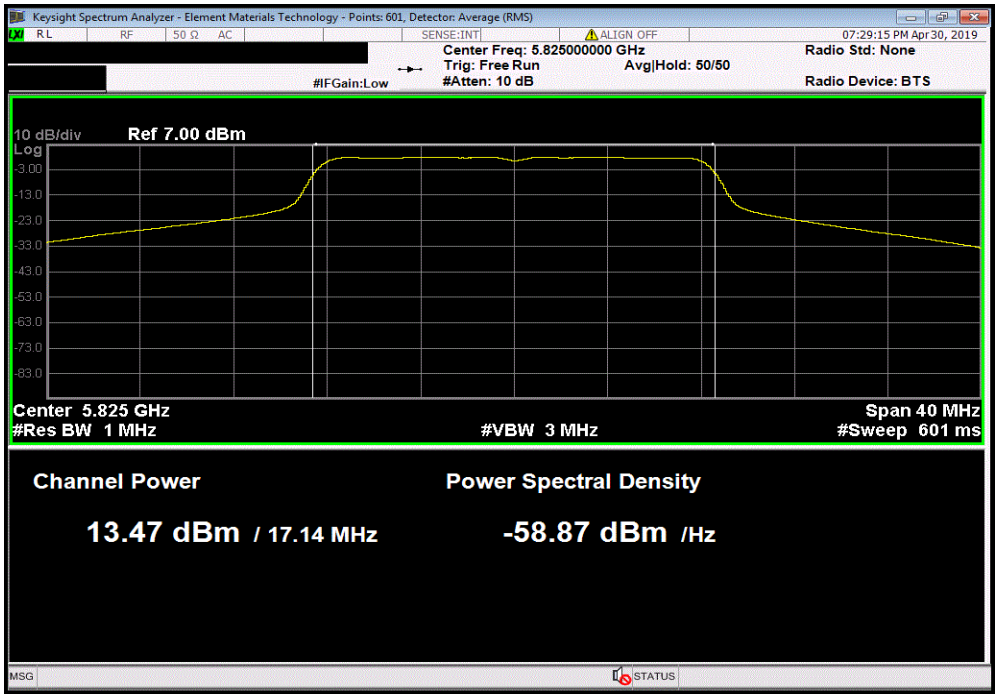
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 149 - 5745 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.438	0.1	13.5	30	Pass



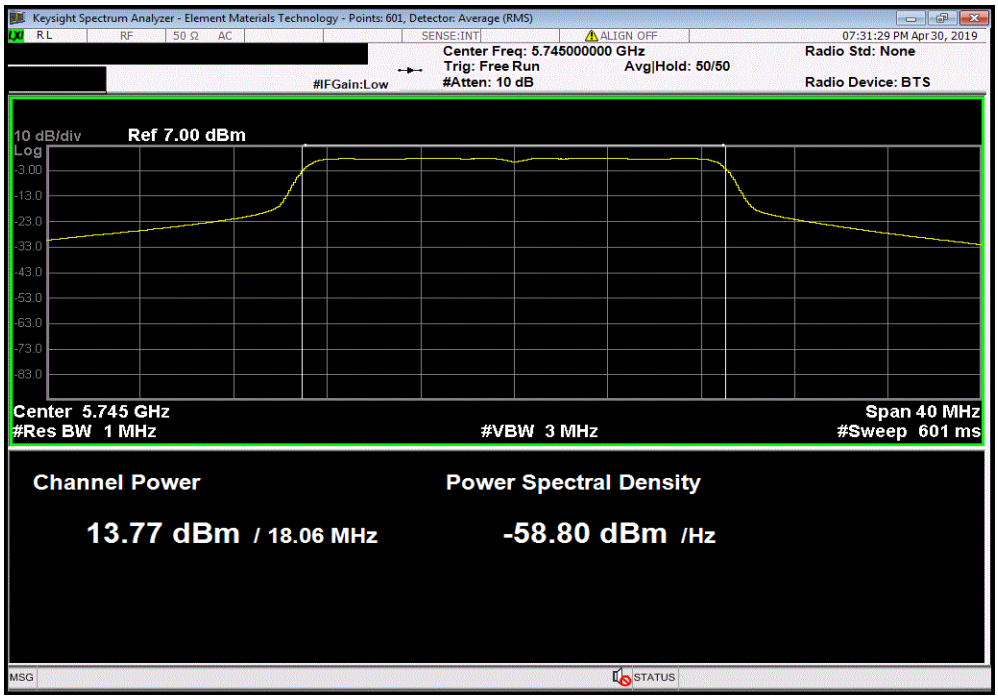
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 157 - 5785 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.491	0.1	13.5	30	Pass



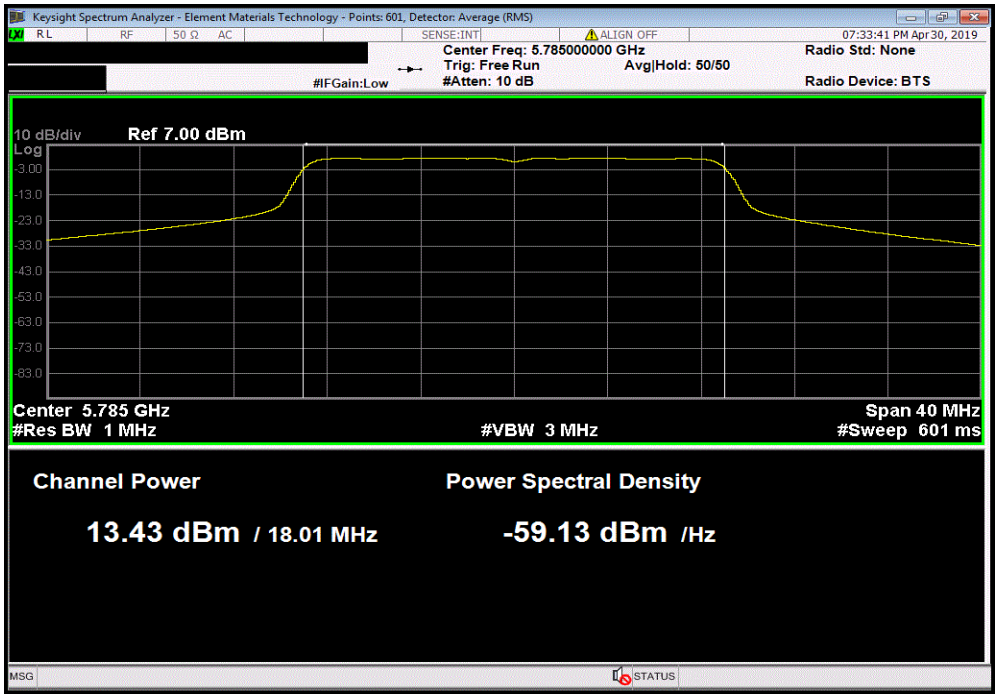
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 165 - 5825 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.471	0.1	13.5	30	Pass



