

POWER SPECTRAL DENSITY SINGLE 3.45G



XMit 2022.02.07.0

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	2022-03-02	2023-03-02
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2022-09-08	2023-09-08
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 power spectral density was measured using the channels and modes as called out on the following data sheets.

The method of ANSI C63.26-2015 section 5.2.4.5 was used to make this measurement.

RF conducted emissions testing was performed on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section) and the antenna port 57 for the 3.45GHz band was selected to perform the testing for this effort.

The total PSD for all antenna ports (at the radio output) were determined per ANSI C63.26-2015 paragraph 6.4.3.2.4. The EIRP calculations are based upon ANSI C63.26-2015 paragraphs 6.4 and 6.4.6.3.

FCC Requirements: §27.50 Power limits and duty cycle.

27.50 (k) The following power requirements apply to stations transmitting in the 3450-3550 MHz band:

(1) The power of each fixed or base station transmitting in the 3450-3550 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3450-3550 MHz band and situated in any geographic location other than that described in paragraph (k)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

POWER SPECTRAL DENSITY SINGLE 3.45G



TxDx 2022.06.03.0 XM6 2022.02.07.0

EUT: AQQQA	Work Order: NOKI0052			
Serial Number: YK224300010	Date: 16-Jan-23			
Customer: Nokia of America Corporation	Temperature: 21.5 °C			
Attendees: John Rattanavong, Michell Hill	Humidity: 46% RH			
Project: None	Barometric Pres.: 1011 mbar			
Tested by: Brandon Hobbs	Job Site: TX07			
TEST SPECIFICATIONS	Power: 54 VDC			
FCC 27:2023	Test Method: ANSI C63.26:2015			
COMMENTS	All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carriers were enabled at maximum power levels. The PSD was measured while transmitting one carrier on Port 57. The total PSD for multiport (64x64 MIMO) operation was determined based upon ANSI 63.26 clause 6.4.3.2.4 (10 Log Nout). The total PSD for sixty four port operation is single port PSD +18.1dB [i.e. 10 Log(64)].			
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	5			
Signature:				
	Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD
Port 57				
Band n77, 3450 - 3550 MHz 20 MHz Bandwidth				
QPSK Modulation				
Low Channel, 3460.02 MHz	22.400	0	22.4	40.5
Mid Channel, 3500.01 MHz	22.391	0	22.4	40.5
High Channel, 3540.00 MHz	22.412	0	22.4	40.5
16QAM Modulation				
Low Channel, 3460.02 MHz	23.592	0	23.6	41.7
Mid Channel, 3500.01 MHz	23.618	0	23.6	41.7
High Channel, 3540.00 MHz	23.643	0	23.6	41.7
64QAM Modulation				
Low Channel, 3460.02 MHz	22.564	0	22.6	40.7
Mid Channel, 3500.01 MHz	22.513	0	22.5	40.6
High Channel, 3540.00 MHz	22.529	0	22.5	40.6
256QAM Modulation				
Low Channel, 3460.02 MHz	22.460	0	22.5	40.6
Mid Channel, 3500.01 MHz	22.458	0	22.5	40.6
High Channel, 3540.00 MHz	22.390	0	22.4	40.5
30 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3500.01 MHz	20.523	0	20.5	38.6
16QAM Modulation				
Mid Channel, 3500.01 MHz	22.298	0	22.3	40.4
64QAM Modulation				
Mid Channel, 3500.01 MHz	20.627	0	20.6	38.7
256QAM Modulation				
Mid Channel, 3500.01 MHz	20.255	0	20.3	38.4
40 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3500.01 MHz	19.714	0	19.7	37.8
16QAM Modulation				
Mid Channel, 3500.01 MHz	21.634	0	21.6	39.7
64QAM Modulation				
Mid Channel, 3500.01 MHz	19.876	0	19.9	38.0
256QAM Modulation				
Mid Channel, 3500.01 MHz	20.080	0	20.1	38.2

POWER SPECTRAL DENSITY SINGLE 3.45G

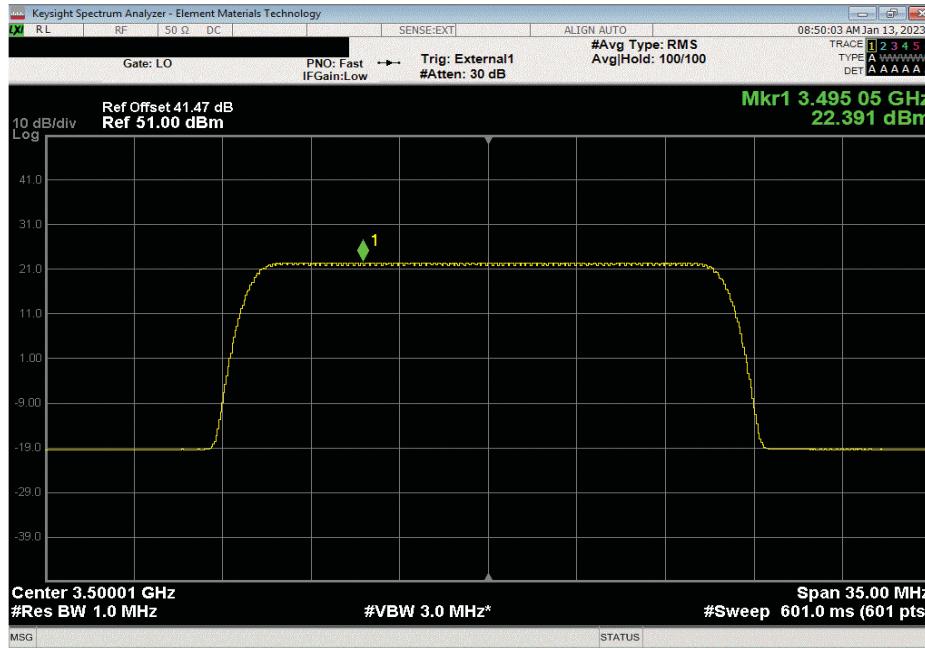


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, QPSK Modulation, Low Channel, 3460.02 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.4	0	22.4	40.5		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.391	0	22.4	40.5		

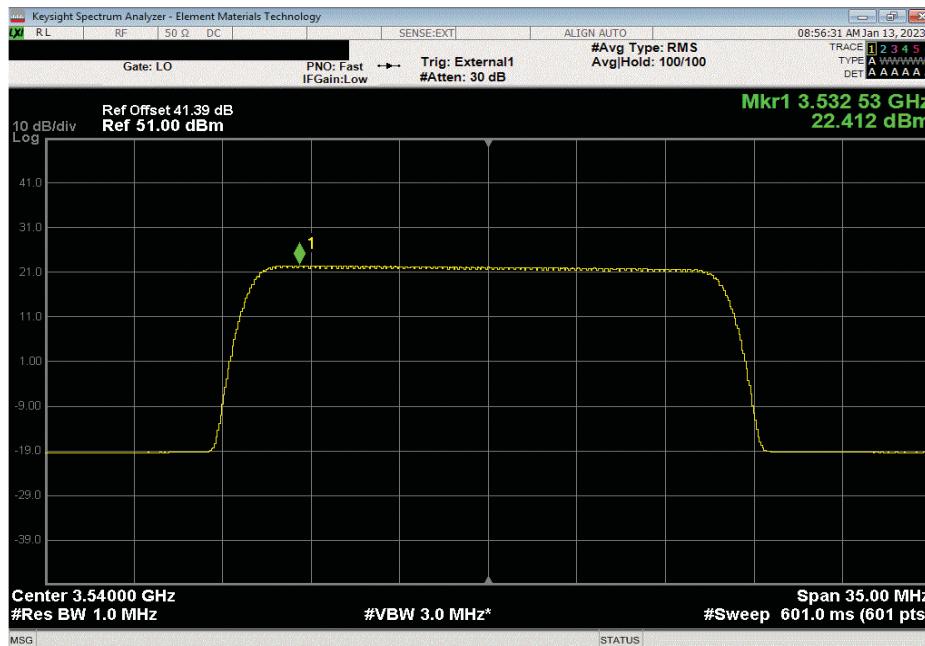


POWER SPECTRAL DENSITY SINGLE 3.45G

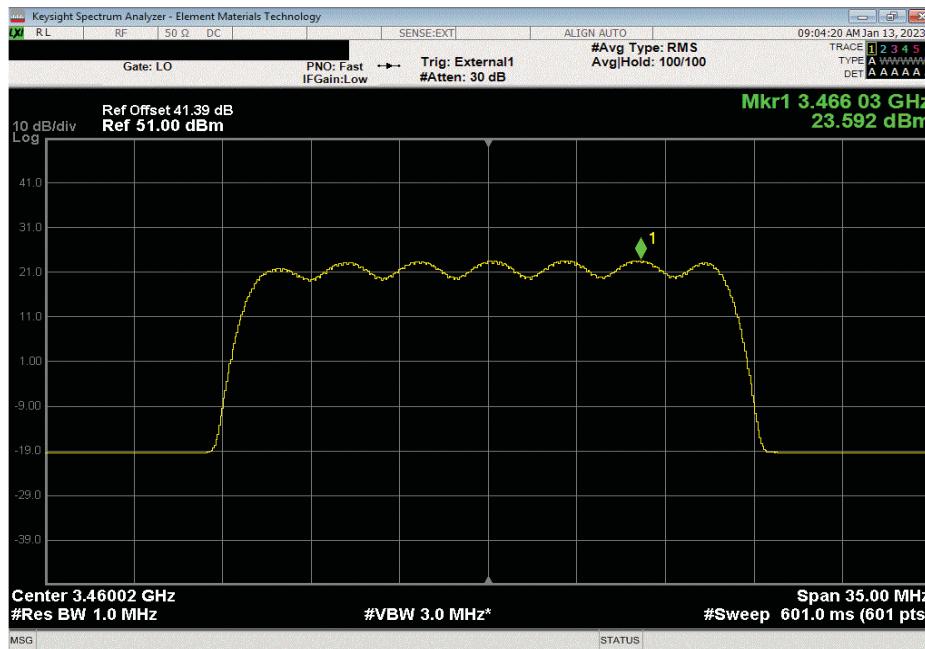


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, QPSK Modulation, High Channel, 3540.00 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.412	0	22.412	40.512		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 16QAM Modulation, Low Channel, 3460.02 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
23.592	0	23.6	41.7		

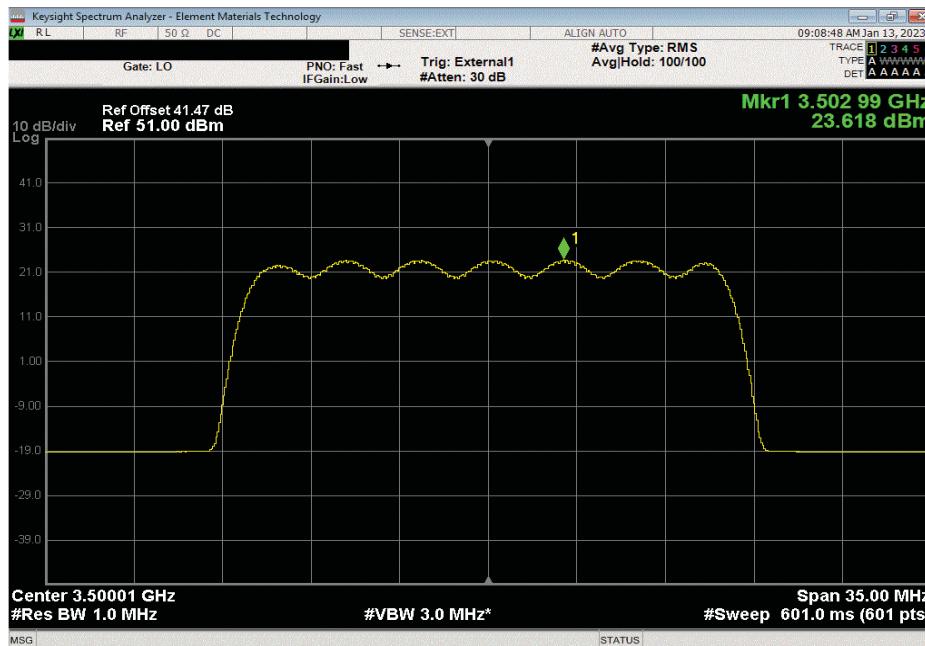


POWER SPECTRAL DENSITY SINGLE 3.45G

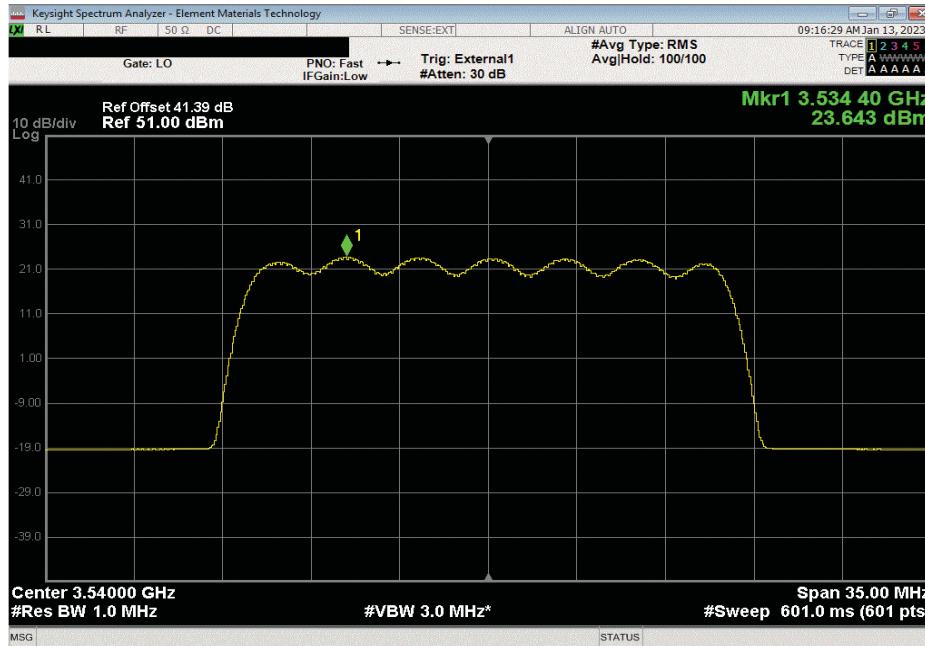


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
23.618	0	23.618	41.718		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 16QAM Modulation, High Channel, 3540.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
23.643	0	23.6	41.7		

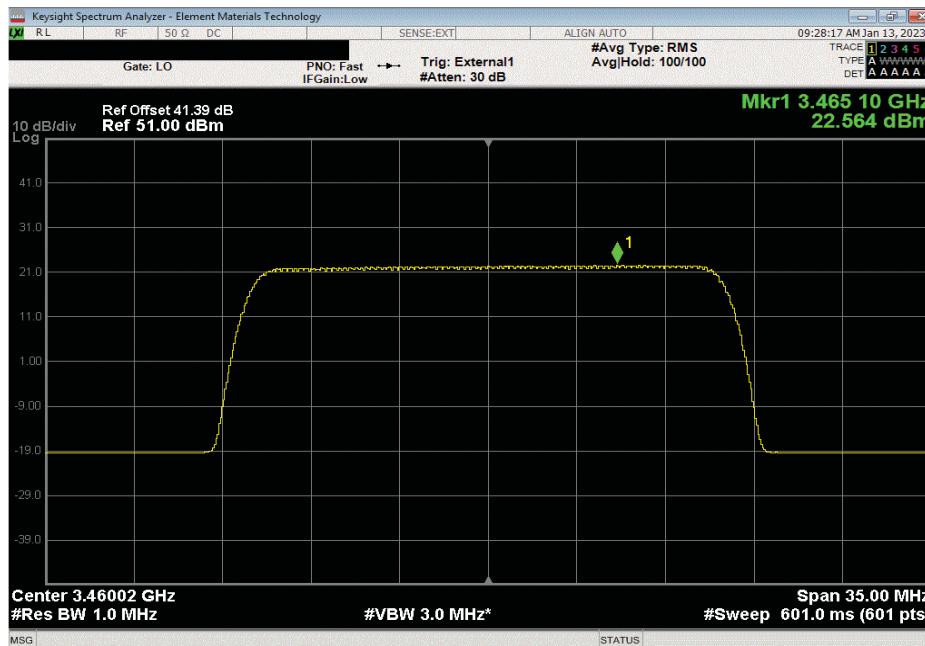


POWER SPECTRAL DENSITY SINGLE 3.45G



TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 64QAM Modulation, Low Channel, 3460.02 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.564	0	22.564	40.664		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.513	0	22.5	40.6		

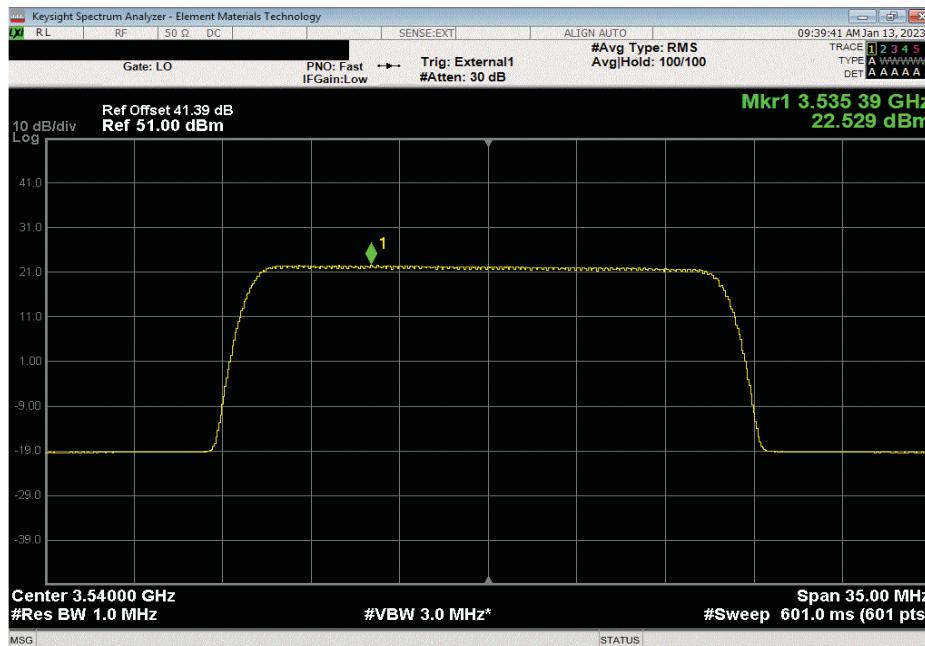


POWER SPECTRAL DENSITY SINGLE 3.45G

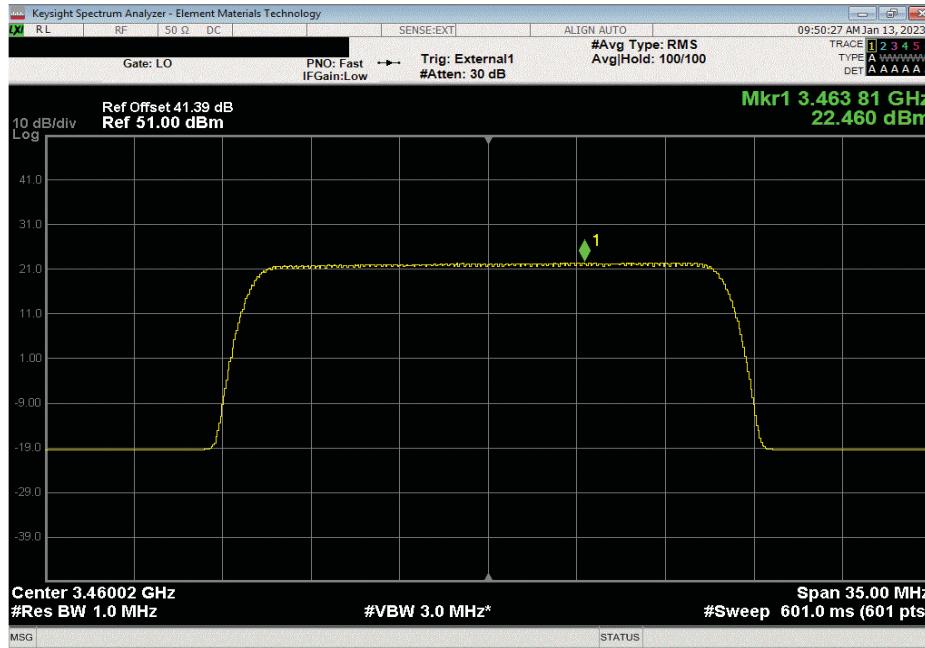


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 64QAM Modulation, High Channel, 3540.00 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.529	0	22.529	40.629		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.46	0	22.5	40.6		

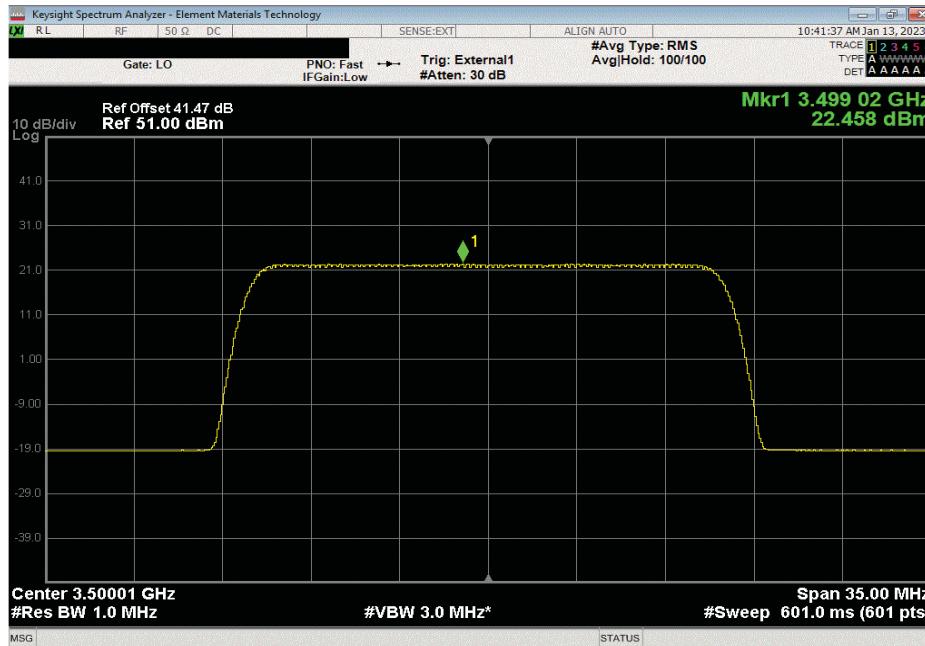


POWER SPECTRAL DENSITY SINGLE 3.45G

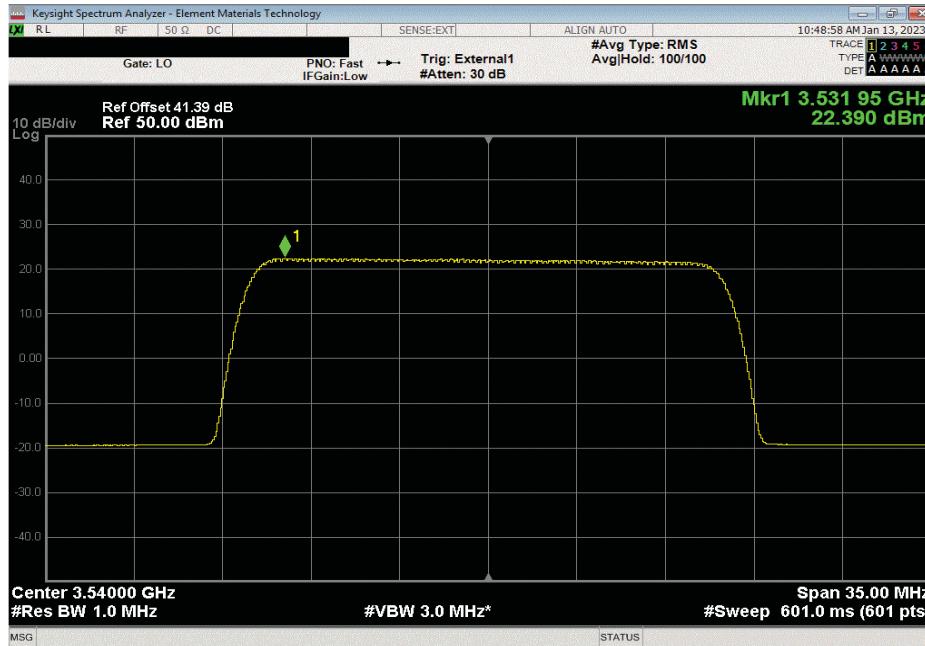


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.458	0	22.458	40.558		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.39	0	22.4	40.5		

