EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

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
Attenuator	Fairview Microwave	SA4018-20	TYW	17-Mar-19	17-Mar-20
Block - DC	Fairview Microwave	SD3379	AMM	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.

The antenna assembly gain was added to the measured power to derive the EIRP value.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

element

TbTx 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:	22.4 °C
Attendees:	None	Humidity:	56.6% 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 dBi cable loss = 0.9 dBi.

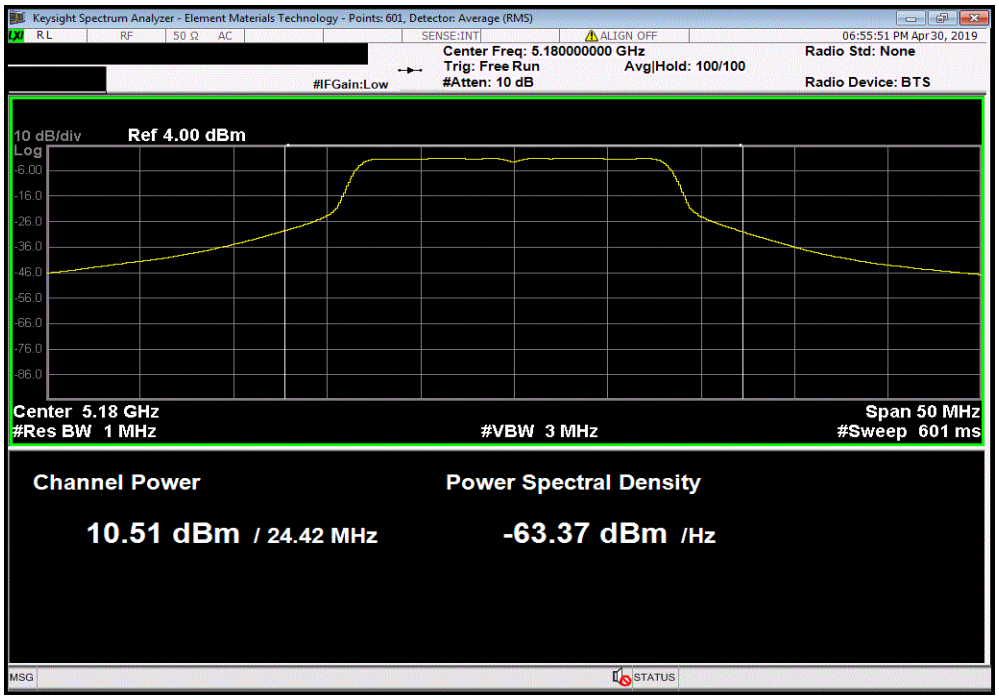
DEVIATIONS FROM TEST STANDARD

None

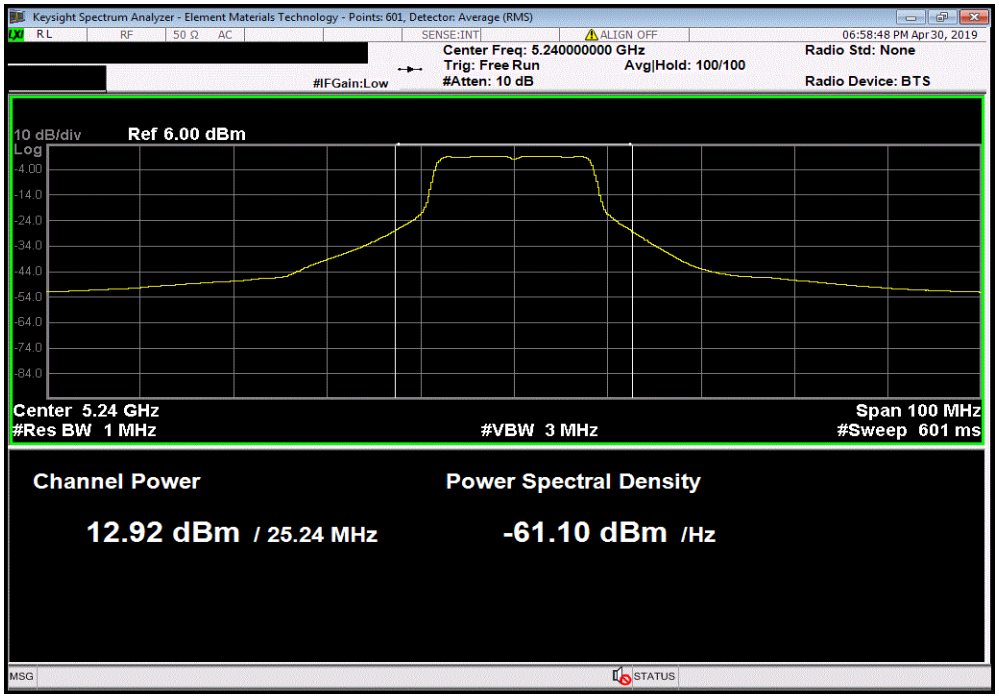
Configuration #	1	Signature

	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP 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	0.9	11.5	30	Pass
High Channel, Ch 48 - 5240 MHz	12.923	0.1	13	0.9	13.9	30	Pass
802.11(n) MCS0							
Low Channel, Ch 36 - 5180 MHz	12.325	0.1	12.4	0.9	13.3	30	Pass
High Channel, Ch 48 - 5240 MHz	12.87	0.1	12.9	0.9	13.8	30	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	0.9	14.4	36	Pass
Mid Channel, Ch 157 - 5785 MHz	13.491	0.1	13.5	0.9	14.4	36	Pass
High Channel, Ch 165 - 5825 MHz	13.471	0.1	13.5	0.9	14.4	36	Pass
802.11(n) MCS0							
Low Channel, Ch 149 - 5745 MHz	13.771	0.1	13.8	0.9	14.7	36	Pass
Mid Channel, Ch 157 - 5785 MHz	13.426	0.1	13.5	0.9	14.4	36	Pass
High Channel, Ch 165 - 5825 MHz	13.43	0.1	13.5	0.9	14.4	36	Pass
40 MHz BW							
802.11(n) MCS0							
Low Channel, Ch 149/153 - 5755 MHz	13.446	0.2	13.6	0.9	14.5	36	Pass
High Channel, Ch 157/161 - 5795 MHz	13.258	0.2	13.4	0.9	14.3	36	Pass
80 MHz BW							
802.11(n) MCS0							
Low Channel, Ch 149-161 - 5775 MHz	12.482	0.3	12.8	0.9	13.7	36	Pass

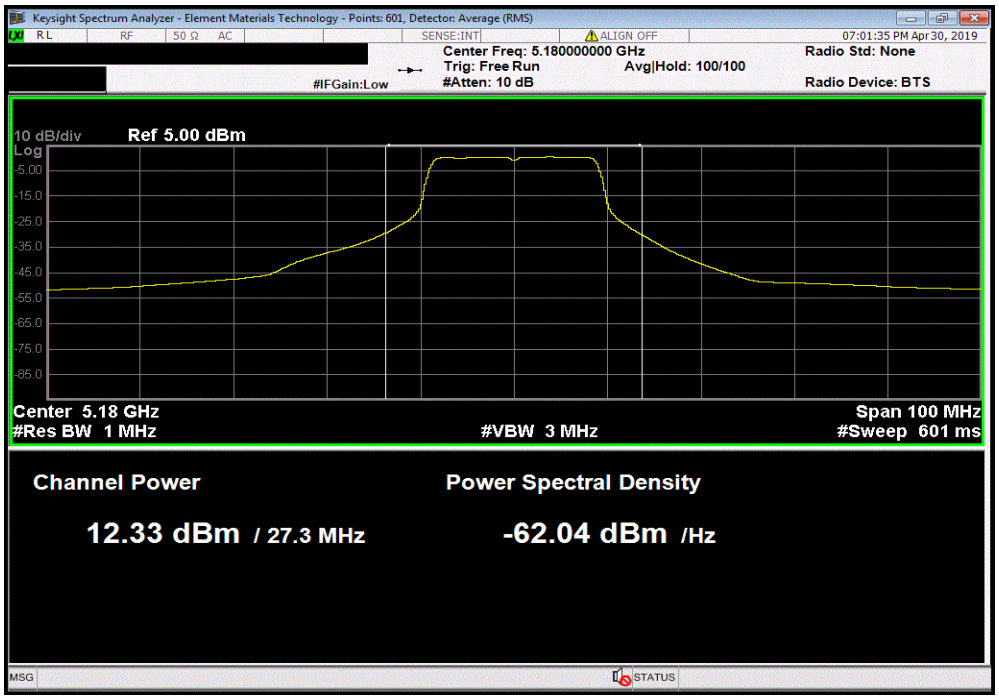
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 36 - 5180 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
10.508	0.1	10.6	0.9	11.5	30	Pass



