

MEASUREMENT REPORT
LTE

Applicant Name:
Tecore Networks
7030 Hi Tech Drive
Hanover, MD 21076
USA


Date of Testing:
2/5-2/22/2018
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M1801290011-02.QLJ

FCC ID:	QLJ4GRFN-005
APPLICANT:	Tecore Networks

Application Type: Certification
Model: CoreCell-E RRH
EUT Type: Remote Radio Head
FCC Classification: Licensed Non-Broadcast Station Transmitter (TNB)
FCC Rule Part(s): §2 §22
ISED Specification: RSS-132 Issue 3
Test Procedure(s): ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.


Randy Ortanez
President

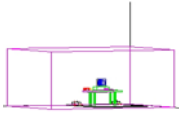


FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 1 of 175

TABLE OF CONTENTS

1.0	INTRODUCTION	4
1.1	Scope	4
1.2	PCTEST Test Location	4
1.3	Test Facility / Accreditations	4
2.0	PRODUCT INFORMATION	5
2.1	Equipment Description	5
2.2	Device Capabilities	5
2.3	Test Configuration	5
2.4	EMI Suppression Device(s)/Modifications	5
3.0	DESCRIPTION OF TESTS	6
3.1	Measurement Procedure	6
3.2	Cellular - Base Frequency Blocks	6
3.3	Cellular - Mobile Frequency Blocks	6
3.4	Radiated Spurious Emissions	7
4.0	MEASUREMENT UNCERTAINTY	8
5.0	TEST EQUIPMENT CALIBRATION DATA	9
6.0	SAMPLE CALCULATIONS	10
7.0	TEST RESULTS	11
7.1	Summary	11
7.2	Conducted Power	13
7.3	Occupied Bandwidth	65
7.4	Out-of-Band Emissions in the Spurious Domain	82
7.5	Out-of-Band Emissions at the Band Edge	94
7.6	Peak-Average Ratio	145
7.7	Radiated Spurious Emissions Measurements – Above 1GHz	162
7.8	Radiated Spurious Emissions Measurements – Below 1GHz	168
7.9	Frequency Stability / Temperature Variation	172
8.0	CONCLUSION	175

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 2 of 175	



MEASUREMENT REPORT

FCC Part 22



Band	FCC Rule Part	Rx Frequency (MHz)	ANT1		ANT2		MIMO		ANT1 Emission Designator	ANT2 Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)	Max. Power (W)	Max. Power (dBm)			
LTE Band 5	22H	869.7 - 893.3	20.941	43.21	20.654	43.15	41.591	46.19	1M11G7D	1M12G7D	QPSK
LTE Band 5	22H	869.7 - 893.3	20.749	43.17	21.086	43.24	41.879	46.22	1M11W7D	1M11W7D	16QAM
LTE Band 5	22H	869.7 - 893.3	20.893	43.20	22.284	43.48	42.756	46.31	1M11W7D	1M13W7D	64QAM
LTE Band 5	22H	869.7 - 893.3	21.135	43.25	22.233	43.47	43.351	46.37	1M12W7D	1M12W7D	256QAM
LTE Band 5	22H	870.5 - 892.5	20.845	43.19	20.893	43.20	41.783	46.21	2M72G7D	2M72G7D	QPSK
LTE Band 5	22H	870.5 - 892.5	20.749	43.17	20.893	43.20	41.210	46.15	2M72W7D	2M73W7D	16QAM
LTE Band 5	22H	870.5 - 892.5	20.701	43.16	21.727	43.37	42.462	46.28	2M71W7D	2M72W7D	64QAM
LTE Band 5	22H	870.5 - 892.5	20.370	43.09	21.777	43.38	41.976	46.23	2M71W7D	2M71W7D	256QAM
LTE Band 5	22H	871.5 - 891.5	20.797	43.18	21.577	43.34	41.879	46.22	4M51G7D	4M51G7D	QPSK
LTE Band 5	22H	871.5 - 891.5	20.893	43.20	21.528	43.33	42.462	46.28	4M51W7D	4M53W7D	16QAM
LTE Band 5	22H	871.5 - 891.5	21.038	43.23	21.086	43.24	41.591	46.19	4M52W7D	4M53W7D	64QAM
LTE Band 5	22H	871.5 - 891.5	21.038	43.23	23.714	43.75	44.463	46.48	4M50W7D	4M53W7D	256QAM
LTE Band 5	22H	874 - 889	20.654	43.15	20.893	43.20	41.591	46.19	9M01G7D	9M02G7D	QPSK
LTE Band 5	22H	874 - 889	20.701	43.16	21.086	43.24	41.591	46.19	9M05W7D	9M01W7D	16QAM
LTE Band 5	22H	874 - 889	20.654	43.15	21.677	43.36	42.170	46.25	9M02W7D	8M98W7D	64QAM
LTE Band 5	22H	874 - 889	20.749	43.17	21.232	43.27	41.879	46.22	8M98W7D	9M05W7D	256QAM

EUT Overview

FCC ID: QLJ4GRFN-005	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 3 of 175	

1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).
- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 4 of 175

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Tecore Networks Remote Radio Head FCC ID: QLJ4GRFN-005**. The test data contained in this report pertains only to the emissions due to the EUT's LTE B5 function. The Remote Radio Head generates band LTE B5 MIMO signal using QPSK, 16-QAM, 64-QAM, and 256-QAM modulations. The signal output level is set to 20 Watts from each antenna port and it is fed via a low loss cable to the input of a spectrum analyzer or a 50Ω load, depending on the type of testing performed. EUT was set up to operate as shown below with a -48VDC power supply. Server equipment was used to control the RF functions of the EUT.

Test Device Serial No.: 10500018

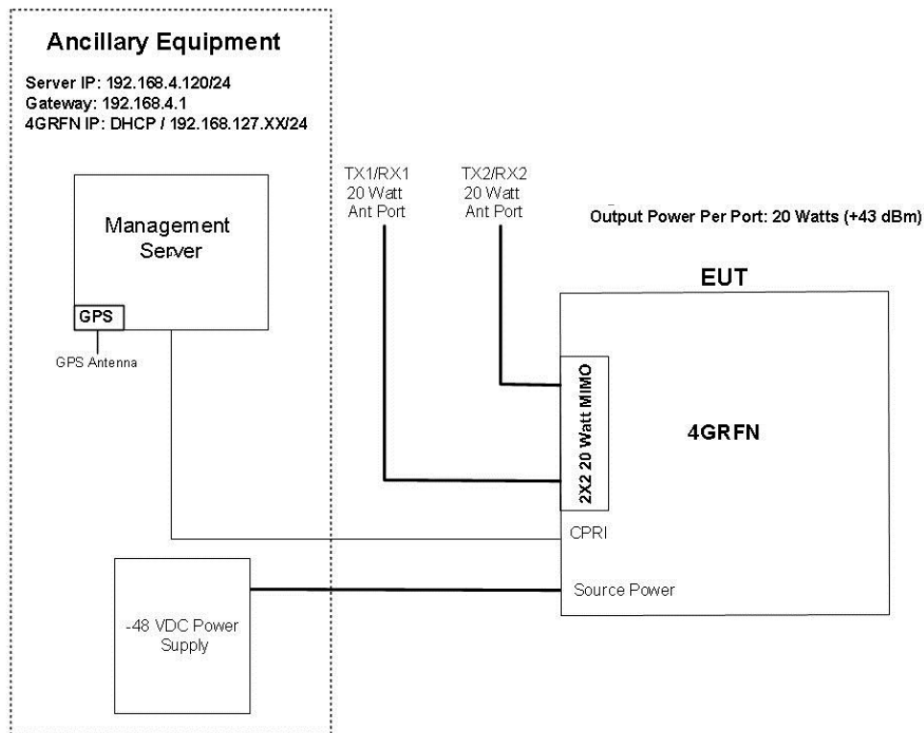


Figure 2-1. Test Setup

2.2 Device Capabilities

This device contains the following capability: LTE B5 MIMO.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

2.4 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

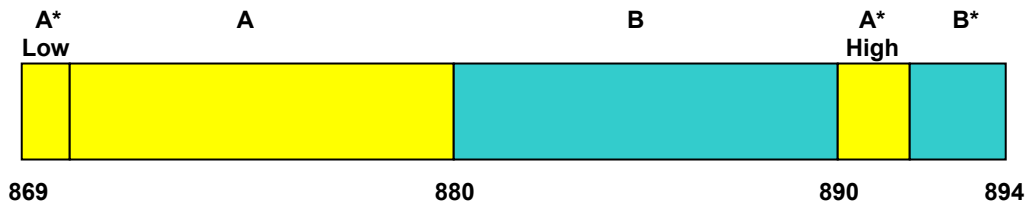
FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 5 of 175

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services” (ANSI C63.26-2015) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168 D01 v03) were used in the measurement of the EUT.

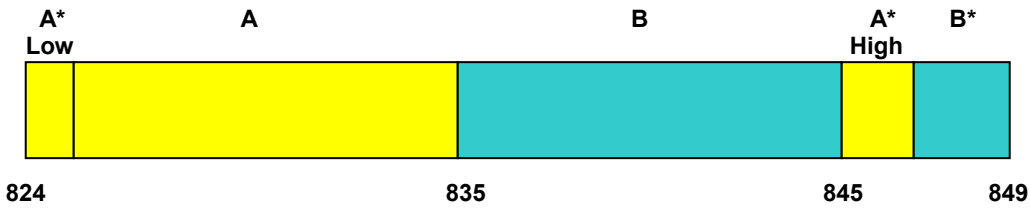
3.2 Cellular - Base Frequency Blocks



BLOCK 1: 869 – 880 MHz (A* Low + A)
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)
BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks



BLOCK 1: 824 – 835 MHz (A* Low + A)
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)
BLOCK 4: 846.5 – 849 MHz (B*)

FCC ID: QLJ4GRFN-005	 PCTEST <small>ENGINEERING LABORATORY, INC.</small>	MEASUREMENT REPORT (CERTIFICATION)	 Tecore <small>networks</small>	Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 6 of 175	

3.4 Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d [dBm] = P_g [dBm] - \text{cable loss} [dB] + \text{antenna gain} [dBd/dBi]$$

Where, P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_g [dBm] - \text{cable loss} [dB]$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of $43 + 10\log_{10}(\text{Power} [Watts])$.

FCC ID: QLJ4GRFN-005	 MEASUREMENT REPORT (CERTIFICATION)		 Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 7 of 175

4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (\pm dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 8 of 175	

5.0 TEST EQUIPMENT CALIBRATION DATA


Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
Agilent	N9020A	MXA Signal Analyzer	1/24/2018	Annual	1/24/2019	US46470561
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	4/19/2017	Annual	4/19/2018	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/3/2017	Annual	7/3/2018	102135
Rohde & Schwarz	TS-PR8	Preamplifier-Antenna SYS; 30MHz-8GHz	10/19/2017	Annual	10/19/2018	102324
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

Table 5-1. Test Equipment

Note:

Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 9 of 175	

6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 10 of 175

7.0 TEST RESULTS

7.1 Summary

Company Name: Tecore Networks
 FCC ID: QLJ4GRFN-005
 FCC Classification: Licensed Non-Broadcast Station Transmitter (TNB)
 Mode(s): LTE

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1046	RSS-132(5.4)	Conducted Power	N/A	CONDUCTED	PASS	Section 7.2
2.1049	RSS-Gen(6.6)	Occupied Bandwidth	N/A		PASS	Section 7.3
2.1051 22.917(a)	RSS-132(5.5)	Out of Band Emissions in the Spurious Domain and at the Band Edge	$> 43 + 10\log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions		PASS	Section 7.4, 7.5
N/A	RSS-132(5.4)	Peak-Average Ratio	N/A		PASS	Section 7.6
2.1055 22.355	RSS-132(5.3)	Frequency Stability	< 1.5 ppm (Part 22)		PASS	Section 7.9

Table 7-1. Summary of Conducted Test Results

FCC ID: QLJ4GRFN-005	 PCTEST ENGINEERING LABORATORY, INC.	MEASUREMENT REPORT (CERTIFICATION)	 Tecore networks	Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 11 of 175	

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.917(a)	RSS-132(5.5)	Undesirable Emissions (Band 5)	$> 43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions	RADIATED	PASS	Section 7.7, 7.8

Table 7-2. Summary of Radiated Test Results

Notes:

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots (Sections 7.3, 7.4, 7.5, 7.6) were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation," Version 4.8.
- 5) For the Radiated Emissions test, the EUT was tested for case radiated spurious emissions with both antenna ports terminated in 50ohms while the EUT was set to transmit from both antenna ports at maximum power.

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 12 of 175	

7.2 Conducted Power

§2.1046, RSS-132(5.4)

Test Overview

The EUT was set to transmit in all four available modulations of LTE B5 mode at 43.01dBm through a management server. An output power level of 43.01dBm was used to ensure that the amplifier would operate in its linear region. The output terminal of the EUT was connected through a calibrated cable and 30dB of external attenuation to a signal analyzer. The signal analyzers' "Channel Power" function was used to measure the conducted output powers in accordance to the guidance of KDB 971168 D01 v03.

Test Procedures Used

KDB 971168 D01 v03 – Section 5.2.1

ANSI C63.26-2015 Section 6.4.3.1

Test Settings

1. Power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. Span = 2 - 3 times the OBW
3. RBW = 1 – 5% of the expected OBW
4. VBW \geq 3 x RBW
5. No. of sweep points \geq 2 x span / RBW
6. Sweep time = auto-couple
7. Detector = RMS
8. Trigger is set to "free run" for signals with continuous operation.
9. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
10. Trace mode = trace averaging (RMS) over 100 sweeps
11. The trace was allowed to stabilize

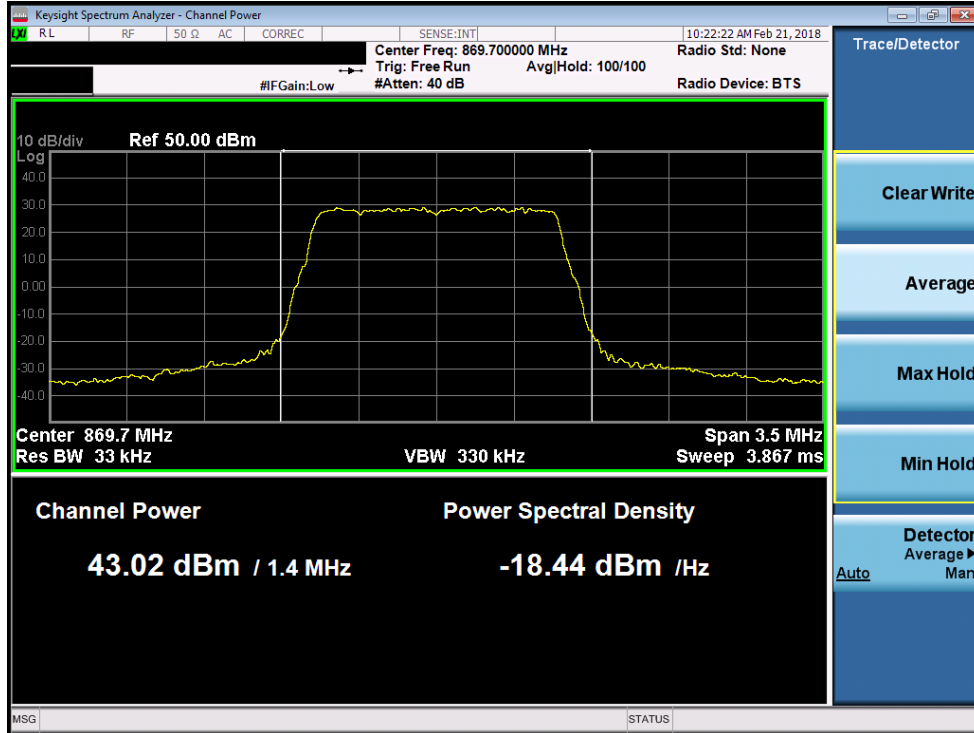
FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 13 of 175

Antenna 1 Conducted Power Measurements

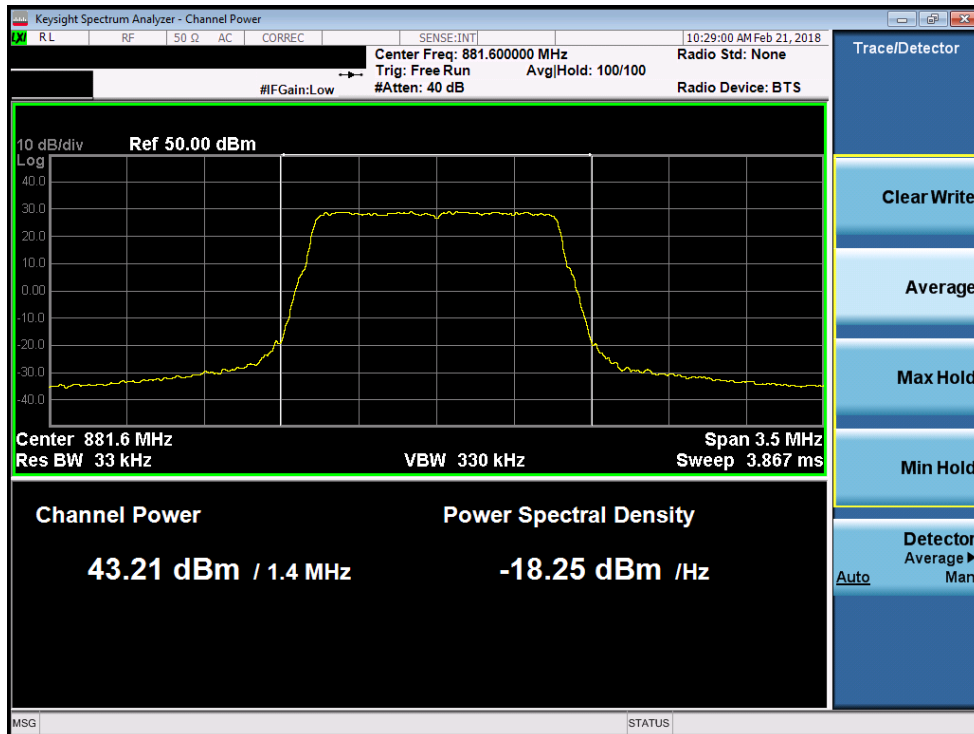
Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Conducted Power [dBm]	Conducted Power [Watts]	Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Conducted Power [dBm]	Conducted Power [Watts]
869.70	1.4	QPSK	43.02	20.04	871.50	5	QPSK	43.18	20.80
881.60	1.4	QPSK	43.21	20.94	881.60	5	QPSK	43.07	20.28
893.30	1.4	QPSK	43.18	20.80	891.50	5	QPSK	43.10	20.42
869.70	1.4	16-QAM	43.08	20.32	871.50	5	16-QAM	43.13	20.56
881.60	1.4	16-QAM	43.15	20.65	881.60	5	16-QAM	43.20	20.89
893.30	1.4	16-QAM	43.17	20.75	891.50	5	16-QAM	43.14	20.61
869.70	1.4	64-QAM	43.04	20.14	871.50	5	64-QAM	43.22	20.99
881.60	1.4	64-QAM	43.11	20.46	881.60	5	64-QAM	43.11	20.46
893.30	1.4	64-QAM	43.20	20.89	891.50	5	64-QAM	43.23	21.04
869.70	1.4	256-QAM	43.08	20.32	871.50	5	256-QAM	43.23	21.04
881.60	1.4	256-QAM	43.25	21.13	881.60	5	256-QAM	43.07	20.28
893.30	1.4	256-QAM	43.20	20.89	891.50	5	256-QAM	43.17	20.75
870.50	3	QPSK	43.03	20.09	874.00	10	QPSK	43.15	20.65
881.60	3	QPSK	43.19	20.84	881.60	10	QPSK	43.09	20.37
892.50	3	QPSK	43.16	20.70	889.00	10	QPSK	43.13	20.56
870.50	3	16-QAM	43.05	20.18	874.00	10	16-QAM	43.16	20.70
881.60	3	16-QAM	43.08	20.32	881.60	10	16-QAM	43.07	20.28
892.50	3	16-QAM	43.17	20.75	889.00	10	16-QAM	43.12	20.51
870.50	3	64-QAM	43.10	20.42	874.00	10	64-QAM	43.12	20.51
881.60	3	64-QAM	43.16	20.70	881.60	10	64-QAM	43.10	20.42
892.50	3	64-QAM	43.13	20.56	889.00	10	64-QAM	43.15	20.65
870.50	3	256-QAM	43.02	20.04	874.00	10	256-QAM	43.17	20.75
881.60	3	256-QAM	43.06	20.23	881.60	10	256-QAM	43.14	20.61
892.50	3	256-QAM	43.09	20.37	889.00	10	256-QAM	43.14	20.61

Table 7-2. Maximum Average Conducted Power

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 14 of 175

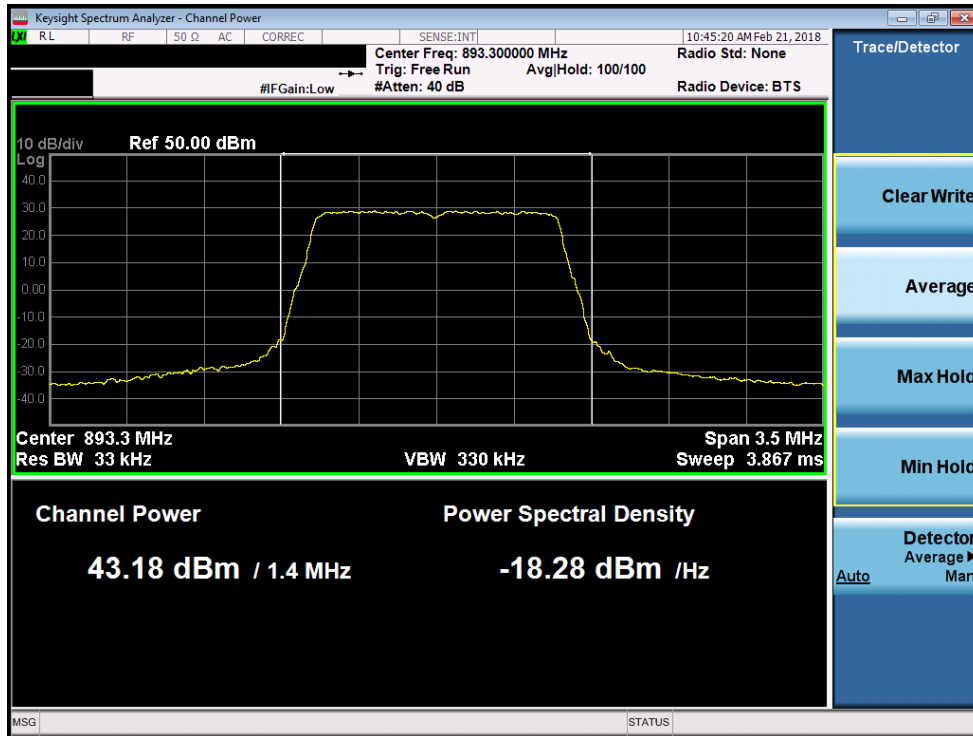


Plot 7-1. Maximum Conducted Power (Band 5 - 1.4MHz QPSK – Low Channel)

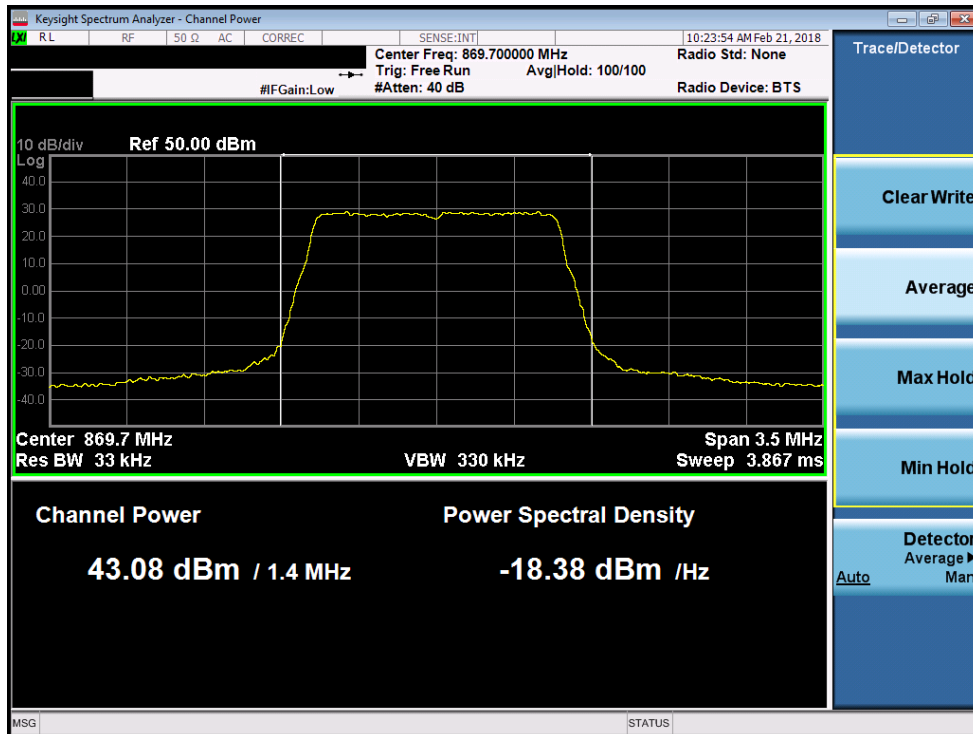


Plot 7-2. Maximum Conducted Power (Band 5 - 1.4MHz QPSK – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 15 of 175

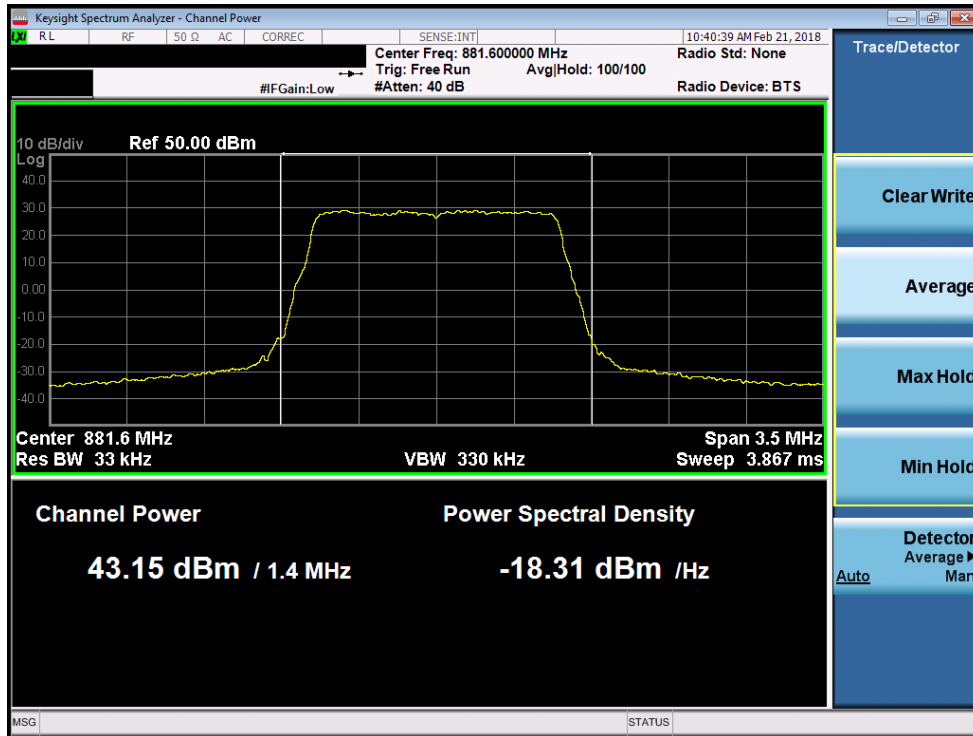


Plot 7-3. Maximum Conducted Power (Band 5 - 1.4MHz QPSK – High Channel)

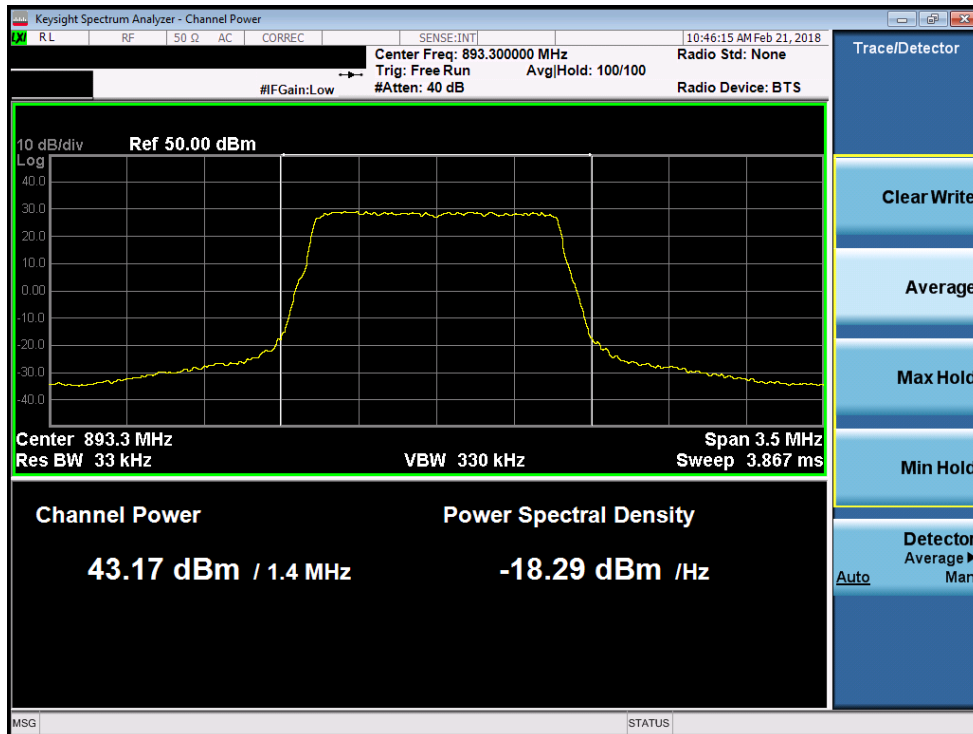


Plot 7-4. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 16 of 175

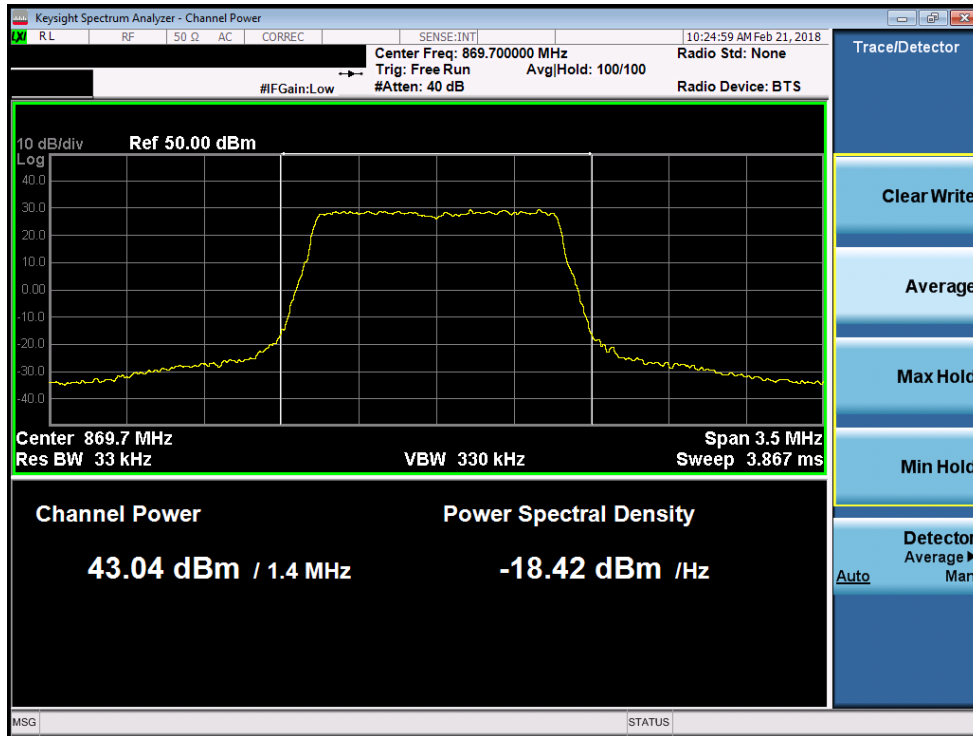


Plot 7-5. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM – Mid Channel)

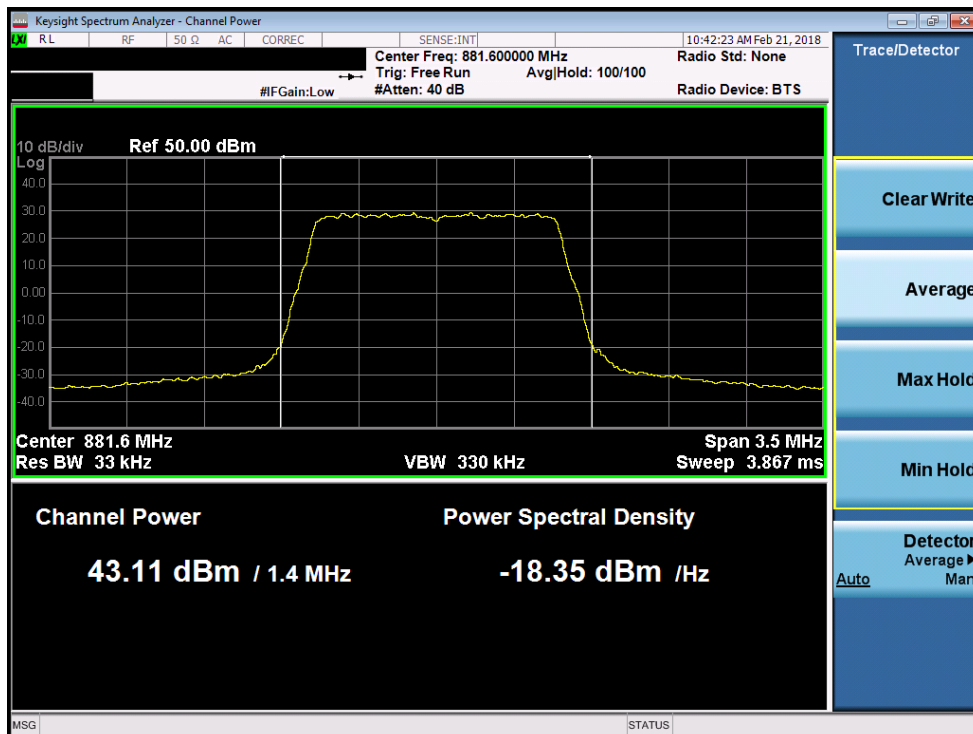


Plot 7-6. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 17 of 175

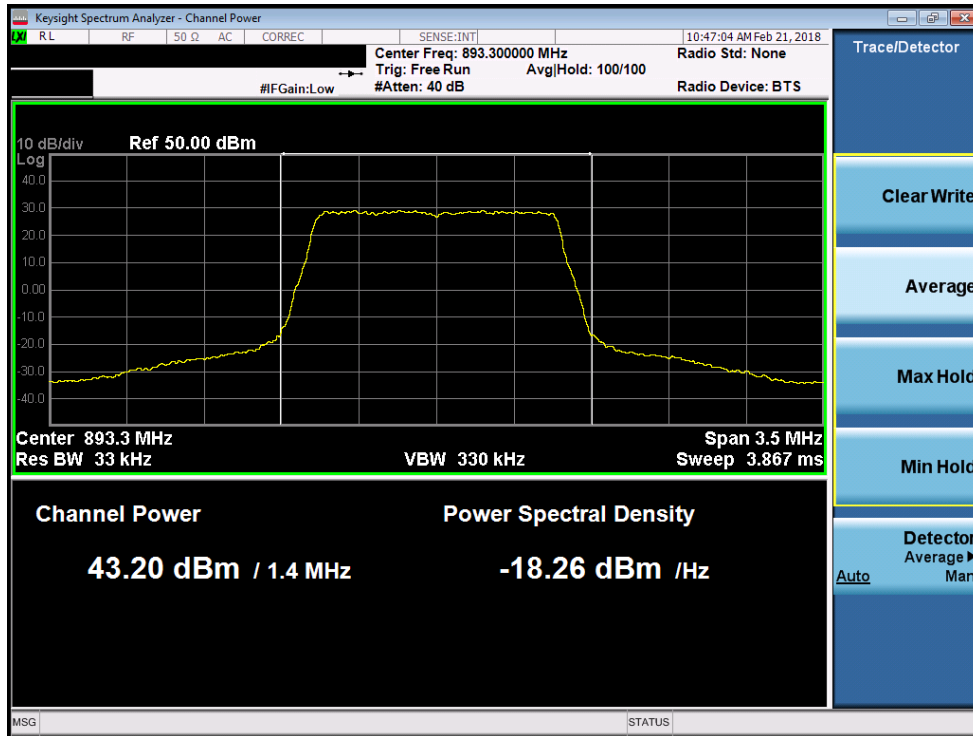


Plot 7-7. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM – Low Channel)