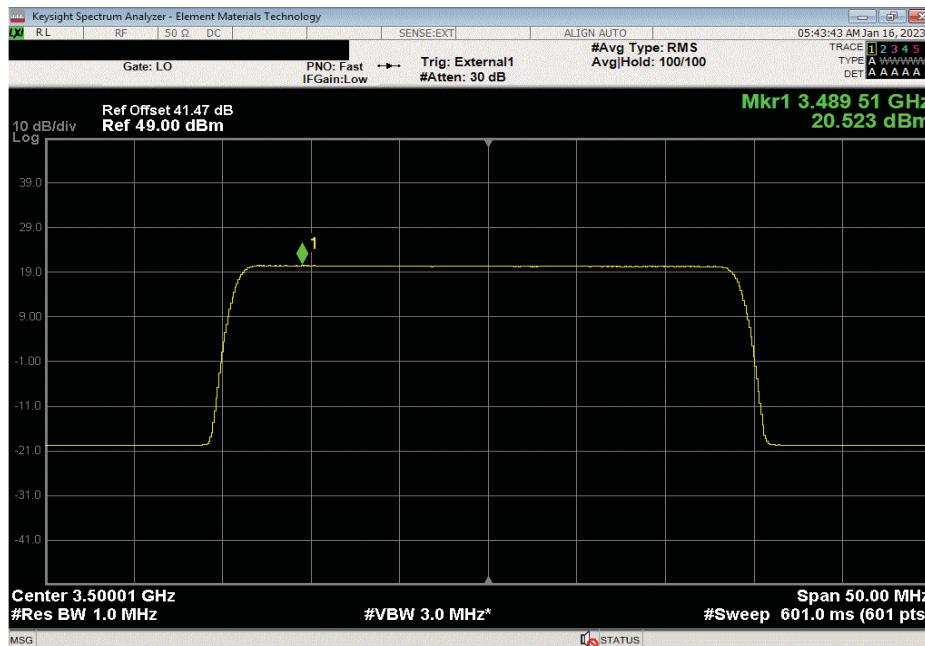


POWER SPECTRAL DENSITY SINGLE 3.45G



TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
20.523	0	20.523	38.623		



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
22.298	0	22.3	40.4		

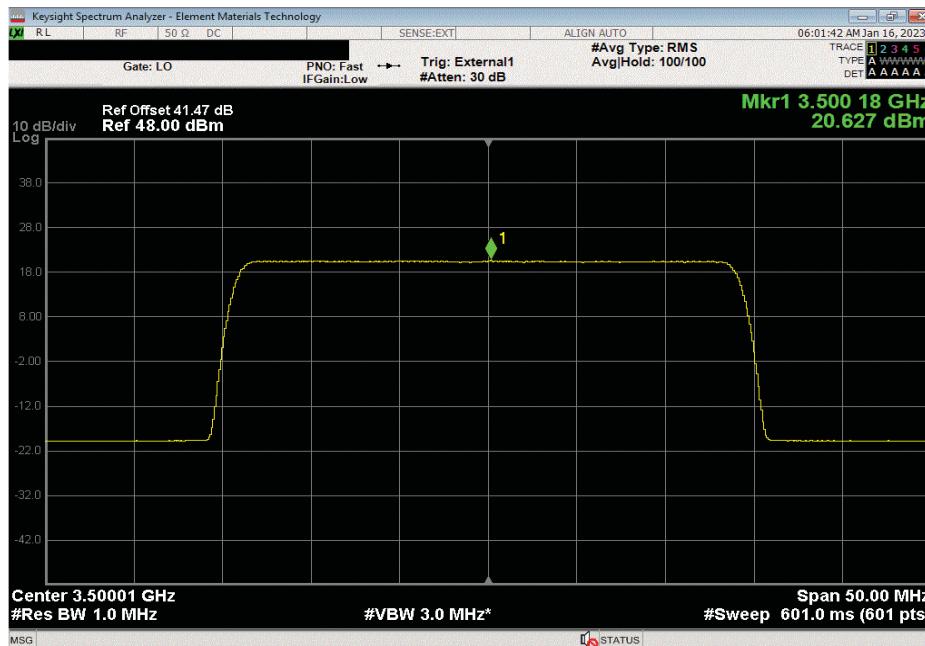


POWER SPECTRAL DENSITY SINGLE 3.45G



TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
20.627	0	20.627	38.727		



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
20.255	0	20.3	38.4		



POWER SPECTRAL DENSITY SINGLE 3.45G

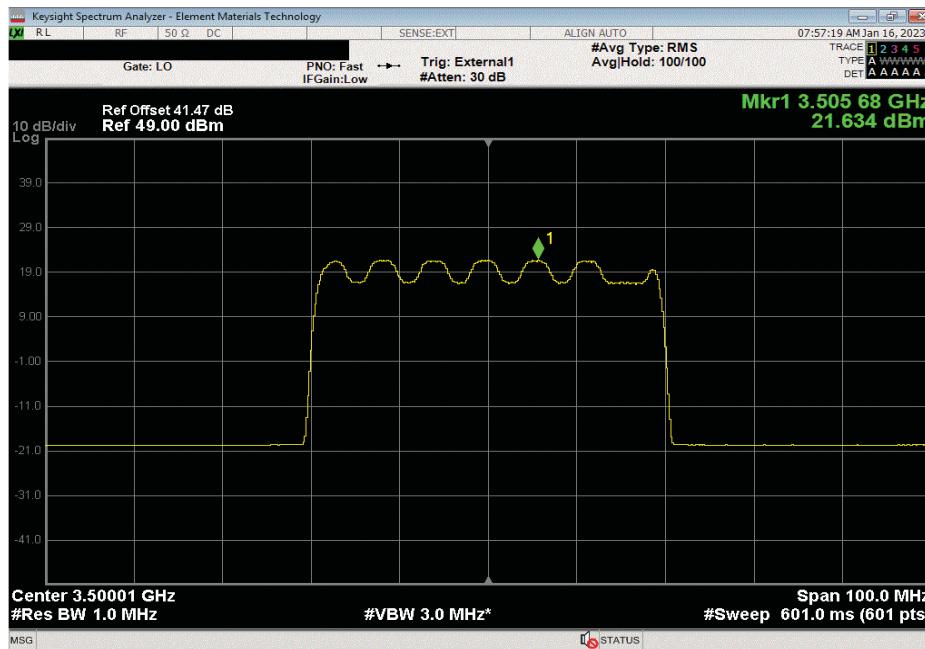


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, QPSK Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.714	0	19.714	37.814		



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
21.634	0	21.6	39.7		

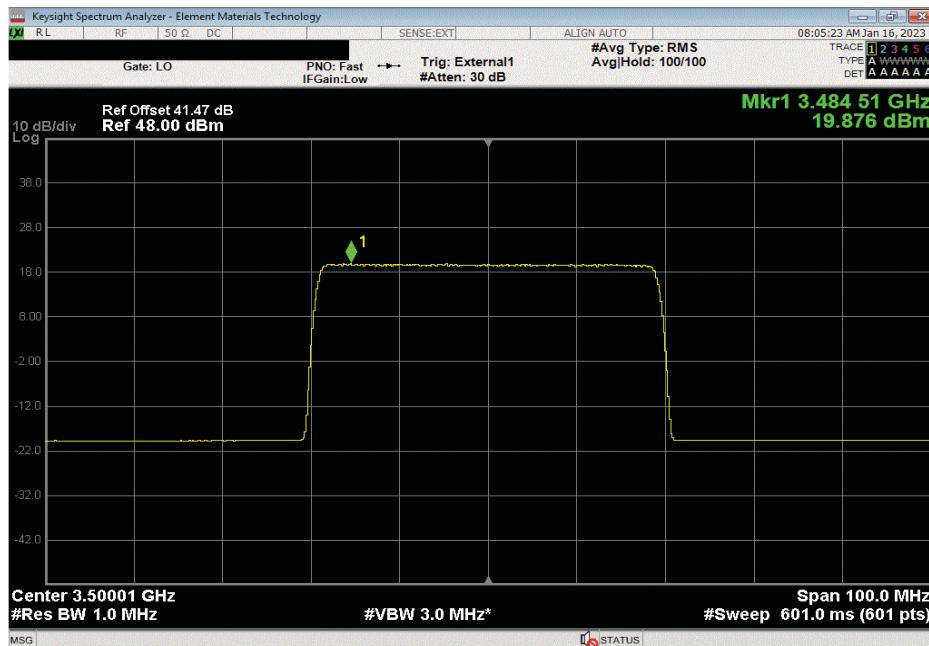


POWER SPECTRAL DENSITY SINGLE 3.45G

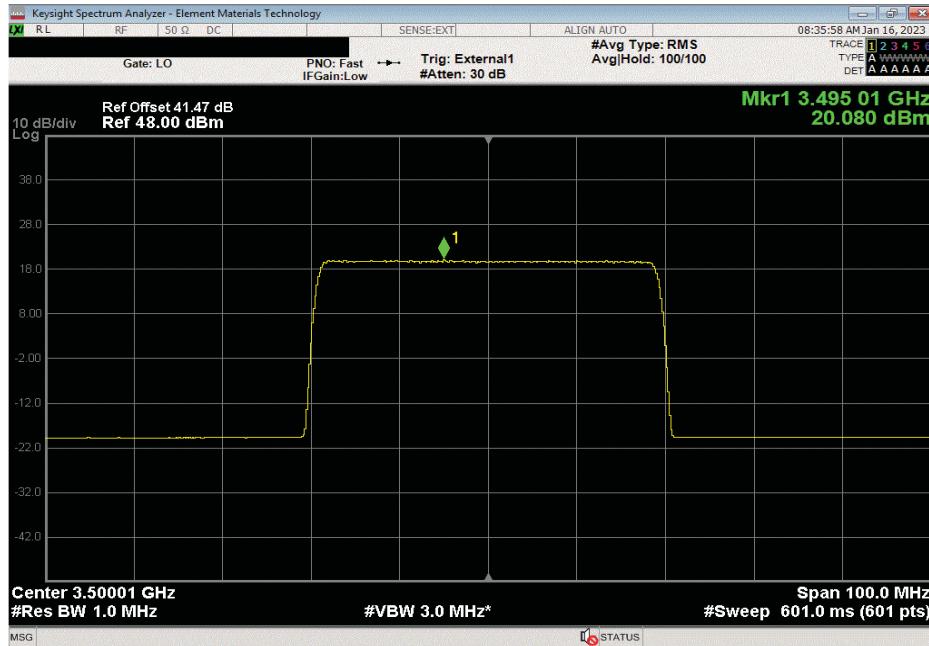


TbTx 2022.06.03.0 XMI 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
19.876	0	19.876	37.976		



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3500.01 MHz					
Initial Value	Duty Cycle	Single Port	Sixty Four Port (64x64 MIMO)		
dBm/MHz	Factor (dB)	dBm/MHz == PSD	dBm/MHz == PSD		
20.08	0	20.1	38.2		



POWER SPECTRAL DENSITY SINGLE 3.45G



ThTx 2022.06.03.0 XMI 2022.02.07.0

5G NR EIRP Calculations for Sixty-Four Port MIMO Operations

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory 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 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.

The AQQQQA antenna assembly has an array of 4 rows and 8 columns of ($\pm 45^\circ$) cross-polarized (orthogonal) radiators. This antenna assembly has a maximum beamforming gain of 25.5dBi. The sixty-four AQQQQA transmitter outputs are connected to the antenna array (thirty-two are connected to $+45^\circ$ radiators/antennas and thirty-two are connected to the -45° radiators/antennas).

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 PSD for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. Calculations of worst-case EIRP for sixty-four port MIMO are as follows:

Parameter	20 MHz Ch BW	30 MHz Ch BW	40 MHz Ch BW
Worst Case PSD/Antenna Port	23.6 dBm/MHz	22.3 dBm/MHz	21.6 dBm/MHz
Cable Loss	0 dB	0 dB	0 dB
Number of Ant Ports per Polarization	32	32	32
Total PSD per Polarization $10 \log 32 = +15.1$ dB	38.7 dBm/MHz	37.4 dBm/MHz	36.7 dBm/MHz
Maximum Antenna Beamforming Gain per Polarization	25.5 dBi	25.5 dBi	25.5 dBi
EIRP per Polarization	64.2 dBm/MHz	62.9 dBm/MHz	62.2 dBm/MHz
Number of Polarizations	2	2	2
EIRP Total (See Note 1)	64.2 dBm/MHz	62.9 dBm/MHz	62.2 dBm/MHz
Passing EIRP Limit	65.16 dBm/MHz	65.16 dBm/MHz	65.16 dBm/MHz

Note 1: The EIRP per antenna polarization 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).

Calculation Summary for the 3.45G Band

- (1) The worst case AQQQQA sixty-four port MIMO EIRP levels for all 5G NR channel bandwidths (20MHz, 30MHz & 40MHz) are less than the 3280 W/MHz (65.16 dBm/MHz) FCC regulatory limit.
- (2) The worst case AQQQQA sixty-four port MIMO EIRP levels for all 5G NR channel bandwidths (20MHz, 30MHz & 40MHz) exceed the 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit by 2.05 dB (64.2 dBm/MHz - 62.15 dBm/MHz), 0.75dB (62.9 dBm/MHz - 62.15 dBm/MHz), and 0.05dB (62.2 dBm/MHz - 62.15 dBm/MHz), respectively. The AQQQQA 5G NR (20MHz, 30MHz & 40MHz channel bandwidths) carrier power levels using sixty-four port MIMO operation need to be reduced to meet the 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit.

POWER SPECTRAL DENSITY SINGLE 3.7G



element

XMit 2022.02.07.0

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
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2022-09-08	2023-09-08
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 power spectral density was measured using the channels and modes as called out on the following data sheets.

The method of ANSI C63.26-2015 section 5.2.4.5 was used to make this measurement.

RF conducted emissions testing was performed on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in the "Output Power - All Ports" report section) and the antenna port 22 for the 3.7GHz band was selected to perform the testing for this effort.

The total PSD for all antenna ports (at the radio output) were determined per ANSI C63.26-2015 paragraph 6.4.3.2.4. The EIRP calculations are based upon ANSI C63.26-2015 paragraphs 6.4 and 6.4.6.3.

FCC Requirements: §27.50 Power limits and duty cycle.

27.50 (j) The following power requirements apply to stations transmitting in the 3700-3980 MHz band:

(1) The power of each fixed or base station transmitting in the 3700-3980 MHz band and located in any county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, is limited to an equivalent isotropically radiated power (EIRP) of 3280 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

(2) The power of each fixed or base station transmitting in the 3700-3980 MHz band and situated in any geographic location other than that described in paragraph (j)(1) of this section is limited to an EIRP of 1640 Watts/MHz. This limit applies to the aggregate power of all antenna elements in any given sector of a base station.

POWER SPECTRAL DENSITY SINGLE 3.7G



TbTx 2022.06.03.0 XMI 2022.02.07.0

EUT: AQQQA	Work Order: NOKI0052			
Serial Number: YK224300010	Date: 19-Jan-23			
Customer: Nokia of America Corporation	Temperature: 20.9 °C			
Attendees: John Rattanavong, Michell Hill	Humidity: 31.4% RH			
Project: None	Barometric Pres.: 1023 mbar			
Tested by: Brandon Hobbs	Job Site: TX07			
TEST SPECIFICATIONS	Power: 54 VDC			
FCC 27:2023	Test Method: ANSI C63.26:2015			
COMMENTS	All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carriers were enabled at maximum power levels. The PSD was measured while transmitting one carrier on Port 22. The total PSD for multiport (64x64 MIMO) operation was determined based upon ANSI 63.26 clause 6.4.3.2.4 (10 Log Nout). The total PSD for sixty four port operation is single port PSD +18.1dB [i.e. 10 Log(64)].			
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	4.5			
Signature 				
	Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD
Port 22				
Band n77, 3700 - 3980 MHz				
20 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	20.994	0	21.0	39.1
16QAM Modulation				
Mid Channel, 3840.00 MHz	22.298	0	22.3	40.4
64QAM Modulation				
Mid Channel, 3840.00 MHz	21.089	0	21.1	39.2
256QAM Modulation				
Mid Channel, 3840.00 MHz	21.106	0	21.1	39.2
40 MHz Bandwidth				
QPSK Modulation				
Low Channel, 3720.00 MHz	20.686	0	20.7	38.8
Mid Channel, 3840.00 MHz	21.303	0	21.3	39.4
High Channel, 3960.00 MHz	21.080	0	21.1	39.2
16QAM Modulation				
Low Channel, 3720.00 MHz	22.788	0	22.8	40.9
Mid Channel, 3840.00 MHz	23.055	0	23.1	41.2
High Channel, 3960.00 MHz	22.961	0	23.0	41.1
64QAM Modulation				
Low Channel, 3720.00 MHz	20.899	0	20.9	39.0
Mid Channel, 3840.00 MHz	21.343	0	21.3	39.4
High Channel, 3960.00 MHz	21.112	0	21.1	39.2
256QAM Modulation				
Low Channel, 3720.00 MHz	20.879	0	20.9	39.0
Mid Channel, 3840.00 MHz	21.210	0	21.2	39.3
High Channel, 3960.00 MHz	21.050	0	21.1	39.2
60 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	19.352	0	19.4	37.5
16QAM Modulation				
Mid Channel, 3840.00 MHz	21.076	0	21.1	39.2
64QAM Modulation				
Mid Channel, 3840.00 MHz	19.484	0	19.5	37.6
256QAM Modulation				
Mid Channel, 3840.00 MHz	19.412	0	19.4	37.5
80 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	18.995	0	19.0	37.1
16QAM Modulation				
Mid Channel, 3840.00 MHz	20.926	0	20.9	39.0
64QAM Modulation				
Mid Channel, 3840.00 MHz	19.100	0	19.1	37.2
256QAM Modulation				
Mid Channel, 3840.00 MHz	19.056	0	19.1	37.2
100 MHz Bandwidth				
QPSK Modulation				
Mid Channel, 3840.00 MHz	18.313	0	18.3	36.4
16QAM Modulation				
Mid Channel, 3840.00 MHz	20.222	0	20.2	38.3
64QAM Modulation				
Mid Channel, 3840.00 MHz	18.108	0	18.1	36.2
256QAM Modulation				
Mid Channel, 3840.00 MHz	18.317	0	18.3	36.4

POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
20.994	0	21.0	39.1		



Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.298	0	22.3	40.4		



POWER SPECTRAL DENSITY SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.089	0	21.1	39.2	



Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.106	0	21.1	39.2	



POWER SPECTRAL DENSITY SINGLE 3.7G

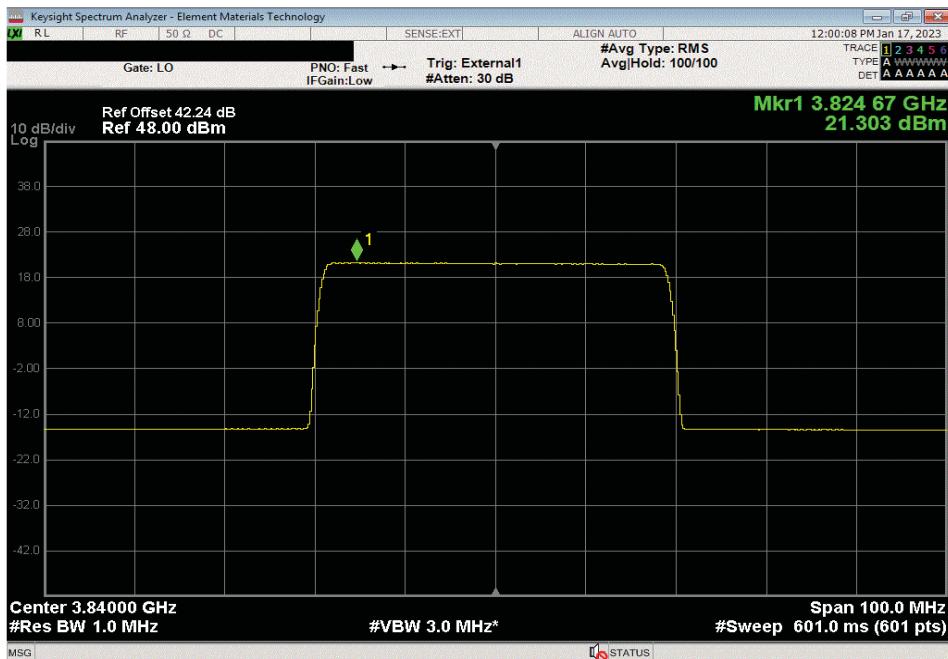


TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, QPSK Modulation, Low Channel, 3720.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
20.686	0	20.7	38.8		



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
21.303	0	21.3	39.4		



POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, QPSK Modulation, High Channel, 3960.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
21.08	0	21.1	39.2		



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 16QAM Modulation, Low Channel, 3720.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
22.788	0	22.8	40.9		

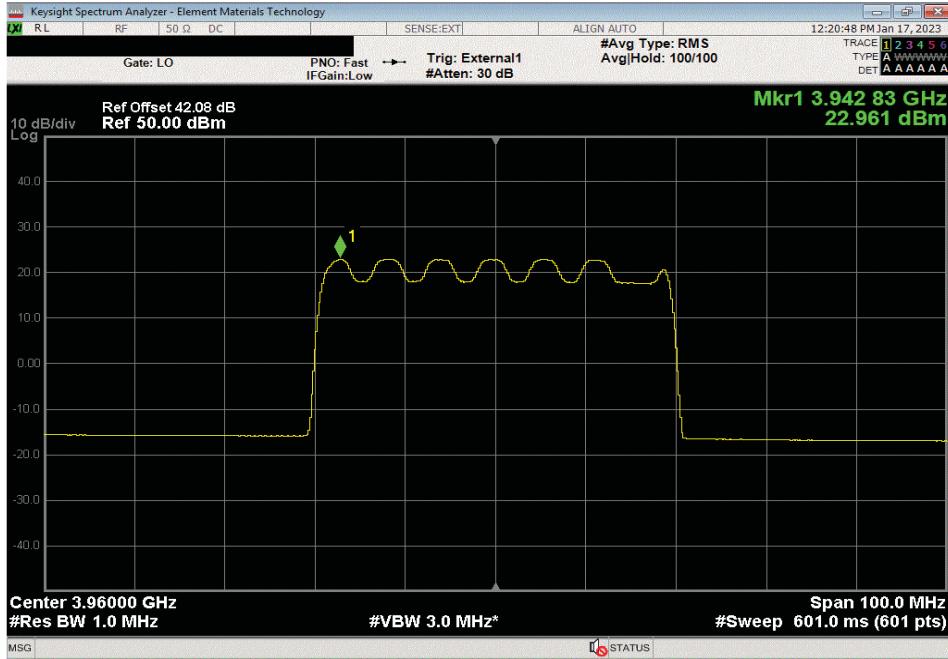


POWER SPECTRAL DENSITY SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
23.055	0	23.1	41.2	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 16QAM Modulation, High Channel, 3960.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
22.961	0	23.0	41.1	



POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 64QAM Modulation, Low Channel, 3720.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
20.899	0	20.9	39.0	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.343	0	21.3	39.4	

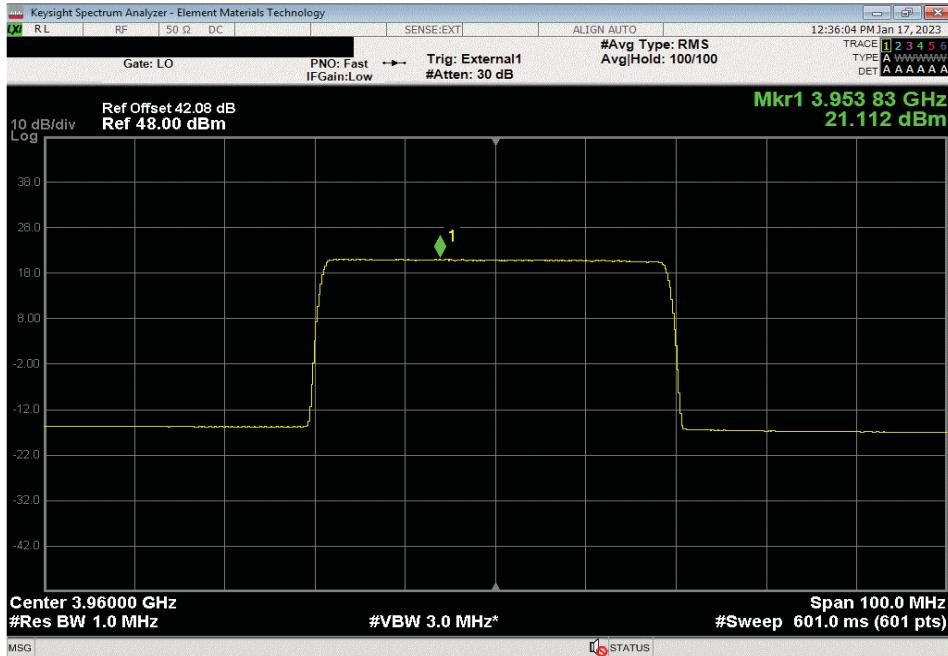


POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 64QAM Modulation, High Channel, 3960.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.112	0	21.1	39.2	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
20.879	0	20.9	39.0	



POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.21	0	21.2	39.3	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
21.05	0	21.1	39.2	