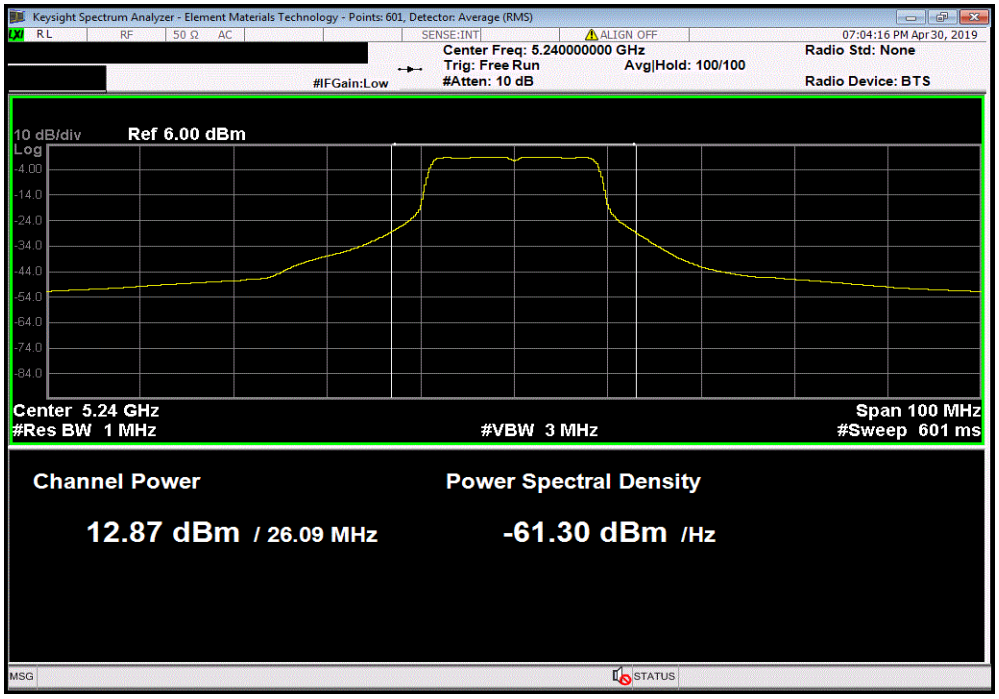
Chain A, 5150 - 5250 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 48 - 5240 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
12.923	0.1	13	0.9	13.9	30	Pass



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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
12.325	0.1	12.4	0.9	13.3	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
12.87	0.1	12.9	0.9	13.8	30	Pass

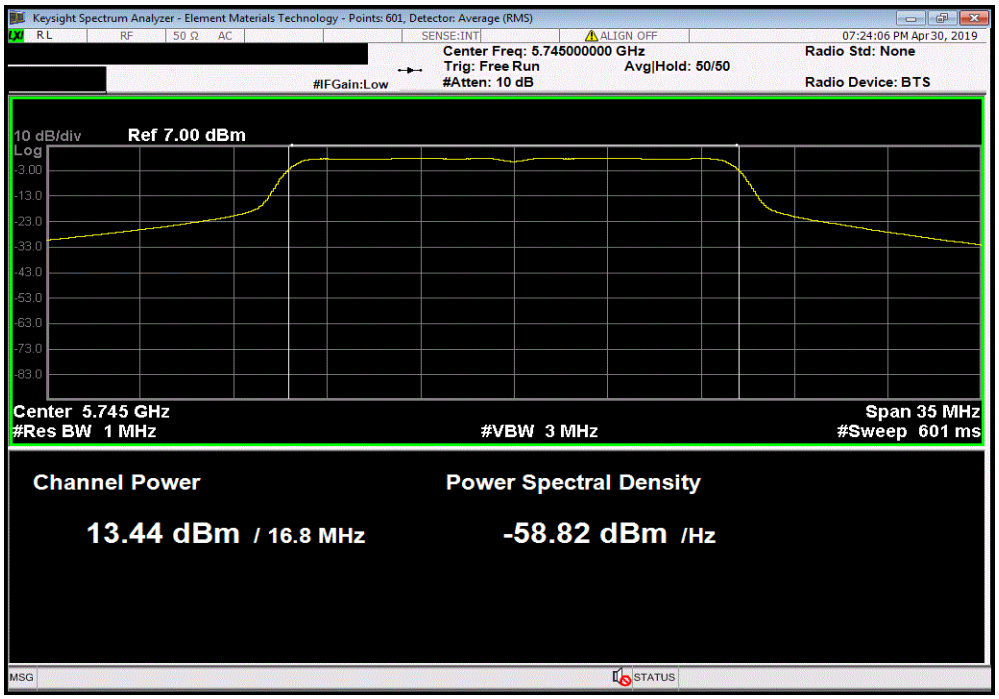


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

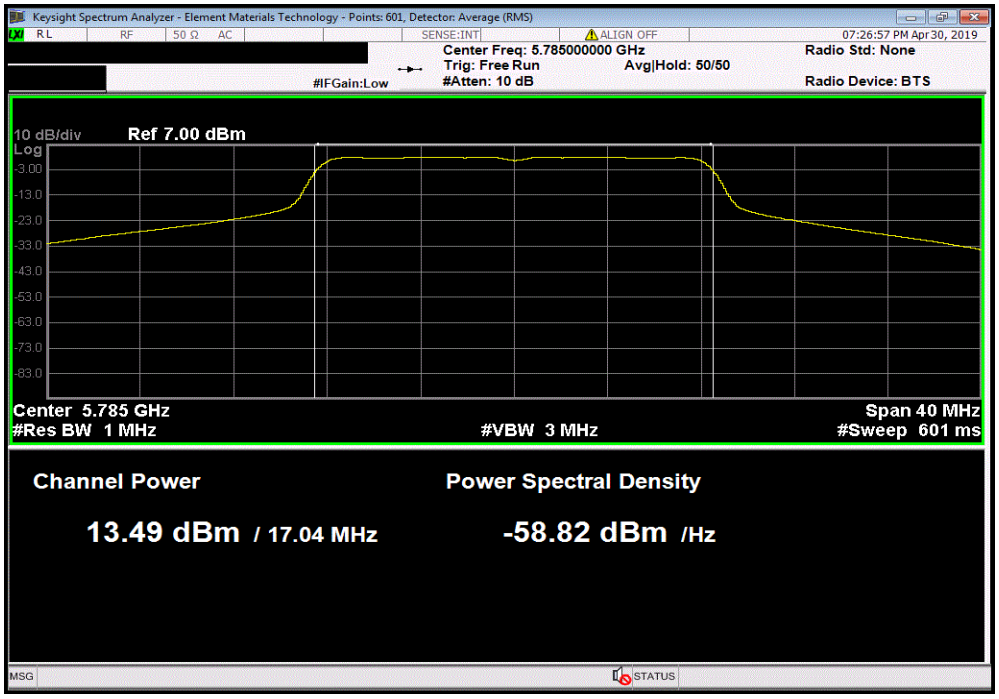
element

TbtTx 2018.09.13 XMit 2019.02.26

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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.438	0.1	13.5	0.9	14.4	36	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.491	0.1	13.5	0.9	14.4	36	Pass

