OCCUPIED BANDWIDTH - 4G LTE

XMit 2020.12.30.0

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
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Block - DC	Fairview Microwave	SD3239	ANC	2021-06-24	2022-06-24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and the spectrum analyzer. The method in section 5.4 of ANSI C63.26 was used to make this measurement. The spectrum analyzer settings were as follows:

- RBW is 1% - 5% of the occupied bandwidth
- VBW is ≥ 3x the RBW
- Peak Detector was used
- Trace max hold was used

RF conducted emissions testing was performed only on one port. The AZHL antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during output power testing on 8 ports) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i, and 6.4.

The 99% bandwidth was measured utilizing the analyzer's peak detector and measuring the carrier's 26 dB occupied bandwidth based on the peak output power level measured. A plot was taken to show the occupied bandwidth is contained within the allowable transmit band. FCC 27.53(m)(6) defines the emission bandwidth to be used as 26dB down.

The occupied bandwidth was measured with the EUT configured in the modes called out in the data sheets.

Band 41 (2496 MHz to 2690 MHz) Emission Designators derived from the measurement results:

FCC Emission Designators for Band 41 (2496MHz to 2690MHz)					
Chan BW	Radio Channel	4G-LTE: QPSK	4G-LTE : 16QAM	4G-LTE : 64QAM	4G-LTE : 256QAM
15MHz	Low				14M1F9W
	Mid	14M3F9W	14M3F9W	14M1F9W	14M1F9W
	High				14M2F9W
20MHz	Low				18M8F9W
	Mid	18M6F9W	18M9F9W	18M9F9W	18M8F9W
	High				18M7F9W
Note: FCC emission designators are based on 26dB emission bandwidth.					

OCCUPIED BANDWIDTH - 4G LTE

TbtTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	**AZHL (C2PC LTE/5G NR B41)**			**Work Order:**	**NOKI0035**
Serial Number:	**YK203400025**			**Date:**	**13-Oct-21**
Customer:	**Nokia Solutions and Networks**			**Temperature:**	**23 °C**
Attendees:	**David Le, John Rattanavong**			**Humidity:**	**52.5% RH**
Project:	**None**			**Barometric Pres.:**	**1011 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**54 VDC**	**Job Site:**	**TX09**

TEST SPECIFICATIONS	**Test Method**
FCC 27:2021	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n41 carriers and enabled at maximum power. External 1 gating was set using a trig delay = 5.044ms and a gate length = 6.8061ms.

DEVIATIONS FROM TEST STANDARD

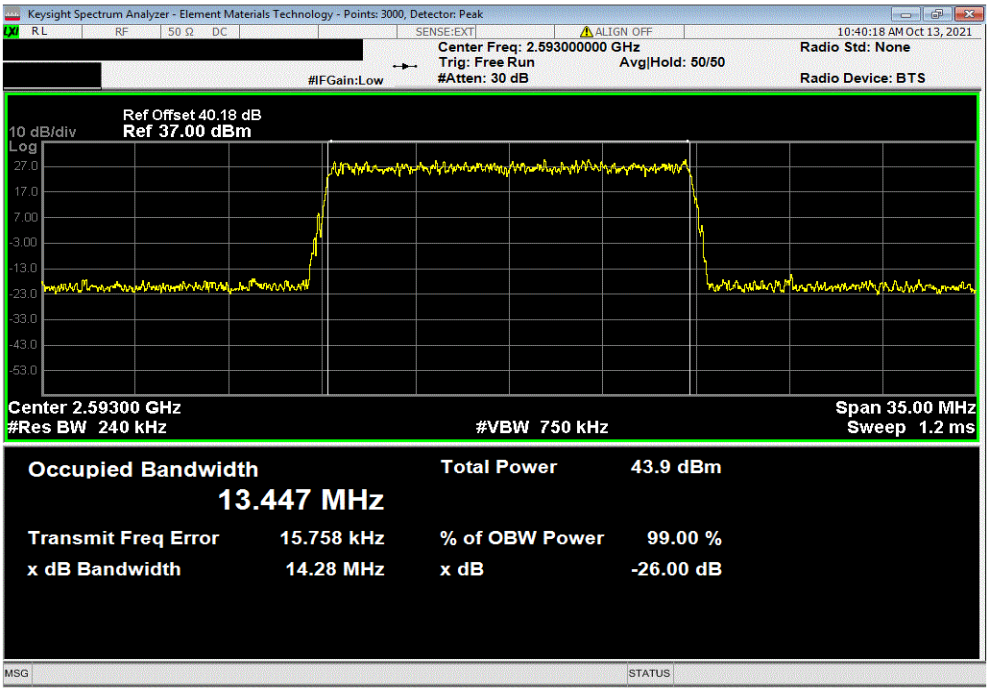
None

Configuration #	**2**	*Signature*

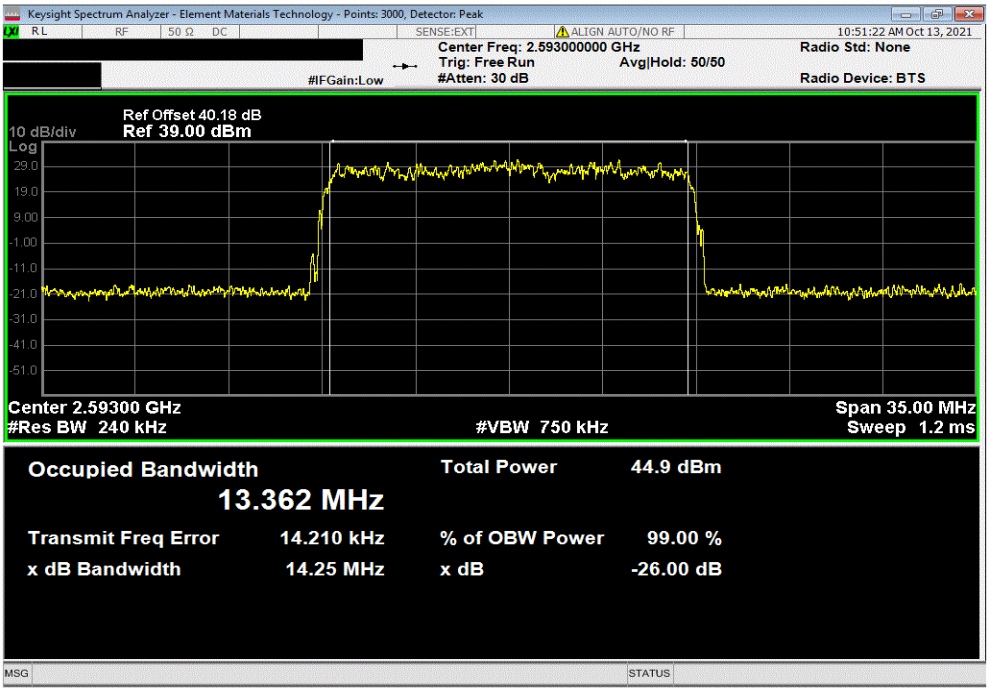
		Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
4G LTE, Band 41, 2496 MHz - 2690 MHz					
Port 1					
LTE15 (15MHz)					
QPSK					
	Mid Channel 2593 MHz	13.4	14.3	Within Band	Pass
16QAM					
	Mid Channel 2593 MHz	13.4	14.3	Within Band	Pass
64QAM					
	Mid Channel 2593 MHz	13.4	14.1	Within Band	Pass
256QAM					
	Low Channel 2503.5 MHz	13.4	14.1	Within Band	Pass
	Mid Channel 2593 MHz	13.4	14.1	Within Band	Pass
	High Channel 2682.5 MHz	13.4	14.2	Within Band	Pass
LTE20 (20MHz)					
QPSK					
	Mid Channel 2593 MHz	17.9	18.6	Within Band	Pass
16QAM					
	Mid Channel 2593 MHz	17.9	18.9	Within Band	Pass
64QAM					
	Mid Channel 2593 MHz	17.9	18.9	Within Band	Pass
256QAM					
	Low Channel 2506 MHz	17.9	18.8	Within Band	Pass
	Mid Channel 2593 MHz	17.9	18.8	Within Band	Pass
	High Channel 2680 MHz	17.9	18.7	Within Band	Pass

OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), QPSK, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.447	14.282	Within Band	Pass

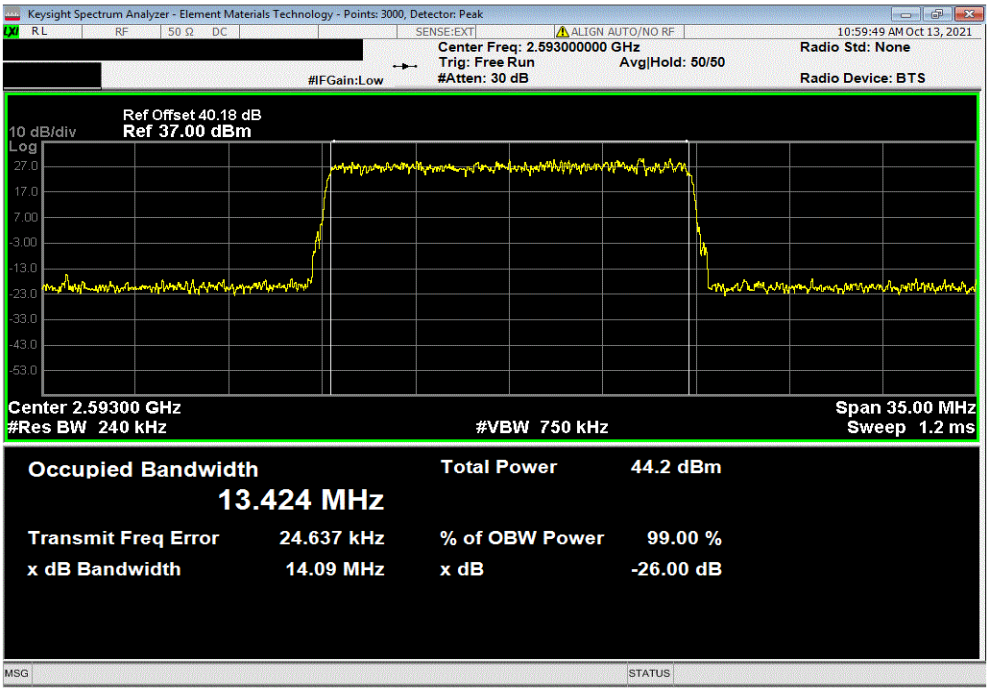


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 16QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.362	14.251	Within Band	Pass

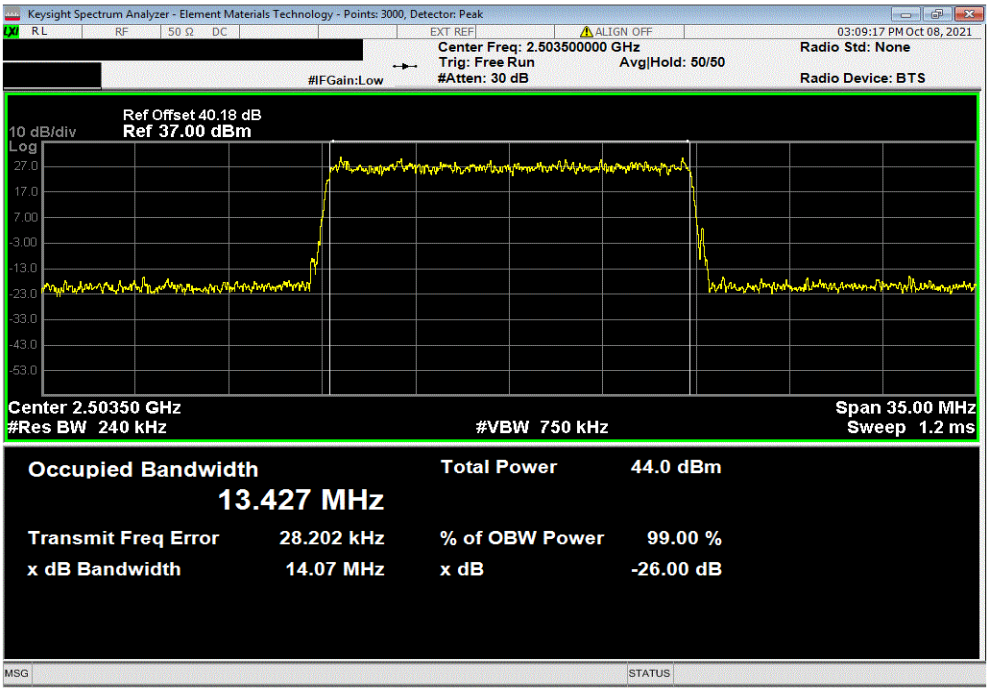


OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 64QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.424	14.094	Within Band	Pass

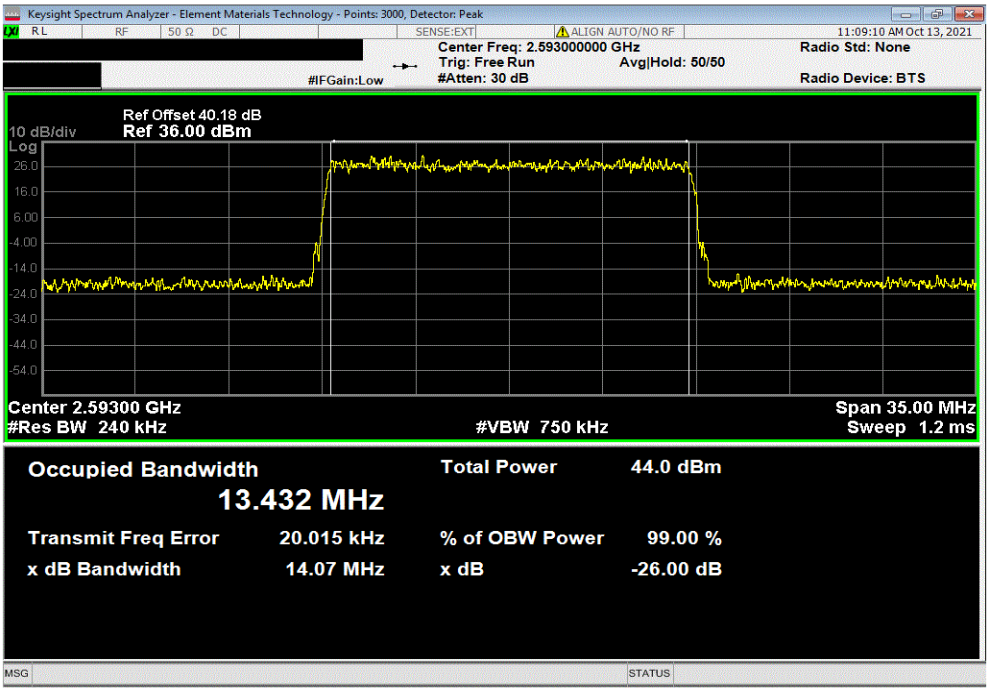


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, Low Channel 2503.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.427	14.073	Within Band	Pass

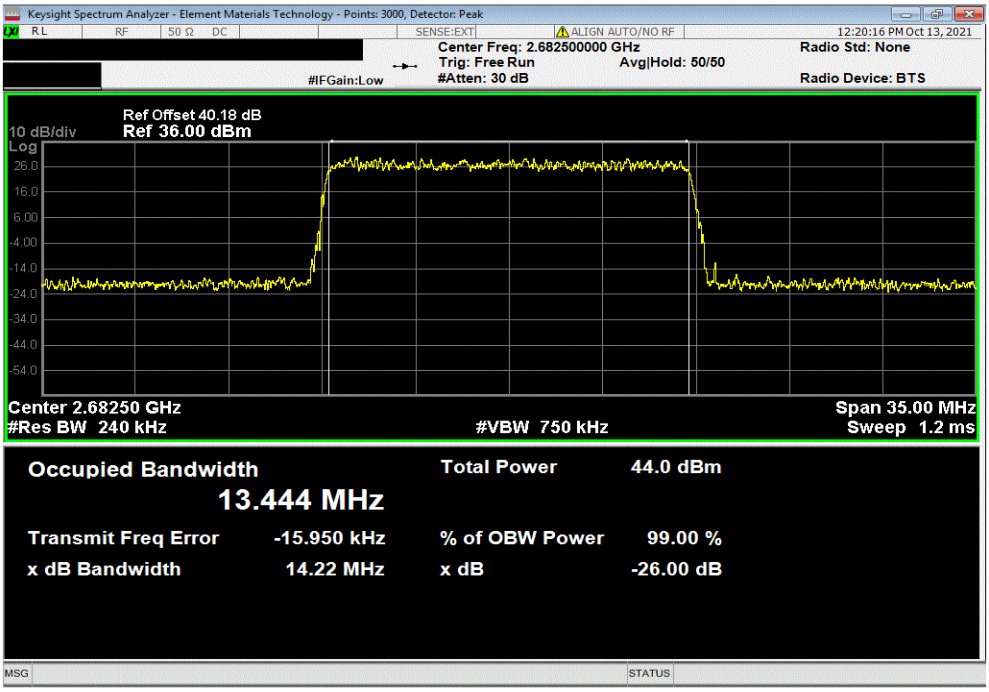


OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.432	14.071	Within Band	Pass

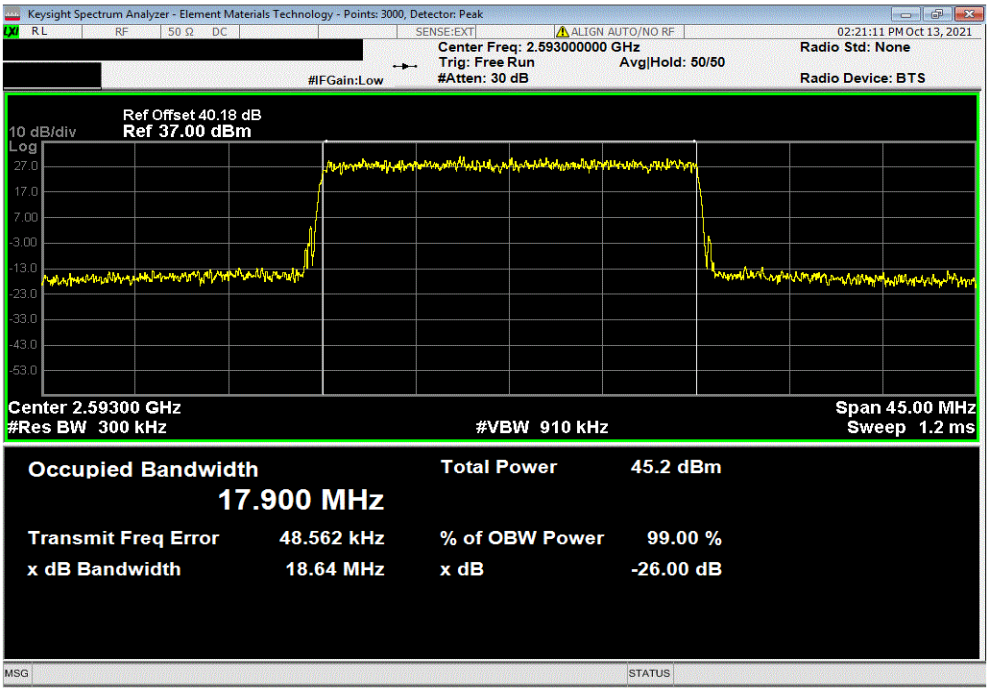


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, High Channel 2682.5 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			13.444	14.219	Within Band	Pass