POWER SPECTRAL DENSITY SINGLE 3.7G

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.352	0	19.4	37.5		



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
21.076	0	21.1	39.2		

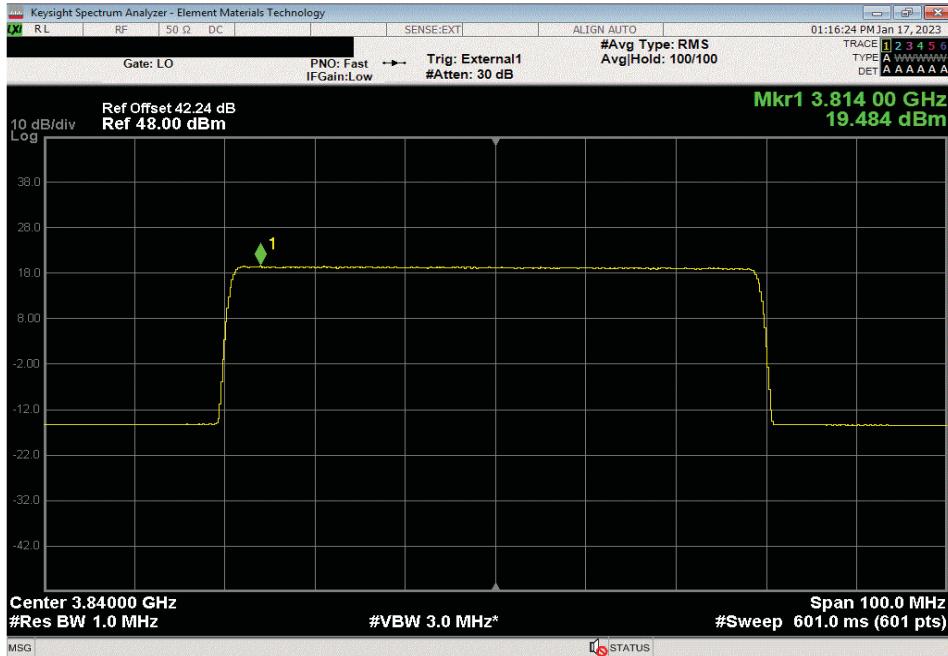


POWER SPECTRAL DENSITY SINGLE 3.7G



TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.484	0	19.5	37.6		



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.412	0	19.4	37.5		

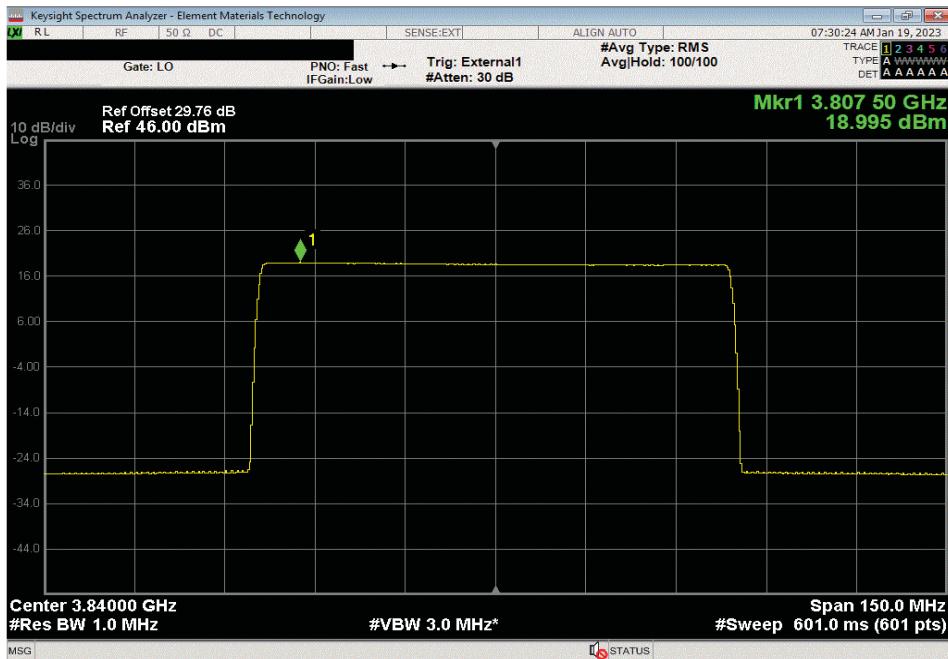


POWER SPECTRAL DENSITY SINGLE 3.7G

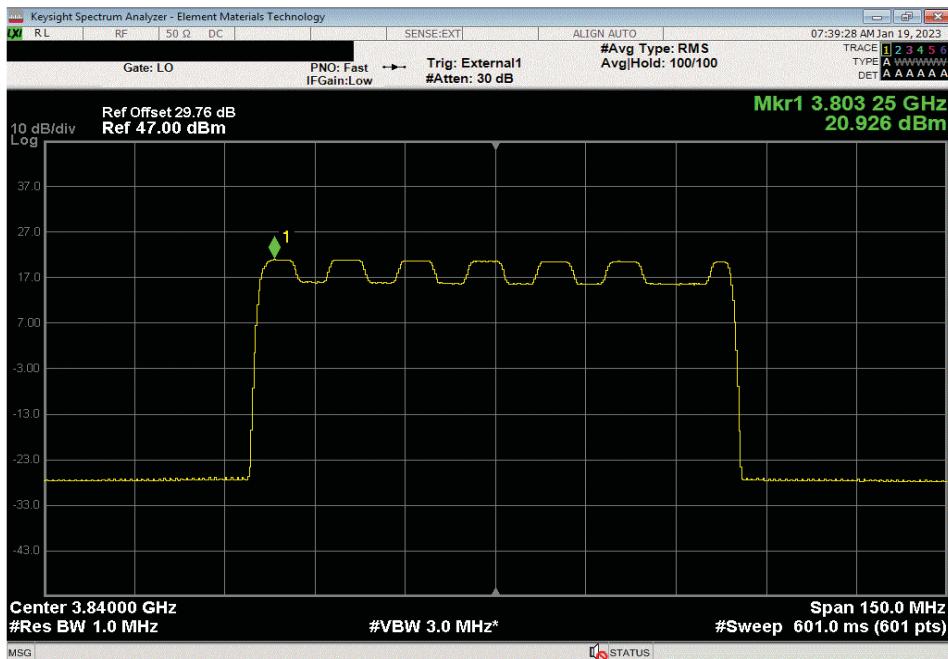


TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
18.995	0	19.0	37.1		



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
20.926	0	20.9	39.0		



POWER SPECTRAL DENSITY SINGLE 3.7G

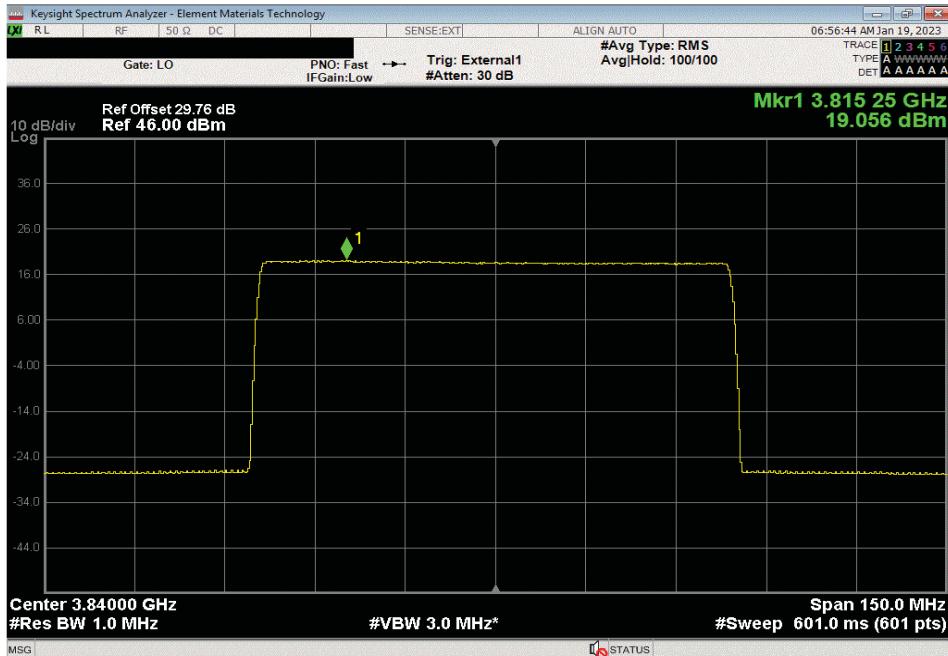


TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.1	0	19.1	37.2		



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
19.056	0	19.1	37.2		



POWER SPECTRAL DENSITY SINGLE 3.7G

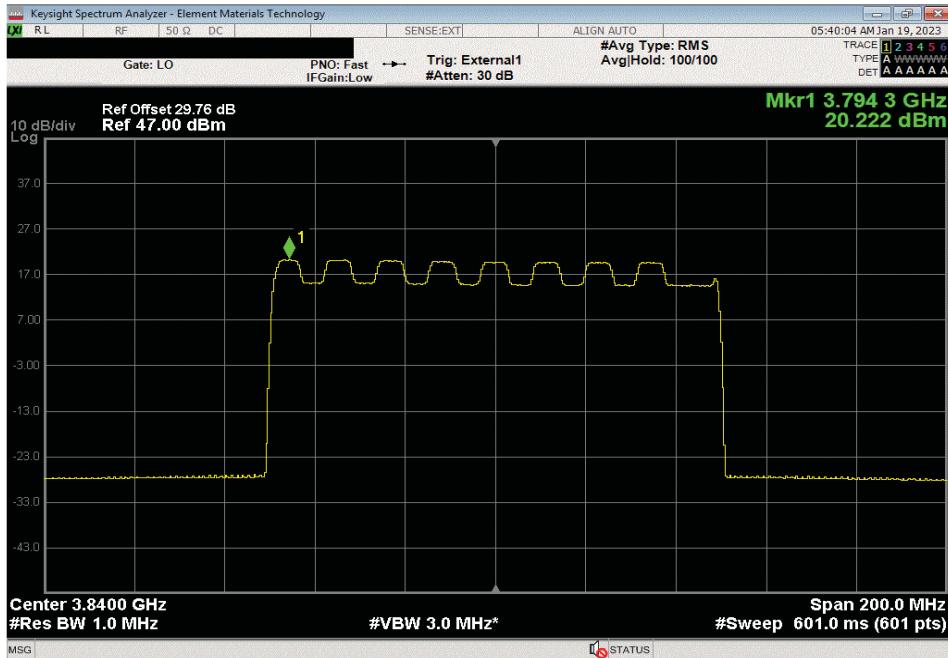


TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, QPSK Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
18.313	0	18.3	36.4	



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 16QAM Modulation, Mid Channel, 3840.00 MHz				
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD	
20.222	0	20.2	38.3	



POWER SPECTRAL DENSITY SINGLE 3.7G

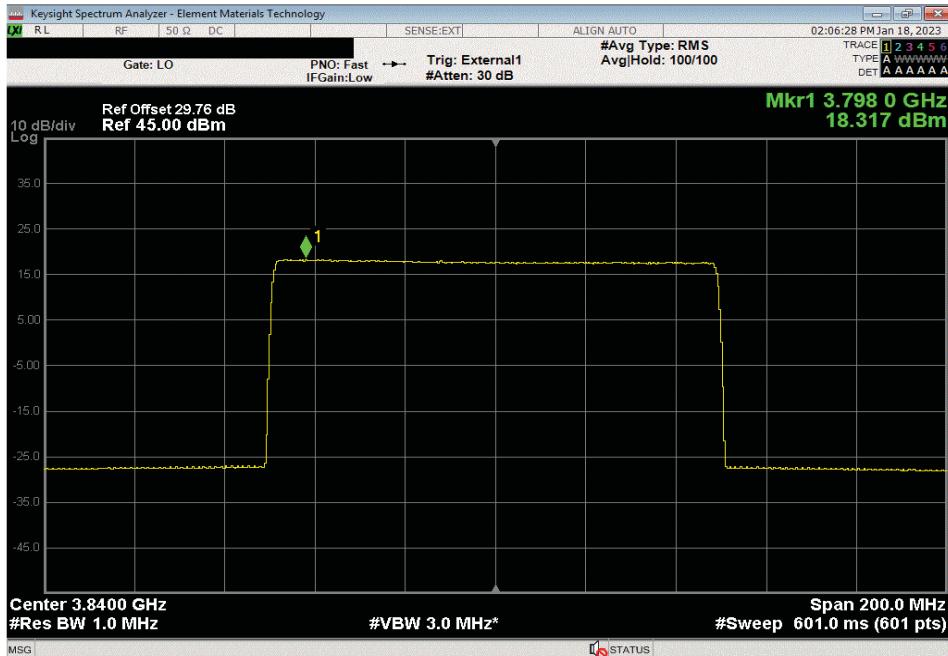


TbITx 2022.06.03.0 XML 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 64QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
18.108	0	18.1	36.2		



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Mid Channel, 3840.00 MHz					
Initial Value dBm/MHz	Duty Cycle Factor (dB)	Single Port dBm/MHz == PSD	Sixty Four Port (64x64 MIMO) dBm/MHz == PSD		
18.317	0	18.3	36.4		



POWER SPECTRAL DENSITY SINGLE 3.7G



Tbitx 2022.06.03.0 XMI 2022.02.07.0

5G NR EIRP Calculations for Sixty-Four Port MIMO Operations

EIRP calculations are needed at each transmitter location to optimize base station operational performance while meeting regulatory 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 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.

The AQQQA antenna assembly has an array of 4 rows and 8 columns of ($\pm 45^\circ$) cross-polarized (orthogonal) radiators. This antenna assembly has a maximum beamforming gain of 25.5dBi. The sixty-four AQQQA transmitter outputs are connected to the antenna array (thirty-two are connected to $+45^\circ$ radiators/antennas and thirty-two are connected to the -45° radiators/antennas).

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 PSD for each channel bandwidth type). The maximum antenna assembly beamforming gain was used for this calculation. Calculations of worst-case EIRP for sixty-four port MIMO are as follows:

Parameter	20 MHz Ch BW	40 MHz Ch BW	60 MHz Ch BW	80 MHz Ch BW	100 MHz Ch BW
Worst Case PSD/Antenna Port	22.3 dBm/MHz	23.1 dBm/MHz	21.1 dBm/MHz	20.9 dBm/MHz	20.2 dBm/MHz
Cable Loss	0 dB	0 dB	0 dB	0 dB	0 dB
Number of Ant Ports per Polarization	32	32	32	32	32
Total PSD per Polarization $10 \log 32 = +15.1 \text{ dB}$	37.4 dBm/MHz	38.2 dBm/MHz	36.2 dBm/MHz	36.0 dBm/MHz	35.3 dBm/MHz
Maximum Antenna Beamforming Gain per Polarization	25.5 dBi	25.5 dBi	25.5 dBi	25.5 dBi	25.5 dBi
EIRP per Polarization	62.9 dBm/MHz	63.7 dBm/MHz	61.7 dBm/MHz	61.5 dBm/MHz	60.8 dBm/MHz
Number of Polarizations	2	2	2	2	2
EIRP Total (See Note 1)	62.9 dBm/MHz	63.7 dBm/MHz	61.7 dBm/MHz	61.5 dBm/MHz	60.8 dBm/MHz
Passing EIRP Limit	65.16 dBm/MHz	65.16 dBm/MHz	62.15 dBm/MHz and 65.16 dBm/MHz	62.15 dBm/MHz and 65.16 dBm/MHz	62.15 dBm/MHz and 65.16 dBm/MHz

Note 1: The EIRP per antenna polarization 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).

Calculation Summary

- (1) The worst case AQQQA sixty-four port MIMO EIRP levels for all 5G NR channel bandwidths (20MHz, 40MHz, 60MHz, 80MHz, & 100MHz) are less than the 3280 W/MHz (65.16 dBm/MHz) FCC regulatory limit.
- (2) The worst case AQQQA sixty-four port MIMO EIRP levels for the 5G NR 60MHz, 80MHz & 100MHz channel bandwidths are less than the 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit.
- (3) The worst case AQQQA sixty-four port MIMO EIRP levels for the 5G NR 20MHz & 40MHz channel bandwidths exceed the 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit by 0.75 dB (62.9 dBm/MHz - 62.15 dBm/MHz) and 1.55 dB (63.7 dBm/MHz - 62.15 dBm/MHz), respectively. The AQQQA 5G NR (20MHz & 40MHz channel bandwidths) carrier power levels using sixty-four port MIMO operation need to be reduced to meet the 1640 W/MHz (62.15 dBm/MHz) FCC regulatory limit.

BAND EDGE COMPLIANCE SINGLE 3.45G



XMIT 2022.02.07.0

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	2022-03-02	2023-03-02
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2022-09-08	2023-09-08
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 spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

All limits were adjusted by a factor of $[-10 \log(64)]$ dB to account for the device operation as a 64 port MIMO transmitter, as per FCC KDB 622911.

Per section 27.53(n)(1), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -31.1 dBm [-13 dBm -10 log (64)] for the 3440 to 3450MHz & 3550 to 3560MHz ranges, -43.1 dBm [-25 dBm -10 log (64)] for the 3430 to 3440MHz & 3560 to 3570MHz ranges and -58.1 dBm [-40 dBm -10 log (64)] for ranges below 3430MHz & above 3570MHz per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per 27.53(n)(1), emissions seen up to 1 MHz outside of authorized operating frequency range band edges shall be measured with a RBW of 1% of the measured emission bandwidth. Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 1 MHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 1 MHz. The resolution bandwidth to be used for band edge measurements (between band edge and 1MHz outside band edge) are required to be >1% of the measured emission bandwidth with a maximum of 200kHz per FCC 27.53(n)(1)

RF conducted emissions testing was performed on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing) and the antenna port 57 for the 3.45GHz band was selected to perform the testing for this effort.

The band edge testing was performed using only one modulation type because the Occupied Bandwidth variation between modulation types is small, the average output power variation between modulation types is small, the highest average power (worst case) port was used for testing, and there is significant/good passing margin. The highest rate modulation type (256QAM) was used. (See ANSI C63.26. clause 5.7.2e)

BAND EDGE COMPLIANCE SINGLE 3.45G



TbTx 2022.06.03.0 XMit 2022.02.07.0

EUT:	AQQQA	Work Order:	NOKI0052		
Serial Number:	YK224300010	Date:	16-Jan-23		
Customer:	Nokia of America Corporation	Temperature:	21.9 °C		
Attendees:	John Rattanavong, Michell Hill	Humidity:	46.5% RH		
Project:	None	Barometric Pres.:	1011 mbar		
Tested by:	Brandon Hobbs	Job Site:	TX07		
TEST SPECIFICATIONS		Test Method			
FCC 27:2023		ANSI C63.26:2015			
COMMENTS					
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carriers are operated at maximum power (at 3.125 watts/carrier for NR40 and at 2.5 watts/carrier for NR20 & NR30). Some measurement marker values were offset by RBW/2 from the band edge frequency as allowed by ANSI C63.26 clause 5.7.2 for some test cases. Worst case antenna port was used for this testing.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1 & 5	Signature			
Port 57	Frequency Range	Max Value (dBm)	Limit (dBm)	Result	
Band n77, 3450 - 3550 MHz					
20 MHz Bandwidth					
256QAM Modulation					
Low Channel, 3460.02 MHz	1	-32.4	-31.1	Pass	
Low Channel, 3460.02 MHz	2	-35.2	-31.1	Pass	
Low Channel, 3460.02 MHz	3	-34.4	-31.1	Pass	
Low Channel, 3460.02 MHz	4	-46.5	-43.1	Pass	
Low Channel, 3460.02 MHz	5	-73.1	-58.1	Pass	
High Channel, 3540.00 MHz	1	-37.3	-31.1	Pass	
High Channel, 3540.00 MHz	2	-34.5	-31.1	Pass	
High Channel, 3540.00 MHz	3	-34.9	-31.1	Pass	
High Channel, 3540.00 MHz	4	-46.6	-43.1	Pass	
High Channel, 3540.00 MHz	5	-68.4	-58.1	Pass	
30 MHz Bandwidth					
256QAM Modulation					
Low Channel, 3465.00 MHz	1	-36.5	-31.1	Pass	
Low Channel, 3465.00 MHz	2	-35.2	-31.1	Pass	
Low Channel, 3465.00 MHz	3	-34.7	-31.1	Pass	
Low Channel, 3465.00 MHz	4	-46.9	-43.1	Pass	
Low Channel, 3465.00 MHz	5	-73.8	-58.1	Pass	
High Channel, 3534.99 MHz	1	-37.0	-31.1	Pass	
High Channel, 3534.99 MHz	2	-35.2	-31.1	Pass	
High Channel, 3534.99 MHz	3	-35.6	-31.1	Pass	
High Channel, 3534.99 MHz	4	-47.2	-43.1	Pass	
High Channel, 3534.99 MHz	5	-69.7	-58.1	Pass	
40 MHz Bandwidth					
256QAM Modulation					
Low Channel, 3470.01 MHz	1	-34.7	-31.1	Pass	
Low Channel, 3470.01 MHz	2	-34.3	-31.1	Pass	
Low Channel, 3470.01 MHz	3	-33.6	-31.1	Pass	
Low Channel, 3470.01 MHz	4	-46.1	-43.1	Pass	
Low Channel, 3470.01 MHz	5	-71.8	-58.1	Pass	
High Channel, 3529.98 MHz	1	-35.5	-31.1	Pass	
High Channel, 3529.98 MHz	2	-34.7	-31.1	Pass	
High Channel, 3529.98 MHz	3	-34.6	-31.1	Pass	
High Channel, 3529.98 MHz	4	-46.8	-43.1	Pass	
High Channel, 3529.98 MHz	5	-69.7	-58.1	Pass	

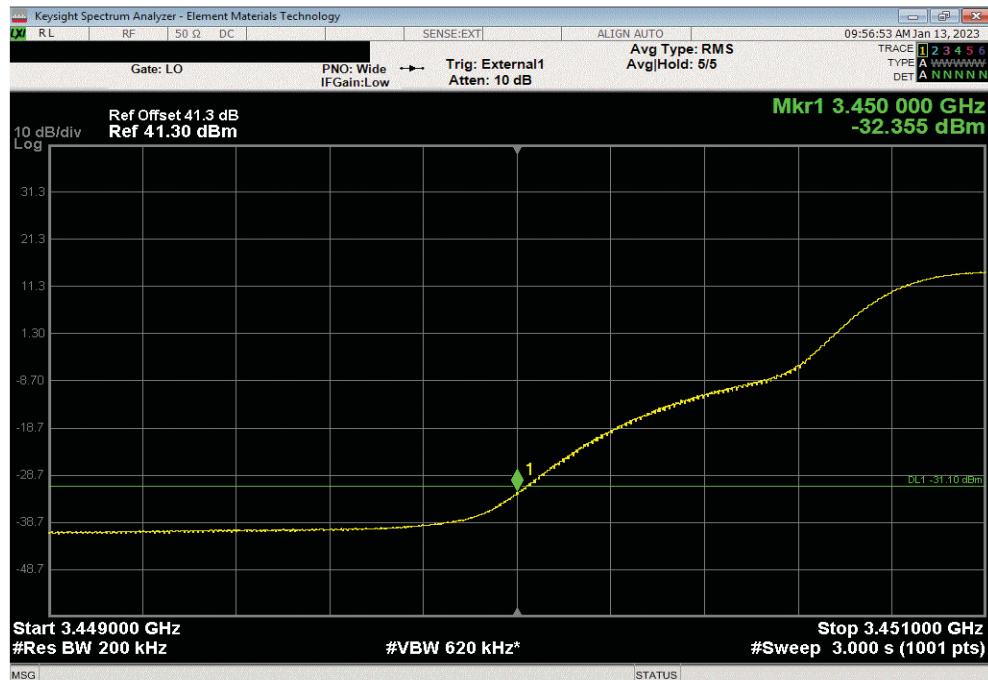
BAND EDGE COMPLIANCE SINGLE 3.45G



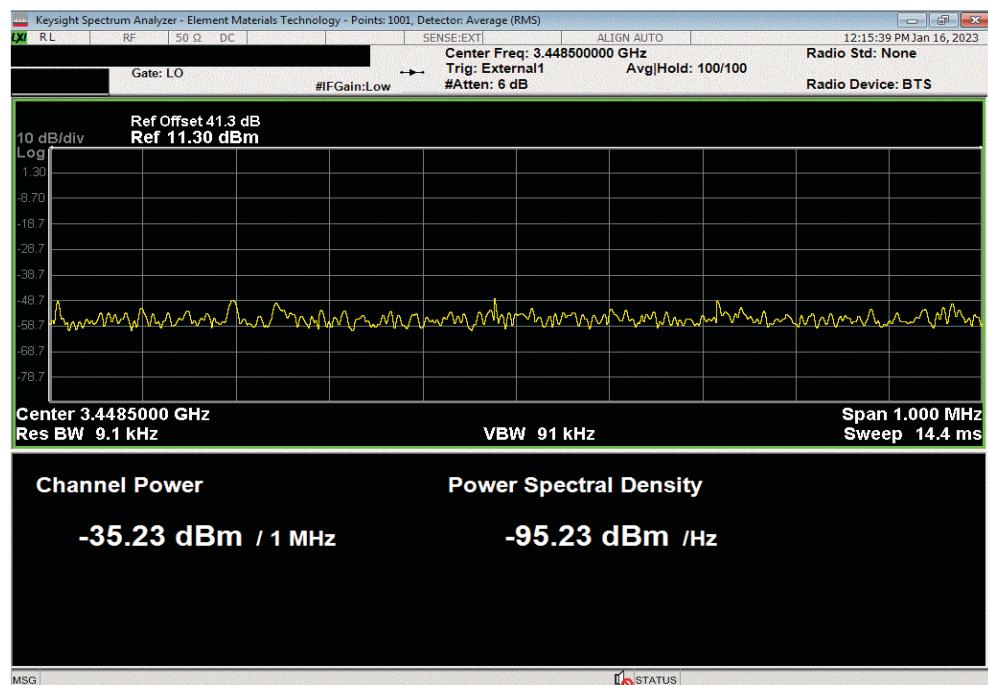
TbtTx 2022.06.03.0

XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz						
Frequency Range	Max Value (dBm)		Limit (dBm)	Result		
1	-32.36	-31.1	Pass			



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz						
Frequency Range	Max Value (dBm)			Limit (dBm)	Result	
2	-35.23	-31.1	Pass			



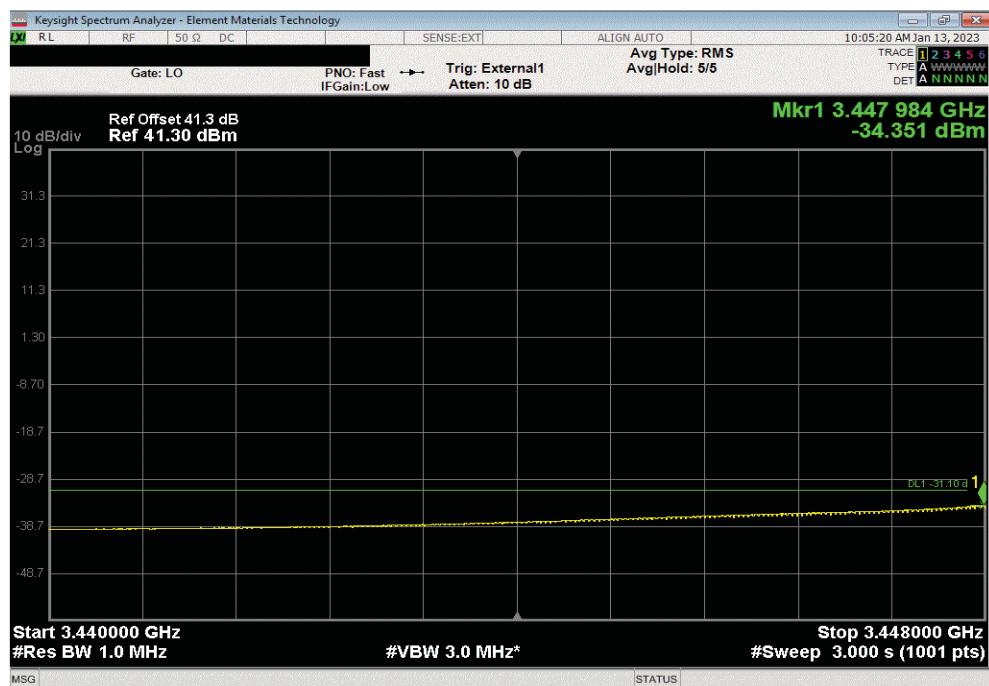
BAND EDGE COMPLIANCE SINGLE 3.45G



TbtTx 2022.06.03.0 XMit 2022.02.07.0

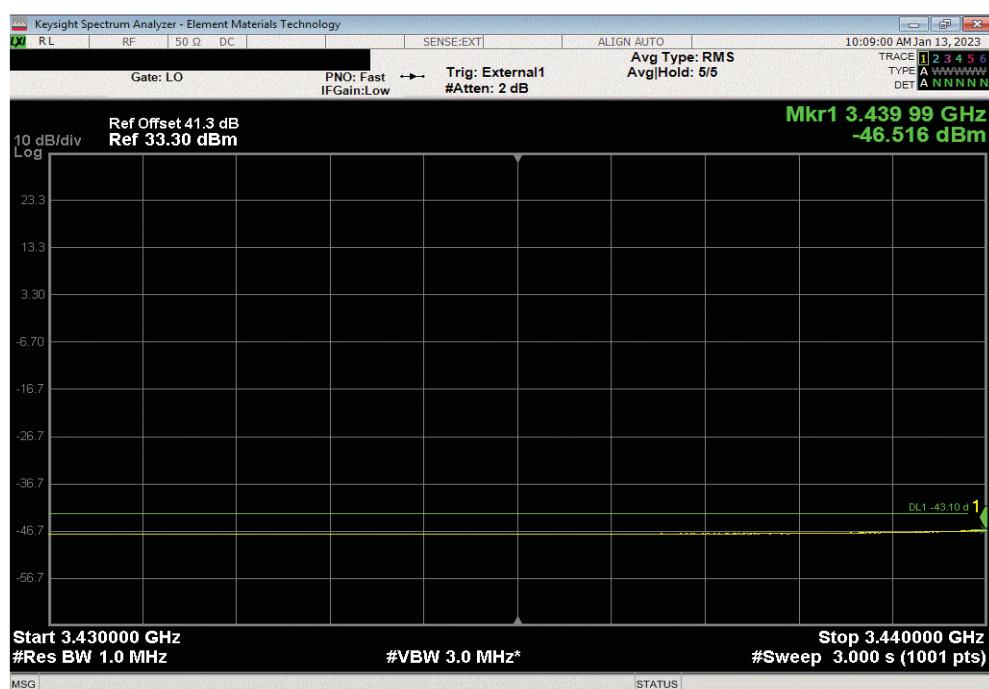
Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz