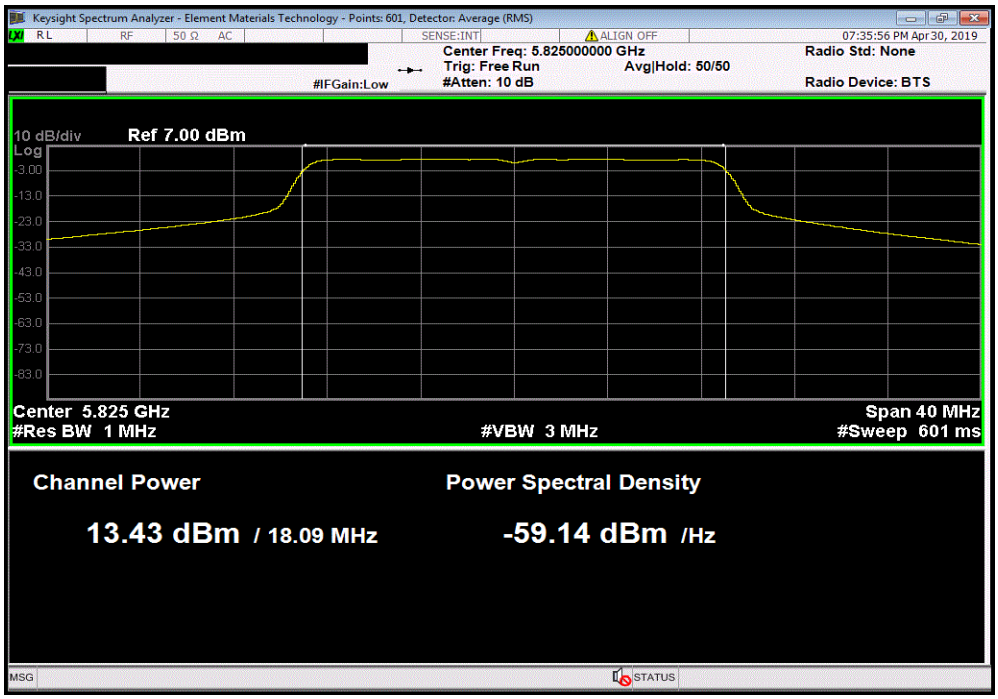
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149 - 5745 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.771	0.1	13.8	30	Pass



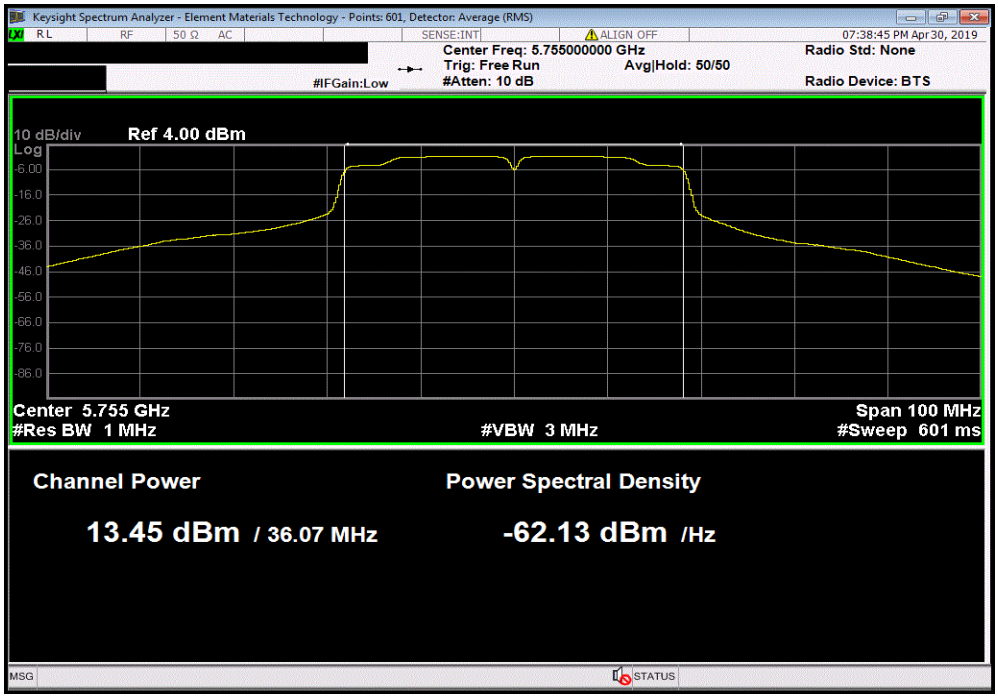
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 157 - 5785 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.426	0.1	13.5	30	Pass



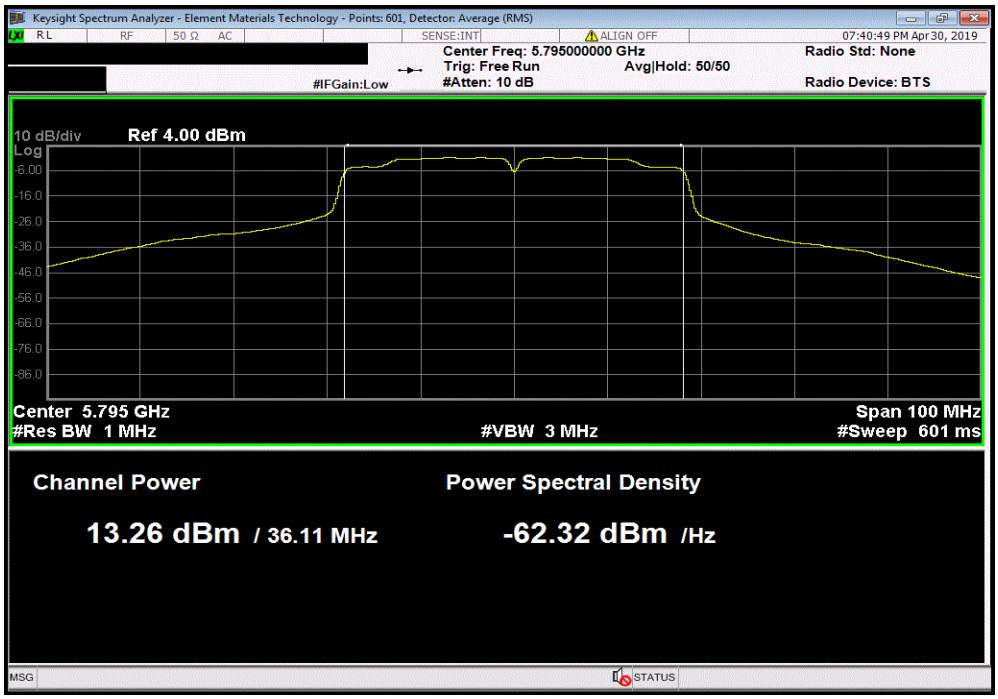
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 165 - 5825 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.43	0.1	13.5	30	Pass