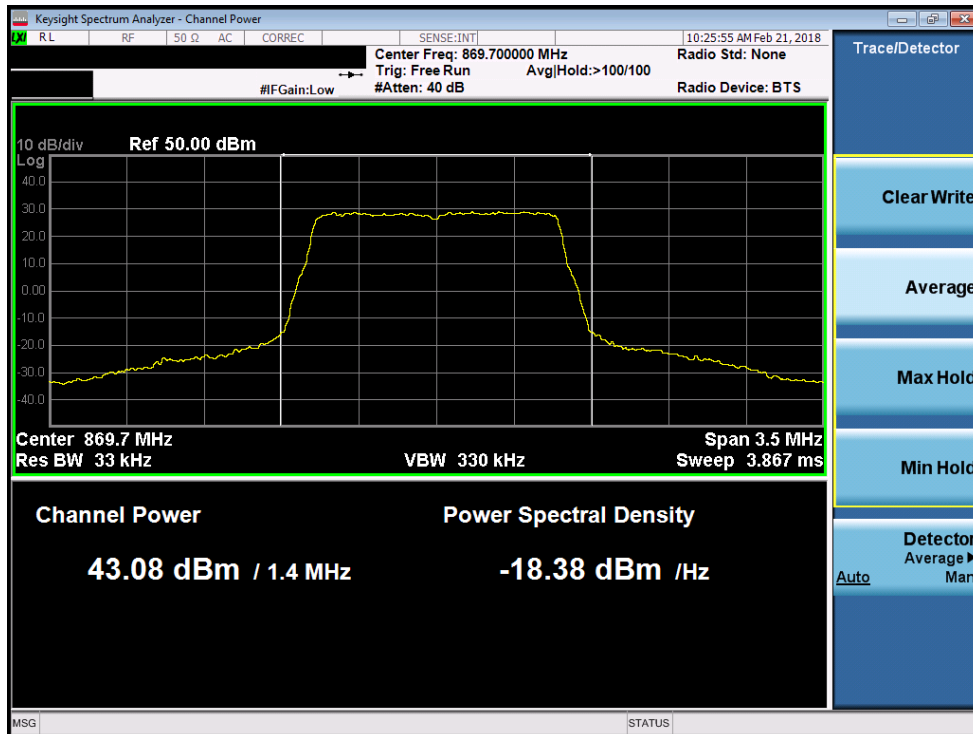


Plot 7-8. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 18 of 175

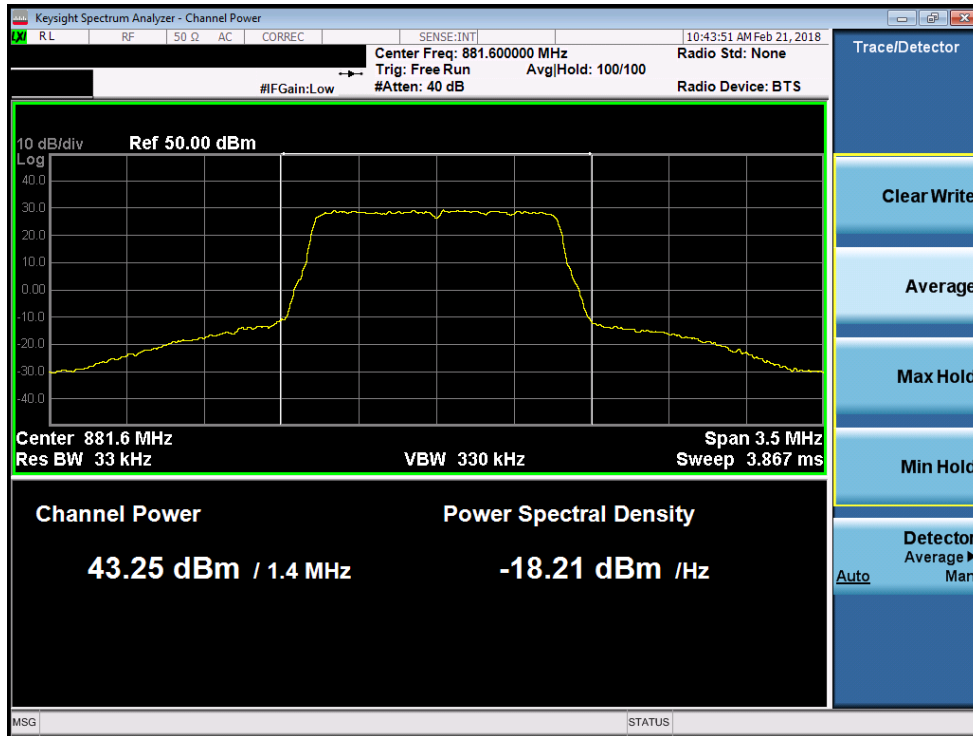


Plot 7-9. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM – High Channel)

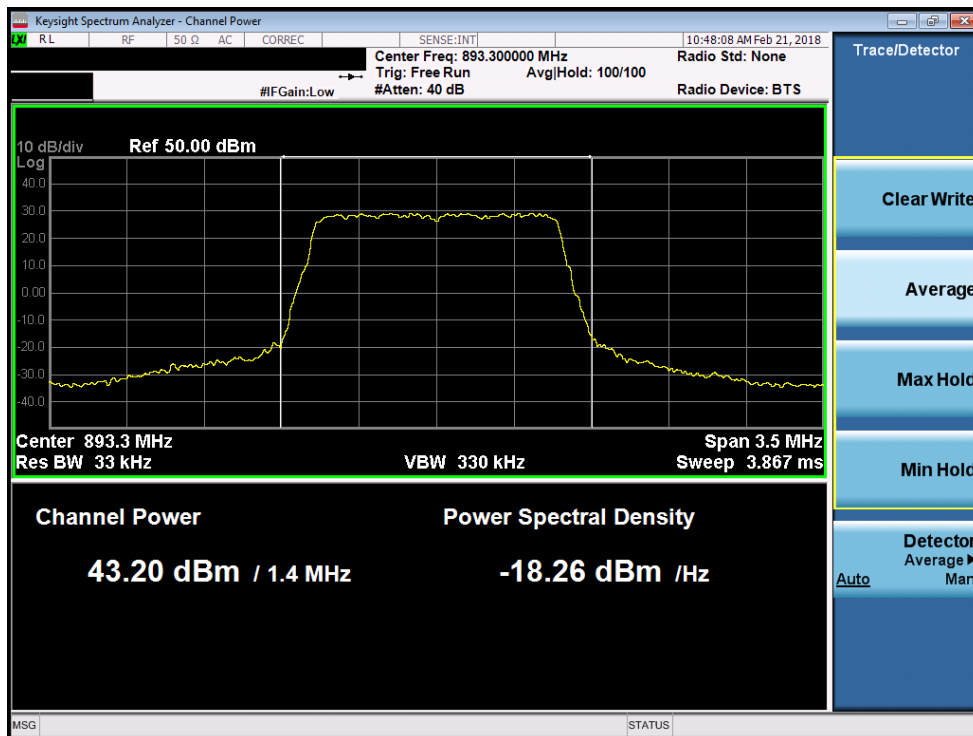


Plot 7-10. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 19 of 175

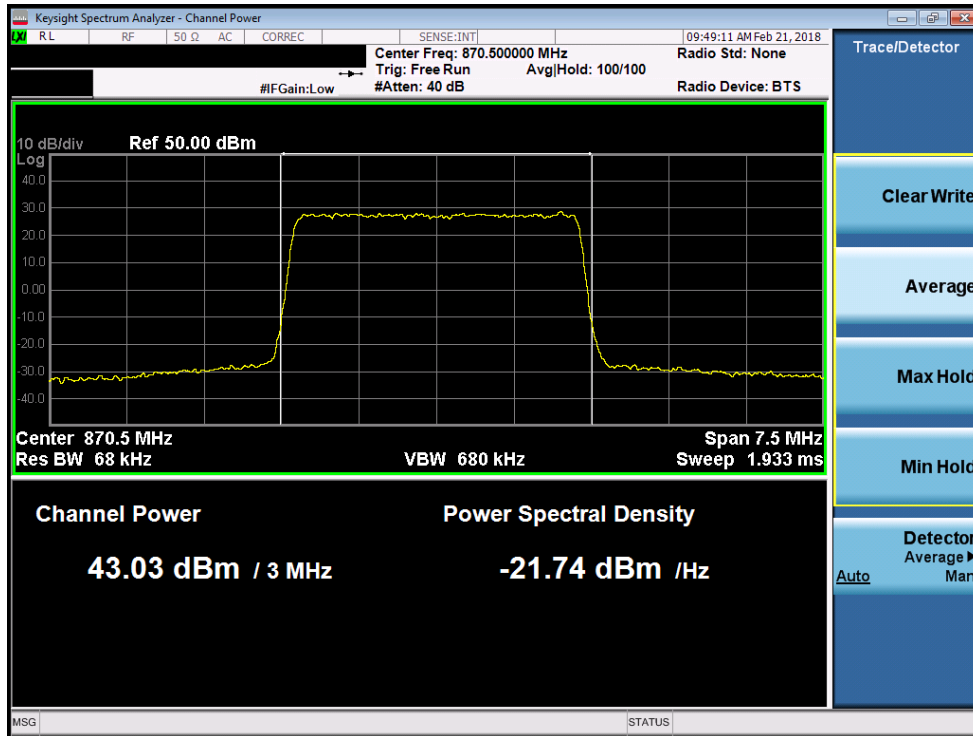


Plot 7-11. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM – Mid Channel)

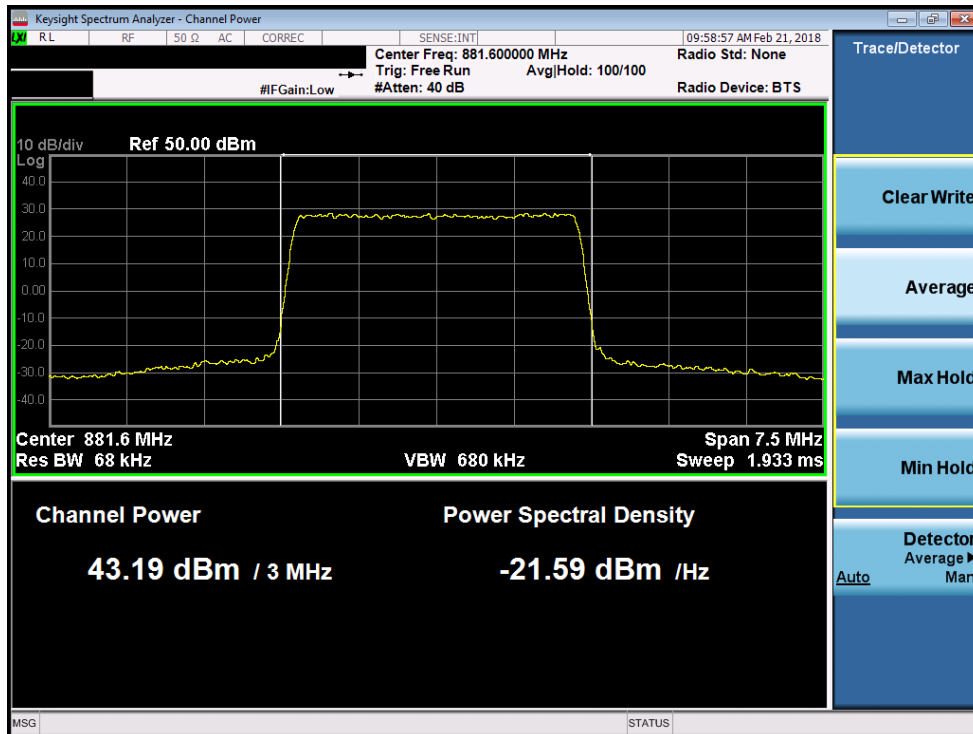


Plot 7-12. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 20 of 175

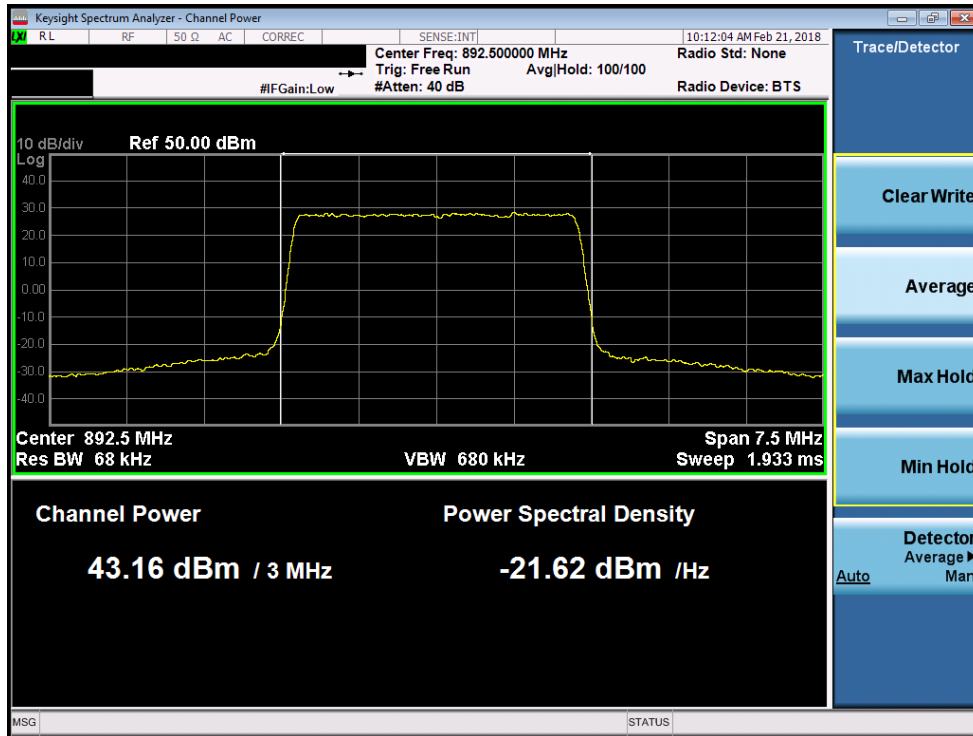


Plot 7-13. Maximum Conducted Power (Band 5 - 3.0MHz QPSK – Low Channel)

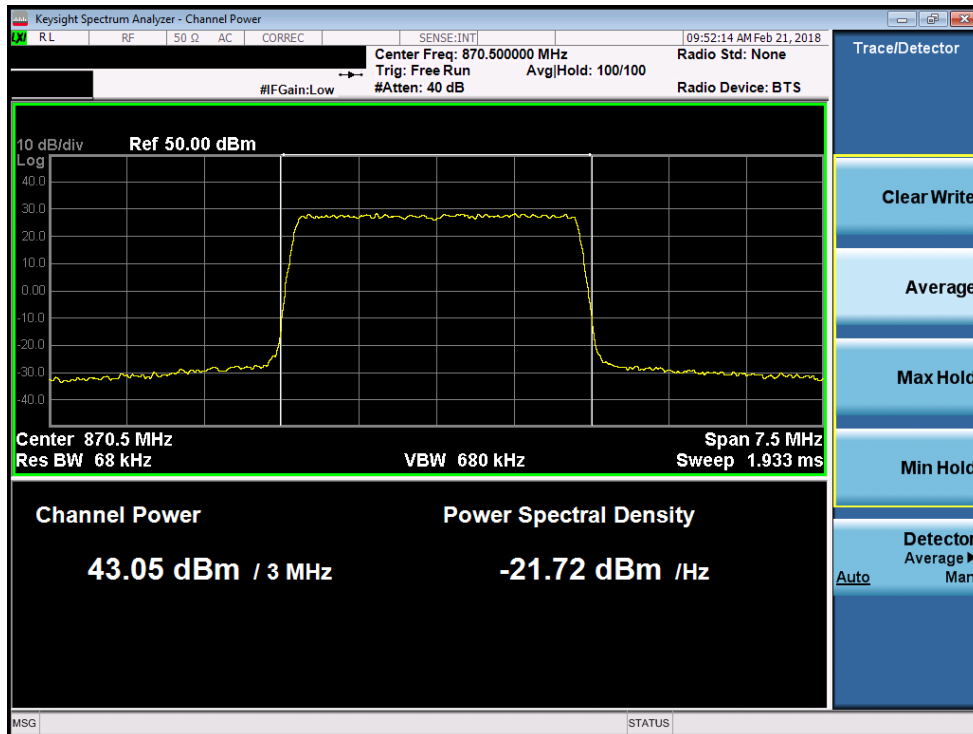


Plot 7-14. Maximum Conducted Power (Band 5 - 3.0MHz QPSK – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 21 of 175

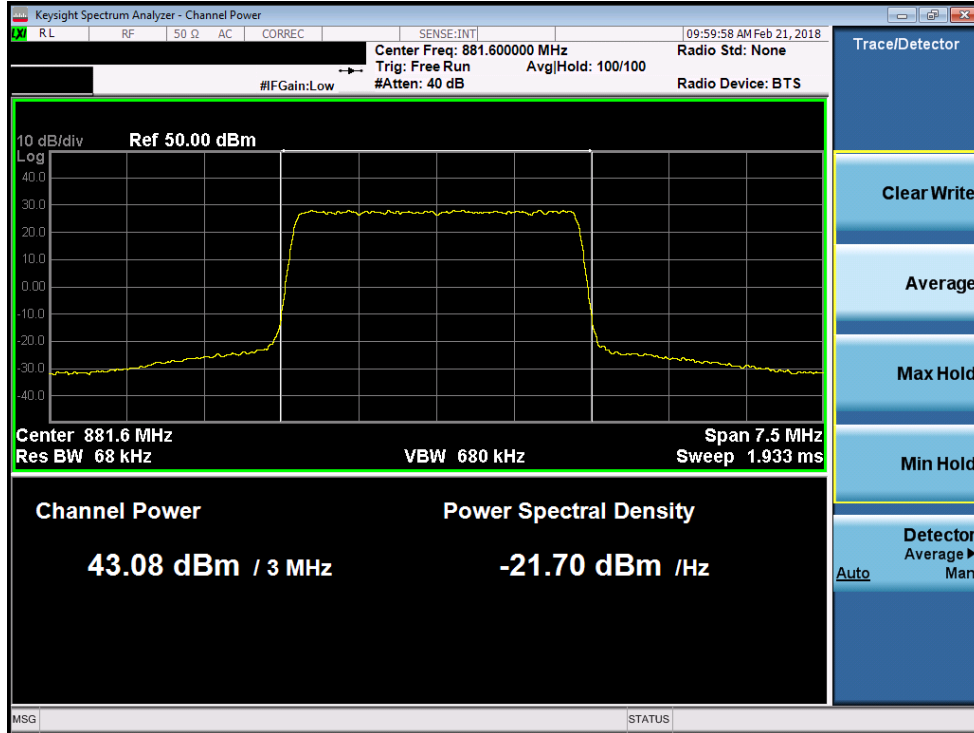


Plot 7-15. Maximum Conducted Power (Band 5 - 3.0MHz QPSK – High Channel)

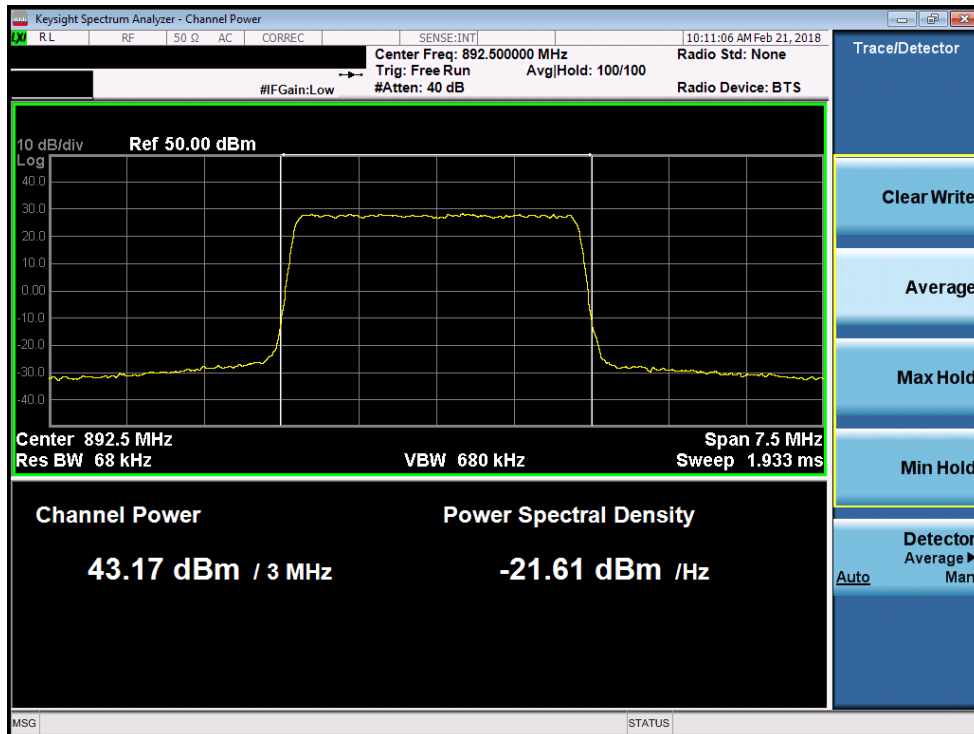


Plot 7-16. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 22 of 175

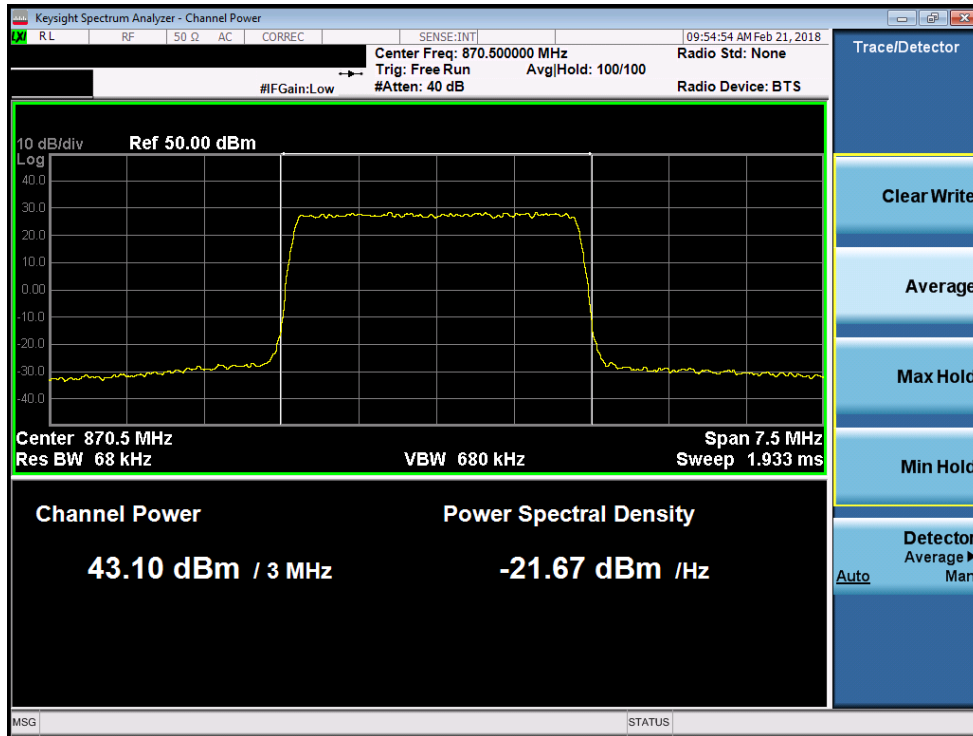


Plot 7-17. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM – Mid Channel)

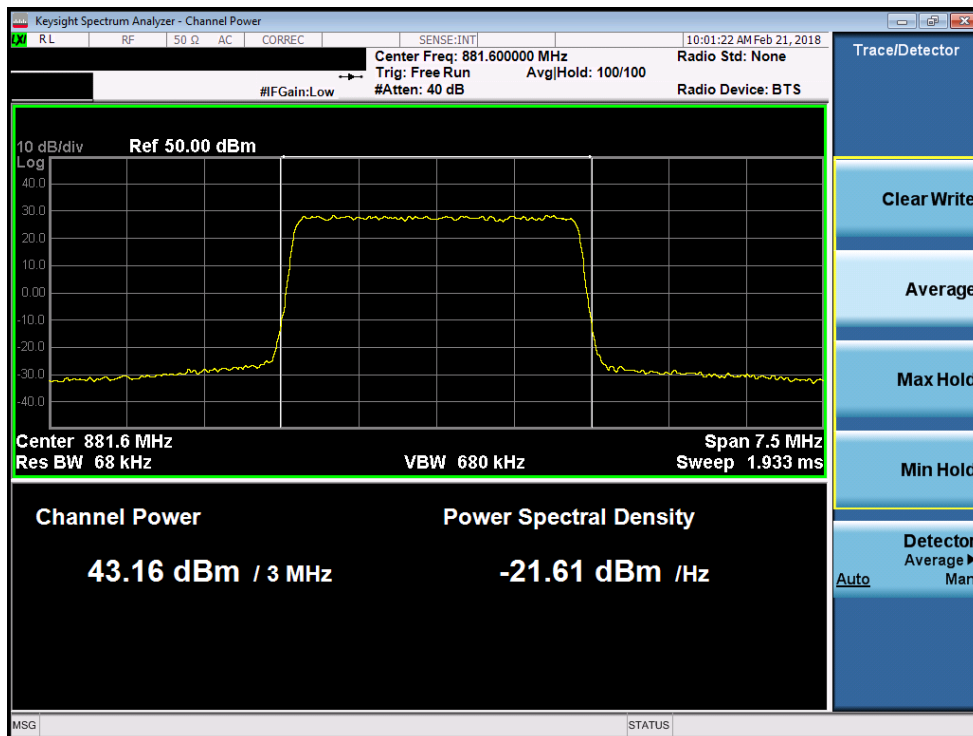


Plot 7-18. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 23 of 175

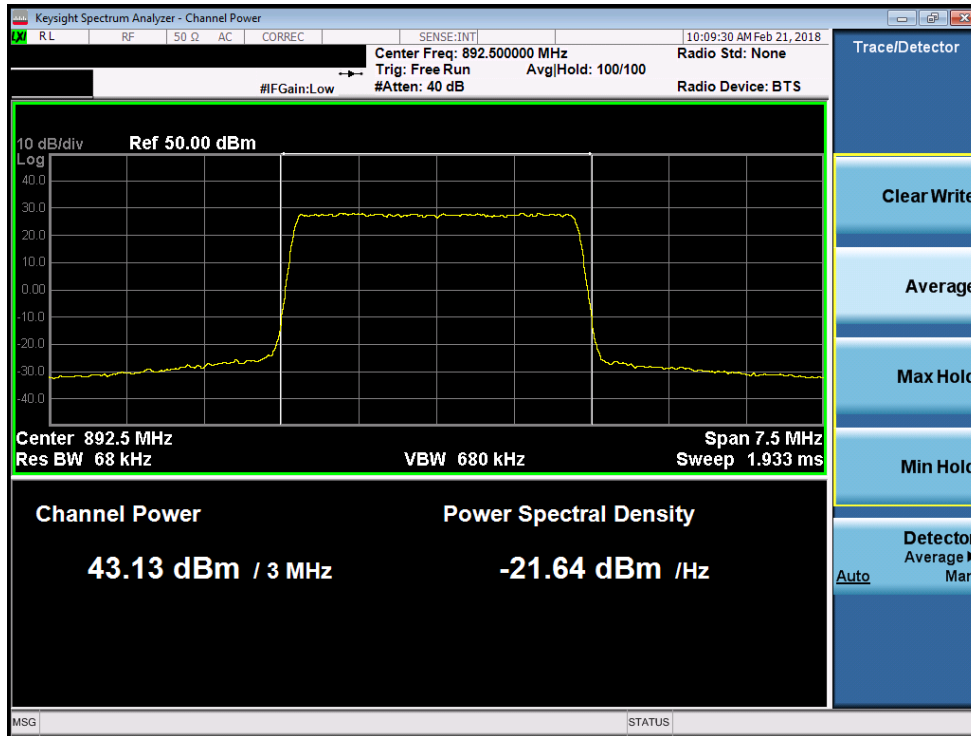


Plot 7-19. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM – Low Channel)

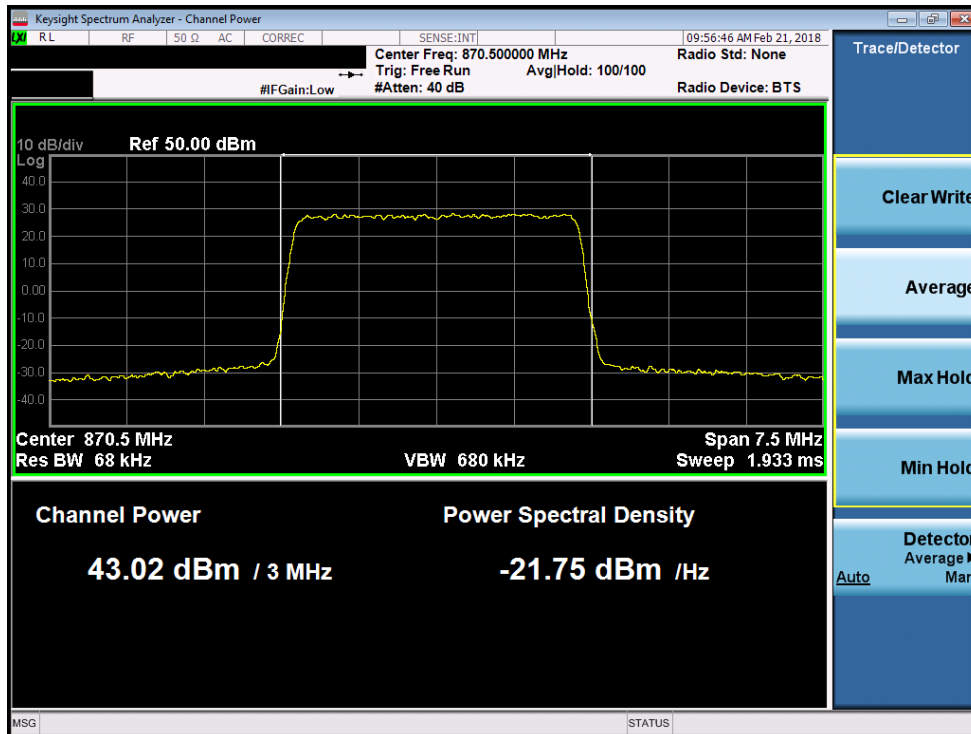


Plot 7-20. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 24 of 175

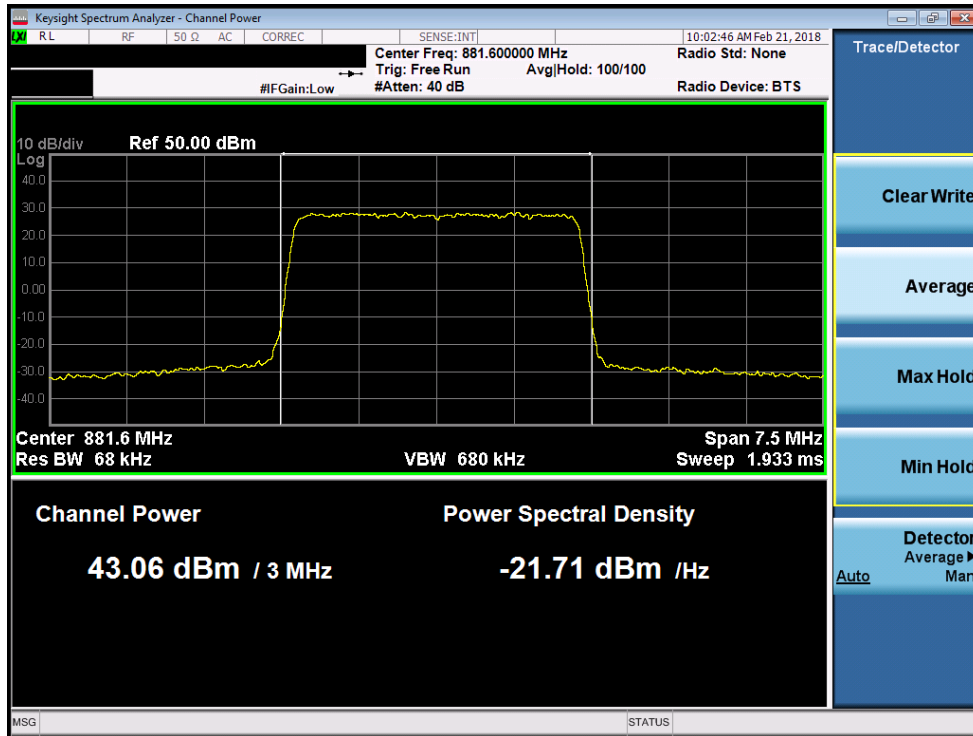


Plot 7-21. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM – High Channel)