Frequency Range	Max Value (dBm)	Limit (dBm)	Result
3	-34.35	-31.1	Pass



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz

Frequency Range	Max Value (dBm)	Limit (dBm)	Result
4	-46.52	-43.1	Pass

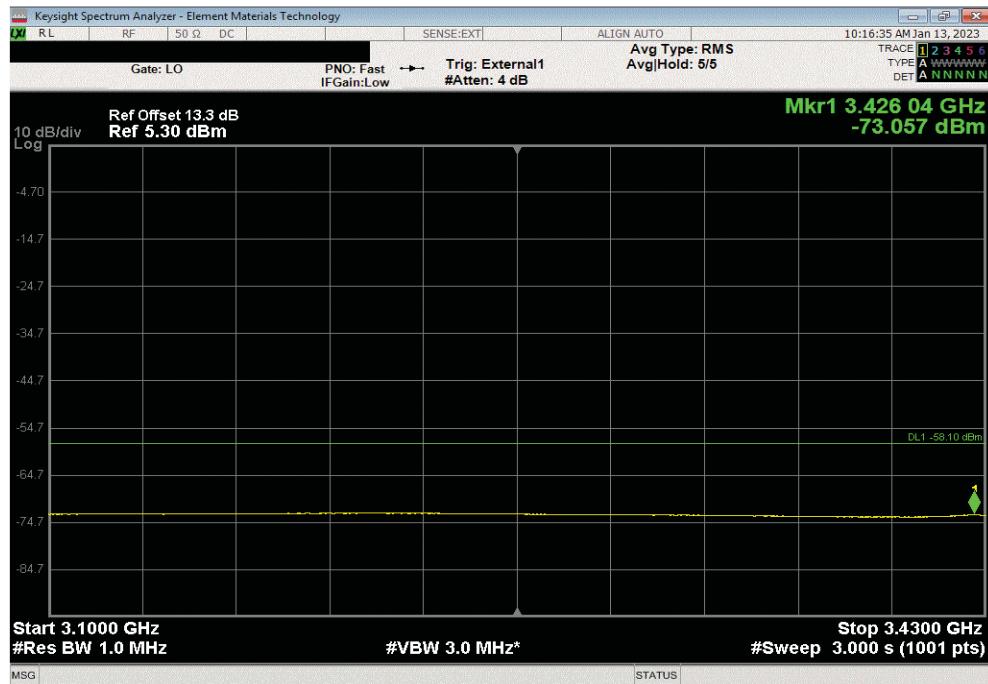


BAND EDGE COMPLIANCE SINGLE 3.45G



TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3460.02 MHz					
Frequency Range	Max Value (dBm)	Limit (dBm)	Result		
5	-73.06	-58.1	Pass		



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Frequency Range	Max Value (dBm)	Limit (dBm)	Result		
1	-37.25	-31.1	Pass		

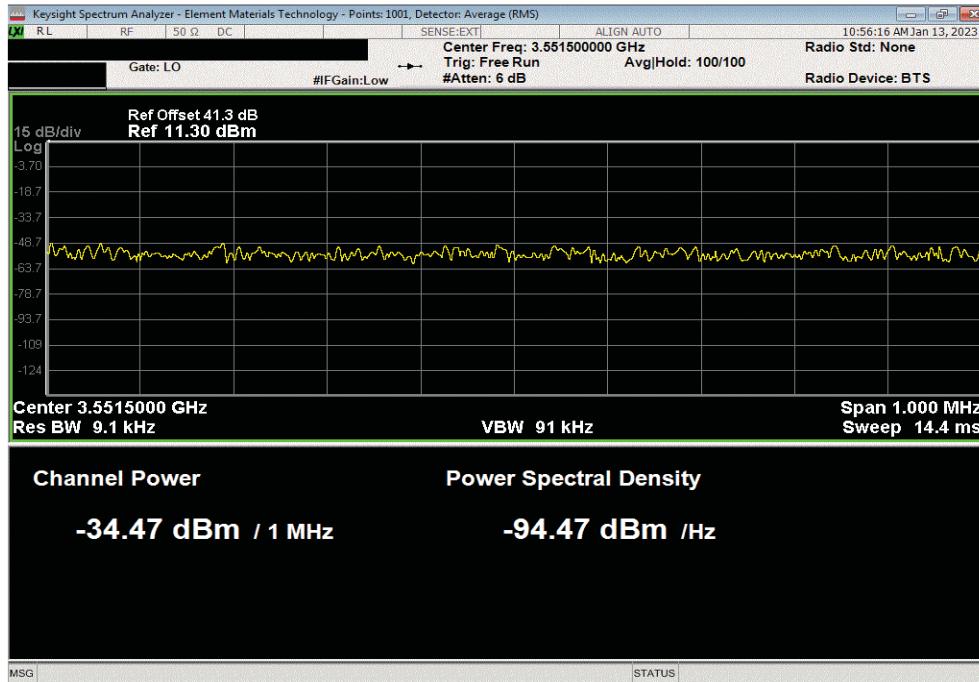


BAND EDGE COMPLIANCE SINGLE 3.45G

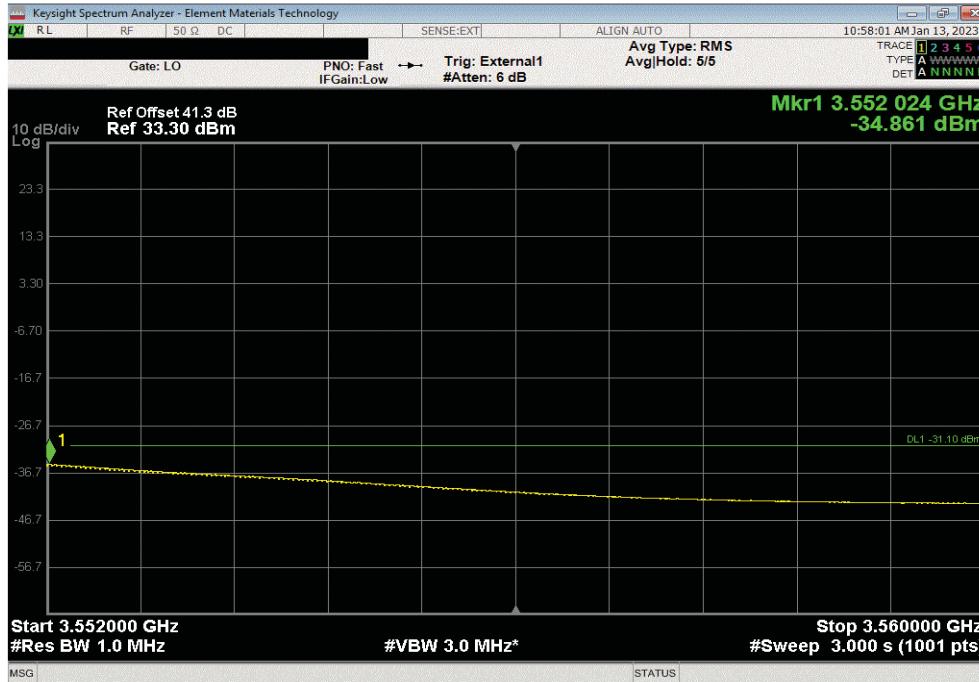


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	2	-34.47	-31.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	3	-34.86	-31.1	Pass	

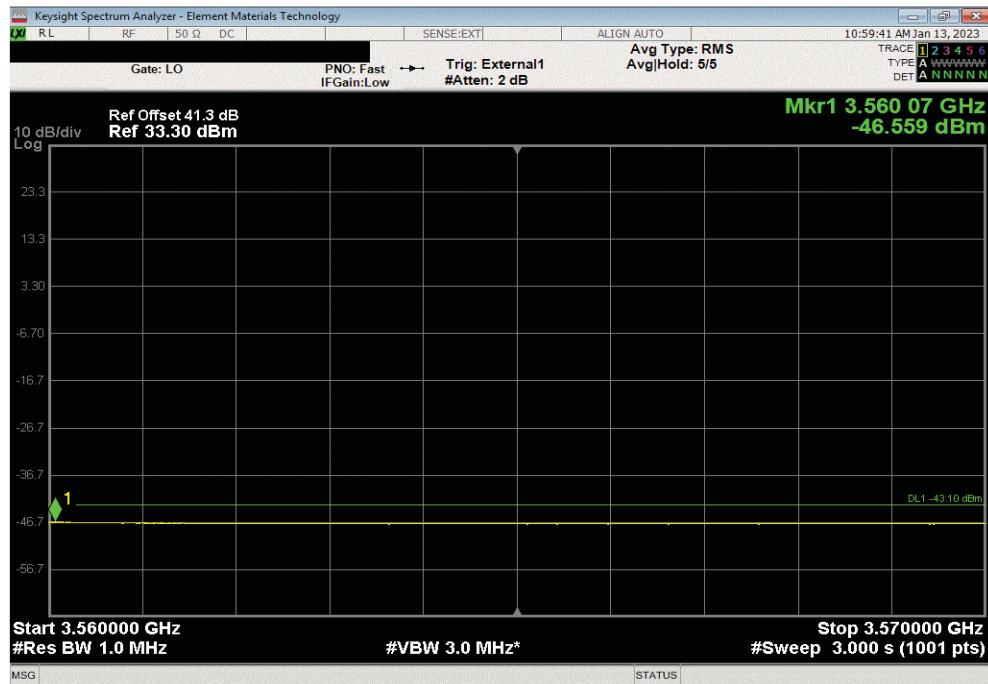


BAND EDGE COMPLIANCE SINGLE 3.45G

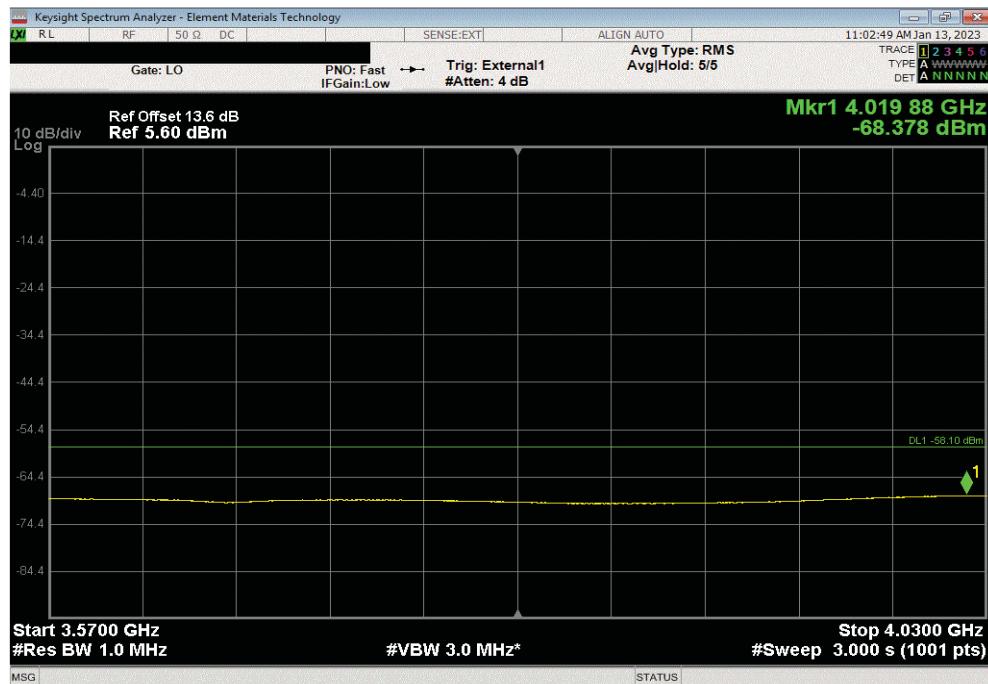


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	4	-46.56	-43.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3540.00 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	5	-68.38	-58.1	Pass	



BAND EDGE COMPLIANCE SINGLE 3.45G



TbtTx 2022.06.03.0

XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz						
Frequency Range	Max Value (dBm)		Limit (dBm)	Result		
1	-36.5	-31.1	Pass			



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz						
Frequency Range	Max Value (dBm)			Limit (dBm)	Result	
2	-35.23	-31.1	Pass			



Channel Power

Power Spectral Density

-35.23 dBm / 1 MHz

-95.23 dBm /Hz

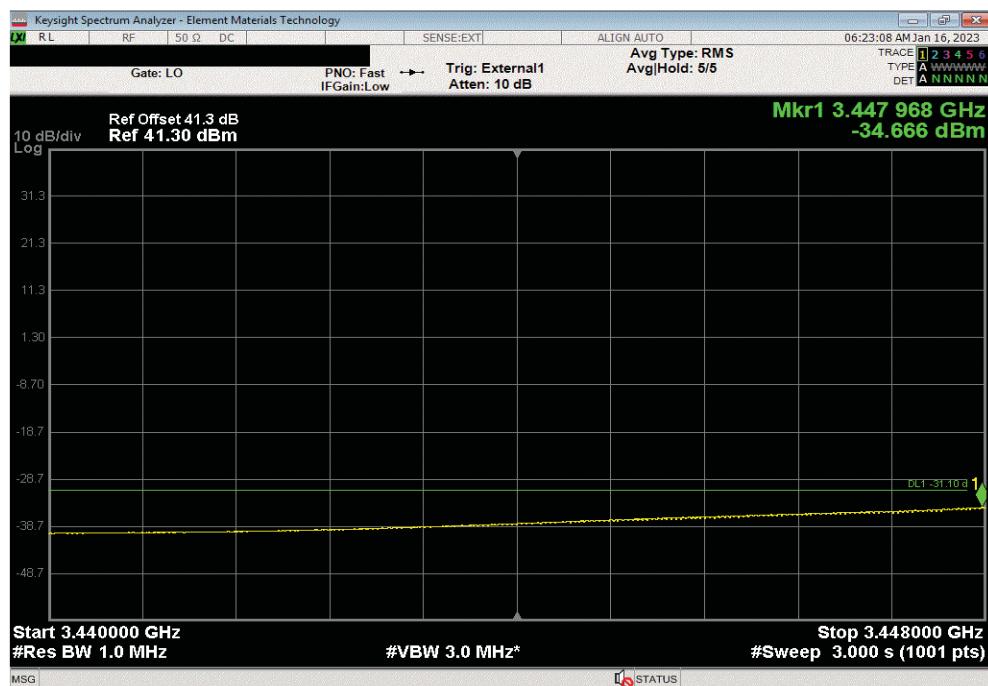
BAND EDGE COMPLIANCE SINGLE 3.45G



TbtTx 2022.06.03.0 XMit 2022.02.07.0

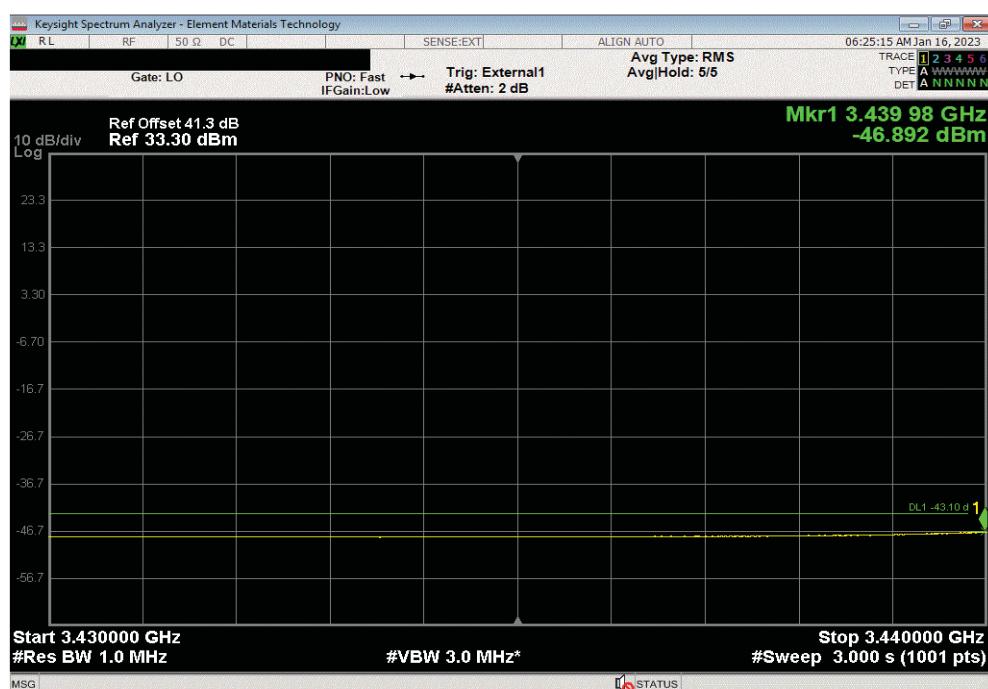
Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz

Frequency Range	Max Value (dBm)	Limit (dBm)	Result
3	-34.67	-31.1	Pass



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz

Frequency Range	Max Value (dBm)	Limit (dBm)	Result
4	-46.89	-43.1	Pass

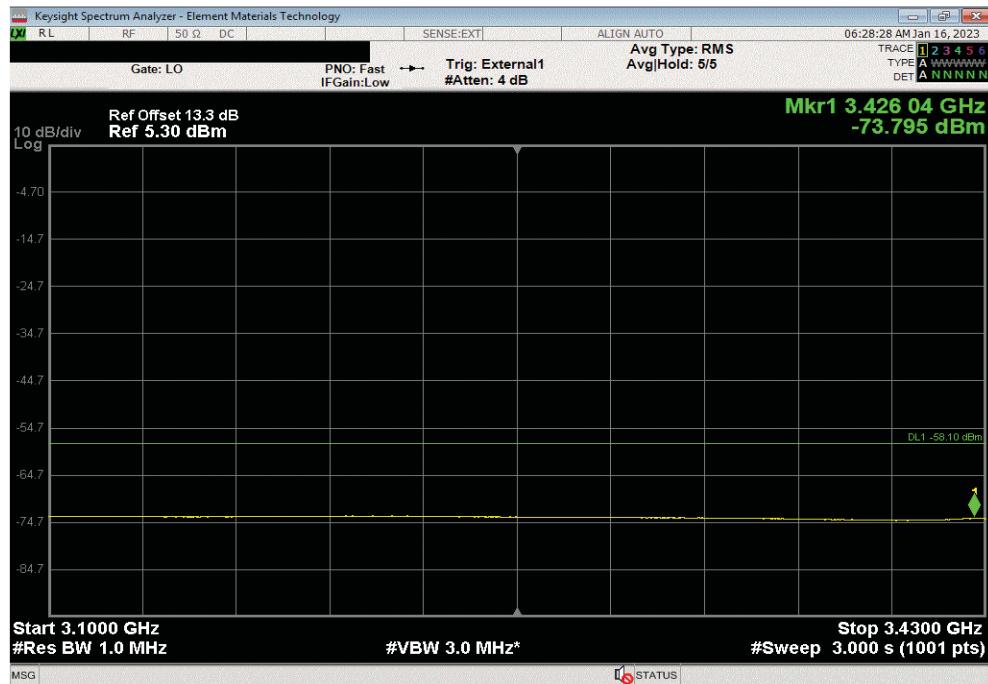


BAND EDGE COMPLIANCE SINGLE 3.45G



TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, Low Channel, 3465.00 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	5	-73.8	-58.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	1	-36.98	-31.1	Pass	

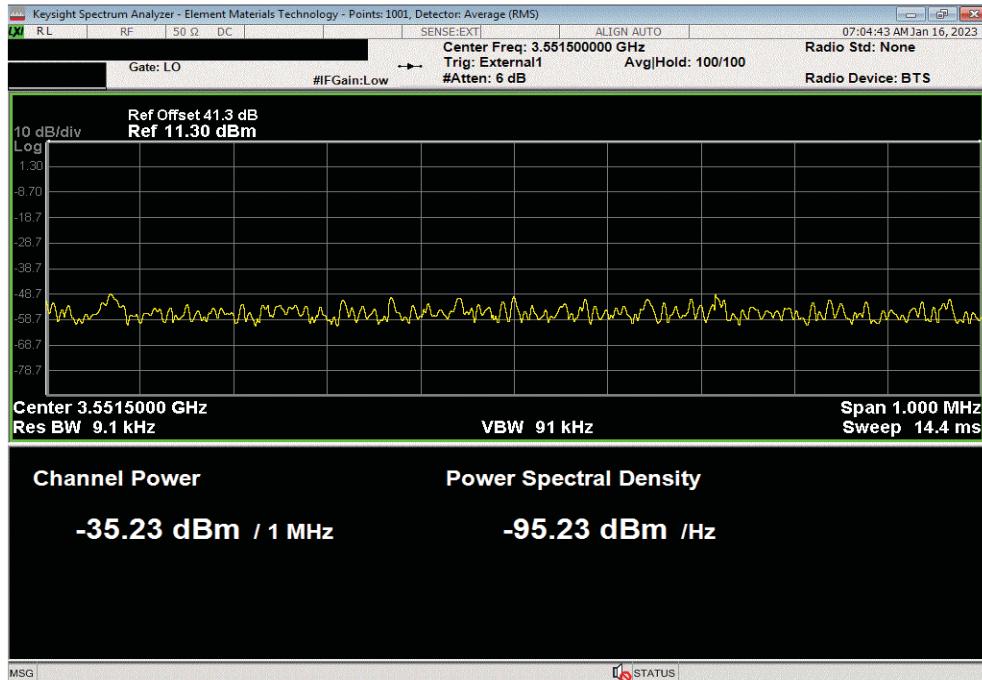


BAND EDGE COMPLIANCE SINGLE 3.45G

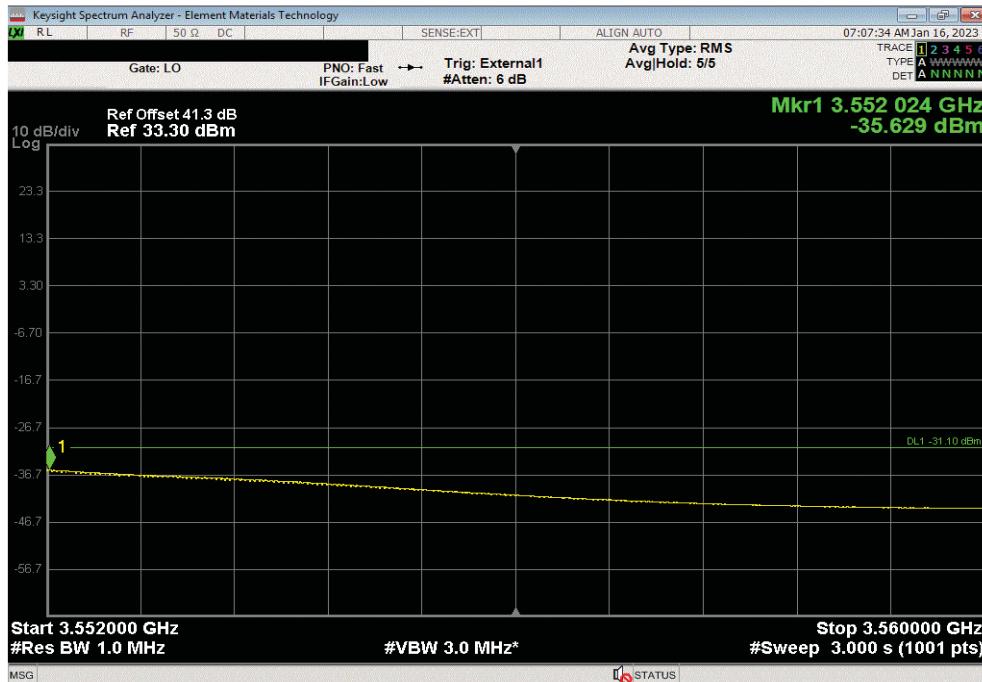


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	2	-35.23	-31.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	3	-35.63	-31.1	Pass	

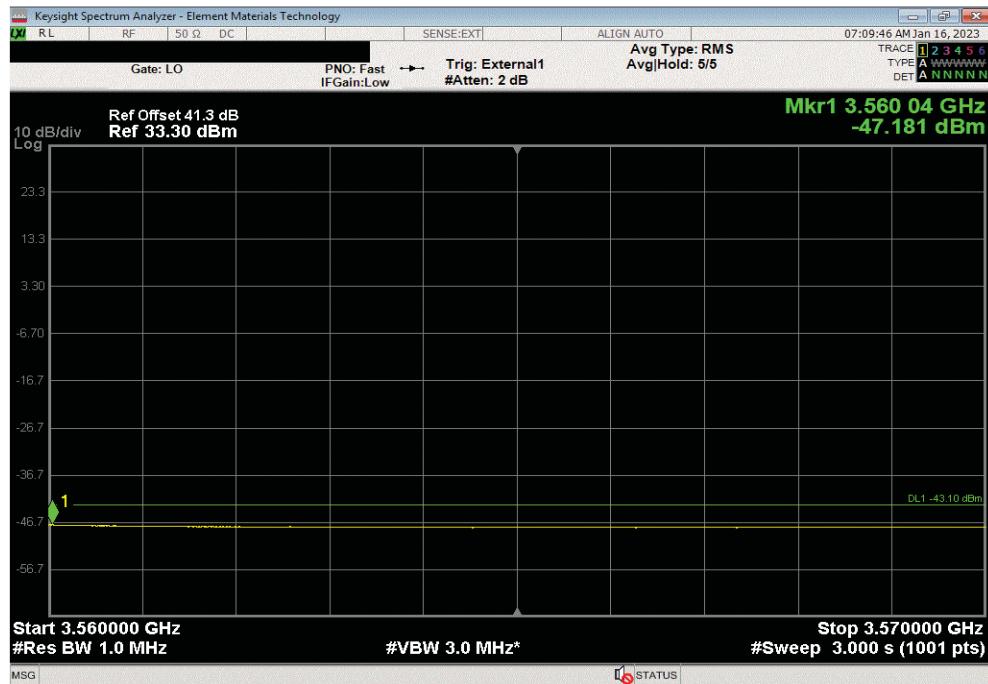


BAND EDGE COMPLIANCE SINGLE 3.45G

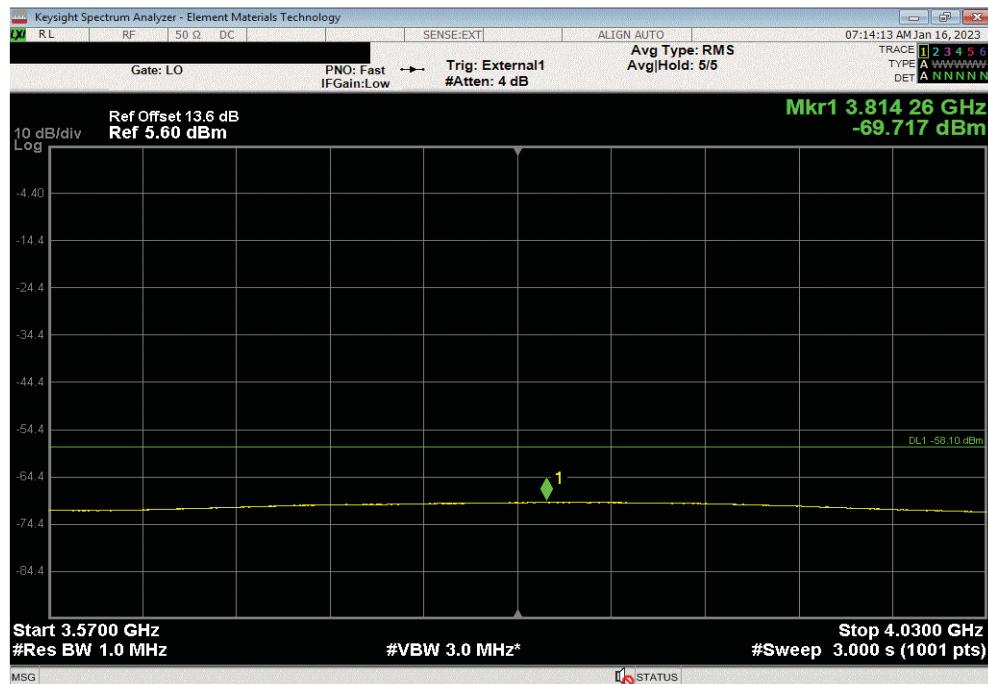


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	4	-47.18	-43.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 30 MHz Bandwidth, 256QAM Modulation, High Channel, 3534.99 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	5	-69.72	-58.1	Pass	