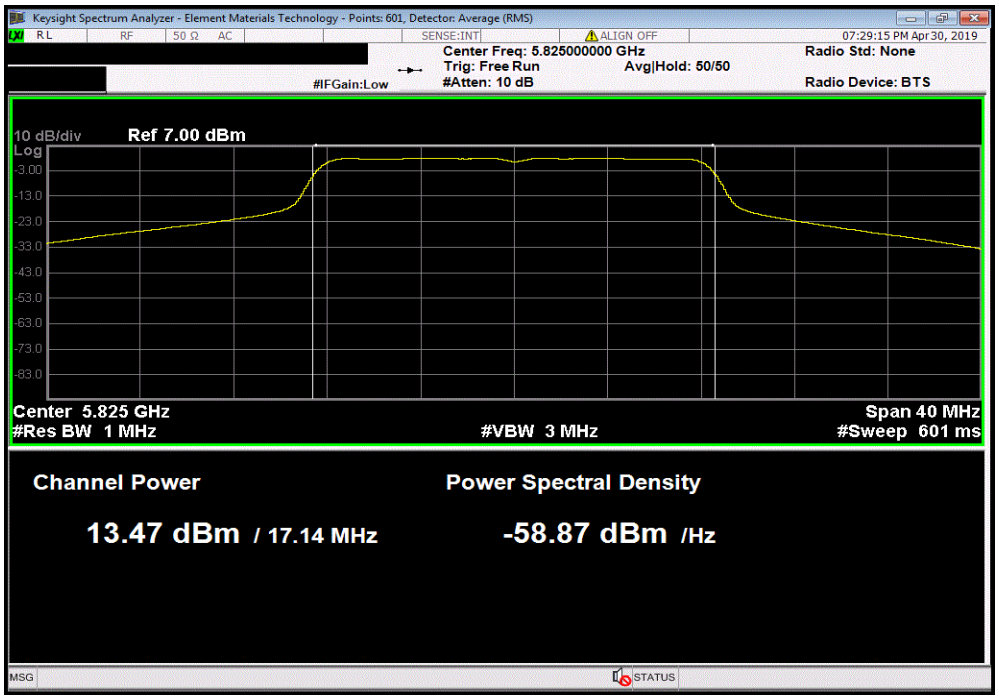


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

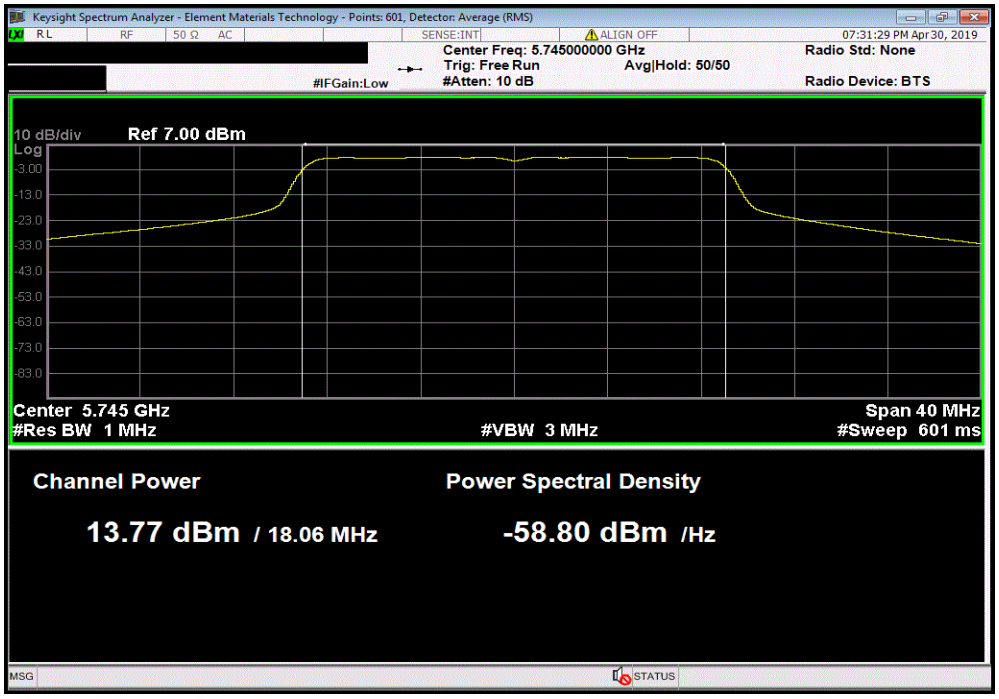
element

TbtTx 2018.09.13 XMit 2019.02.26

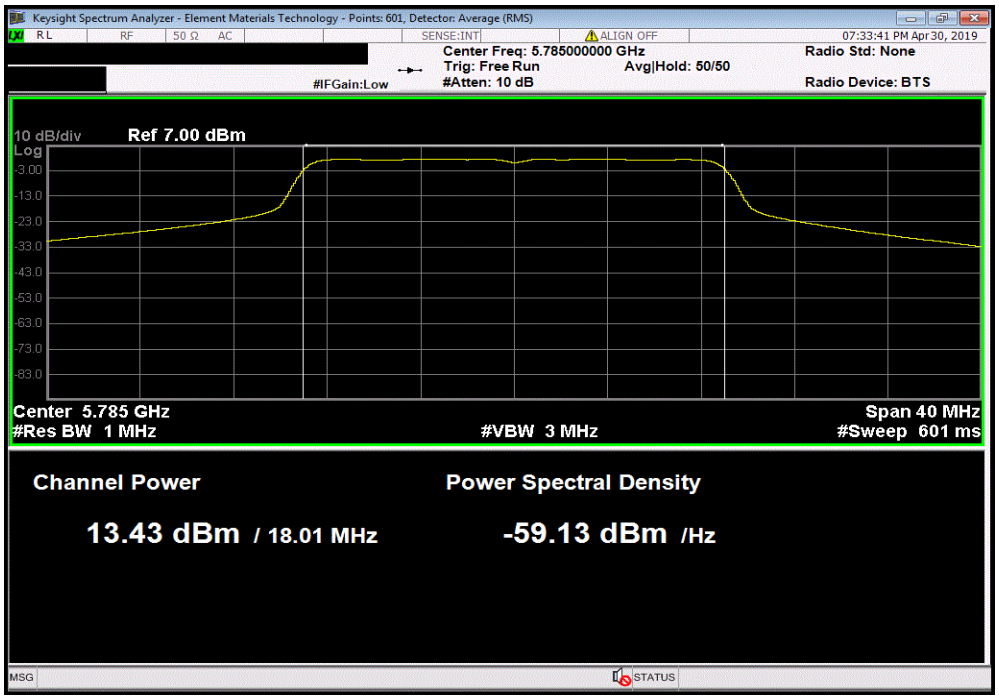
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 165 - 5825 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.471	0.1	13.5	0.9	14.4	36	Pass



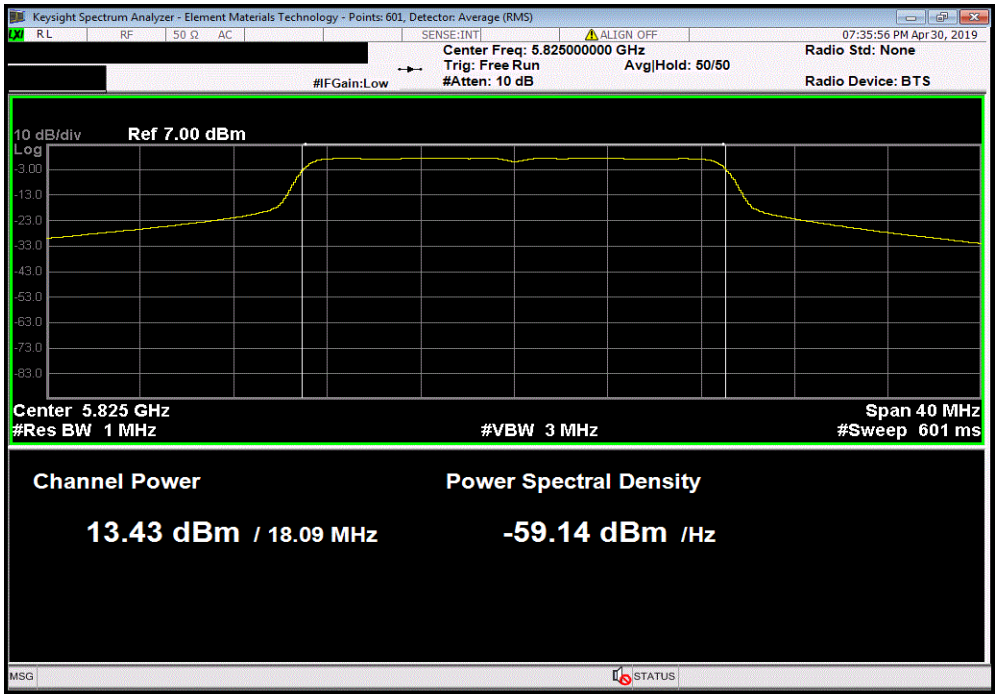
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149 - 5745 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.771	0.1	13.8	0.9	14.7	36	Pass