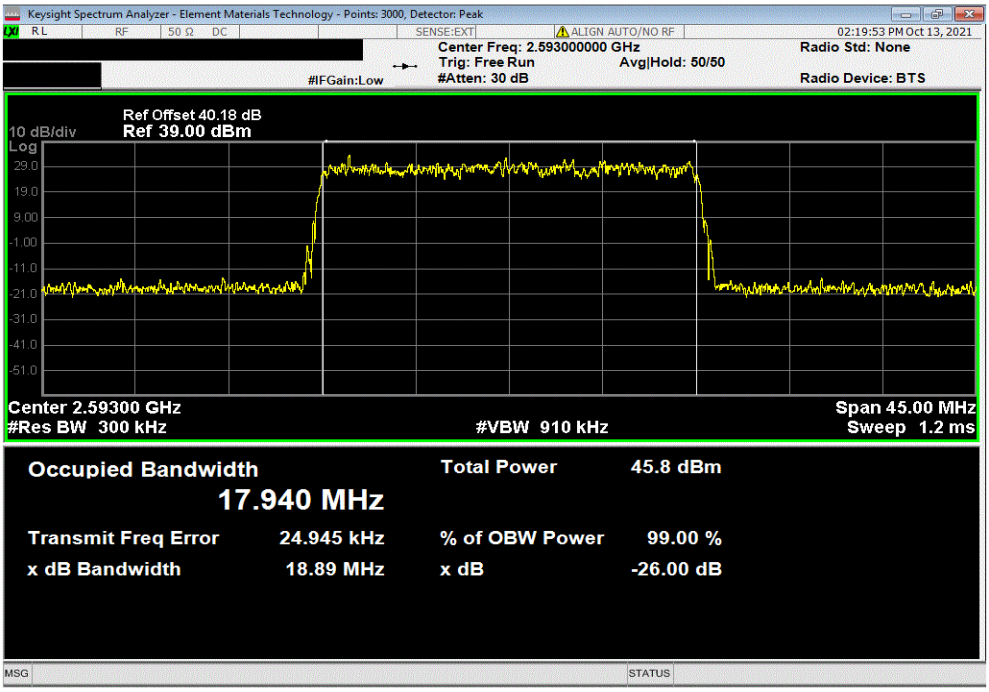


OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), QPSK, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.9	18.636	Within Band	Pass

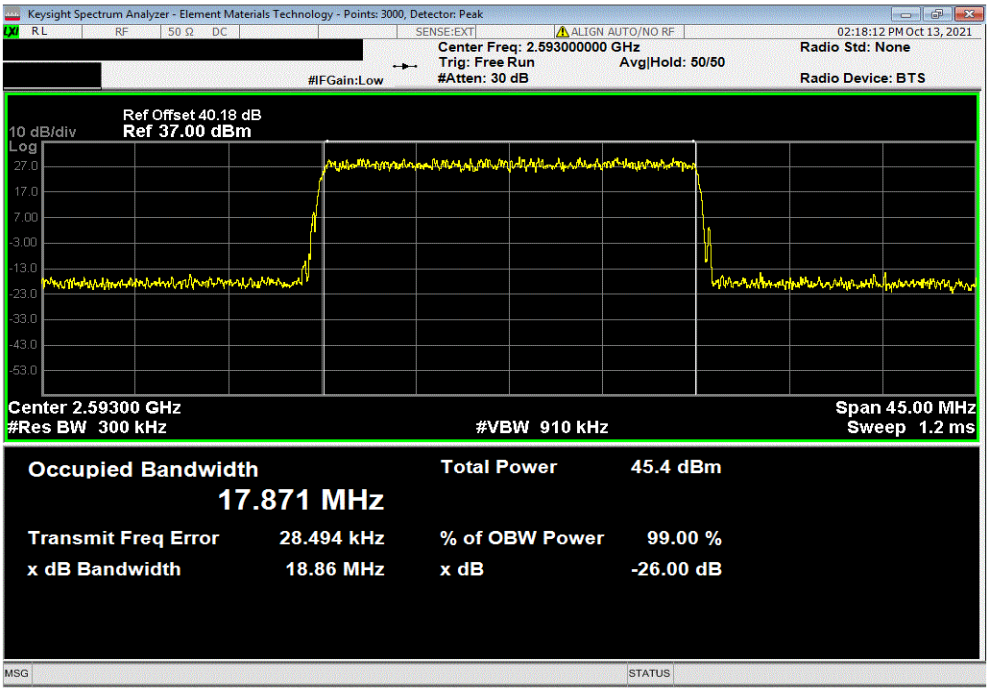


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 16QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.94	18.885	Within Band	Pass

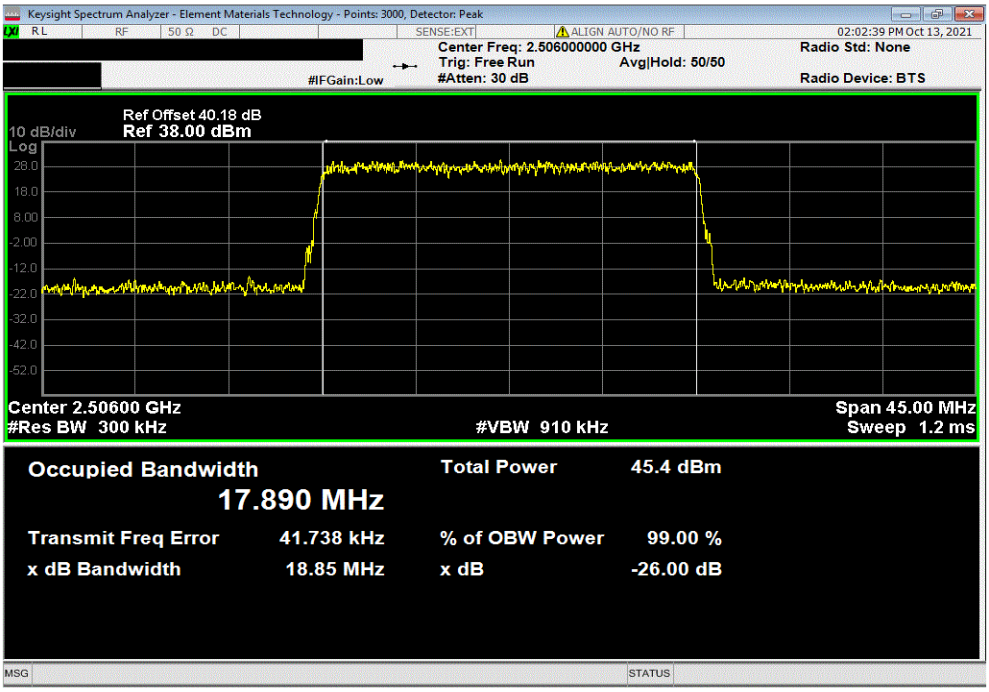


OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 64QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.871	18.863	Within Band	Pass

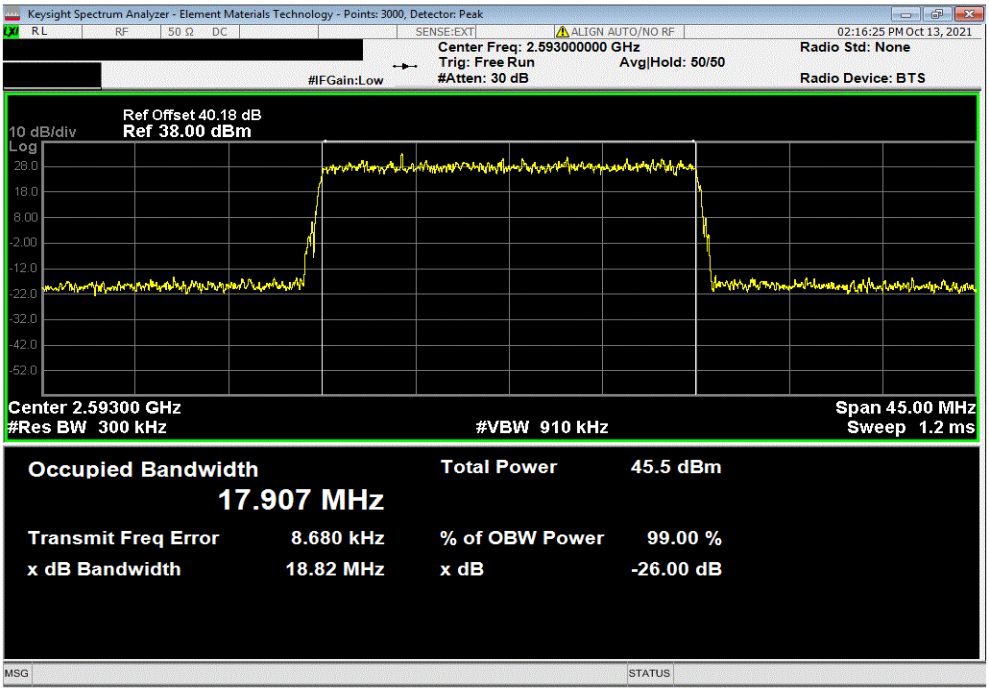


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, Low Channel 2506 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.89	18.847	Within Band	Pass

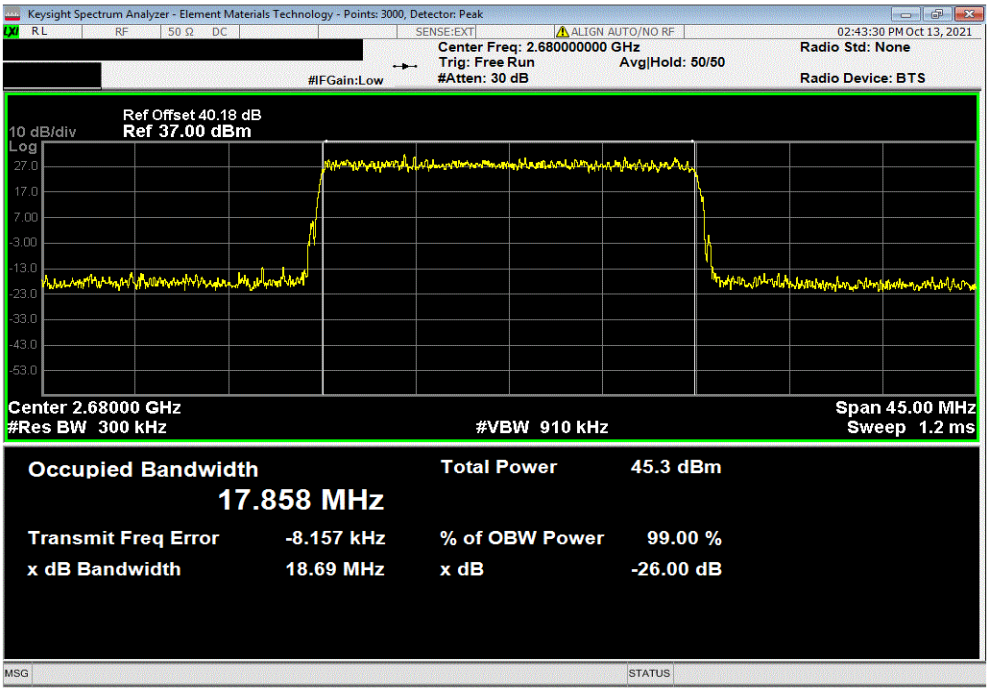


OCCUPIED BANDWIDTH - 4G LTE

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, Mid Channel 2593 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.907	18.823	Within Band	Pass



4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, High Channel 2680 MHz						
			Value 99% (MHz)	Value 26dB (MHz)	Limit	Result
			17.858	18.688	Within Band	Pass



OUTPUT POWER - 5G NR & EIRP CALCULATION

XMit 2020.12.30.0

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	SD3239	ANC	2021-06-24	2022-06-24
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the follwoing data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed only on one port. The AZHL antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during 8 port output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1.

The EIRP limit is defined by FCC Part27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. PSD (power/1MHz) measurements are not required for this radio since the FCC limits for EIRP are defined in watts.

OUTPUT POWER - 5G NR & EIRP CALCULATION

element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

EUT:	AZHL (C2PC LTE/5G NR B41)	**Work Order:**	NOKI0035
Serial Number:	YK203400025	**Date:**	8-Oct-21
Customer:	Nokia Solutions and Networks	**Temperature:**	21.1 °C
Attendees:	David Le, John Rattanavong	**Humidity:**	50.6% RH
Project:	None	**Barometric Pres.:**	1021 mbar
Tested by:	Brandon Hobbs	**Power:** 54 VDC	**Job Site:** TX09

TEST SPECIFICATIONS	Test Method
FCC 27:2021	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n41 carriers and enabled at maximum power. External 1 gating was set using a trig delay = 86.2us and a gate length = 3.714ms. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier channel bandwidth on port 1. The total output power for multiport (2x2 MIMO, 4x4 MIMO and 8x8 MIMO) operation was determined based upon ANSI C63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 Log Nout). The total output power for two port operation is single port power + 3dB [i.e.: 10 Log(2)]. The total output power for four port operation is single port power + 6dB [i.e.: 10 Log(4)]. The total output power for eight port operation is single port power + 9dB [i.e.: 10 Log(8)].

DEVIATIONS FROM TEST STANDARD

None

Configuration #	2	Signature

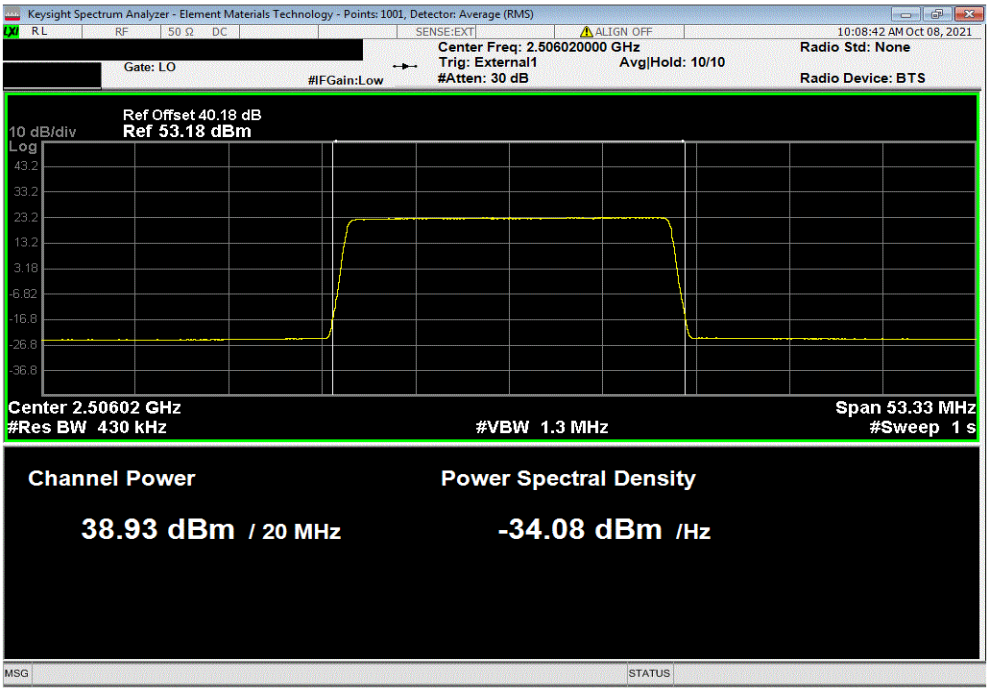
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz						
(NR20) 20 MHz Bandwidth						
256QAM Modulation						
Low Channel 2506.02 MHz	38.930	0	38.9	41.9	44.9	47.9
Mid Channel 2592.99 MHz	38.870	0	38.9	41.9	44.9	47.9
High Channel 2679.99 MHz	38.929	0	38.9	41.9	44.9	47.9
(NR30) 30 MHz Bandwidth						
256QAM Modulation						
Low Channel 2511.00 MHz	40.707	0	40.7	43.7	46.7	49.7
Mid Channel 2592.99 MHz	40.911	0	40.9	43.9	46.9	49.9
High Channel 2674.98 MHz	40.819	0	40.8	43.8	46.8	49.8
(NR40) 40 MHz Bandwidth						
256QAM Modulation						
Low Channel 2516.01 MHz	41.846	0	41.8	44.8	47.8	50.8
Mid Channel 2592.99 MHz	41.928	0	41.9	44.9	47.9	50.9
High Channel 2670.00 MHz	42.100	0	42.1	45.1	48.1	51.1
(NR50) 50 MHz Bandwidth						
256QAM Modulation						
Low Channel 2521.02 MHz	42.600	0	42.6	45.6	48.6	51.6
Mid Channel 2592.99 MHz	42.810	0	42.8	45.8	48.8	51.8
High Channel 2664.99 MHz	43.136	0	43.1	46.1	49.1	52.1
(NR60) 60 MHz Bandwidth						
256QAM Modulation						
Low Channel 2526.00 MHz	43.491	0	43.5	46.5	49.5	52.5
Mid Channel 2592.99 MHz	43.507	0	43.5	46.5	49.5	52.5
High Channel 2659.98 MHz	43.786	0	43.8	46.8	49.8	52.8
(NR70) 70 MHz Bandwidth						
256QAM Modulation						
Low Channel 2531.01 MHz	44.016	0	44.0	47.0	50.0	53.0
Mid Channel 2592.99 MHz	43.981	0	44.0	47.0	50.0	53.0
High Channel 2655.00 MHz	44.252	0	44.3	47.3	50.3	53.3
(NR80) 80 MHz Bandwidth						
256QAM Modulation						
Low Channel 2536.02 MHz	44.866	0	44.9	47.9	50.9	53.9
Mid Channel 2592.99 MHz	44.957	0	45.0	48.0	51.0	54.0
High Channel 2649.99 MHz	45.128	0	45.1	48.1	51.1	54.1
(NR90) 90 MHz Bandwidth						
QPSK Modulation						
Mid Channel 2592.99 MHz	45.426	0	45.4	48.4	51.4	54.4
16QAM Modulation						
Mid Channel 2592.99 MHz	45.492	0	45.5	48.5	51.5	54.5
64QAM Modulation						
Mid Channel 2592.99 MHz	45.347	0	45.3	48.3	51.3	54.3
256QAM Modulation						
Low Channel 2541.00 MHz	45.467	0	45.5	48.5	51.5	54.5
Mid Channel 2592.99 MHz	45.359	0	45.4	48.4	51.4	54.4
High Channel 2644.98 MHz	45.584	0	45.6	48.6	51.6	54.6