BAND EDGE COMPLIANCE SINGLE 3.45G

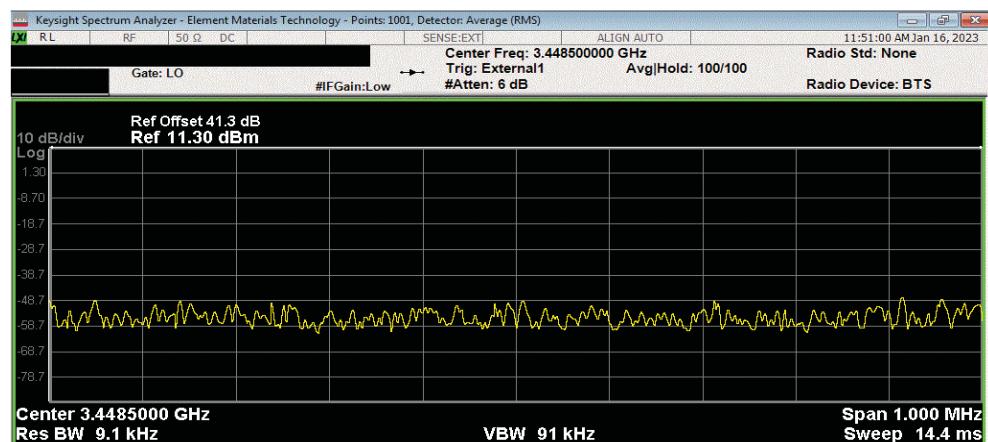


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	1	-34.69	-31.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	2	-34.33	-31.1	Pass	

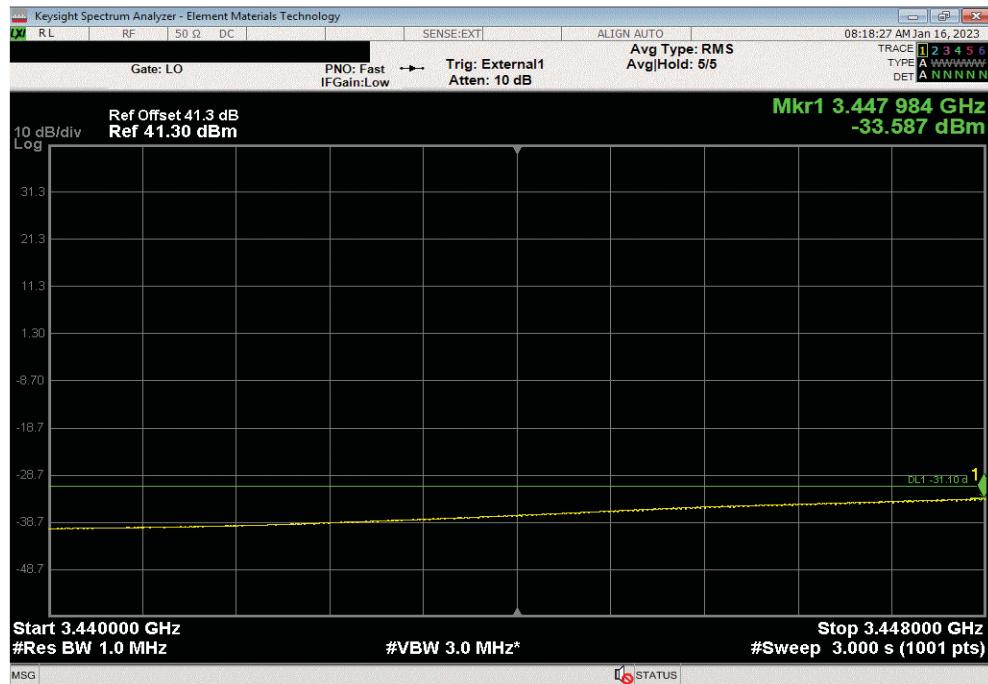


BAND EDGE COMPLIANCE SINGLE 3.45G

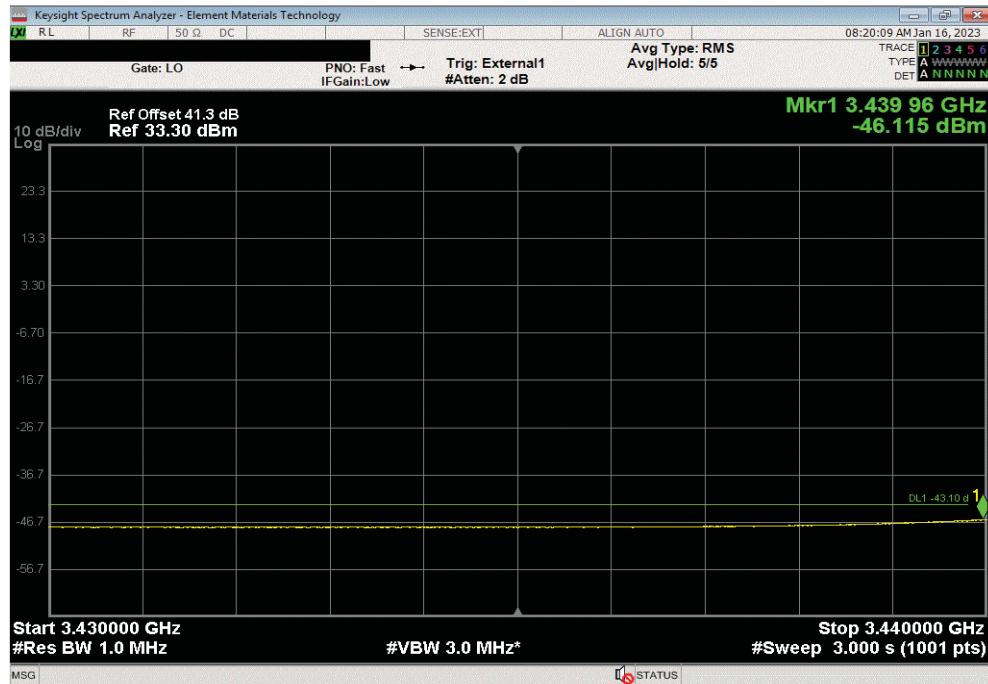


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	3	-33.59	-31.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	4	-46.12	-43.1	Pass	

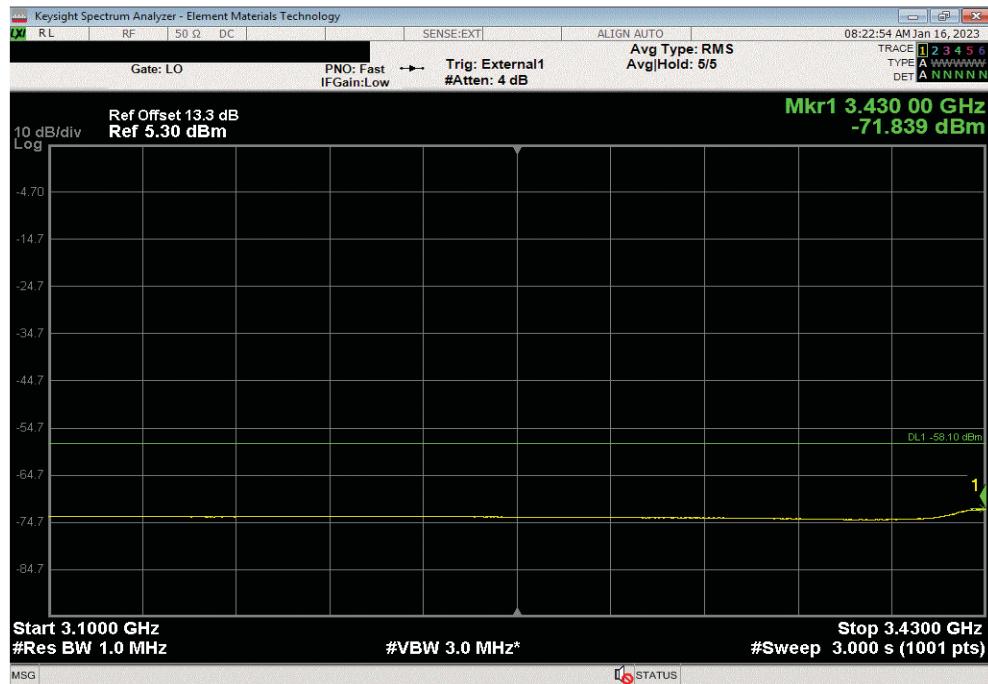


BAND EDGE COMPLIANCE SINGLE 3.45G

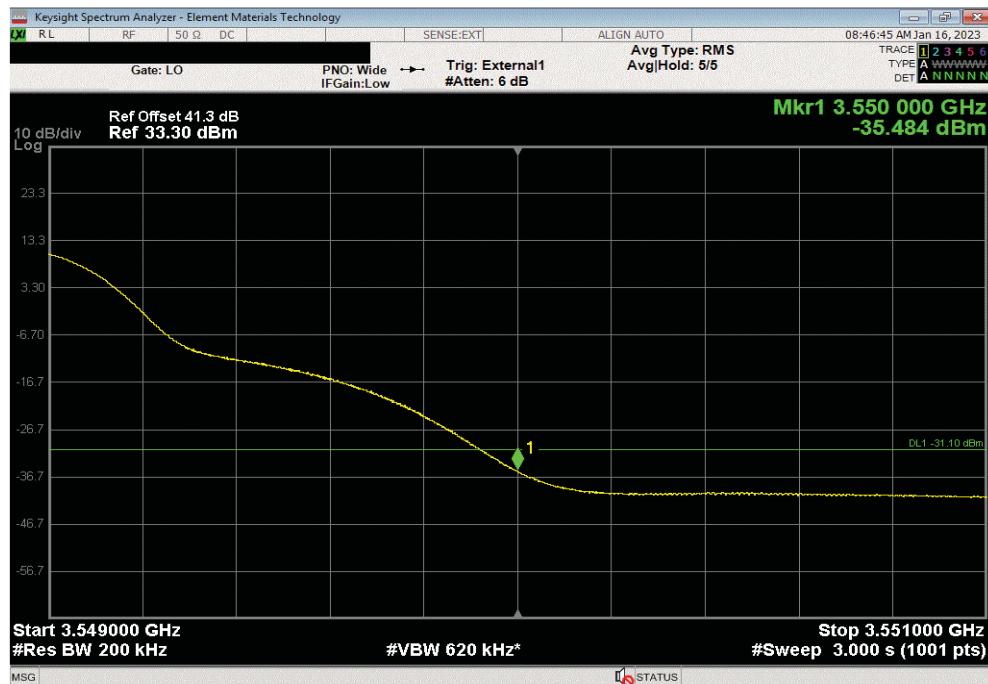


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3470.01 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	5	-71.84	-58.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	1	-35.48	-31.1	Pass	

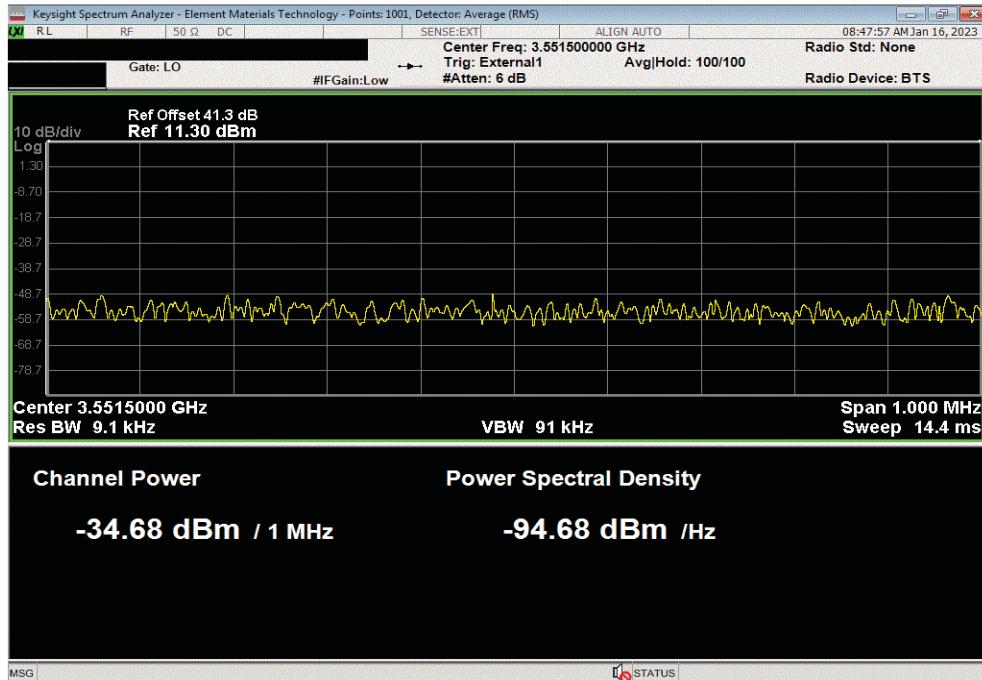


BAND EDGE COMPLIANCE SINGLE 3.45G

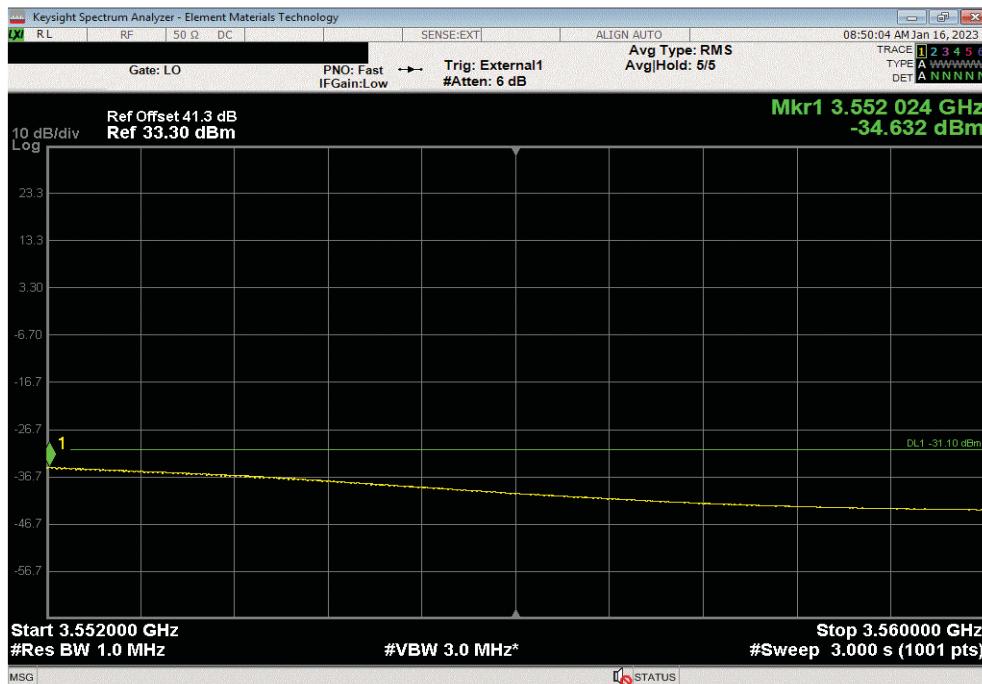


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	2	-34.68	-31.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	3	-34.63	-31.1	Pass	

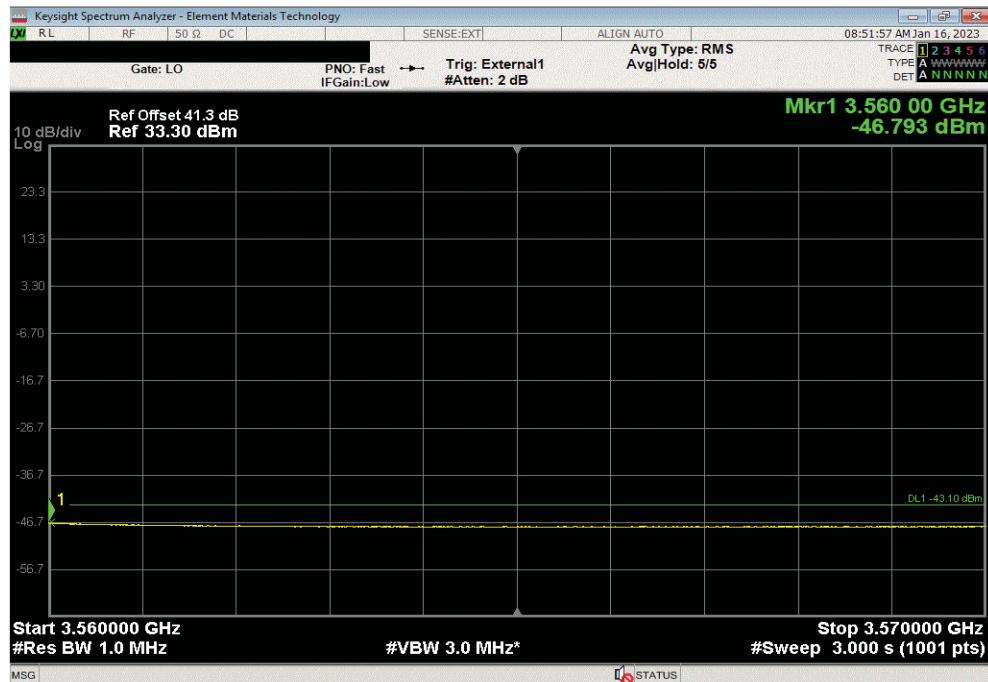


BAND EDGE COMPLIANCE SINGLE 3.45G

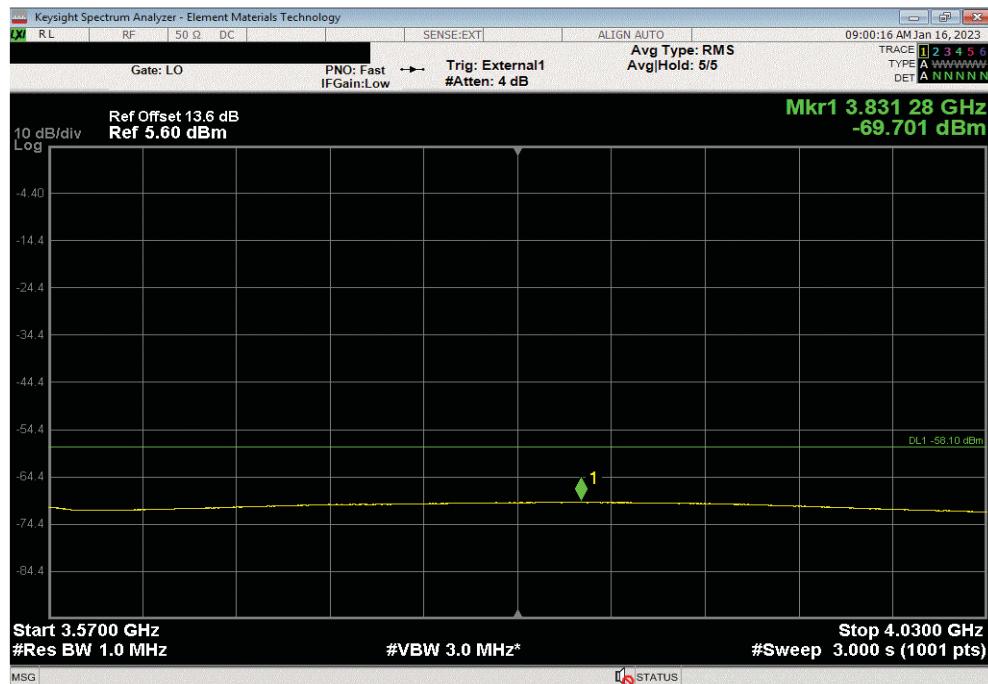


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	4	-46.79	-43.1	Pass	



Port 57, Band n77, 3450 - 3550 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3529.98 MHz					
Frequency Range		Max Value (dBm)	Limit (dBm)	Result	
	5	-69.7	-58.1	Pass	



BAND EDGE COMPLIANCE SINGLE 3.7G



element

XMit 2022.02.07.0

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
Attenuator	Fairview Microwave	SA3N10W-20	RKY	2022-11-15	2023-11-15
Block - DC	Fairview Microwave	SD3239	ANC	2022-03-02	2023-03-02
Generator - Signal	Agilent	N5173B	TIW	2020-07-17	2023-07-17
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFD	2022-10-19	2023-10-19

TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in the available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

All limits were adjusted by a factor of $[-10 \log(64)]$ dB to account for the device operation as a 64 port MIMO transmitter, as per FCC KDB 622911.

Per section 27.53(l)(1), the power of any emission outside of the authorized operating frequency range cannot exceed -13 dBm. The limit is adjusted to -31.1 dBm [-13 dBm -10 log (64)] per FCC KDB 662911D01 v02r01 and ANSI C63.26-2015 section 6.4 because the BTS may operate as a 64 port MIMO transmitter.

Per 27.53(l)(1), emissions seen up to 1 MHz outside of authorized operating frequency range band edges shall be measured with a RBW of 1% of the measured emission bandwidth. Any emission seen to be > 1 MHz further outside the band edges shall be measured with a RBW of 1 MHz. However, a narrower RBW of at least 1% of the emission bandwidth is still allowed provided that the measured power is integrated over the full reference bandwidth of 1 MHz.

RF conducted emissions testing was performed on the worst case (highest average power) port by band. The AQQQA antenna ports are all within the manufacturer's rated output power tolerances (the RF power variation between antenna ports is small as shown in this certification testing) and the antenna port 22 for the 3.7GHz band was selected to perform the testing for this effort.

The band edge testing was performed using only one modulation type because the Occupied Bandwidth variation between modulation types is small, the average output power variation between modulation types is small, the highest average power (worst case) port was used for testing, and there is significant/good passing margin. The highest rate modulation type (256QAM) was used. (See ANSI C63.26. clause 5.7.2e)

BAND EDGE COMPLIANCE SINGLE 3.7G



TbTx-2022.06.03.0 XML 2022.02.07.0

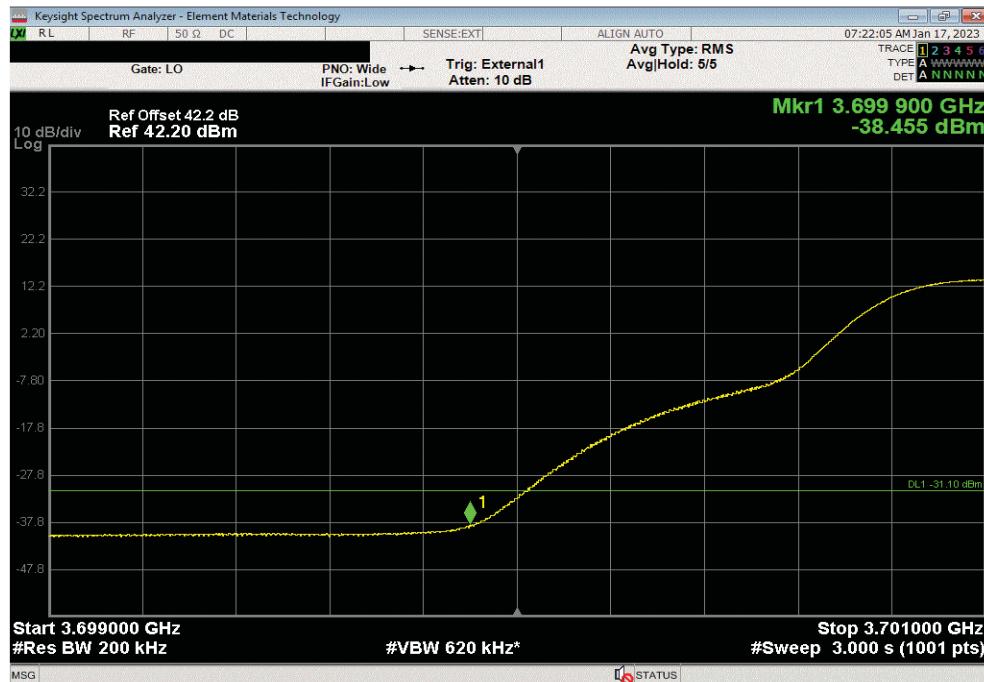
EUT: AQQQA	Work Order: NOKI0052							
Serial Number: YK224300010	Date: 19-Jan-23							
Customer: Nokia of America Corporation	Temperature: 21.2 °C							
Attendees: John Rattanavong, Michell Hill	Humidity: 31% RH							
Project: None	Barometric Pres.: 1023 mbars							
Tested by: Brandon Hobbs	Job Site: TX07							
TEST SPECIFICATIONS	Test Method							
FCC 27:2023	ANSI C63.26:2015							
COMMENTS								
All measurement path losses were accounted for in the reference level offset including any attenuators, filters and DC blocks. The carriers are operated at maximum power (at 2.5 watts/carrier for NR20 and at 5 watts/carrier for NR40, NR60, NR80 & NR100). Some measurement marker values were offset by RBW/2 from the band edge frequency as allowed by ANSI C63.26 clause 5.7.2 for some test cases. Worst case antenna port was used for this testing.								
DEVIATIONS FROM TEST STANDARD								
None								
Configuration #	4,5	Signature		Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result
Port 22								
Band n77, 3700 - 3980 MHz								
20 MHz Bandwidth								
256QAM Modulation								
Low Channel, 3710.01 MHz		1	3699.9	-38.5	-31.1	Pass		
Low Channel, 3710.01 MHz		2	3698.5	-36.9	-31.1	Pass		
Low Channel, 3710.01 MHz		3	3698.0	-34.0	-31.1	Pass		
High Channel, 3969.99 MHz		1	3980.1	-38.2	-31.1	Pass		
High Channel, 3969.99 MHz		2	3981.5	-35.7	-31.1	Pass		
High Channel, 3969.99 MHz		3	3982.0	-34.1	-31.1	Pass		
40 MHz Bandwidth								
256QAM Modulation								
Low Channel, 3720.00 MHz		1	3699.8	-37.7	-31.1	Pass		
Low Channel, 3720.00 MHz		2	3699.4	-37.6	-31.1	Pass		
Low Channel, 3720.00 MHz		3	3699.2	-38.4	-31.1	Pass		
Low Channel, 3720.00 MHz		4	3698.5	-34.5	-31.1	Pass		
Low Channel, 3720.00 MHz		5	3697.9	-33.5	-31.1	Pass		
High Channel, 3960.00 MHz		1	3980.2	-36.7	-31.1	Pass		
High Channel, 3960.00 MHz		2	3980.6	-37.8	-31.1	Pass		
High Channel, 3960.00 MHz		3	3980.8	-37.7	-31.1	Pass		
High Channel, 3960.00 MHz		4	3981.5	-33.6	-31.1	Pass		
High Channel, 3960.00 MHz		5	3982.0	-33.3	-31.1	Pass		
60 MHz Bandwidth								
256QAM Modulation								
Low Channel, 3730.02 MHz		1	3699.7	-37.5	-31.1	Pass		
Low Channel, 3730.02 MHz		2	3699.3	-37.1	-31.1	Pass		
Low Channel, 3730.02 MHz		3	3698.5	-35.4	-31.1	Pass		
Low Channel, 3730.02 MHz		4	3698.0	-34.7	-31.1	Pass		
High Channel, 3949.98 MHz		1	3980.3	-36.8	-31.1	Pass		
High Channel, 3949.98 MHz		2	3980.7	-36.8	-31.1	Pass		
High Channel, 3949.98 MHz		3	3981.5	-35.0	-31.1	Pass		
High Channel, 3949.98 MHz		4	3982.0	-34.3	-31.1	Pass		
80 MHz Bandwidth								
256QAM Modulation								
Low Channel, 3740.01 MHz		1	3699.6	-35.5	-31.1	Pass		
Low Channel, 3740.01 MHz		2	3699.4	-35.9	-31.1	Pass		
Low Channel, 3740.01 MHz		3	3698.5	-34.8	-31.1	Pass		
Low Channel, 3740.01 MHz		4	3698.0	-36.2	-31.1	Pass		
High Channel, 3939.99 MHz		1	3980.4	-35.3	-31.1	Pass		
High Channel, 3939.99 MHz		2	3980.6	-35.7	-31.1	Pass		
High Channel, 3939.99 MHz		3	3981.5	-34.8	-31.1	Pass		
High Channel, 3939.99 MHz		4	3982.0	-35.6	-31.1	Pass		
100 MHz Bandwidth								
256QAM Modulation								
Low Channel, 3750.00 MHz		1	3699.5	-34.6	-31.1	Pass		
Low Channel, 3750.00 MHz		2	3698.5	-35.0	-31.1	Pass		
Low Channel, 3750.00 MHz		3	3698.0	-36.6	-31.1	Pass		
High Channel, 3930.00 MHz		1	3980.5	-34.4	-31.1	Pass		
High Channel, 3930.00 MHz		2	3981.5	-35.1	-31.1	Pass		
High Channel, 3930.00 MHz		3	3982.0	-35.5	-31.1	Pass		

