TEST REPORT

Report Number: R13952660-E1

Applicant	:	GOGO BUSINESS AVIATION 105 EDGEVIEW DRIVE SUITE 300 BROOMFIELD CO, 80021
Model	:	DMA
FCC ID	:	2AW6C-DMA
IC ID	:	10226A-DMA
EUT Description	:	AIR TO GROUND TRANSCEIVER
Test Standard(s)	:	FCC CFR47 Part 22 Subpart G ISED RSS-127 Issue 1 ISED RSS-GEN Issue 5

Date Of Issue:
2021-11-10

Prepared by:
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ACCREDITED
CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2021-10-13	Initial Issue	Niklas Haydon
V2	2021-11-10	Clarified radiated method used.	Brian T. Kiewra

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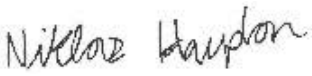
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	GOGO BUSINESS AVIATION 105 EDGEVIEW DRIVE SUITE 300 BROOMFIELD CO, 80021
Model	DMA
FCC ID	2AW6C-DMA
IC	10226A-DMA
EUT Description	AIR TO GROUND TRANSCEIVER
Serial Number	Non-serialized
Sample Receipt Date	2021-08-30
Date Tested	2021-08-31 to 2021-09-07
Applicable Standards	FCC CFR47 Part 22 Subpart G ISED RSS-127 Issue 1 ISED RSS-GEN issue 5
Test Results	Compliant

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released By:	Reviewed By:	Prepared By:
		
Dan Coronia Operations Leader UL Verification Services Inc	Kiya Kedida Senior Project Engineer UL Verification Services Inc	Niklas Haydon Operations Leader UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC CFR 47 Part 22 Subpart G
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP
- ISED RSS-GEN Issue 5
- RSS-127 Issue 1

3. FACILITIES AND ACCREDITATION

UL LLC is accredited A2LA, certification # 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	703469
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560	US0067	27265	703469

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1 METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2 DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
RF output power, conducted	1.3 dB (PK) 0.45 dB (AV)
Power Spectral Density, conducted	2.47 dB
Unwanted Emissions, conducted	1.94 dB
All emissions, radiated	6.01 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

4.4 SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:
Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

5. EQUIPMENT UNDER TEST

5.1 DESCRIPTION OF EUT

The EUT is an Air to Ground Transceiver.

5.2 MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

The transmitter has an peak ERP output powers as follows:

SISO Port A:

Frequency (MHz)	Peak Power ERP (dBm)	Peak Power ERP (mW)
894.73-895.27	40.77	11939.88

SISO Port B:

Frequency (MHz)	Peak Power ERP (dBm)	Peak Power ERP (mW)
894.73-895.27	40.78	11967.41

MIMO Port A + Port B:

Frequency (MHz)	Peak Power ERP (dBm)	Peak Power ERP (mW)
894.73-895.27	40.78	11967.41

5.3 SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 93.1.41.0.

5.4 MAXIMUM ANTENNA GAIN AND CABLE LOSS

The antenna gain(s) and the type, as provided by the manufacturer, are as follows:

Frequency	Antenna Model	Antenna Gain (dBi)
894.73 - 895.27MHz	P12949	5.8
	P17770/P17772	7
	P17204	8.5
	P35500	8.7

Frequency	Cable	Loss (dB)
894.73 - 895.27MHz	Minimum	1.5
	Maximum	5

For MIMO configuration the antennas uncorrelated.

5.5 WORST-CASE CONFIGURATION AND MODE

The worst-case scenario for all measurements is based on the peak conducted output power measurement investigation results. Output power measurements were measured for various packet sizes. The EUT supports QPSK, 16QAM, and 64QAM. It was found that QPSK and 16QAM results were worst case. All spurious testing was performed using QPSK and 16QAM packet sizes to represent the worst case. All testing except for output power were performed at a power level higher than those reported in the maximum output power section as worst case. Only the powers levels reported in the output power section will be used by the manufacturer.

The EUT operates in SISO and MIMO modes. All testing except for output power was tested in MIMO mode with SISO power set on the EUT. Output power testing shows all modes supported.

The EUT was investigated in three orthogonal orientations X/Y/Z with antennas terminated to a communications tester (cabinet method). It was determined that X orientation was worst-case orientation. Therefore, all radiated testing is reported in X orientation. P12949 antenna with highest loss cable was highest power therefore that level was used for testing.

Port A = Tx01
Port B = Tx02

5.6 DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Signal Generator	Rohde & Schwarz	SMBV100A	1205790	NA
Power Supply	BK Precision	1672	295F11435	NA

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	USB	1	USB	Communication	1m	None
2	DC	1	DC	Power	1m	None

Setup Diagrams

Refer to R13952660-EP1 for Setup Diagrams and photos.

6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 1				
SA0027	Spectrum Analyzer	Keysight Technologies	N9030A	2021-06-25	2022-06-25
PWM001	RF Power Meter	Keysight Technologies	N1912A	2021-07-16	2022-07-16
PWS004	Peak and Avg Power Sensor, 50MHz to 6GHz	Keysight Technologies	E9323A	2021-08-19	2022-08-19
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2021-01-04	2022-01-04
HI0091	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
SOFTEMI	Antenna Port Software	UL	Version 2021.08.11	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville - North Chamber)

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2021-08-19	2022-08-19
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2021-02-19	2022-02-19
	1-18 GHz				
AT0078	Double-Ridged Waveguide Horn Antenna, 1 to 18 GHz	ETS Lindgren	3117	2020-11-19	2021-11-19
	Gain-Loss Chains				
N-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2021-07-20	2022-07-20
N-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-07-20	2022-07-20
N-SAC03	Gain-loss string: 1-18GHz	Various	Various	2021-07-20	2022-07-20

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2021-03-30	2022-03-30
SOFTEMI	EMI Software	UL	Version 9.5 (24 Jun 2021)		
	Additional Equipment used				
s/n 200037635	Environmental Meter	Fisher Scientific	06-662-4	2020-01-22	2022-01-22
HPF009	1GHz high-pass filter, 2W, F_{high} =10GHz	Micro-Tronics	HPM17672	2021-02-16	2022-02-16
BRF001	900MHz notch filter, 2W, F_{high} =6GHz	Micro-Tronics	BRM50706	2021-07-22	2022-07-22

NOTES:

1. * Testing is completed before equipment expiration date.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

7. RF OUTPUT POWER

TEST PROCEDURE

The transmitter output was connected to a characterized coaxial cable and coupler, the other end of which was connected to a peak power meter. The peak power was measured with the peak power meter at the middle channel in each band.

LIMIT

FCC: §22.867
The effective radiated power (ERP) of ground and airborne stations operating on the frequency ranges listed in §22.857 must not exceed the limits in this section.

(a) The peak ERP of airborne mobile station transmitters must not exceed 12 Watts.

ISED: RSS-127 Issue 1
5.4 Effective Radiated Power
The effective radiated power (ERP) of ground and airborne equipment shall not exceed the limits established in SRSP-515.

ISED: SRSP-515
5.1 Effective Radiated Power (ERP)
The maximum ERP limits for ground stations and airborne stations are as follows:
Airborne Station: 12 W ERP

RESULTS

SISO Port A:

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P12949 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	38.57	5.8	-2.15	1.5	40.72	40.79	-0.07
	16QAM	38.6	5.8	-2.15	1.5	40.75	40.79	-0.04
	64QAM	38.57	5.8	-2.15	1.5	40.72	40.79	-0.07
894.76	QPSK	38.62	5.8	-2.15	1.5	40.77	40.79	-0.02
	16QAM	38.49	5.8	-2.15	1.5	40.64	40.79	-0.15
	64QAM	38.55	5.8	-2.15	1.5	40.70	40.79	-0.09
895.24	QPSK	38.57	5.8	-2.15	1.5	40.72	40.79	-0.07
	16QAM	38.6	5.8	-2.15	1.5	40.75	40.79	-0.04
	64QAM	38.55	5.8	-2.15	1.5	40.70	40.79	-0.09
895.27	QPSK	38.49	5.8	-2.15	1.5	40.64	40.79	-0.15
	16QAM	38.51	5.8	-2.15	1.5	40.66	40.79	-0.13
	64QAM	38.53	5.8	-2.15	1.5	40.68	40.79	-0.11

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P12949 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.5	5.8	-2.15	5	38.15	40.79	-2.64
	16QAM	39.96	5.8	-2.15	5	38.61	40.79	-2.18
	64QAM	39.88	5.8	-2.15	5	38.53	40.79	-2.26
894.76	QPSK	40.46	5.8	-2.15	5	39.11	40.79	-1.68
	16QAM	40.53	5.8	-2.15	5	39.18	40.79	-1.61
	64QAM	40.44	5.8	-2.15	5	39.09	40.79	-1.70
895.24	QPSK	41.21	5.8	-2.15	5	39.86	40.79	-0.93
	16QAM	41.25	5.8	-2.15	5	39.90	40.79	-0.89
	64QAM	41.31	5.8	-2.15	5	39.96	40.79	-0.83
895.27	QPSK	38.6	5.8	-2.15	5	37.25	40.79	-3.54
	16QAM	38.63	5.8	-2.15	5	37.28	40.79	-3.51
	64QAM	38.74	5.8	-2.15	5	37.39	40.79	-3.40

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P17770/17772 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	37.4	7	-2.15	1.5	40.75	40.79	-0.04
	16QAM	37.38	7	-2.15	1.5	40.73	40.79	-0.06
	64QAM	37.37	7	-2.15	1.5	40.72	40.79	-0.07
894.76	QPSK	37.4	7	-2.15	1.5	40.75	40.79	-0.04
	16QAM	37.39	7	-2.15	1.5	40.74	40.79	-0.05
	64QAM	37.34	7	-2.15	1.5	40.69	40.79	-0.10
895.24	QPSK	37.4	7	-2.15	1.5	40.75	40.79	-0.04
	16QAM	37.4	7	-2.15	1.5	40.75	40.79	-0.04
	64QAM	37.37	7	-2.15	1.5	40.72	40.79	-0.07
895.27	QPSK	37.38	7	-2.15	1.5	40.73	40.79	-0.06
	16QAM	37.39	7	-2.15	1.5	40.74	40.79	-0.05
	64QAM	37.39	7	-2.15	1.5	40.74	40.79	-0.05

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P17770/17772 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.5	7	-2.15	5	39.35	40.79	-1.44
	16QAM	39.96	7	-2.15	5	39.81	40.79	-0.98
	64QAM	39.88	7	-2.15	5	39.73	40.79	-1.06
894.76	QPSK	40.46	7	-2.15	5	40.31	40.79	-0.48
	16QAM	40.53	7	-2.15	5	40.38	40.79	-0.41
	64QAM	40.44	7	-2.15	5	40.29	40.79	-0.50
895.24	QPSK	40.88	7	-2.15	5	40.73	40.79	-0.06
	16QAM	40.87	7	-2.15	5	40.72	40.79	-0.07
	64QAM	40.87	7	-2.15	5	40.72	40.79	-0.07
895.27	QPSK	38.6	7	-2.15	5	38.45	40.79	-2.34
	16QAM	38.63	7	-2.15	5	38.48	40.79	-2.31
	64QAM	38.74	7	-2.15	5	38.59	40.79	-2.20

Test Engineer ID:	84740/40882	Test Date:	2021/8/31

Port A: Antenna P17204 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	35.89	8.5	-2.15	1.5	40.74	40.79	-0.05
	16QAM	35.85	8.5	-2.15	1.5	40.70	40.79	-0.09
	64QAM	35.92	8.5	-2.15	1.5	40.77	40.79	-0.02
894.76	QPSK	35.89	8.5	-2.15	1.5	40.74	40.79	-0.05
	16QAM	35.86	8.5	-2.15	1.5	40.71	40.79	-0.08
	64QAM	35.9	8.5	-2.15	1.5	40.75	40.79	-0.04
895.24	QPSK	35.77	8.5	-2.15	1.5	40.62	40.79	-0.17
	16QAM	35.91	8.5	-2.15	1.5	40.76	40.79	-0.03
	64QAM	35.85	8.5	-2.15	1.5	40.70	40.79	-0.09
895.27	QPSK	35.82	8.5	-2.15	1.5	40.67	40.79	-0.12
	16QAM	35.87	8.5	-2.15	1.5	40.72	40.79	-0.07
	64QAM	35.86	8.5	-2.15	1.5	40.71	40.79	-0.08

Test Engineer ID:	84740/40882	Test Date:	2021/08/31

Port A: Antenna P17204 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.21	8.5	-2.15	5	40.56	40.79	-0.23
	16QAM	39.32	8.5	-2.15	5	40.67	40.79	-0.12
	64QAM	39.26	8.5	-2.15	5	40.61	40.79	-0.18
894.76	QPSK	39.28	8.5	-2.15	5	40.63	40.79	-0.16
	16QAM	39.25	8.5	-2.15	5	40.60	40.79	-0.19
	64QAM	39.39	8.5	-2.15	5	40.74	40.79	-0.05
895.24	QPSK	39.3	8.5	-2.15	5	40.65	40.79	-0.14
	16QAM	39.28	8.5	-2.15	5	40.63	40.79	-0.16
	64QAM	39.4	8.5	-2.15	5	40.75	40.79	-0.04
895.27	QPSK	39.34	8.5	-2.15	5	40.69	40.79	-0.10
	16QAM	39.41	8.5	-2.15	5	40.76	40.79	-0.03
	64QAM	39.4	8.5	-2.15	5	40.75	40.79	-0.04

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P35500 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	35.53	8.7	-2.15	1.5	40.58	40.79	-0.21
	16QAM	35.49	8.7	-2.15	1.5	40.54	40.79	-0.25
	64QAM	35.51	8.7	-2.15	1.5	40.56	40.79	-0.23
894.76	QPSK	35.48	8.7	-2.15	1.5	40.53	40.79	-0.26
	16QAM	35.49	8.7	-2.15	1.5	40.54	40.79	-0.25
	64QAM	35.52	8.7	-2.15	1.5	40.57	40.79	-0.22
895.24	QPSK	35.51	8.7	-2.15	1.5	40.56	40.79	-0.23
	16QAM	35.53	8.7	-2.15	1.5	40.58	40.79	-0.21
	64QAM	35.49	8.7	-2.15	1.5	40.54	40.79	-0.25
895.27	QPSK	35.52	8.7	-2.15	1.5	40.57	40.79	-0.22
	16QAM	35.54	8.7	-2.15	1.5	40.59	40.79	-0.20
	64QAM	35.44	8.7	-2.15	1.5	40.49	40.79	-0.30

Test Engineer ID:	40882	Test Date:	2021-08-31

Port A: Antenna P35500 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.1	8.7	-2.15	5	40.65	40.79	-0.14
	16QAM	39.09	8.7	-2.15	5	40.64	40.79	-0.15
	64QAM	39.08	8.7	-2.15	5	40.63	40.79	-0.16
894.76	QPSK	39.12	8.7	-2.15	5	40.67	40.79	-0.12
	16QAM	39.16	8.7	-2.15	5	40.71	40.79	-0.08
	64QAM	39.14	8.7	-2.15	5	40.69	40.79	-0.10
895.24	QPSK	39.06	8.7	-2.15	5	40.61	40.79	-0.18
	16QAM	39.04	8.7	-2.15	5	40.59	40.79	-0.20
	64QAM	39.05	8.7	-2.15	5	40.60	40.79	-0.19
895.27	QPSK	39.12	8.7	-2.15	5	40.67	40.79	-0.12
	16QAM	39.11	8.7	-2.15	5	40.66	40.79	-0.13
	64QAM	39.11	8.7	-2.15	5	40.66	40.79	-0.13