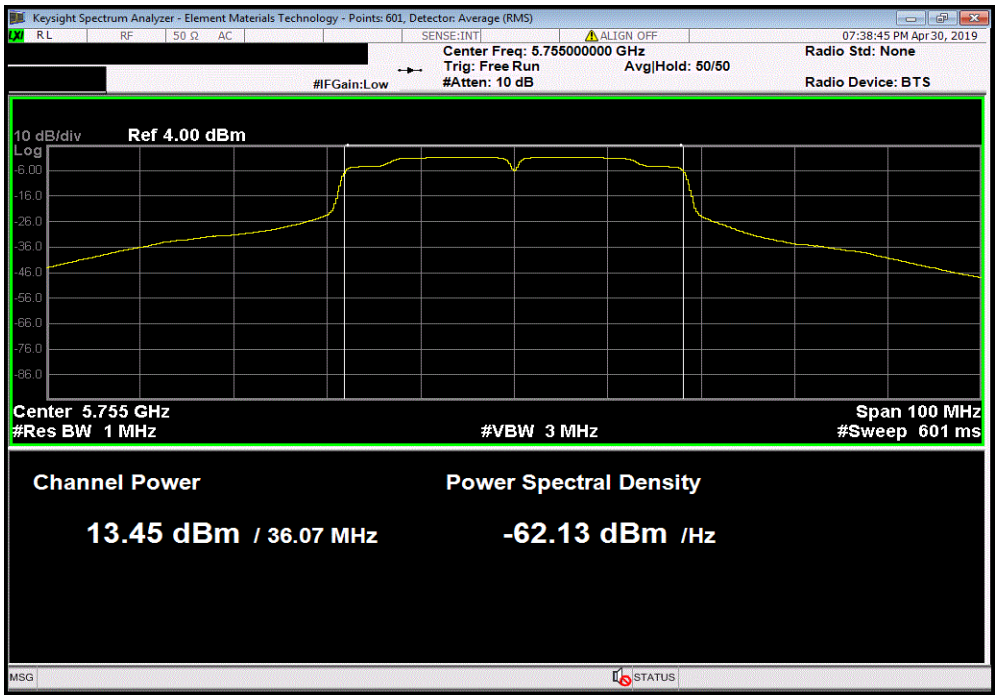
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 157 - 5785 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.426	0.1	13.5	0.9	14.4	36	Pass



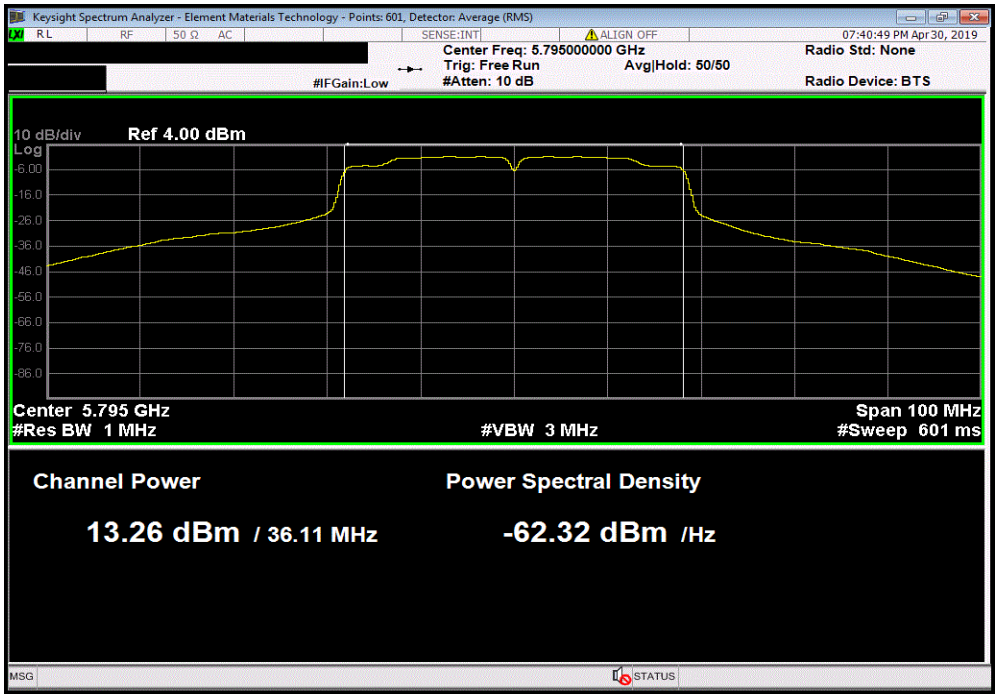
Chain A, 5725 - 5785 MHz Band, 20 MHz BW, 802.11(n) MCS0, High Channel, Ch 165 - 5825 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.43	0.1	13.5	0.9	14.4	36	Pass



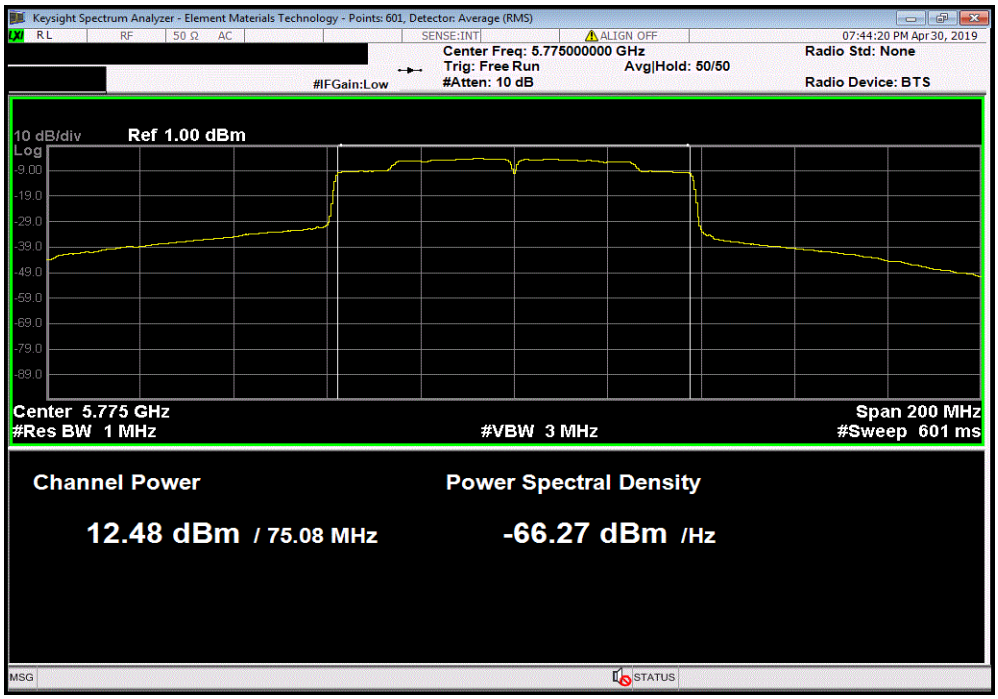
Chain A, 5725 - 5785 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 149/153 - 5755 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.446	0.2	13.6	0.9	14.5	36	Pass



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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.258	0.2	13.4	0.9	14.3	36	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)**	**Assembly Gain (dBi)**	**EIRP (dBm)**	**EIRP Limit (dBm)**	**Result**
12.482	0.3	12.8	0.9	13.7	36	Pass



EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

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.

The antenna assembly gain was added to the measured power to derive the EIRP value.