BAND EDGE COMPLIANCE SINGLE 3.7G

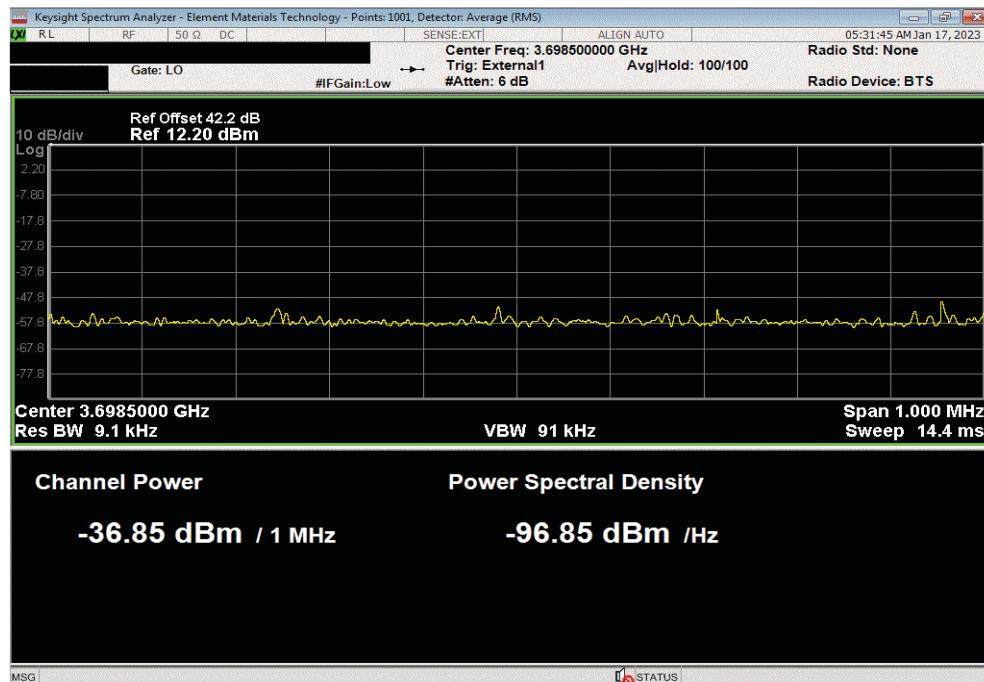


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3710.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3699.9	-38.46	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3710.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3698.5	-36.85	-31.1	Pass	

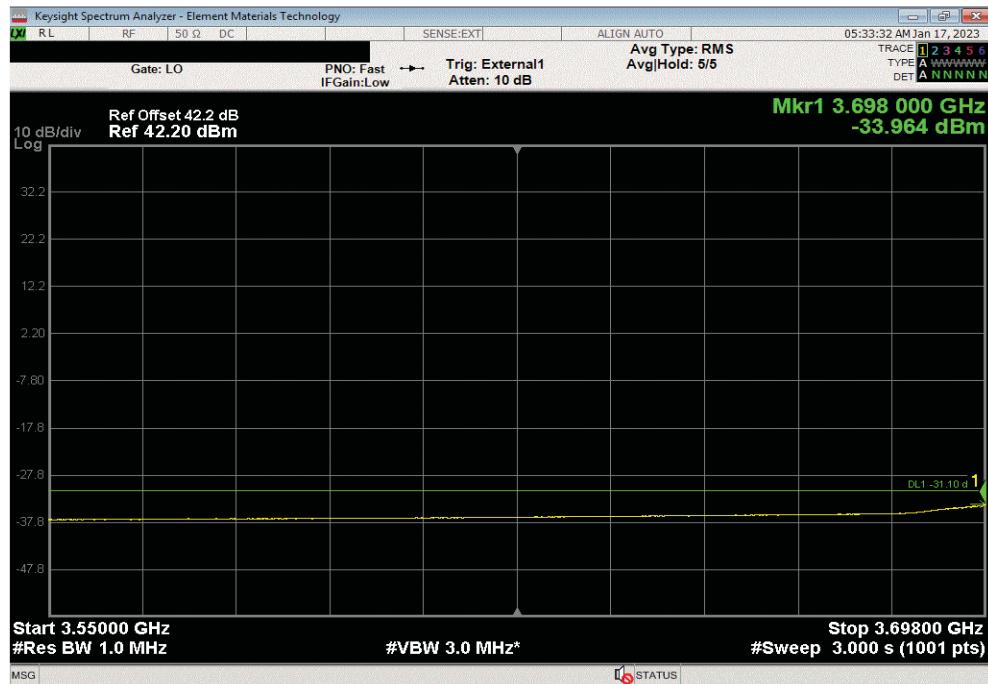


BAND EDGE COMPLIANCE SINGLE 3.7G



TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, Low Channel, 3710.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3698.0	-33.96	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3969.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3980.1	-38.23	-31.1	Pass	

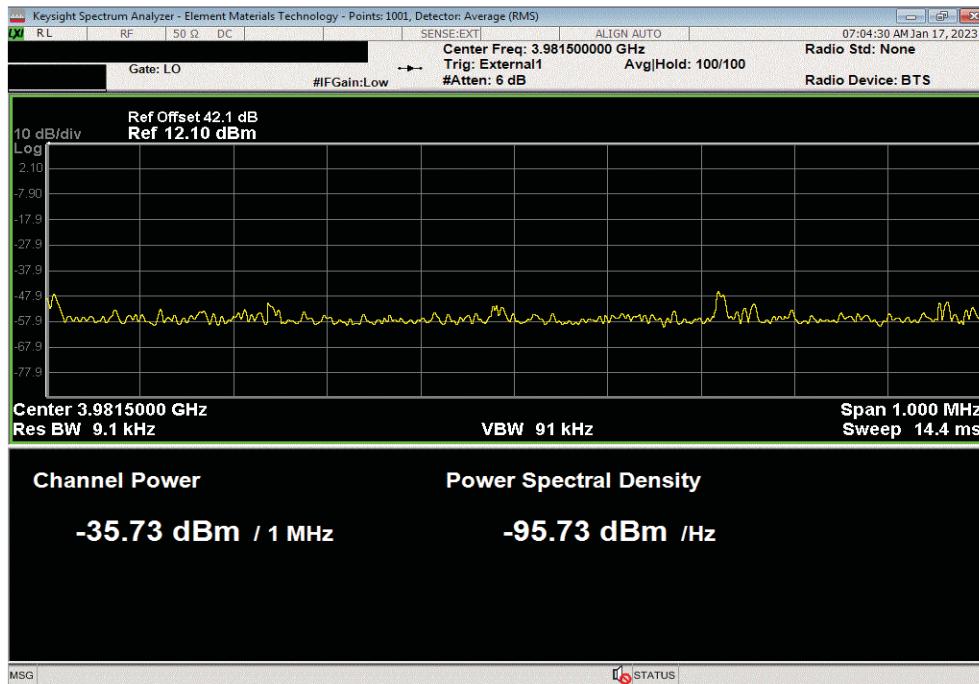


BAND EDGE COMPLIANCE SINGLE 3.7G

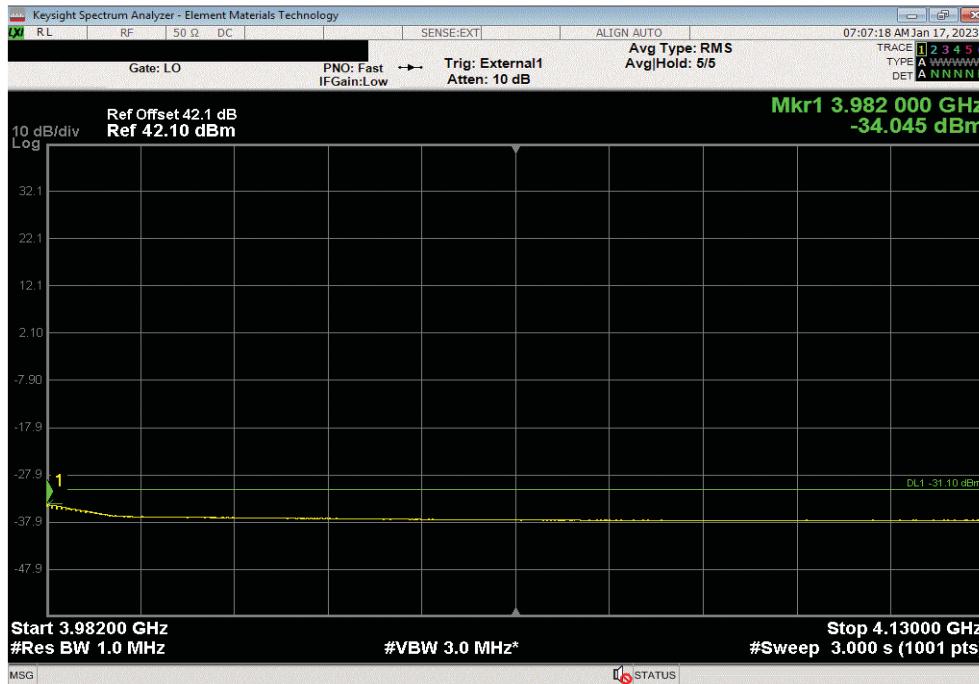


TbTx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3969.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3981.5	-35.73	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 20 MHz Bandwidth, 256QAM Modulation, High Channel, 3969.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3982.0	-34.05	-31.1	Pass	

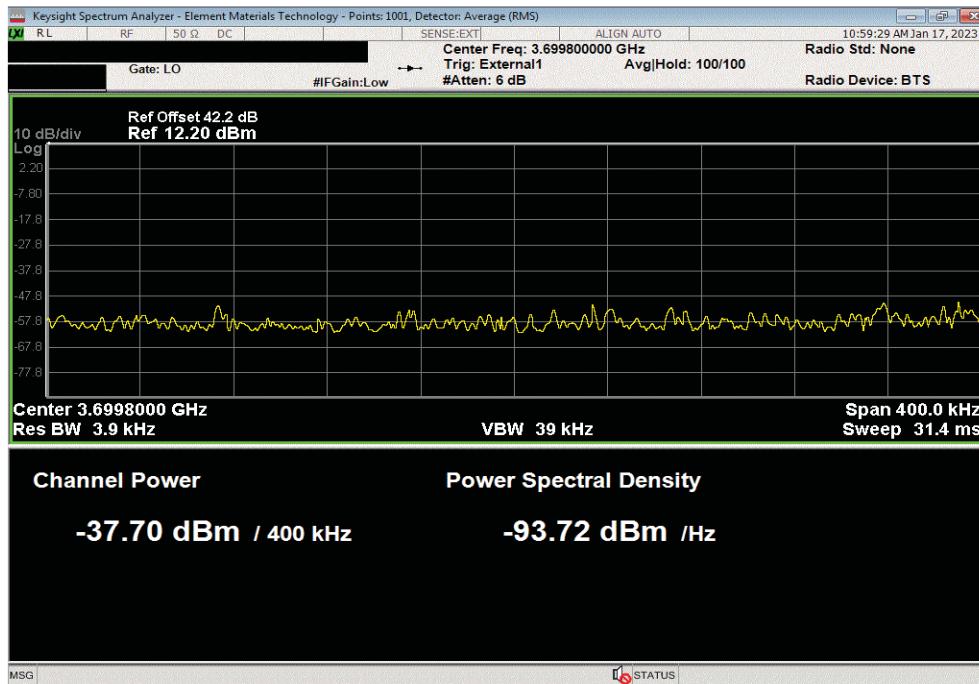


BAND EDGE COMPLIANCE SINGLE 3.7G

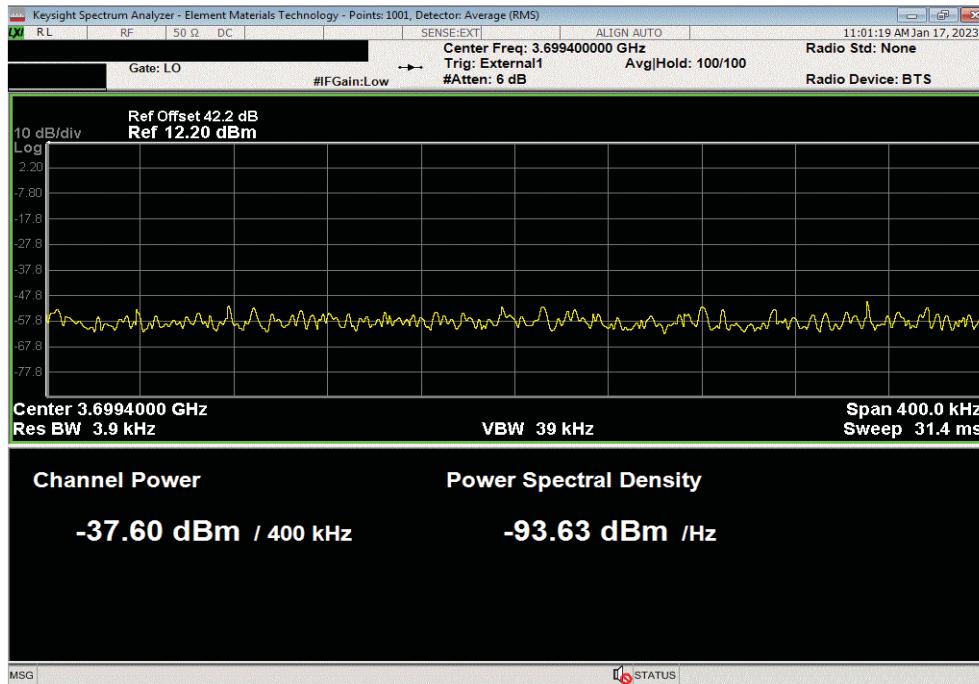


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3699.8	-37.70	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3699.4	-37.60	-31.1	Pass	

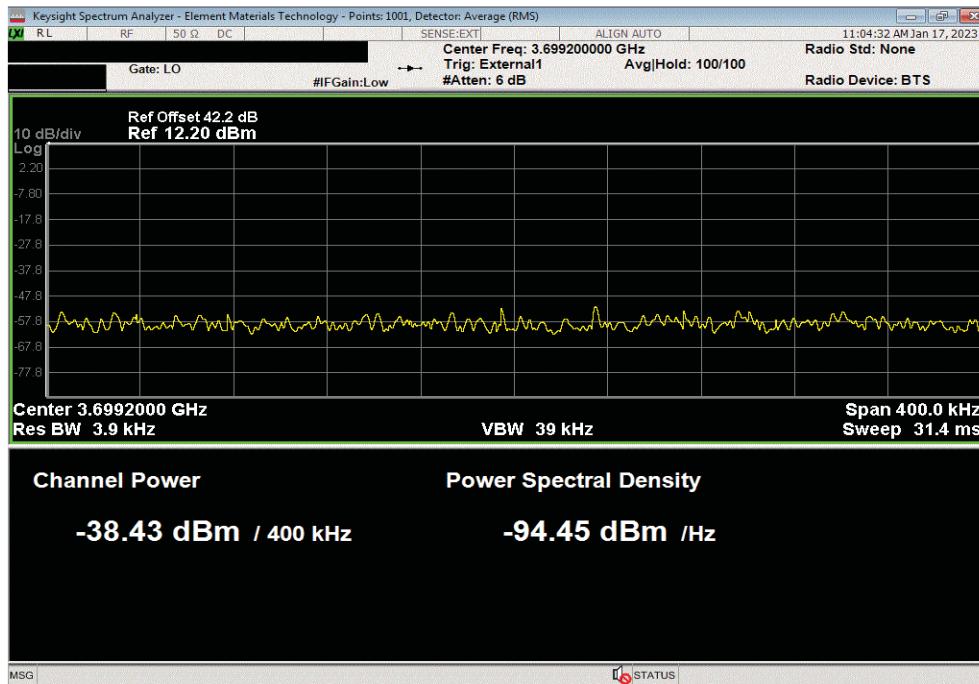


BAND EDGE COMPLIANCE SINGLE 3.7G

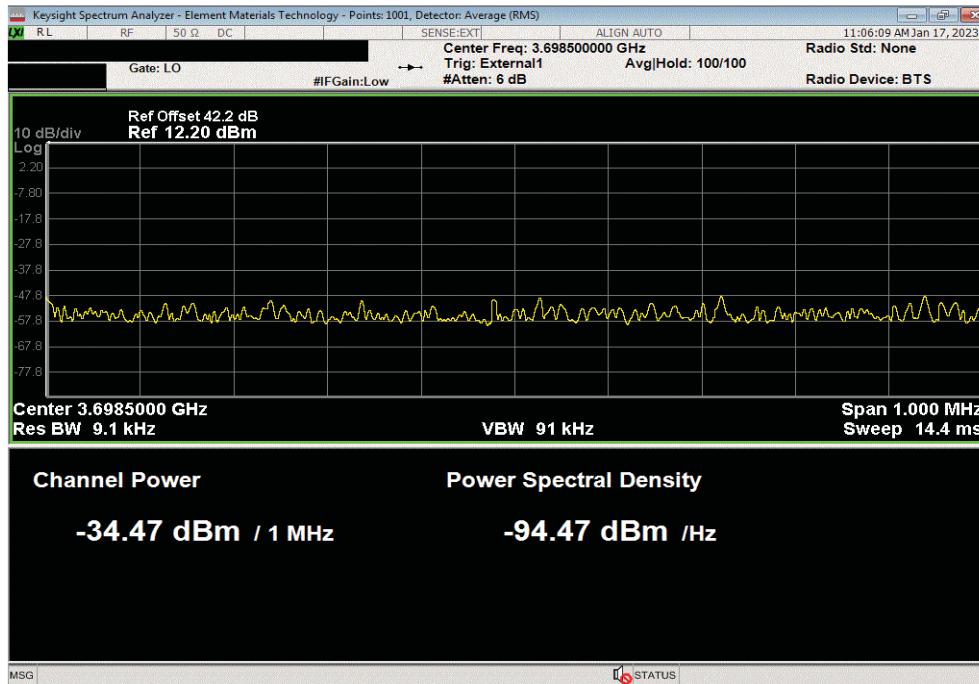


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3699.2	-38.43	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3698.5	-34.47	-31.1	Pass	

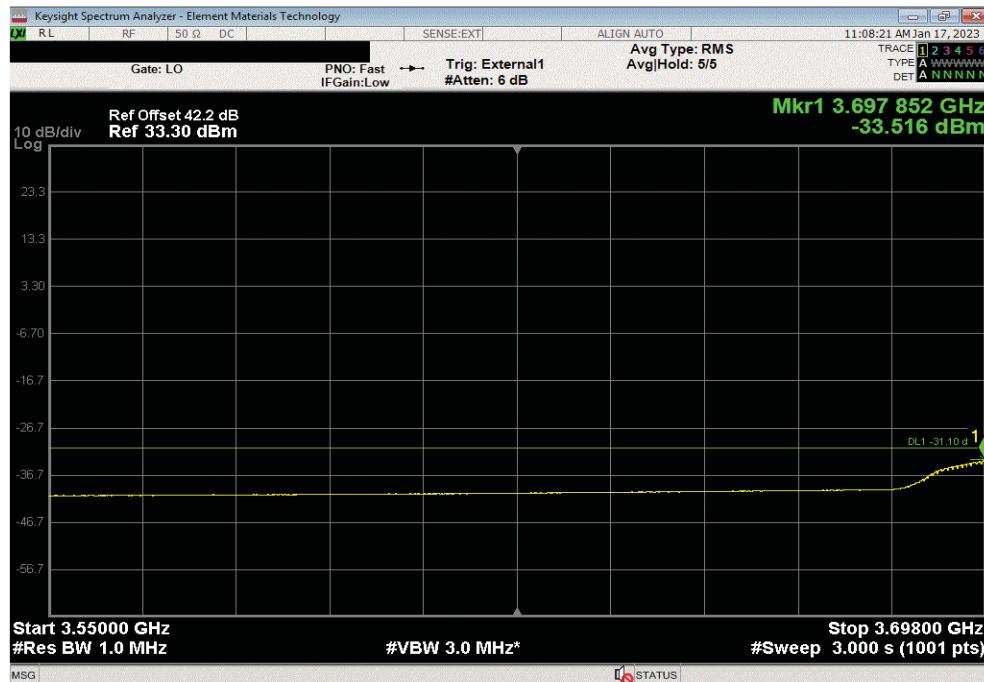


BAND EDGE COMPLIANCE SINGLE 3.7G

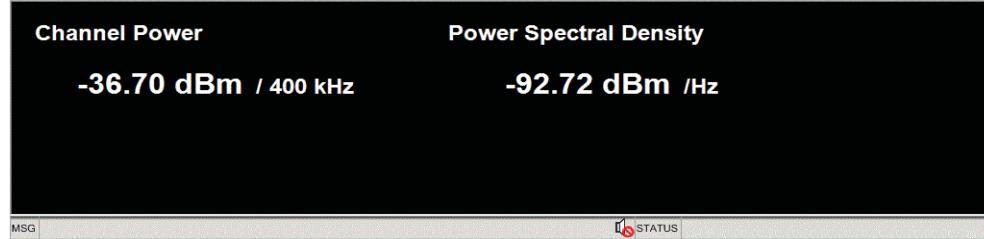
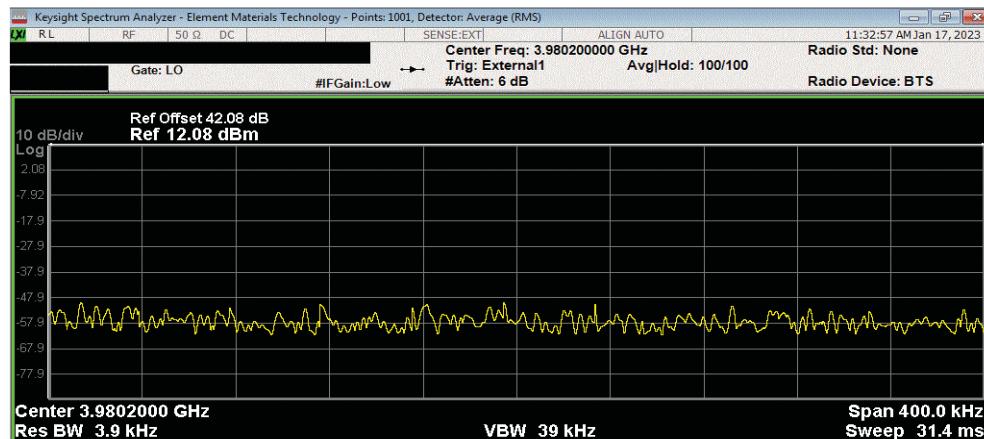


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, Low Channel, 3720.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
5	3697.9	-33.52	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3980.2	-36.70	-31.1	Pass	

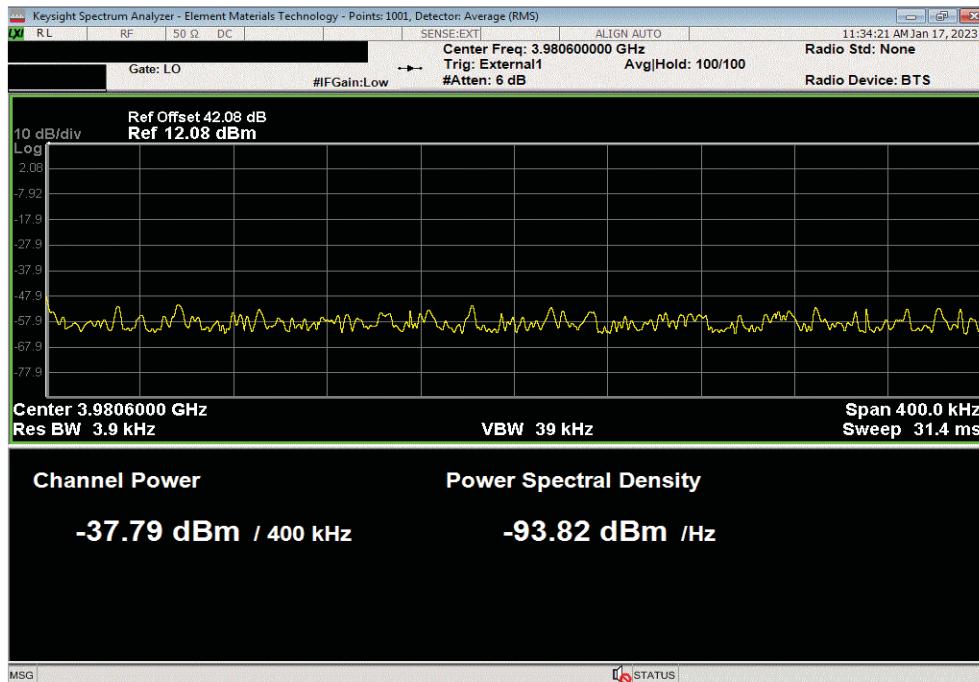


BAND EDGE COMPLIANCE SINGLE 3.7G

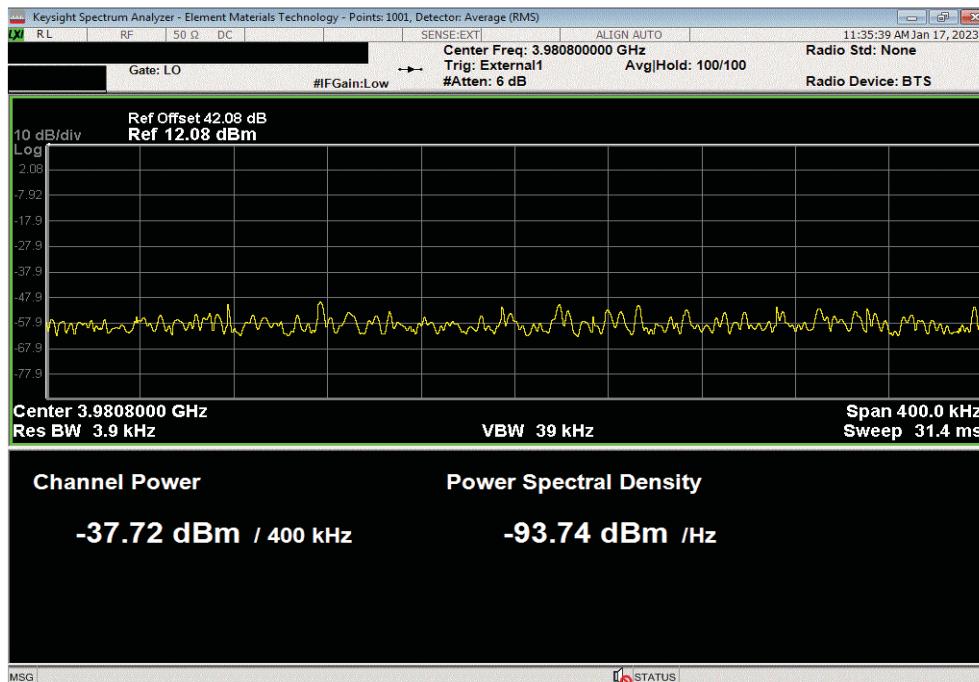


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3980.6	-37.79	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3980.8	-37.72	-31.1	Pass	