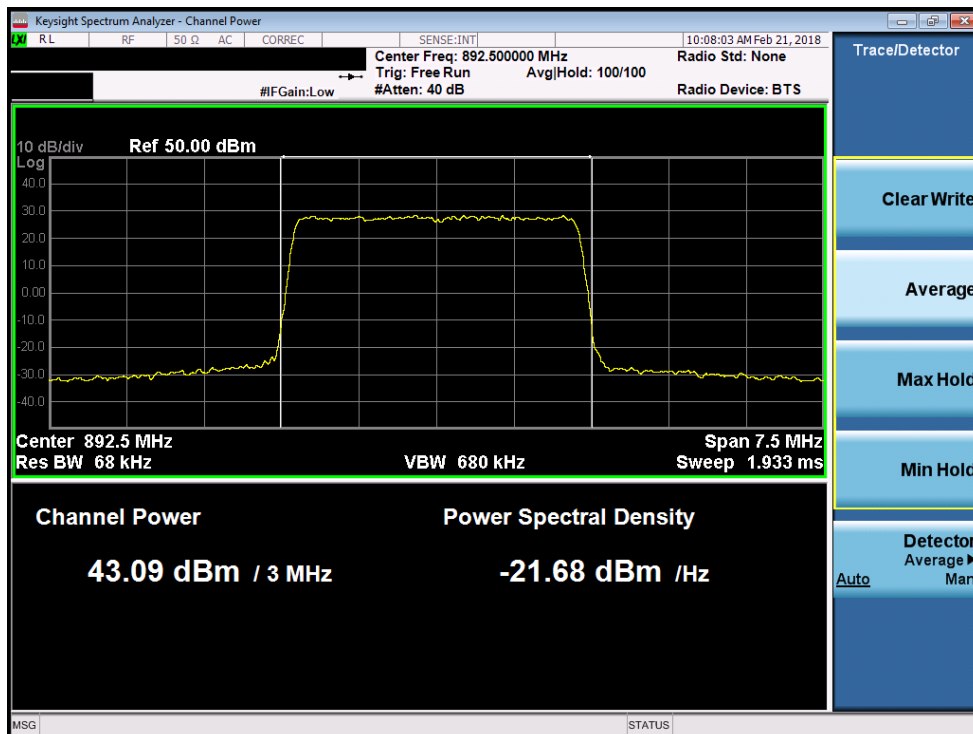


Plot 7-22. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 25 of 175

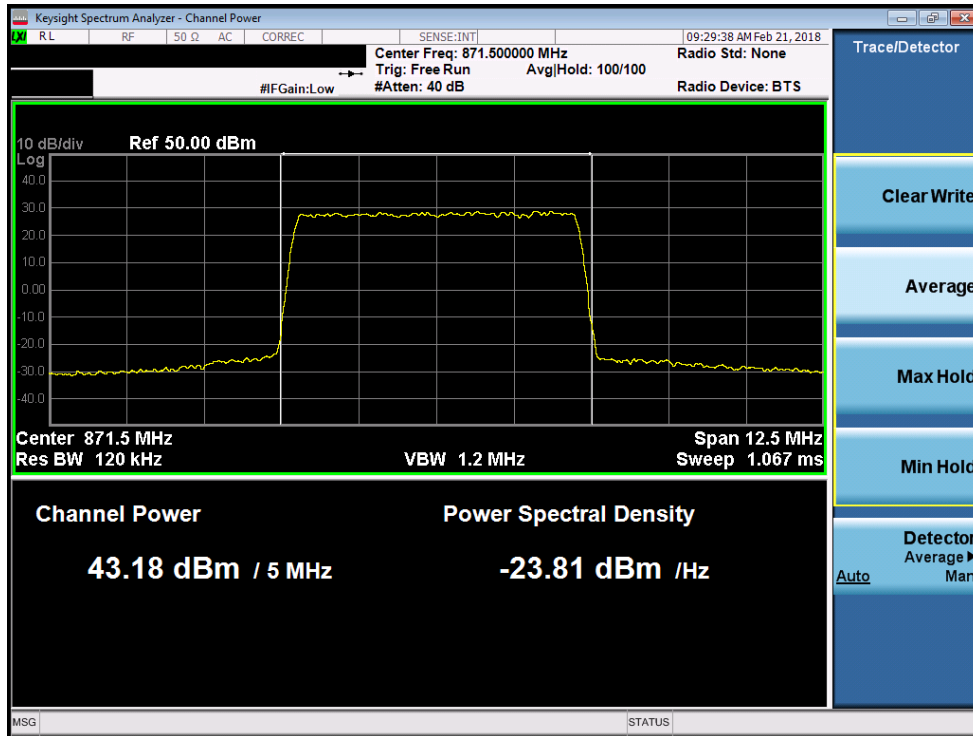


Plot 7-23. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM – Mid Channel)

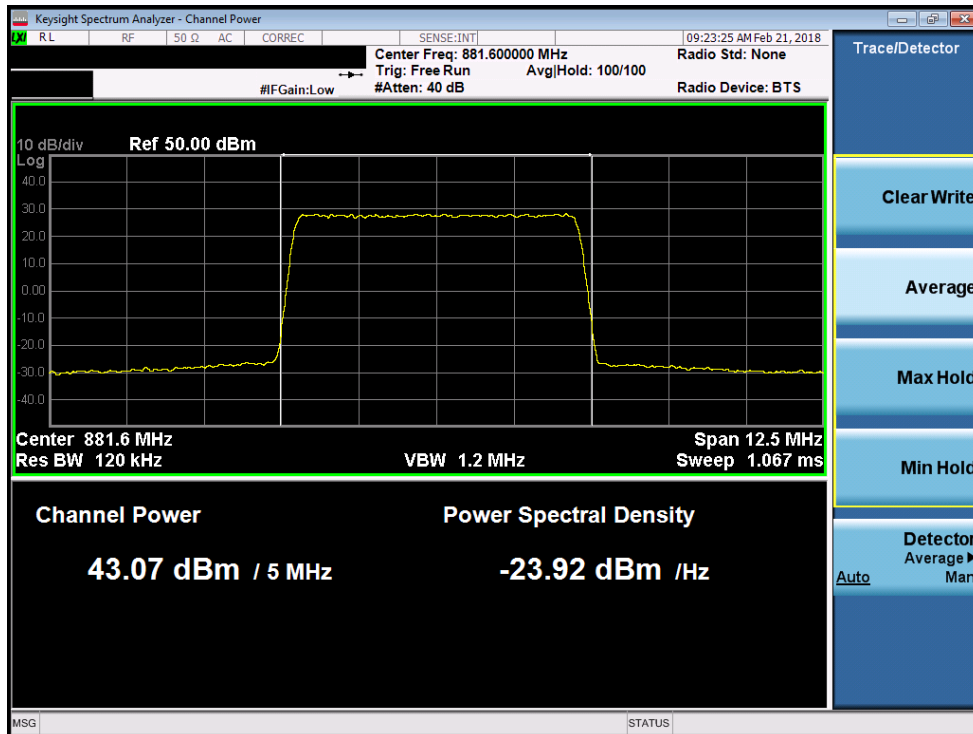


Plot 7-24. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 26 of 175

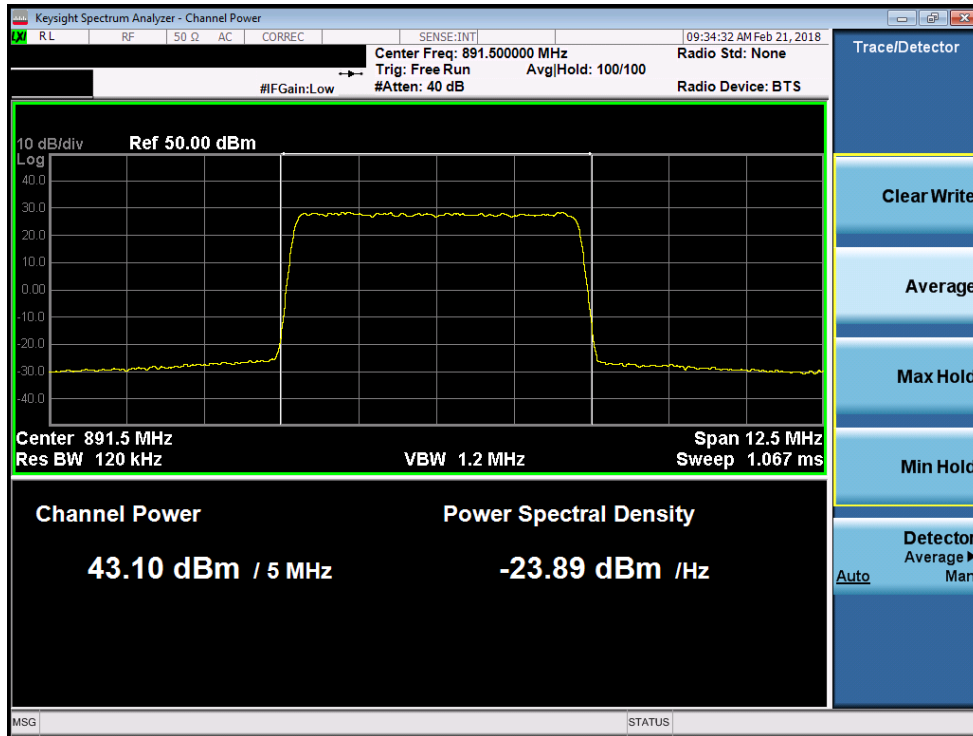


Plot 7-25. Maximum Conducted Power (Band 5 - 5.0MHz QPSK – Low Channel)

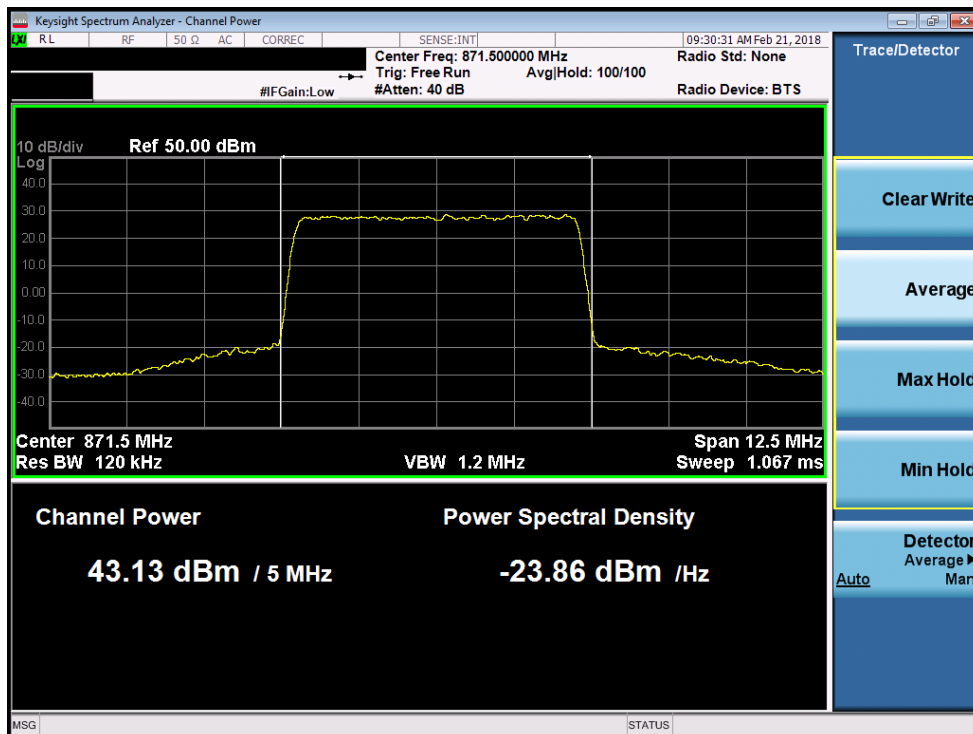


Plot 7-26. Maximum Conducted Power (Band 5 - 5.0MHz QPSK – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 27 of 175

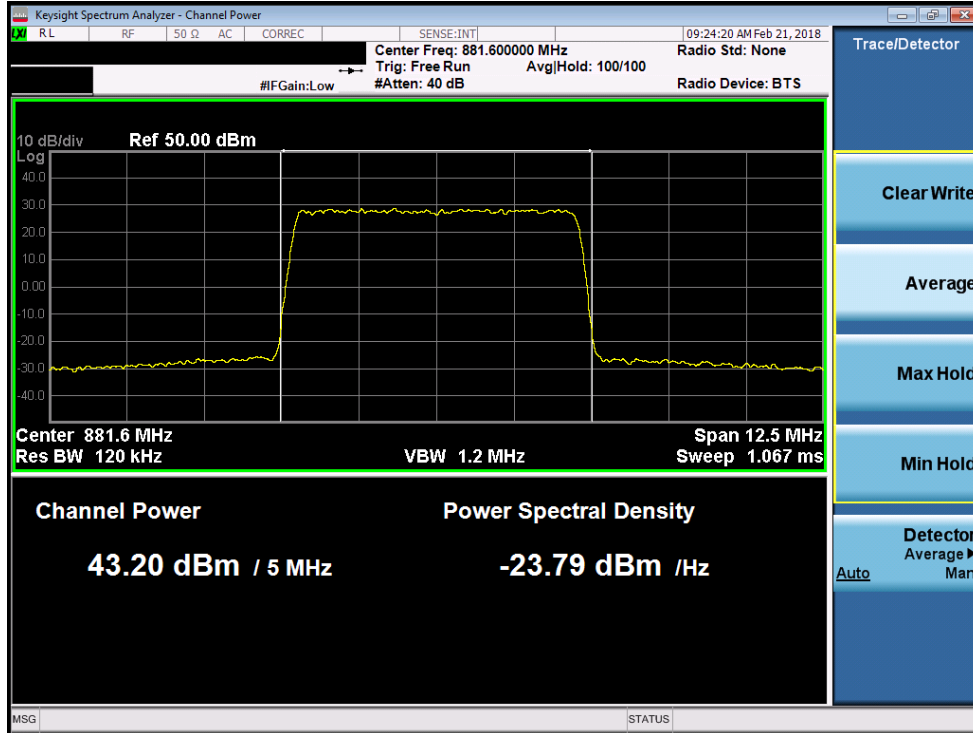


Plot 7-27. Maximum Conducted Power (Band 5 - 5.0MHz QPSK – High Channel)

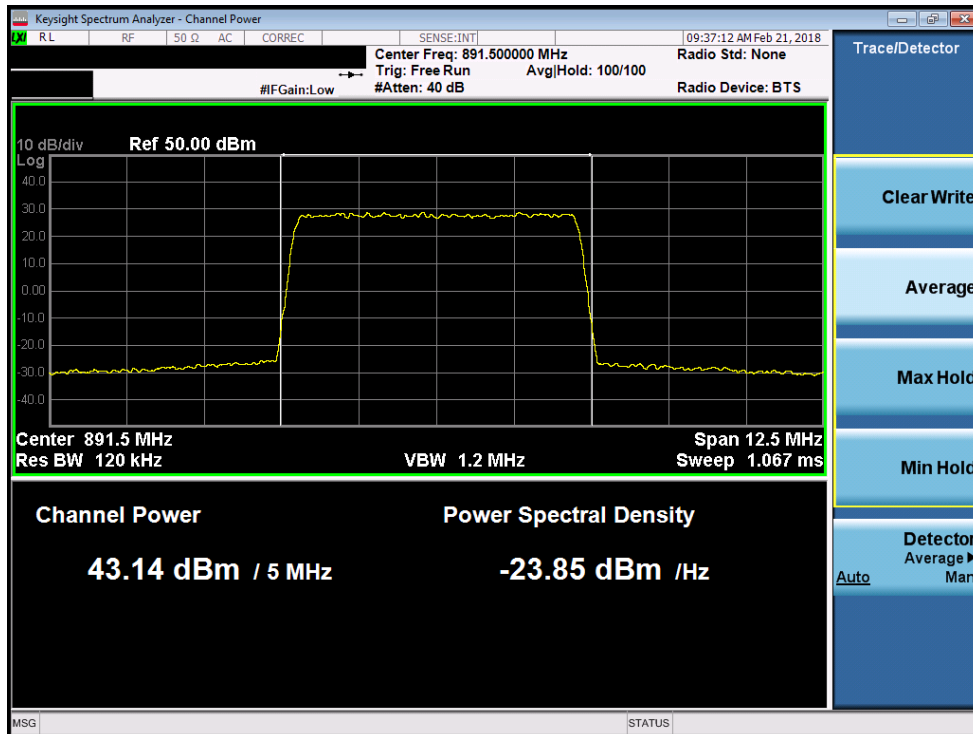


Plot 7-28. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 28 of 175

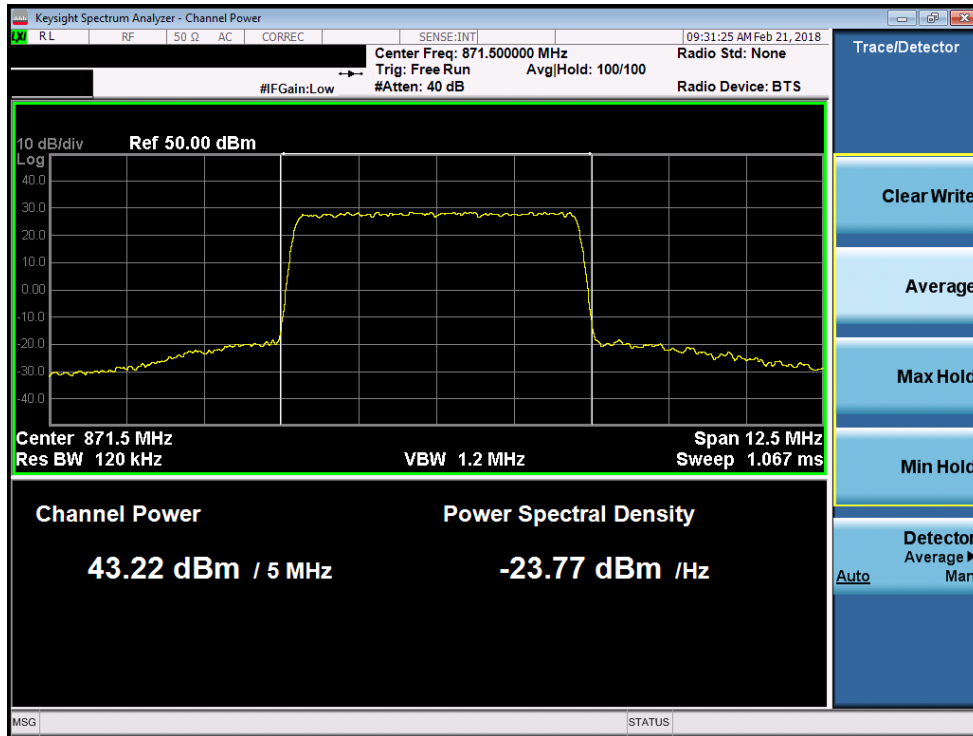


Plot 7-29. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM – Mid Channel)

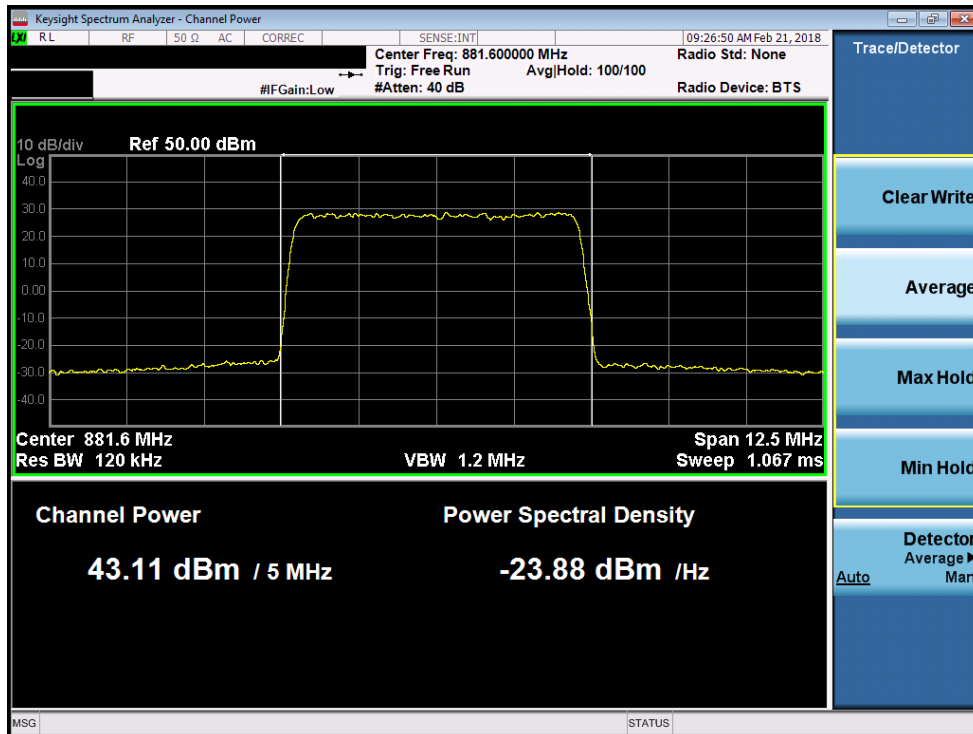


Plot 7-30. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 29 of 175

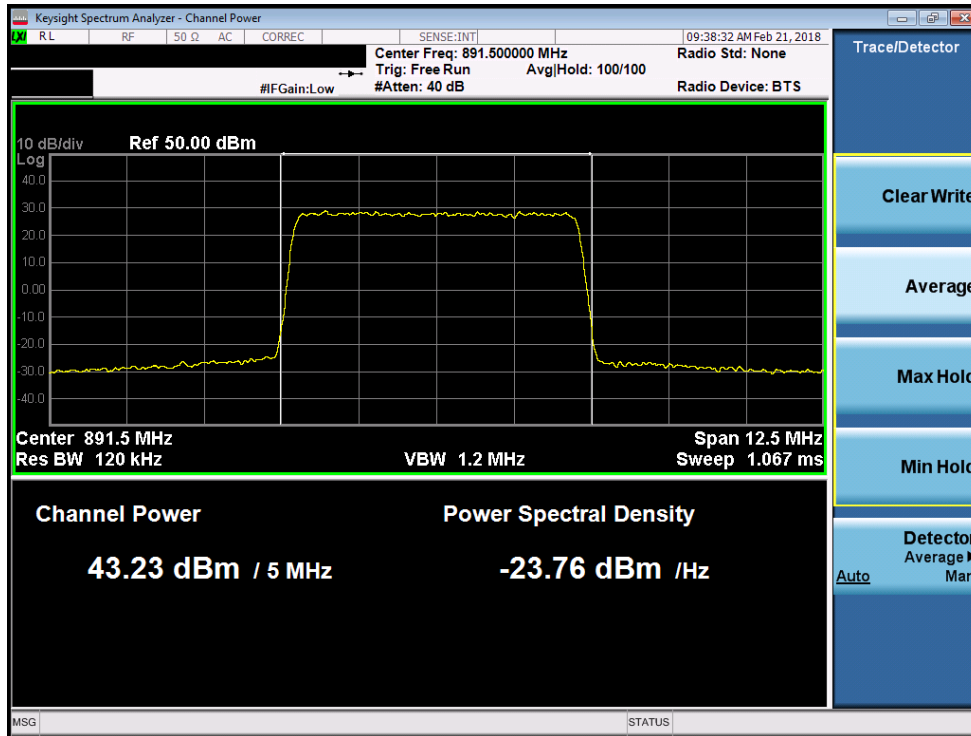


Plot 7-31. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM – Low Channel)

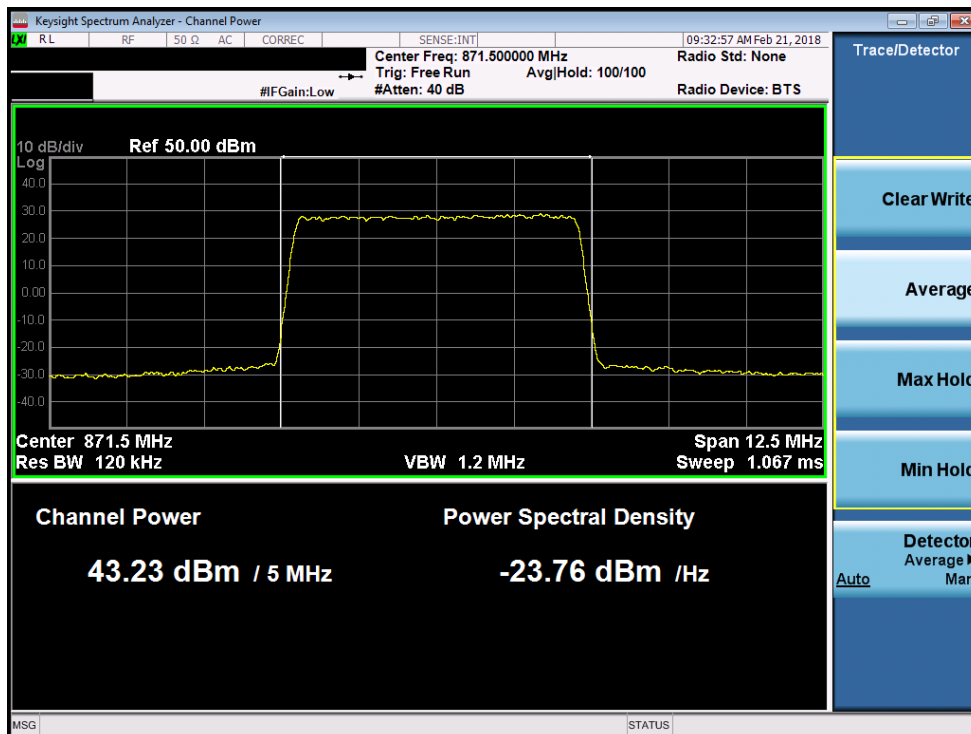


Plot 7-32. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 30 of 175

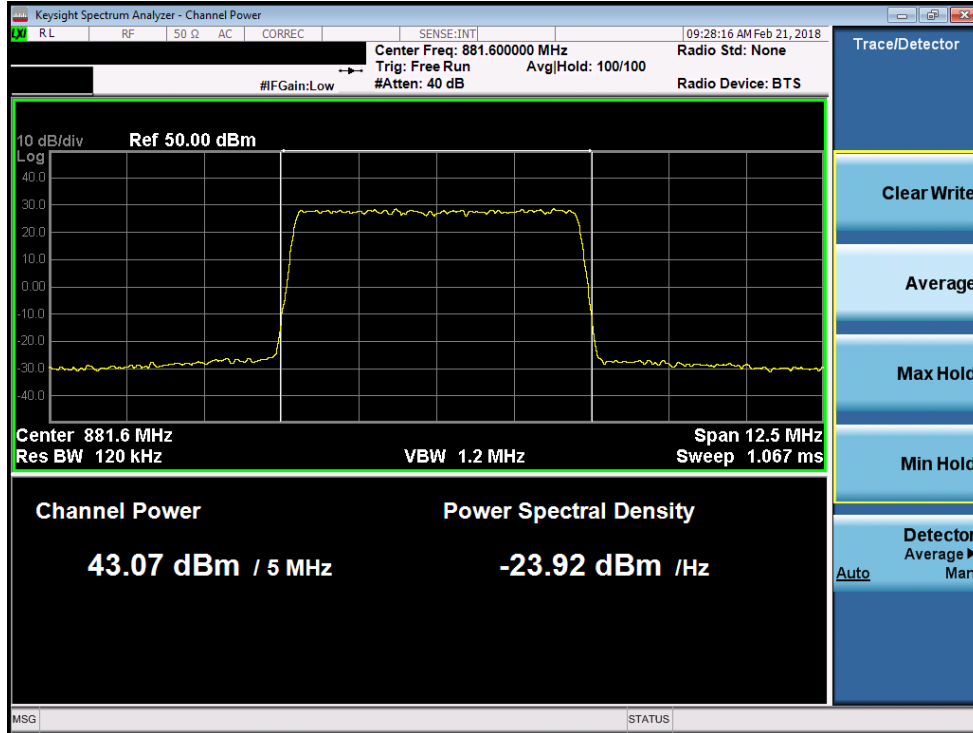


Plot 7-33. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM – High Channel)

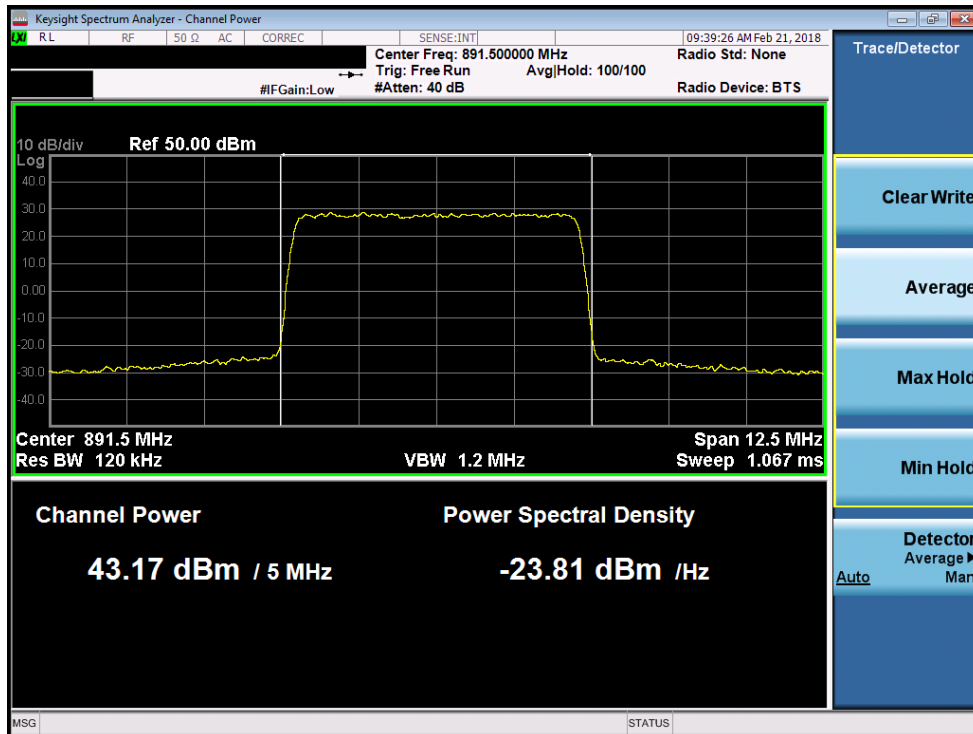


Plot 7-34. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM – Low Channel)

FCC ID: QLJ4GRFN-005			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head			Page 31 of 175

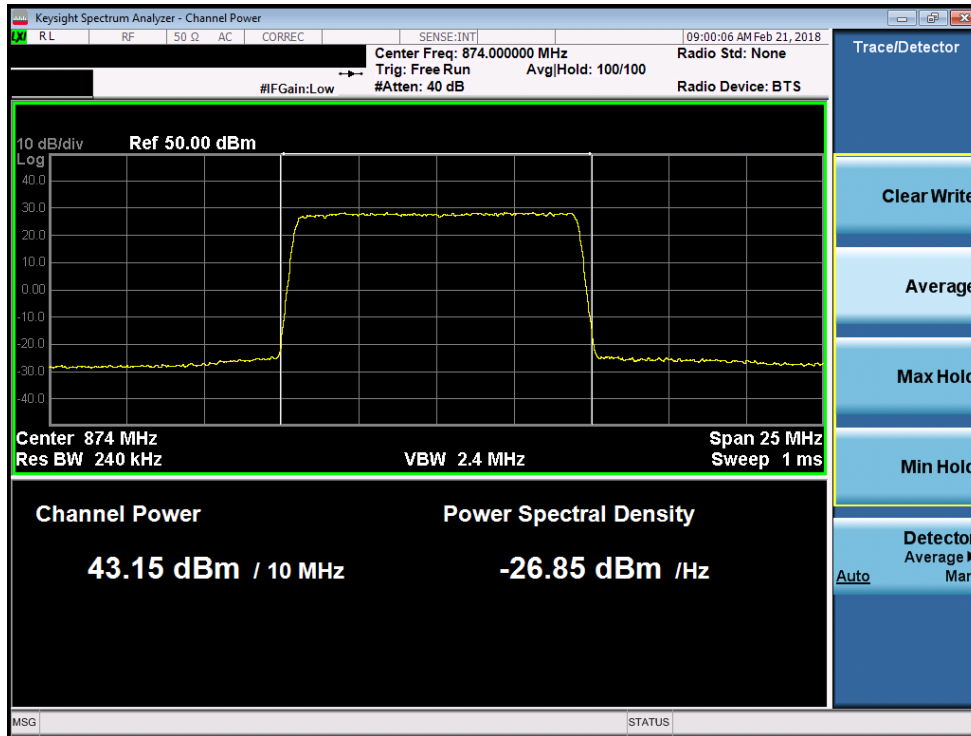


Plot 7-35. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM – Mid Channel)

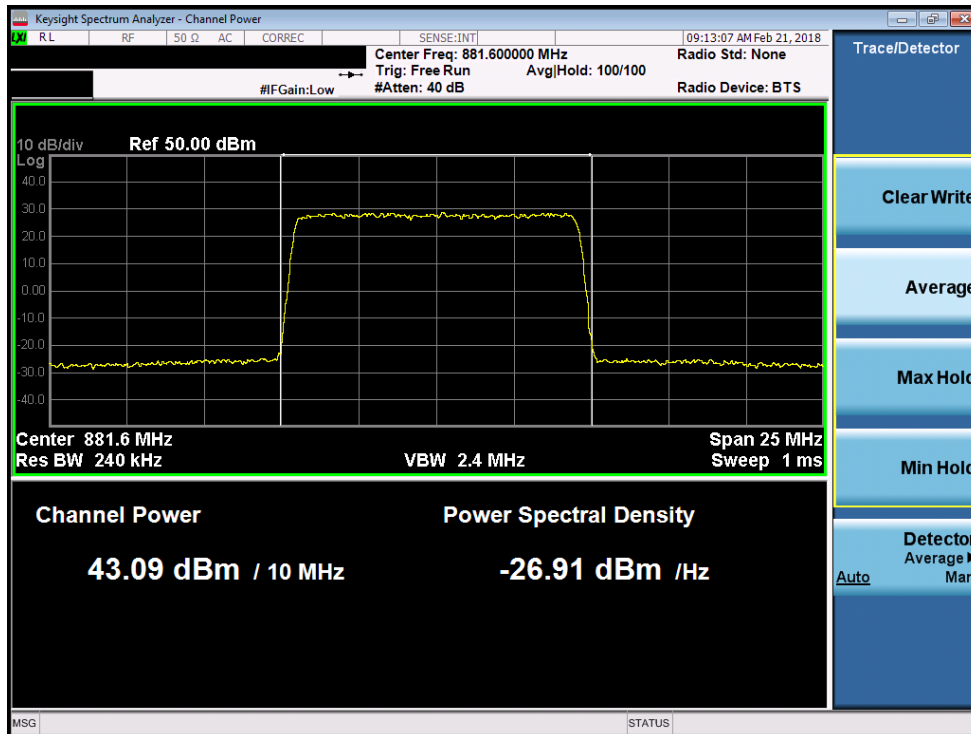


Plot 7-36. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 32 of 175

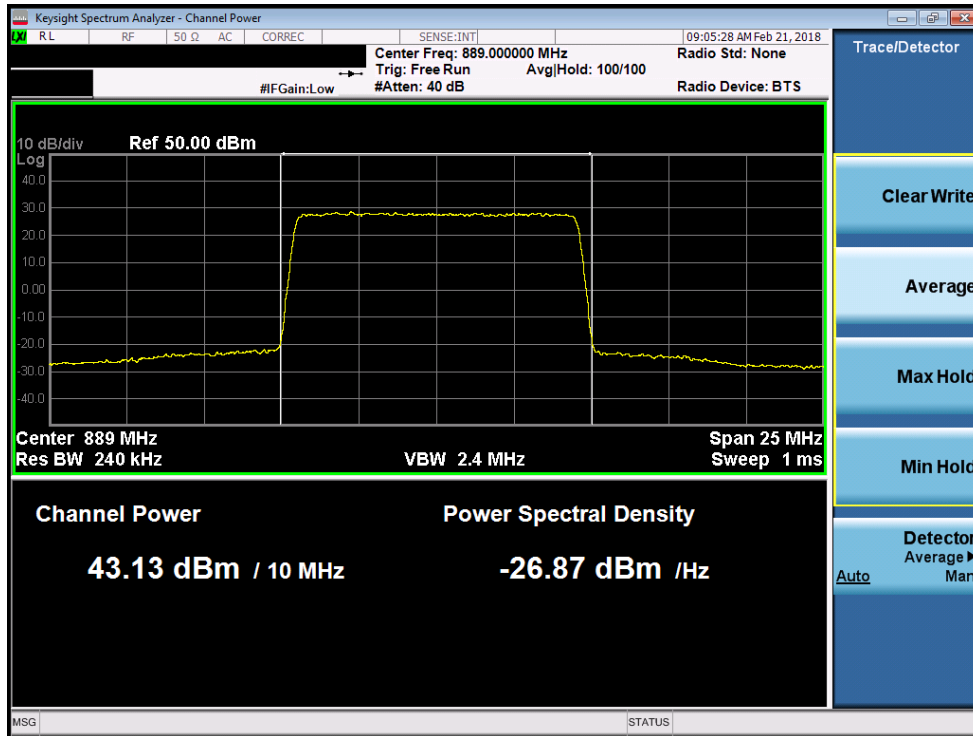


Plot 7-37. Maximum Conducted Power (Band 5 - 10.0MHz QPSK – Low Channel)