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

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:	22.1 °C
Attendees:	None	Humidity:	54.5% 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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP 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	0.9	14.8	30	Pass
High Channel, Ch 64 - 5320 MHz	11.866	0.1	11.9	0.9	12.8	30	Pass
802.11(n) MCS0							
Low Channel, Ch 52 - 5260 MHz	13.816	0.1	13.9	0.9	14.8	30	Pass
High Channel, Ch 64 - 5320 MHz	12.229	0.1	12.3	0.9	13.2	30	Pass
40 MHz BW							
802.11(n) MCS0							
Low Channel, Ch 52/56 - 5270 MHz	8.578	0.2	8.7	0.9	9.6	30	Pass
High Channel, Ch 60/64 - 5310 MHz	9.745	0.2	9.9	0.9	10.8	30	Pass
5470 - 5725 MHz Band							
20 MHz BW							
802.11(a) 6 Mbps							
Low Channel, Ch 100 - 5500 MHz	11.929	0.1	12	0.9	12.9	30	Pass
Mid Channel, Ch 116 - 5580 MHz	13.454	0.1	13.5	0.9	14.4	30	Pass
High Channel, Ch 140 - 5700 MHz	11.9	0.1	12	0.9	12.9	30	Pass
802.11(n) MCS0							
Low Channel, Ch 100 - 5500 MHz	11.71	0.1	11.8	0.9	12.7	30	Pass
Mid Channel, Ch 116 - 5580 MHz	13.294	0.1	13.4	0.9	14.3	30	Pass
High Channel, Ch 140 - 5700 MHz	11.523	0.1	11.6	0.9	12.5	30	Pass
80 MHz BW							
802.11(n) MCS0							
Low Channel, Ch 100-112 - 5530 MHz	8.421	0.3	8.8	0.9	9.7	30	Pass
Low Channel, Ch 116-128 - 5610 MHz	12.178	0.3	12.5	0.9	13.4	30	Pass

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element

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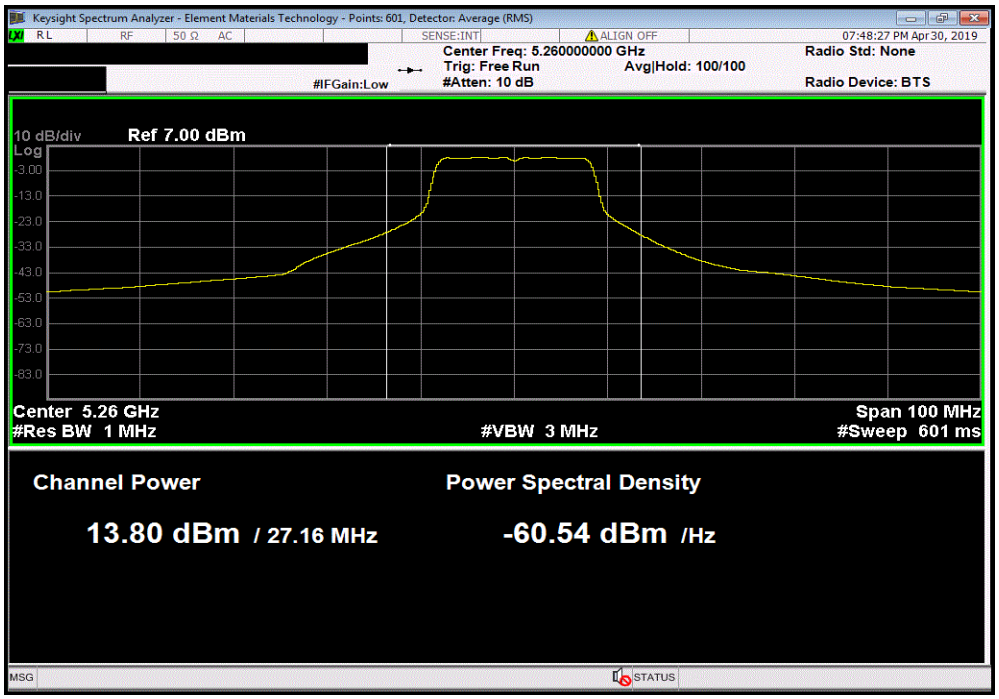
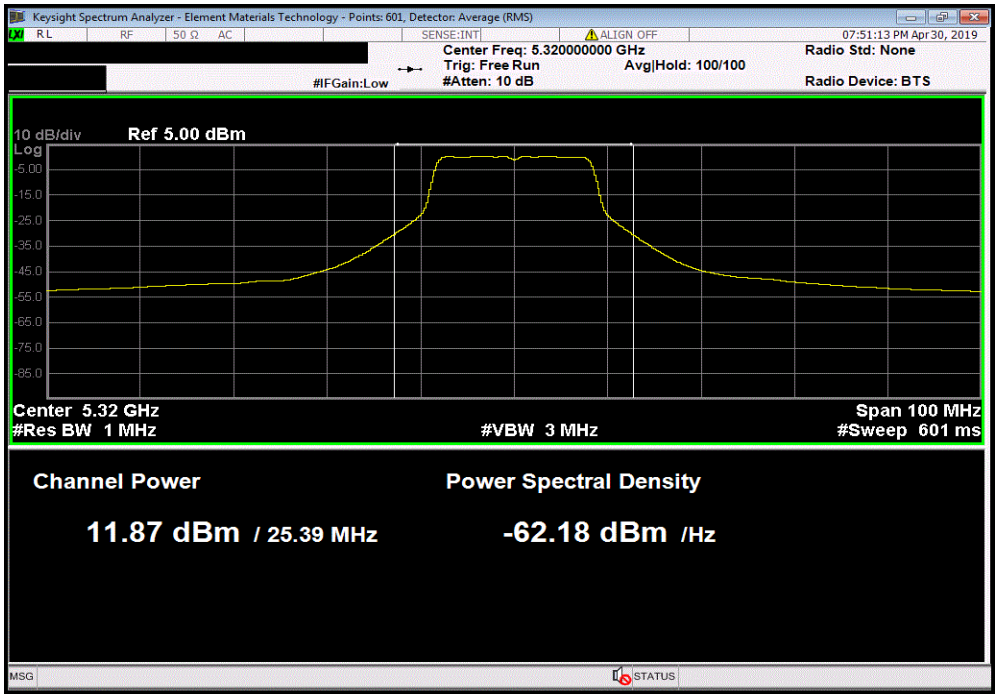
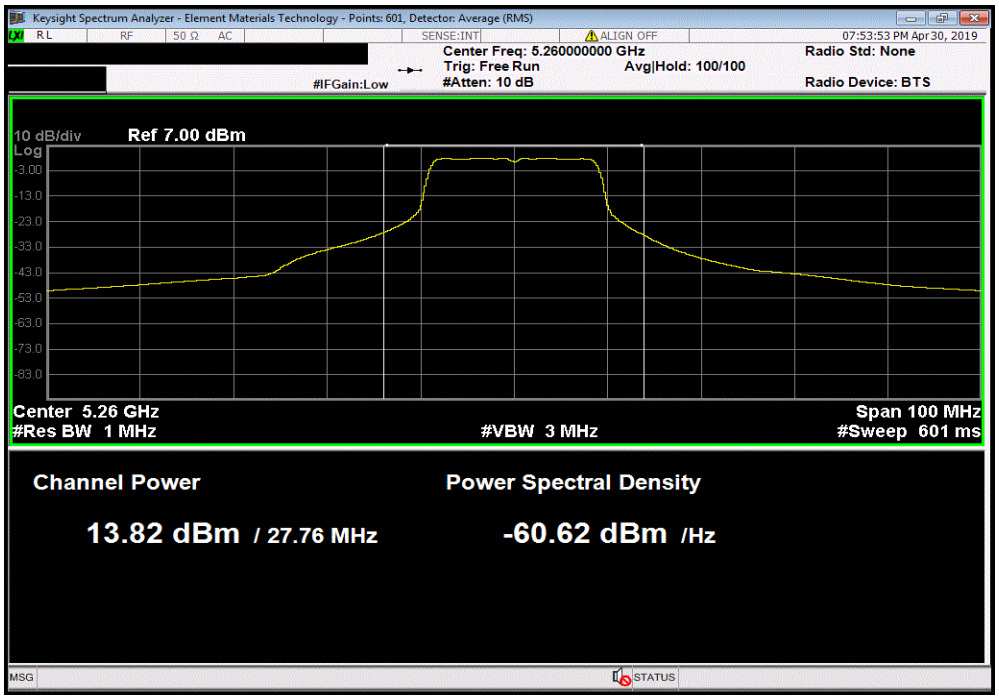
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, Low Channel, Ch 52 - 5260 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.797	0.1	13.9	0.9	14.8	30	Pass