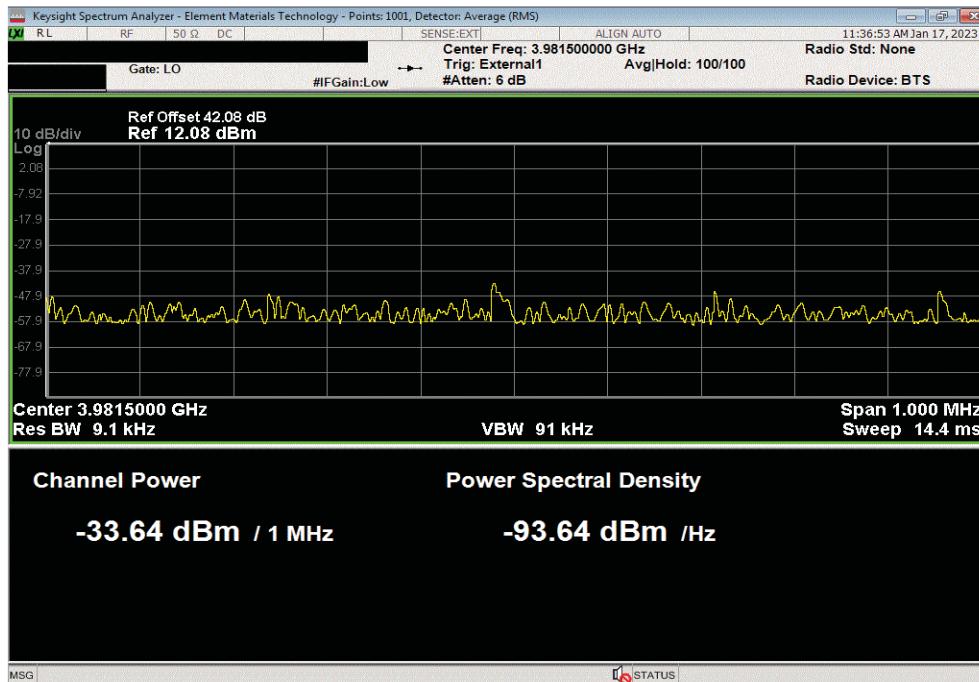


BAND EDGE COMPLIANCE SINGLE 3.7G

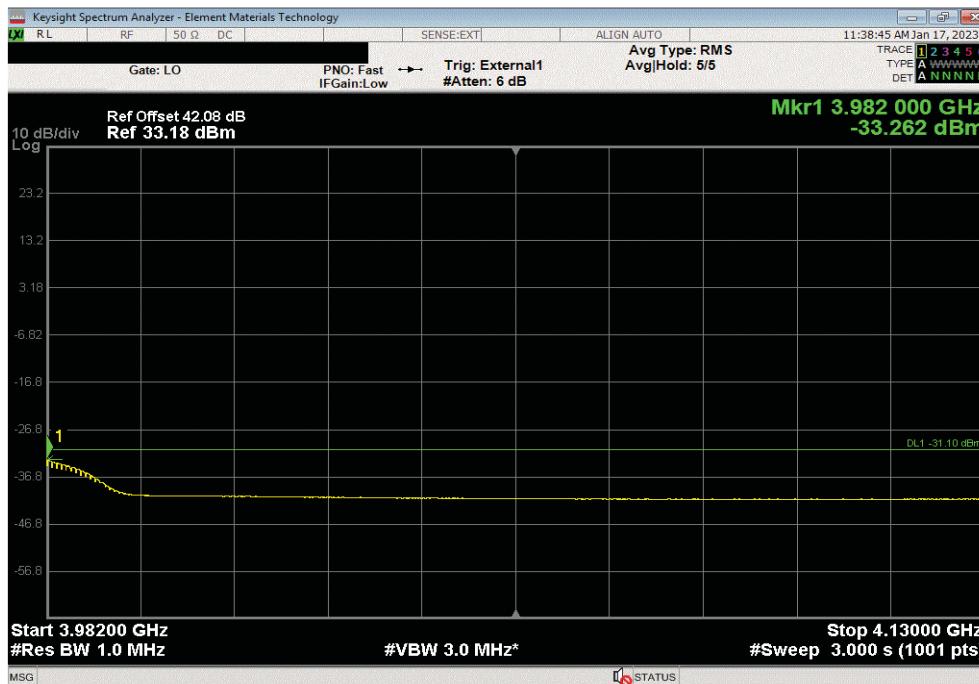


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3981.5	-33.64	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 40 MHz Bandwidth, 256QAM Modulation, High Channel, 3960.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
5	3982.0	-33.26	-31.1	Pass	

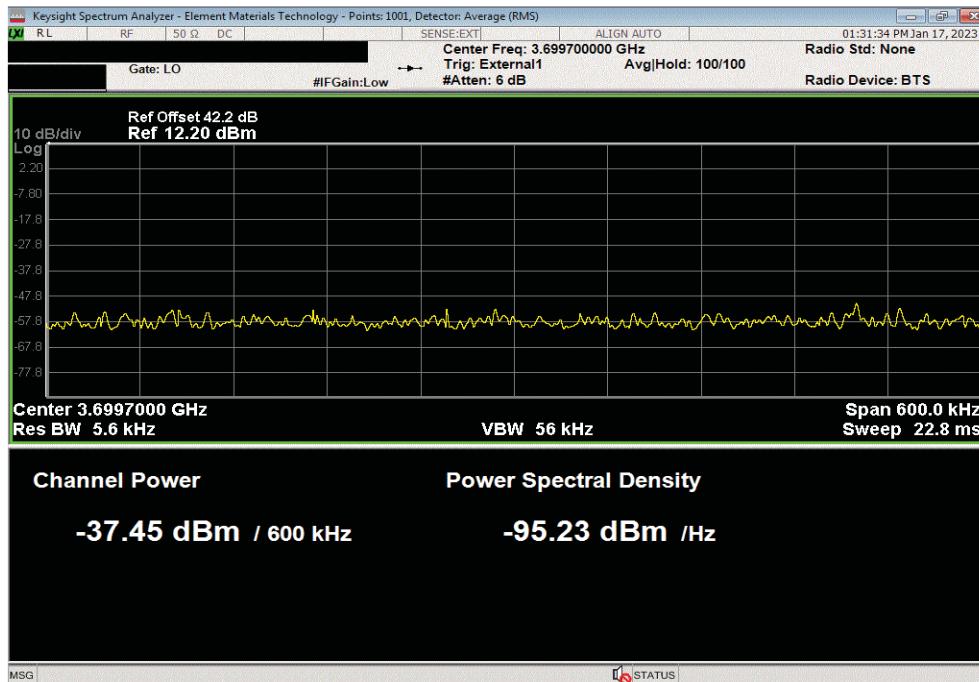


BAND EDGE COMPLIANCE SINGLE 3.7G

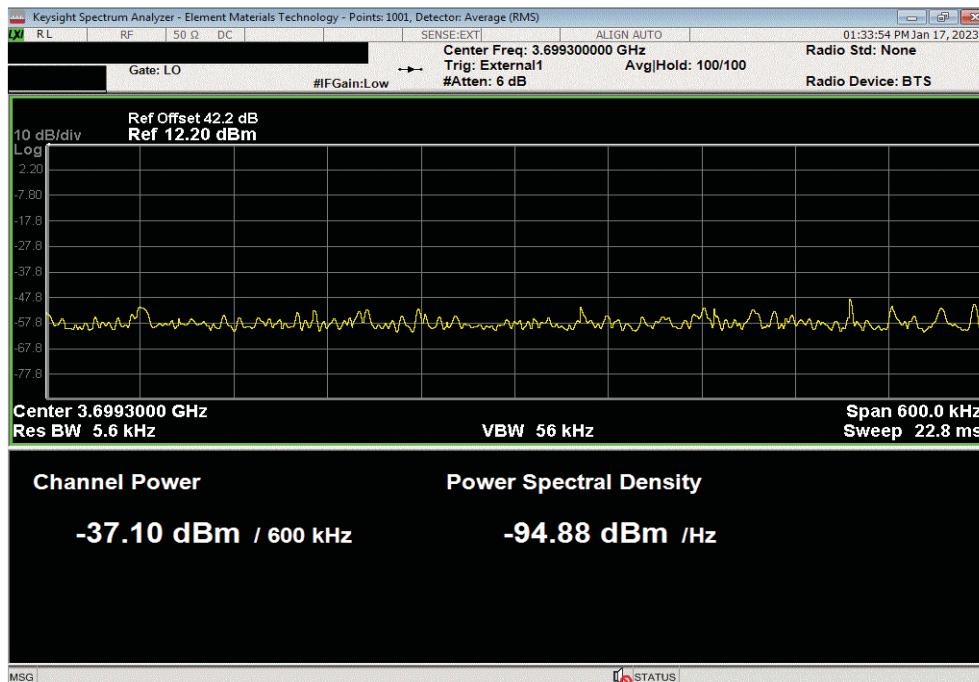


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Low Channel, 3730.02 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3699.7	-37.45	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Low Channel, 3730.02 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3699.3	-37.10	-31.1	Pass	

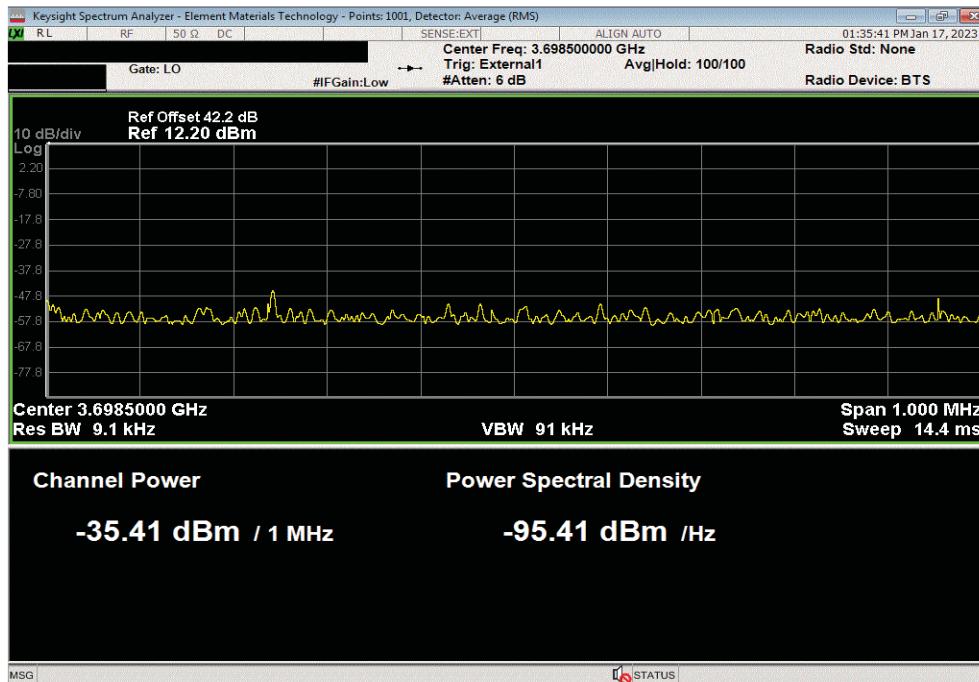


BAND EDGE COMPLIANCE SINGLE 3.7G

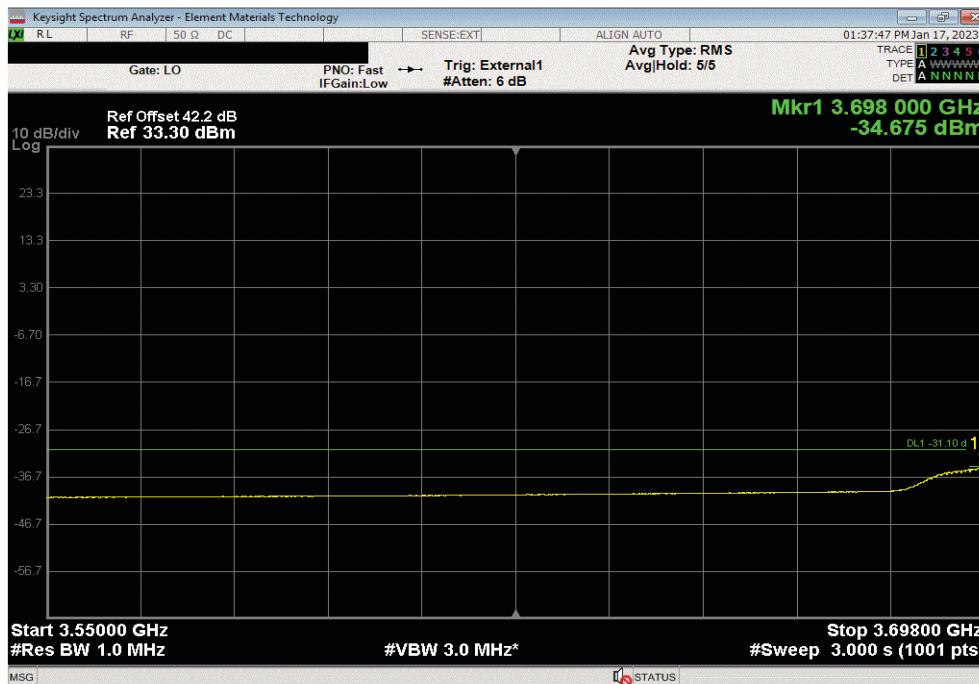


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Low Channel, 3730.02 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3698.5	-35.41	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, Low Channel, 3730.02 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3698.0	-34.68	-31.1	Pass	

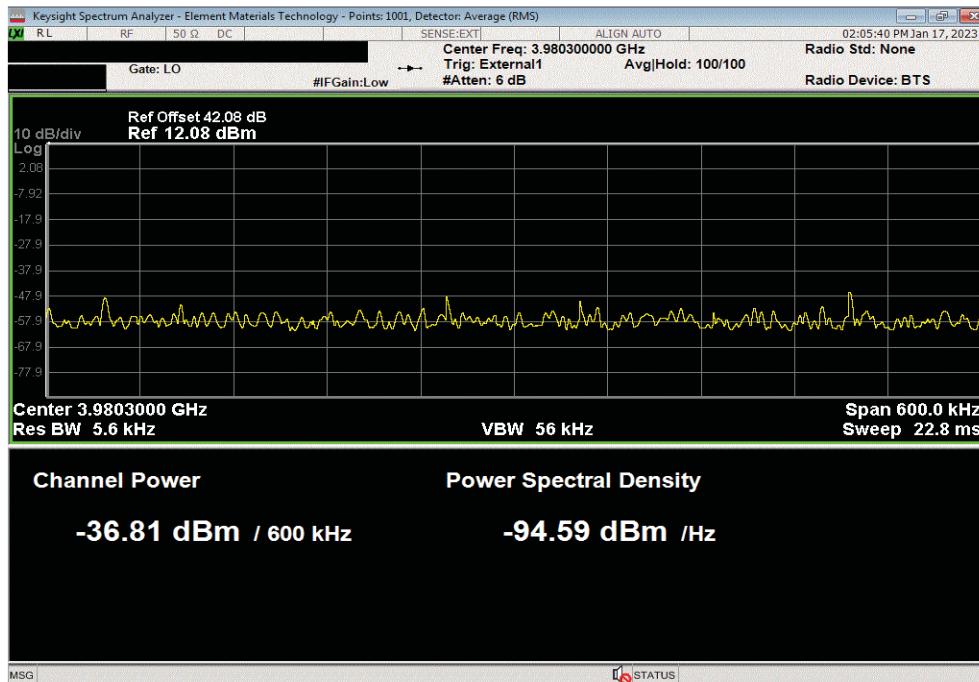


BAND EDGE COMPLIANCE SINGLE 3.7G

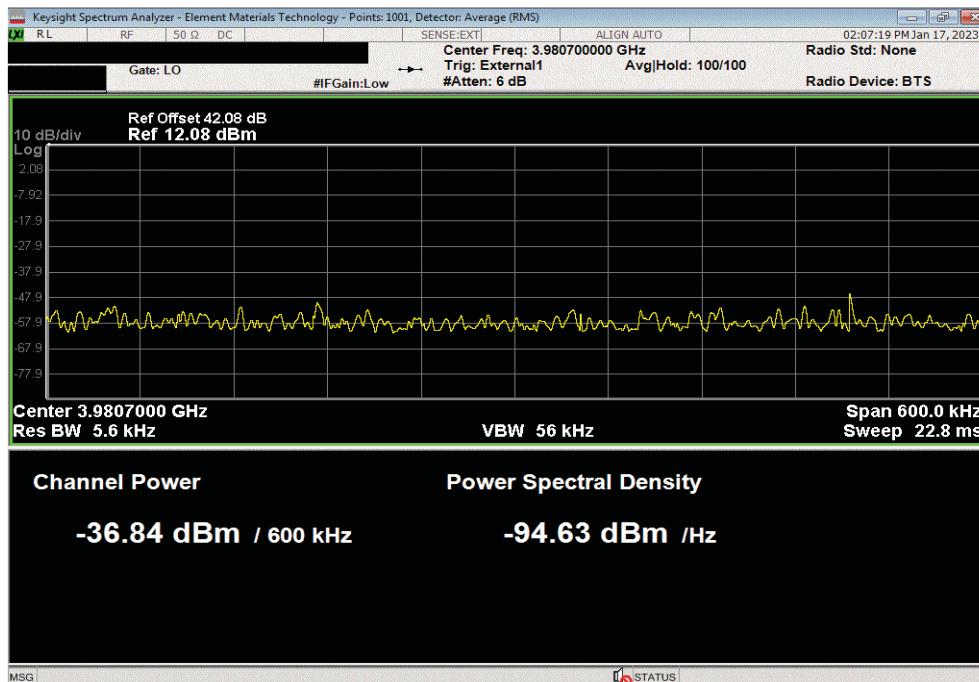


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, High Channel, 3949.98 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3980.3	-36.81	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, High Channel, 3949.98 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3980.7	-36.84	-31.1	Pass	

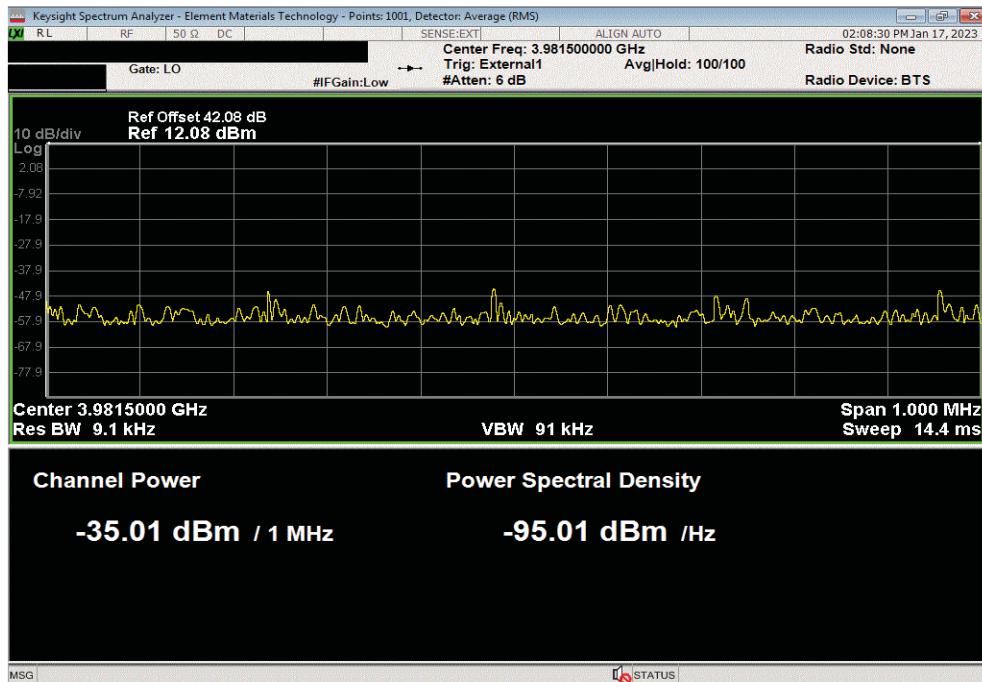


BAND EDGE COMPLIANCE SINGLE 3.7G

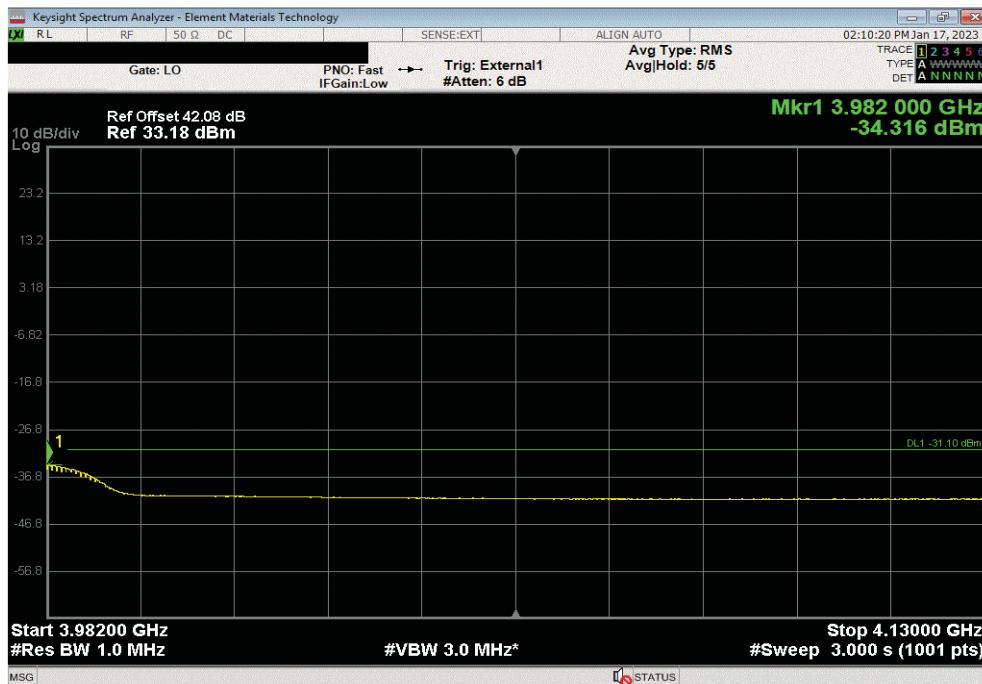


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, High Channel, 3949.98 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3981.5	-35.01	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 60 MHz Bandwidth, 256QAM Modulation, High Channel, 3949.98 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3982.0	-34.32	-31.1	Pass	

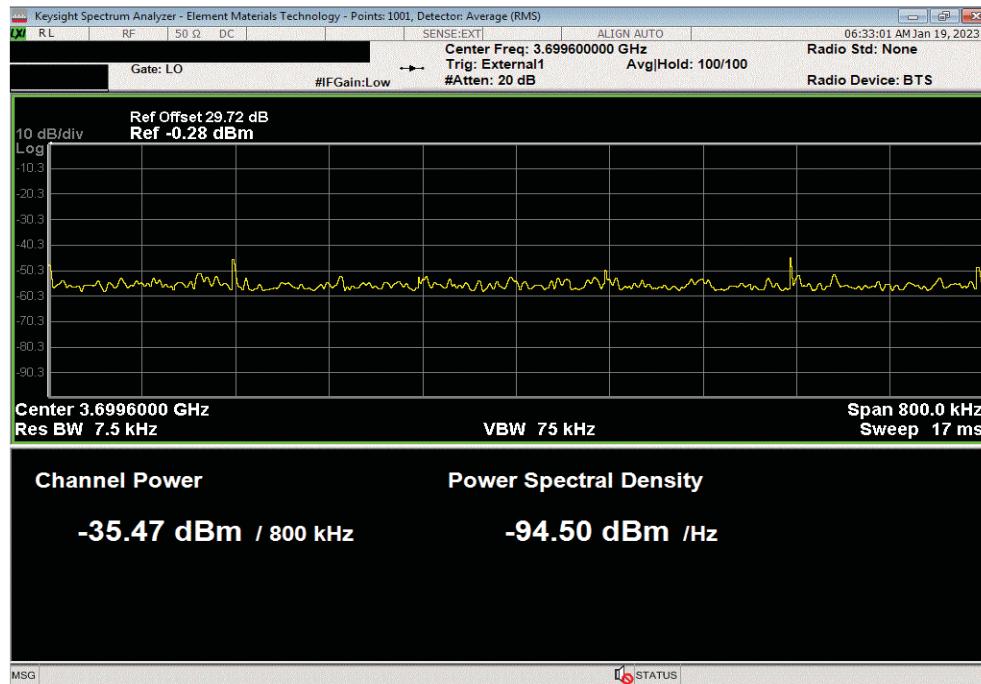


BAND EDGE COMPLIANCE SINGLE 3.7G

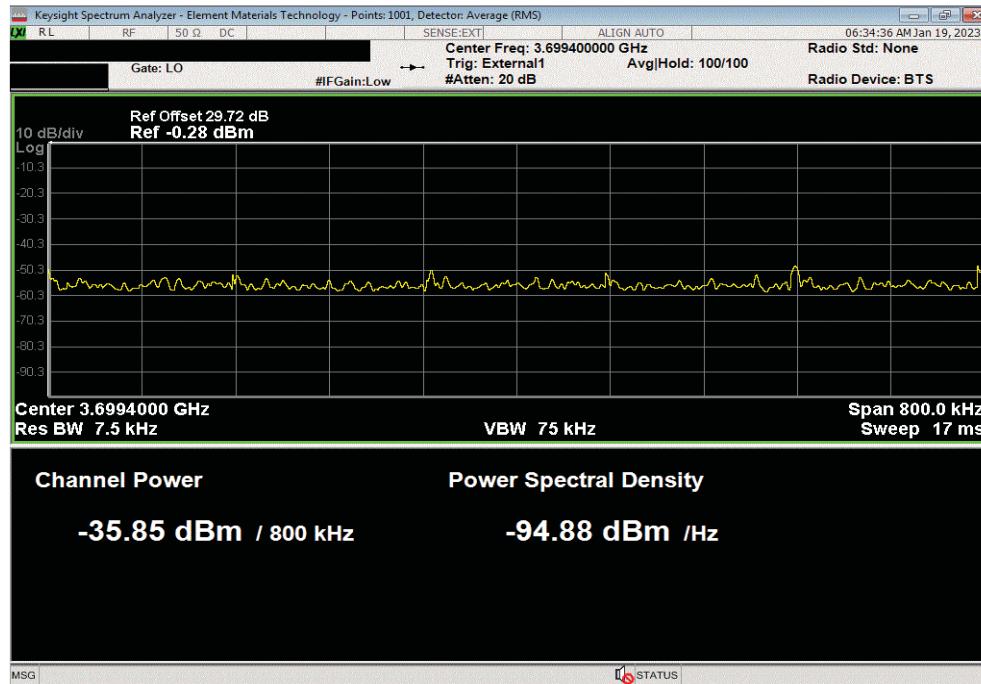


TbTx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Low Channel, 3740.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3699.6	-35.47	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Low Channel, 3740.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3699.4	-35.85	-31.1	Pass	