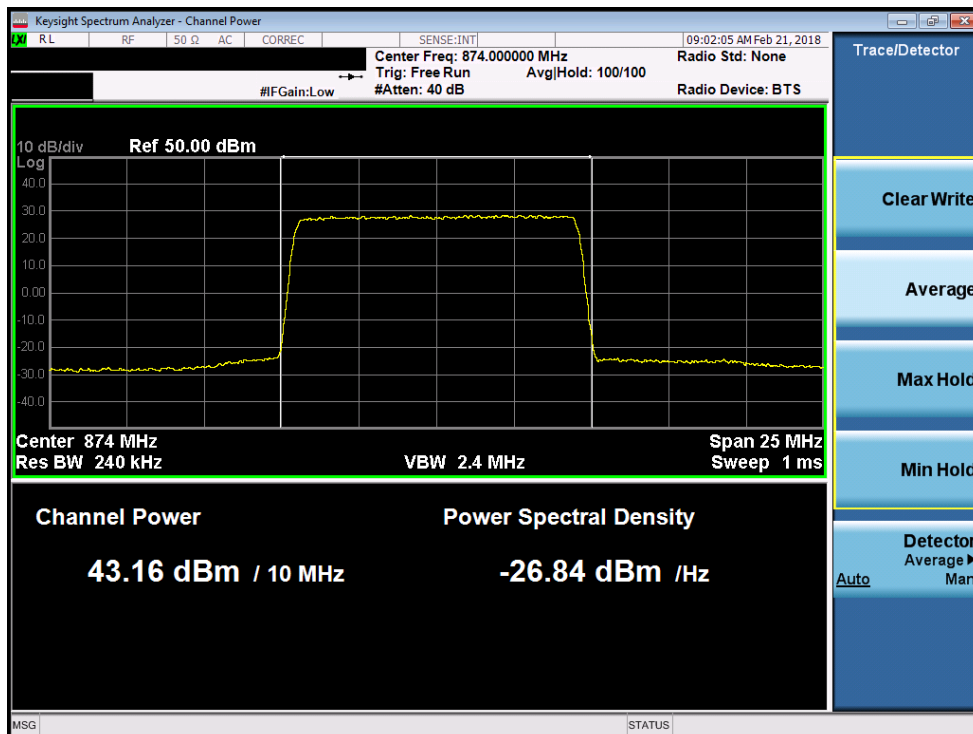


Plot 7-38. Maximum Conducted Power (Band 5 - 10.0MHz QPSK – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 33 of 175

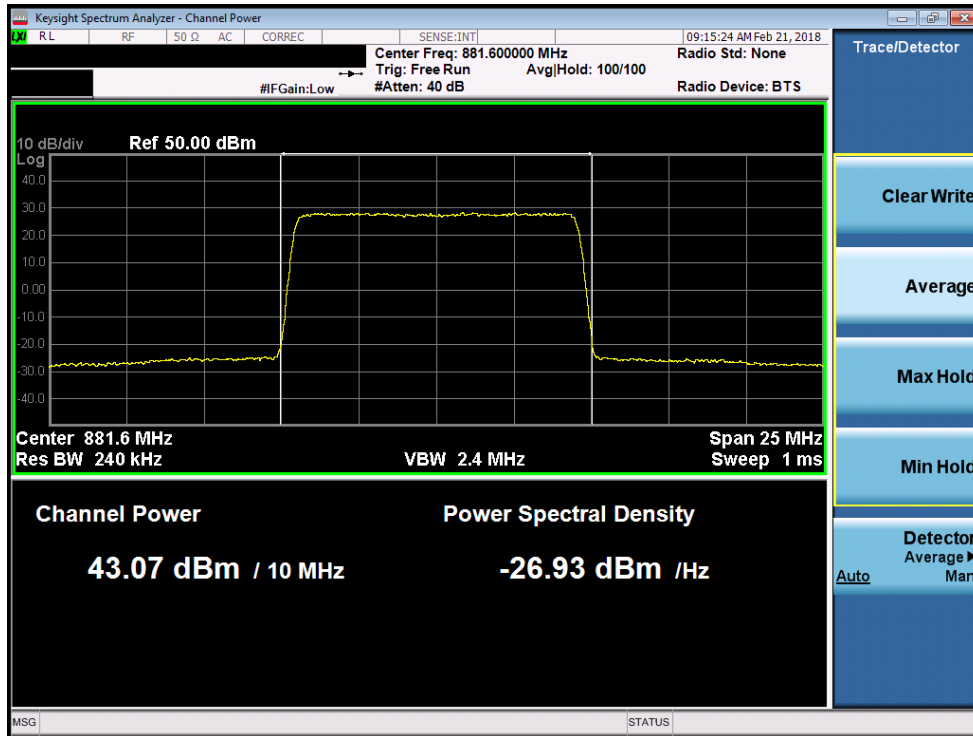


Plot 7-39. Maximum Conducted Power (Band 5 - 10.0MHz QPSK – High Channel)

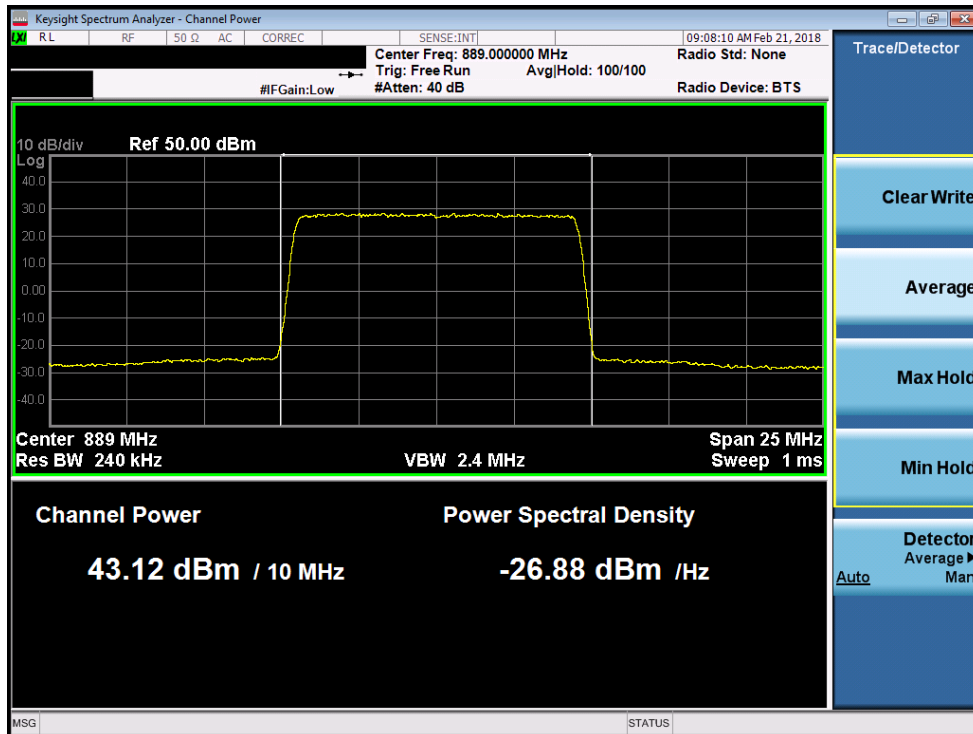


Plot 7-40. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 34 of 175

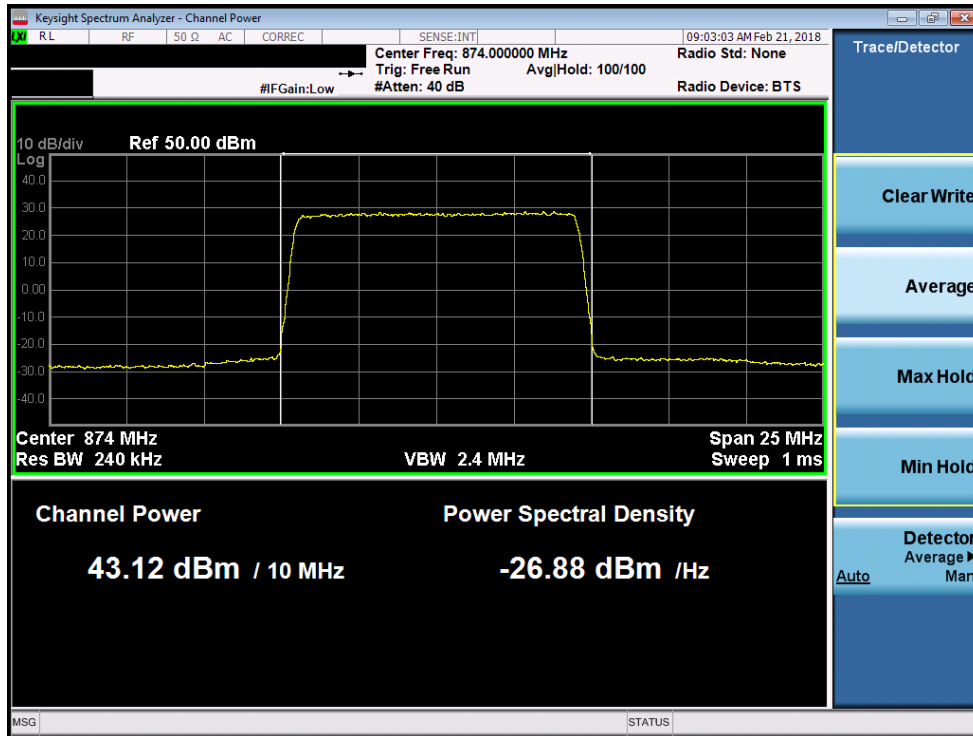


Plot 7-41. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM – Mid Channel)

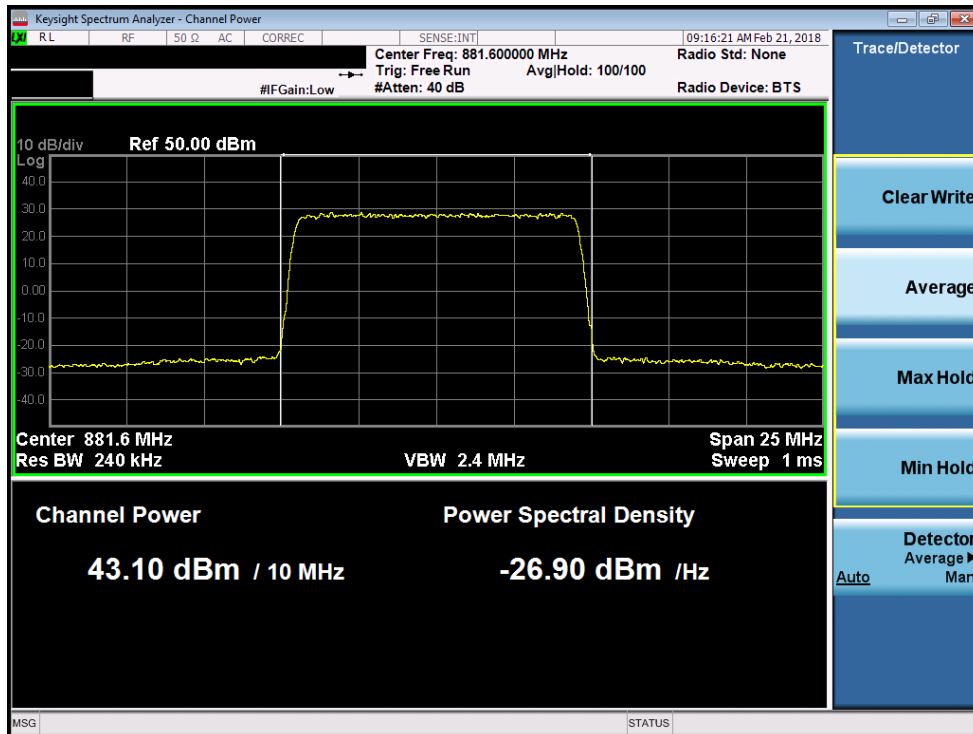


Plot 7-42. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 35 of 175

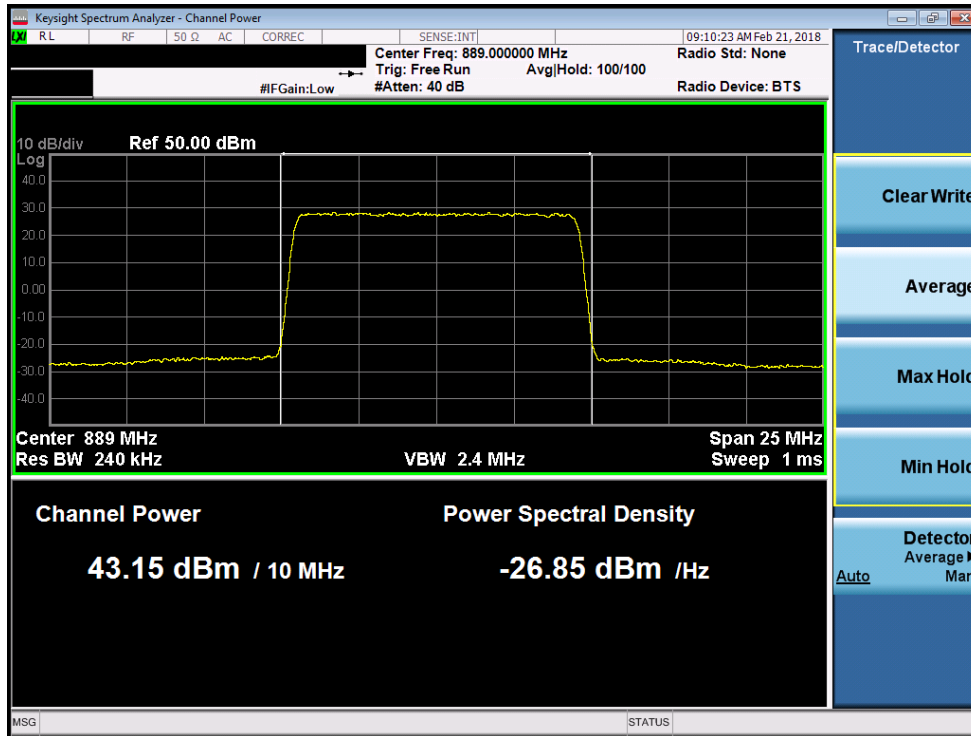


Plot 7-43. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM – Low Channel)

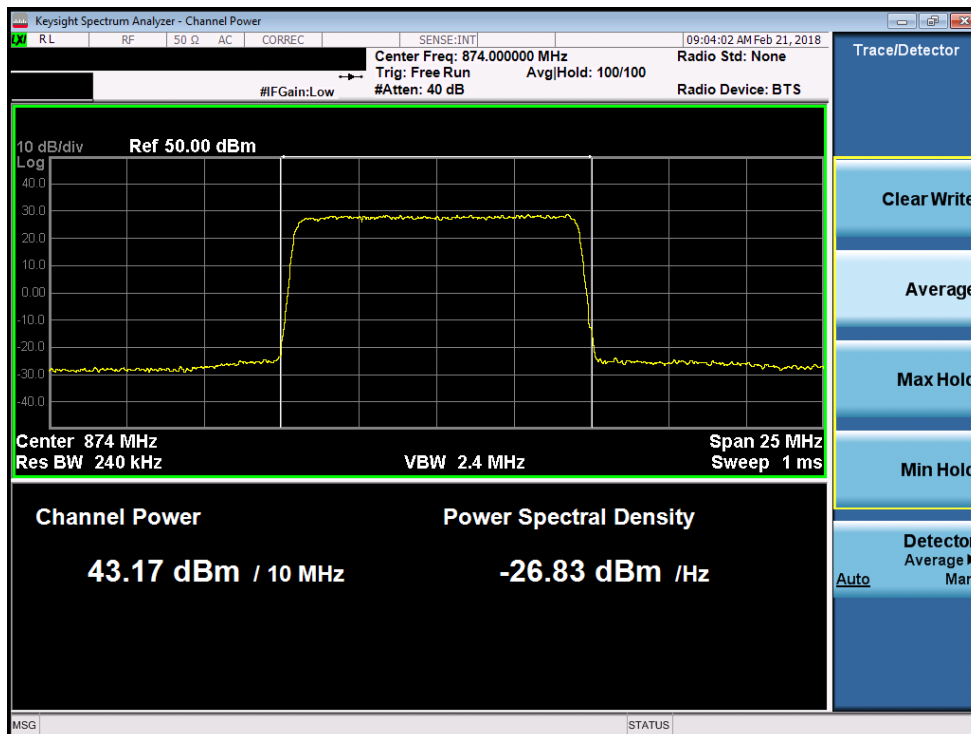


Plot 7-44. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 36 of 175

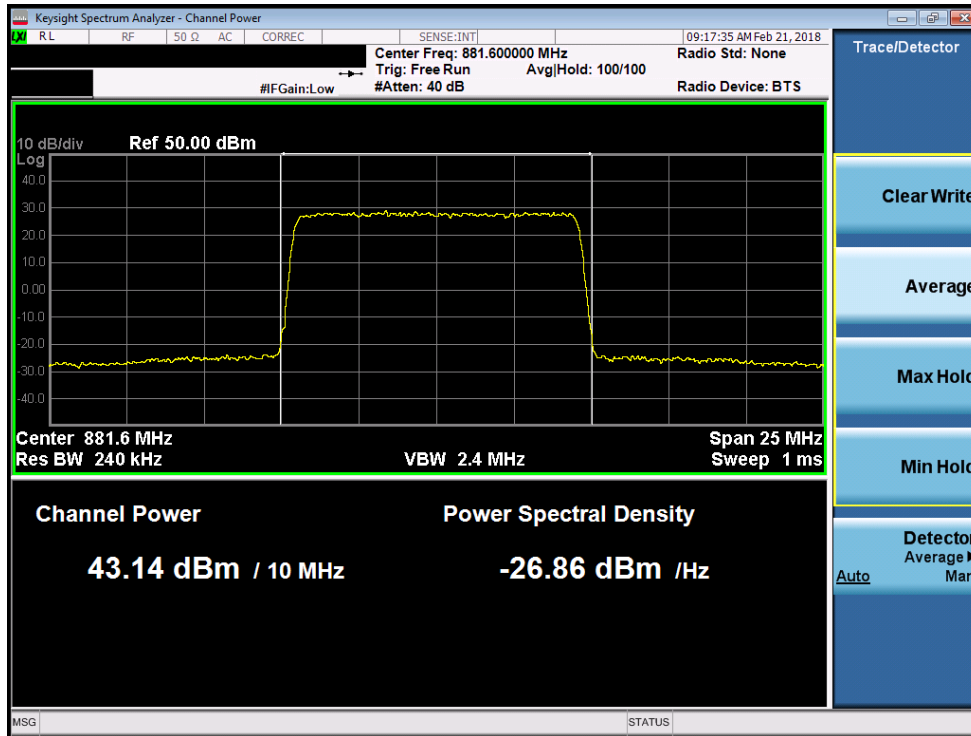


Plot 7-45. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM – High Channel)

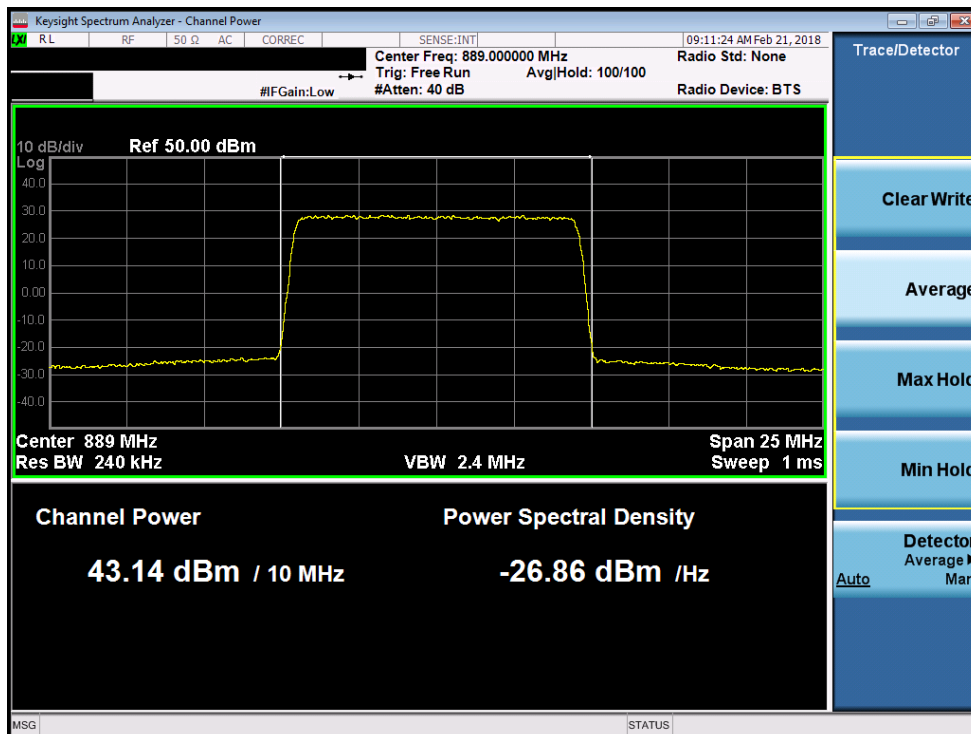


Plot 7-46. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM – Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 37 of 175



Plot 7-47. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM – Mid Channel)



Plot 7-48. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 38 of 175

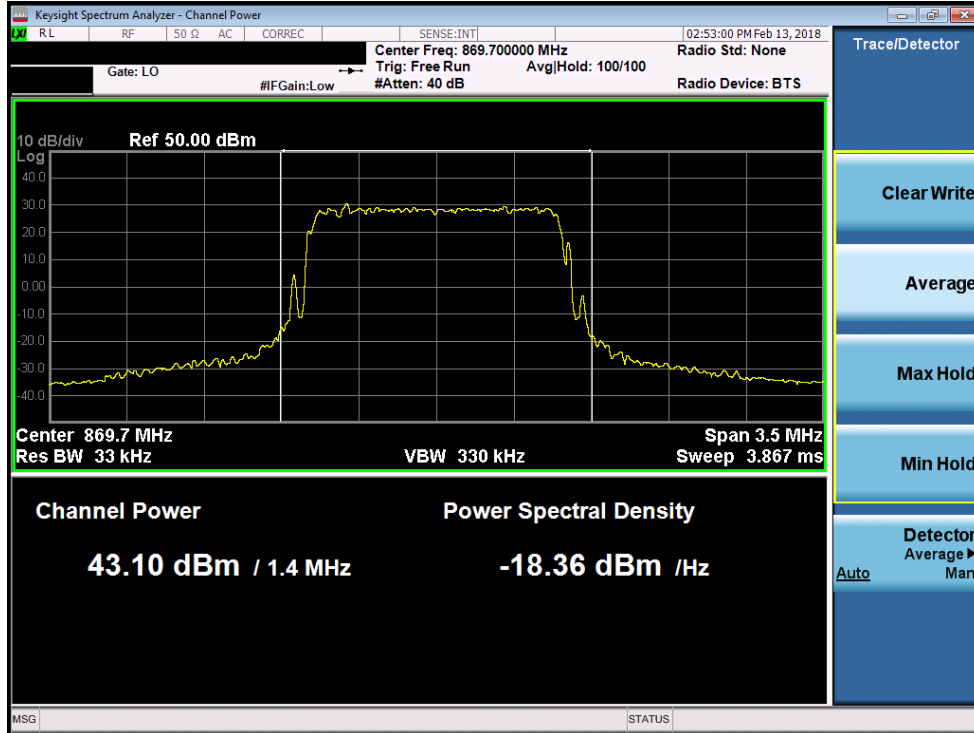
Antenna 2 Conducted Power Measurements

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Conducted Power [dBm]	Conducted Power [Watts]
869.70	1.4	QPSK	43.10	20.42
881.60	1.4	QPSK	43.15	20.65
893.30	1.4	QPSK	43.10	20.42
869.70	1.4	16-QAM	43.15	20.65
881.60	1.4	16-QAM	43.19	20.84
893.30	1.4	16-QAM	43.24	21.09
869.70	1.4	64-QAM	43.12	20.51
881.60	1.4	64-QAM	43.48	22.28
893.30	1.4	64-QAM	43.17	20.75
869.70	1.4	256-QAM	43.13	20.56
881.60	1.4	256-QAM	43.47	22.23
893.30	1.4	256-QAM	43.44	22.08
870.50	3	QPSK	43.17	20.75
881.60	3	QPSK	43.20	20.89
892.50	3	QPSK	43.05	20.18
870.50	3	16-QAM	43.09	20.37
881.60	3	16-QAM	43.20	20.89
892.50	3	16-QAM	43.02	20.04
870.50	3	64-QAM	43.06	20.23
881.60	3	64-QAM	43.37	21.73
892.50	3	64-QAM	43.29	21.33
870.50	3	256-QAM	43.09	20.37
881.60	3	256-QAM	43.38	21.78
892.50	3	256-QAM	43.08	20.32

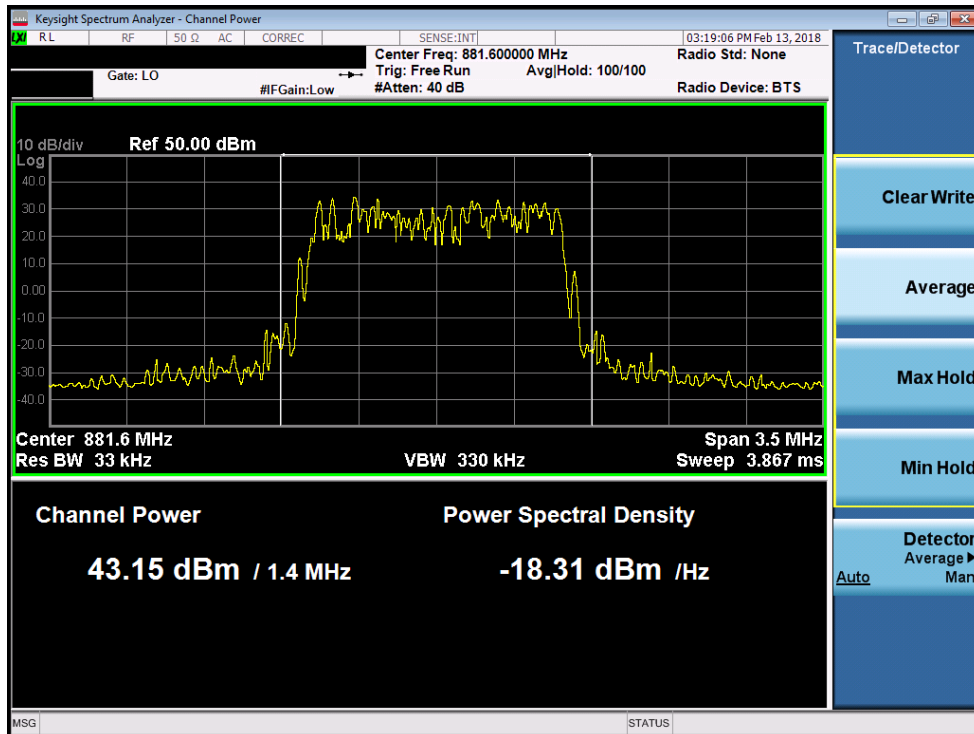
Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Conducted Power [dBm]	Conducted Power [Watts]
871.50	5	QPSK	43.22	20.99
881.60	5	QPSK	43.34	21.58
891.50	5	QPSK	43.25	21.13
871.50	5	16-QAM	43.30	21.38
881.60	5	16-QAM	43.33	21.53
891.50	5	16-QAM	43.02	20.04
871.50	5	64-QAM	43.08	20.32
881.60	5	64-QAM	43.24	21.09
891.50	5	64-QAM	43.11	20.46
871.50	5	256-QAM	43.19	20.84
881.60	5	256-QAM	43.49	22.34
891.50	5	256-QAM	43.75	23.71
874.00	10	QPSK	43.20	20.89
881.60	10	QPSK	43.18	20.80
889.00	10	QPSK	43.06	20.23
874.00	10	16-QAM	43.16	20.70
881.60	10	16-QAM	43.02	20.04
889.00	10	16-QAM	43.24	21.09
874.00	10	64-QAM	43.36	21.68
881.60	10	64-QAM	43.18	20.80
889.00	10	64-QAM	43.03	20.09
874.00	10	256-QAM	43.17	20.75
881.60	10	256-QAM	43.27	21.23
889.00	10	256-QAM	43.11	20.46

Table 7-2. Maximum Average Conducted Power

FCC ID: QLJ4GRFN-005	 MEASUREMENT REPORT (CERTIFICATION)			Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 39 of 175	

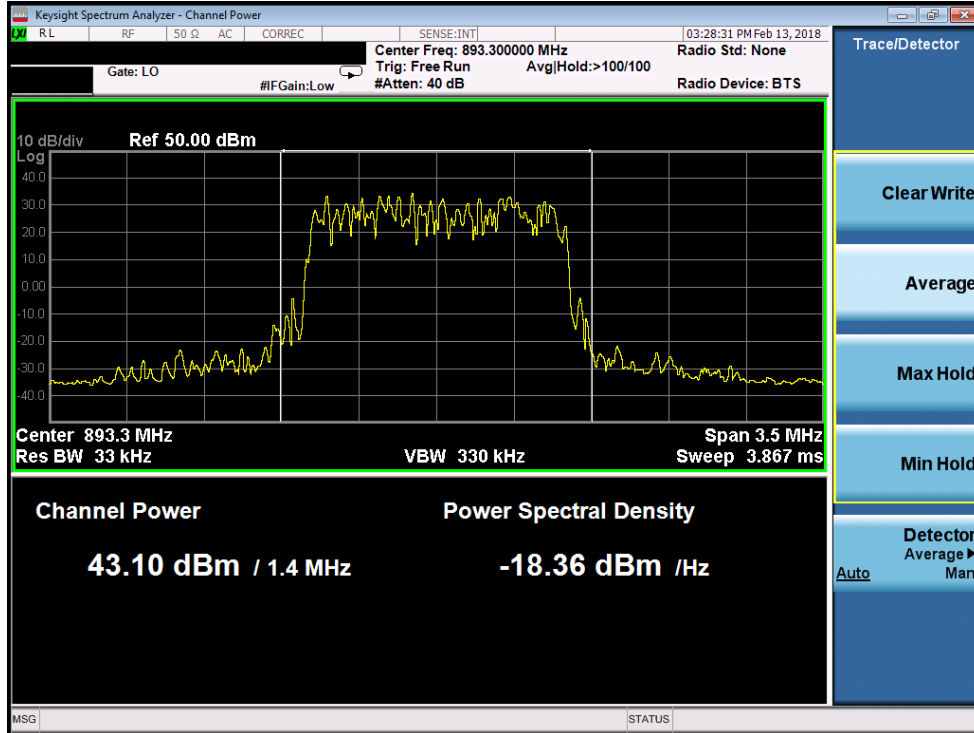


Plot 7-49. Maximum Conducted Power (Band 5 - 1.4MHz QPSK - Low Channel)

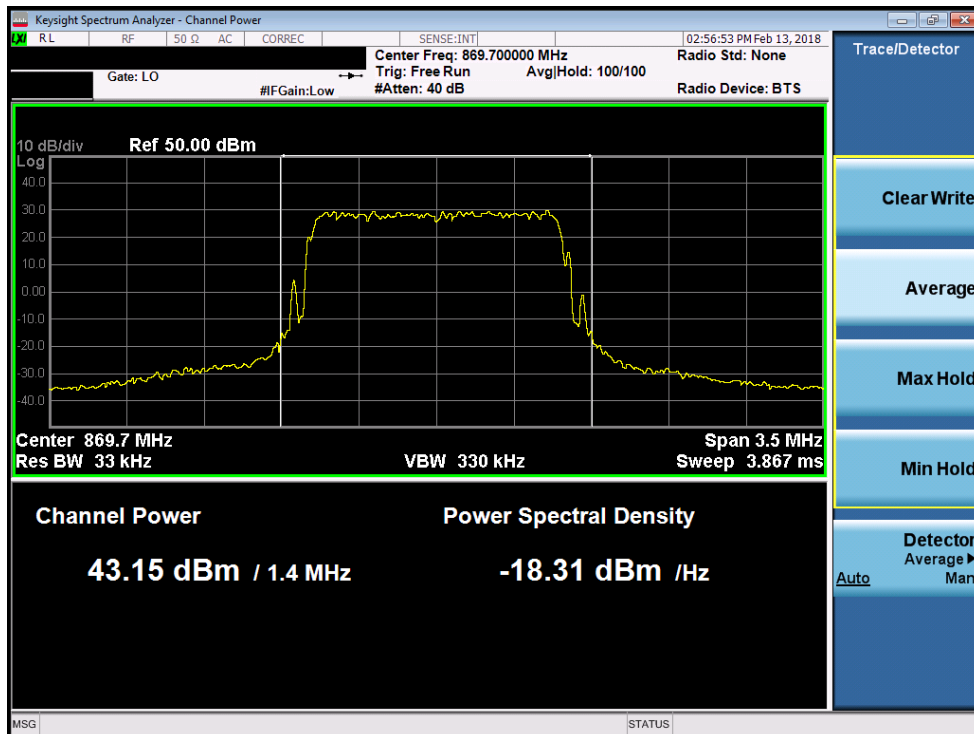


Plot 7-50. Maximum Conducted Power (Band 5 - 1.4MHz QPSK - Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 40 of 175