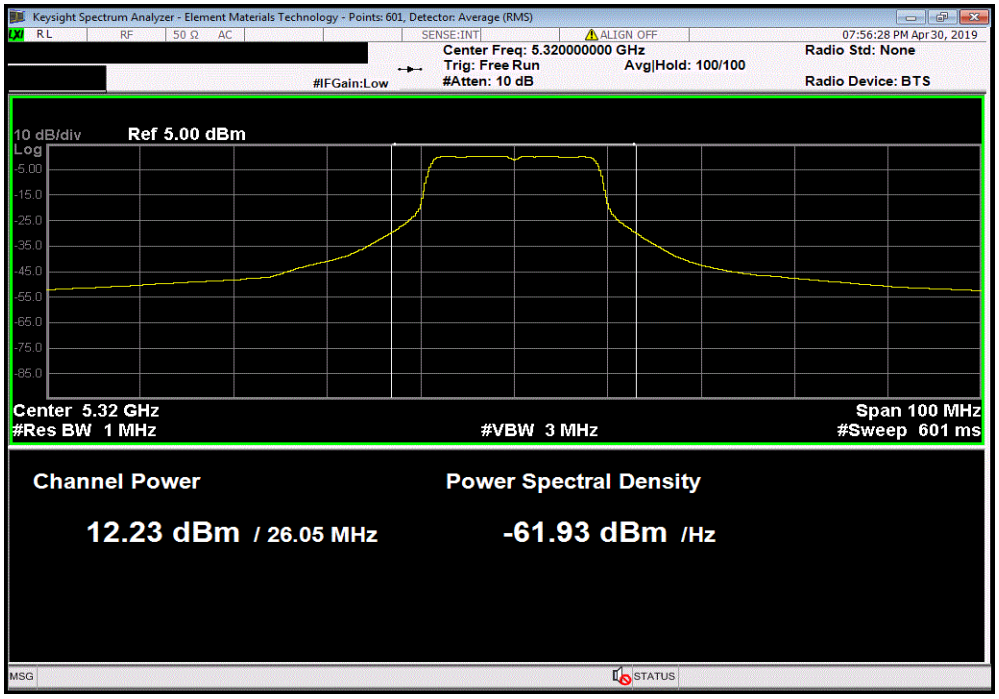
Chain A, 5250 - 5350 MHz Band, 20 MHz BW, 802.11(a) 6 Mbps, High Channel, Ch 64 - 5320 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.866	0.1	11.9	0.9	12.8	30	Pass



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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.816	0.1	13.9	0.9	14.8	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
12.229	0.1	12.3	0.9	13.2	30	Pass

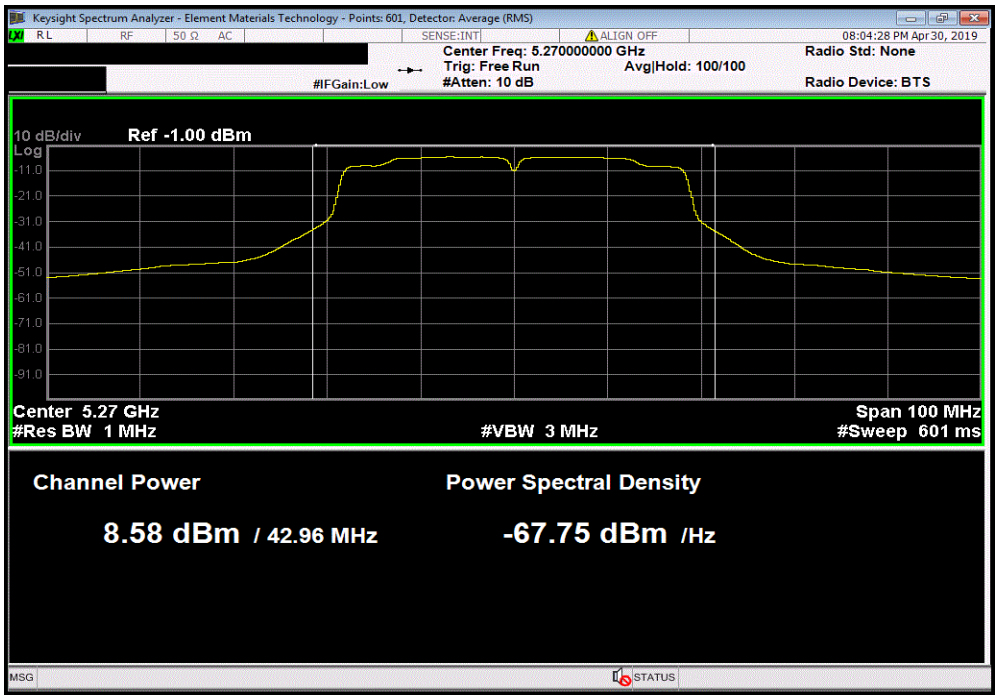


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

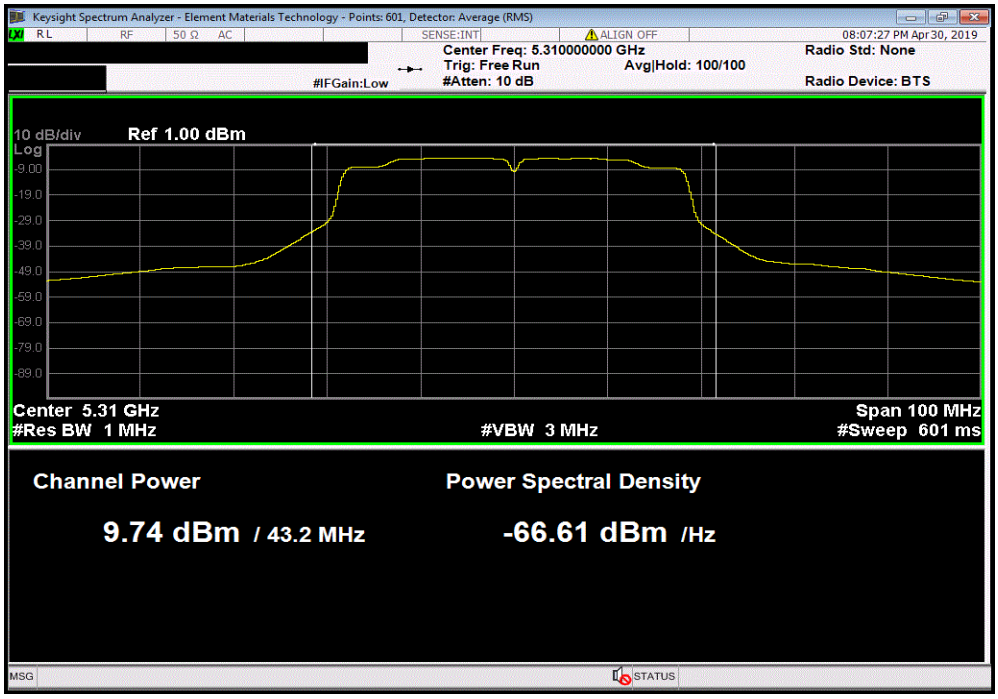
element

TbtTx 2018.09.13 XMit 2019.02.26

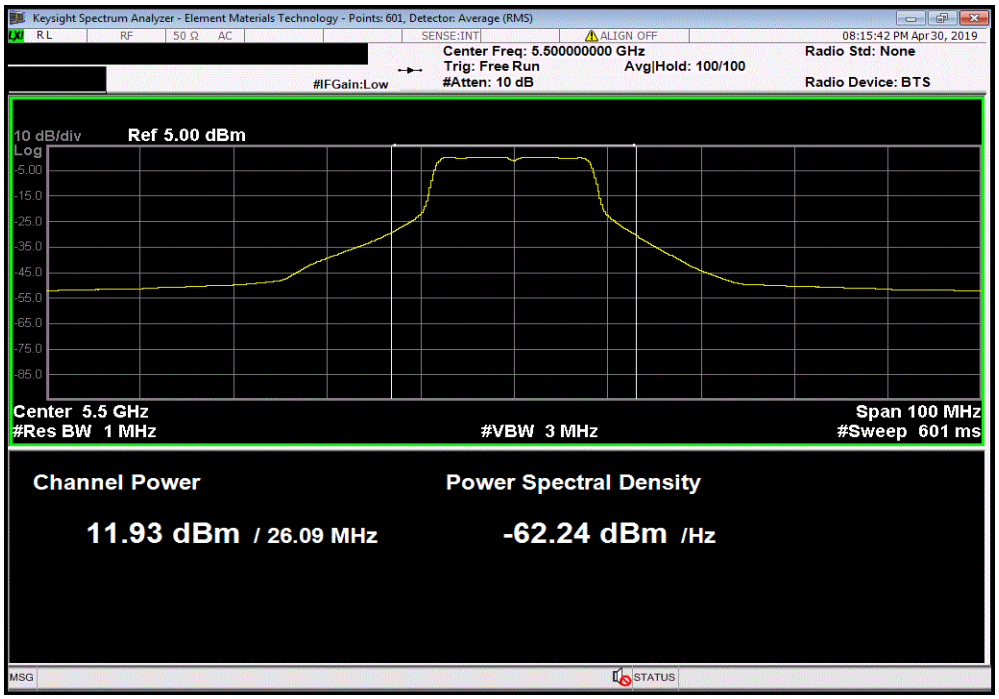
Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, Low Channel, Ch 52/56 - 5270 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
8.578	0.2	8.7	0.9	9.6	30	Pass