OUTPUT POWER - 5G NR & EIRP CALCULATION

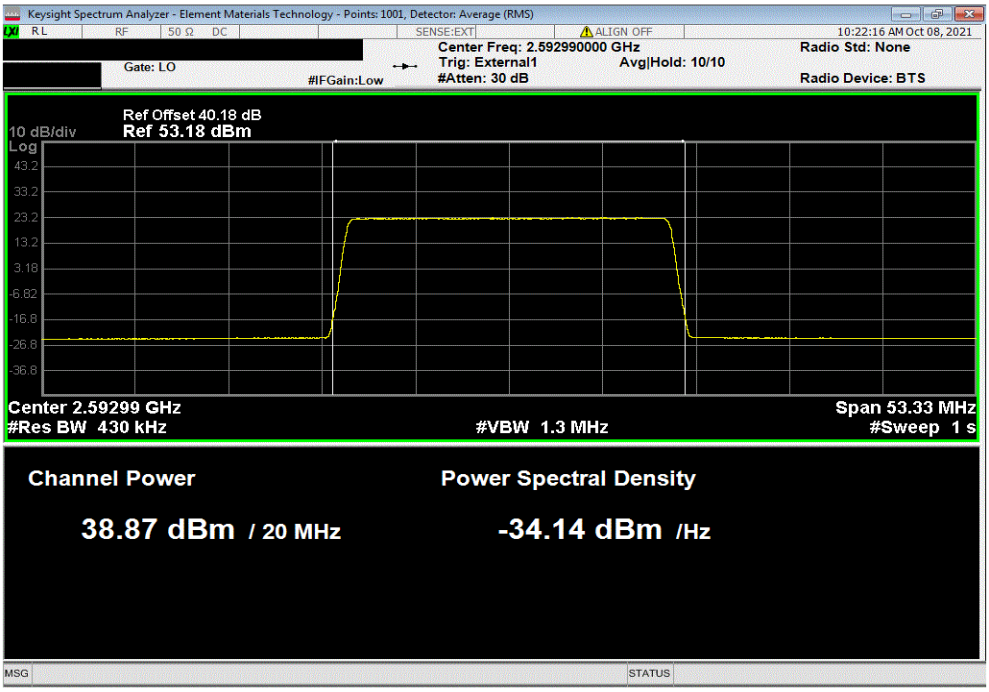
element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, Low Channel 2506.02 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	38.93	0	38.93	41.93	44.93	47.93



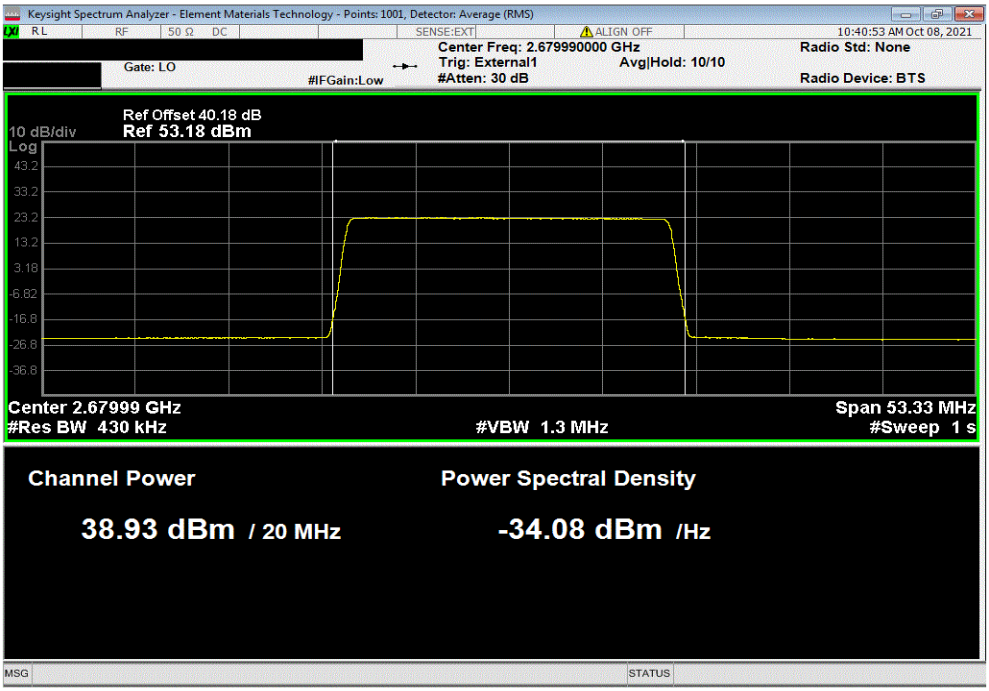
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	38.87	0	38.87	41.87	44.87	47.87



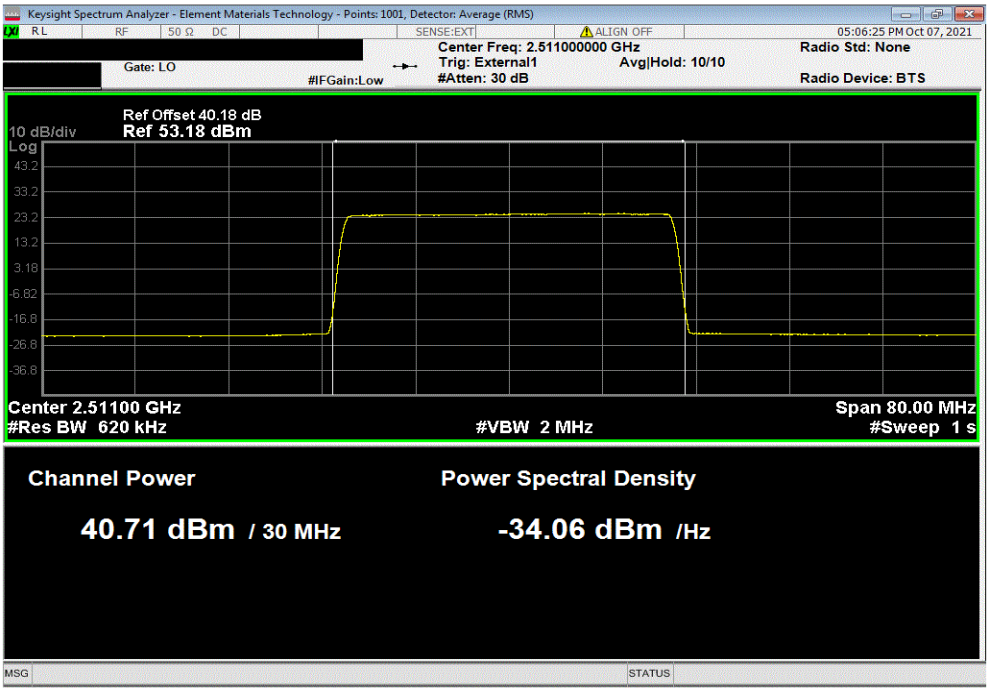
OUTPUT POWER - 5G NR & EIRP CALCULATION

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR20) 20 MHz Bandwidth, 256QAM Modulation, High Channel 2679.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	38.929	0	38.929	41.929	44.929	47.929

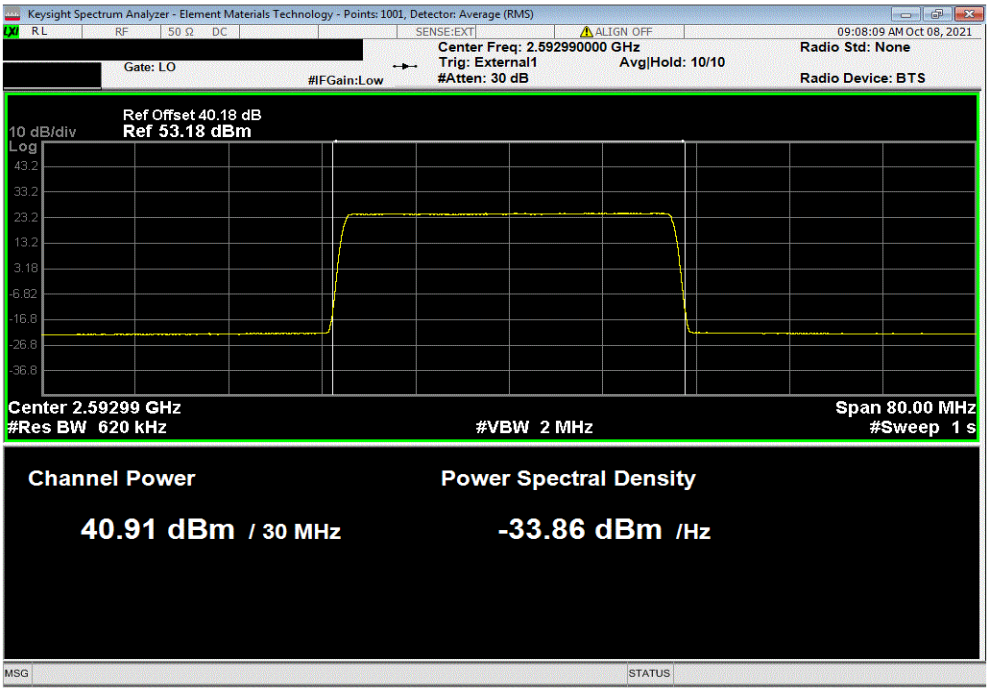


Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, Low Channel 2511.00 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	40.707	0	40.707	43.707	46.707	49.707

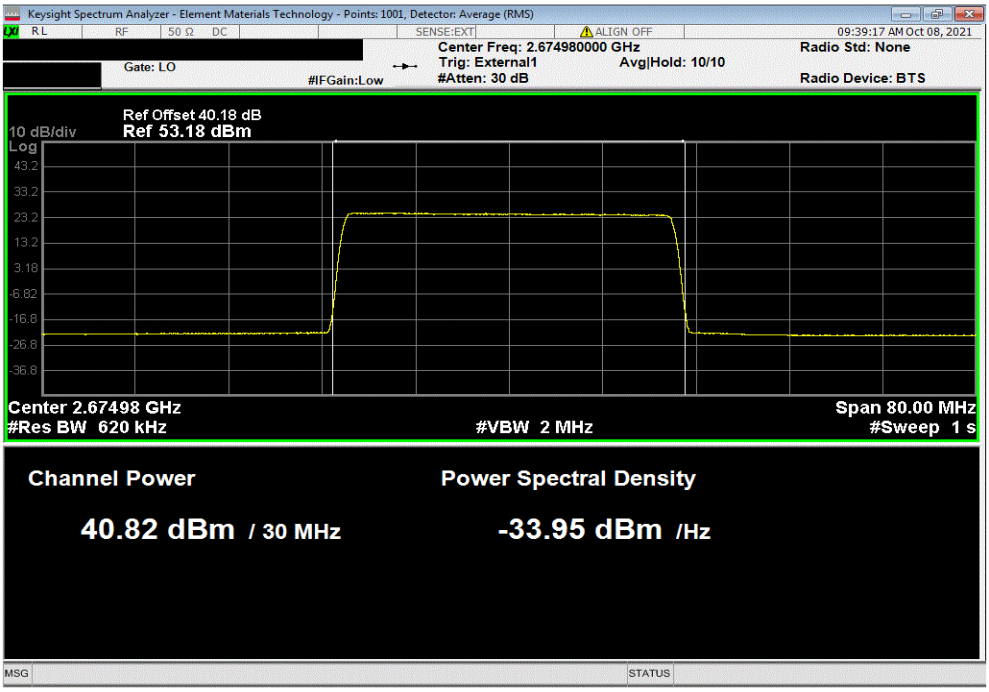


OUTPUT POWER - 5G NR & EIRP CALCULATION

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	40.911	0	40.911	43.911	46.911	49.911

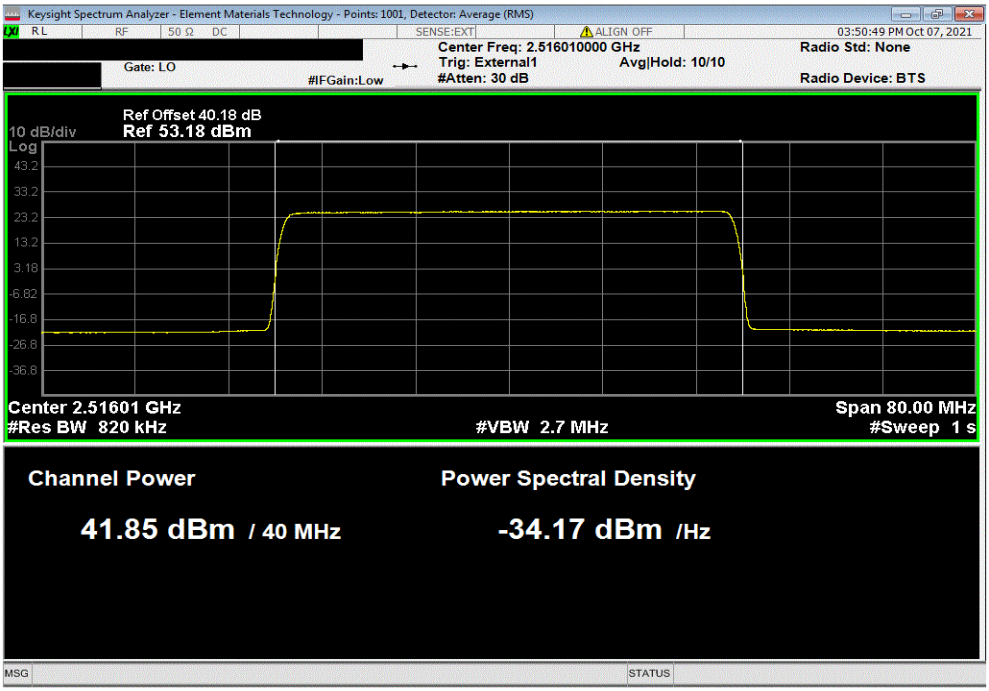


Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR30) 30 MHz Bandwidth, 256QAM Modulation, High Channel 2674.98 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	40.819	0	40.819	43.819	46.819	49.819

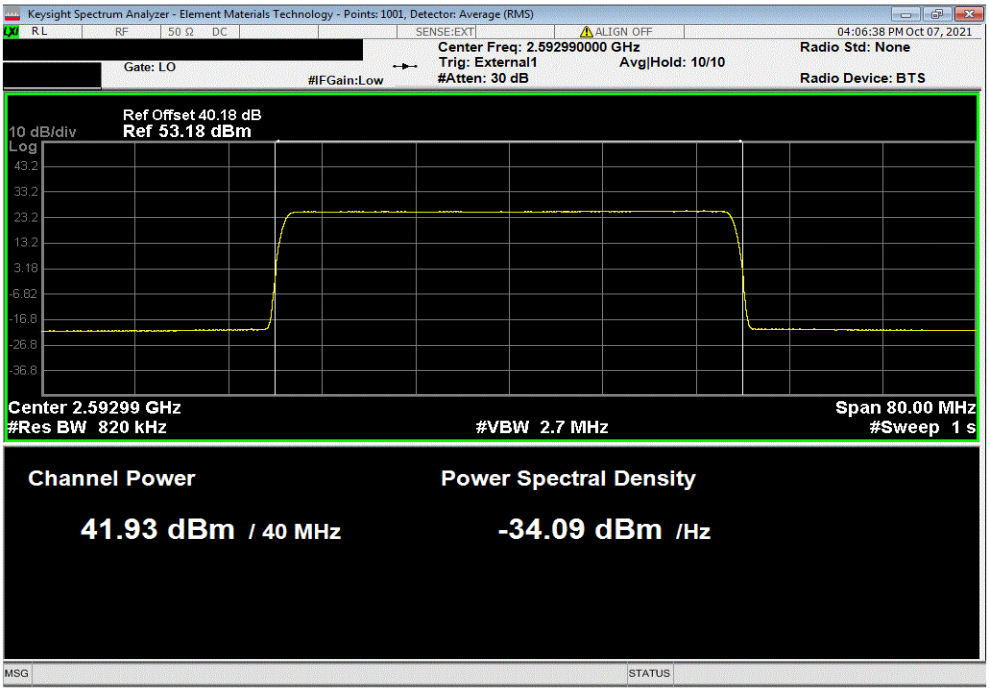


OUTPUT POWER - 5G NR & EIRP CALCULATION

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, Low Channel 2516.01 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	41.846	0	41.846	44.846	47.846	50.846



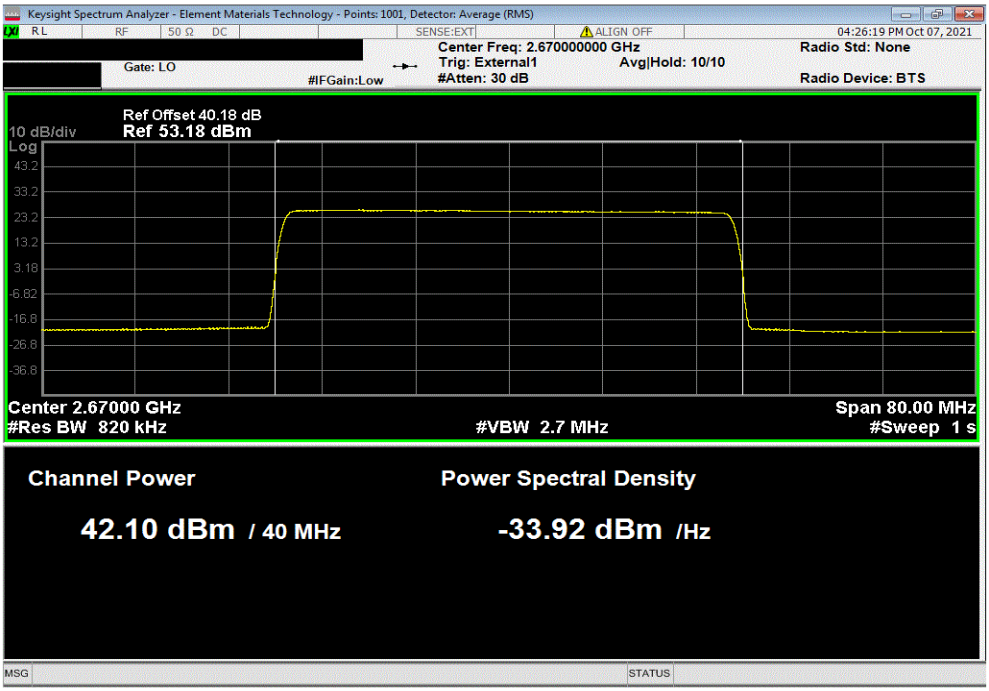
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	41.928	0	41.928	44.928	47.928	50.928