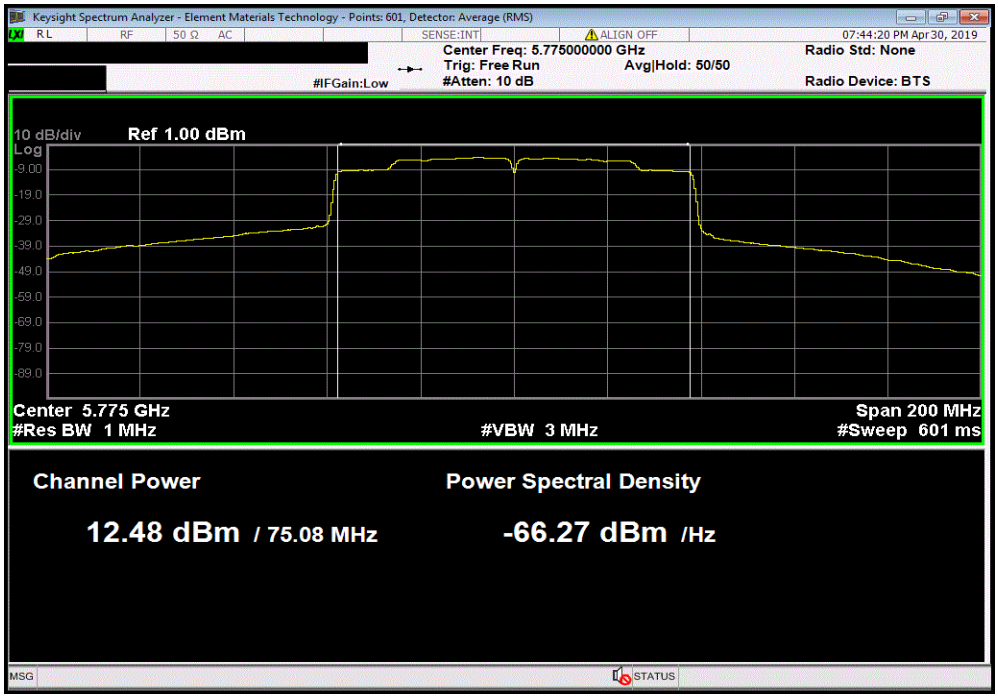
Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149/153 - 5755 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.446	0.2	13.6	30	Pass



Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 157/161 - 5795 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.258	0.2	13.4	30	Pass



Chain A, 5725 - 5785 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149-161 - 5775 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.482	0.3	12.8	30	Pass



MAXIMUM CONDUCTED OUTPUT POWER

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
Block - DC	Fairview Microwave	SD3379	AMM	17-Mar-19	17-Mar-20
Attenuator	Fairview Microwave	SA4018-20	TYW	17-Mar-19	17-Mar-20
Cable	Micro-Coax	UFD150A-1-0720-200200	TXG	10-Oct-18	10-Oct-19
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 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.

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*LOG(1/D) where D is the duty cycle.

MAXIMUM CONDUCTED OUTPUT POWER

element

TitTx 2018.09.13 XMit 2019.02.26

EUT:	Dual Band Wireless-AC 3160 Module			**Work Order:**	AMRN0006
Serial Number:	APT31600958			**Date:**	30-Apr-19
Customer:	American Portwell Technology			**Temperature:**	22.1 °C
Attendees:	None			**Humidity:**	53.8% RH
Project:	None			**Barometric Pres.:**	1013 mbar
Tested by:	Jonathan Kiefer	**Power:**	110VAC/60Hz	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 15.407:2019	ANSI C63.10:2013

COMMENTS

See Power Table for output power settings used. External dipole antennas are used. Assembly gain = 2.0 dBi antenna gain - 1.1 dB cable loss = 0.9 dBi.

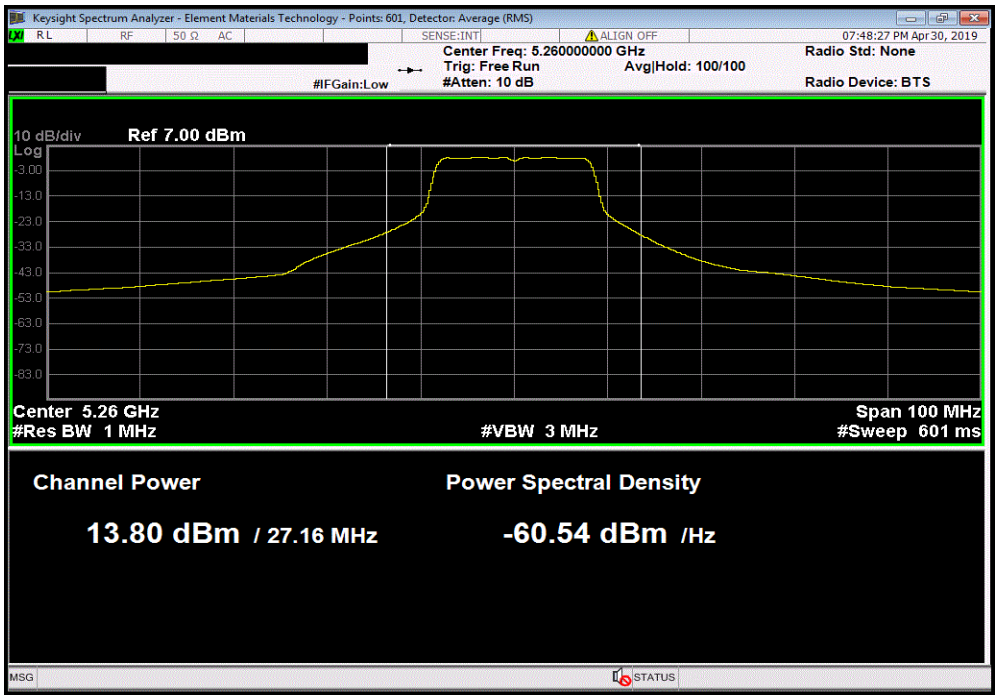
DEVIATIONS FROM TEST STANDARD

None

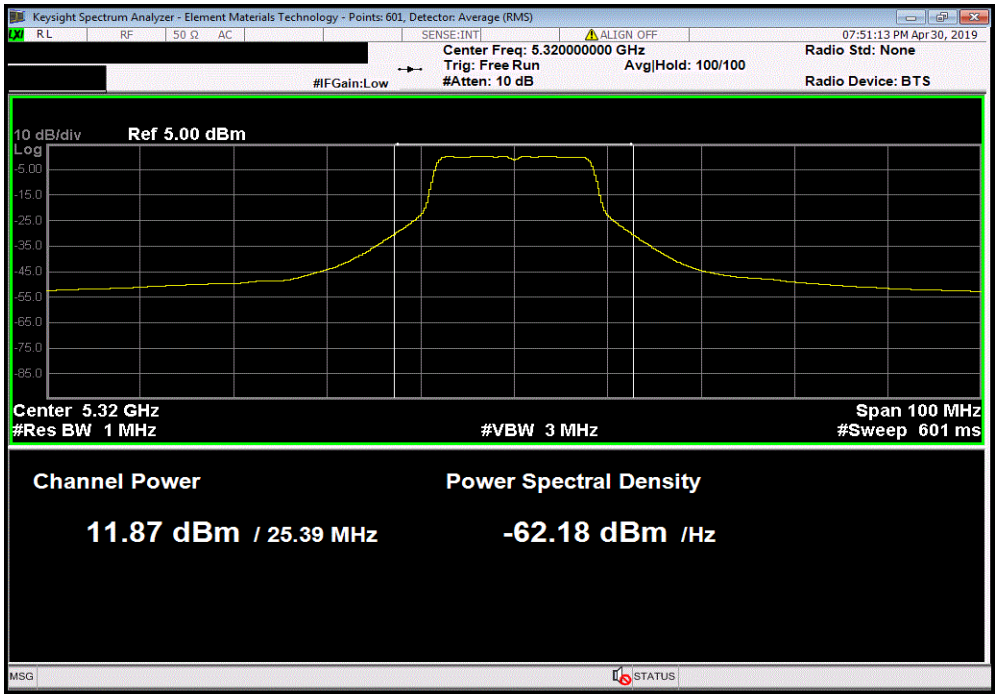
Configuration #	1	Signature	Jonathan Kiefer