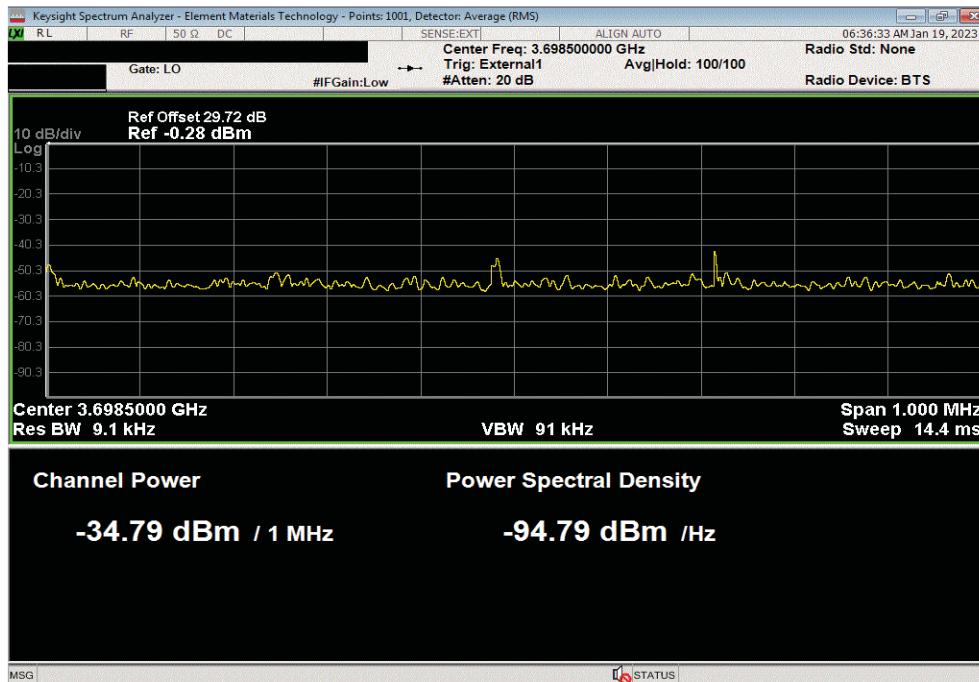


BAND EDGE COMPLIANCE SINGLE 3.7G

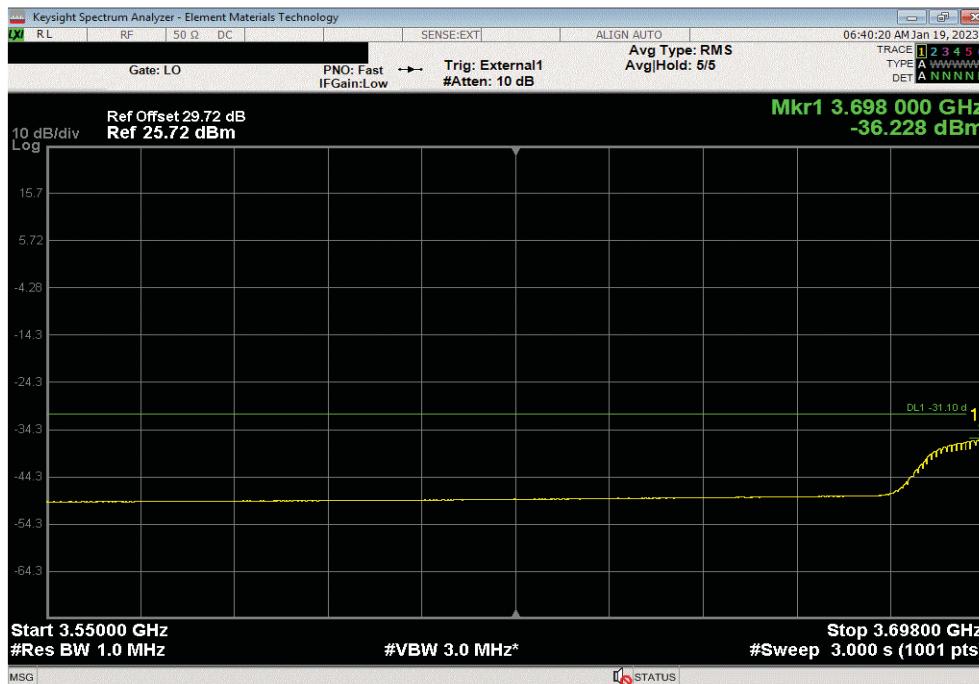


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Low Channel, 3740.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3698.5	-34.79	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, Low Channel, 3740.01 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3698.0	-36.23	-31.1	Pass	

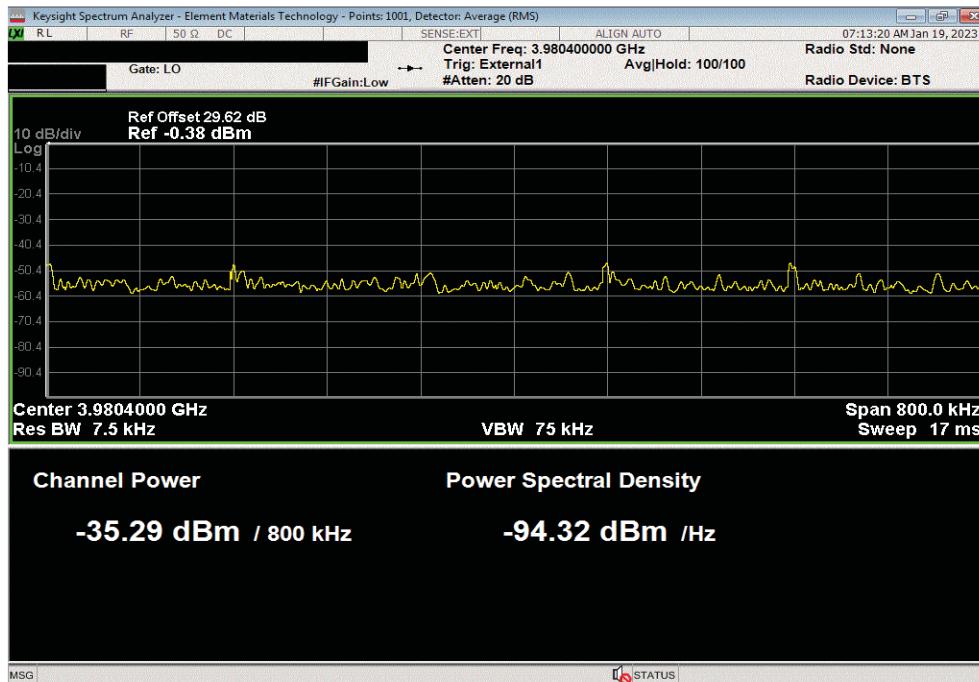


BAND EDGE COMPLIANCE SINGLE 3.7G

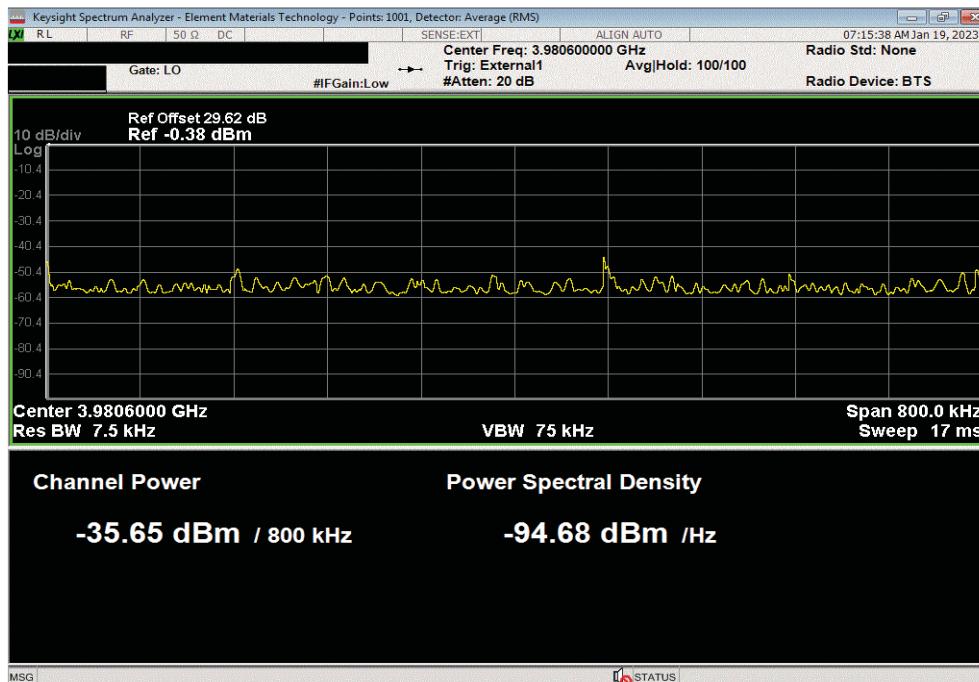


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, High Channel, 3939.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3980.4	-35.29	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, High Channel, 3939.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3980.6	-35.65	-31.1	Pass	

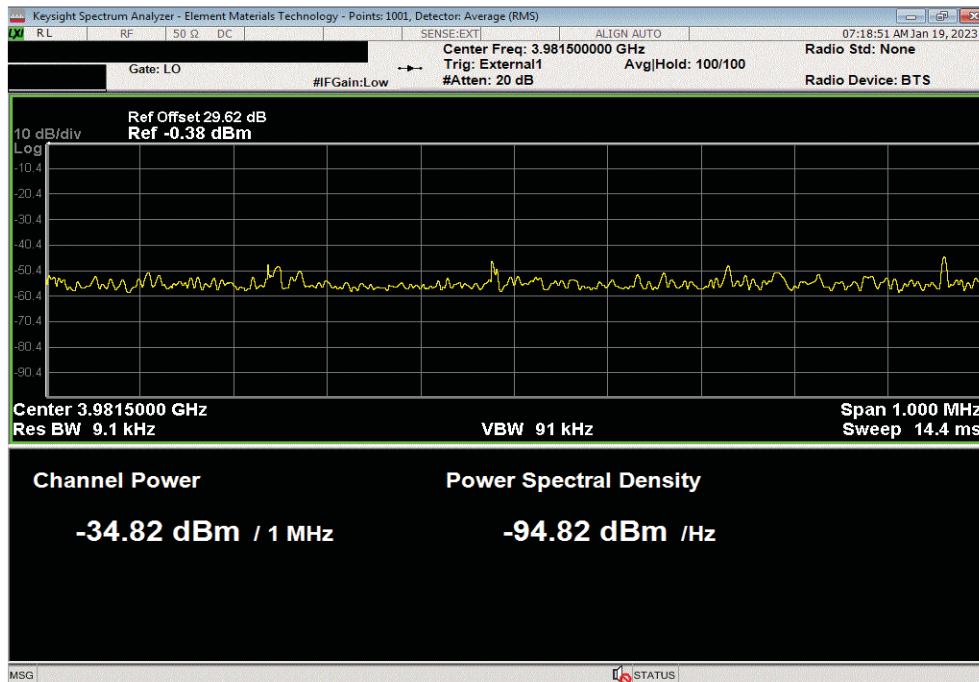


BAND EDGE COMPLIANCE SINGLE 3.7G

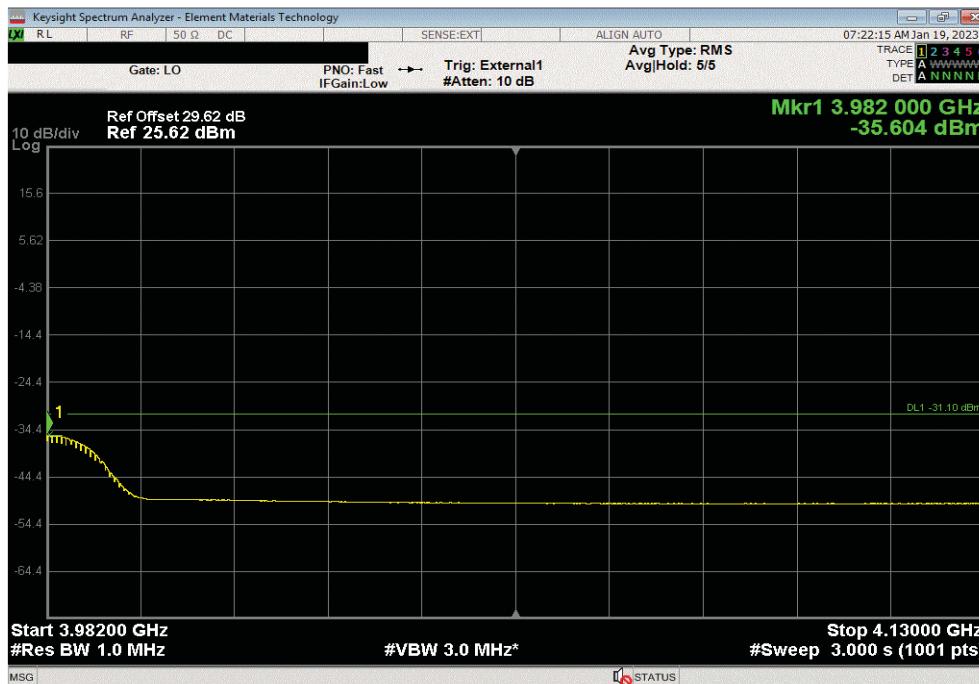


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, High Channel, 3939.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3981.5	-34.82	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 80 MHz Bandwidth, 256QAM Modulation, High Channel, 3939.99 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
4	3982.0	-35.60	-31.1	Pass	

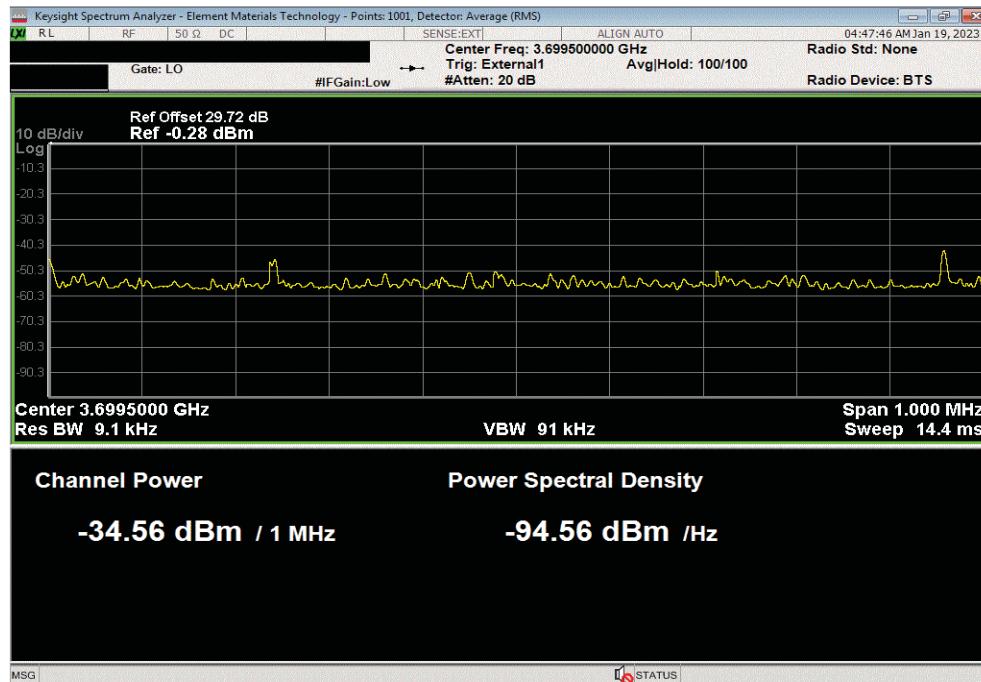


BAND EDGE COMPLIANCE SINGLE 3.7G

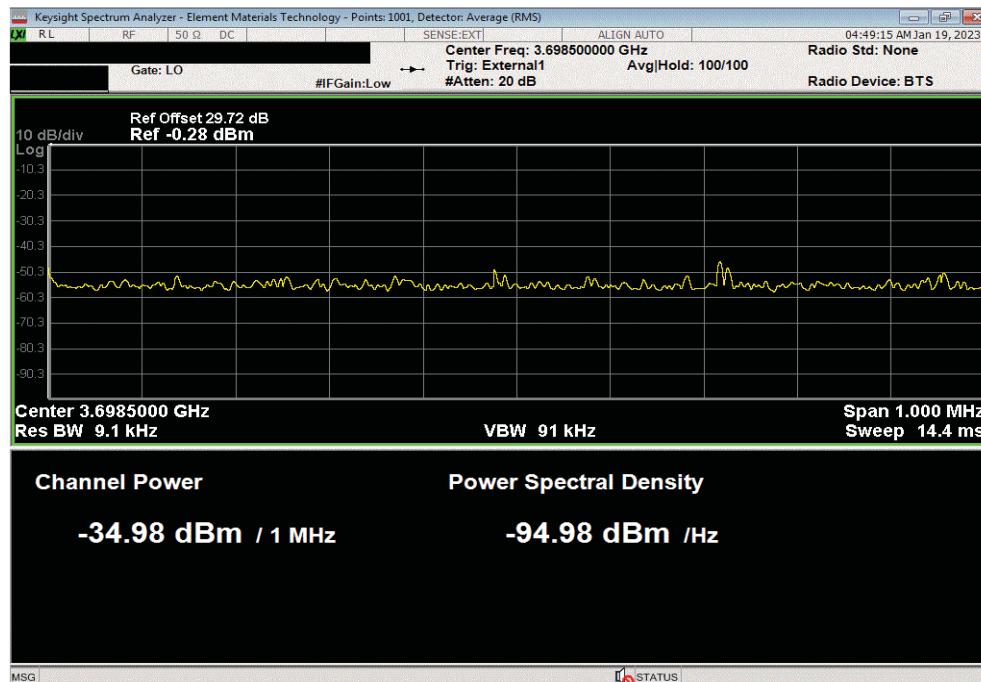


TbtTx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Low Channel, 3750.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3699.5	-34.56	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Low Channel, 3750.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3698.5	-34.98	-31.1	Pass	

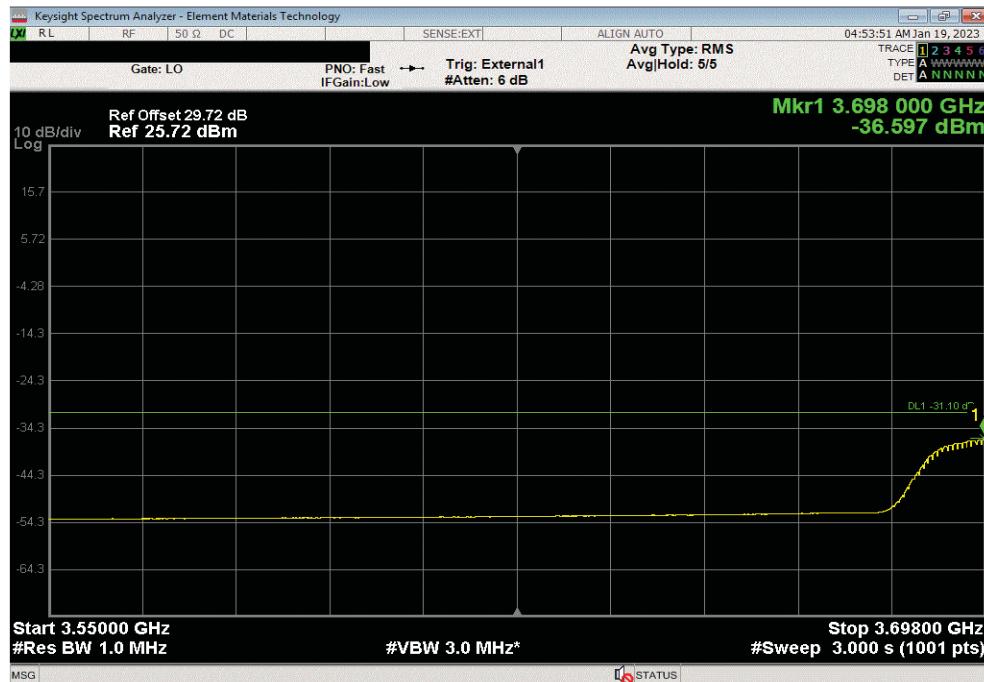


BAND EDGE COMPLIANCE SINGLE 3.7G

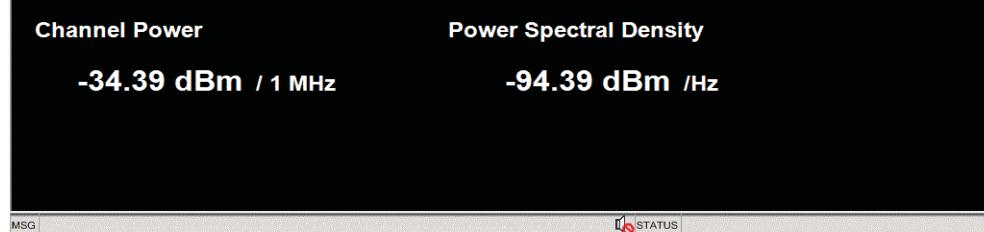
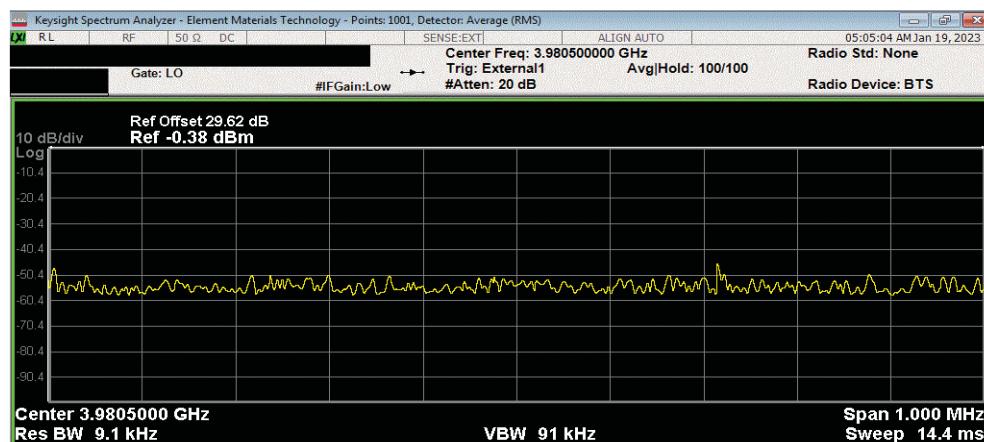


TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, Low Channel, 3750.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3698.0	-36.60	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, High Channel, 3930.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
1	3980.5	-34.39	-31.1	Pass	

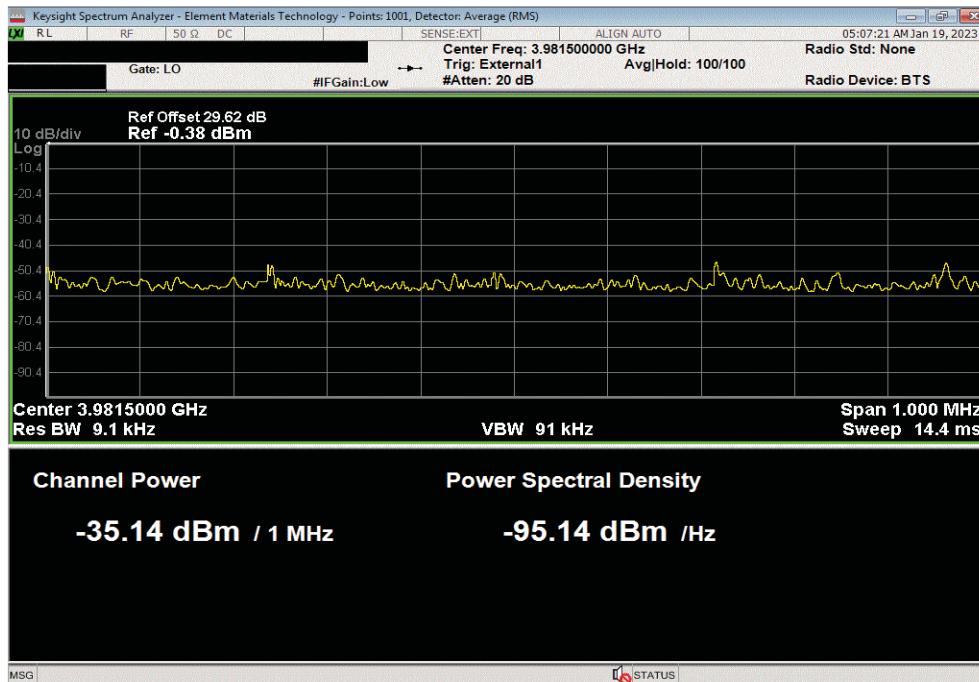


BAND EDGE COMPLIANCE SINGLE 3.7G



TbITx 2022.06.03.0 XMit 2022.02.07.0

Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, High Channel, 3930.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
2	3981.5	-35.14	-31.1	Pass	



Port 22, Band n77, 3700 - 3980 MHz, 100 MHz Bandwidth, 256QAM Modulation, High Channel, 3930.00 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBm)	Limit (dBm)	Result	
3	3982.0	-35.52	-31.1	Pass	