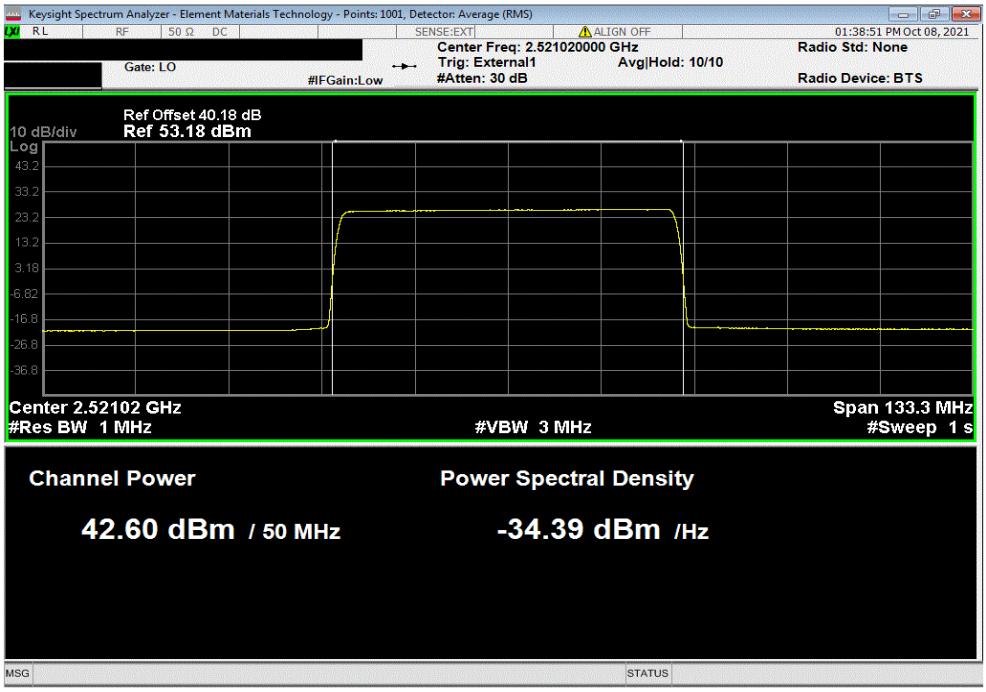
OUTPUT POWER - 5G NR & EIRP CALCULATION

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR40) 40 MHz Bandwidth, 256QAM Modulation, High Channel 2670.00 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	42.1	0	42.1	45.1	48.1	51.1



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, Low Channel 2521.02 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	42.6	0	42.6	45.6	48.6	51.6

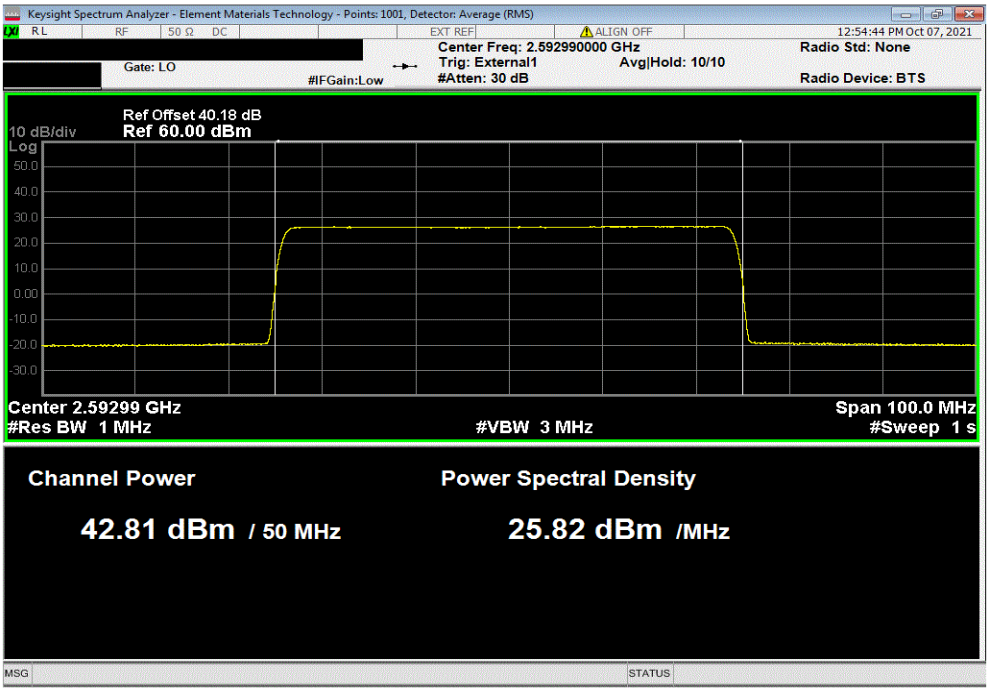


OUTPUT POWER - 5G NR & EIRP CALCULATION

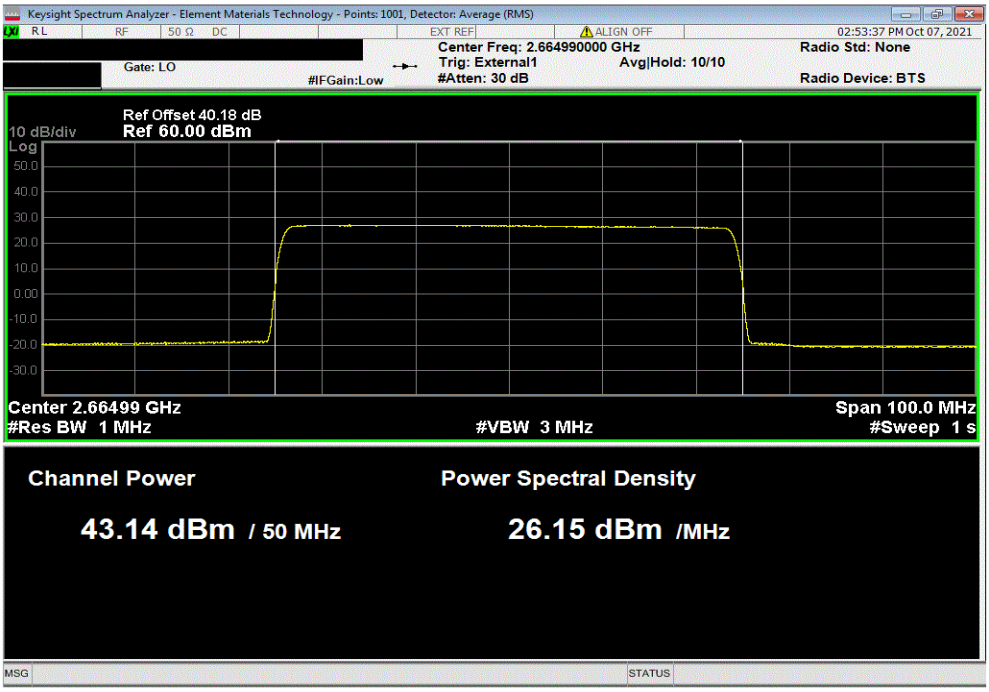
element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	42.81	0	42.81	45.81	48.81	51.81



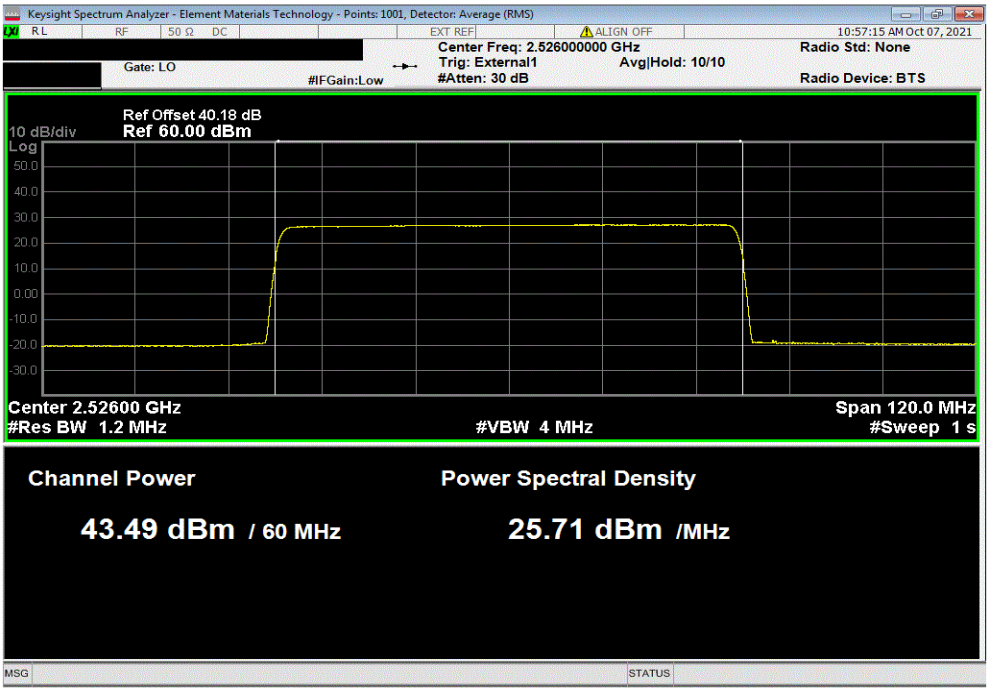
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR50) 50 MHz Bandwidth, 256QAM Modulation, High Channel 2664.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	43.136	0	43.136	46.136	49.136	52.136



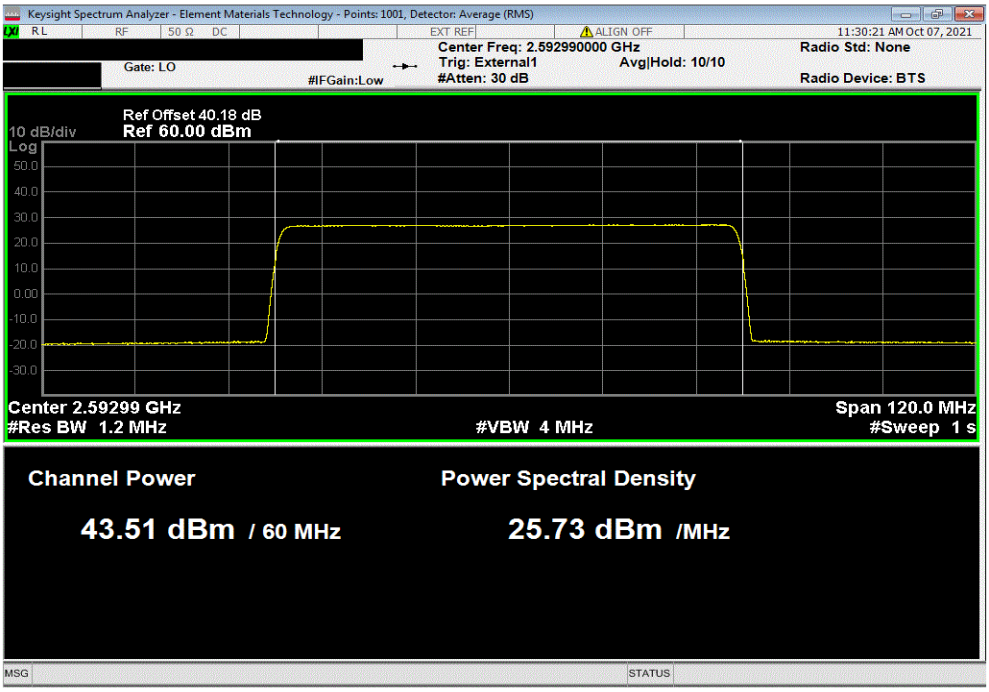
OUTPUT POWER - 5G NR & EIRP CALCULATION

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, Low Channel 2526.00 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	43.491	0	43.491	46.491	49.491	52.491



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	43.507	0	43.507	46.507	49.507	52.507

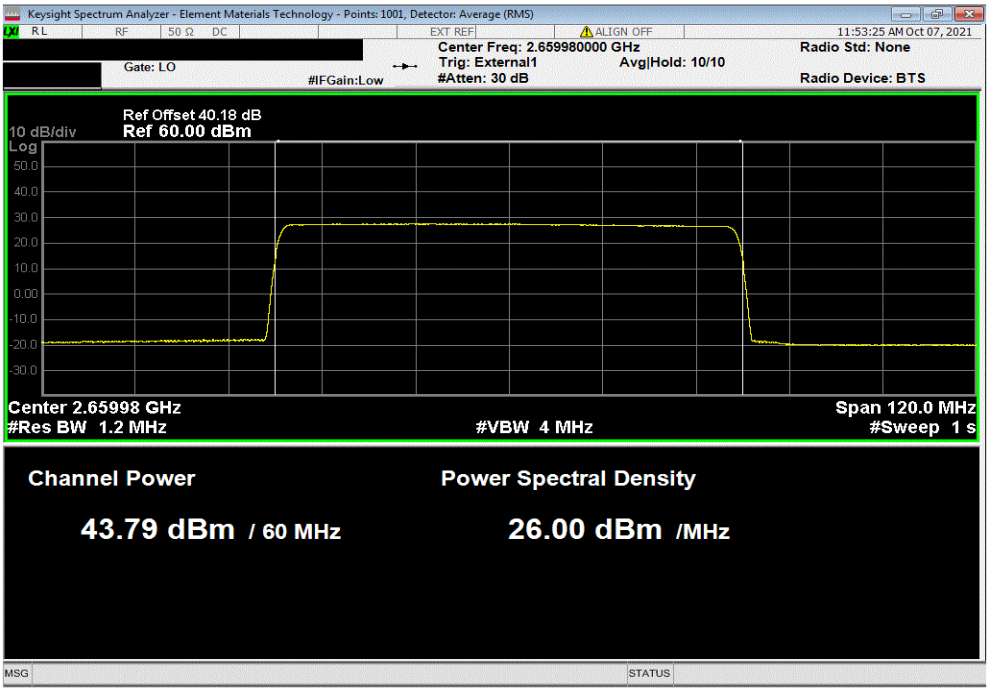


OUTPUT POWER - 5G NR & EIRP CALCULATION

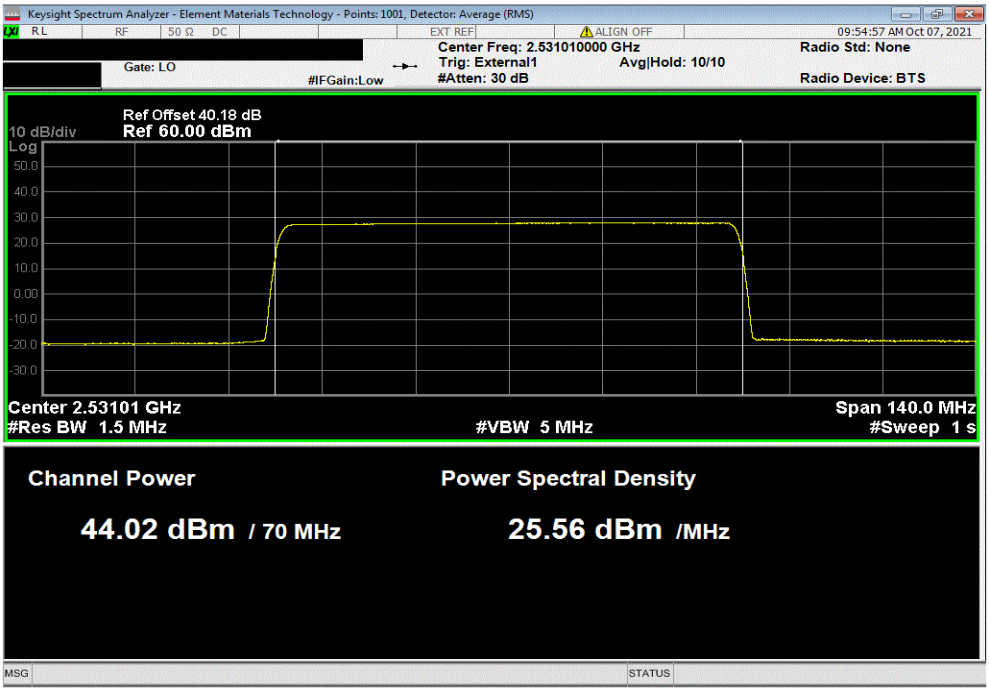
element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR60) 60 MHz Bandwidth, 256QAM Modulation, High Channel 2659.98 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	43.786	0	43.786	46.786	49.786	52.786



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, Low Channel 2531.01 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	44.016	0	44.016	47.016	50.016	53.016

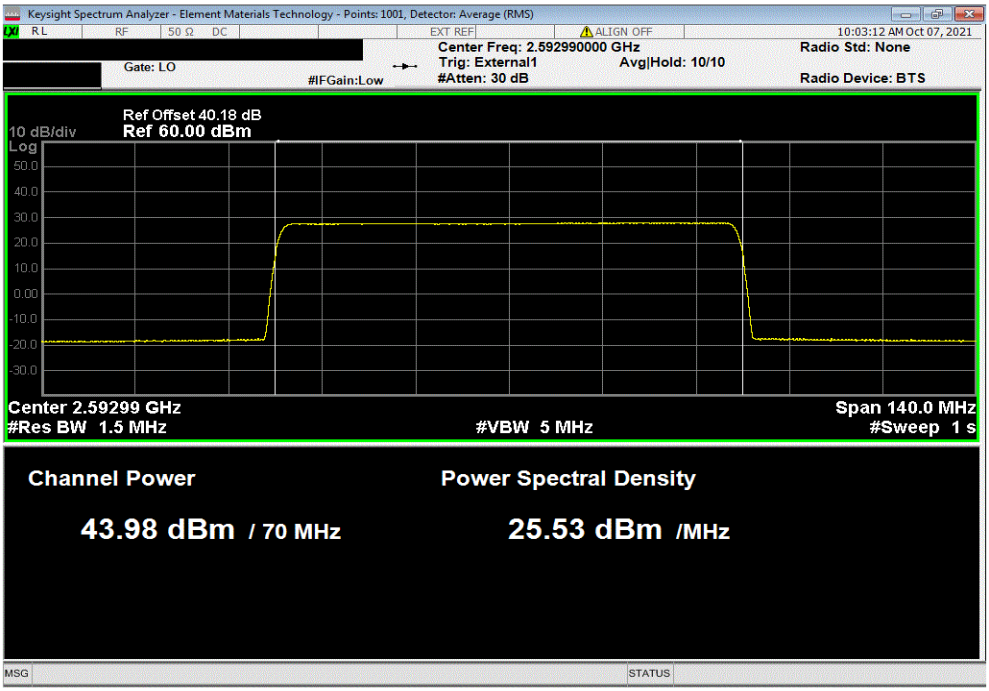


OUTPUT POWER - 5G NR & EIRP CALCULATION

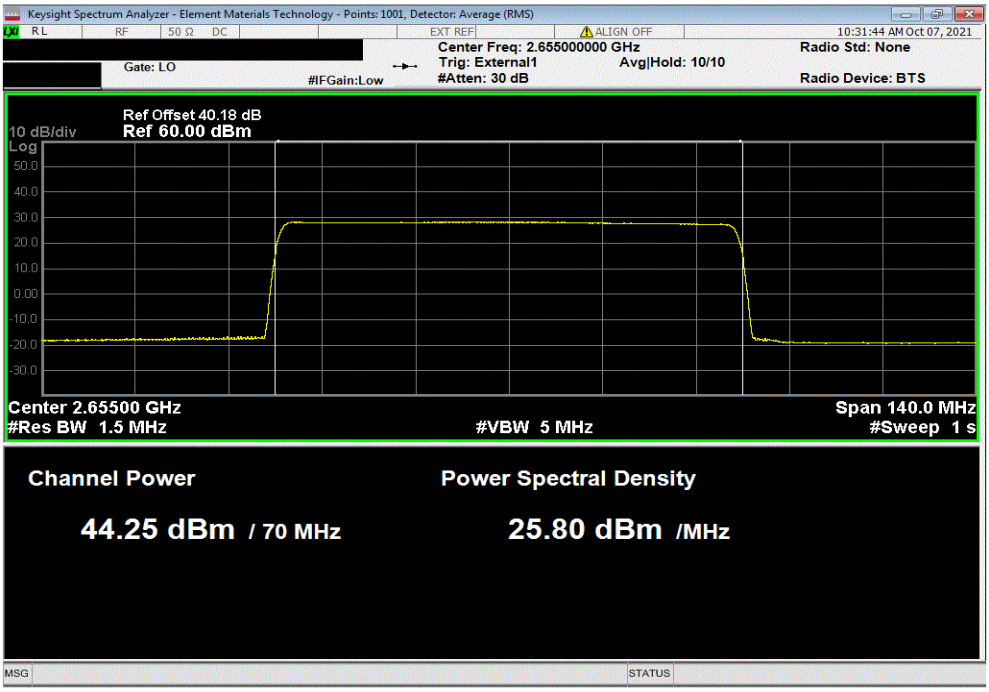
element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	43.981	0	43.981	46.981	49.981	52.981



Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR70) 70 MHz Bandwidth, 256QAM Modulation, High Channel 2655.00 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	44.252	0	44.252	47.252	50.252	53.252

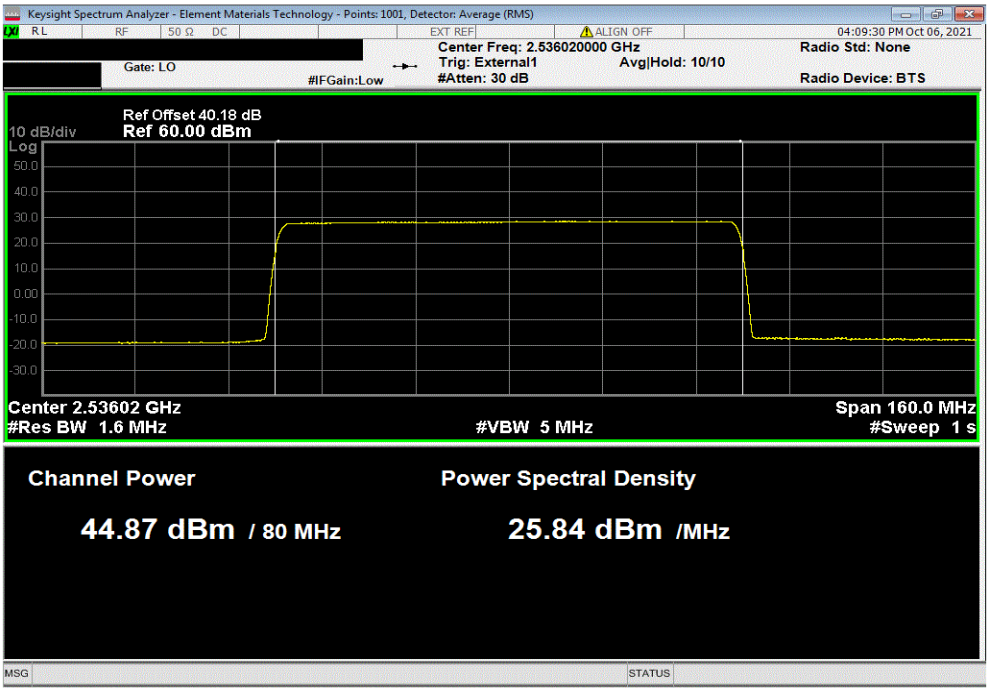


OUTPUT POWER - 5G NR & EIRP CALCULATION

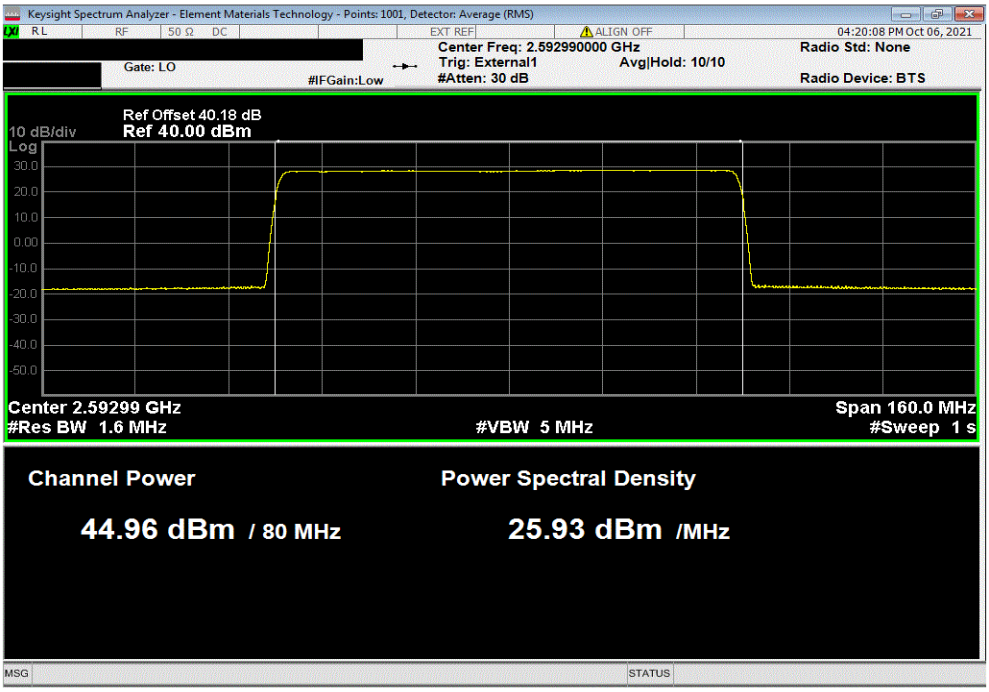
element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, Low Channel 2536.02 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	44.866	0	44.866	47.866	50.866	53.866

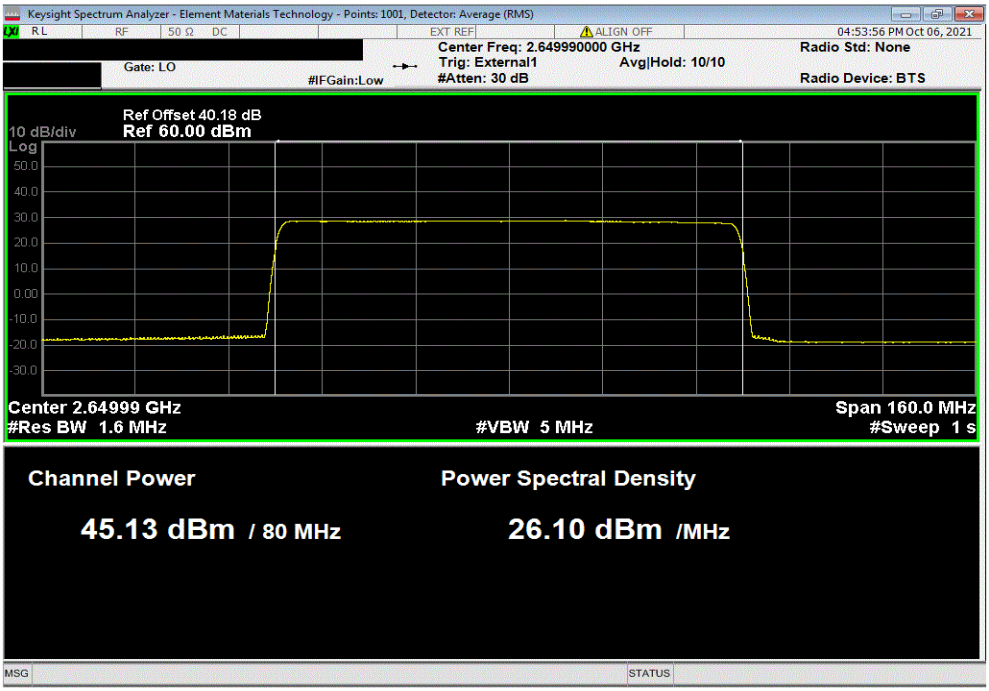


Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	44.957	0	44.957	47.957	50.957	53.957

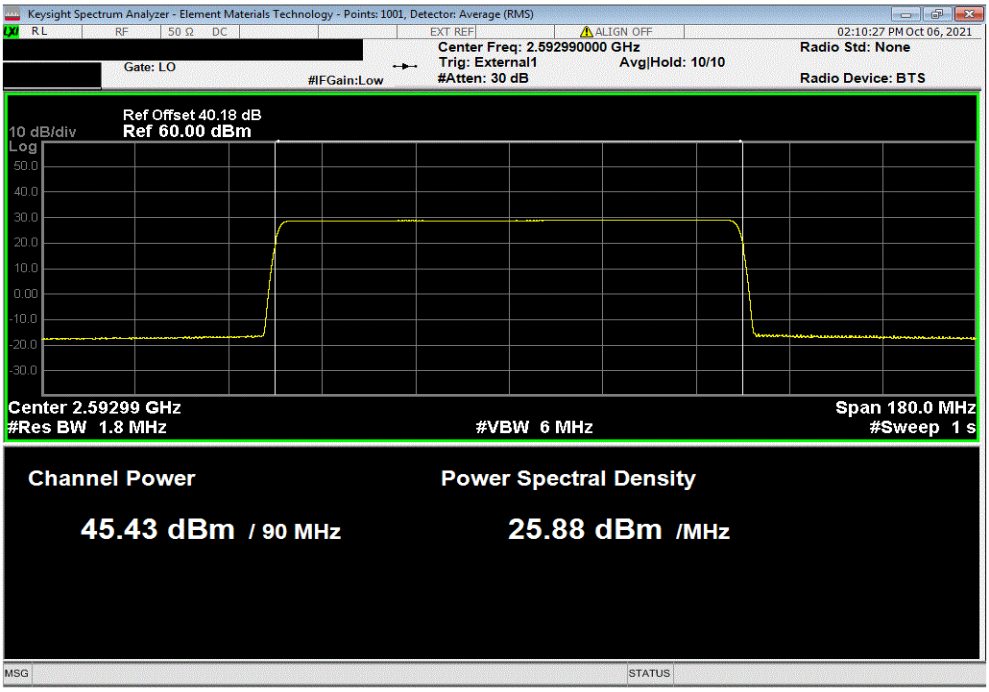


OUTPUT POWER - 5G NR & EIRP CALCULATION

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR80) 80 MHz Bandwidth, 256QAM Modulation, High Channel 2649.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.128	0	45.128	48.128	51.128	54.128



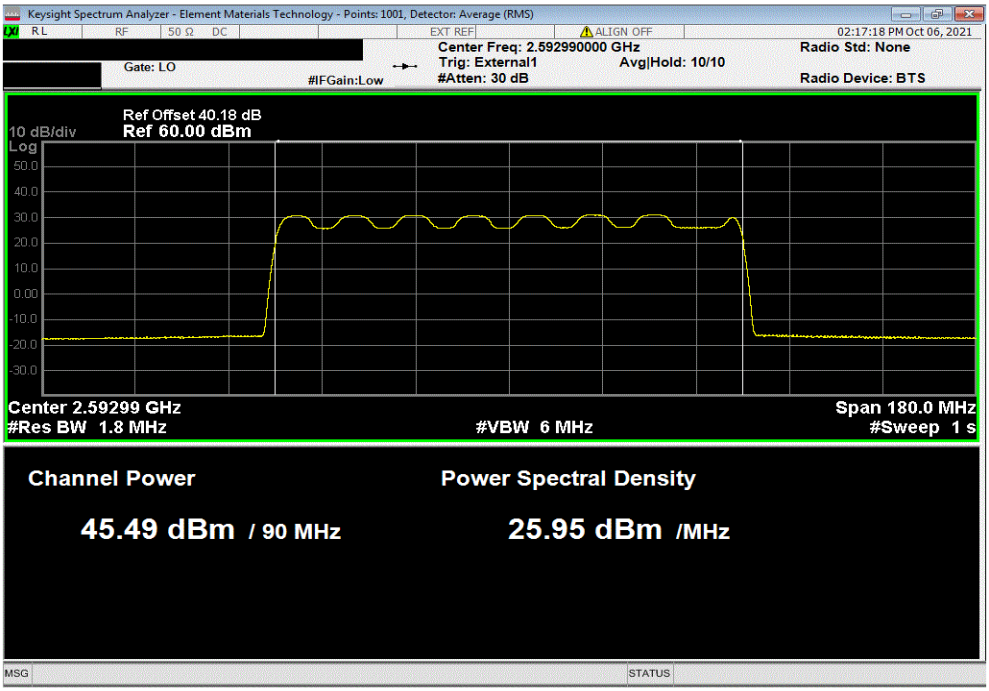
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, QPSK Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.426	0	45.426	48.426	51.426	54.426



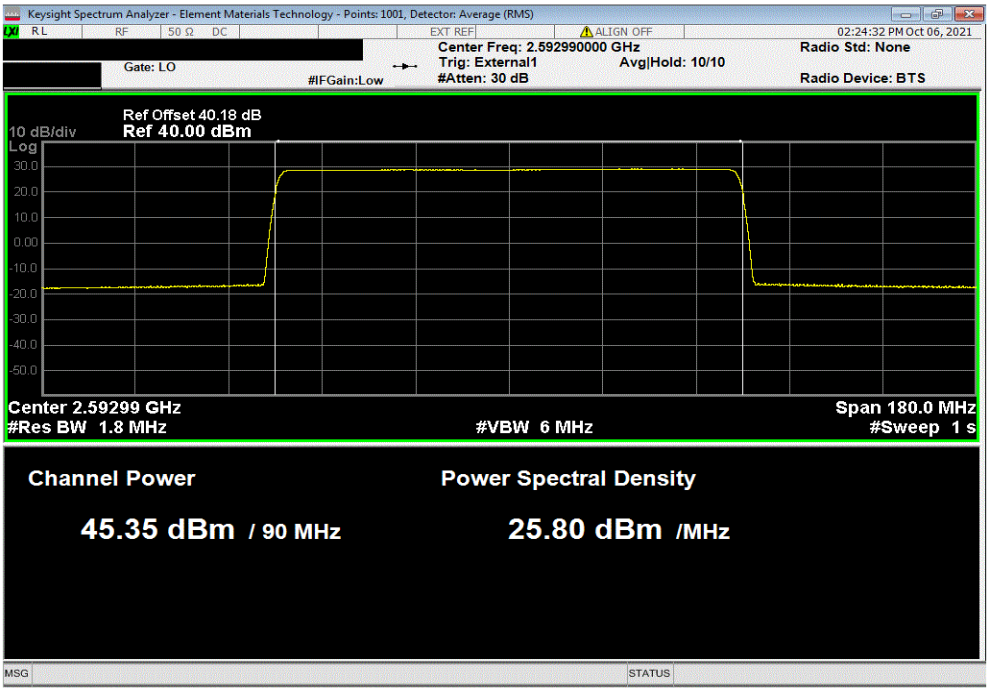
OUTPUT POWER - 5G NR & EIRP CALCULATION

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 16QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.492	0	45.492	48.492	51.492	54.492



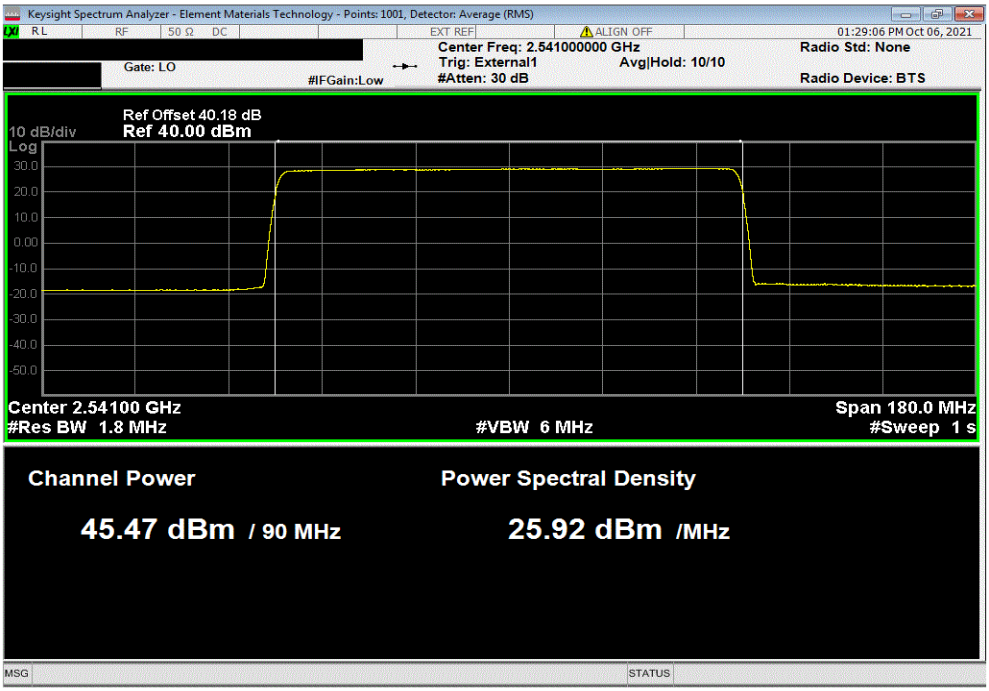
Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 64QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.347	0	45.347	48.347	51.347	54.347



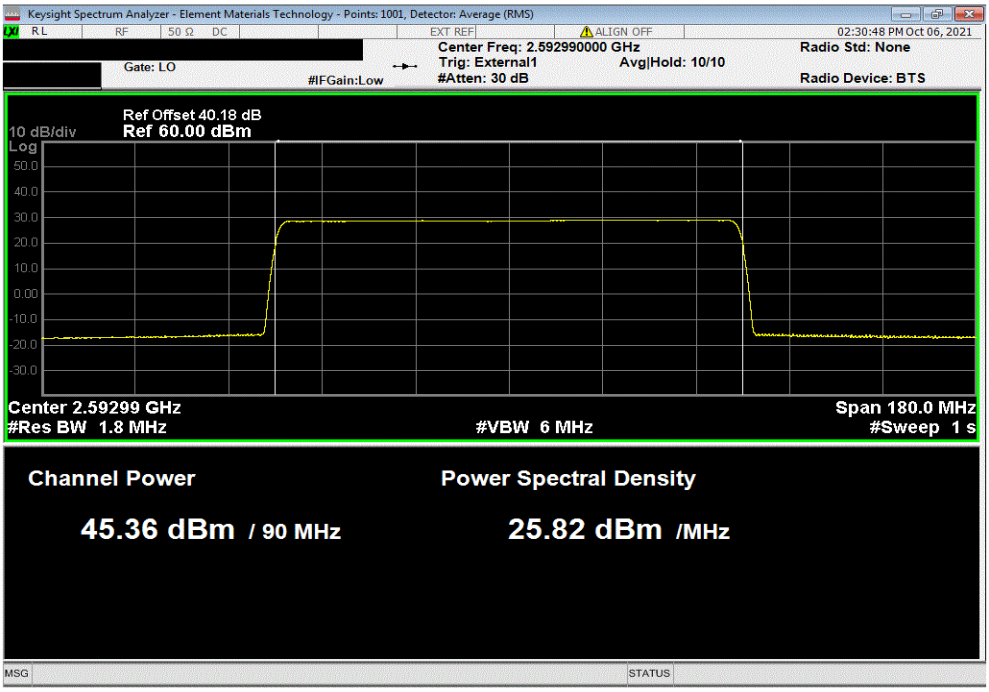
OUTPUT POWER - 5G NR & EIRP CALCULATION

TbtTx 2019.08.30.0 XMit 2020.12.30.0

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, Low Channel 2541.00 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.467	0	45.467	48.467	51.467	54.467