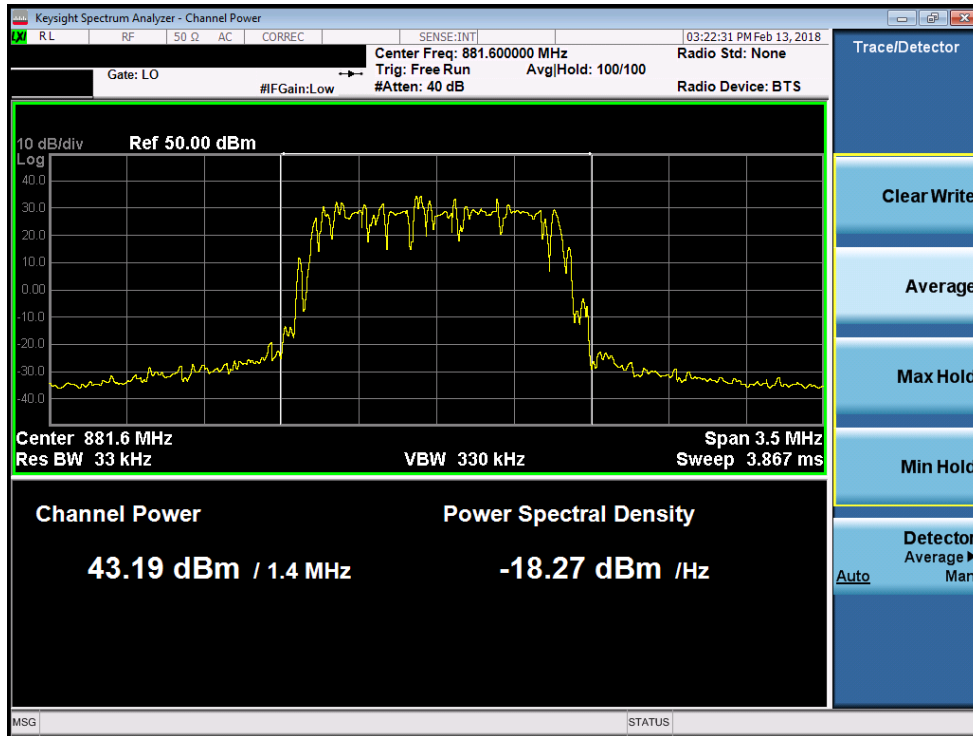


Plot 7-51. Maximum Conducted Power (Band 5 - 1.4MHz QPSK – High Channel)

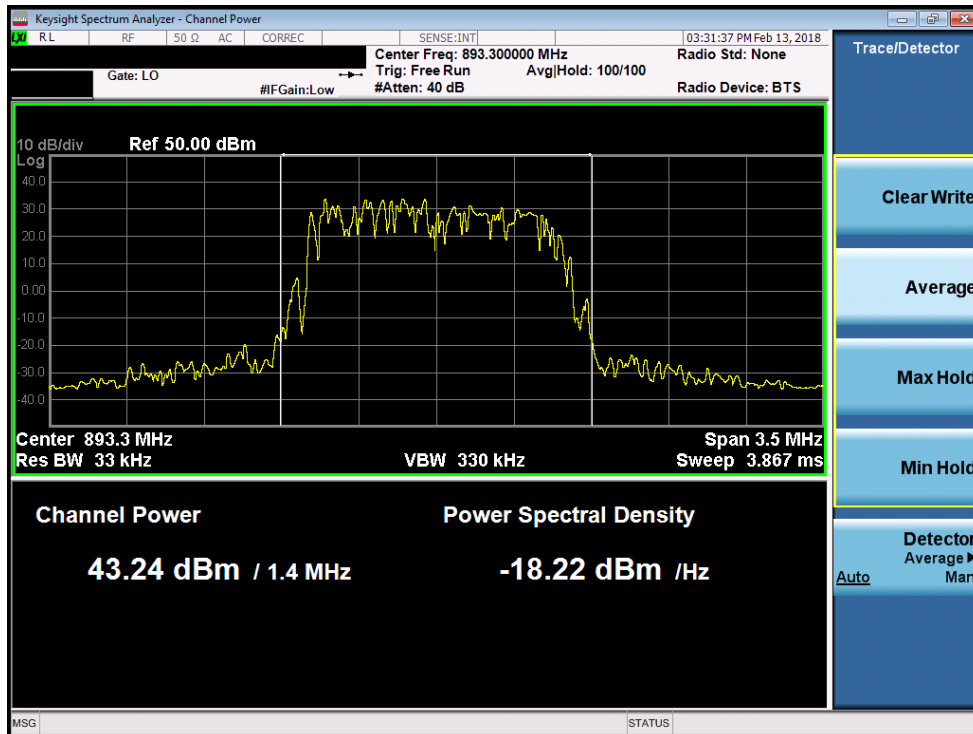


Plot 7-52. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 41 of 175

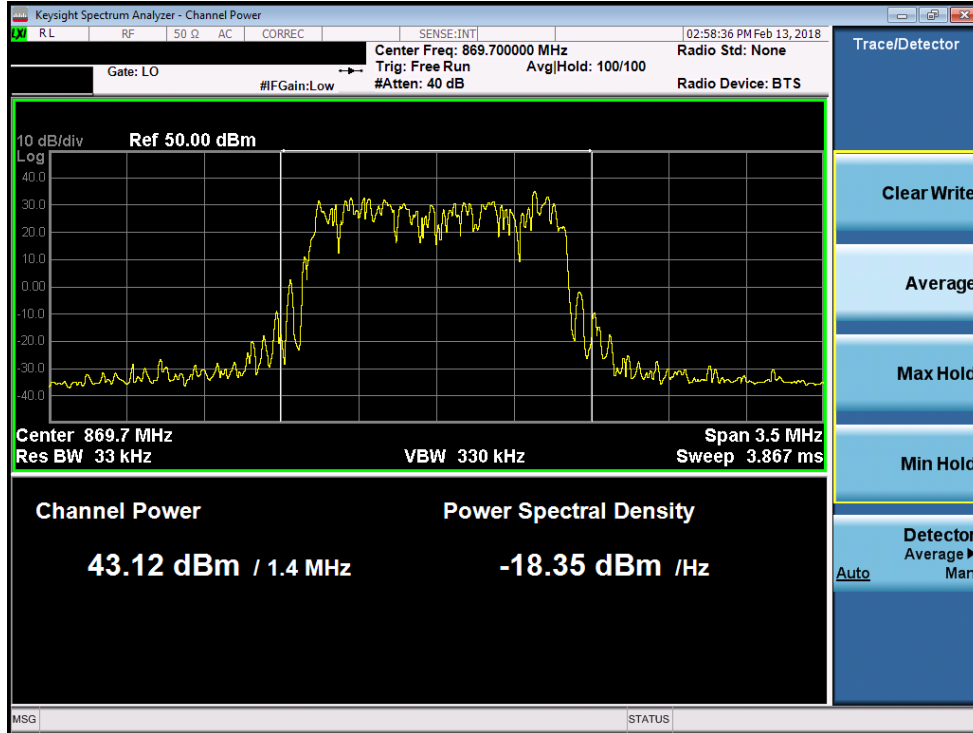


Plot 7-53. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM – Mid Channel)

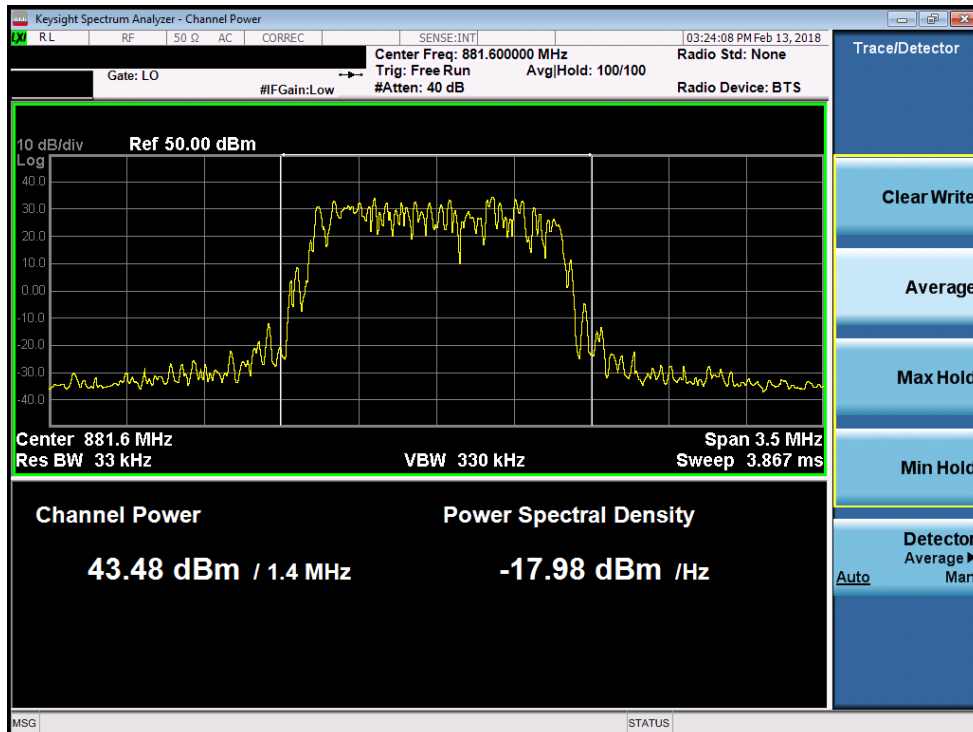


Plot 7-54. Maximum Conducted Power (Band 5 - 1.4MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 42 of 175

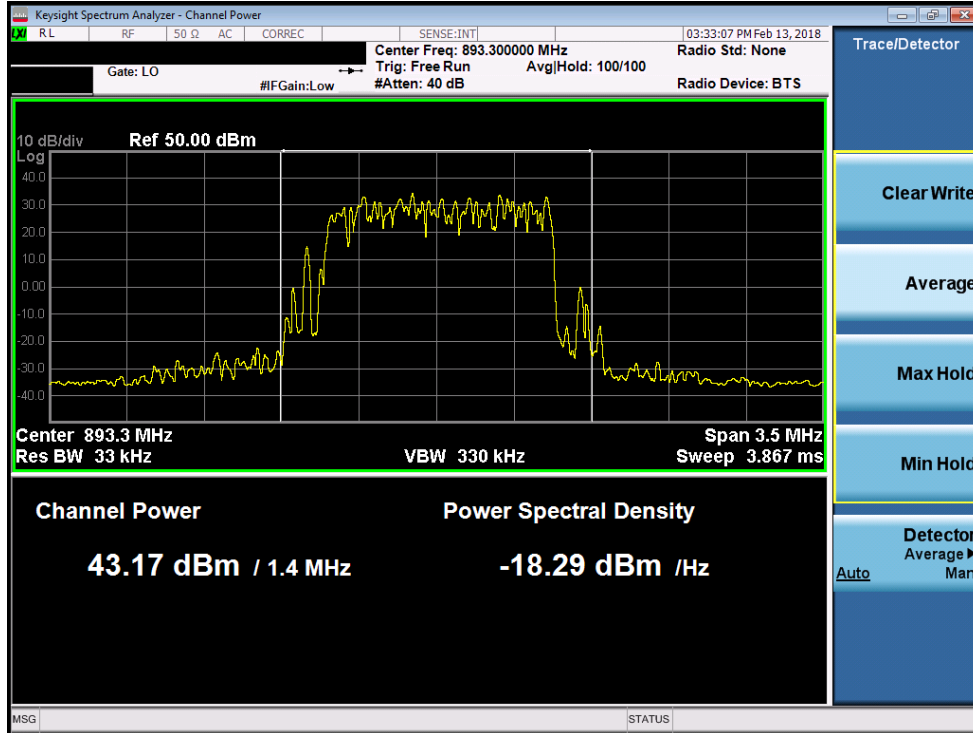


Plot 7-55. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM - Low Channel)

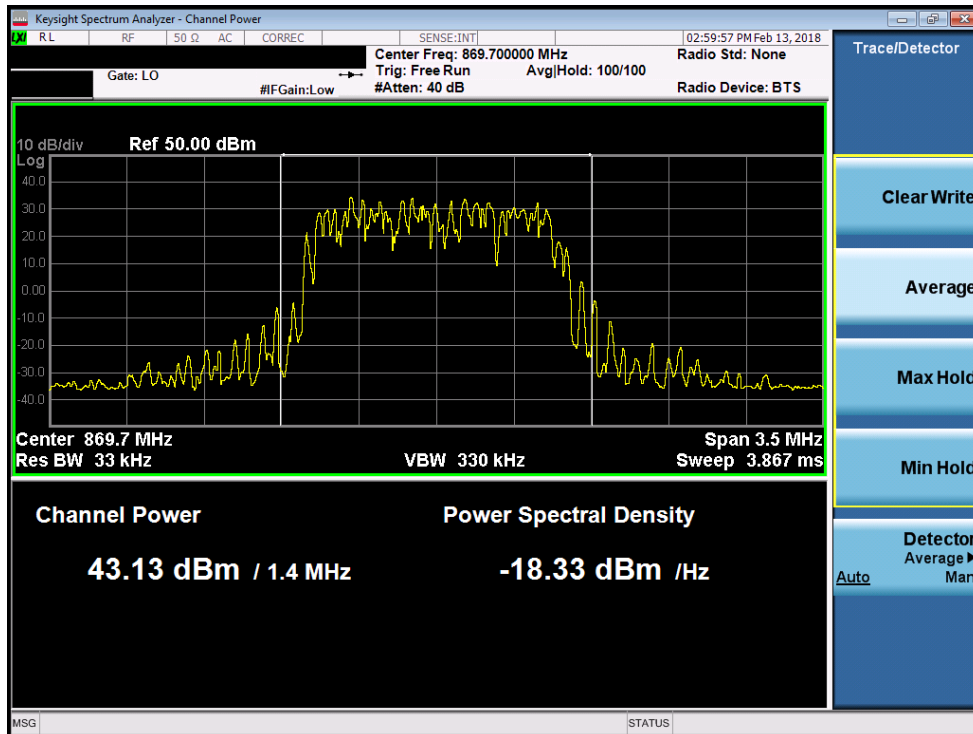


Plot 7-56. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 43 of 175

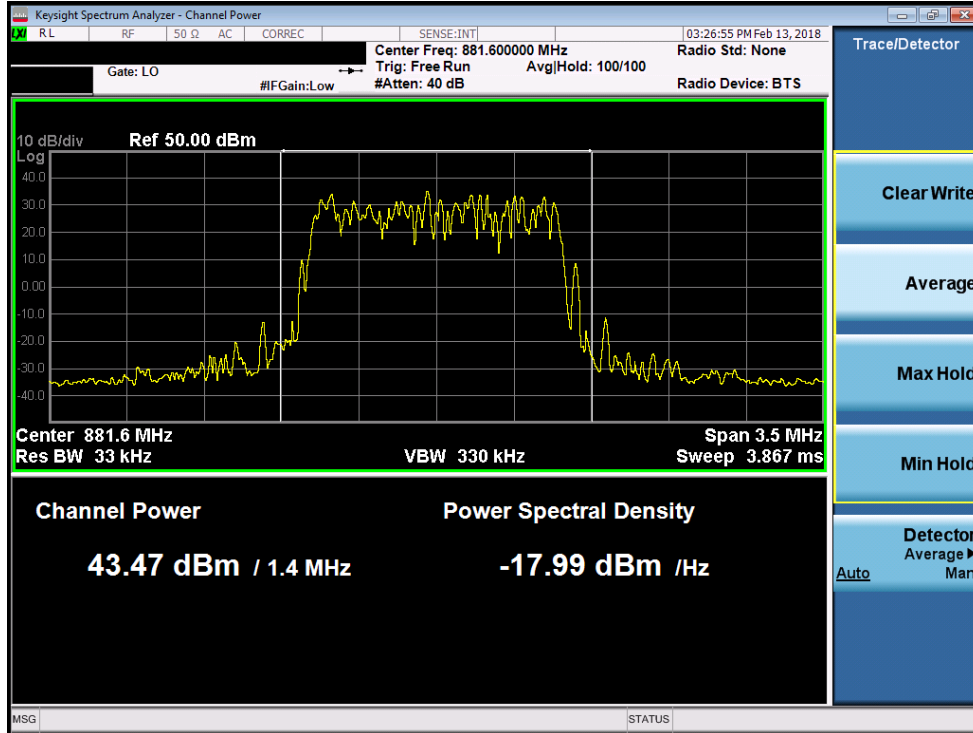


Plot 7-57. Maximum Conducted Power (Band 5 - 1.4MHz 64-QAM – High Channel)

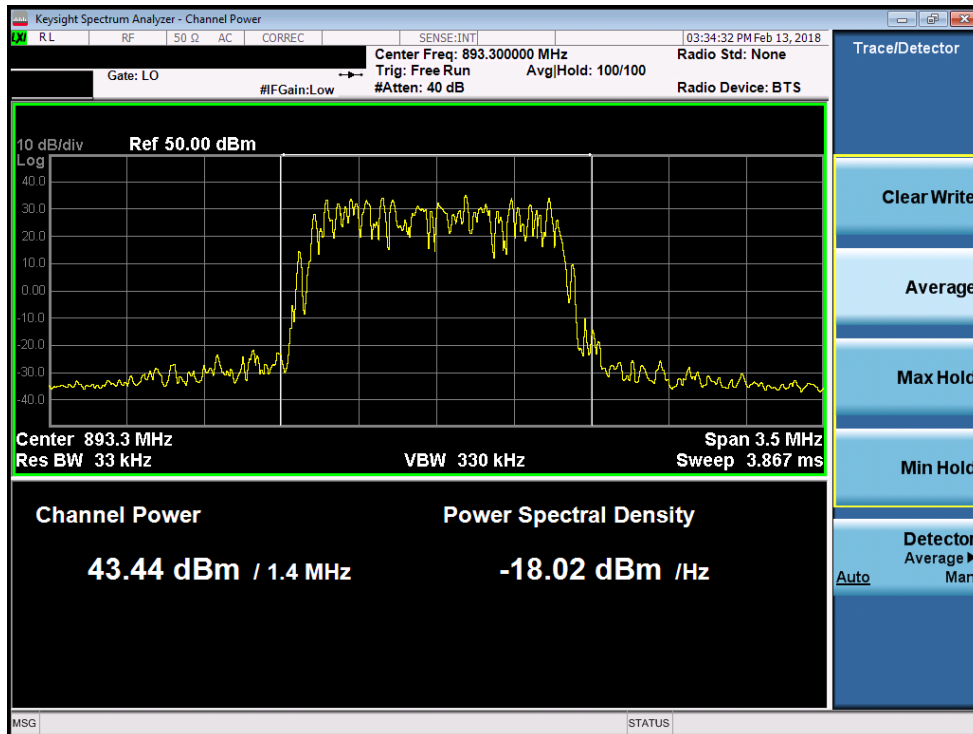


Plot 7-58. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 44 of 175

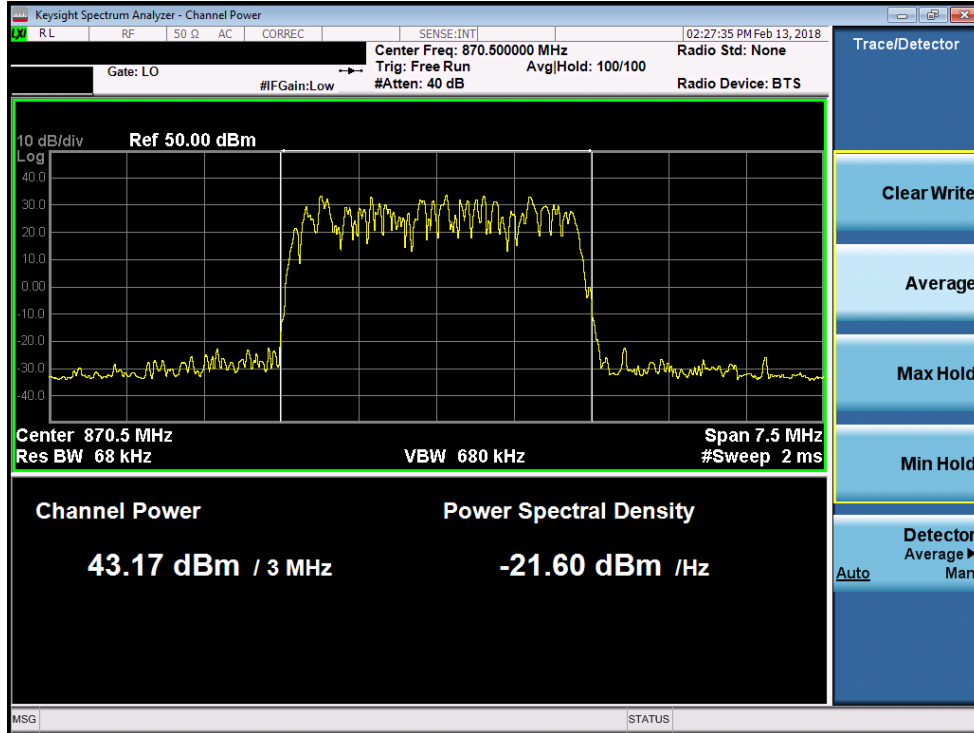


Plot 7-59. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM – Mid Channel)

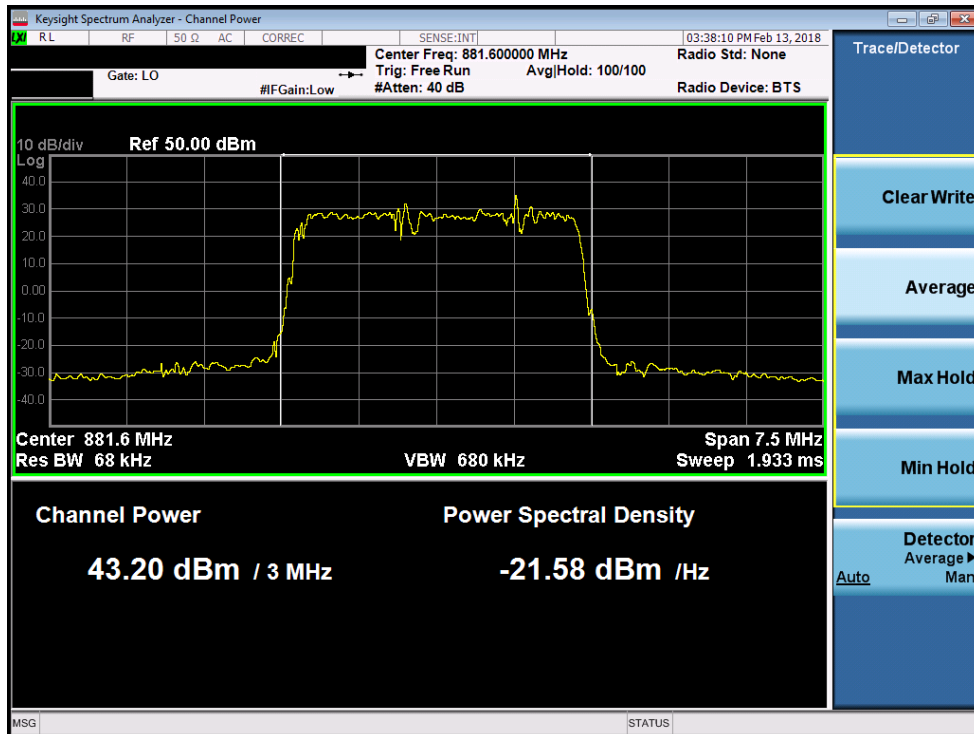


Plot 7-60. Maximum Conducted Power (Band 5 - 1.4MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 45 of 175

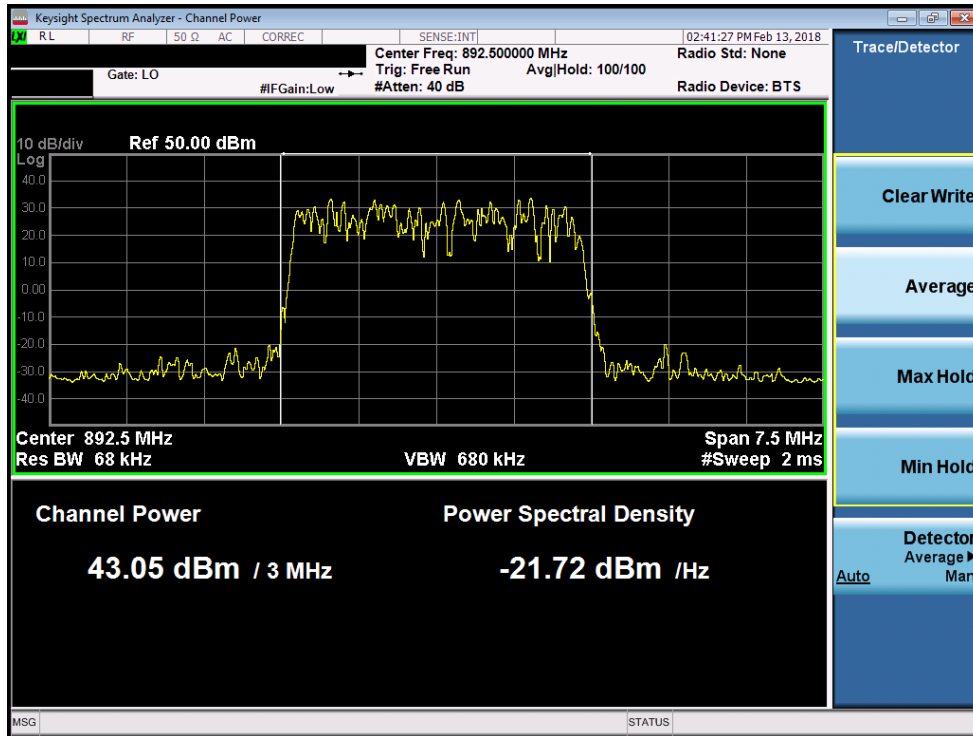


Plot 7-61. Maximum Conducted Power (Band 5 - 3.0MHz QPSK - Low Channel)

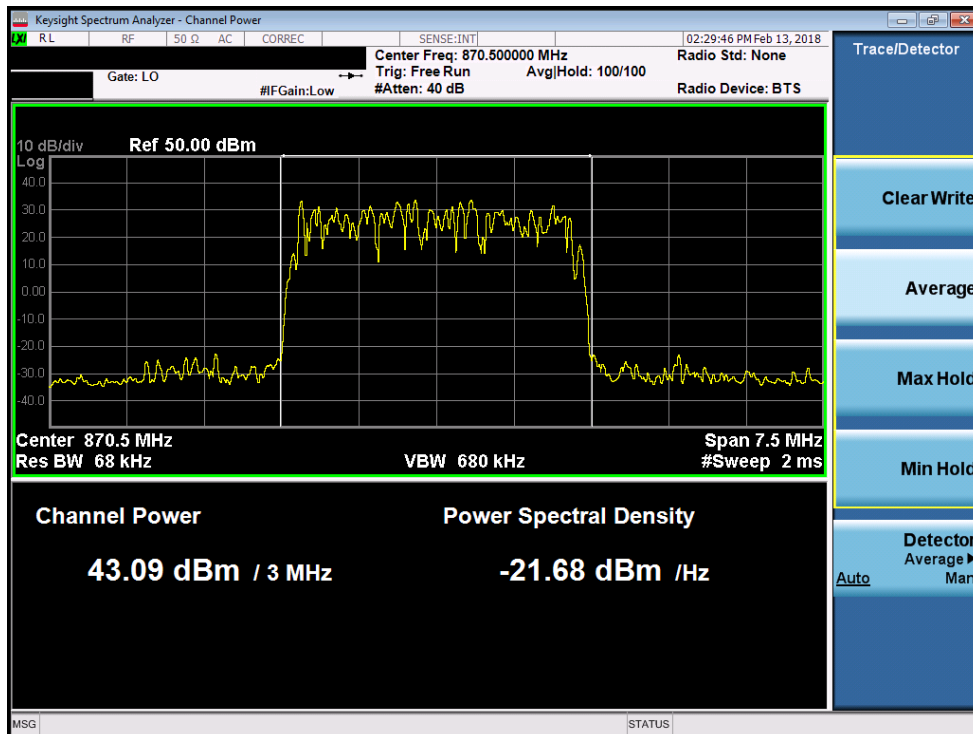


Plot 7-62. Maximum Conducted Power (Band 5 - 3.0MHz QPSK - Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 46 of 175

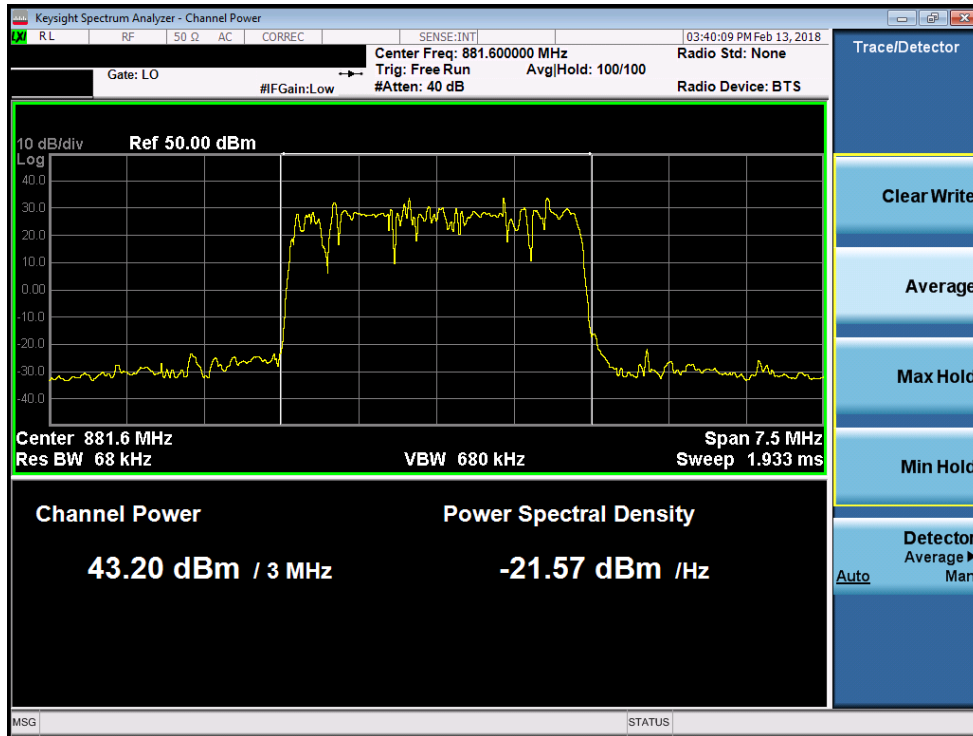


Plot 7-63. Maximum Conducted Power (Band 5 - 3.0MHz QPSK – High Channel)

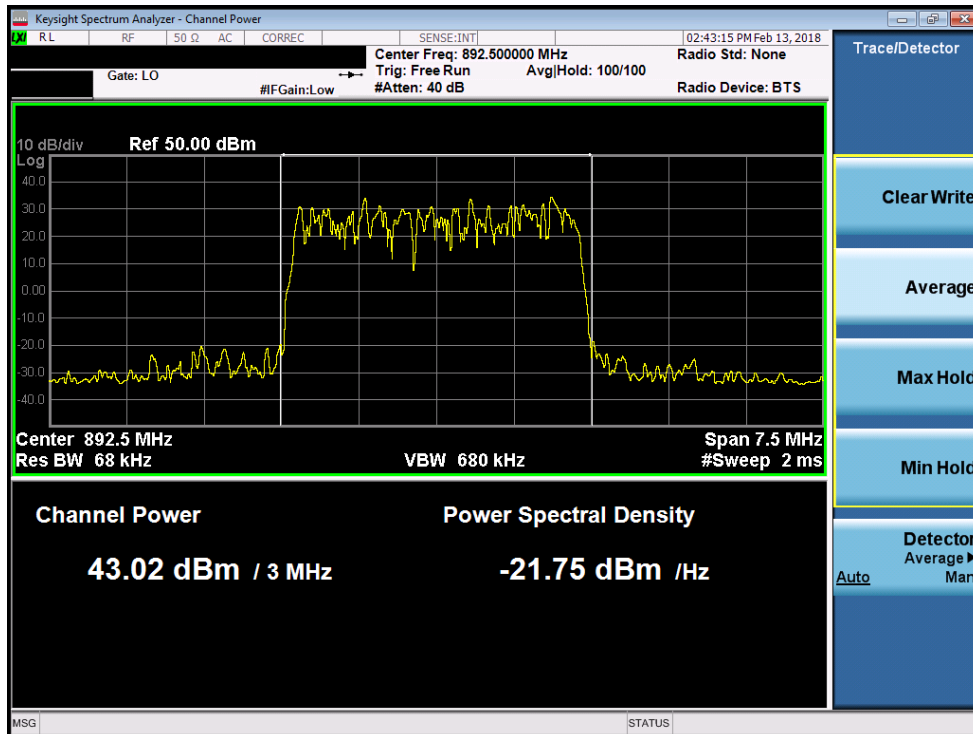


Plot 7-64. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 47 of 175

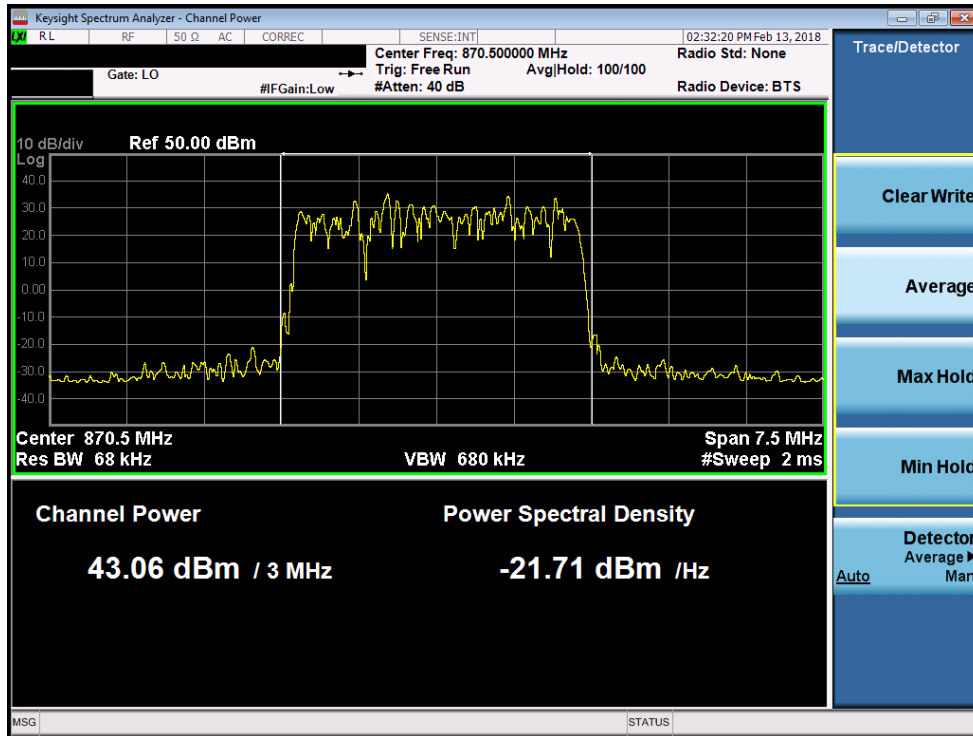


Plot 7-65. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM – Mid Channel)