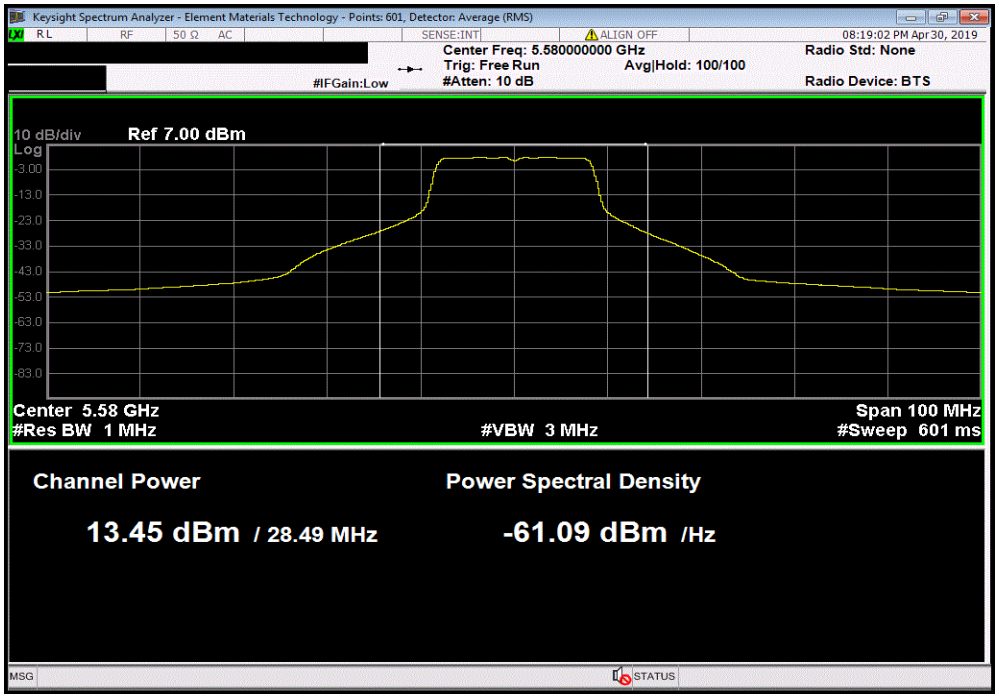
Chain A, 5250 - 5350 MHz Band, 40 MHz BW, 802.11(n) MCS0, High Channel, Ch 60/64 - 5310 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
9.745	0.2	9.9	0.9	10.8	30	Pass



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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.929	0.1	12	0.9	12.9	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.454	0.1	13.5	0.9	14.4	30	Pass

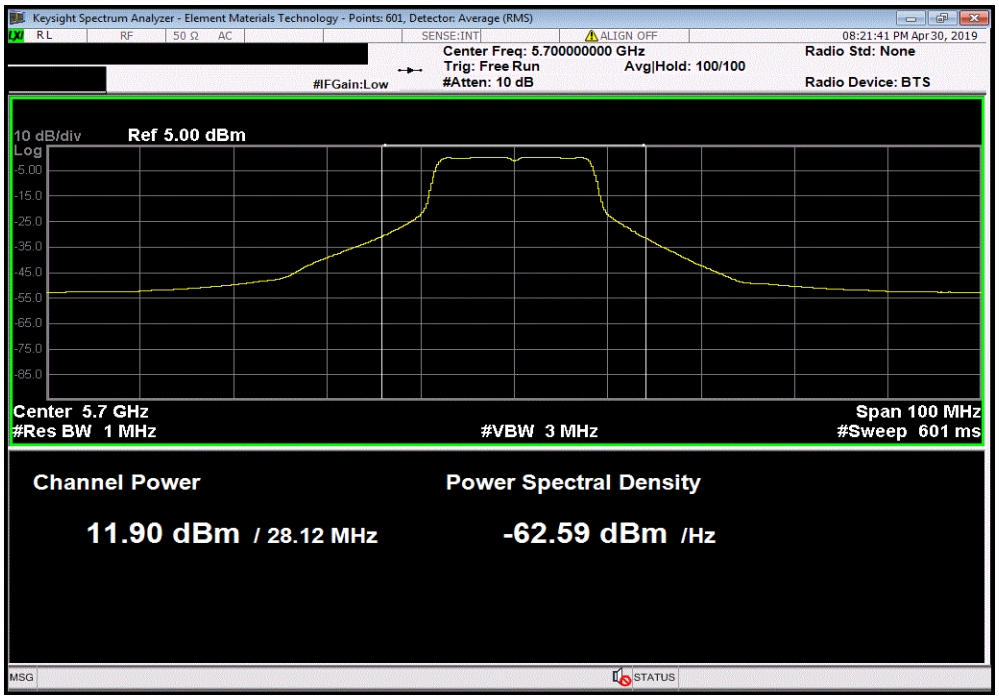


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

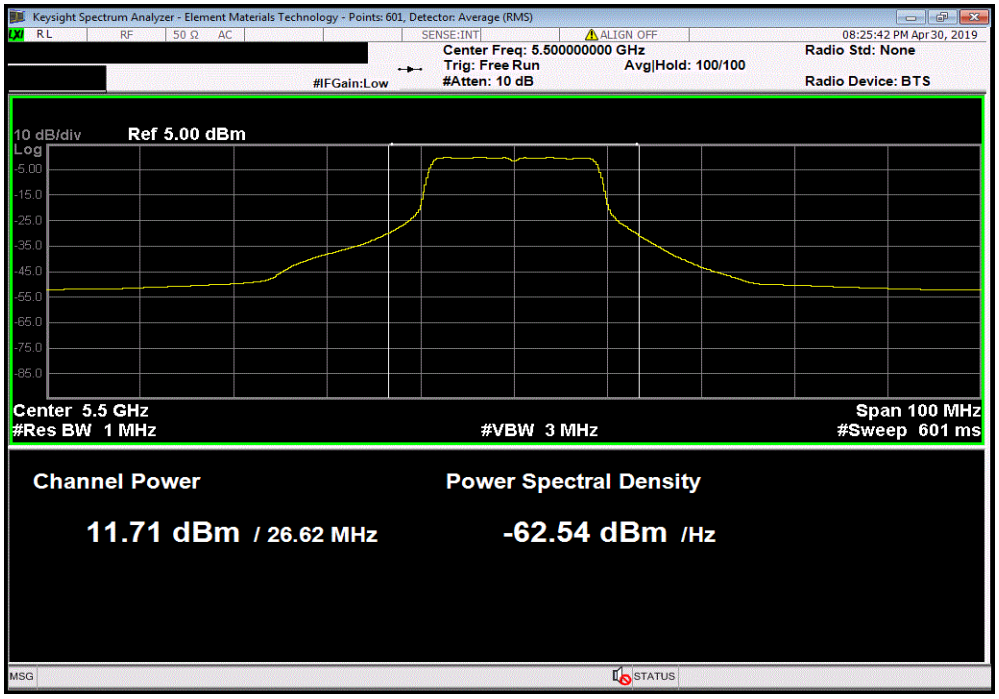
element

TbtTx 2018.09.13 XMit 2019.02.26

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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.9	0.1	12	0.9	12.9	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.71	0.1	11.8	0.9	12.7	30	Pass