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
Chain A					
5250 - 5350 MHz Band					
20 MHz BW					
802.11(a) 6 Mbps					
Low Channel, Ch 52 - 5260 MHz	13.797	0.1	13.9	24	Pass
High Channel, Ch 64 - 5320 MHz	11.866	0.1	11.9	24	Pass
802.11(n) MCS0					
Low Channel, Ch 52 - 5260 MHz	13.816	0.1	13.9	24	Pass
High Channel, Ch 64 - 5320 MHz	12.229	0.1	12.3	24	Pass
40 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 52/56 - 5270 MHz	8.578	0.2	8.7	24	Pass
High Channel, Ch 60/64 - 5310 MHz	9.745	0.2	9.9	24	Pass
80 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 52-64 - 5290 MHz	9.363	0.3	9.7	24	Pass
5470 - 5725 MHz Band					
20 MHz BW					
802.11(a) 6 Mbps					
Low Channel, Ch 100 - 5500 MHz	11.929	0.1	12	24	Pass
Mid Channel, Ch 116 - 5580 MHz	13.454	0.1	13.5	24	Pass
High Channel, Ch 140 - 5700 MHz	11.9	0.1	12	24	Pass
802.11(n) MCS0					
Low Channel, Ch 100 - 5500 MHz	11.71	0.1	11.8	24	Pass
Mid Channel, Ch 116 - 5580 MHz	13.294	0.1	13.4	24	Pass
High Channel, Ch 140 - 5700 MHz	11.523	0.1	11.6	24	Pass
40 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 100/104 - 5510 MHz	9.057	0.2	9.2	24	Pass
Mid Channel, Ch 116/120 - 5590 MHz	13.118	0.2	13.3	24	Pass
High Channel, Ch 132/136 - 5670 MHz	12.571	0.2	12.7	24	Pass
80 MHz BW					
802.11(n) MCS0					
Low Channel, Ch 100-112 - 5530 MHz	8.421	0.3	8.8	24	Pass
Low Channel, Ch 116-128 - 5610 MHz	12.178	0.3	12.5	24	Pass

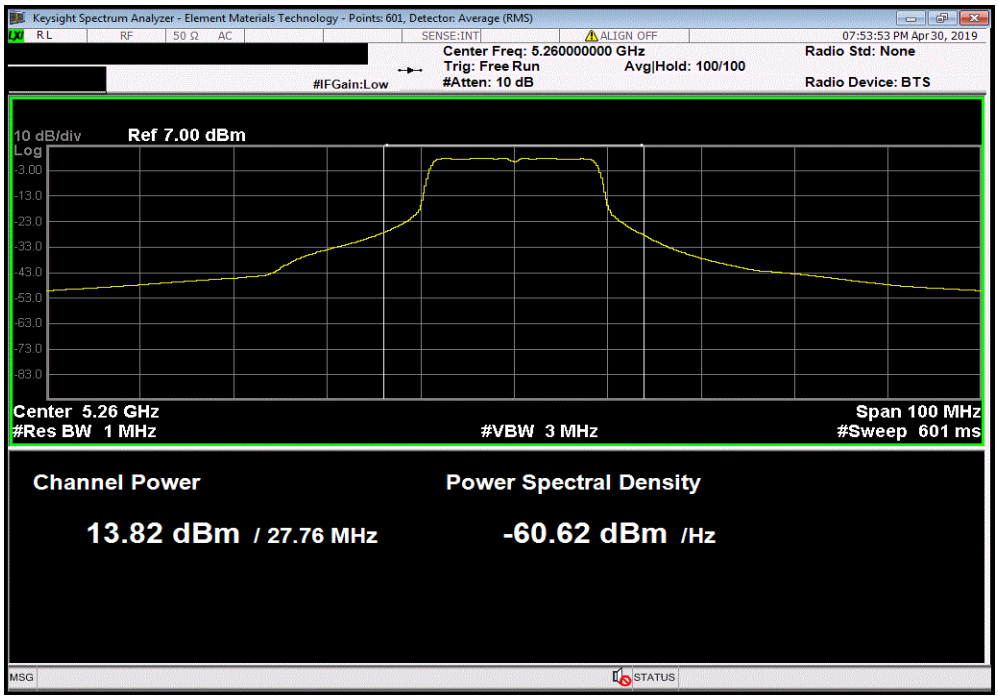
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 52 - 5260 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.797	0.1	13.9	24	Pass



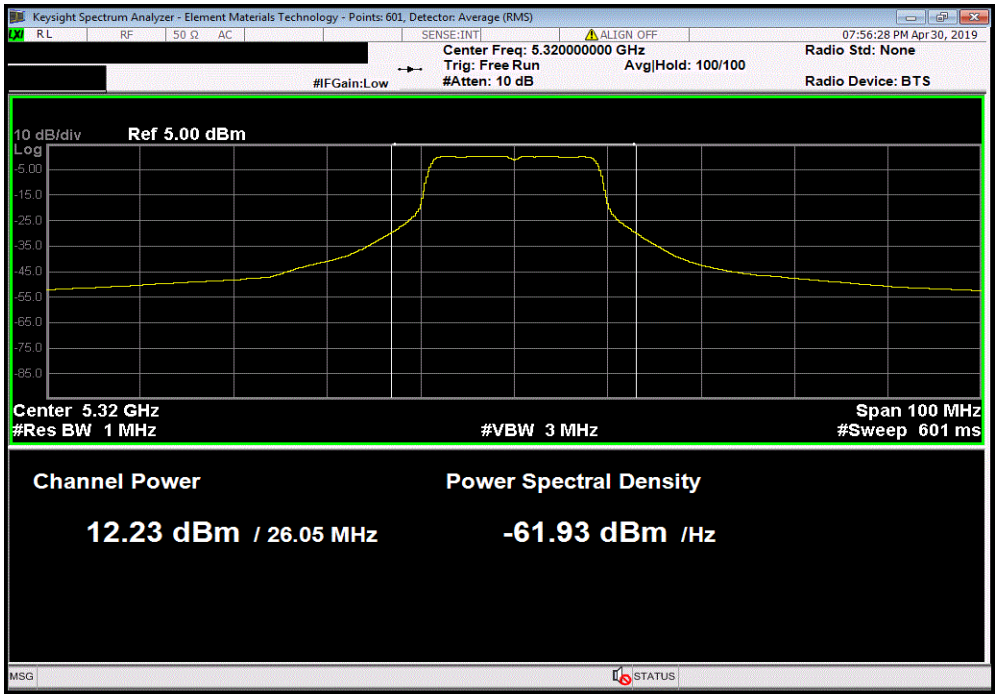
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 64 - 5320 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		11.866	0.1	11.9	24	Pass