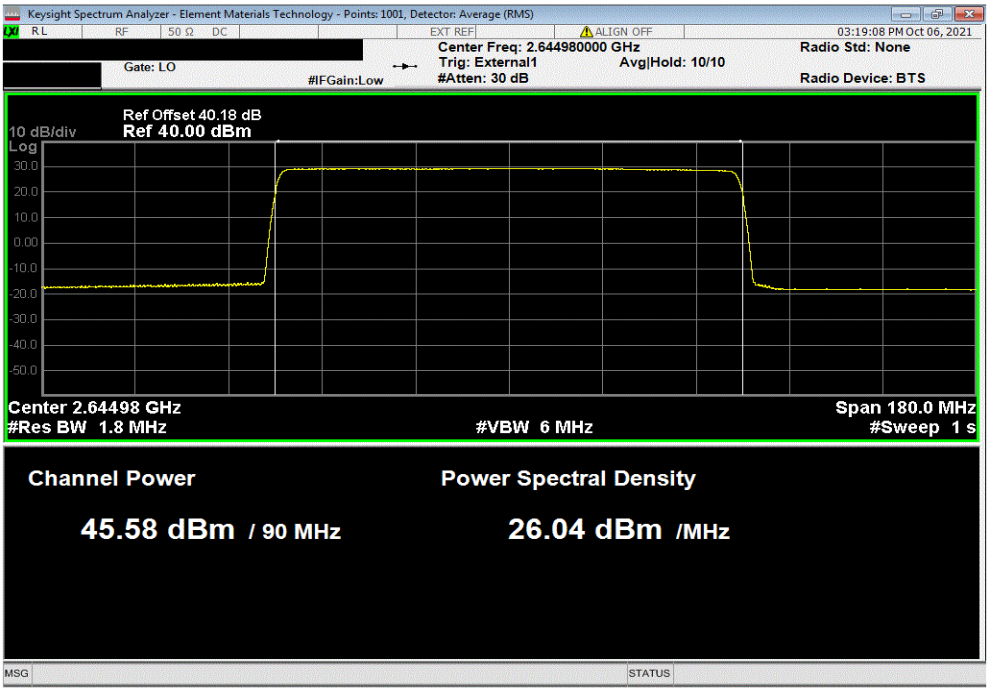


Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.359	0	45.359	48.359	51.359	54.359



OUTPUT POWER - 5G NR & EIRP CALCULATION

Port 1, 5G NR, Band n41, 2496 MHz - 2690 MHz, (NR90) 90 MHz Bandwidth, 256QAM Modulation, High Channel 2644.98 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	45.584	0	45.584	48.584	51.584	54.584



OUTPUT POWER - 5G NR & EIRP CALCULATION

element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

5G NR EIRP Calculations for Eight Port MIMO Operations

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regu latory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory r equirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and b ase station operational parameters (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer and this EIRP calculation is based upon a sample worst case antenna. The EIRP calculation is based upon the Commscope Planar Array Antenna model T4-90A-R1-V2. This antenna assembly has four columns with a maximum beamforming gain of 22. 3 ± 0.8dBi. The columns within the antenna have ±45° cross-polarized (orthogonal) radiators. The eight AZHL transmitter outputs are connected to the columns (four are connected to +45° radiators/antennas and four are connected to the -45° radiators/antennas). The AZHL provides transmitter outputs for one 4-column antenna.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26 -2015 section 6.4 for a system of correlated output signals) from the results of power measurements (highest measured average power for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent (will not be 0 dB) but for this worst case EIRP calculation 0 dB was used. Calculations of worst-case EIRP for eight port MIMO are as follows:

Parameter	20 MHz Ch BW	30 MHz Ch BW	40 MHz Ch BW	50 MHz Ch BW	60 MHz Ch BW	70 MHz Ch BW	80 MHz Ch BW	90 MHz Ch BW
Power Out /Radio Antenna Port	38.9 dBm or 7.8 W	40.9 dBm or 12.3 W	42.1 dBm or 16.2 W	43.1 dBm or 20.4 W	43.8 dBm or 24.0 W	44.3 dBm or 26.9 W	45.1 dBm or 32.4 W	45.6 dBm or 36.3 W
Cable Loss	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB	0 dB
Number of Ant Ports per Polarization	4	4	4	4	4	4	4	4
Total Power per Polarization	31.0 Watts or 44.9 dBm	49.2 Watts or 46.9 dBm	64.9 Watts or 48.1 dBm	81.7 Watts or 49.1 dBm	96.0 Watts or 49.8 dBm	107.7 Watts or 50.3 dBm	129.4 Watts or 51.1 dBm	145.2 Watts or 51.6 dBm
Maximum Antenna Beamforming Gain per Polarization	23.1 dBi	23.1 dBi	23.1 dBi	23.1 dBi	23.1 dBi	23.1 dBi	23.1 dBi	23.1 dBi
EIRP per Polarization	68.0 dBm or 6.34 kW	70.0 dBm or 10.0 kW	71.2 dBm or 13.2 kW	72.2 dBm or 16.7 kW	72.9 dBm or 19.6 kW	73.4 dBm or 22.0 kW	74.2 dBm or 26.4 kW	74.7 dBm or 29.7 kW
Number of Polarizations	2	2	2	2	2	2	2	2
EIRP Total (See Note 1)	68.0 dBm or 6.34 kW	70.0 dBm or 10.0 kW	71.2 dBm or 13.2 kW	72.2 dBm or 16.7 kW	72.9 dBm or 19.6 kW	73.4 dBm or 22.0 kW	74.2 dBm or 26.4 kW	74.7 dBm or 29.7 kW
EIRP Limit Calculation (See Note 2)	79.6 dBm	81.4 dBm	82.7 dBm	83.6 dBm	84.4 dBm	85.1 dBm	85.7 dBm	86.2 dBm

Note 1: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).
Note 2: The EIRP limit is defined by FCC part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. The Commscope model T4-90A-R1-V2 antenna has a horizontal beamwidth of 26 degrees. Y was selected to be 6MHz for this cal culation.

Calculation Summary

The worst case AZHL eight port MIMO EIRP levels for all 5G NR channel bandwidths using the Commscope antenna assembly model “T4-90A-R1-V2” are less than the FCC regulatory limits.

OUTPUT POWER - 4G LTE & EIRP CALCULATION

XMit 2020.12.30.0

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
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Block - DC	Fairview Microwave	SD3239	ANC	2021-06-24	2022-06-24

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the follwoing data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed only on one port. The AZHL antenna ports are essentially electrically identical (the RF power variation between antenna ports is small as shown during 8 port output power testing) and antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

The total average transmit power of all antenna ports was determined per ANSI C63.26-2105 paragraph 6.4.3.1.

The EIRP limit is defined by FCC Part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. PSD (power/1MHz) measurements are not required for this radio since the FCC limits for EIRP are defined in watts.

OUTPUT POWER - 4G LTE & EIRP CALCULATION

element

TbiTx 2021.03.19.1 XMit 2020.12.30.0

EUT:	AZHL (C2PC LTE/5G NR B41)			**Work Order:**	NOKI0035
Serial Number:	YK203400025			**Date:**	13-Oct-21
Customer:	Nokia Solutions and Networks			**Temperature:**	22.6 °C
Attendees:	David Le, John Rattanavong			**Humidity:**	52.6% RH
Project:	None			**Barometric Pres.:**	1011 mbar
Tested by:	Brandon Hobbs	**Power:**	54 VDC	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 27:2021	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n41 carriers and enabled at maximum power. External 1 gating was set using a trig delay = 5.044ms and a gate length = 6.8061ms. The following is the output power measurements at the radio output ports. The output power was measured for a single carrier channel bandwidth on port 1. The total output power for multiport (2x2 MIMO, 4x4 MIMO and 8x8 MIMO) operation was determined based upon ANSI C63.26 clauses 6.4.3.1 and 6.4.3.2.4 (10 Log Nout). The total output power for two port operation is single port power + 3dB [i.e.: 10 Log(2)]. The total output power for four port operation is single port power + 6dB [i.e.: 10 Log(4)]. The total output power for eight port operation is single port power + 9dB [i.e.: 10 Log(8)].

DEVIATIONS FROM TEST STANDARD

None

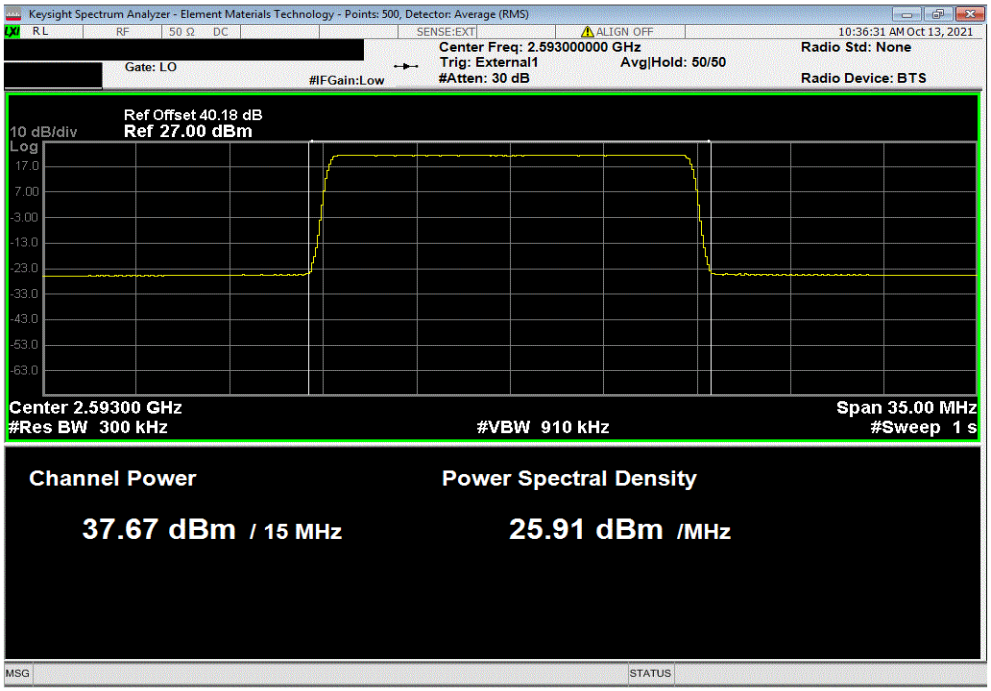
Configuration #	2	Signature

		Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
4G LTE, Band 41, 2496 MHz - 2690 MHz							
Port 1							
LTE15 (15MHz)							
QPSK							
	Mid Channel 2593 MHz	37.674	0	37.7	40.7	43.7	46.7
16QAM							
	Mid Channel 2593 MHz	37.892	0	37.9	40.9	43.9	46.9
64QAM							
	Mid Channel 2593 MHz	37.853	0	37.9	40.9	43.9	46.9
256QAM							
	Low Channel 2503.5 MHz	37.777	0	37.8	40.8	43.8	46.8
	Mid Channel 2593 MHz	37.813	0	37.8	40.8	43.8	46.8
	High Channel 2682.5 MHz	37.716	0	37.7	40.7	43.7	46.7
LTE20 (20MHz)							
256QAM							
	Low Channel 2506 MHz	39.023	0	39.0	42.0	45.0	48.0
	Mid Channel 2593 MHz	39.100	0	39.1	42.1	45.1	48.1
	High Channel 2680 MHz	39.055	0	39.1	42.1	45.1	48.1

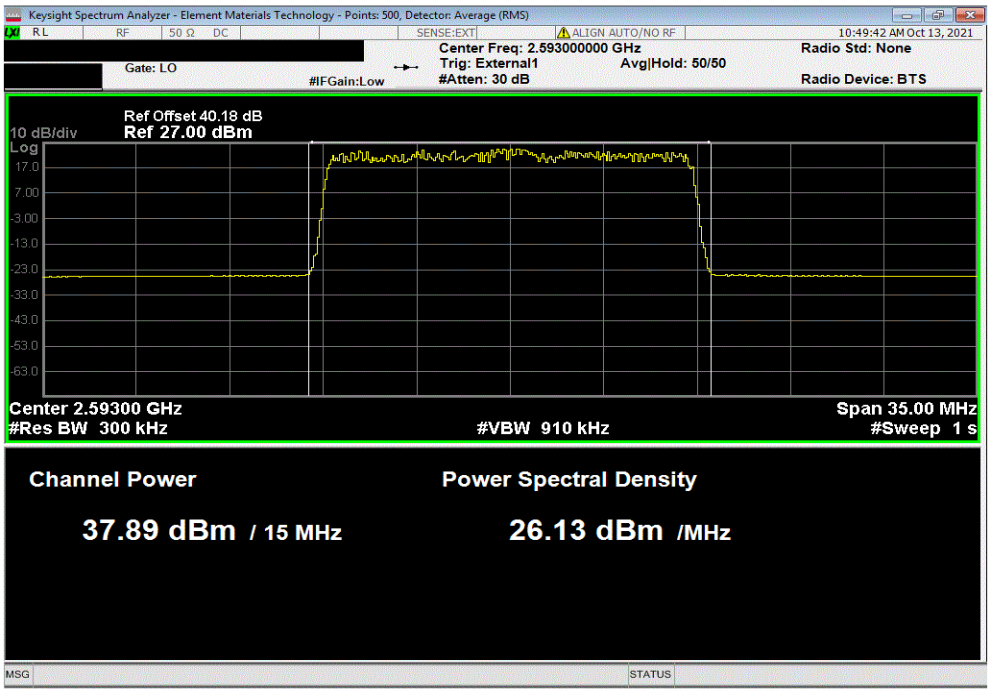
OUTPUT POWER - 4G LTE & EIRP CALCULATION

TbtTx 2021.03.19.1 XMit 2020.12.30.0

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), QPSK, Mid Channel 2593 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.674	0	37.674	40.674	43.674	46.674

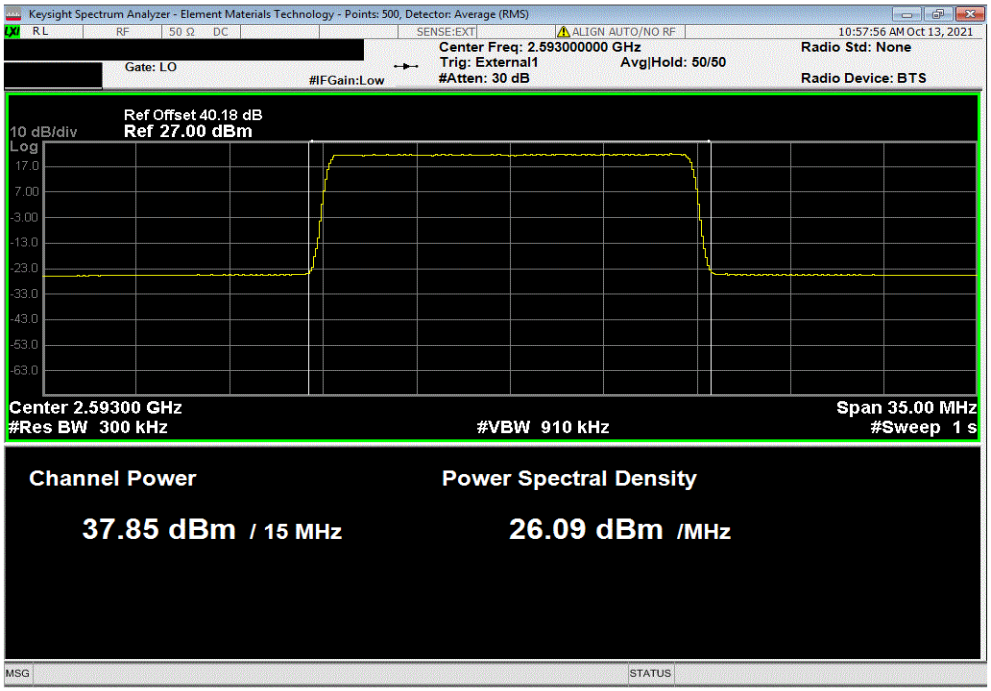


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 16QAM, Mid Channel 2593 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.892	0	37.892	40.892	43.892	46.892

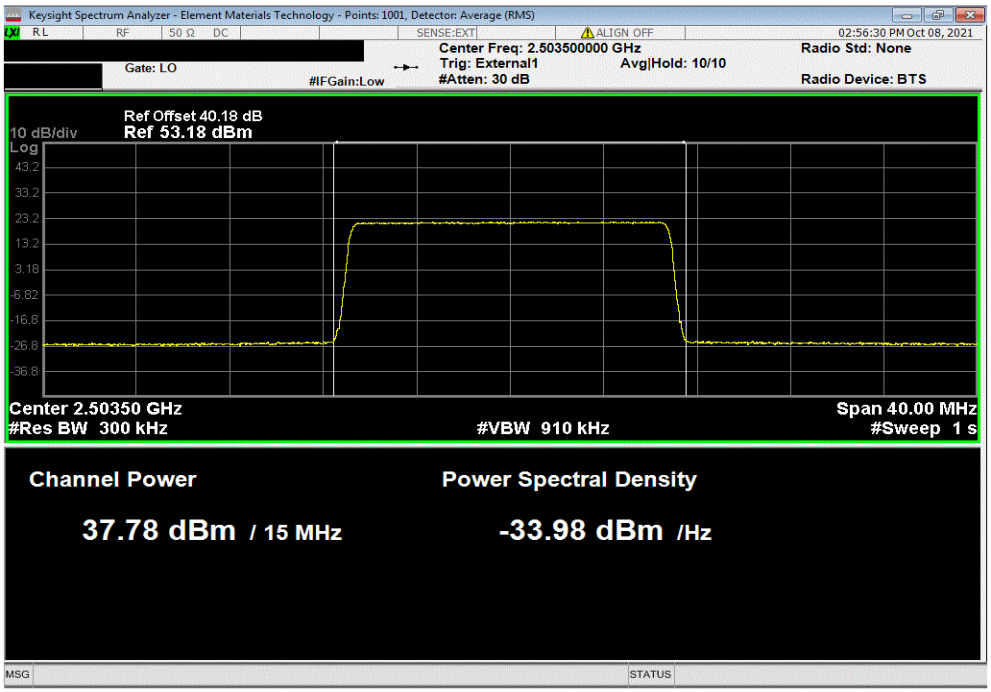


OUTPUT POWER - 4G LTE & EIRP CALCULATION

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 64QAM, Mid Channel 2593 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.853	0	37.853	40.853	43.853	46.853