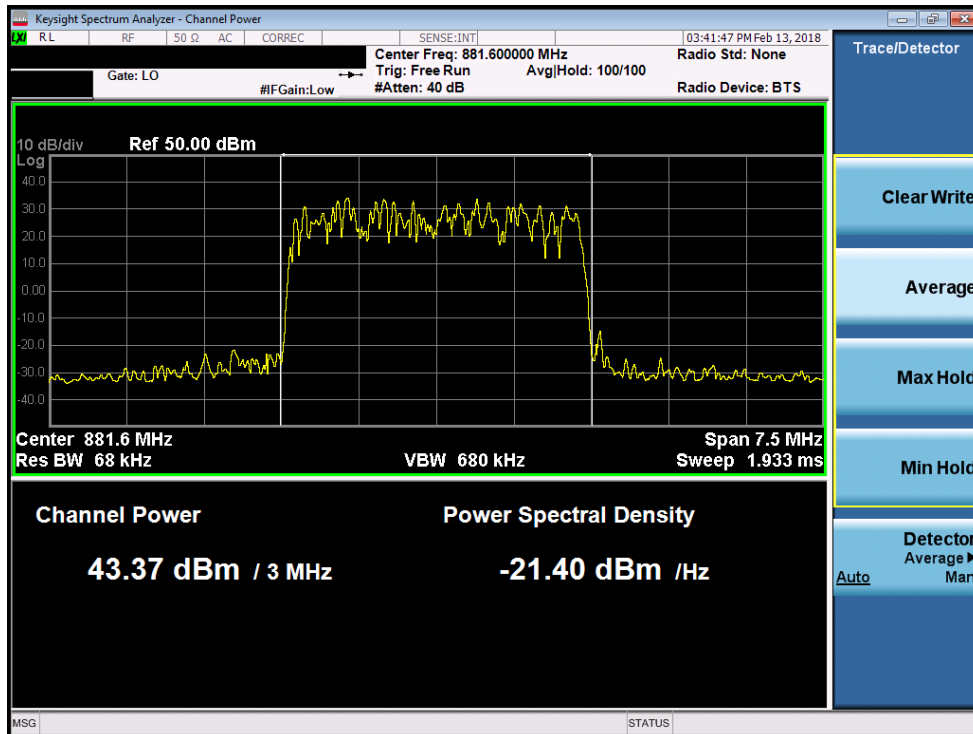


Plot 7-66. Maximum Conducted Power (Band 5 - 3.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 48 of 175

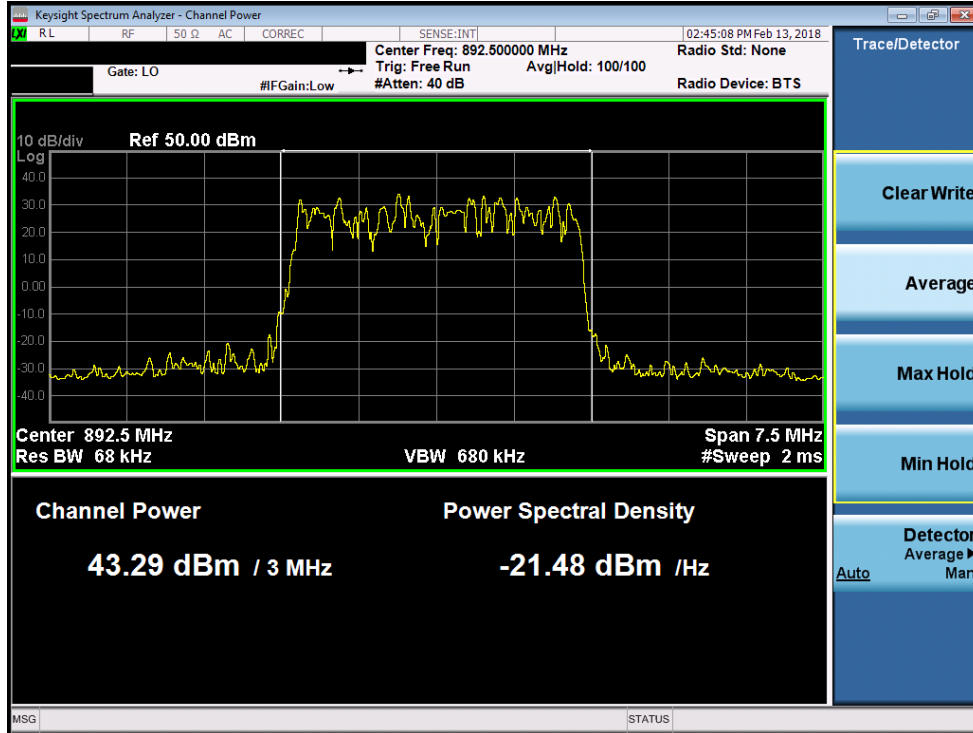


Plot 7-67. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM - Low Channel)

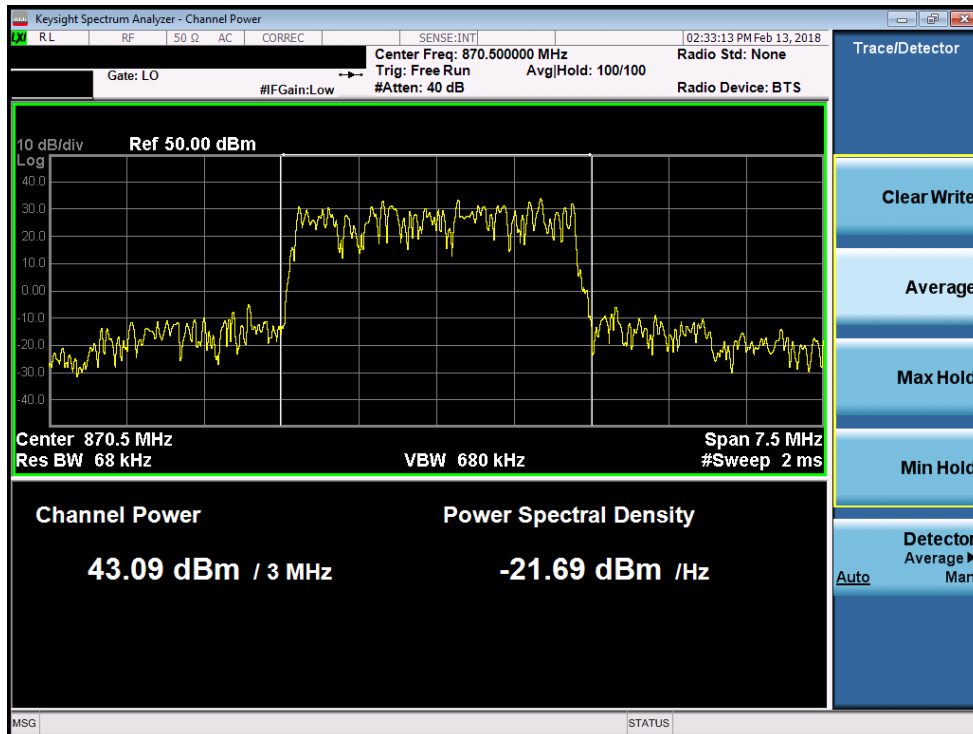


Plot 7-68. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 49 of 175

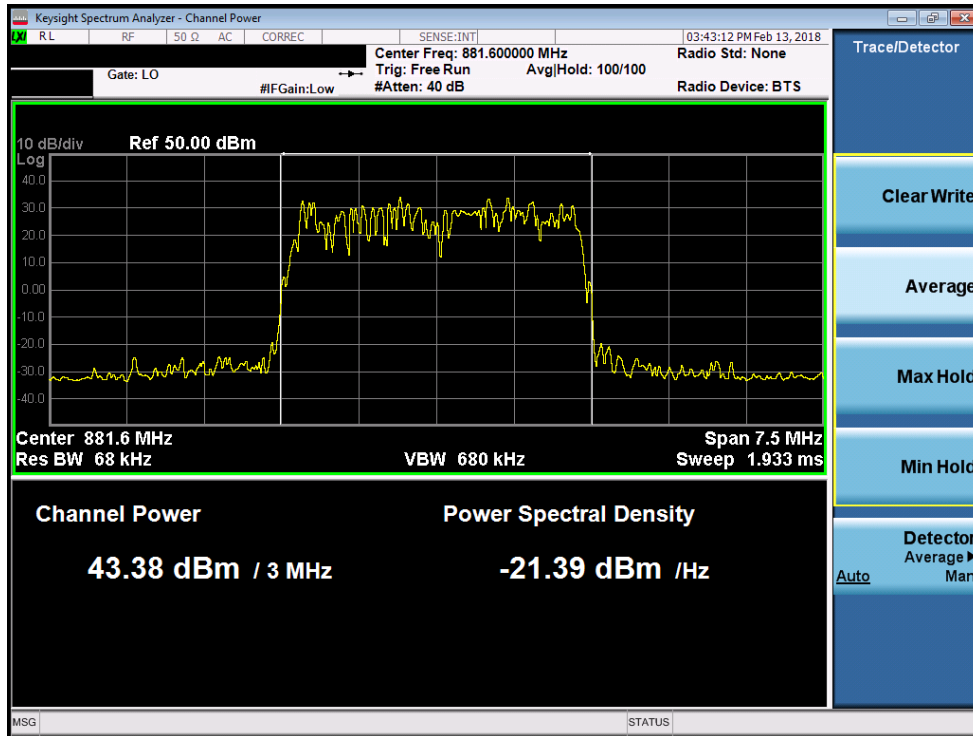


Plot 7-69. Maximum Conducted Power (Band 5 - 3.0MHz 64-QAM – High Channel)

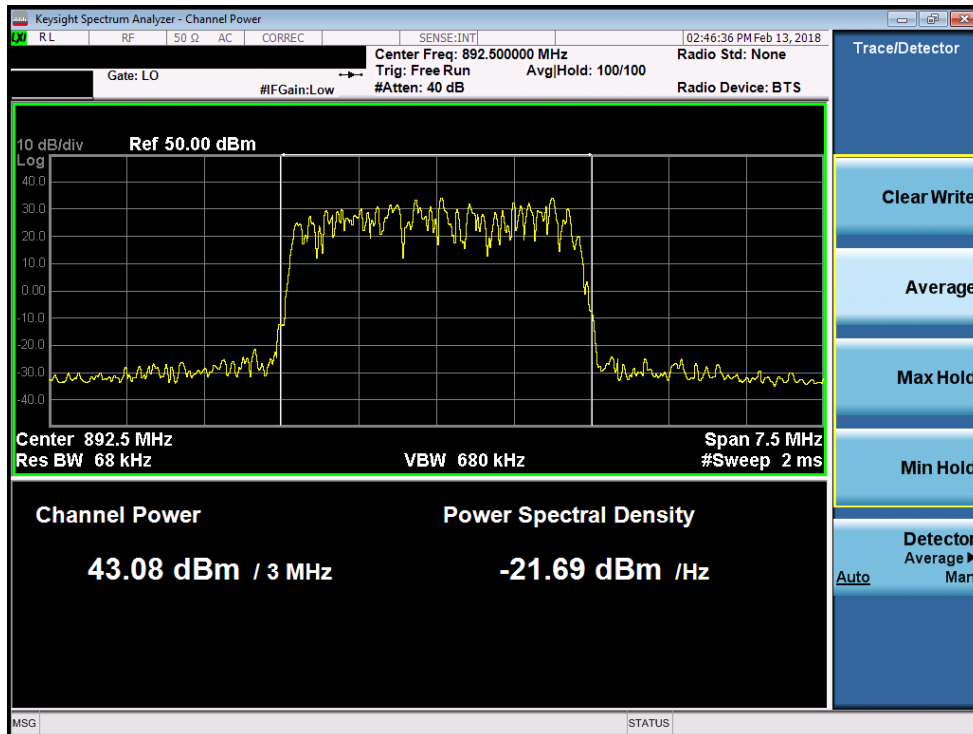


Plot 7-70. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 50 of 175

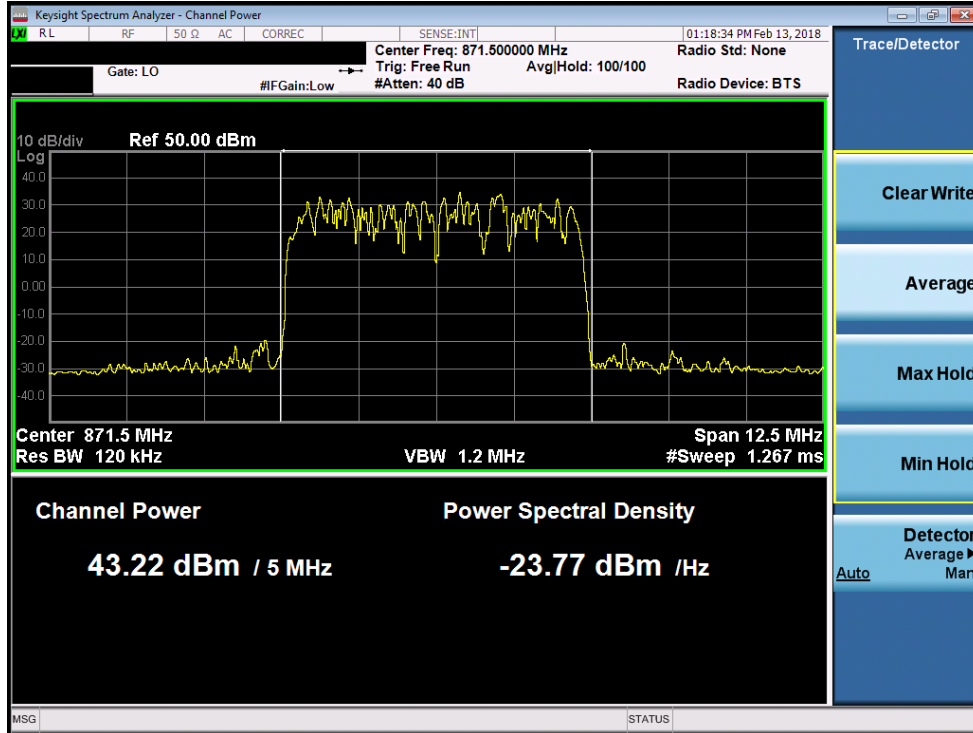


Plot 7-71. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM – Mid Channel)

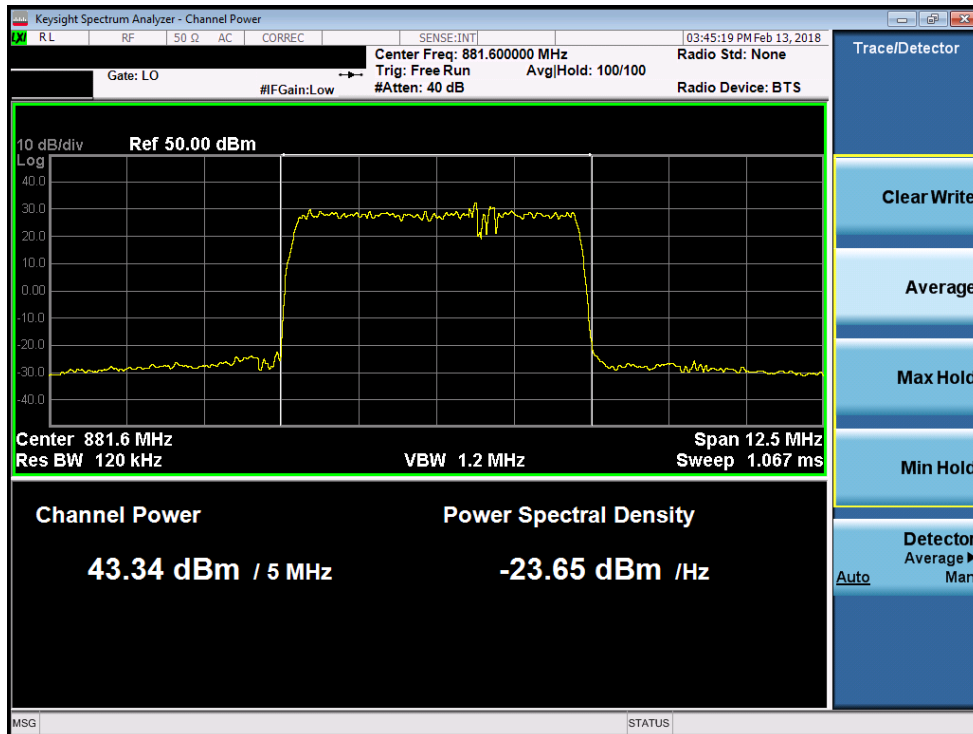


Plot 7-72. Maximum Conducted Power (Band 5 - 3.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 51 of 175

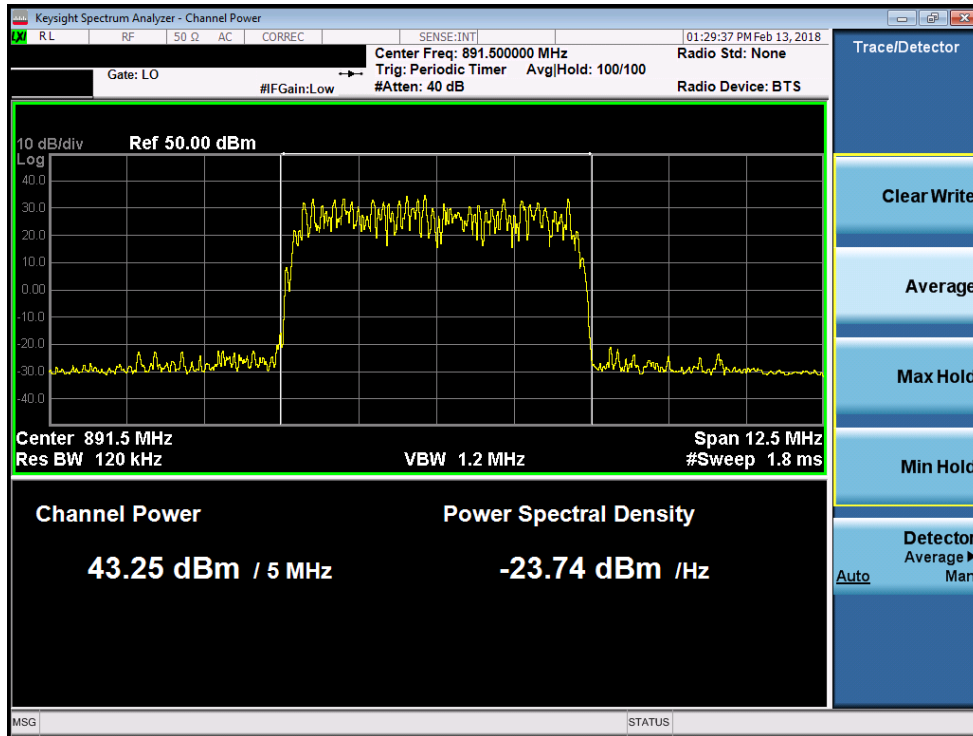


Plot 7-73. Maximum Conducted Power (Band 5 - 5.0MHz QPSK - Low Channel)

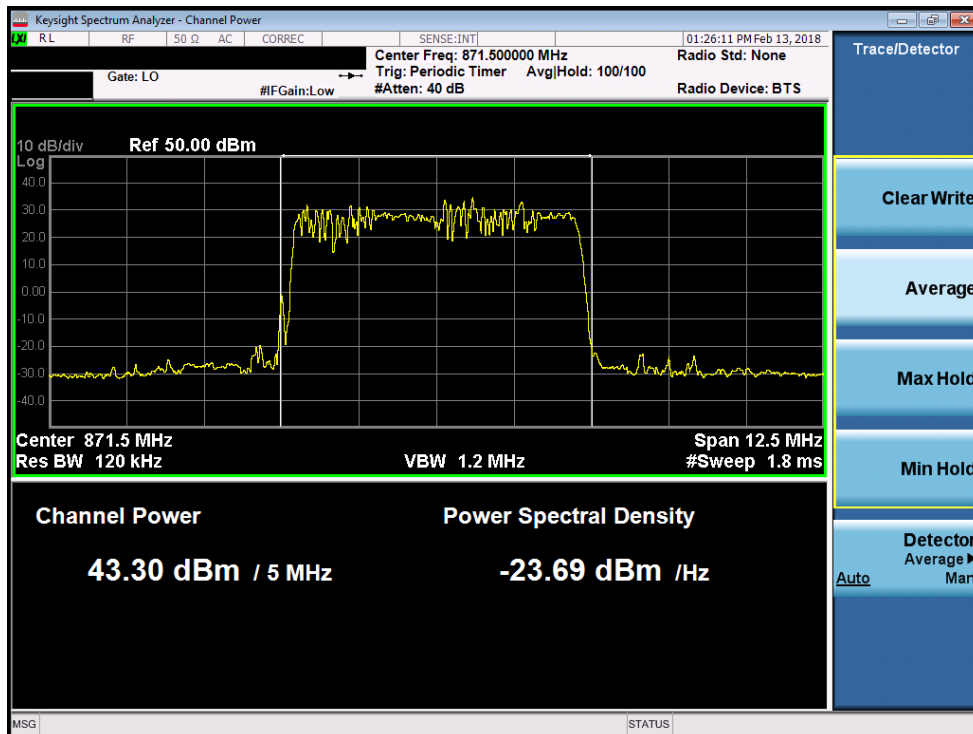


Plot 7-74. Maximum Conducted Power (Band 5 - 5.0MHz QPSK – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 52 of 175

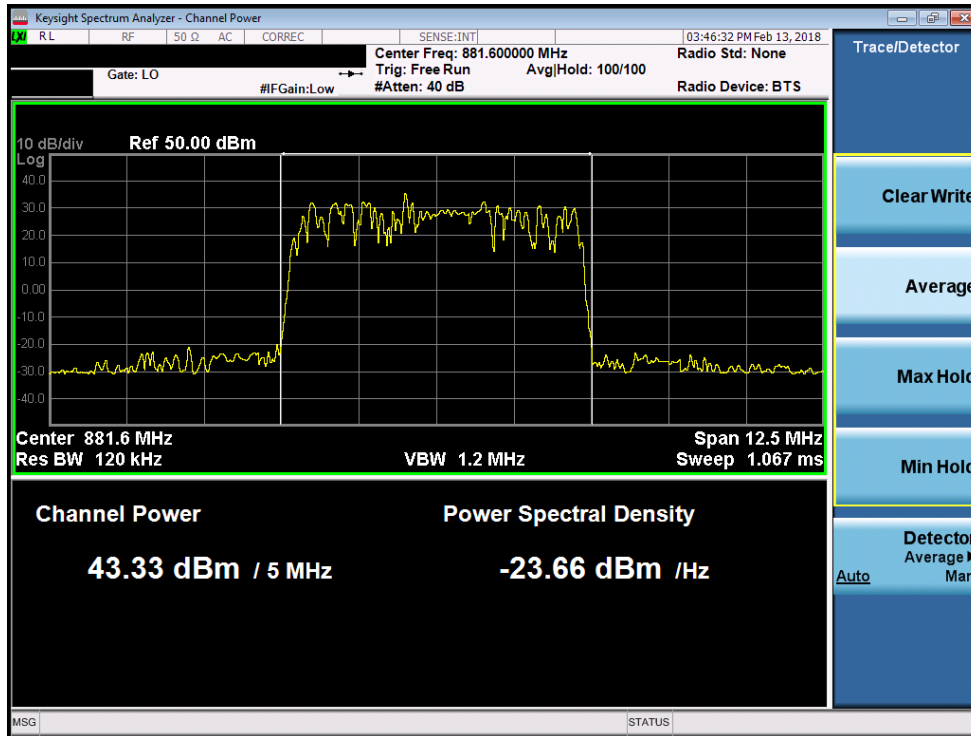


Plot 7-75. Maximum Conducted Power (Band 5 - 5.0MHz QPSK – High Channel)

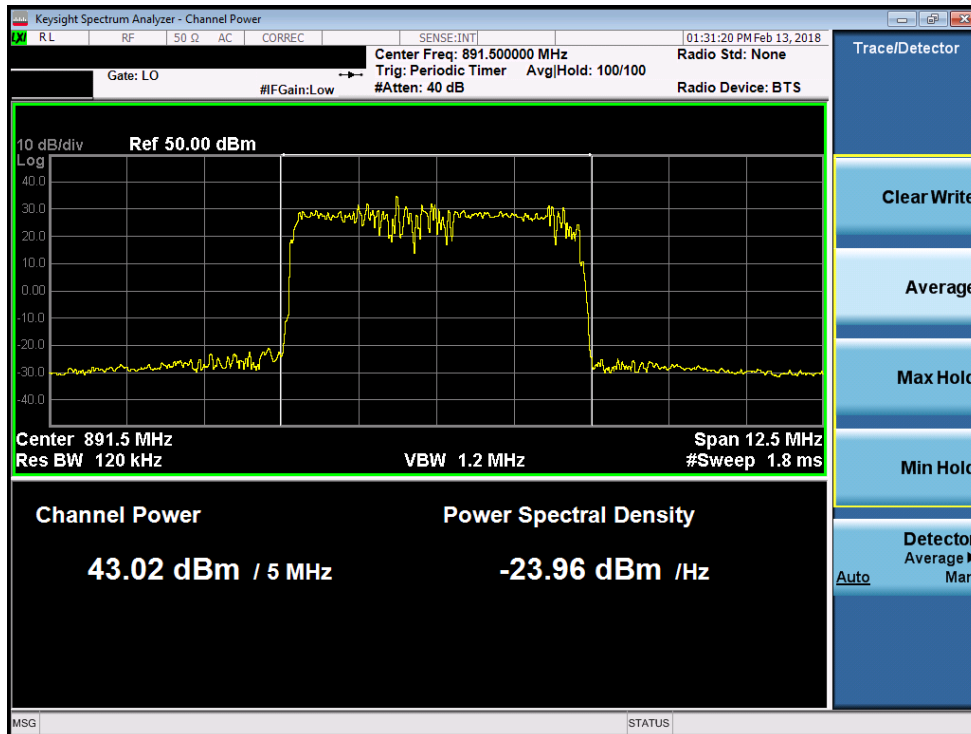


Plot 7-76. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 53 of 175

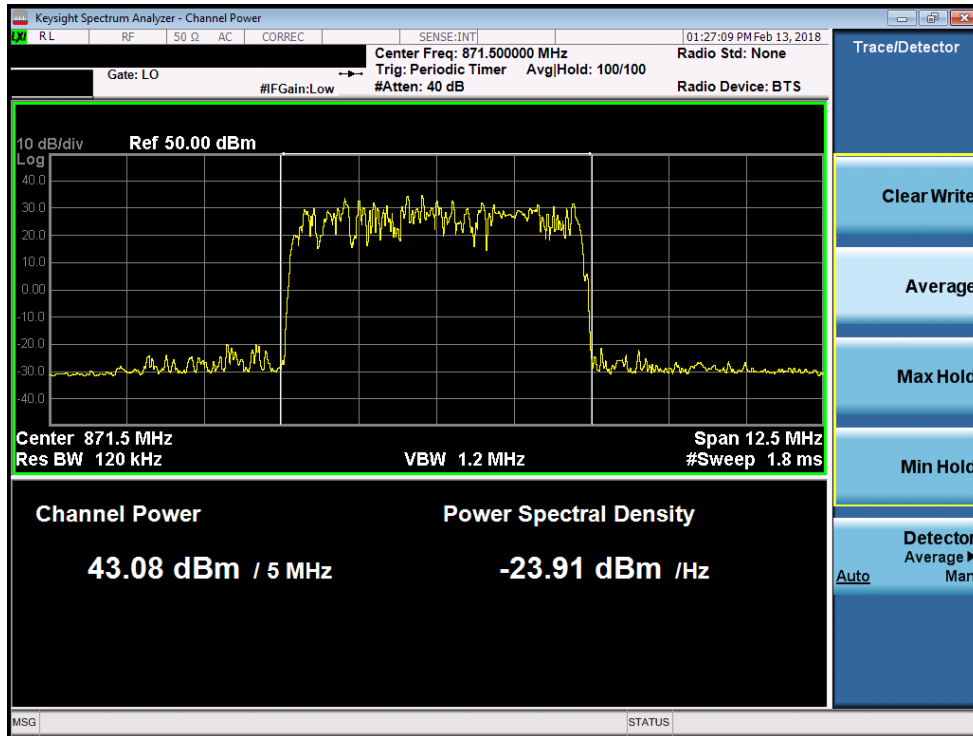


Plot 7-77. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM – Mid Channel)

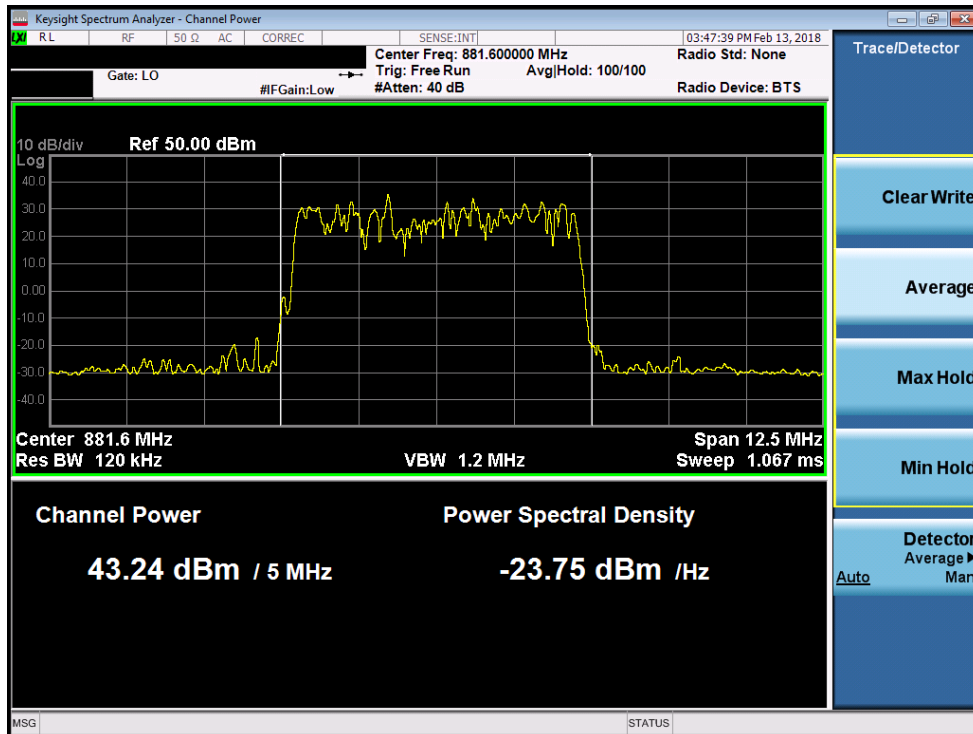


Plot 7-78. Maximum Conducted Power (Band 5 - 5.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 54 of 175

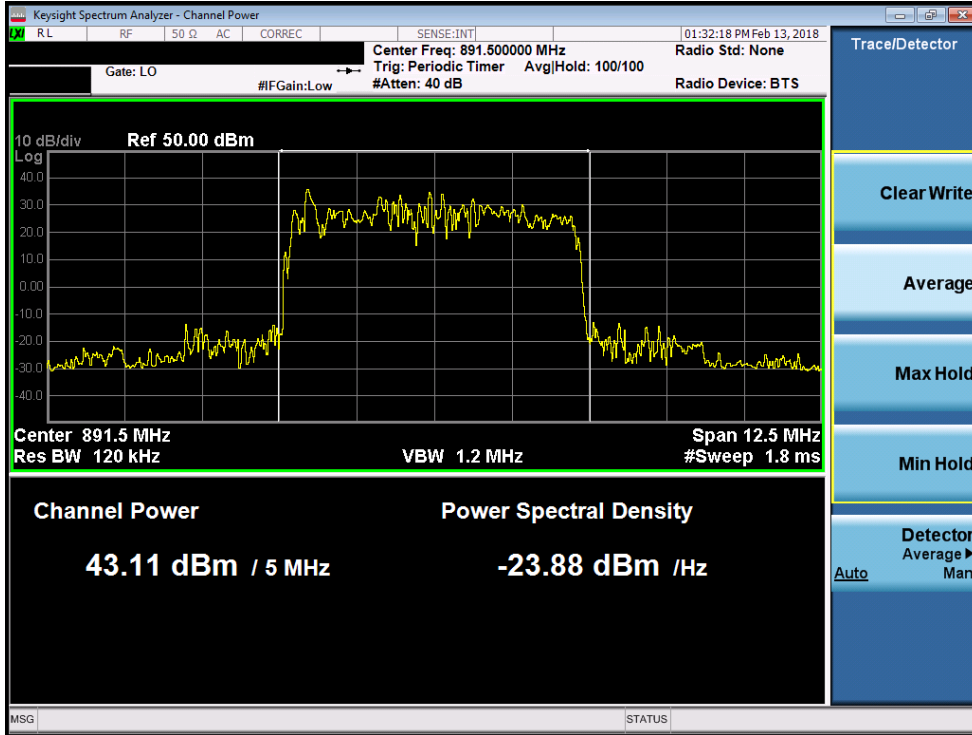


Plot 7-79. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM - Low Channel)

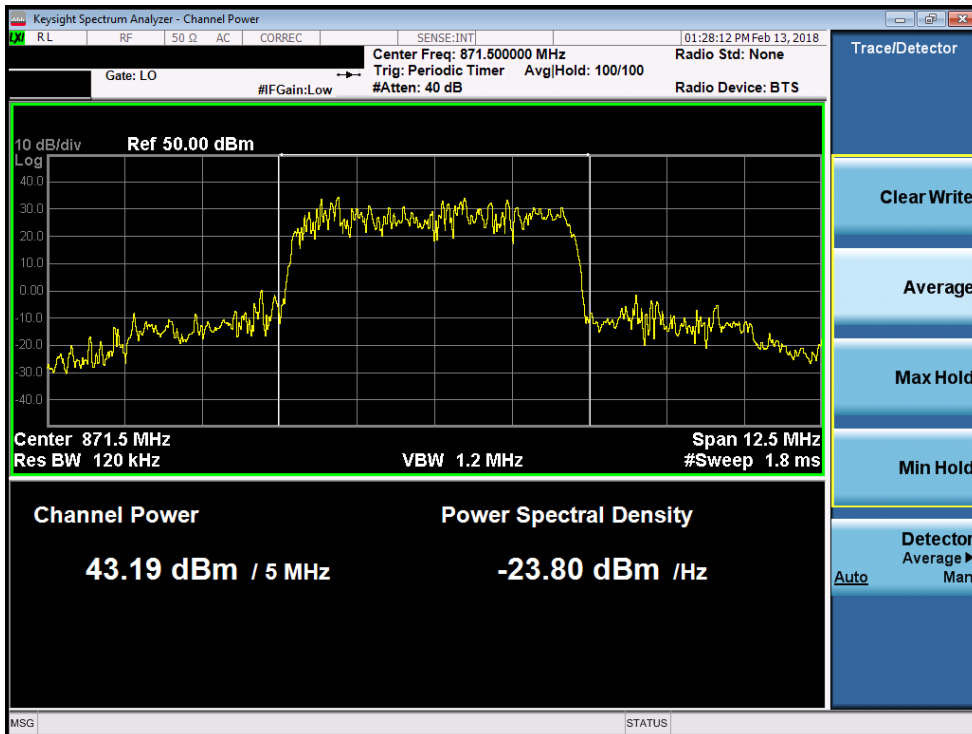


Plot 7-80. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM – Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 55 of 175