SISO Port B

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P12949 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	38.61	5.8	-2.15	1.5	40.76	40.79	-0.03
	16QAM	38.42	5.8	-2.15	1.5	40.57	40.79	-0.22
	64QAM	38.42	5.8	-2.15	1.5	40.57	40.79	-0.22
894.76	QPSK	38.46	5.8	-2.15	1.5	40.61	40.79	-0.18
	16QAM	38.46	5.8	-2.15	1.5	40.61	40.79	-0.18
	64QAM	38.61	5.8	-2.15	1.5	40.76	40.79	-0.03
895.24	QPSK	38.55	5.8	-2.15	1.5	40.70	40.79	-0.09
	16QAM	38.63	5.8	-2.15	1.5	40.78	40.79	-0.01
	64QAM	38.61	5.8	-2.15	1.5	40.76	40.79	-0.03
895.27	QPSK	38.59	5.8	-2.15	1.5	40.74	40.79	-0.05
	16QAM	38.58	5.8	-2.15	1.5	40.73	40.79	-0.06
	64QAM	38.63	5.8	-2.15	1.5	40.78	40.79	-0.01

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P12949 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.19	5.8	-2.15	5	37.84	40.79	-2.95
	16QAM	39.42	5.8	-2.15	5	38.07	40.79	-2.72
	64QAM	39.37	5.8	-2.15	5	38.02	40.79	-2.77
894.76	QPSK	39.27	5.8	-2.15	5	37.92	40.79	-2.87
	16QAM	39.47	5.8	-2.15	5	38.12	40.79	-2.67
	64QAM	39.42	5.8	-2.15	5	38.07	40.79	-2.72
895.24	QPSK	39.62	5.8	-2.15	5	38.27	40.79	-2.52
	16QAM	39.84	5.8	-2.15	5	38.49	40.79	-2.30
	64QAM	39.72	5.8	-2.15	5	38.37	40.79	-2.42
895.27	QPSK	39.64	5.8	-2.15	5	38.29	40.79	-2.50
	16QAM	39.34	5.8	-2.15	5	37.99	40.79	-2.80
	64QAM	39.49	5.8	-2.15	5	38.14	40.79	-2.65

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P17770/17772 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	37.3	7	-2.15	1.5	40.65	40.79	-0.14
	16QAM	37.31	7	-2.15	1.5	40.66	40.79	-0.13
	64QAM	37.3	7	-2.15	1.5	40.65	40.79	-0.14
894.76	QPSK	37.39	7	-2.15	1.5	40.74	40.79	-0.05
	16QAM	37.43	7	-2.15	1.5	40.78	40.79	-0.01
	64QAM	37.4	7	-2.15	1.5	40.75	40.79	-0.04
895.24	QPSK	37.36	7	-2.15	1.5	40.71	40.79	-0.08
	16QAM	37.39	7	-2.15	1.5	40.74	40.79	-0.05
	64QAM	37.33	7	-2.15	1.5	40.68	40.79	-0.11
895.27	QPSK	37.41	7	-2.15	1.5	40.76	40.79	-0.03
	16QAM	37.35	7	-2.15	1.5	40.70	40.79	-0.09
	64QAM	37.34	7	-2.15	1.5	40.69	40.79	-0.10

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P17770/17772 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.41	7	-2.15	5	39.26	40.79	-1.53
	16QAM	39.5	7	-2.15	5	39.35	40.79	-1.44
	64QAM	39.46	7	-2.15	5	39.31	40.79	-1.48
894.76	QPSK	39.35	7	-2.15	5	39.20	40.79	-1.59
	16QAM	39.43	7	-2.15	5	39.28	40.79	-1.51
	64QAM	39.43	7	-2.15	5	39.28	40.79	-1.51
895.24	QPSK	39.64	7	-2.15	5	39.49	40.79	-1.30
	16QAM	39.74	7	-2.15	5	39.59	40.79	-1.20
	64QAM	39.71	7	-2.15	5	39.56	40.79	-1.23
895.27	QPSK	39.61	7	-2.15	5	39.46	40.79	-1.33
	16QAM	39.69	7	-2.15	5	39.54	40.79	-1.25
	64QAM	39.69	7	-2.15	5	39.54	40.79	-1.25

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P17204 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	35.78	8.5	-2.15	1.5	40.63	40.79	-0.16
	16QAM	35.84	8.5	-2.15	1.5	40.69	40.79	-0.10
	64QAM	35.74	8.5	-2.15	1.5	40.59	40.79	-0.20
894.76	QPSK	35.75	8.5	-2.15	1.5	40.60	40.79	-0.19
	16QAM	35.85	8.5	-2.15	1.5	40.70	40.79	-0.09
	64QAM	35.77	8.5	-2.15	1.5	40.62	40.79	-0.17
895.24	QPSK	35.87	8.5	-2.15	1.5	40.72	40.79	-0.07
	16QAM	35.92	8.5	-2.15	1.5	40.77	40.79	-0.02
	64QAM	35.93	8.5	-2.15	1.5	40.78	40.79	-0.01
895.27	QPSK	35.88	8.5	-2.15	1.5	40.73	40.79	-0.06
	16QAM	35.91	8.5	-2.15	1.5	40.76	40.79	-0.03
	64QAM	35.84	8.5	-2.15	1.5	40.69	40.79	-0.10

Test Engineer ID:	84740/40882	Test Date:	2021-09-01

Port B: Antenna P17204 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.4	8.5	-2.15	5	40.75	40.79	-0.04
	16QAM	39.24	8.5	-2.15	5	40.59	40.79	-0.20
	64QAM	39.24	8.5	-2.15	5	40.59	40.79	-0.20
894.76	QPSK	39.3	8.5	-2.15	5	40.65	40.79	-0.14
	16QAM	39.25	8.5	-2.15	5	40.60	40.79	-0.19
	64QAM	39.29	8.5	-2.15	5	40.64	40.79	-0.15
895.24	QPSK	39.36	8.5	-2.15	5	40.71	40.79	-0.08
	16QAM	39.4	8.5	-2.15	5	40.75	40.79	-0.04
	64QAM	39.41	8.5	-2.15	5	40.76	40.79	-0.03
895.27	QPSK	39.39	8.5	-2.15	5	40.74	40.79	-0.05
	16QAM	39.33	8.5	-2.15	5	40.68	40.79	-0.11
	64QAM	39.38	8.5	-2.15	5	40.73	40.79	-0.06

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port B: Antenna P35500 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.24	QPSK	35.58	8.7	-2.15	1.5	40.63	40.79	-0.16
	16QAM	35.67	8.7	-2.15	1.5	40.72	40.79	-0.07
	64QAM	35.65	8.7	-2.15	1.5	40.70	40.79	-0.09
894.27	QPSK	35.68	8.7	-2.15	1.5	40.73	40.79	-0.06
	16QAM	35.46	8.7	-2.15	1.5	40.51	40.79	-0.28
	64QAM	35.61	8.7	-2.15	1.5	40.66	40.79	-0.13
895.73	QPSK	35.63	8.7	-2.15	1.5	40.68	40.79	-0.11
	16QAM	35.7	8.7	-2.15	1.5	40.75	40.79	-0.04
	64QAM	35.67	8.7	-2.15	1.5	40.72	40.79	-0.07
895.76	QPSK	35.46	8.7	-2.15	1.5	40.51	40.79	-0.28
	16QAM	35.62	8.7	-2.15	1.5	40.67	40.79	-0.12
	64QAM	35.59	8.7	-2.15	1.5	40.64	40.79	-0.15

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port B: Antenna P35500 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	39.2	8.7	-2.15	5	40.75	40.79	-0.04
	16QAM	39.17	8.7	-2.15	5	40.72	40.79	-0.07
	64QAM	39.15	8.7	-2.15	5	40.70	40.79	-0.09
894.76	QPSK	39.08	8.7	-2.15	5	40.63	40.79	-0.16
	16QAM	39.18	8.7	-2.15	5	40.73	40.79	-0.06
	64QAM	39.15	8.7	-2.15	5	40.70	40.79	-0.09
895.24	QPSK	39.18	8.7	-2.15	5	40.73	40.79	-0.06
	16QAM	39.15	8.7	-2.15	5	40.70	40.79	-0.09
	64QAM	39.21	8.7	-2.15	5	40.76	40.79	-0.03
895.27	QPSK	39.16	8.7	-2.15	5	40.71	40.79	-0.08
	16QAM	39.19	8.7	-2.15	5	40.74	40.79	-0.05
	64QAM	39.16	8.7	-2.15	5	40.71	40.79	-0.08

MIMO Port A: + Port B

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P12949 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	36.15	5.8	-2.15	1.5	40.49	40.79	-0.30
	16QAM	34.87	36.17	5.8	-2.15	1.5	40.73	40.79	-0.06
	64QAM	35.06	35.97	5.8	-2.15	1.5	40.70	40.79	-0.09
894.76	QPSK	35.38	35.57	5.8	-2.15	1.5	40.64	40.79	-0.15
	16QAM	35.92	35.29	5.8	-2.15	1.5	40.78	40.79	-0.01
	64QAM	36.25	34.53	5.8	-2.15	1.5	40.63	40.79	-0.16
895.24	QPSK	36.01	35.11	5.8	-2.15	1.5	40.74	40.79	-0.05
	16QAM	36.39	34.3	5.8	-2.15	1.5	40.63	40.79	-0.16
	64QAM	36.6	34.33	5.8	-2.15	1.5	40.77	40.79	-0.02
895.27	QPSK	34.8	36.11	5.8	-2.15	1.5	40.66	40.79	-0.13
	16QAM	35.59	35.54	5.8	-2.15	1.5	40.73	40.79	-0.06
	64QAM	35.8	35.17	5.8	-2.15	1.5	40.66	40.79	-0.13

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P12949 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	36.39	5.8	-2.15	5	37.14	40.79	-3.65
	16QAM	34.87	36.41	5.8	-2.15	5	37.37	40.79	-3.42
	64QAM	35.06	36.4	5.8	-2.15	5	37.44	40.79	-3.35
894.76	QPSK	35.38	36.22	5.8	-2.15	5	37.48	40.79	-3.31
	16QAM	35.92	36.46	5.8	-2.15	5	37.86	40.79	-2.93
	64QAM	36.25	36.5	5.8	-2.15	5	38.04	40.79	-2.75
895.24	QPSK	36.01	36.68	5.8	-2.15	5	38.02	40.79	-2.77
	16QAM	36.39	36.95	5.8	-2.15	5	38.34	40.79	-2.45
	64QAM	36.6	36.69	5.8	-2.15	5	38.31	40.79	-2.48
895.27	QPSK	34.8	36.51	5.8	-2.15	5	37.40	40.79	-3.39
	16QAM	35.59	36.4	5.8	-2.15	5	37.67	40.79	-3.12
	64QAM	35.8	36.64	5.8	-2.15	5	37.90	40.79	-2.89

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P17770/17772 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	34.23	7	-2.15	1.5	40.64	40.79	-0.15
	16QAM	34.87	33.8	7	-2.15	1.5	40.73	40.79	-0.06
	64QAM	35.06	33.62	7	-2.15	1.5	40.76	40.79	-0.03
894.76	QPSK	35.1	33.56	7	-2.15	1.5	40.76	40.79	-0.03
	16QAM	34.53	34.09	7	-2.15	1.5	40.68	40.79	-0.11
	64QAM	34.37	34.31	7	-2.15	1.5	40.70	40.79	-0.09
895.24	QPSK	35.31	33.17	7	-2.15	1.5	40.73	40.79	-0.06
	16QAM	34.76	34.02	7	-2.15	1.5	40.77	40.79	-0.02
	64QAM	34.54	34.21	7	-2.15	1.5	40.74	40.79	-0.05
895.27	QPSK	34.8	33.79	7	-2.15	1.5	40.68	40.79	-0.11
	16QAM	35.59	32.75	7	-2.15	1.5	40.76	40.79	-0.03
	64QAM	35.35	33.15	7	-2.15	1.5	40.75	40.79	-0.04

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P17770/17772 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	36.14	7	-2.15	5	38.18	40.79	-2.61
	16QAM	34.87	36.62	7	-2.15	5	38.69	40.79	-2.10
	64QAM	35.06	36.46	7	-2.15	5	38.68	40.79	-2.11
894.76	QPSK	35.38	36.22	7	-2.15	5	38.68	40.79	-2.11
	16QAM	35.92	36.44	7	-2.15	5	39.05	40.79	-1.74
	64QAM	36.25	36.33	7	-2.15	5	39.15	40.79	-1.64
895.24	QPSK	36.01	36.59	7	-2.15	5	39.17	40.79	-1.62
	16QAM	36.39	36.93	7	-2.15	5	39.53	40.79	-1.26
	64QAM	36.6	36.61	7	-2.15	5	39.47	40.79	-1.32
895.27	QPSK	34.8	36.81	7	-2.15	5	38.78	40.79	-2.01
	16QAM	35.59	36.37	7	-2.15	5	38.86	40.79	-1.93
	64QAM	35.8	36.61	7	-2.15	5	39.08	40.79	-1.71

Test Engineer ID:	84740/40882	Test Date:	2021-09-03

Port A: + Port B: Antenna P17204 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	33.26	32.39	8.5	-2.15	1.5	40.71	40.79	-0.08
	16QAM	32.87	32.97	8.5	-2.15	1.5	40.78	40.79	-0.01
	64QAM	32.59	33.19	8.5	-2.15	1.5	40.76	40.79	-0.03
894.76	QPSK	32.11	33.56	8.5	-2.15	1.5	40.76	40.79	-0.03
	16QAM	32.11	33.51	8.5	-2.15	1.5	40.73	40.79	-0.06
	64QAM	32.43	33.27	8.5	-2.15	1.5	40.73	40.79	-0.06
895.24	QPSK	32.5	33.17	8.5	-2.15	1.5	40.71	40.79	-0.08
	16QAM	32.33	33.34	8.5	-2.15	1.5	40.72	40.79	-0.07
	64QAM	32.58	33.1	8.5	-2.15	1.5	40.71	40.79	-0.08
895.27	QPSK	32.91	32.77	8.5	-2.15	1.5	40.70	40.79	-0.09
	16QAM	32.5	33.2	8.5	-2.15	1.5	40.72	40.79	-0.07
	64QAM	32.32	33.34	8.5	-2.15	1.5	40.72	40.79	-0.07

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P17204 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	36.14	8.5	-2.15	5	39.68	40.79	-1.11
	16QAM	34.87	36.62	8.5	-2.15	5	40.19	40.79	-0.60
	64QAM	35.06	36.46	8.5	-2.15	5	40.18	40.79	-0.61
894.76	QPSK	35.38	36.22	8.5	-2.15	5	40.18	40.79	-0.61
	16QAM	35.92	36.44	8.5	-2.15	5	40.55	40.79	-0.24
	64QAM	36.25	36.33	8.5	-2.15	5	40.65	40.79	-0.14
895.24	QPSK	36.01	36.59	8.5	-2.15	5	40.67	40.79	-0.12
	16QAM	36.39	36.37	8.5	-2.15	5	40.74	40.79	-0.05
	64QAM	36.6	36.19	8.5	-2.15	5	40.76	40.79	-0.03
895.27	QPSK	34.8	36.81	8.5	-2.15	5	40.28	40.79	-0.51
	16QAM	35.59	36.37	8.5	-2.15	5	40.36	40.79	-0.43
	64QAM	35.8	36.61	8.5	-2.15	5	40.58	40.79	-0.21