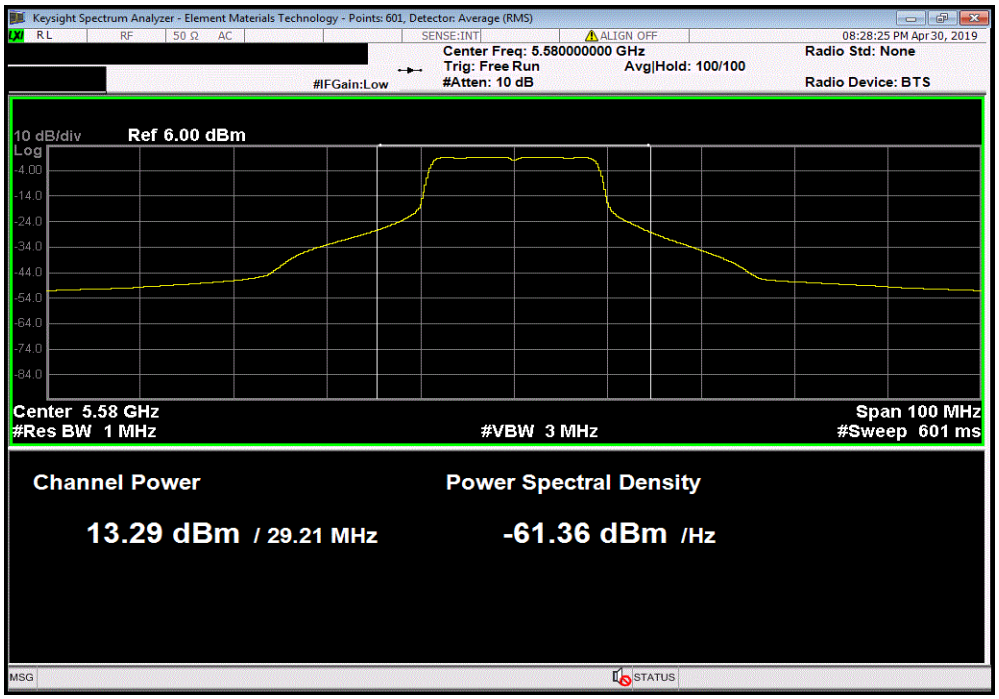


EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

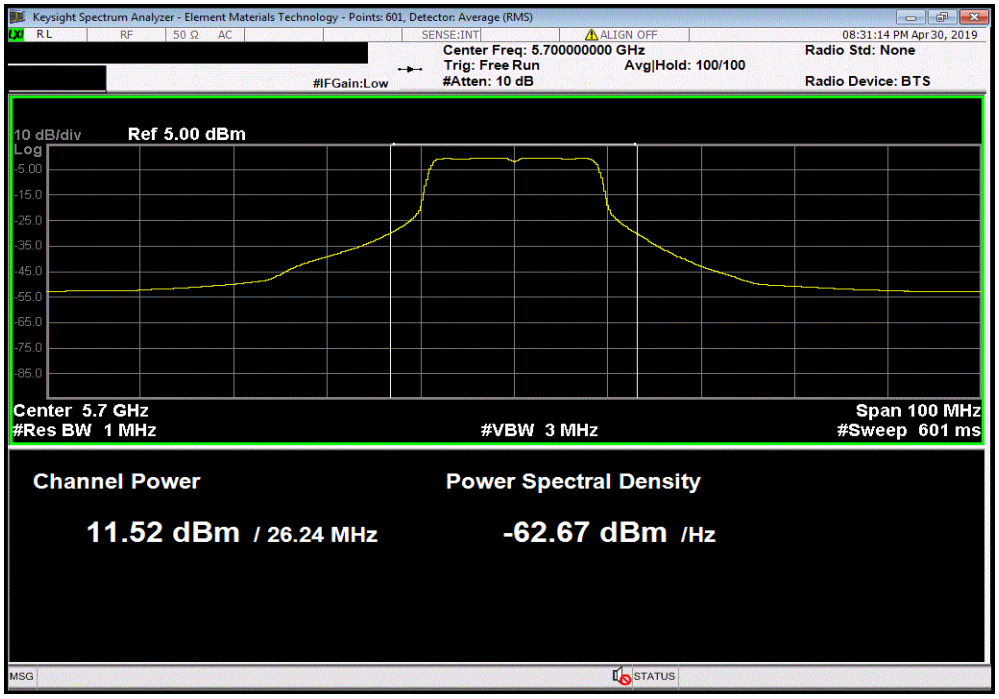
element

TbtTx 2018.09.13 XMit 2019.02.26

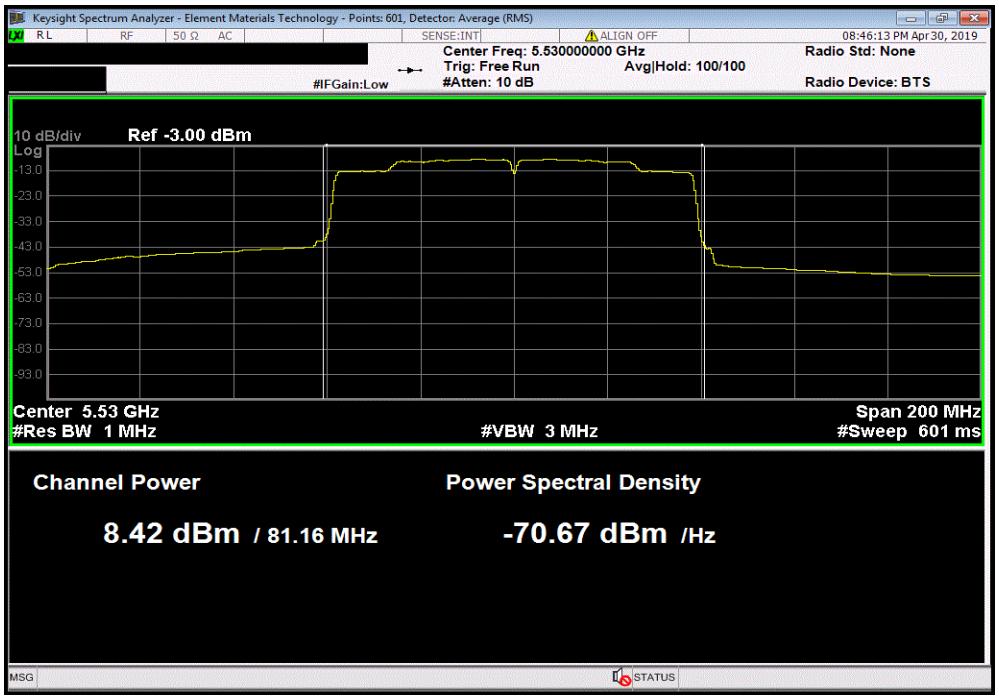
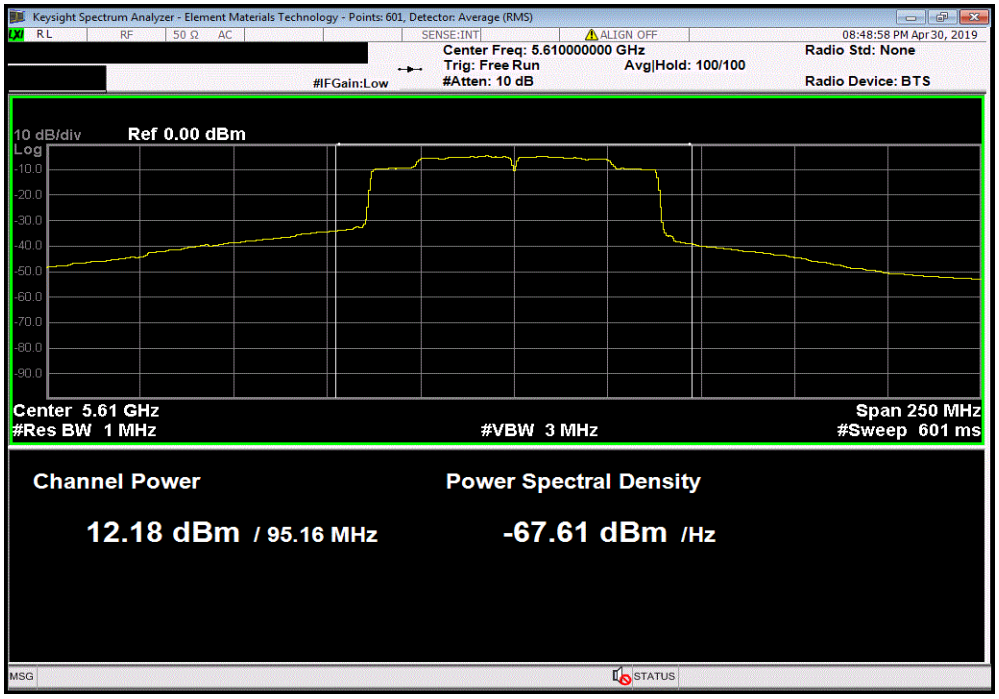
Chain A, 5470 - 5725 MHz Band, 20 MHz BW, 802.11(n) MCS0, Mid Channel, Ch 116 - 5580 MHz						
Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Out Pwr (dBm)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
13.294	0.1	13.4	0.9	14.3	30	Pass



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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
11.523	0.1	11.6	0.9	12.5	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
8.421	0.3	8.8	0.9	9.7	30	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)	Assembly Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
12.178	0.3	12.5	0.9	13.4	30	Pass