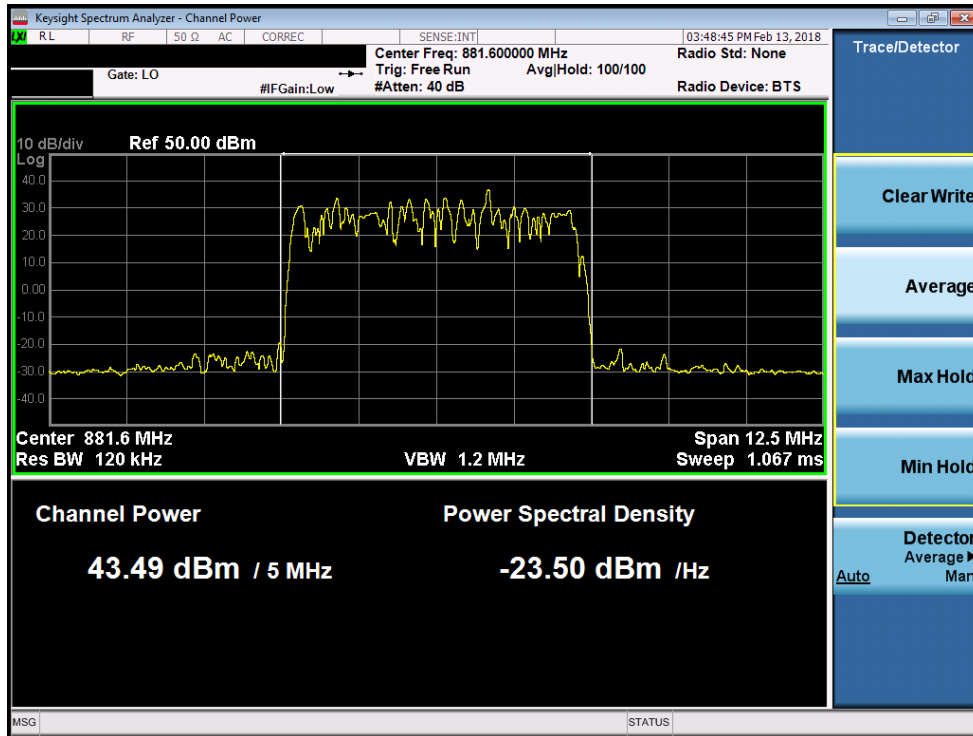


Plot 7-81. Maximum Conducted Power (Band 5 - 5.0MHz 64-QAM – High Channel)

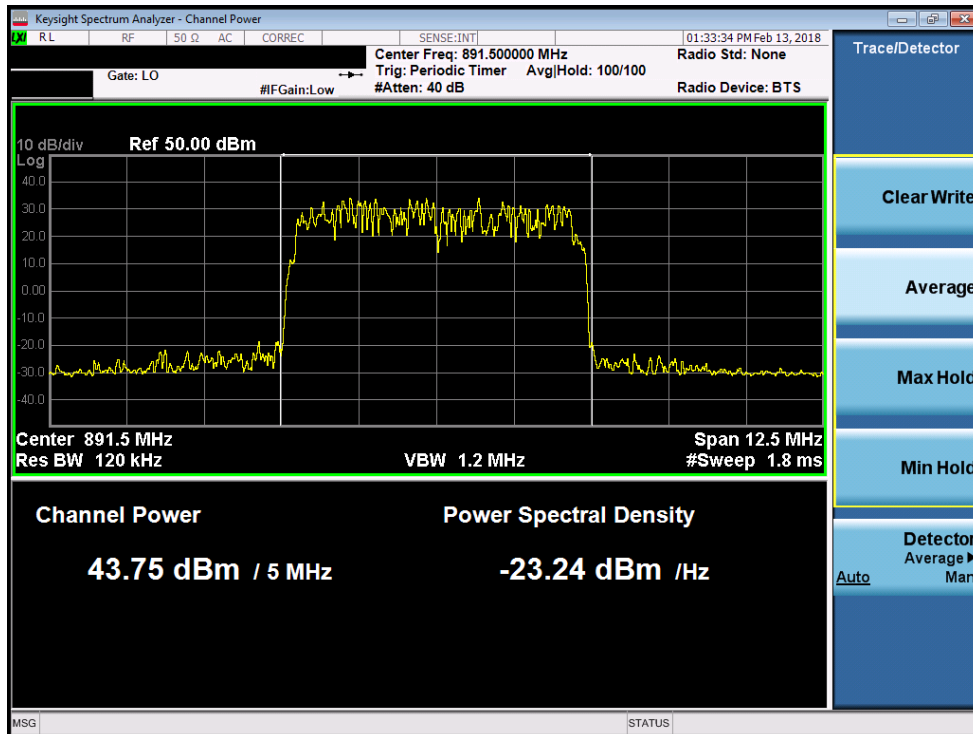


Plot 7-82. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 56 of 175

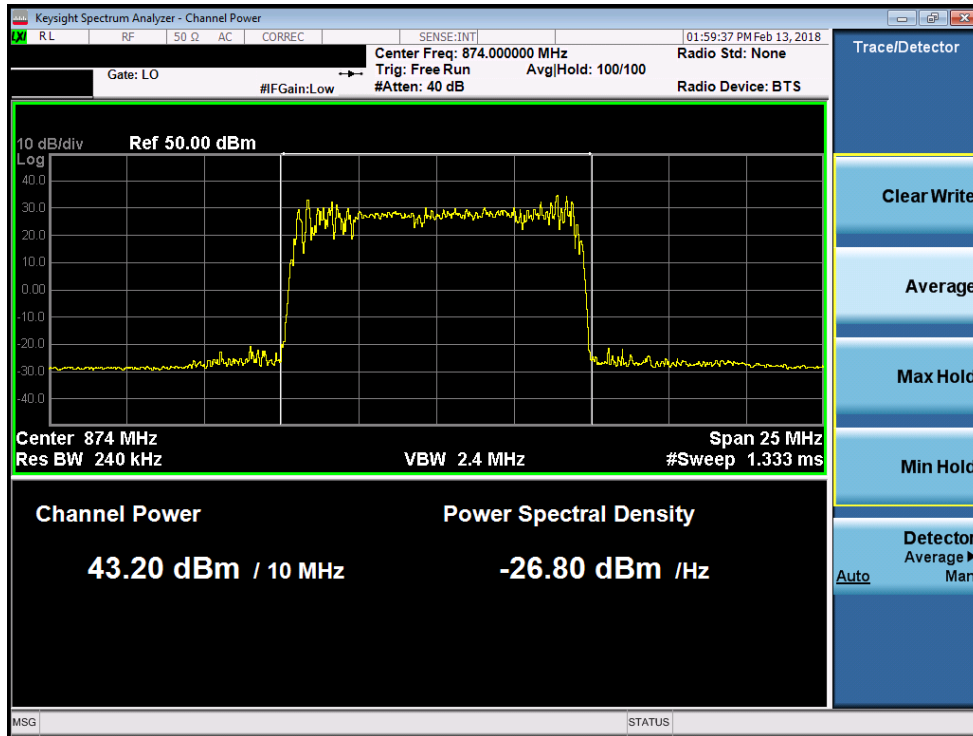


Plot 7-83. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM – Mid Channel)

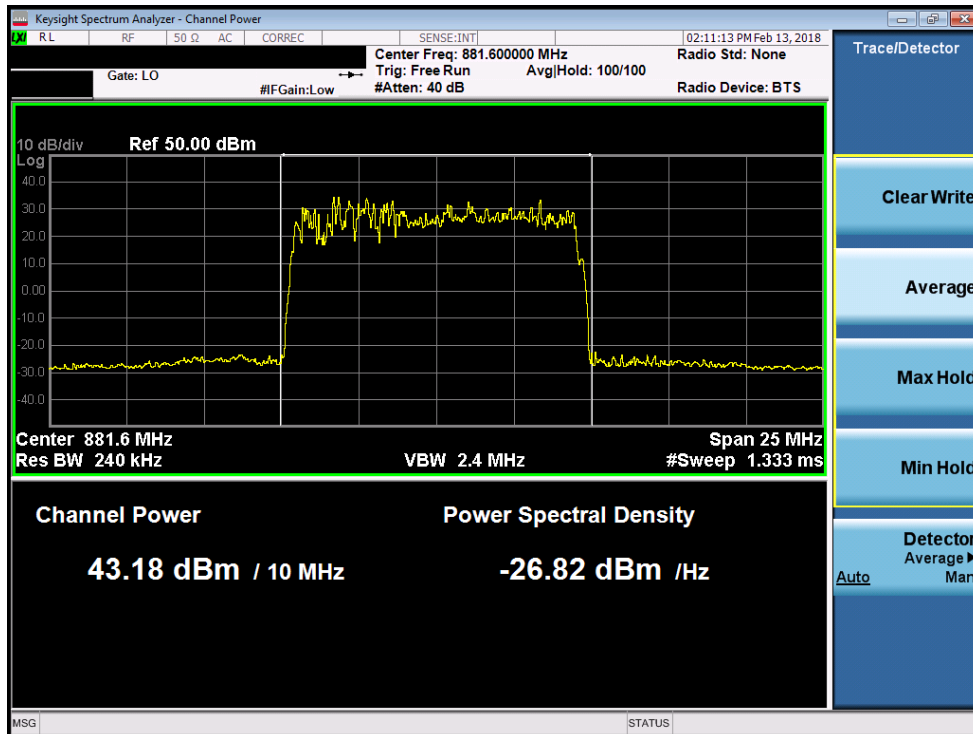


Plot 7-84. Maximum Conducted Power (Band 5 - 5.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 57 of 175

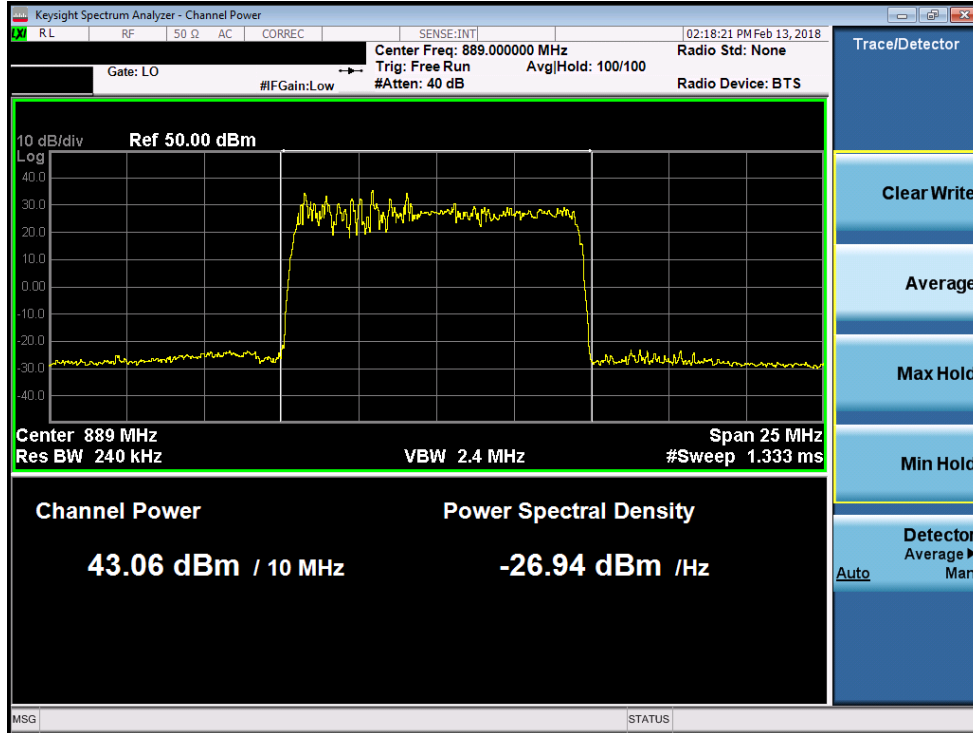


Plot 7-85. Maximum Conducted Power (Band 5 - 10.0MHz QPSK - Low Channel)

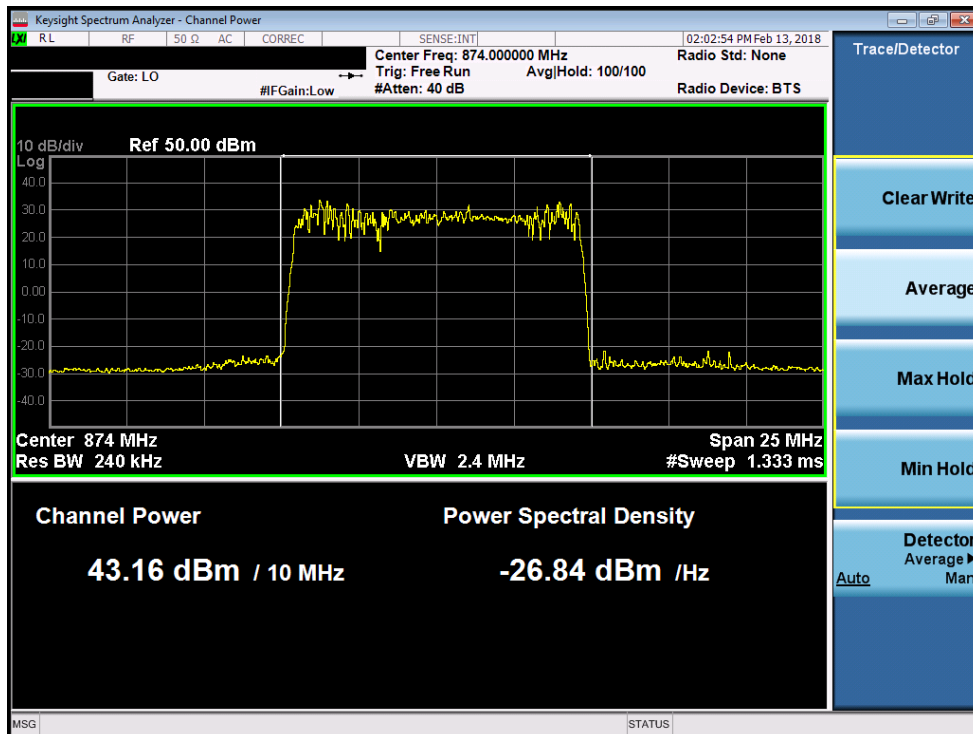


Plot 7-86. Maximum Conducted Power (Band 5 - 10.0MHz QPSK - Mid Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 58 of 175

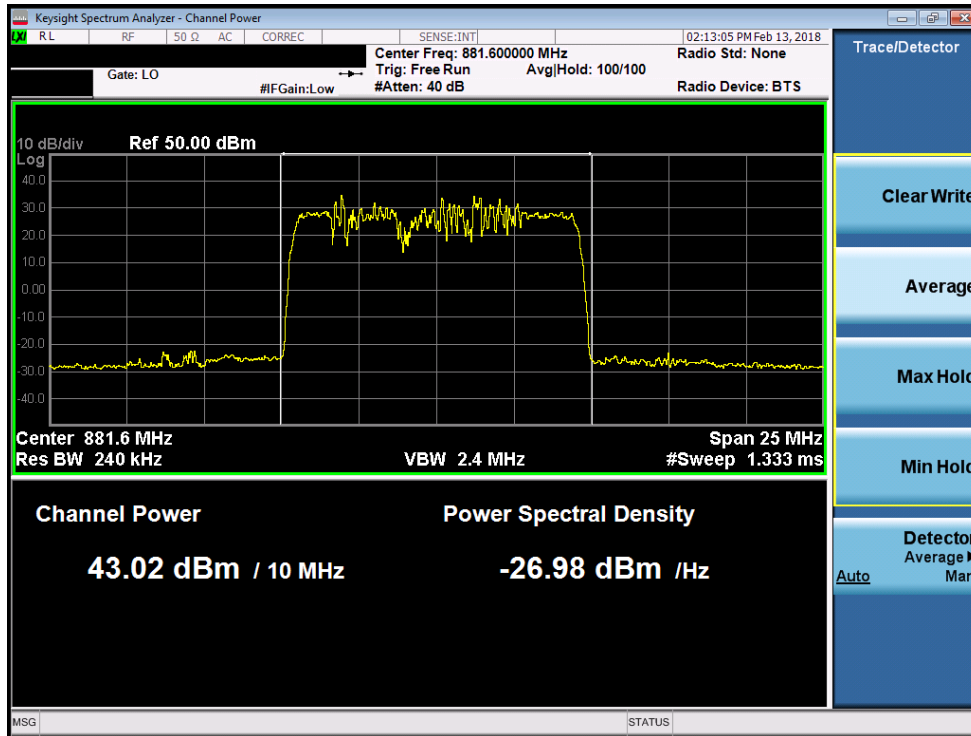


Plot 7-87. Maximum Conducted Power (Band 5 - 10.0MHz QPSK – High Channel)

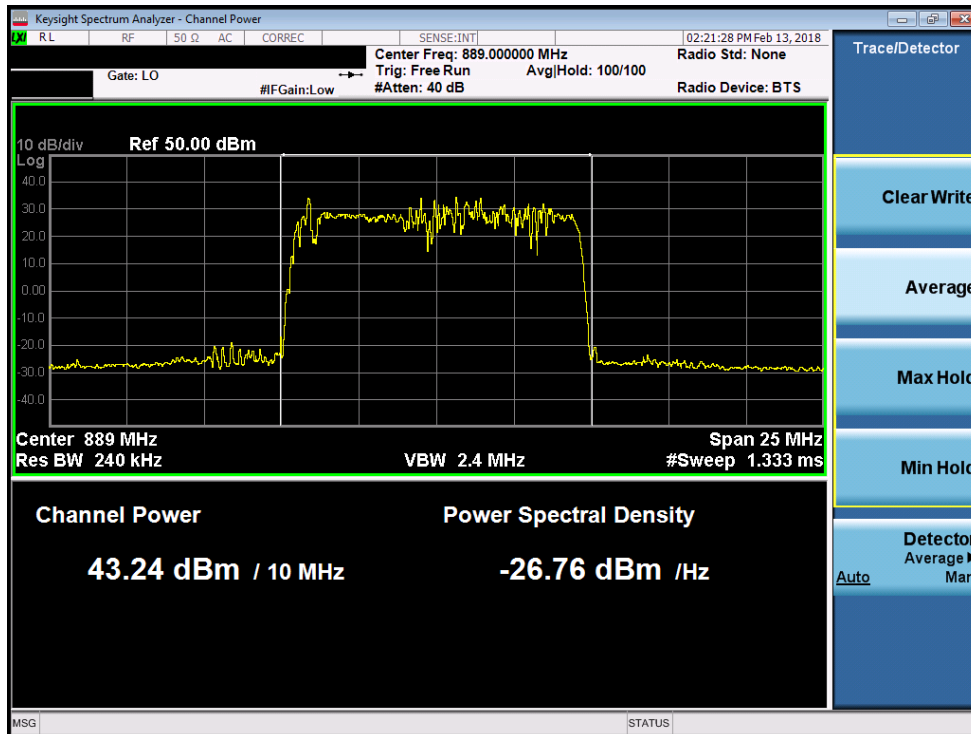


Plot 7-88. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 59 of 175

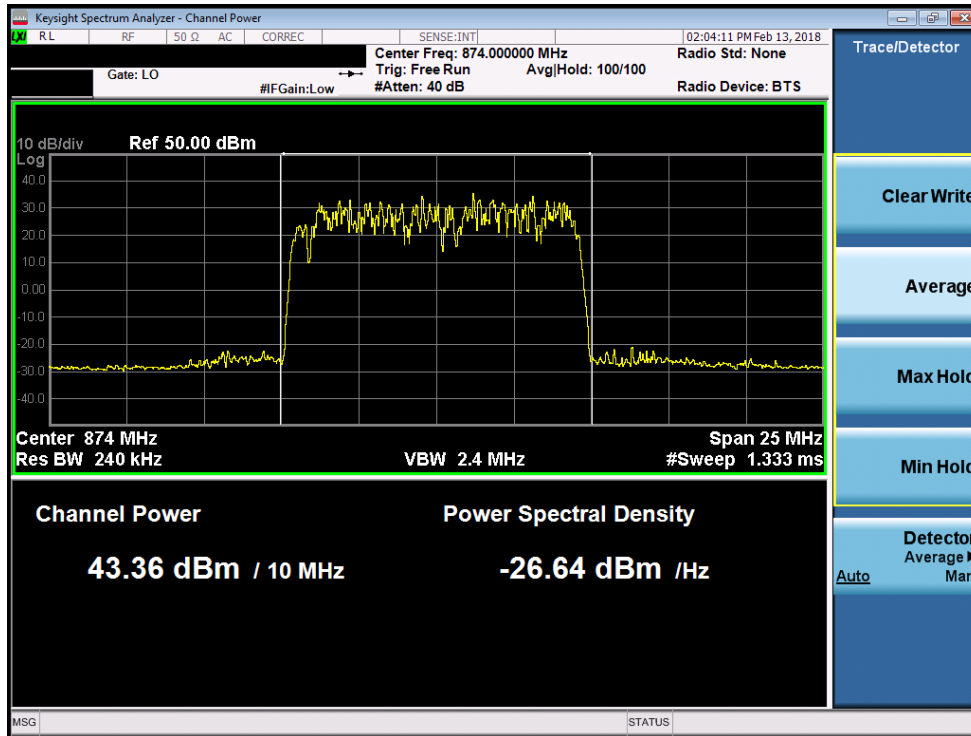


Plot 7-89. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM – Mid Channel)

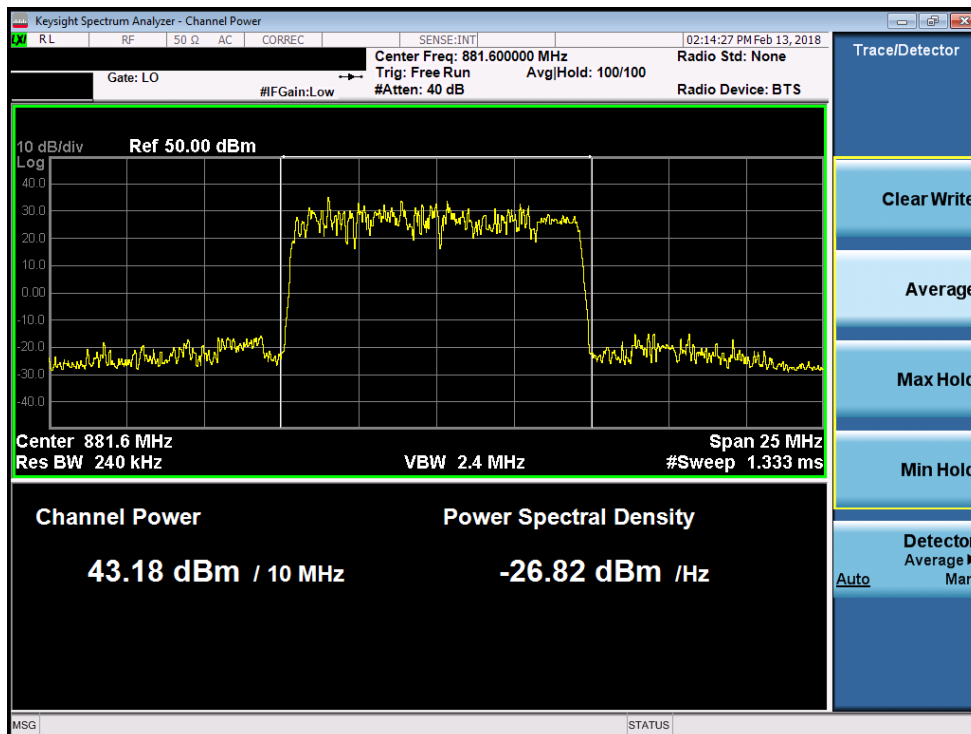


Plot 7-90. Maximum Conducted Power (Band 5 - 10.0MHz 16-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 60 of 175

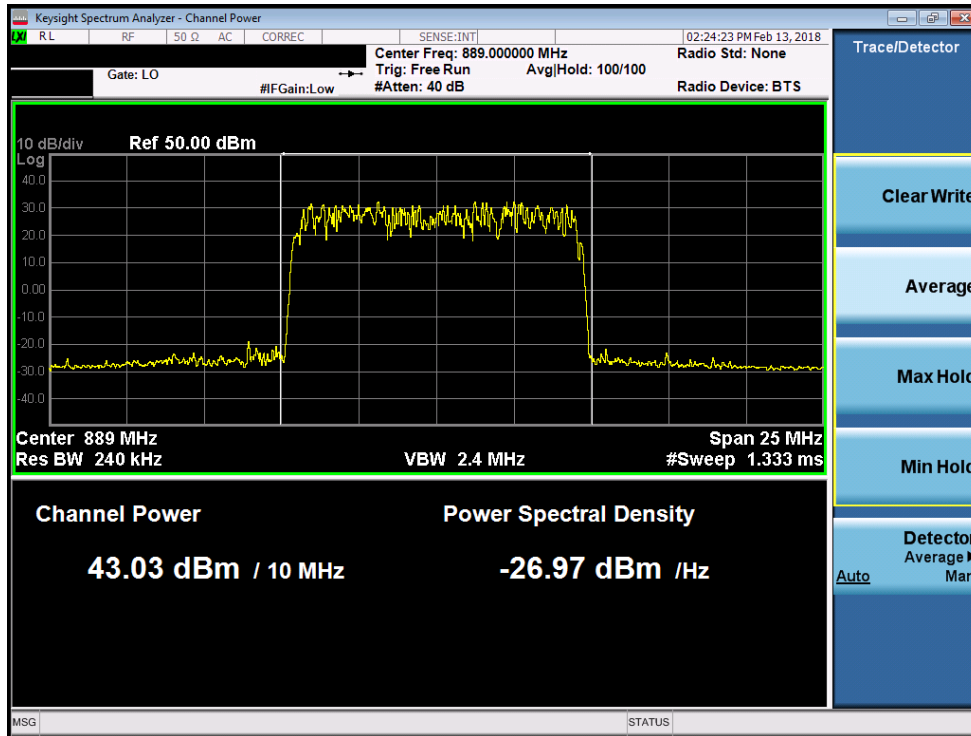


Plot 7-91. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM - Low Channel)

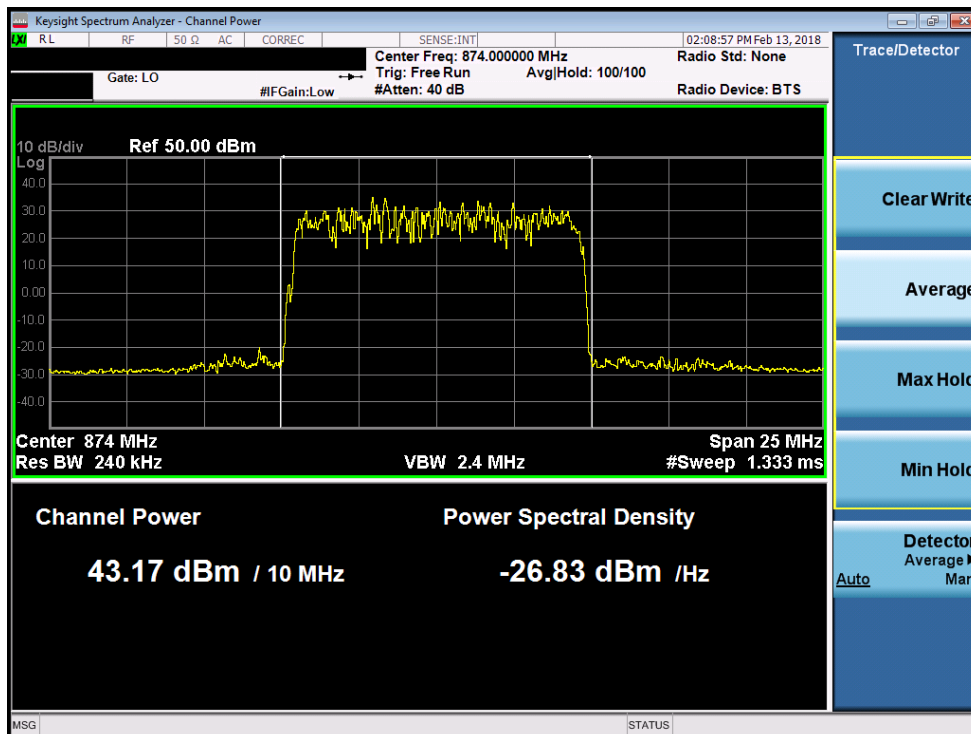


Plot 7-92. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM - Mid Channel)

FCC ID: QLJ4GRFN-005			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head			Page 61 of 175

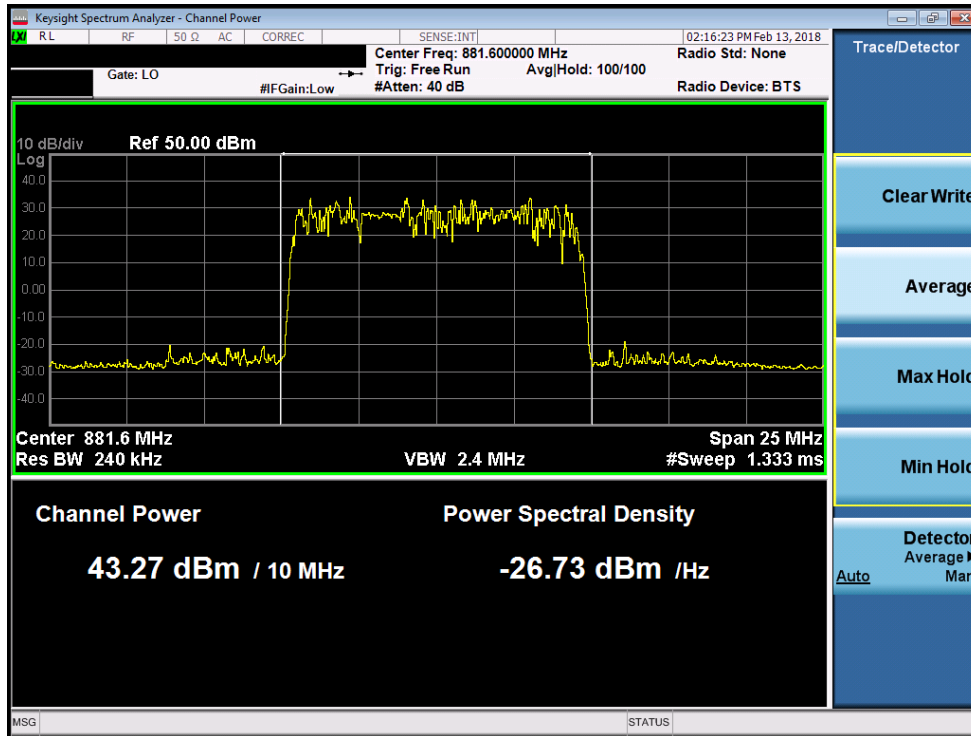


Plot 7-93. Maximum Conducted Power (Band 5 - 10.0MHz 64-QAM – High Channel)

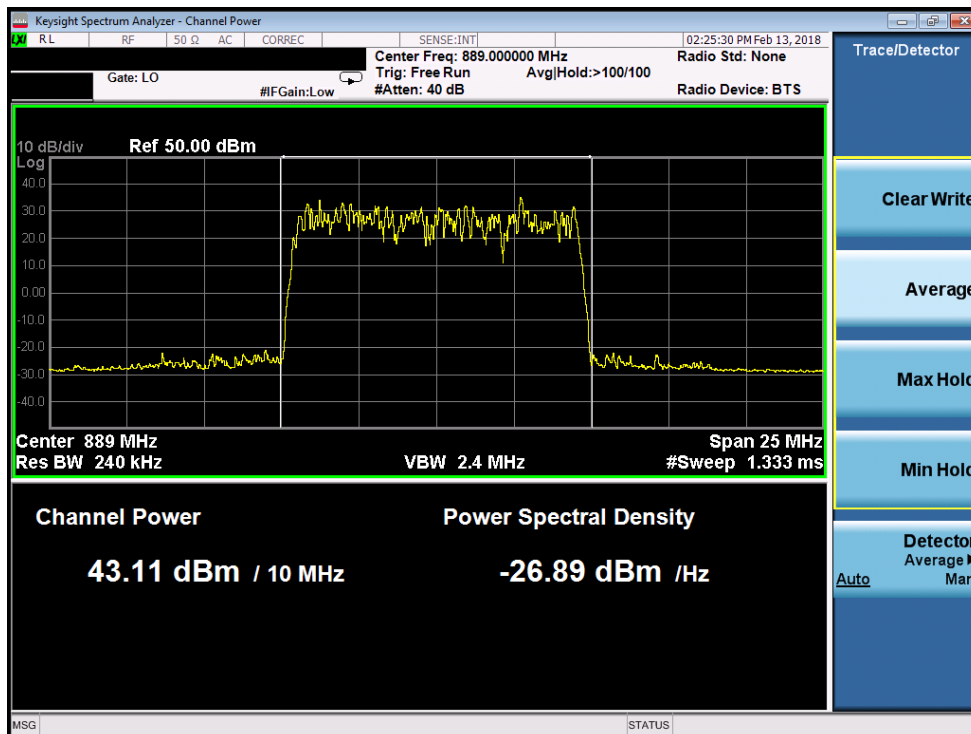


Plot 7-94. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM - Low Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 62 of 175



Plot 7-95. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM – Mid Channel)



Plot 7-96. Maximum Conducted Power (Band 5 - 10.0MHz 256-QAM – High Channel)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 63 of 175

MIMO Conducted Power Measurements

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	ANT 1 Conducted Power [dBm]	ANT 2 Conducted Power [dBm]	MIMO Conducted Power [dBm]	MIMO Conducted Power [Watts]
869.70	1.4	QPSK	43.02	43.10	46.07	40.46
881.60	1.4	QPSK	43.21	43.15	46.19	41.59
893.30	1.4	QPSK	43.18	43.10	46.15	41.21
869.70	1.4	16-QAM	43.08	43.15	46.13	40.98
881.60	1.4	16-QAM	43.15	43.19	46.18	41.50
893.30	1.4	16-QAM	43.17	43.24	46.22	41.84
869.70	1.4	64-QAM	43.04	43.12	46.09	40.65
881.60	1.4	64-QAM	43.11	43.48	46.31	42.75
893.30	1.4	64-QAM	43.20	43.17	46.20	41.64
869.70	1.4	256-QAM	43.08	43.13	46.12	40.88
881.60	1.4	256-QAM	43.25	43.47	46.37	43.37
893.30	1.4	256-QAM	43.20	43.44	46.33	42.97
870.50	3	QPSK	43.03	43.17	46.11	40.84
881.60	3	QPSK	43.19	43.20	46.21	41.74
892.50	3	QPSK	43.16	43.05	46.12	40.89
870.50	3	16-QAM	43.05	43.09	46.08	40.55
881.60	3	16-QAM	43.08	43.20	46.15	41.22
892.50	3	16-QAM	43.17	43.02	46.11	40.79
870.50	3	64-QAM	43.10	43.06	46.09	40.65
881.60	3	64-QAM	43.16	43.37	46.28	42.43
892.50	3	64-QAM	43.13	43.29	46.22	41.89
870.50	3	256-QAM	43.02	43.09	46.07	40.42
881.60	3	256-QAM	43.06	43.38	46.23	42.01
892.50	3	256-QAM	43.09	43.08	46.10	40.69

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	ANT 1 Conducted Power [dBm]	ANT 2 Conducted Power [dBm]	MIMO Conducted Power [dBm]	MIMO Conducted Power [Watts]
871.50	5	QPSK	43.18	43.22	46.21	41.79
881.60	5	QPSK	43.07	43.34	46.22	41.85
891.50	5	QPSK	43.10	43.25	46.19	41.55
871.50	5	16-QAM	43.13	43.30	46.23	41.94
881.60	5	16-QAM	43.20	43.33	46.28	42.42
891.50	5	16-QAM	43.14	43.02	46.09	40.65
871.50	5	64-QAM	43.22	43.08	46.16	41.31
881.60	5	64-QAM	43.11	43.24	46.19	41.55
891.50	5	64-QAM	43.23	43.11	46.18	41.50
871.50	5	256-QAM	43.23	43.19	46.22	41.88
881.60	5	256-QAM	43.07	43.49	46.30	42.61
891.50	5	256-QAM	43.17	43.75	46.48	44.46
874.00	10	QPSK	43.15	43.20	46.19	41.55
881.60	10	QPSK	43.09	43.18	46.15	41.17
889.00	10	QPSK	43.13	43.06	46.11	40.79
874.00	10	16-QAM	43.16	43.16	46.17	41.40
881.60	10	16-QAM	43.07	43.02	46.06	40.32
889.00	10	16-QAM	43.12	43.24	46.19	41.60
874.00	10	64-QAM	43.12	43.36	46.25	42.19
881.60	10	64-QAM	43.10	43.18	46.15	41.21
889.00	10	64-QAM	43.15	43.03	46.10	40.74
874.00	10	256-QAM	43.17	43.17	46.18	41.50
881.60	10	256-QAM	43.14	43.27	46.22	41.84
889.00	10	256-QAM	43.14	43.11	46.14	41.07

Table 7-2. Maximum Average Conducted Power

Note:

Per ANSI C63.26-2015 Section 6.4.3.1 and KDB 662911 v02r01 Section E)1), the conducted powers at Antenna 1 and Antenna 2 were first measured separately during MIMO transmission as shown in the section above. The measured values were then summed in linear power units then converted back to dBm.