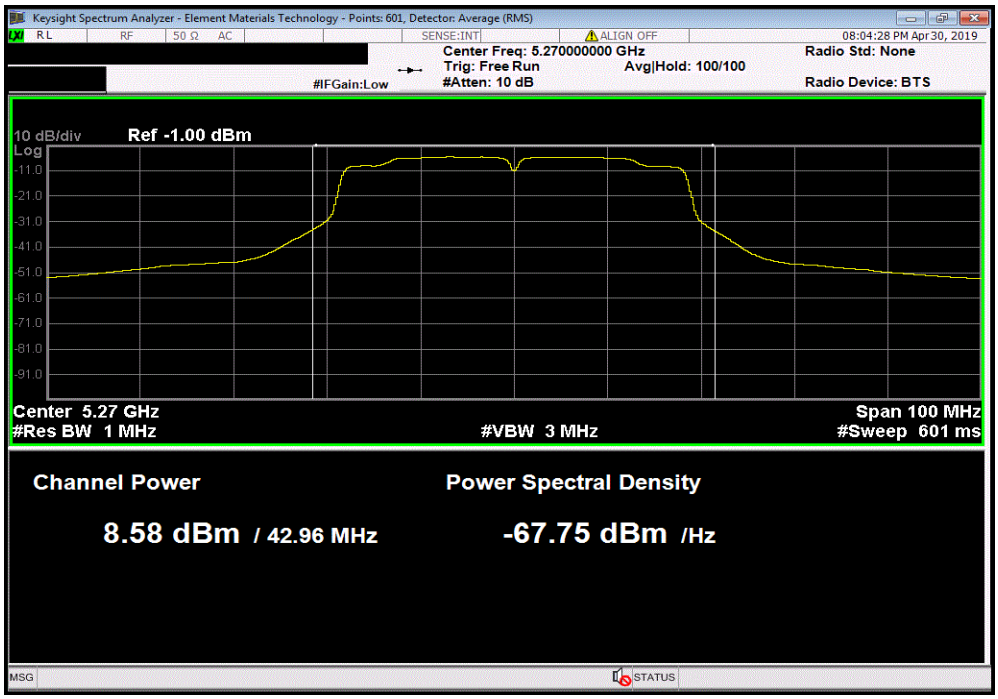
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52 - 5260 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.816	0.1	13.9	24	Pass



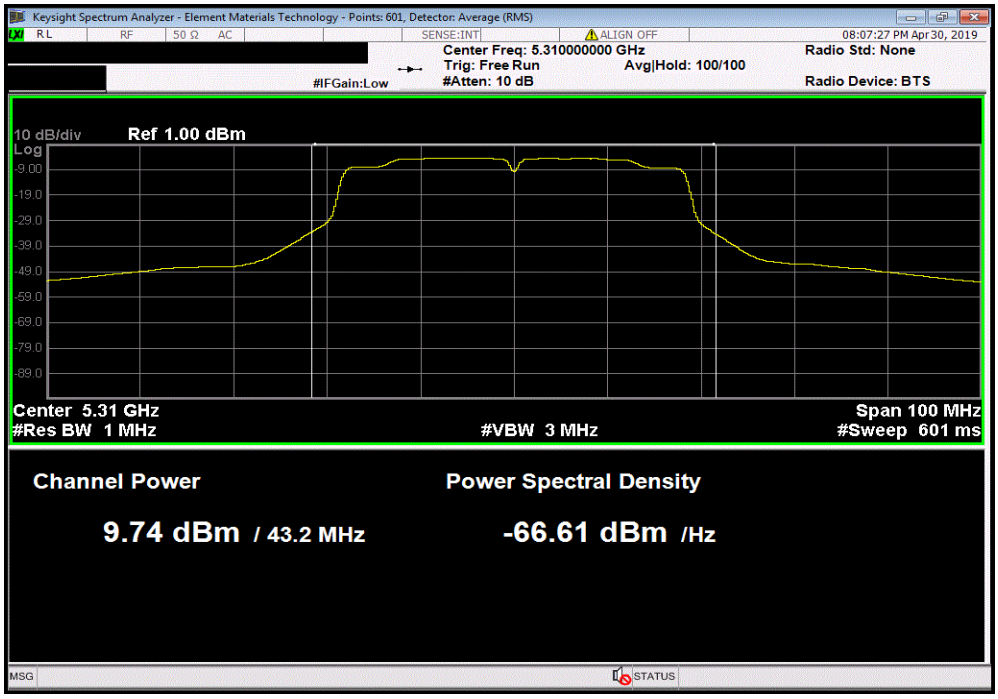
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 64 - 5320 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.229	0.1	12.3	24	Pass



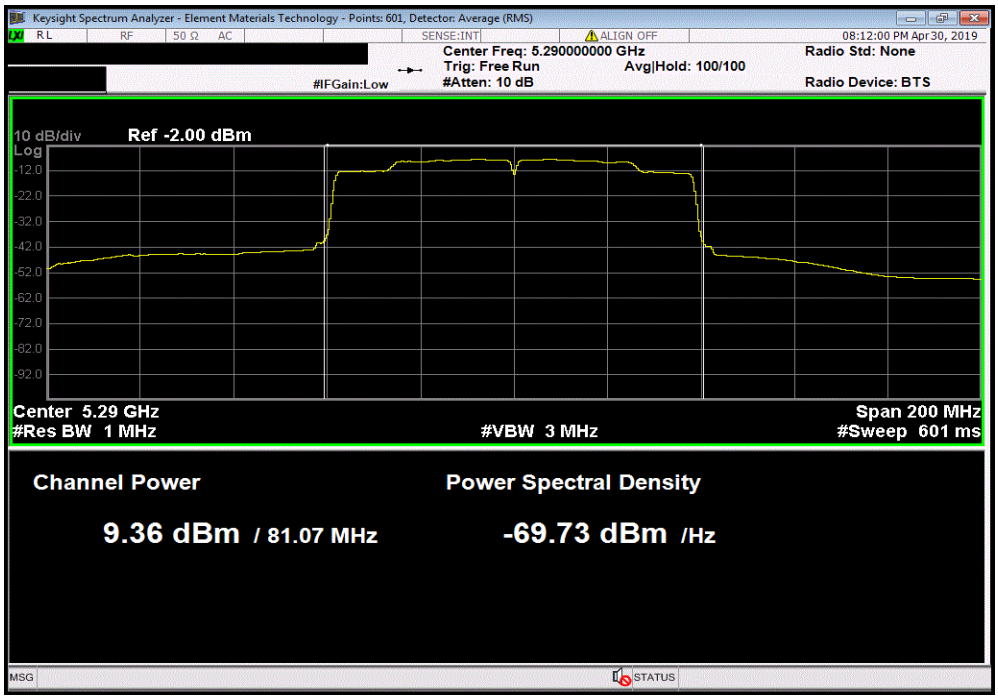
Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52/56 - 5270 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		8.578	0.2	8.7	24	Pass



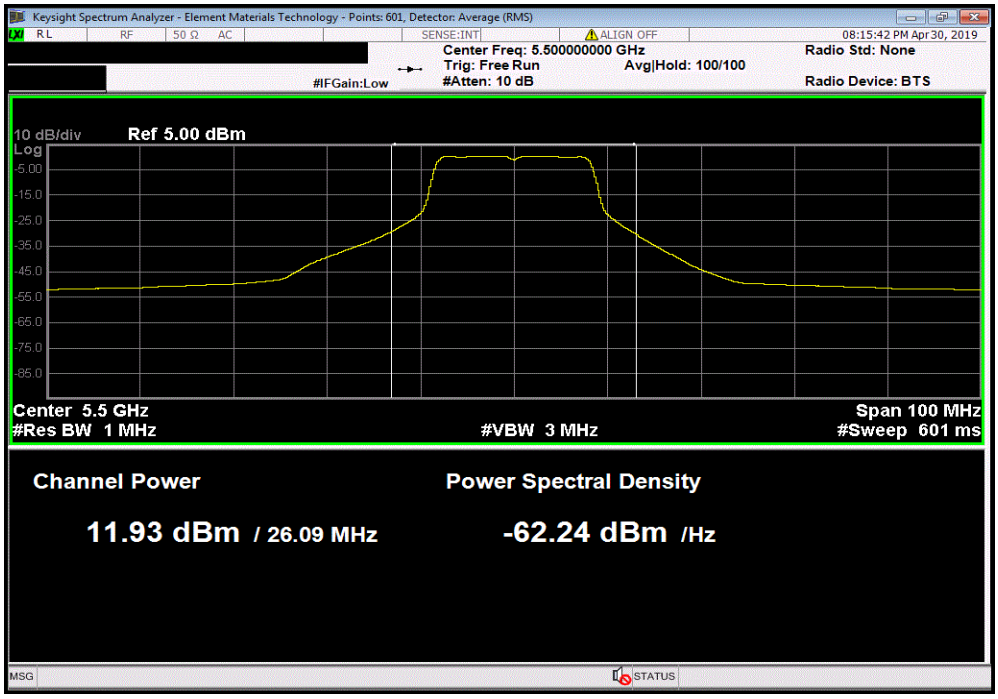
Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 60/64 - 5310 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		9.745	0.2	9.9	24	Pass