Test Engineer ID:	84740/40882	Test Date:	2021-09-03

Port A: + Port B: Antenna P35500 & Min Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	33.26	31.94	8.7	-2.15	1.5	40.71	40.79	-0.08
	16QAM	32.87	32.56	8.7	-2.15	1.5	40.78	40.79	-0.01
	64QAM	32.59	32.72	8.7	-2.15	1.5	40.72	40.79	-0.07
894.76	QPSK	32.11	32.99	8.7	-2.15	1.5	40.63	40.79	-0.16
	16QAM	32.11	33.06	8.7	-2.15	1.5	40.67	40.79	-0.12
	64QAM	32.43	32.96	8.7	-2.15	1.5	40.76	40.79	-0.03
895.24	QPSK	32.5	32.66	8.7	-2.15	1.5	40.64	40.79	-0.15
	16QAM	32.33	32.87	8.7	-2.15	1.5	40.67	40.79	-0.12
	64QAM	32.58	32.67	8.7	-2.15	1.5	40.69	40.79	-0.10
895.27	QPSK	32.91	32.15	8.7	-2.15	1.5	40.61	40.79	-0.18
	16QAM	32.5	32.72	8.7	-2.15	1.5	40.67	40.79	-0.12
	64QAM	32.32	32.8	8.7	-2.15	1.5	40.63	40.79	-0.16

Test Engineer ID:	84740/40882	Test Date:	2021-09-02

Port A: + Port B: Antenna P35500 & Max Loss Cable

Frequency (MHz)	Modulation Scheme	Peak Power Tx0 (dBm)	Peak Power Tx1 (dBm)	Antenna Gain (dBi)	ERP Correction Factor (dB)	Cable Loss (dB)	Output ERP (dBm)	Limit (dBm)	Margin (dBm)
894.73	QPSK	34.32	36.14	8.7	-2.15	5	39.88	40.79	-0.91
	16QAM	34.87	36.62	8.7	-2.15	5	40.39	40.79	-0.40
	64QAM	35.06	36.46	8.7	-2.15	5	40.38	40.79	-0.41
894.76	QPSK	35.38	36.22	8.7	-2.15	5	40.38	40.79	-0.41
	16QAM	35.92	36.44	8.7	-2.15	5	40.75	40.79	-0.04
	64QAM	36.25	36	8.7	-2.15	5	40.69	40.79	-0.10
895.24	QPSK	36.01	36.23	8.7	-2.15	5	40.68	40.79	-0.11
	16QAM	36.39	35.97	8.7	-2.15	5	40.75	40.79	-0.04
	64QAM	36.6	35.62	8.7	-2.15	5	40.70	40.79	-0.09
895.27	QPSK	34.8	36.81	8.7	-2.15	5	40.48	40.79	-0.31
	16QAM	35.59	36.37	8.7	-2.15	5	40.56	40.79	-0.23
	64QAM	35.8	36.61	8.7	-2.15	5	40.78	40.79	-0.01

8. CONDUCTED TEST RESULTS

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

8.1 OCCUPIED BANDWIDTH

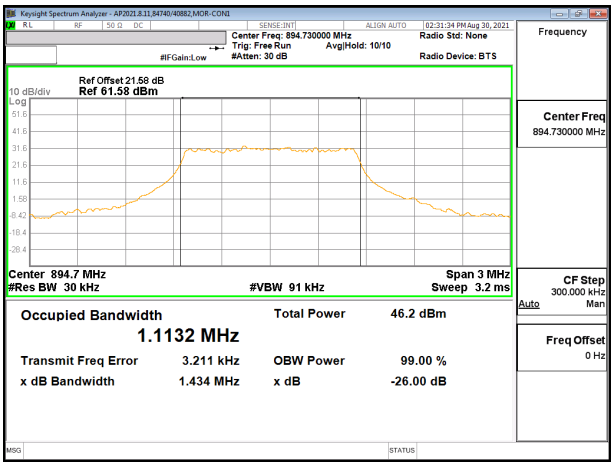
RULE PART(S)
FCC: §2.1049
ISED: RSS-GEN 6.7

LIMITS
For reporting purposes only.

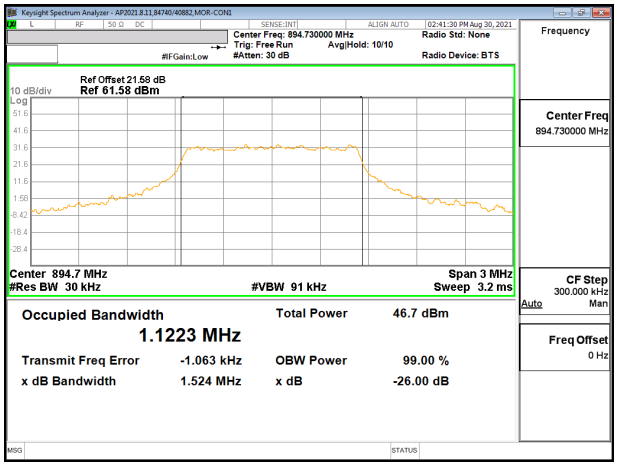
TEST PROCEDURE
The transmitter output was connected to a characterized coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The bandwidth was measured with the spectrum analyzer at the middle channel in each band.

RESULTS

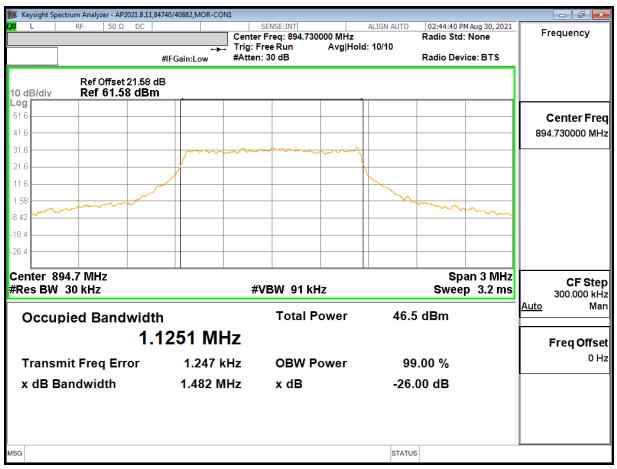
Frequency	Mode	99% OBW (MHz)	26dB BW (MHZ)
894.73	QPSK	1.1132	1.434
894.76	QPSK	1.129	1.493
895.24	QPSK	1.1083	1.441
895.27	QPSK	1.1274	1.502
894.73	16QAM	1.1223	1.524
894.76	16QAM	1.1336	1.528
895.24	16QAM	1.1271	1.496
895.27	16QAM	1.1274	1.496
894.73	64QAM	1.1251	1.482
894.76	64QAM	1.1133	1.459
895.24	64QAM	1.1277	1.496
895.27	64QAM	1.1255	1.489



QPSK (OBW/26dB) – 894.73MHz



16QAM (OBW/26dB) – 894.73MHz



64QAM (OBW/26dB) – 894.73MHz

8.2 FREQUENCY STABILITY

TEST PROCEDURE

FCC Guidance (917768 D01 Power meas Licensed Digital Systems V02r01)

Frequency Stability vs Temperature:
The EUT is placed inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC or -30ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

LIMIT

FCC Part 22.863, The frequency stability of equipment used under this subpart shall be sufficient to ensure that, after accounting for Doppler Frequency shifts, the occupied bandwidth of the fundamental emissions remains within the authorized frequency bands of operation.

RSS-127, Section 5.3

The applicant shall ensure frequency stability by demonstrating that the occupied bandwidth is maintained within the frequency band of operation when tested at the temperature and supply voltage variations specified in RSS-Gen.

RSS GEN section 6.11

Frequency stability is a measure of frequency drift due to temperature and supply voltage variations, with reference to the frequency measured at an appropriate reference temperature and the rated supply voltage.

RESULTS

Test Engineer ID:	40882	Test Date:	2021-09-08 – 2021-09-09

	Voltage	Temp (deg C)	99% BW Point Freq Low MHz	99% BW Point Freq High	Freq Center MHz	Freq Error from 894.73 MHz PPM	Freq Error from Nominal MHz PPM
	28v	50	895.299625	894.1445	894.722	-31.224	-11.386
	28v	40	894.162	895.293625	894.728	-24.797	-4.960
	28v	30	894.144875	895.3225	894.734	-18.231	1.607
Nominal	28v	20	894.144	895.3205	894.732	-19.838	0.000
High	32.2v	20	894.129	895.313375	894.721	-32.202	-12.364
Low	23.8v	20	894.1455	895.318875	894.732	-19.908	-0.070
	28v	10	894.166	895.316625	894.741	-9.709	10.129
	28v	0	894.143	895.301375	894.722	-31.084	-11.246
	28v	-10	894.145625	895.3215	894.734	-18.371	1.467
	28v	-20	894.1415	895.312375	894.727	-25.775	-5.938
	28v	-30	894.156375	895.395375	894.776	28.919	48.758

	Voltage	Temp (deg C)	99% BW Point Freq Low MHz	99% BW Point Freq High	Freq Center MHz	Freq Error from 895.27 MHz PPM	Freq Error from Nominal MHz PPM
	28v	50	894.699375	895.853625	895.277	7.260	8.517
	28v	40	894.7035	895.84375	895.274	4.049	5.306
	28v	30	894.707125	895.861	895.284	15.708	16.964
Nominal	28v	20	894.67125	895.8665	895.269	-1.257	0.000
High	32.2v	20	894.682625	895.862625	895.273	2.932	4.189
Low	23.8v	20	894.69125	895.848875	895.270	0.070	1.326
	28v	10	894.693625	895.84925	895.271	1.606	2.862
	28v	0	894.692375	895.853875	895.273	3.491	4.747
	28v	-10	894.68	895.8645	895.272	2.513	3.770
	28v	-20	894.701125	895.865375	895.283	14.800	16.057
	28v	-30	894.700875	895.8515	895.276	6.911	8.168

8.3 SPURIOUS EMISSION AT ANTENNA TERMINAL

TEST PROCEDURE

The transmitter output was connected to a Keysight Communications Tester and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

FCC: §22.861
b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

RSS-127 Issue 1
4.1 Transmitter Unwanted Emissions
In the 1 MHz bands immediately outside of the frequency band of operation, a resolution bandwidth of at least 1% of the emission bandwidth shall be employed. Beyond the 1 MHz bands immediately outside of the frequency band, the transmitter unwanted emissions shall be measured with a resolution bandwidth of 100 kHz or greater. A narrower resolution bandwidth is allowed in all cases to improve measurement accuracy provided that the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1% of emission bandwidth, as specified).

The emission limits shall be measured with the carrier frequency set at both the highest settable frequency and the lowest settable frequency permitted by the design of the equipment.

LIMITS

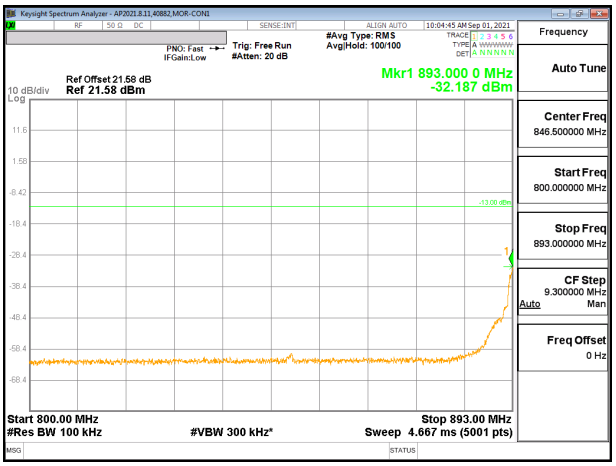
FCC: §22.861 (a)
Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must attenuated below the transmitting power (P) by a factor of at least 43 + 10 log (P) dB.

ISED RSS-127 Section 5.5
Transmitter Unwanted Emissions
The power of any emission outside the equipment’s operating frequency band shall be attenuated below the transmitting power P (in watts) by at least 43 + 10log10(P) (dB).