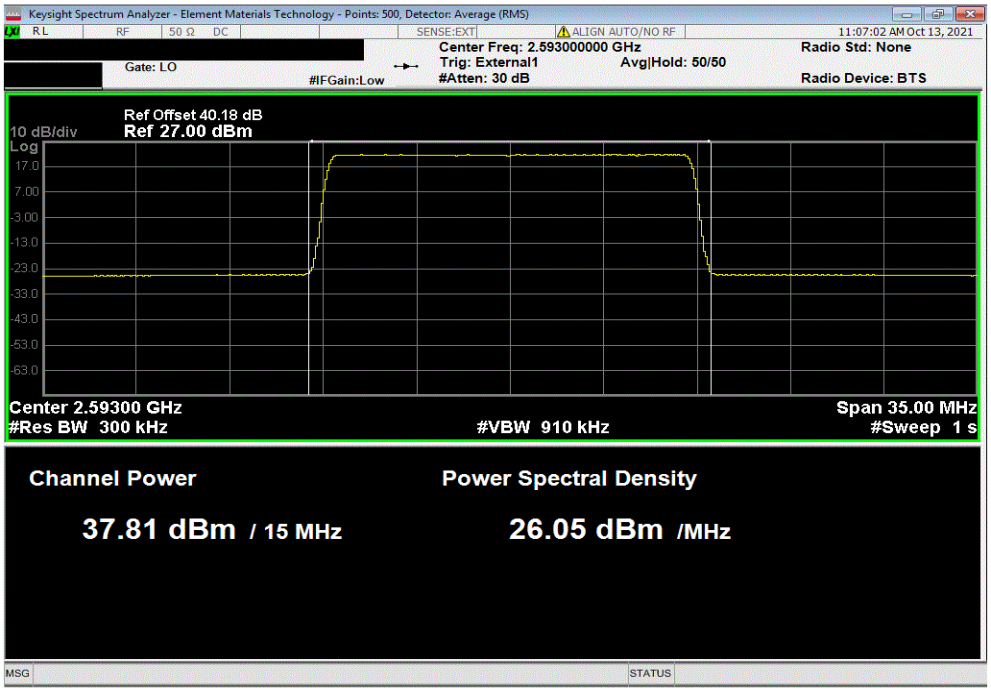
4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, Low Channel 2503.5 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.777	0	37.777	40.777	43.777	46.777



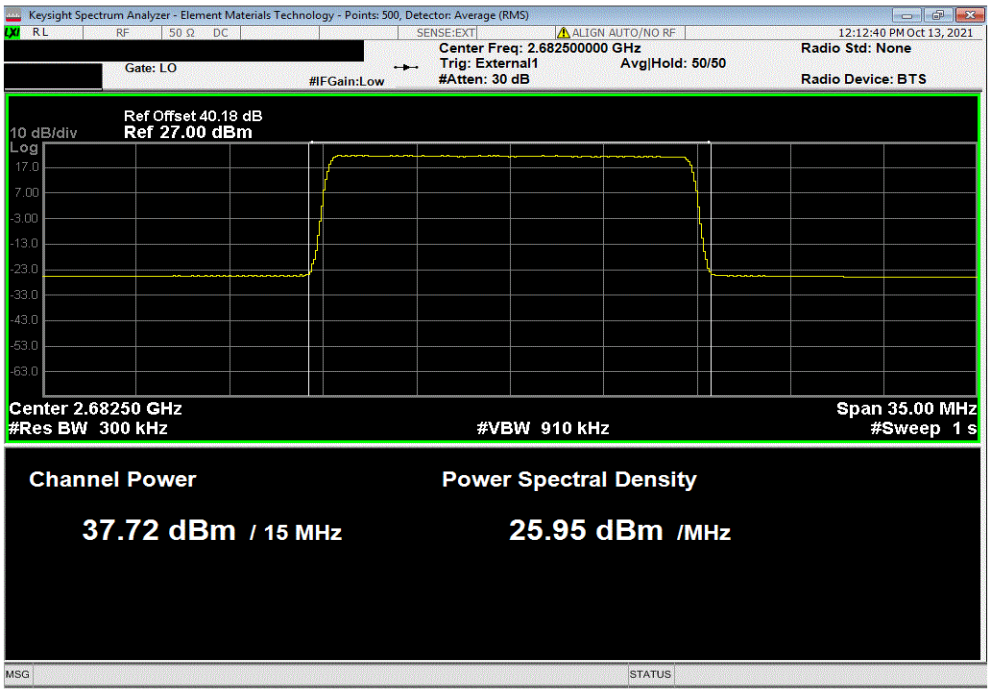
OUTPUT POWER - 4G LTE & EIRP CALCULATION

TbtTx 2021.03.19.1 XMit 2020.12.30.0

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, Mid Channel 2593 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.813	0	37.813	40.813	43.813	46.813

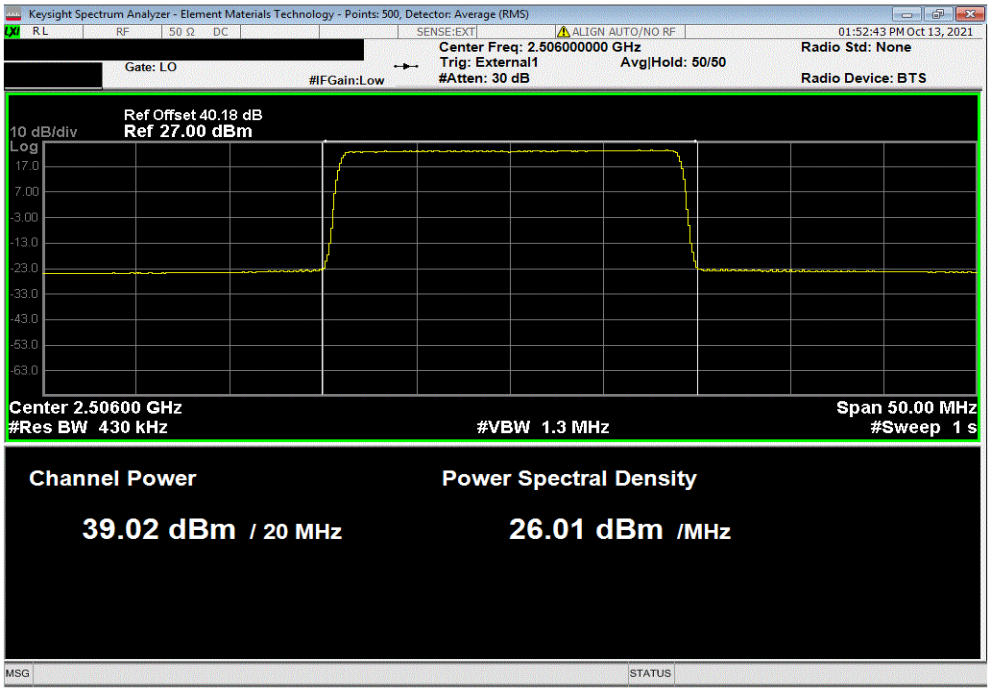


4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE15 (15MHz), 256QAM, High Channel 2682.5 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	37.716	0	37.716	40.716	43.716	46.716

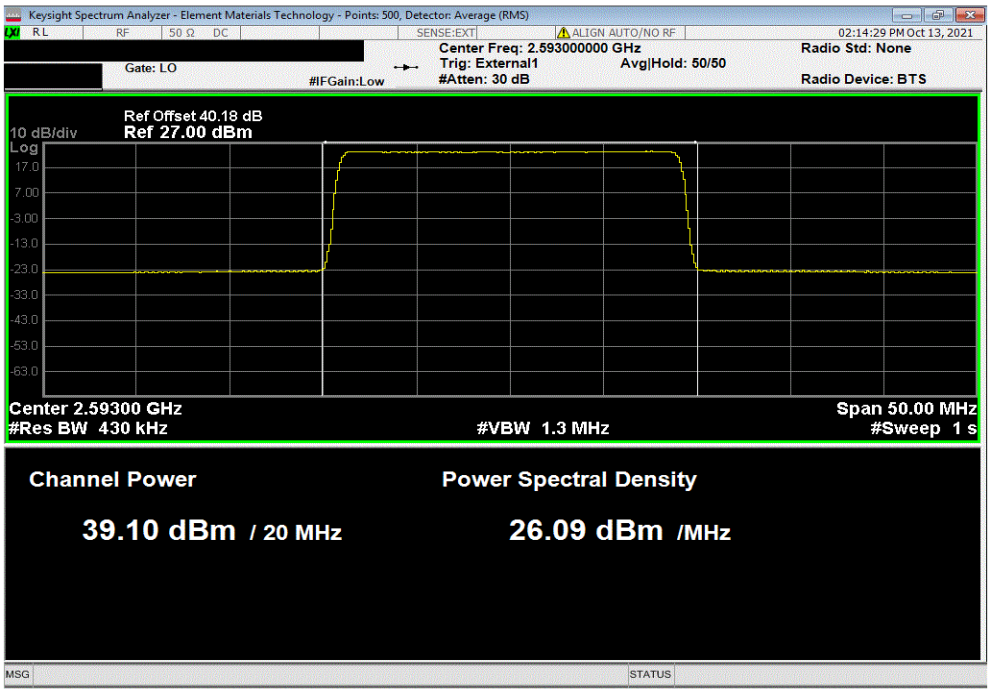


OUTPUT POWER - 4G LTE & EIRP CALCULATION

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, Low Channel 2506 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	39.023	0	39.023	42.023	45.023	48.023



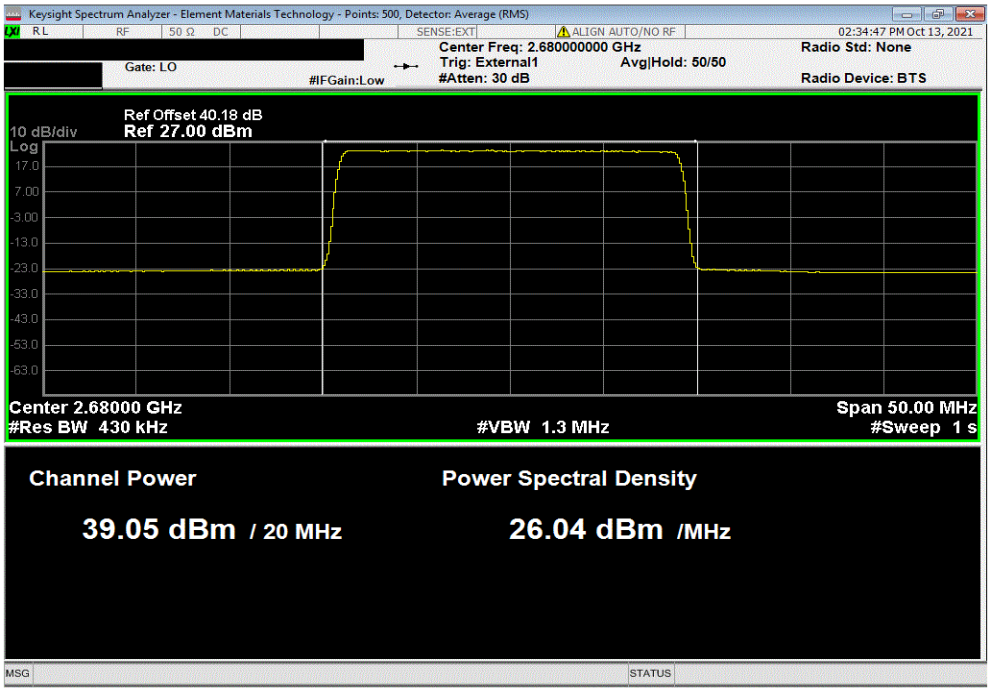
4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, Mid Channel 2593 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	39.1	0	39.1	42.1	45.1	48.1



OUTPUT POWER - 4G LTE & EIRP CALCULATION

TbtTx 2021.03.19.1 XMit 2020.12.30.0

4G LTE, Band 41, 2496 MHz - 2690 MHz, Port 1, LTE20 (20MHz), 256QAM, High Channel 2680 MHz						
	Initial Value dBm/Carrier BW	Duty Cycle	Single Port dBm/Carrier BW	2 Port (2x2 MIMO) dBm/Carrier BW	4 Port (4x4 MIMO) dBm/Carrier BW	8 Port (8x8 MIMO) dBm/Carrier BW
	39.055	0	39.055	42.055	45.055	48.055



OUTPUT POWER - 4G LTE & EIRP CALCULATION

element

TbtTx 2021.03.19.1 XMit 2020.12.30.0

4G LTE EIRP Calculations for Eight Port MIMO Operations

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regu latory requirements. Each cell site installation needs to consider the power measurements in the radio certification report as well as site specific regulatory requirements (such as antenna height, population density, etc.), site installation parameters (line loss between antenna and radio, antenna parameters, etc.) and base station operational paramete rs (MIMO operational setup, carrier power level, channel bandwidth, modulation type, etc.) to optimize performance. Transmitter output power may be reduced (from maximum) by base station setup parameters. Base station antennas are selected by the customer.

The base station antenna is selected by the customer and this EIRP calculation is based upon a sample worst case antenna. The EIRP calculation is based upon the Commscope Planar Array Antenna model T4-90A-R1-V2. This antenna assembly has four columns with a maximum beamforming gain of 22.3 ± 0.8dBi. The columns within the antenna have ±45° cross-polarized (orthogonal) radiators. The eight AZHL transmitter outputs are connected to the columns (four are connected to +45° radiators/antennas and four are connected to the -45° radiators/antennas). The AZHL provides transmitter outputs for one 4-column antenna.

Equivalent Isotropically Radiated Power (EIRP) is calculated (as specified in ANSI C63.26-2015 section 6.4 for a system of correlated output signals) from the results of power measurements (highest measured average power for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. The cable loss between the antenna and transmitter is site dependent (will not be 0 dB) but for this worst case EIRP calculation 0 dB w as used. Calculations of worst-case EIRP for eight port

Parameter	15 MHz Ch BW	20 MHz Ch BW
Power Out /Radio Antenna Port	37.9 dBm or 6.2 W	39.1 dBm or 8.1 W
Cable Loss	0 dB	0 dB
Number of Ant Ports per Polarization	4	4
Total Power per Polarization	24.7 Watts or 43.9 dBm	32.5 Watts or 45.1 dBm
Maximum Antenna Beamforming Gain per Polarization	23.1 dBi	23.1 dBi
EIRP per Polarization	67.0 dBm or 5.0 kW	68.2 dBm or 6.6 kW
Number of Polarizations	2	2
EIRP Total (See Note 1)	67.0 dBm or 5.0 kW	68.2 dBm or 6.6 kW
EIRP Limit Calculation (See Note 2)	78.4 dBm	79.6 dBm

Note 1: The EIRP per antenna polarity is required to be below the regulatory limit as described in ANSI C63.26-2015 section 6.4.6.3 b)2) and KDB 662911 D02v01 page 3 example (2) since the two transmitter outputs to each antenna are 90 degree-phase shifted relative to each other (cross-polarized radiators).
Note 2: The EIRP limit is defined by FCC part 27.50(h)(ii) as 33dBW+ 10Log(X/Y) dBW + 10 log(360/beamwidth) dBW where X is the channel width in MHz and Y is 5.5 or 6MHz. The Commscope model T4-90A-R1-V2 antenna has a horizontal beamwidth of 26 degrees. Y was selected to be 6MHz for this calculation.

Calculation Summary

The worst case AZHL eight port MIMO EIRP levels for all 4G LTE channel bandwidths using the Commscope antenna assembly model “T4-90A-R1-V2” are less than the FCC regulatory limits.

OUTPUT POWER - ALL PORTS

XMit 2020.12.30.0

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
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFL	2021-03-11	2022-03-11
Block - DC	Fairview Microwave	SD3239	ANC	2021-06-24	2022-06-24
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The fundamental emission output power (maximum average conducted output power) was measured using the channels and modes as called out on the follwoing data sheets. The transmit power was set to its default maximum.

The method in section 5.2.4.4 of ANSI C63.26 was used to make the measurements. This method uses trace averaging across the ON and OFF times of the EUT transmissions in the spectrum analyzer channel power function using an RMS detector. Following the measurement a duty cycle correction was applied by adding [10 log (1/D)], where D is the duty cycle in decimal, to the measured power to compute the average power during the actual transmission times.

RF conducted emissions testing was performed on all ports at NR100 middle channel in order to prove the AZHL antenna ports are essentially electrically identical. Antenna port 1 was selected to perform the testing under this effort as allowed by ANSI C63.26-2015 paragraphs 5.2.5.3, 5.7.2i and 6.4.

OUTPUT POWER - ALL PORTS

element

TbtTx 2019.08.30.0 XMit 2020.12.30.0

EUT:	AZHL (C2PC LTE/5G NR B41)			**Work Order:**	NOKI0035
Serial Number:	YK203400025			**Date:**	8-Oct-21
Customer:	Nokia Solutions and Networks			**Temperature:**	20.9 °C
Attendees:	David Le, John Rattanavong			**Humidity:**	51.1% RH
Project:	None			**Barometric Pres.:**	1021 mbar
Tested by:	Brandon Hobbs	**Power:**	54 VDC	**Job Site:**	TX09

TEST SPECIFICATIONS	Test Method
FCC 27:2021	ANSI C63.26:2015

COMMENTS

All losses in the measurement path were accounted for: attenuators, cables, DC block and filter when in use. Band n41 carriers and enabled at maximum power (40 watts/carrier). External 1 gating was set using a trig delay = 86.2us and a gate length = 3.714ms.