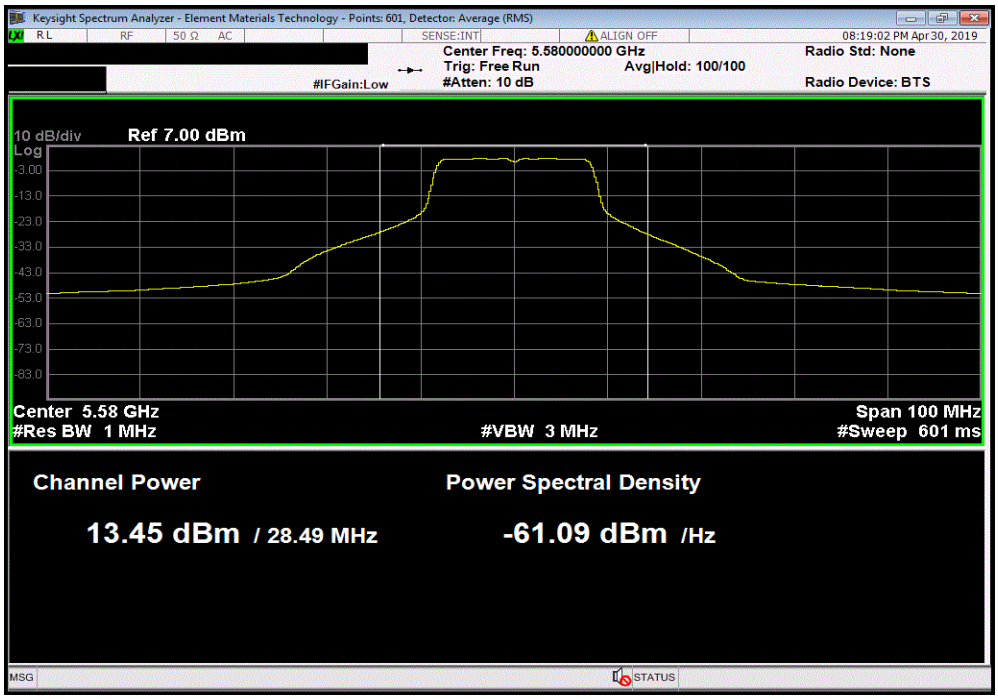
Chain A, 5250 - 5350 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52-64 - 5290 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		9.363	0.3	9.7	24	Pass



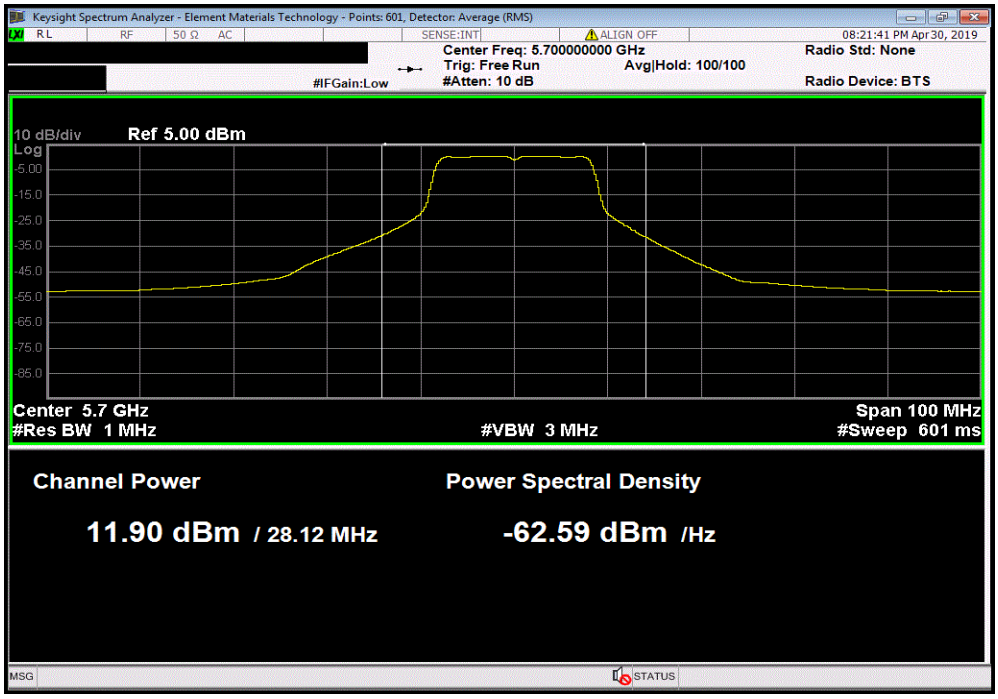
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 100 - 5500 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		11.929	0.1	12	24	Pass



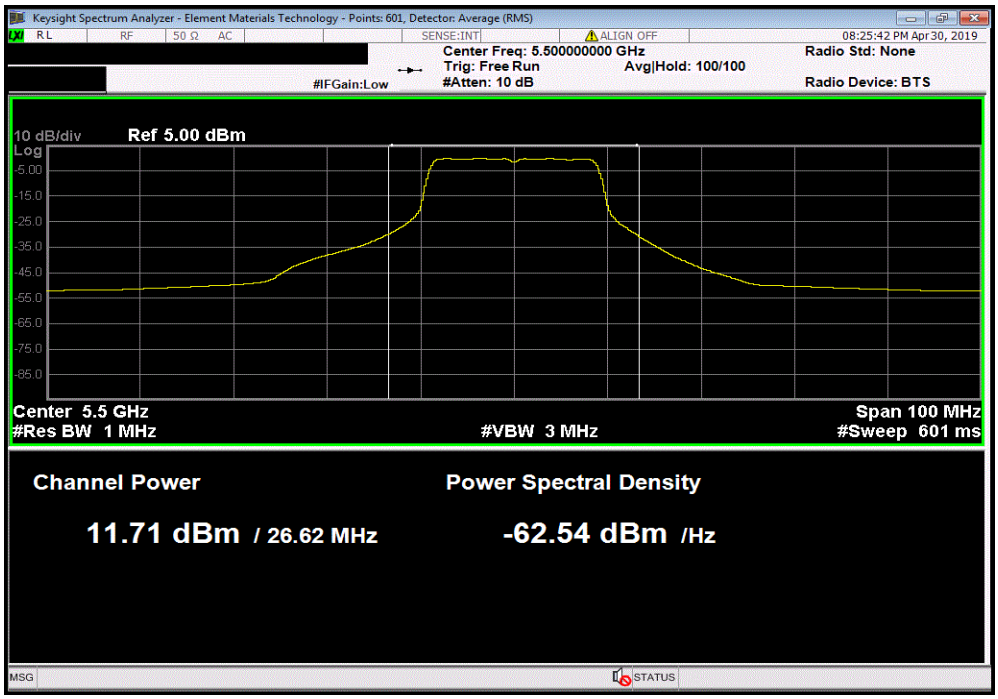
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Mid Channel, Ch 116 - 5580 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.454	0.1	13.5	24	Pass