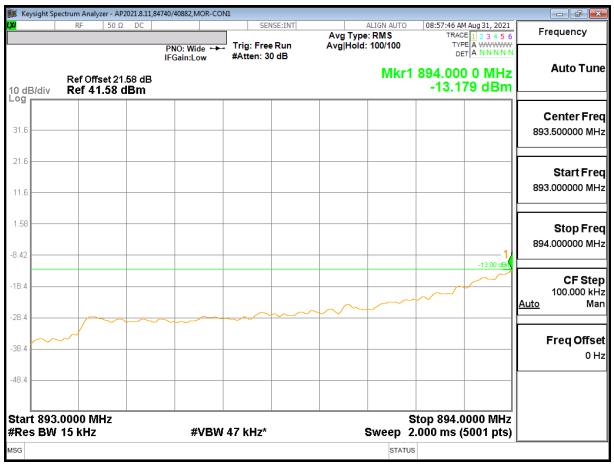
RESULTS

8.3.1 CONDUCTED BAND EDGE

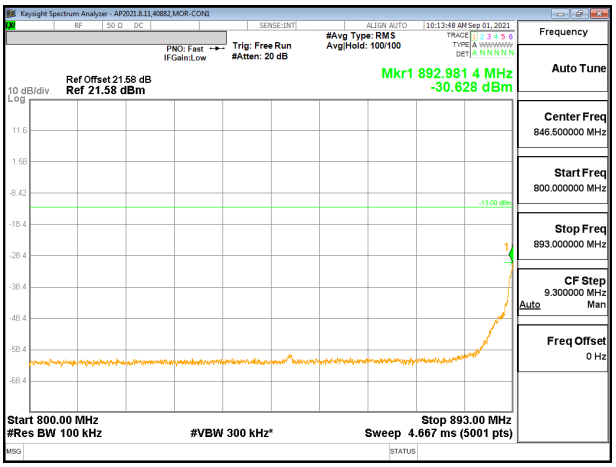
Port A



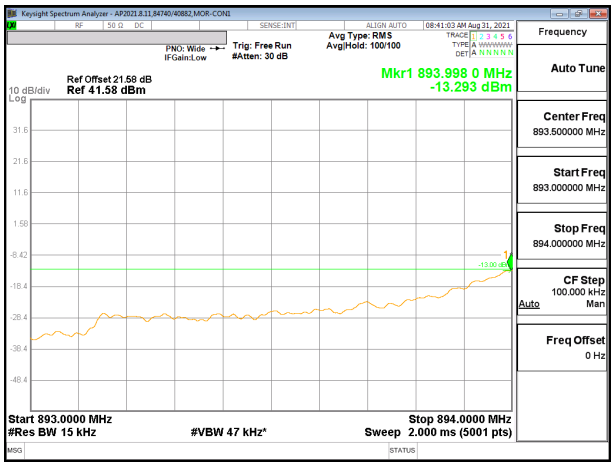
Plot 1: QPSK – 894.73MHz



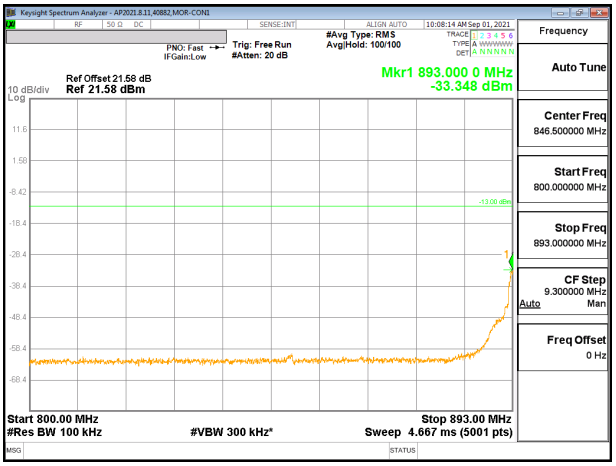
Plot 2: QPSK – 894.73MHz



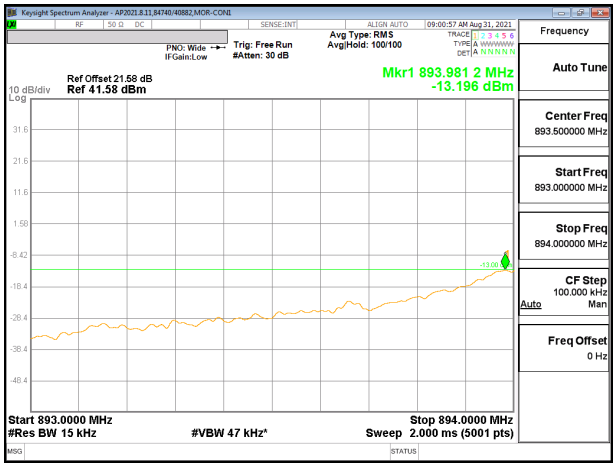
Plot 1: QPSK – 894.76MHz



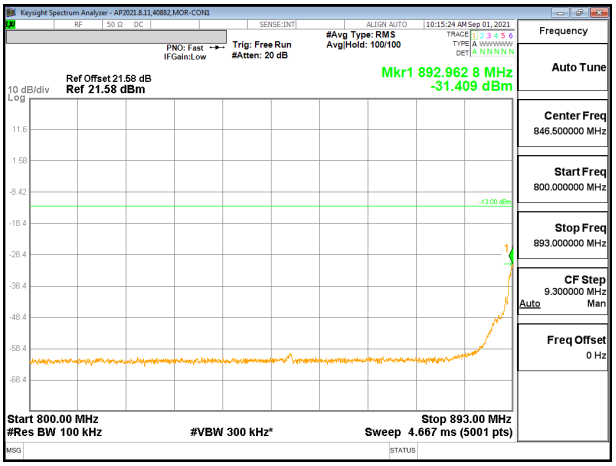
Plot 2: QPSK – 894.76MHz



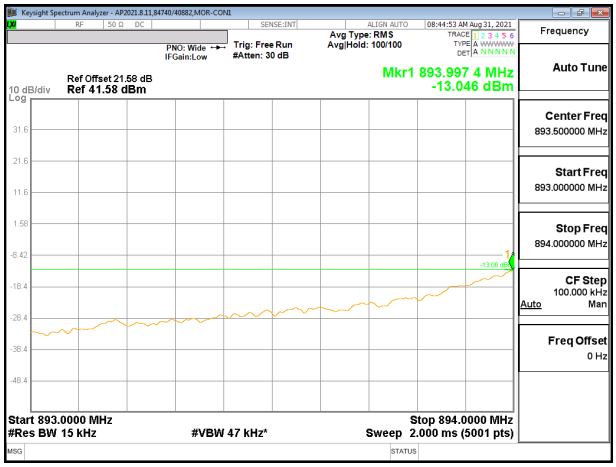
Plot 1: 16QAM – 894.73MHz



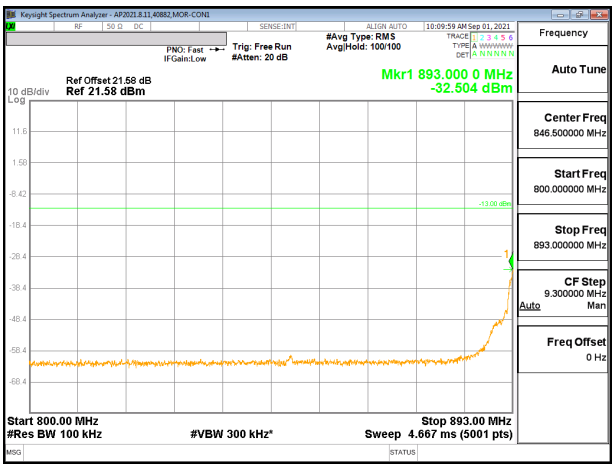
Plot 2: 16QAM – 894.73MHz



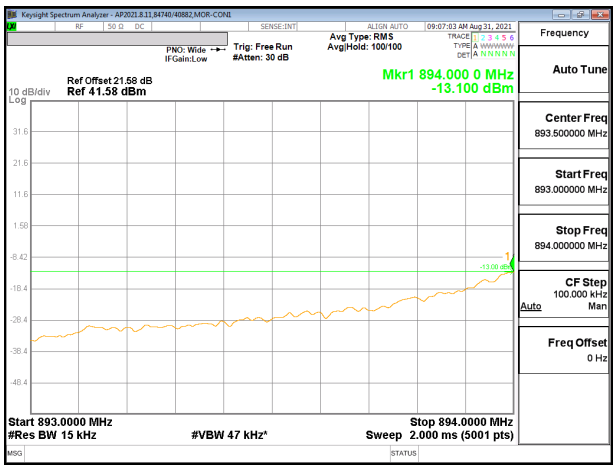
Plot 1: 16QAM – 894.76MHz



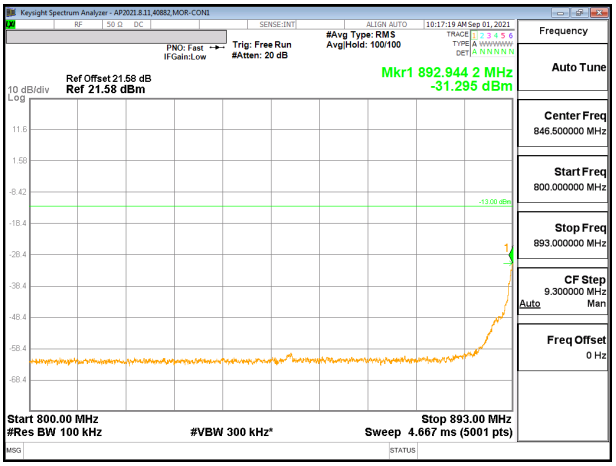
Plot 2: 16QAM – 894.76MHz



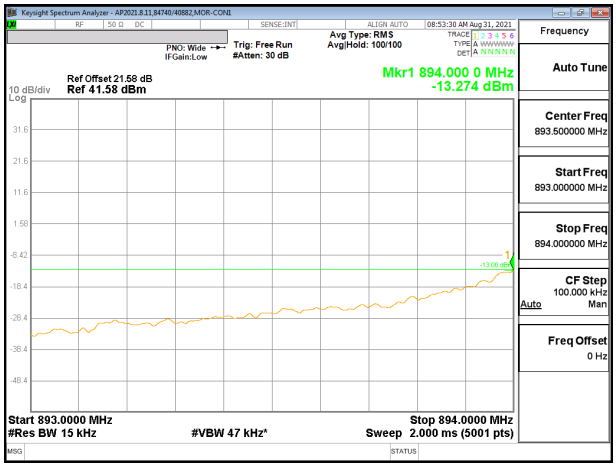
Plot 1: 64QAM – 894.73MHz



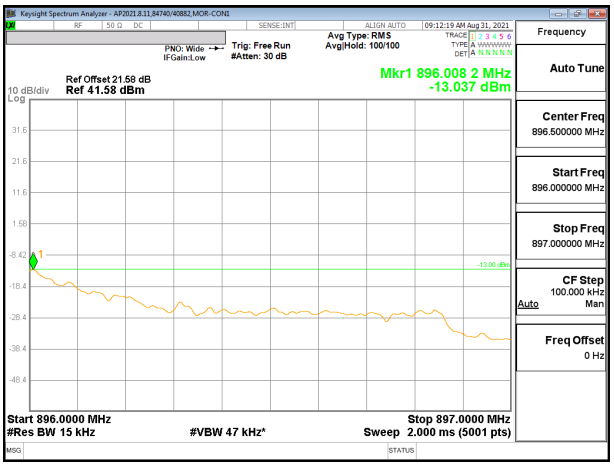
Plot 2: 64QAM – 894.73MHz



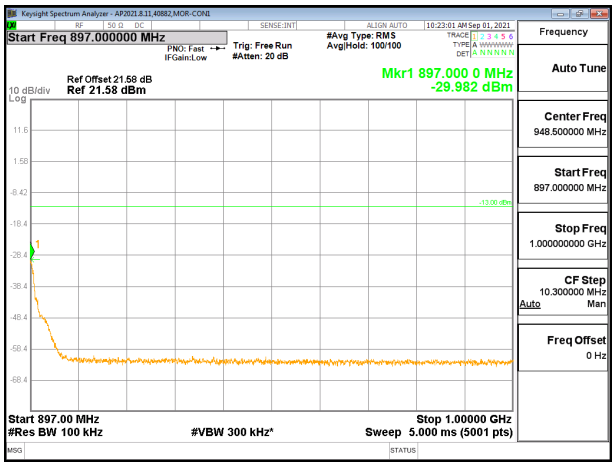
Plot 1: 64QAM – 894.76MHz



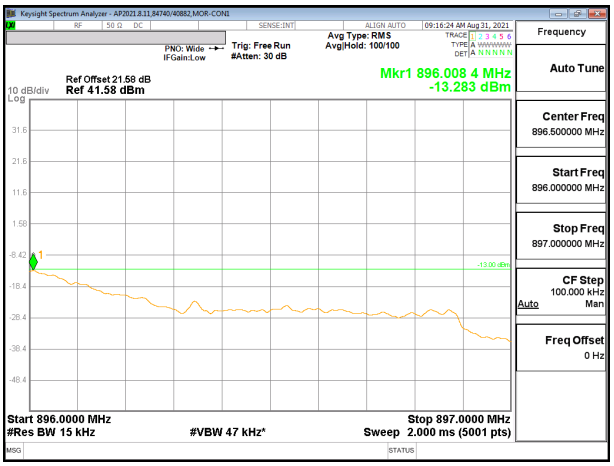
Plot 2: 64QAM – 894.76MHz



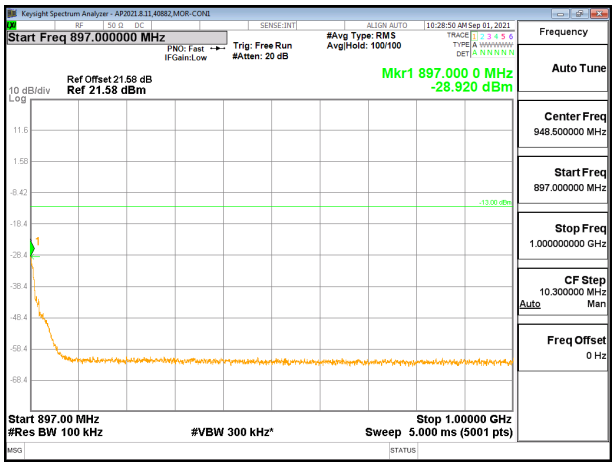
Plot 1: QPSK – 895.24MHz



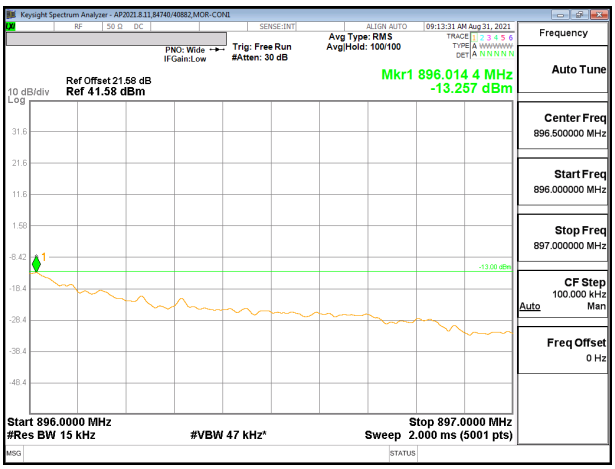
Plot 2: QPSK – 895.24MHz



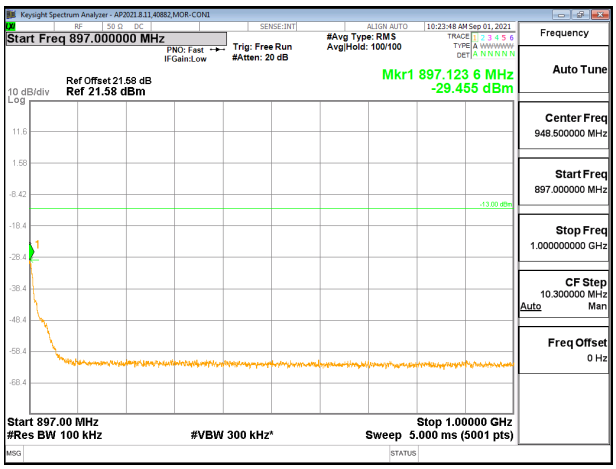