DEVIATIONS FROM TEST STANDARD

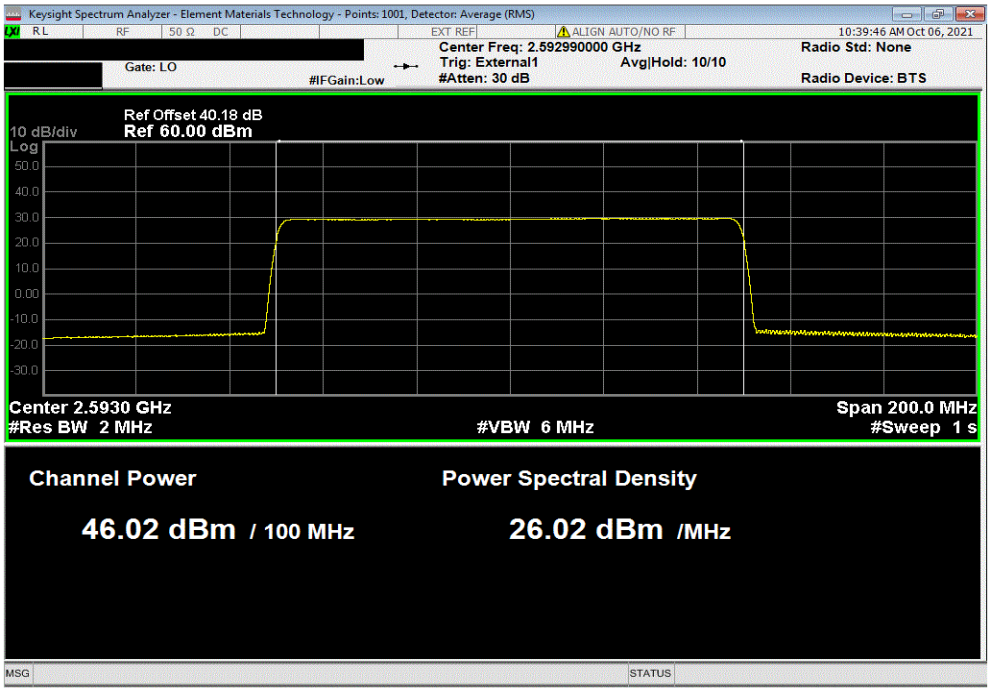
None

Configuration #	2	Signature

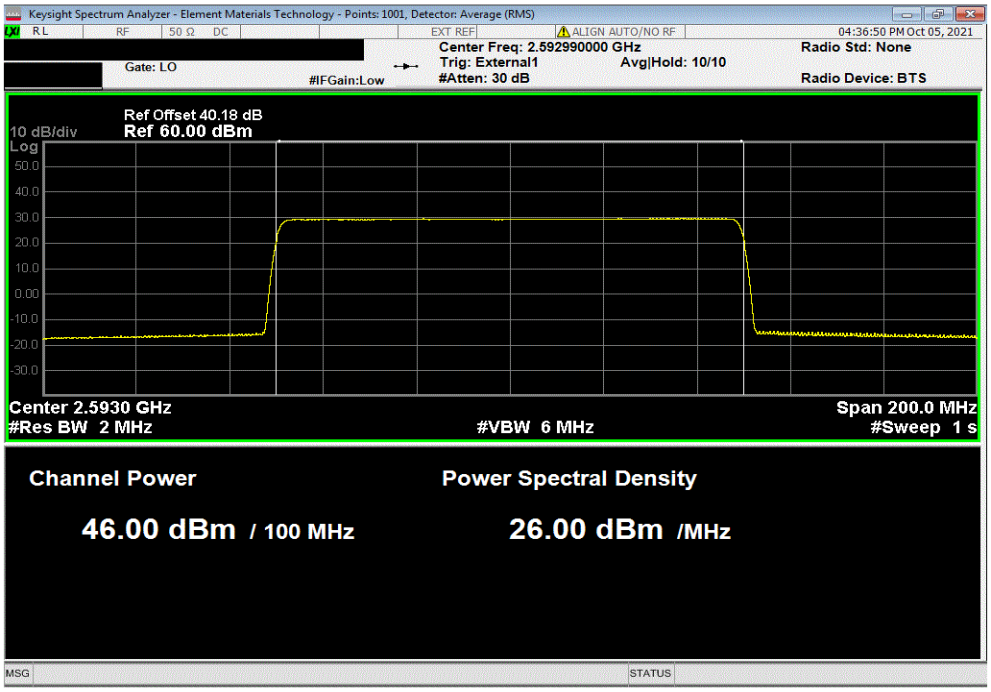
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
5G NR, Band n41, 2496 MHz - 2690 MHz						
(NR100) 100 MHz Bandwidth						
256QAM Modulation						
Mid Channel 2592.99 MHz						
Port 1	46.023	0	46.0	N/A	Within Tolerance	N/A
Port 2	46.000	0	46.0	N/A	Within Tolerance	N/A
Port 3	45.869	0	45.9	N/A	Within Tolerance	N/A
Port 4	46.233	0	46.2	N/A	Within Tolerance	N/A
Port 5	46.023	0	46.0	N/A	Within Tolerance	N/A
Port 6	46.038	0	46.0	N/A	Within Tolerance	N/A
Port 7	46.146	0	46.1	N/A	Within Tolerance	N/A
Port 8	46.230	0	46.2	N/A	Within Tolerance	N/A
All Ports	N/A	0	N/A	55.1	N/A	N/A

OUTPUT POWER - ALL PORTS

5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 1						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.023	0	46	N/A	Within Tolerance	N/A

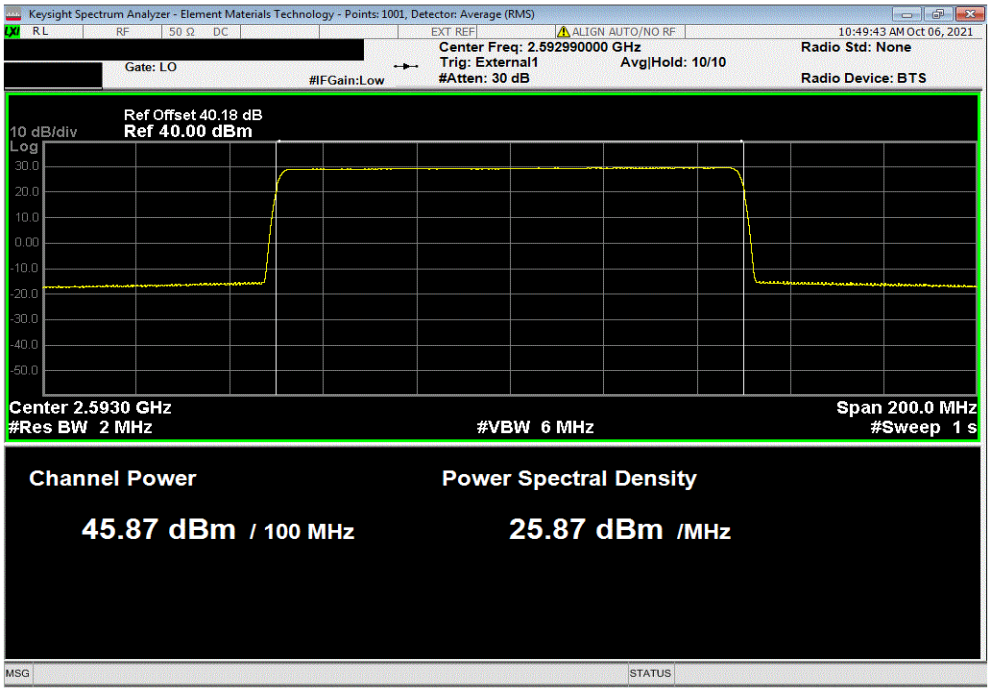


5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 2						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46	0	46	N/A	Within Tolerance	N/A

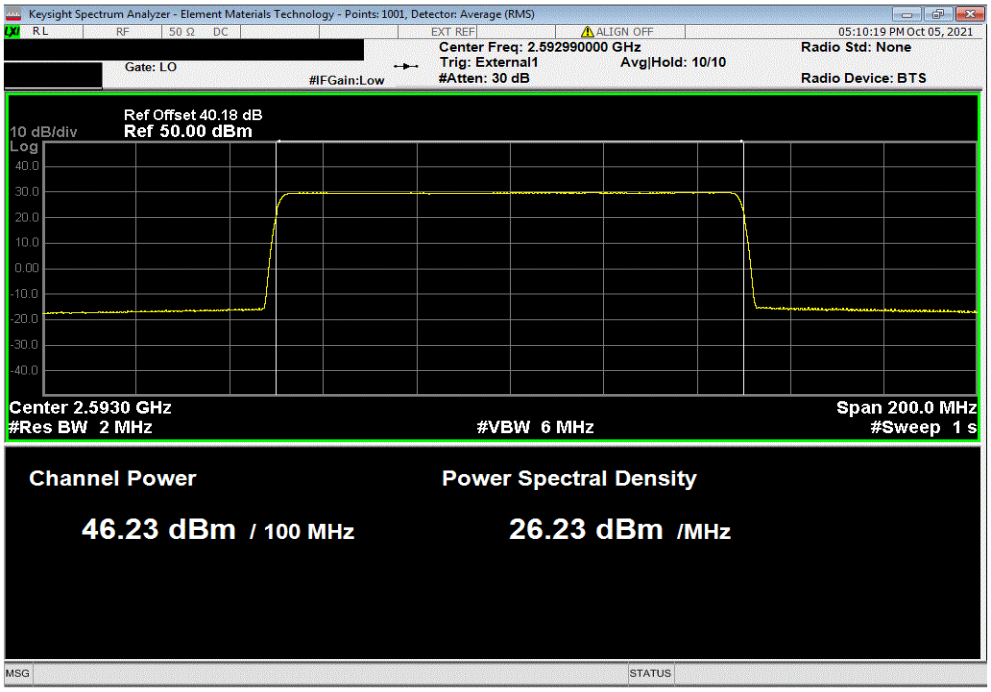


OUTPUT POWER - ALL PORTS

5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 3						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	45.869	0	45.9	N/A	Within Tolerance	N/A

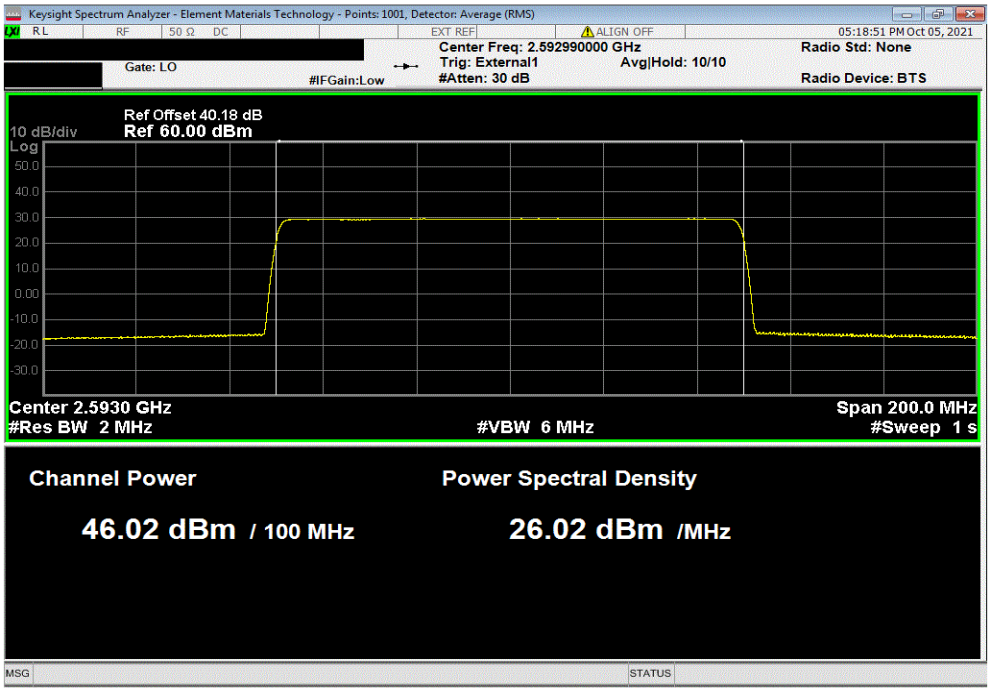


5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 4						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.233	0	46.2	N/A	Within Tolerance	N/A

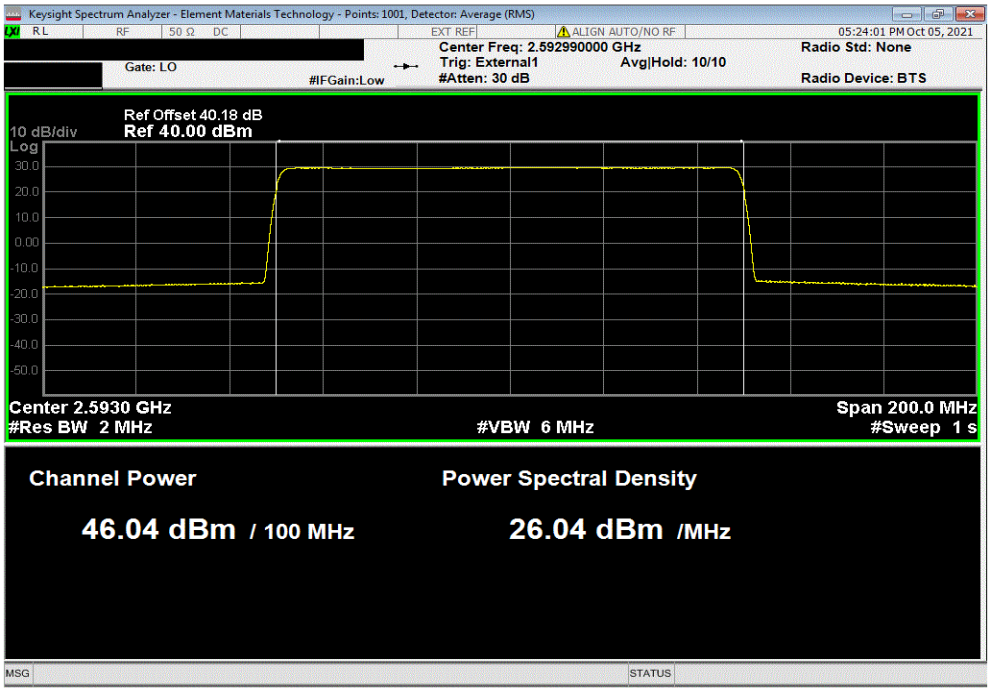


OUTPUT POWER - ALL PORTS

5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 5						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.023	0	46	N/A	Within Tolerance	N/A

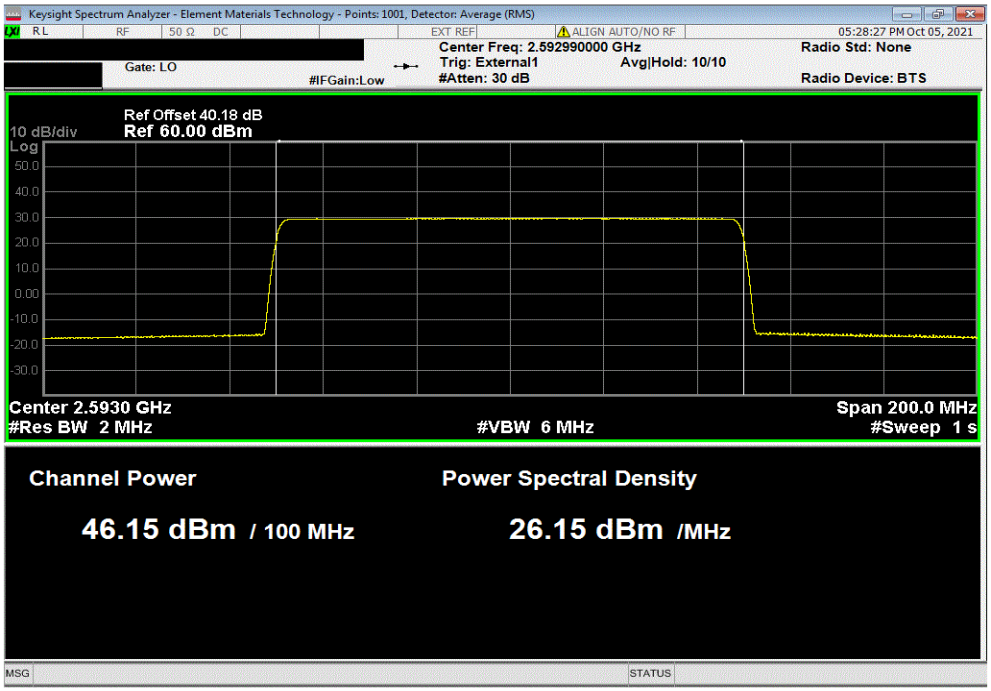


5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 6						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.038	0	46	N/A	Within Tolerance	N/A

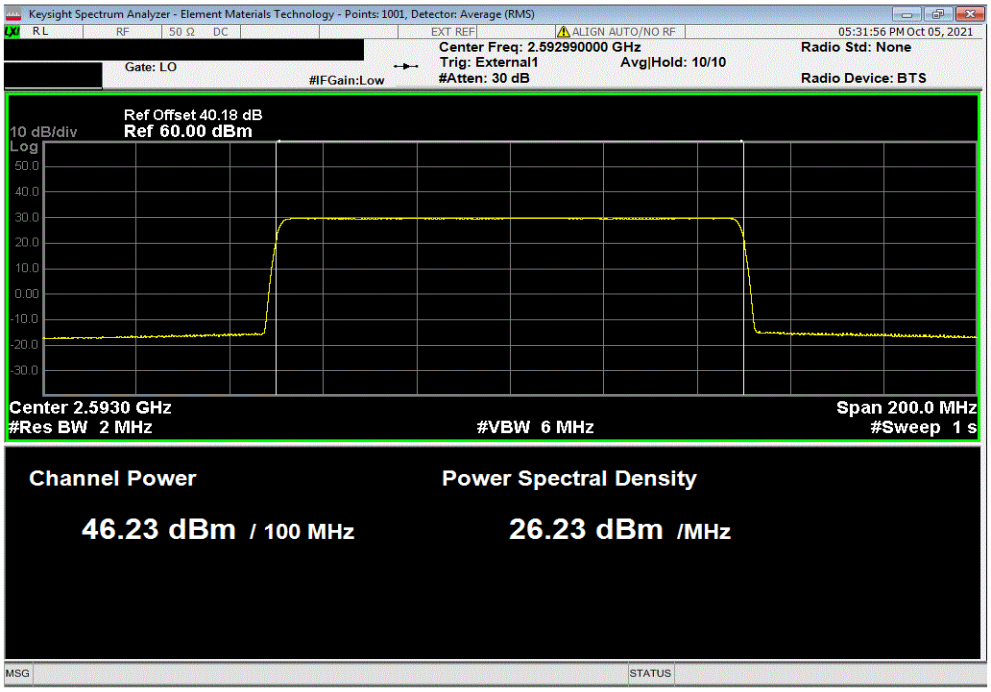


OUTPUT POWER - ALL PORTS

5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 7						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.146	0	46.1	N/A	Within Tolerance	N/A



5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 8						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	46.23	0	46.2	N/A	Within Tolerance	N/A



OUTPUT POWER - ALL PORTS

5G NR, Band n41, 2496 MHz - 2690 MHz, (NR100) 100 MHz Bandwidth, 256QAM Modulation, Mid Channel 2592.99 MHz, Port 7						
	Avg Cond Pwr (dBm)	Duty Cycle Factor (dB)	Value (dBm)	All Ports Value (dBm)	Limit	Results
	N/A	0	N/A	55.1	N/A	N/A

AVERAGE POWER PORT SUMMING									
	PORT 1	PORT 2	PORT 3	PORT 4	PORT 5	PORT 6	PORT 7	PORT 8	SUM TOTAL
INITIAL VALUE (dBm)	46.023	46.000	45.869	46.233	46.023	46.038	46.146	46.230	N/A
INITIAL VALUE (Watts)	40.0	39.8	38.6	42.0	40.0	40.2	41.2	42.0	323.8
TOTAL VALUE (dBm)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**55.1**