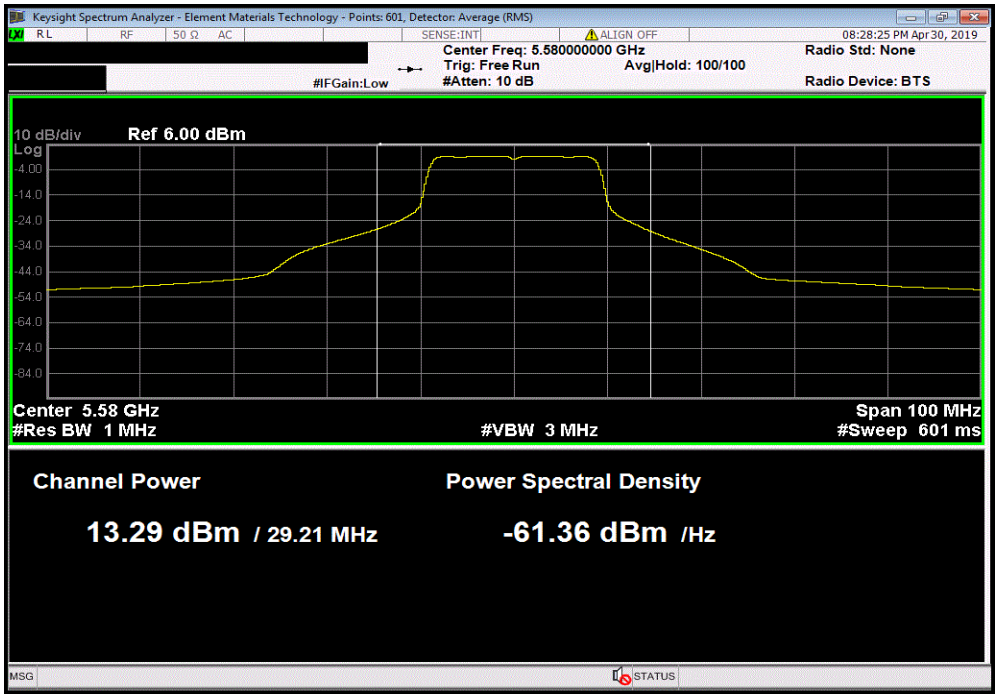
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 140 - 5700 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		11.9	0.1	12	24	Pass



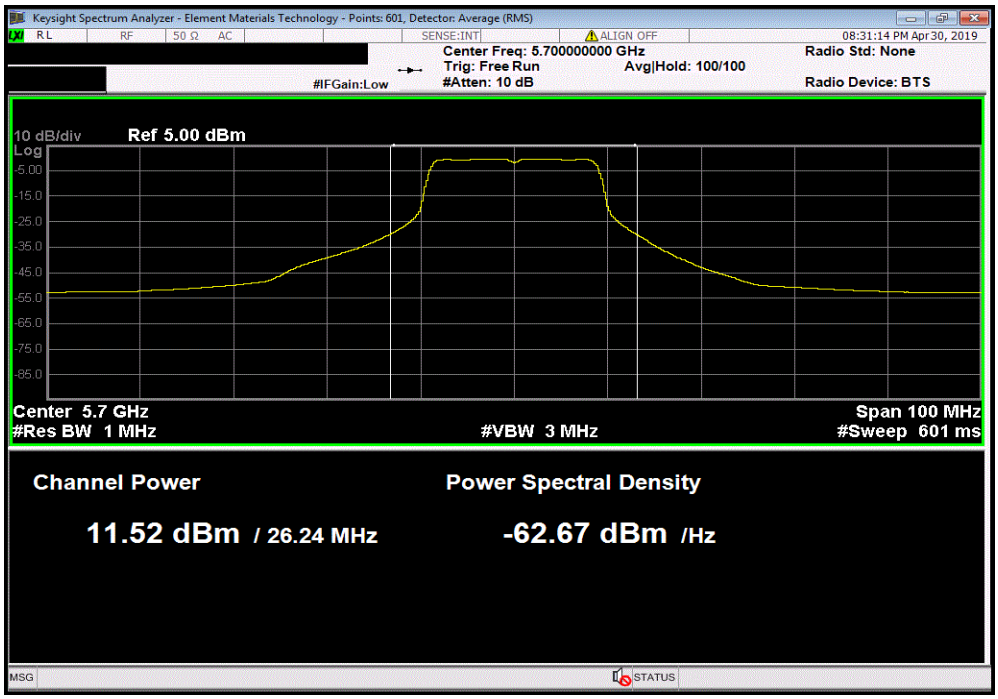
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100 - 5500 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		11.71	0.1	11.8	24	Pass



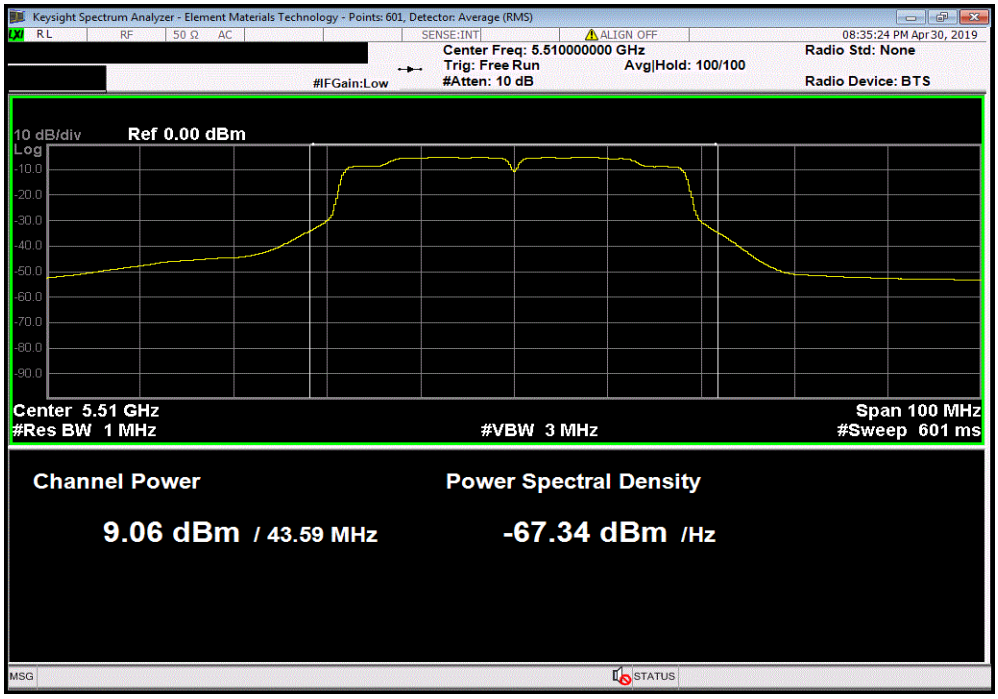
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116 - 5580 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.294	0.1	13.4	24	Pass