Plot 1: QPSK – 895.27MHz



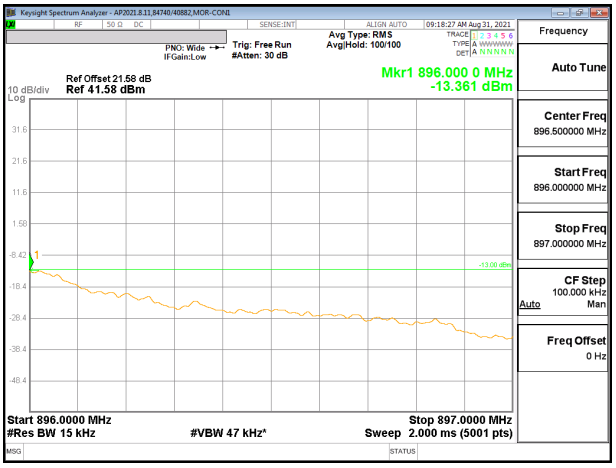
Plot 2: QPSK – 895.27MHz



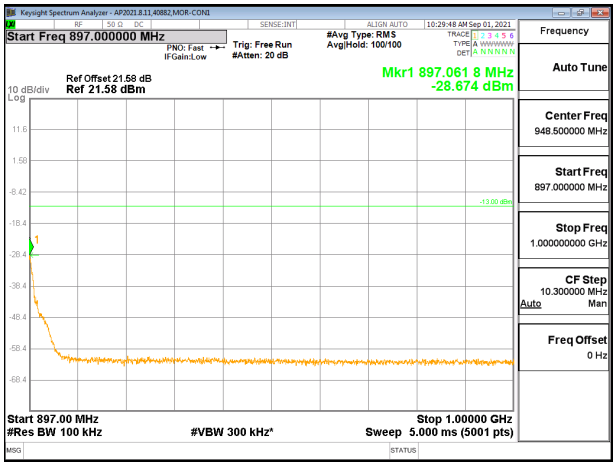
Plot 1: 16QAM – 895.24MHz



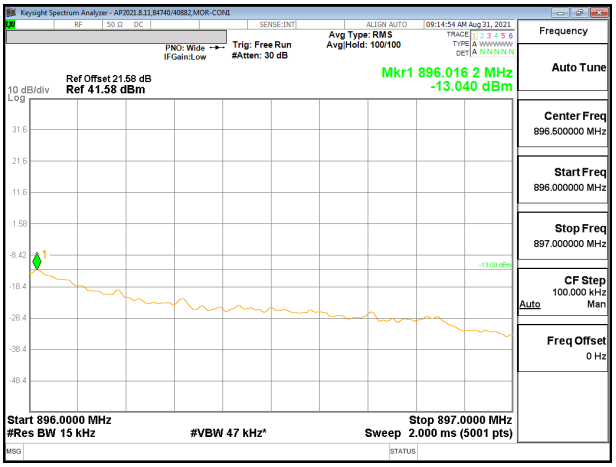
Plot 2: 16QAM – 895.24MHz



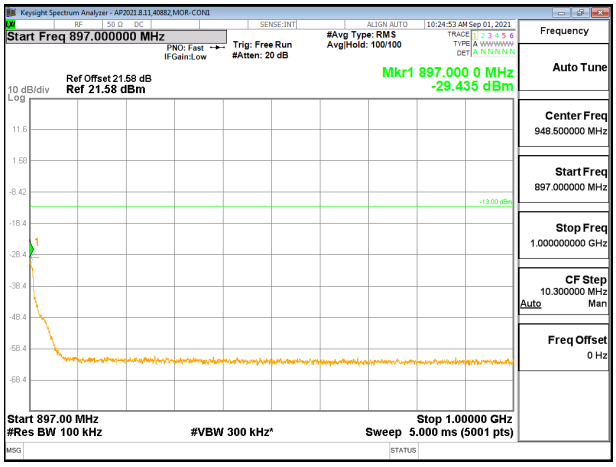
Plot 1: 16QAM – 895.27MHz



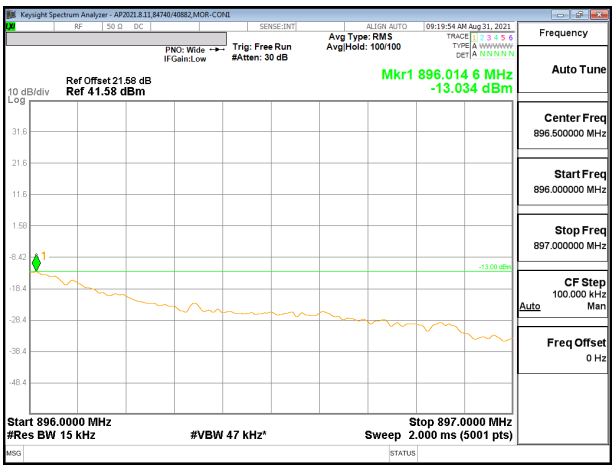
Plot 2: 16QAM – 895.27MHz



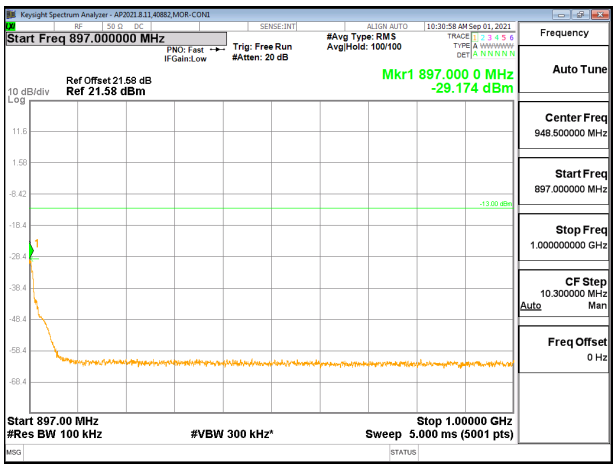
Plot 1: 64QAM – 895.24MHz



Plot 2: 64QAM – 895.24MHz

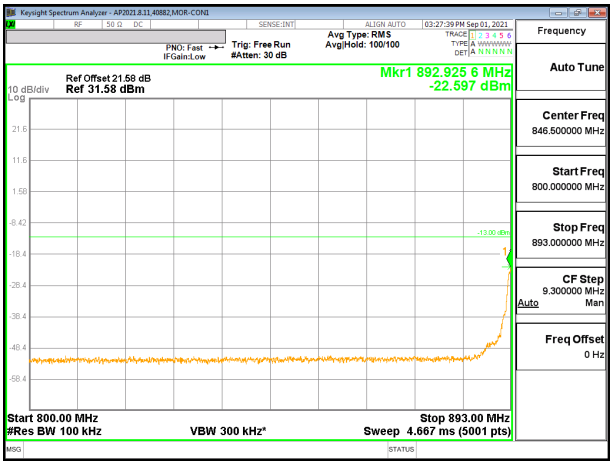


Plot 1: 64QAM – 895.27MHz

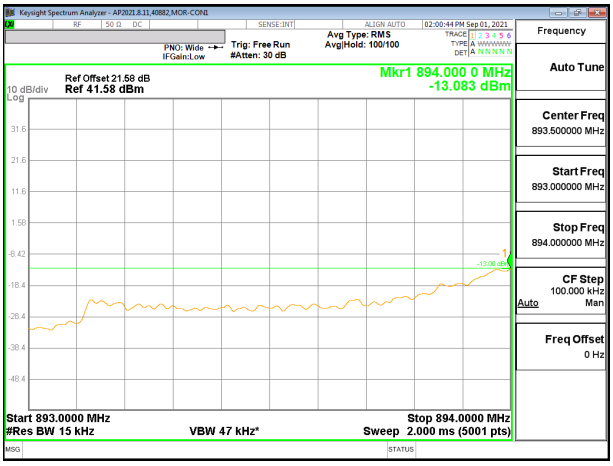


Plot 2: 64QAM – 895.27MHz

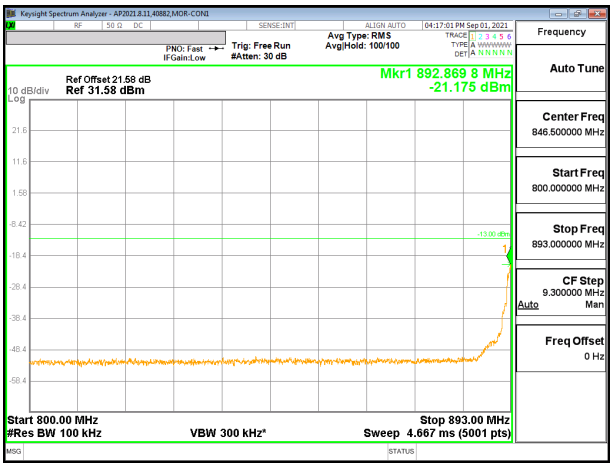
Port B



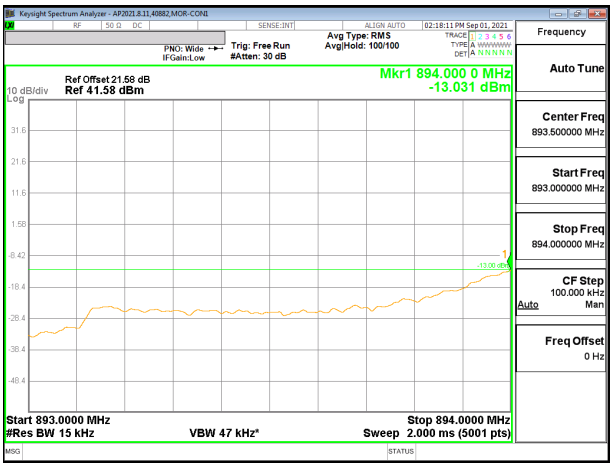
Plot 1: QPSK – 894.73MHz



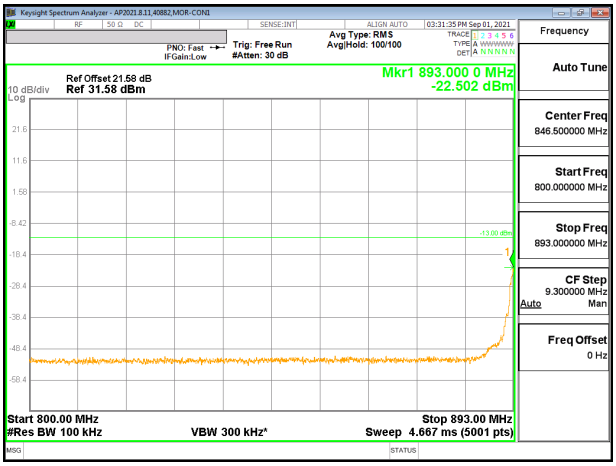
Plot 2: QPSK – 894.73MHz



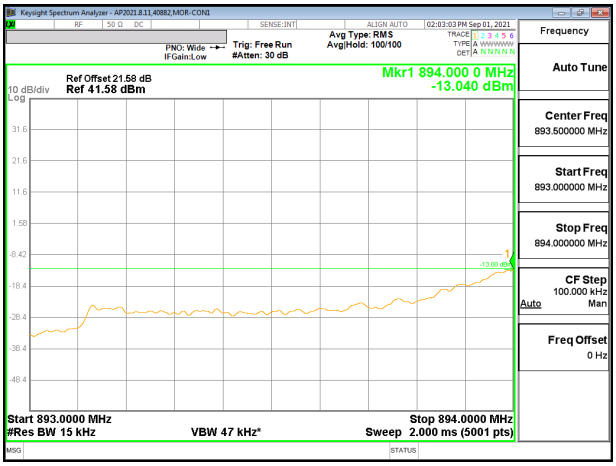
Plot 1: QPSK – 894.76MHz



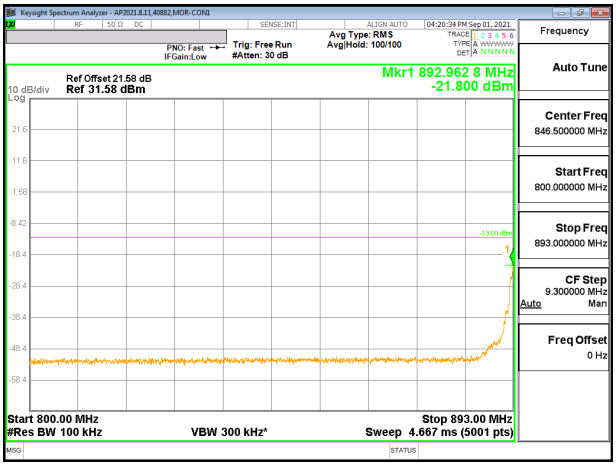
Plot 2: QPSK – 894.76MHz



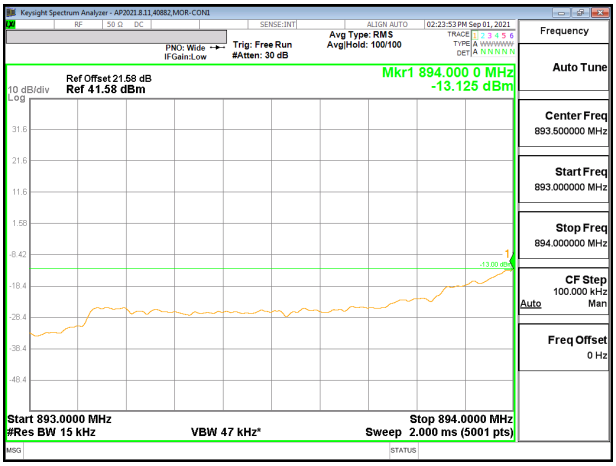
Plot 1: 16QAM – 894.73MHz



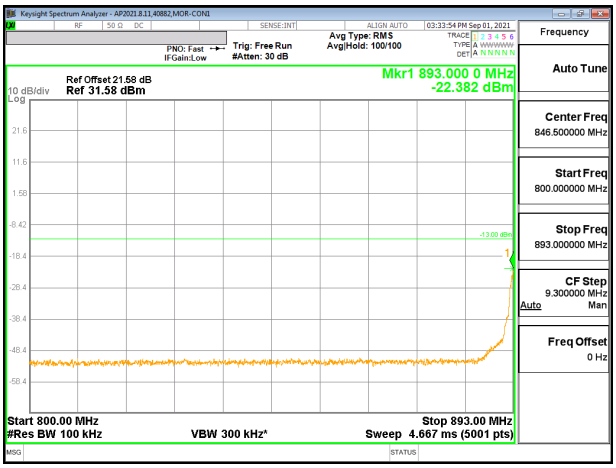
Plot 2: 16QAM – 894.73MHz



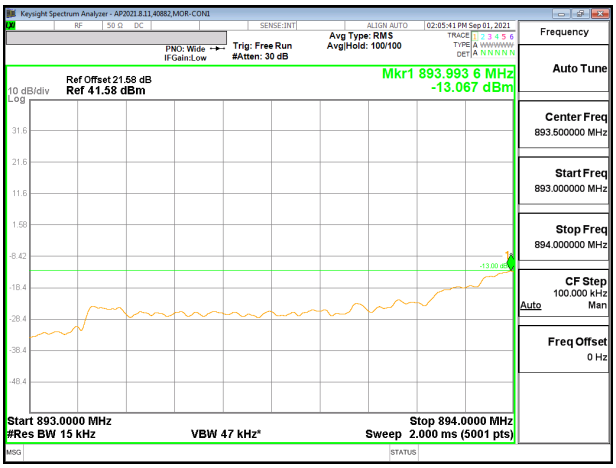
Plot 1: 16QAM – 894.76MHz



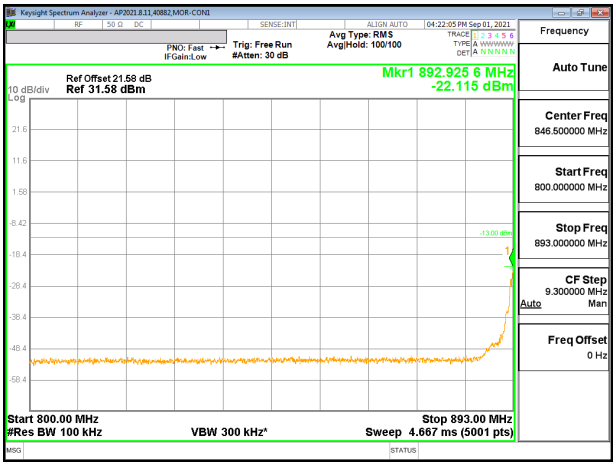
Plot 2: 16QAM – 894.76MHz



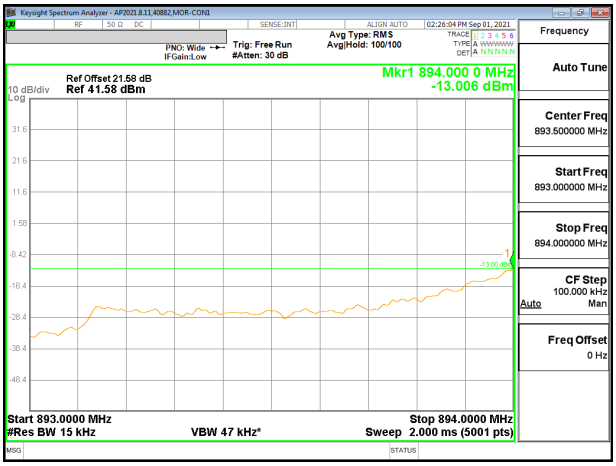
Plot 1: 64QAM – 894.73MHz



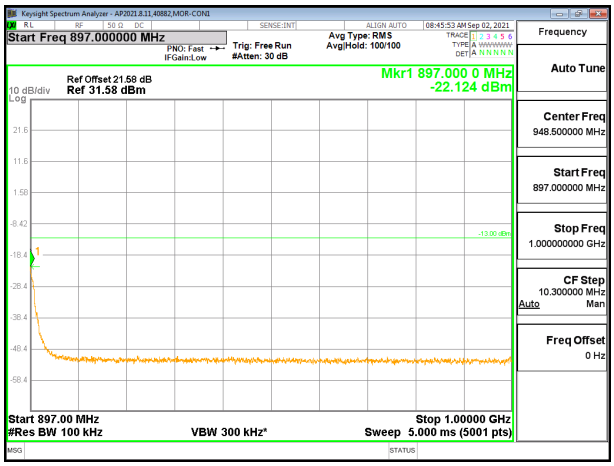
Plot 2: 64QAM – 894.73MHz



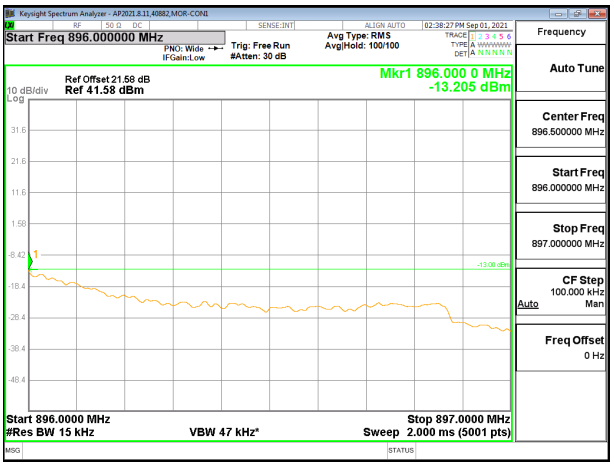
Plot 1: 64QAM – 894.76MHz



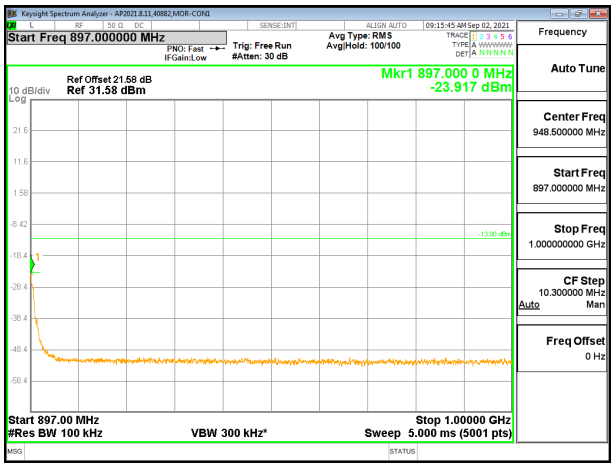
Plot 2: 64QAM – 894.76MHz



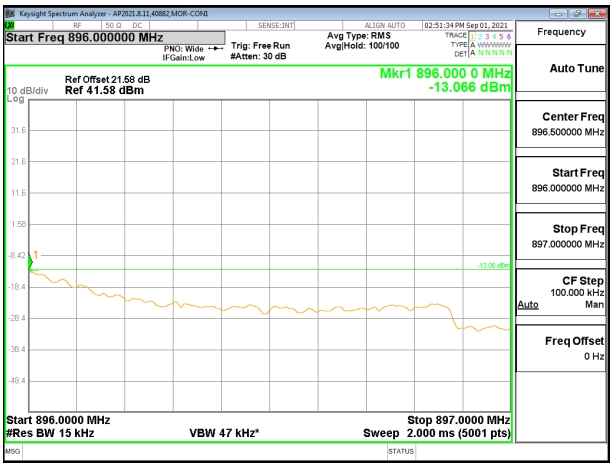
Plot 1: QPSK – 895.24MHz



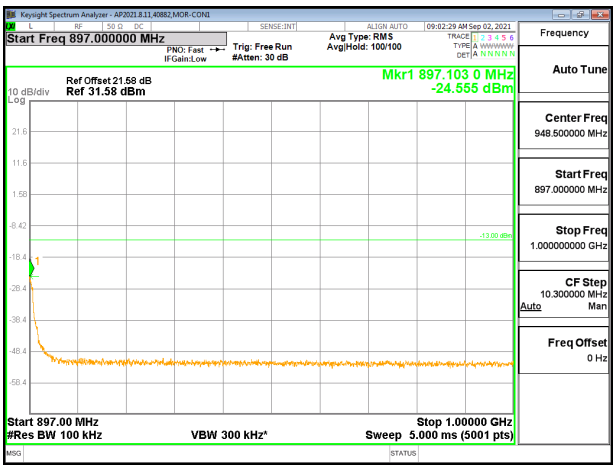
Plot 2: QPSK – 895.24MHz



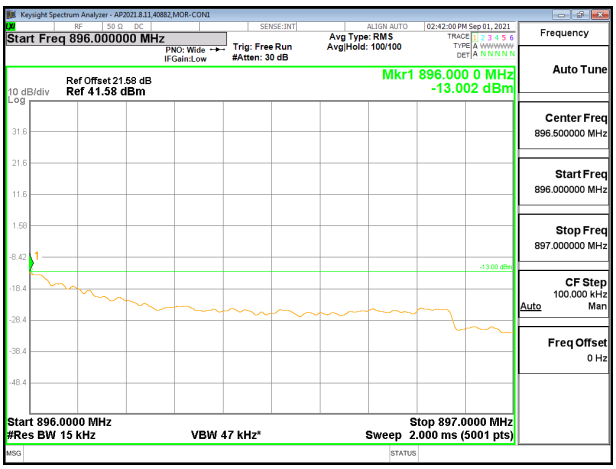
Plot 1: QPSK – 895.27MHz



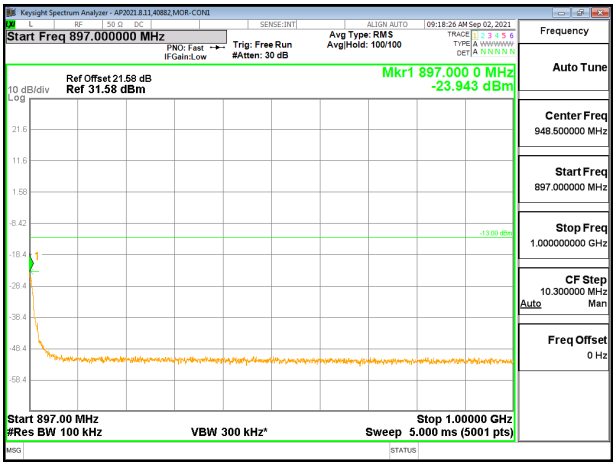
Plot 2: QPSK – 895.27MHz



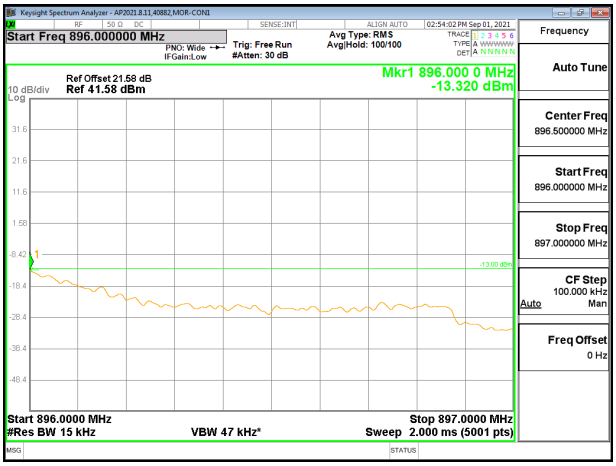
Plot 1: 16QAM – 895.24MHz



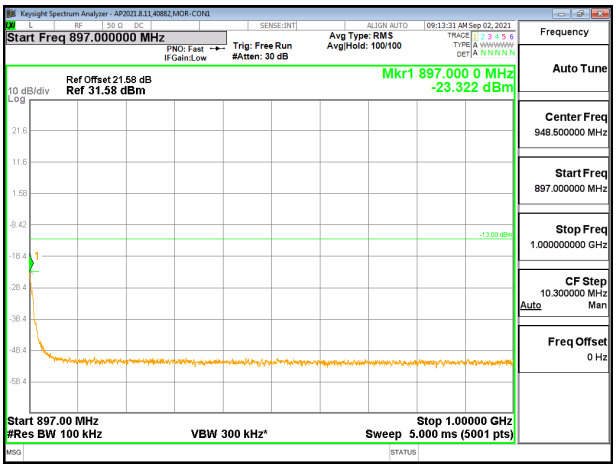
Plot 2: 16QAM – 895.24MHz



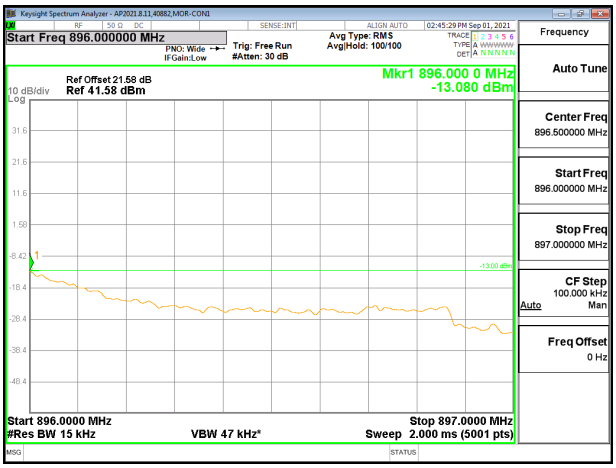
Plot 1: 16QAM – 895.27MHz



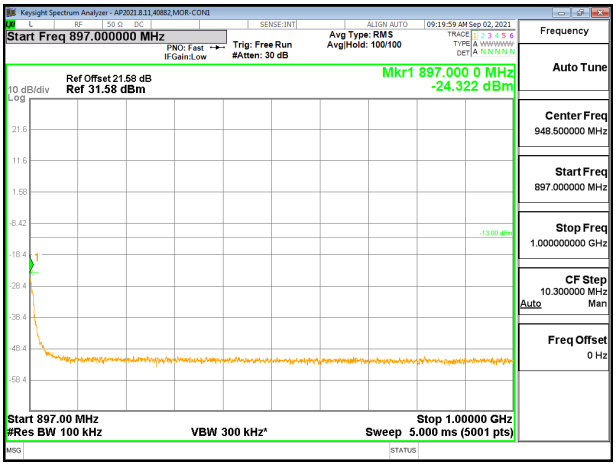
Plot 2: 16QAM – 895.27MHz



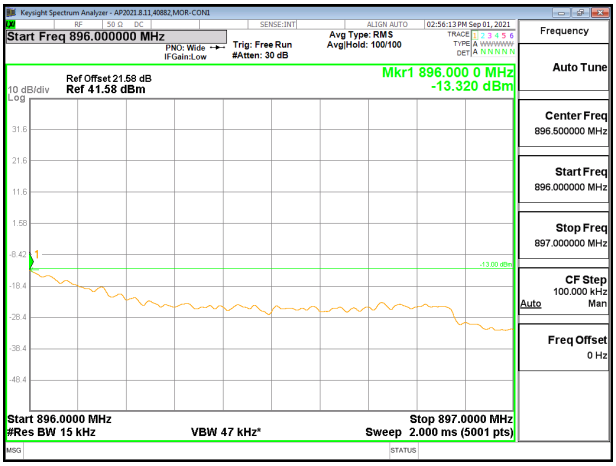
Plot 1: 64QAM – 895.24MHz



Plot 2: 64QAM – 895.24MHz



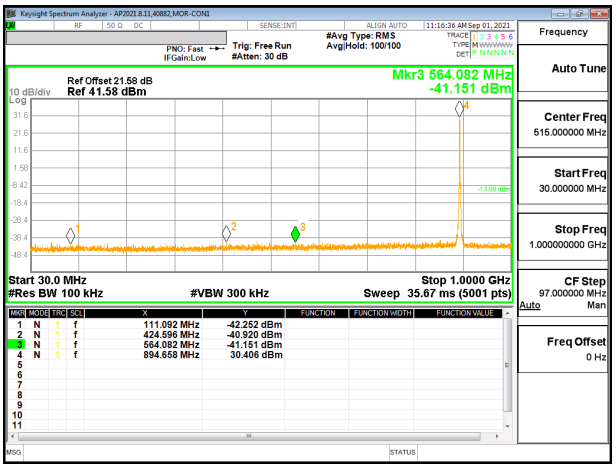
Plot 1: 64QAM – 895.27MHz