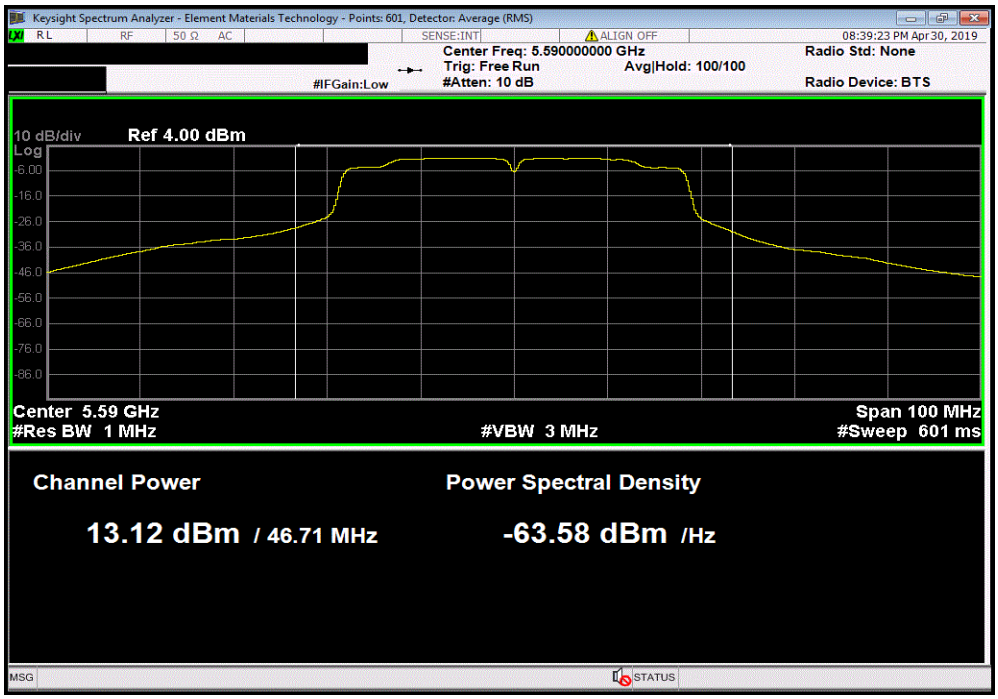
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 140 - 5700 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		11.523	0.1	11.6	24	Pass



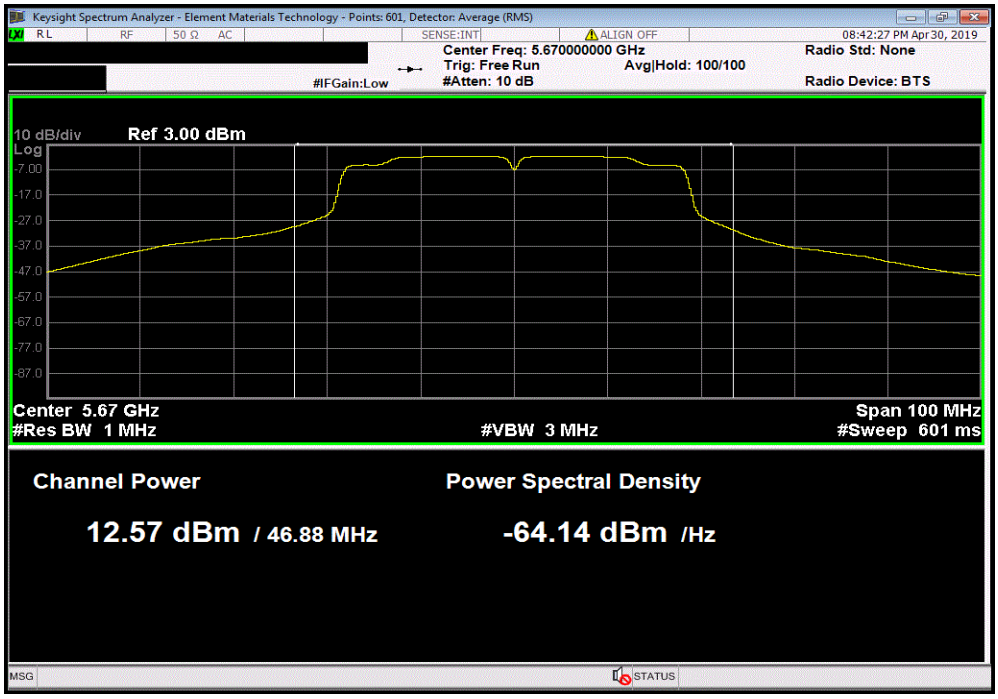
Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100/104 - 5510 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		9.057	0.2	9.2	24	Pass



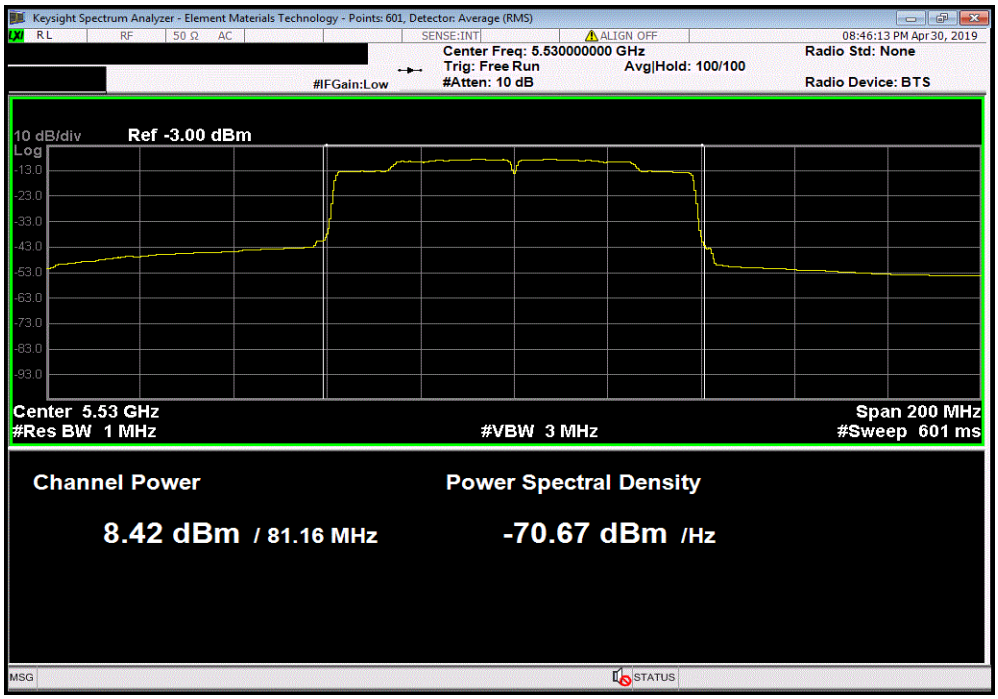
Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116/120 - 5590 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		13.118	0.2	13.3	24	Pass



Chain A, 5470 - 5725 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 132/136 - 5670 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.571	0.2	12.7	24	Pass



Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 100-112 - 5530 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		8.421	0.3	8.8	24	Pass



Chain A, 5470 - 5725 MHz Band, 80 MHz BW, 802.11(n) MCS0, Low Channel, Ch 116-128 - 5610 MHz						
		Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Limit (dBm)	Result
		12.178	0.3	12.5	24	Pass