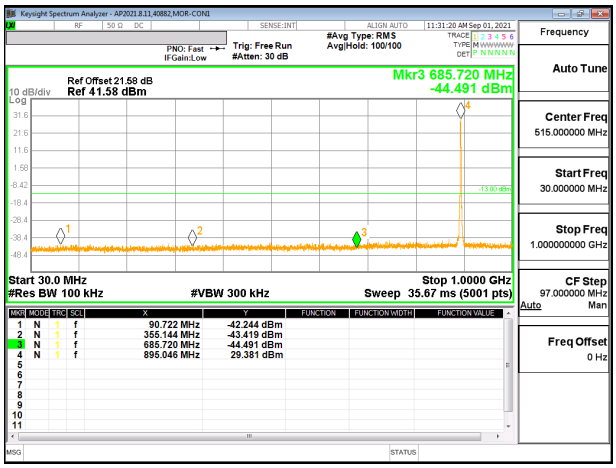
Plot 2: 64QAM – 895.27MHz

CONDUCTED SPURIOUS EMISSIONS

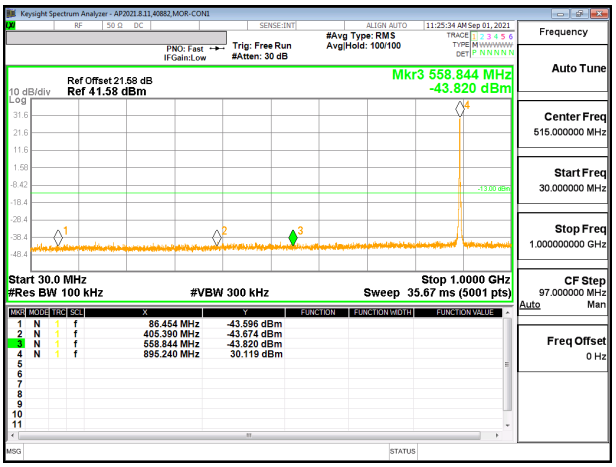
30-1000MHz: Port A



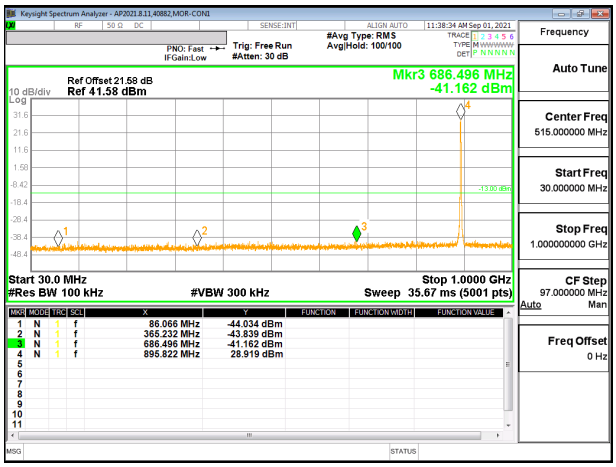
QPSK – 894.73MHz



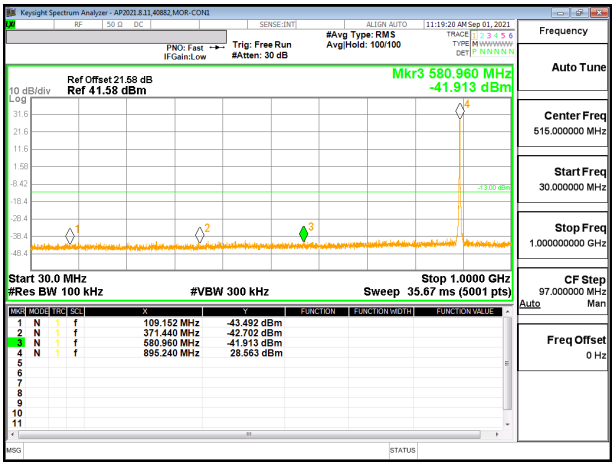
QPSK – 895.24MHz



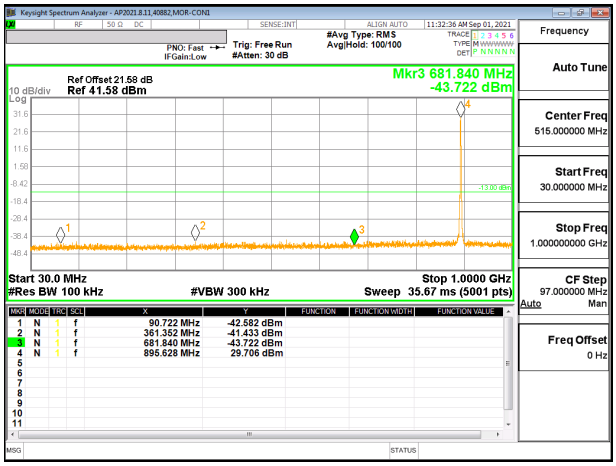
QPSK – 894.76MHz



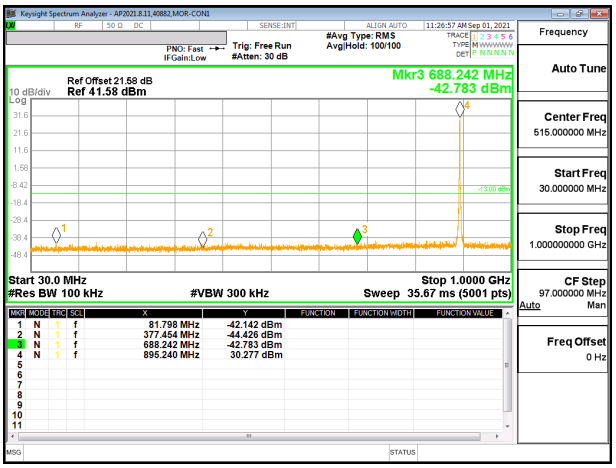
QPSK – 895.27MHz



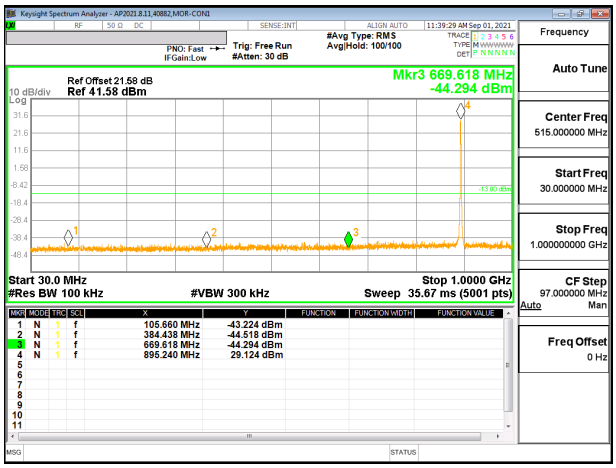
16QAM – 894.73MHz



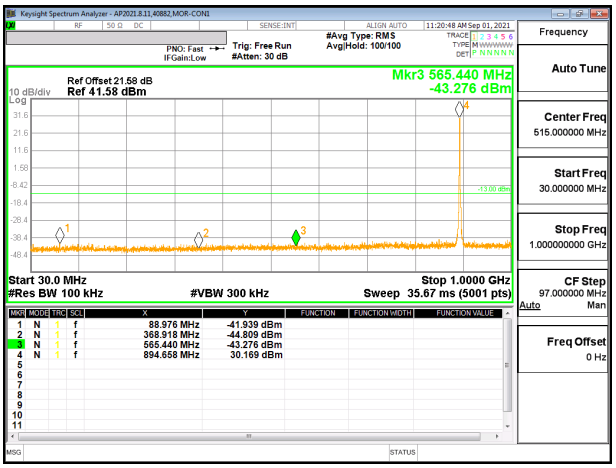
16QAM – 895.24MHz



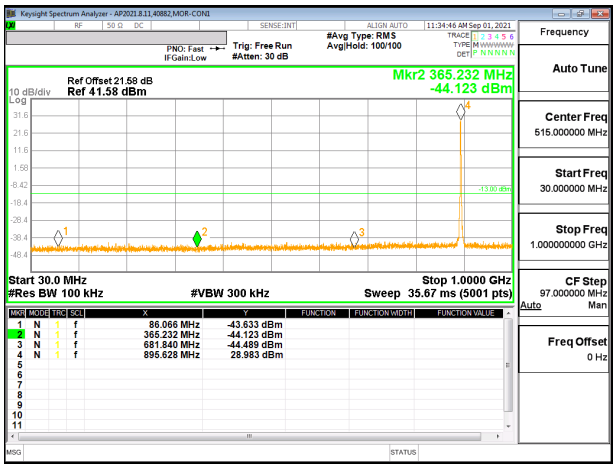
16QAM – 894.76MHz



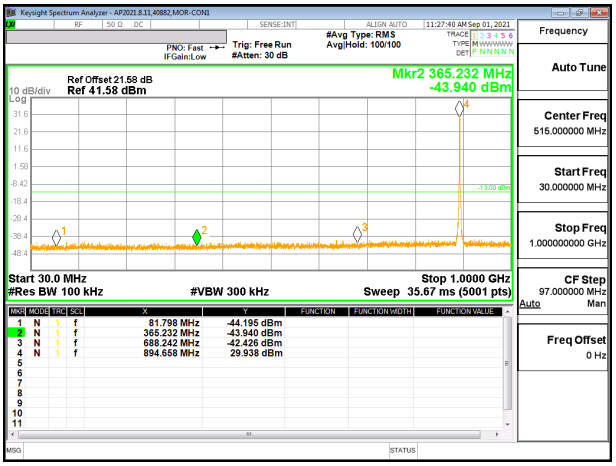
16QAM – 895.27MHz



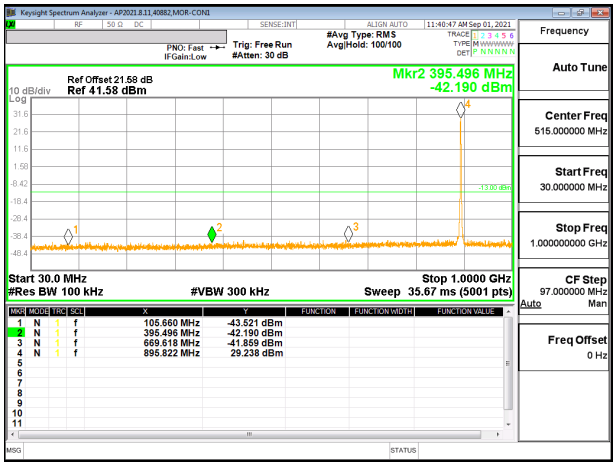
64QAM – 894.73MHz



64QAM – 895.24MHz

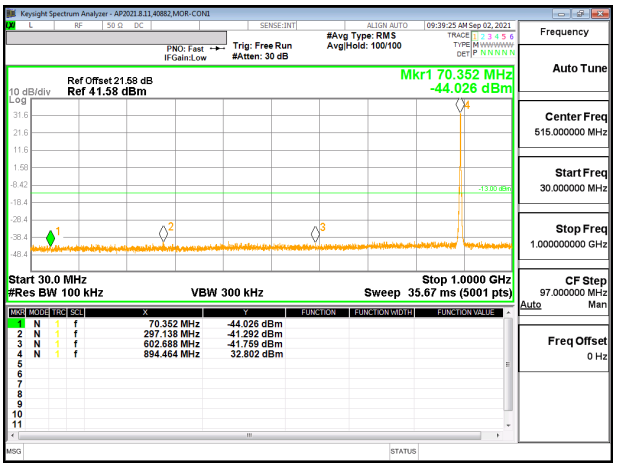


64QAM – 894.76MHz

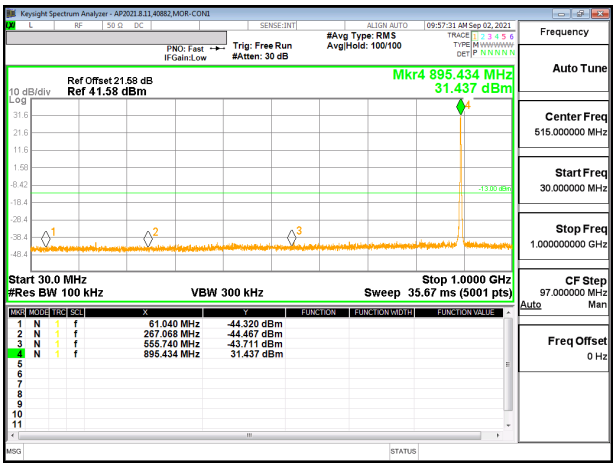


64QAM – 895.27MHz

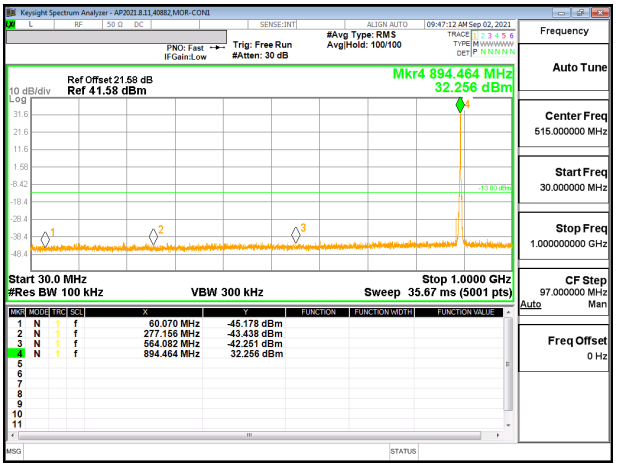
30-1000MHz: Port B



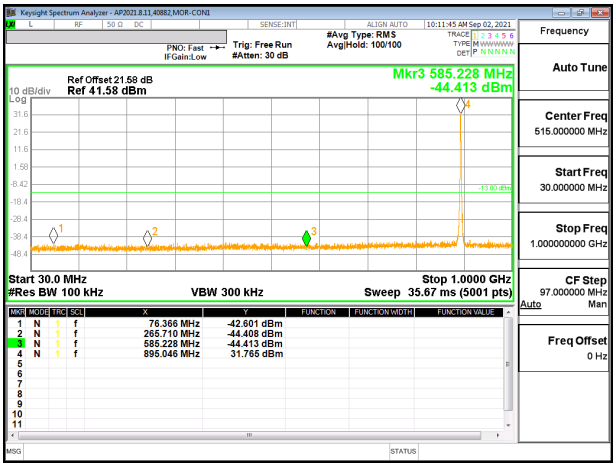
QPSK – 894.73MHz



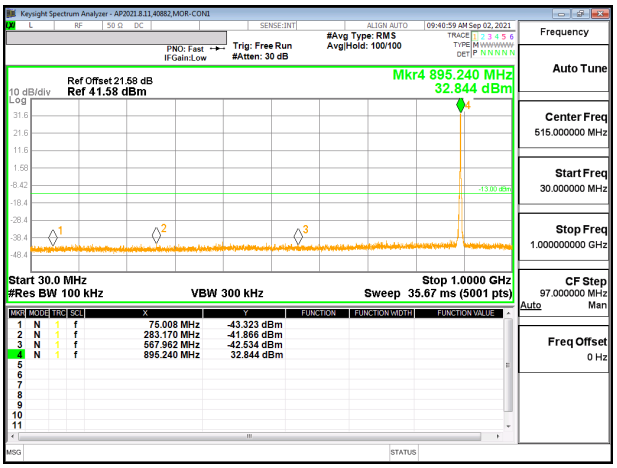
QPSK – 895.24MHz



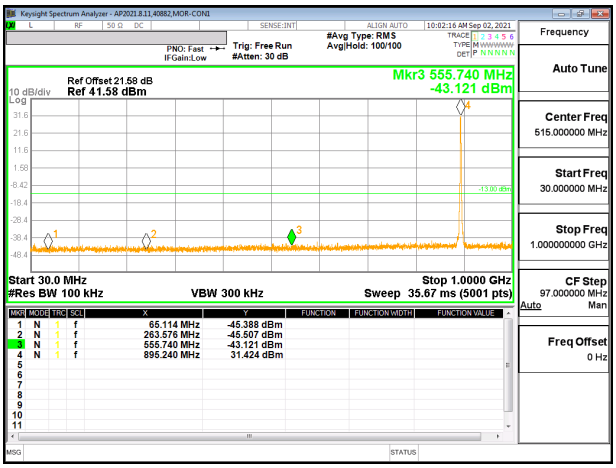
QPSK – 894.76MHz



QPSK – 895.27MHz

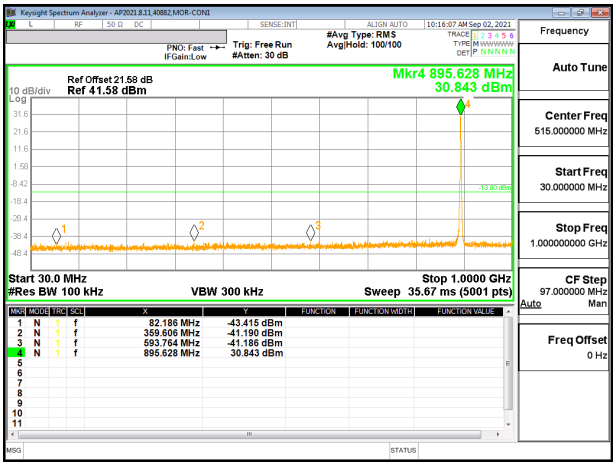


16QAM – 894.73MHz

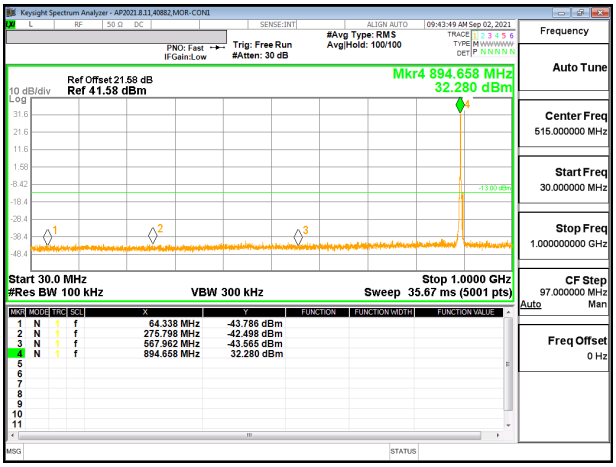


16QAM – 895.24MHz

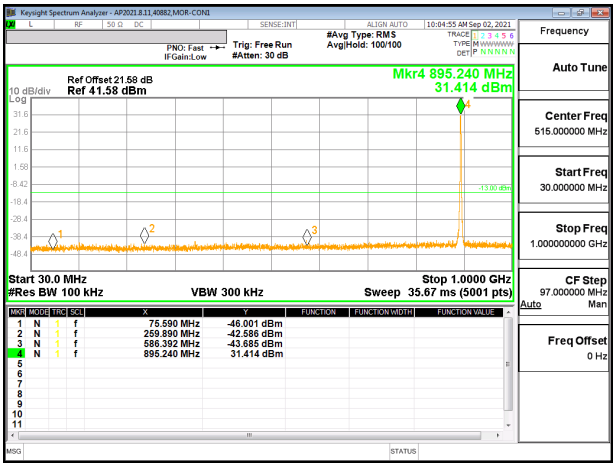
16QAM – 894.76MHz



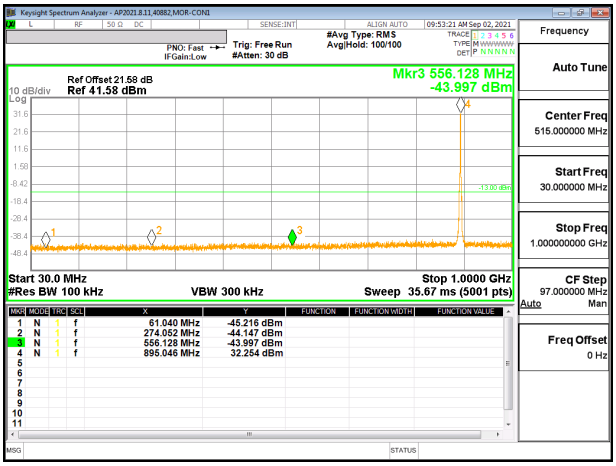
16QAM – 895.27MHz



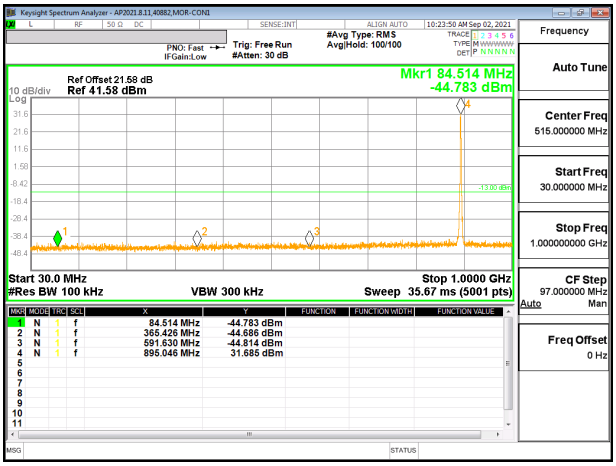
64QAM – 894.73MHz



64QAM – 895.24MHz

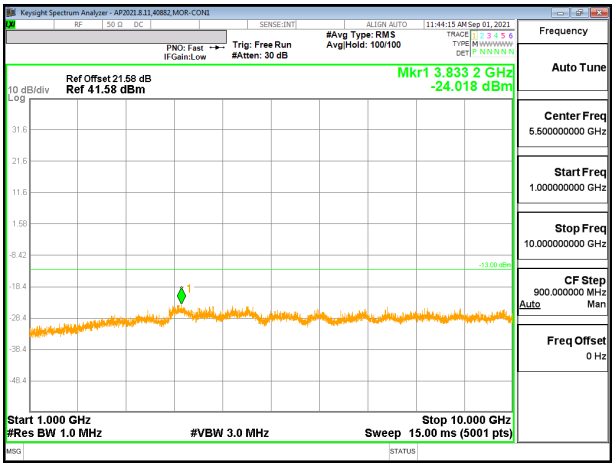


64QAM – 894.76MHz

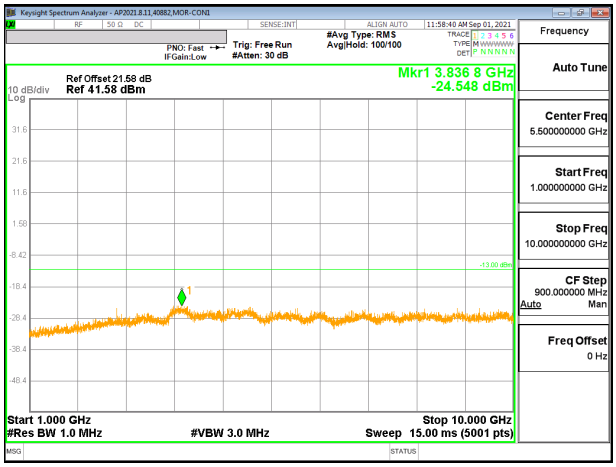


64QAM – 895.27MHz

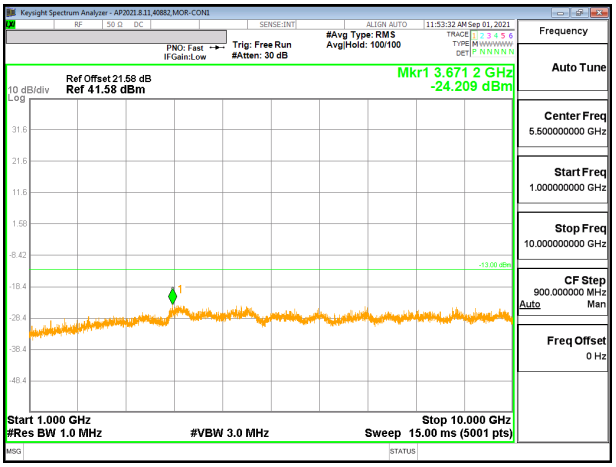
1-10GHz: Port A



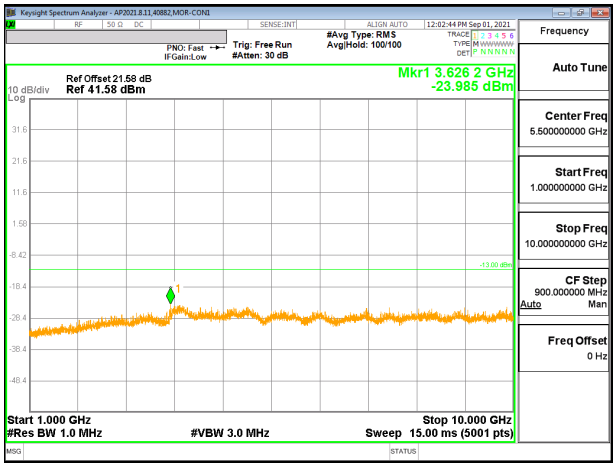
QPSK – 894.73MHz



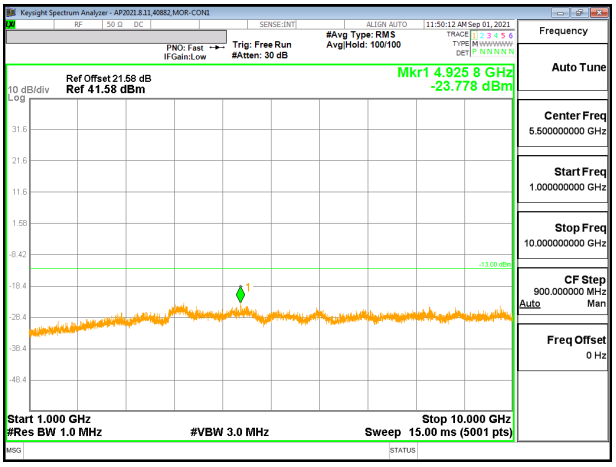
QPSK – 895.24MHz



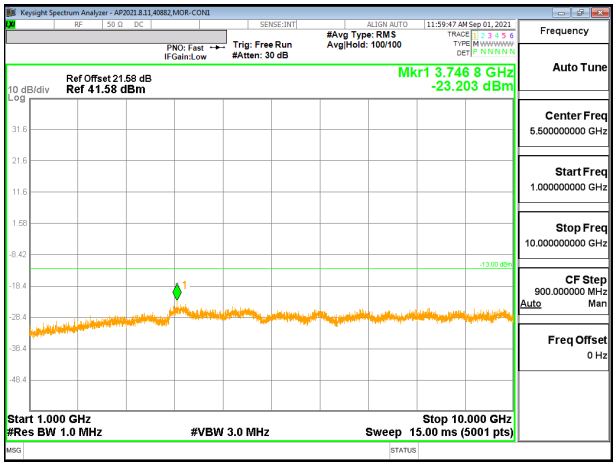
QPSK – 894.76MHz



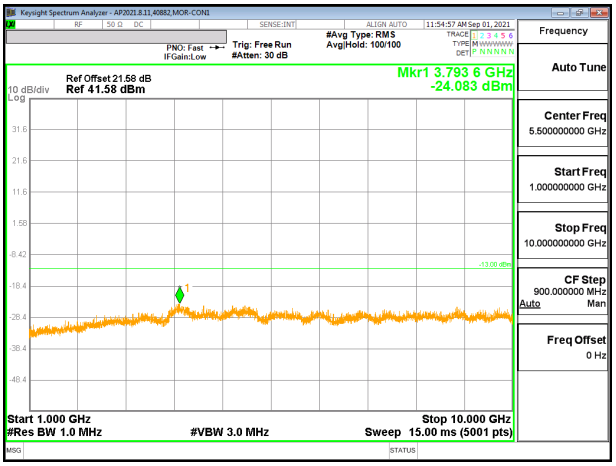
QPSK – 895.27MHz



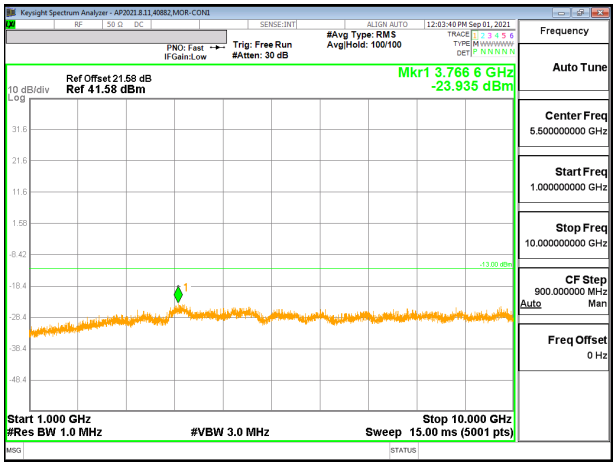
16QAM – 894.73MHz



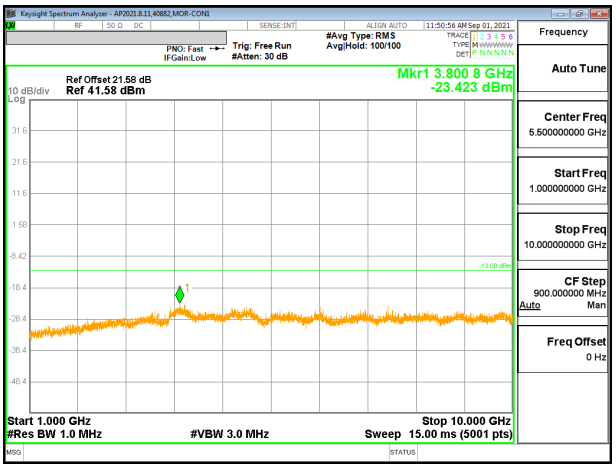
16QAM – 895.24MHz



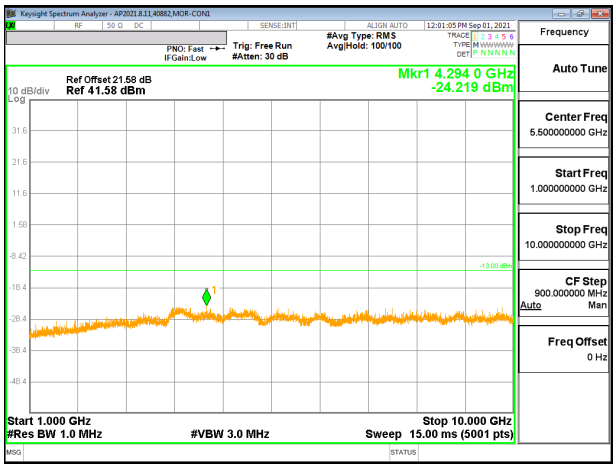
16QAM – 894.76MHz



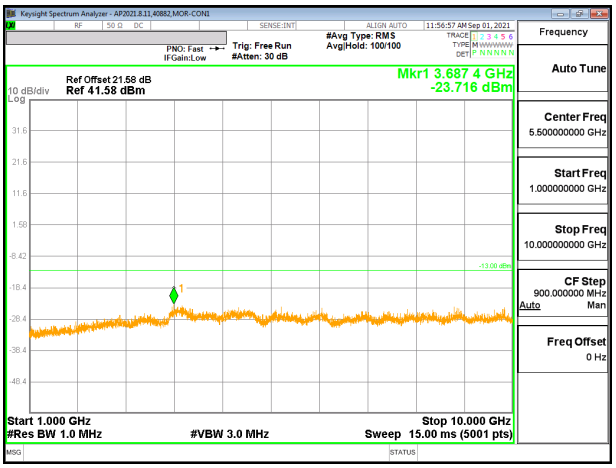
16QAM – 895.27MHz



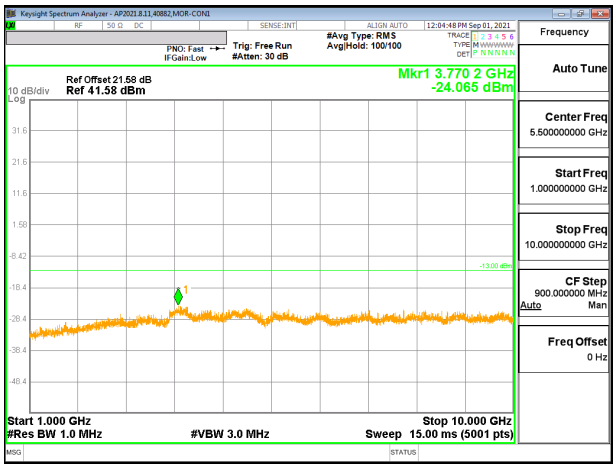
64QAM – 894.73MHz



64QAM – 895.24MHz



64QAM – 894.76MHz



64QAM – 895.27MHz