Sample MIMO Calculation:

At 869.7MHz in QPSK modulation, the average conducted output power was measured to be 43.02 dBm for Antenna-1 and 43.10 dBm for Antenna-2.

$$\text{Antenna 1} + \text{Antenna 2} = \text{MIMO}$$

$$(43.02 \text{ dBm} + 43.10 \text{ dBm}) = (20.04 \text{ mW} + 20.42 \text{ mW}) = 40.46 \text{ W} = 46.07 \text{ dBm}$$

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head	Page 64 of 175	

7.3 Occupied Bandwidth

§2.1049, RSS-Gen(6.6)

Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 D01 v03 – Section 4.2

Test Settings

1. The signal analyzer’s automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

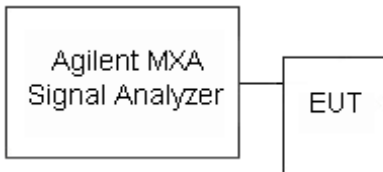


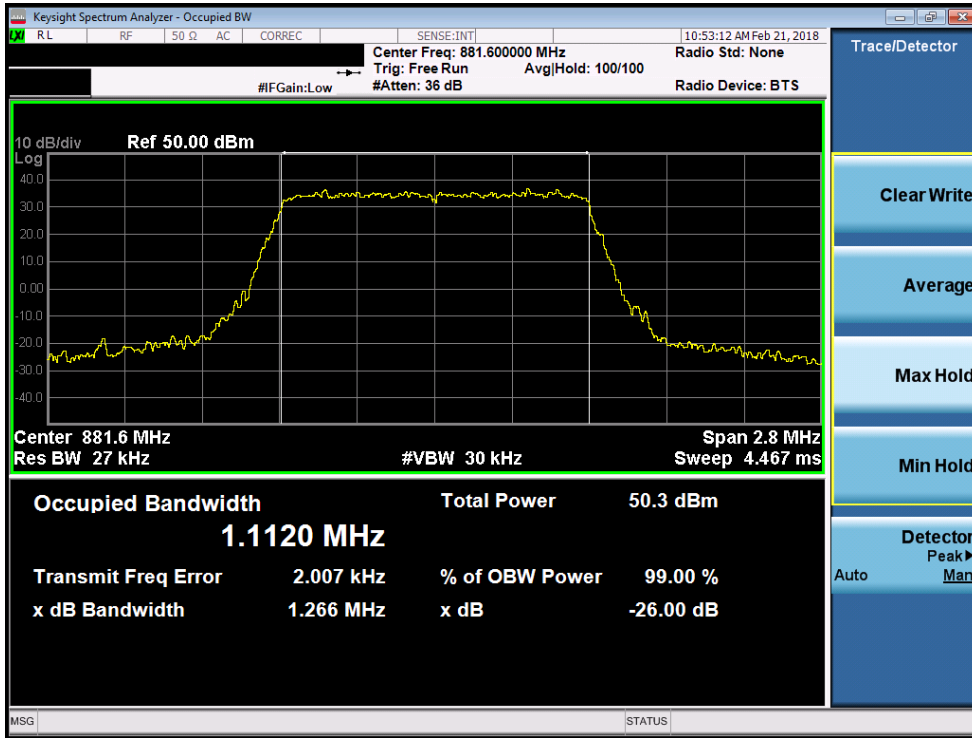
Figure 7-1. Test Instrument & Measurement Setup

Test Notes

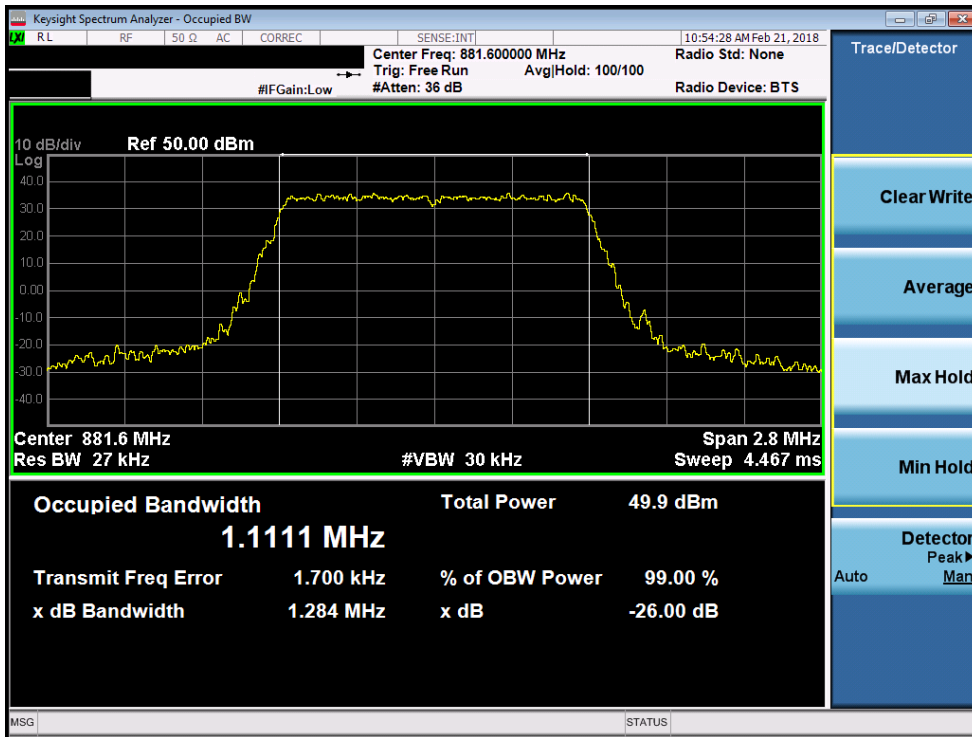
None.

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 65 of 175

Band 5 – Antenna 1

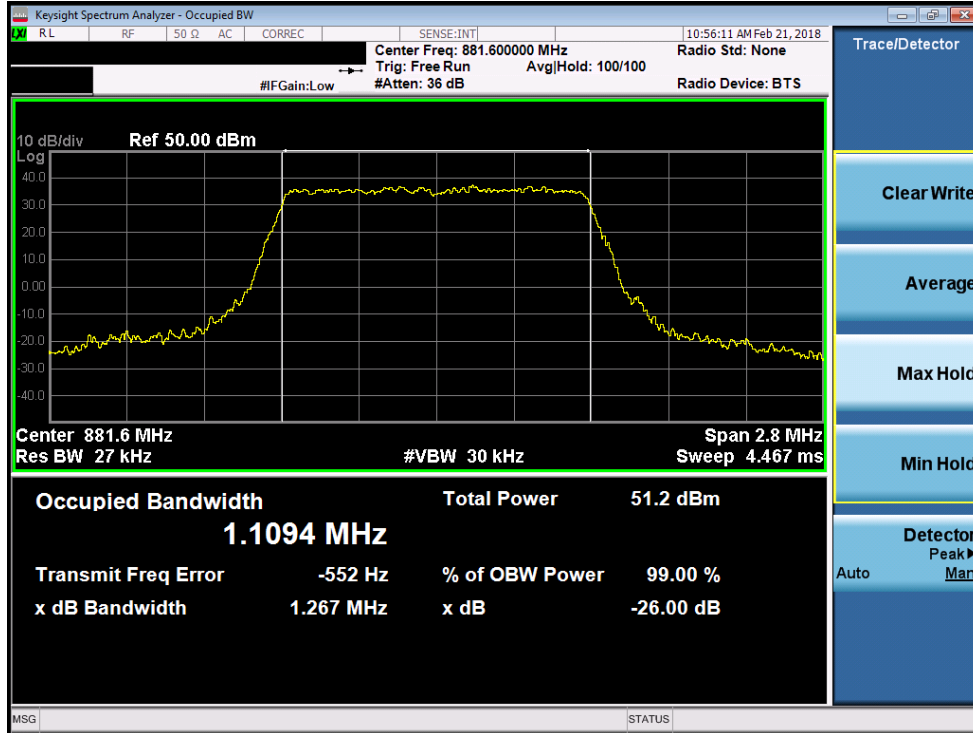


Plot 7-97. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK)

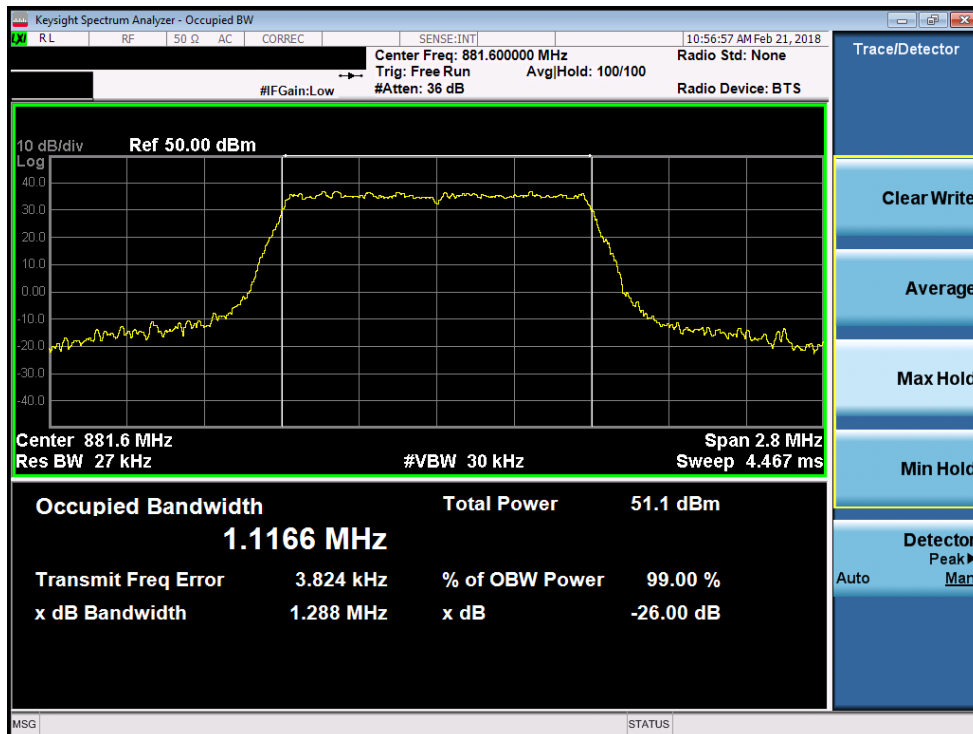


Plot 7-98. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 66 of 175

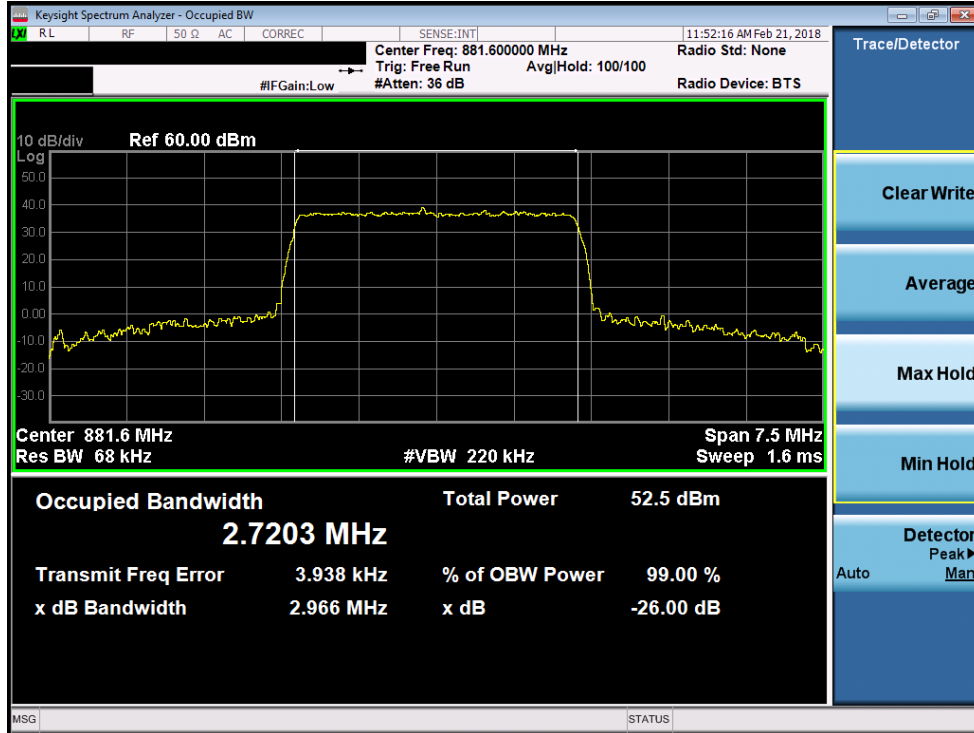


Plot 7-99. Occupied Bandwidth Plot (Band 5 - 1.4MHz 64-QAM)

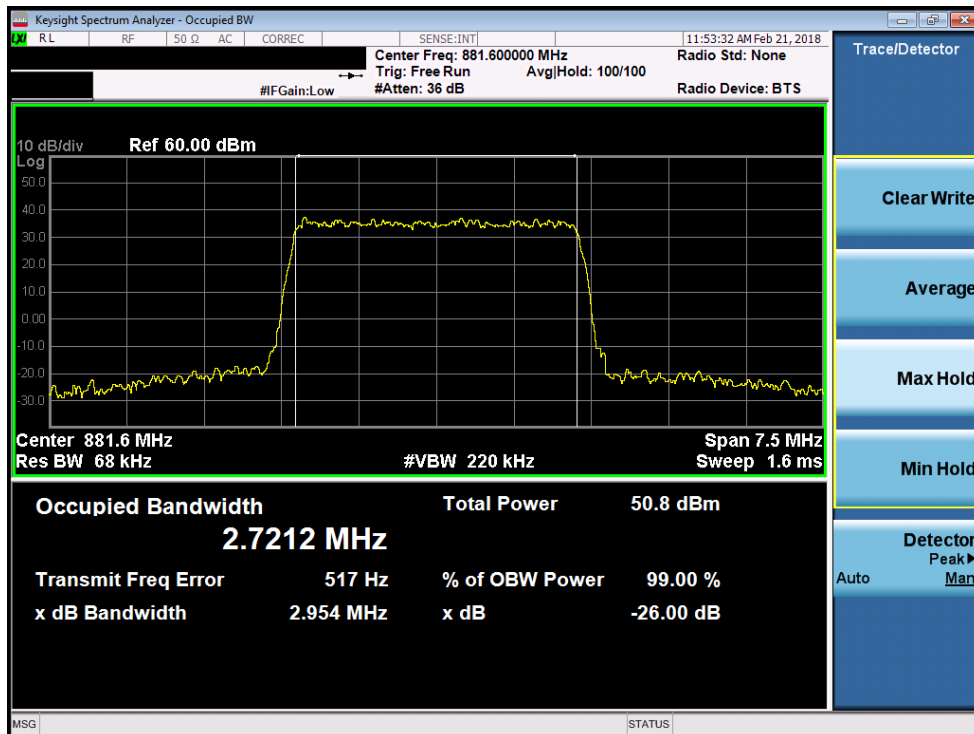


Plot 7-100. Occupied Bandwidth Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005			MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head			Page 67 of 175

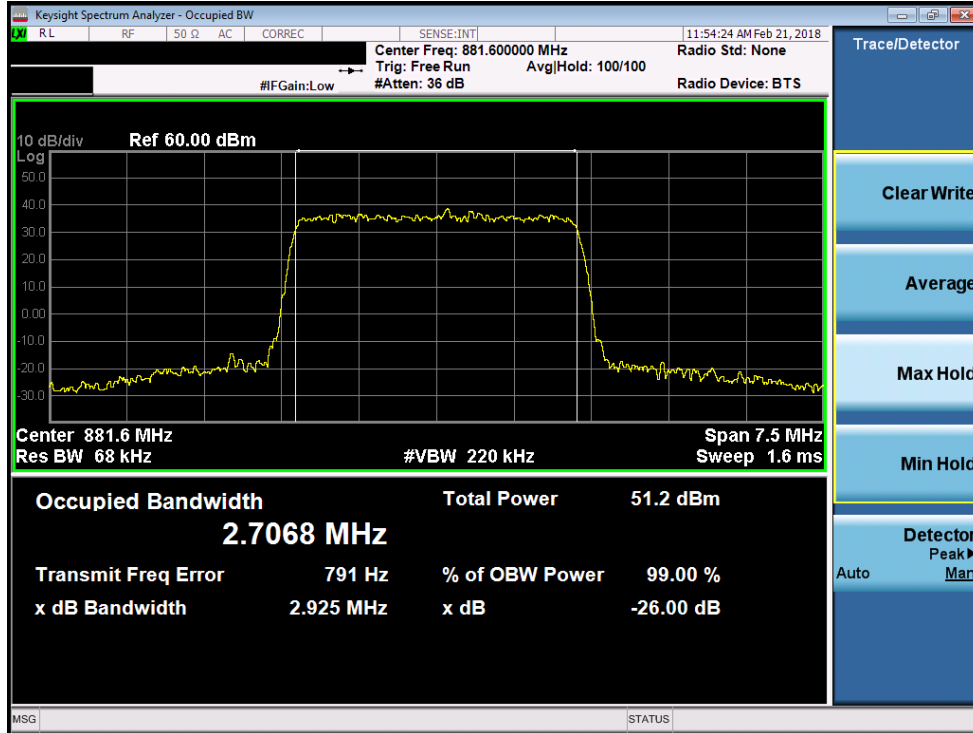


Plot 7-101. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK)

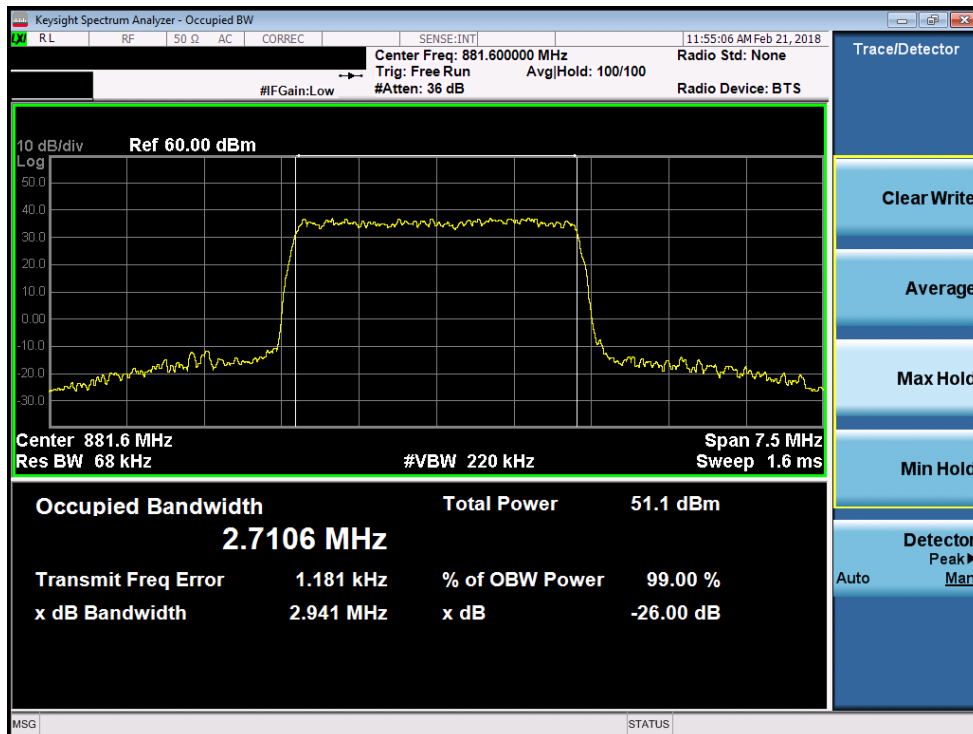


Plot 7-102. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 68 of 175

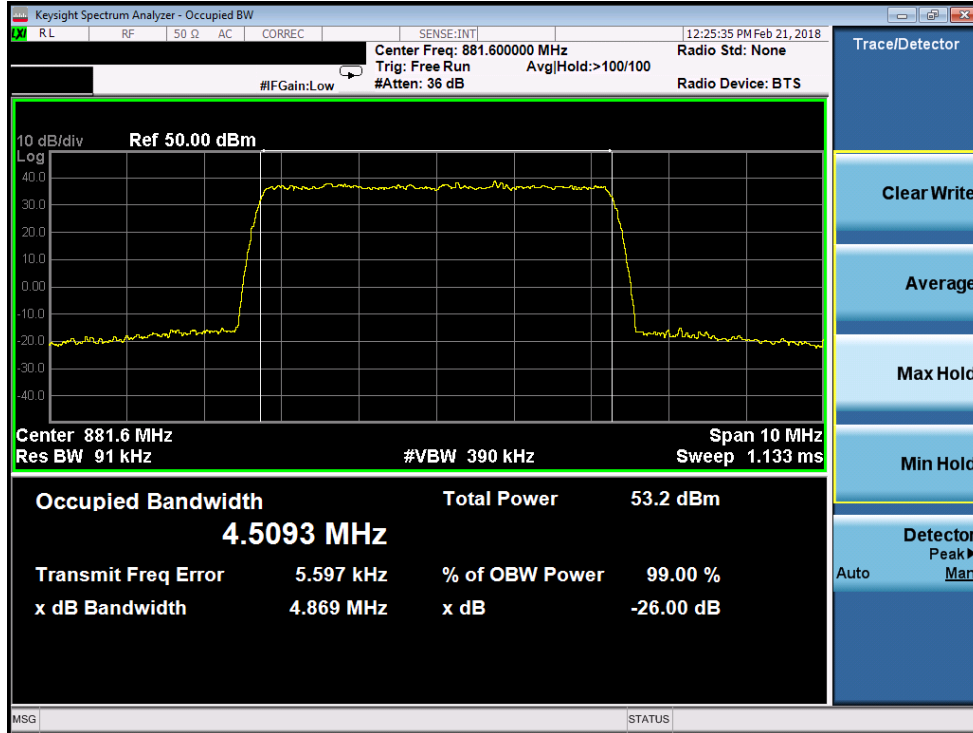


Plot 7-103. Occupied Bandwidth Plot (Band 5 - 3.0MHz 64-QAM)

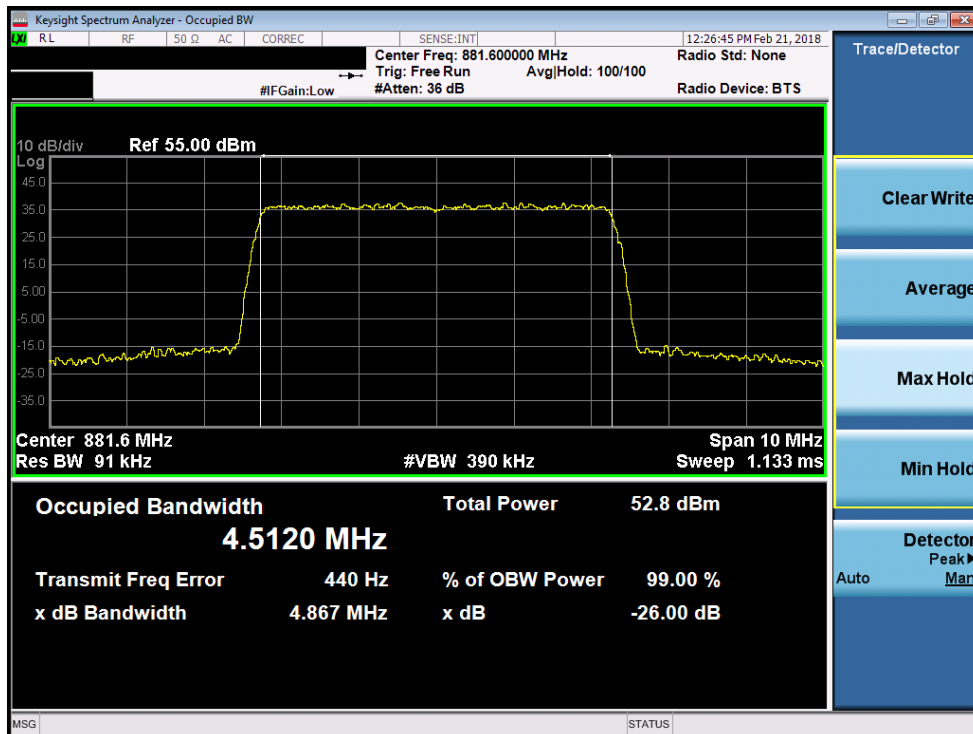


Plot 7-104. Occupied Bandwidth Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 69 of 175

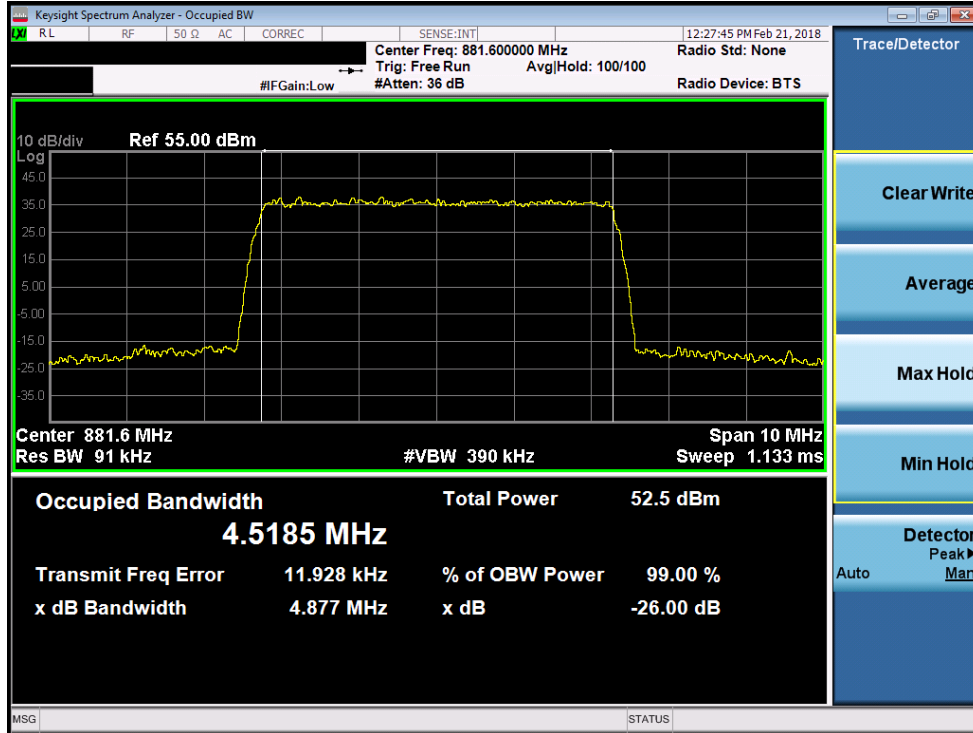


Plot 7-105. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK)

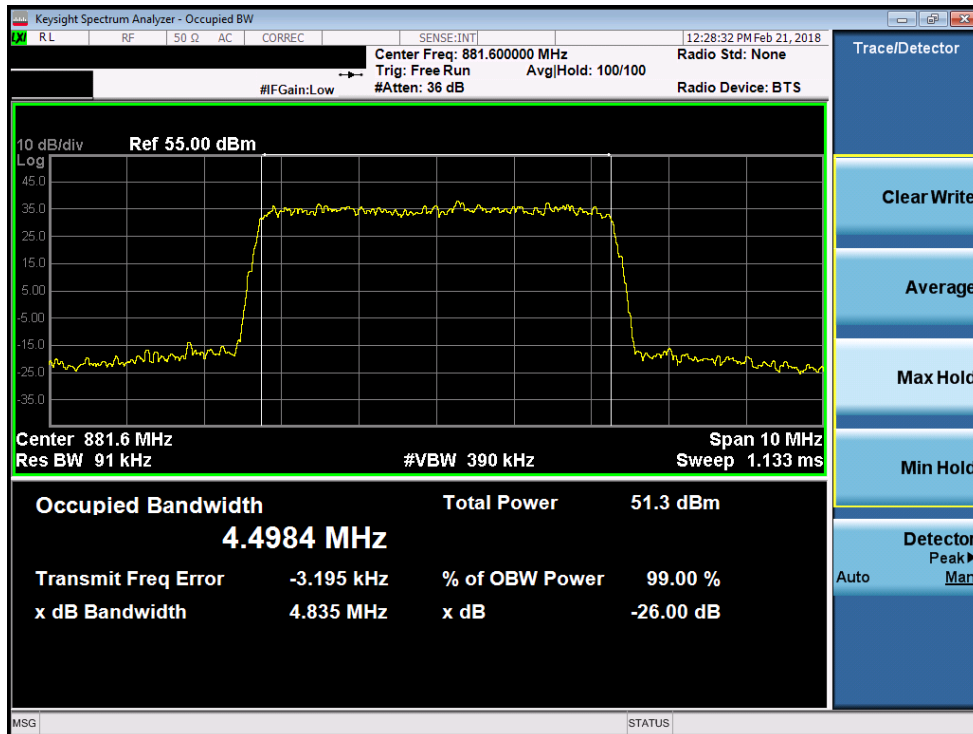


Plot 7-106. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 70 of 175

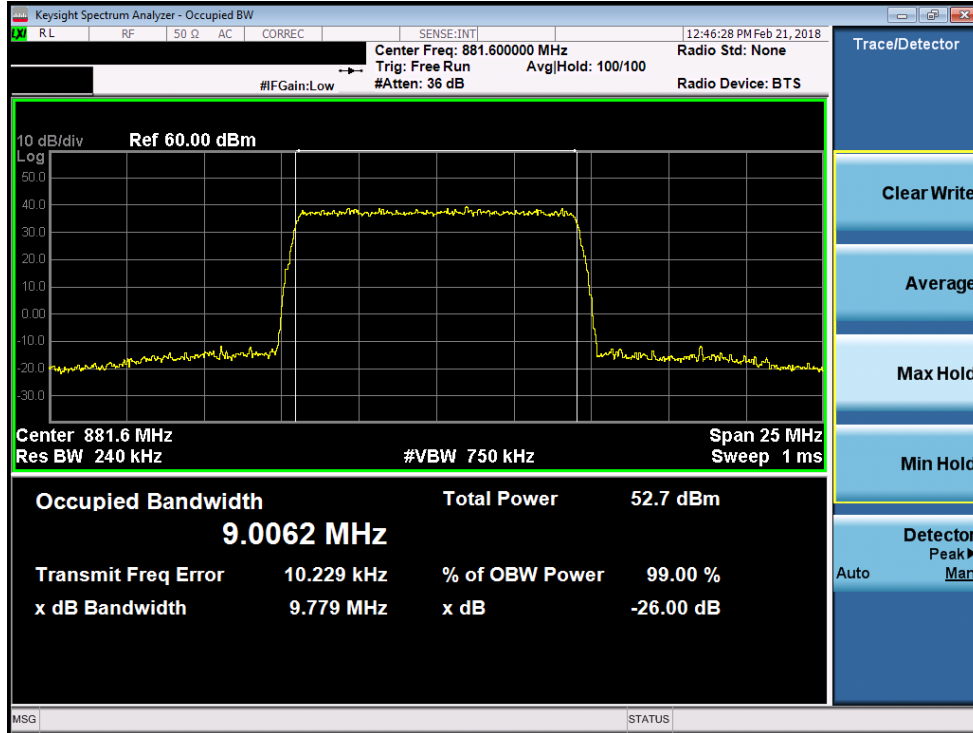


Plot 7-107. Occupied Bandwidth Plot (Band 5 - 5.0MHz 64-QAM)

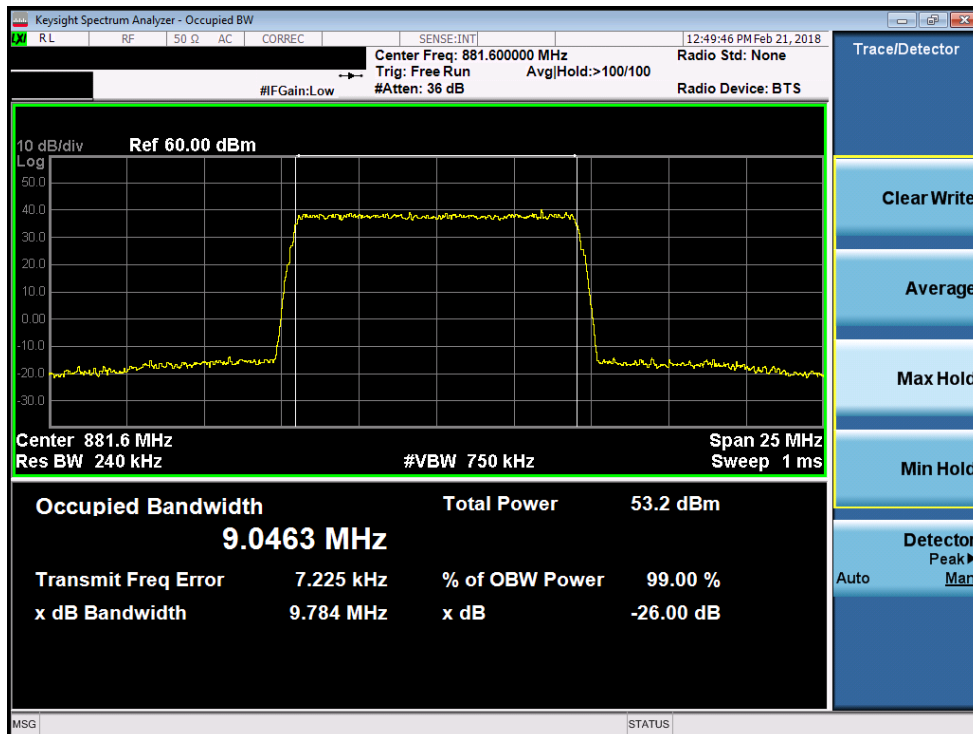


Plot 7-108. Occupied Bandwidth Plot (Band 5 - 5.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 71 of 175

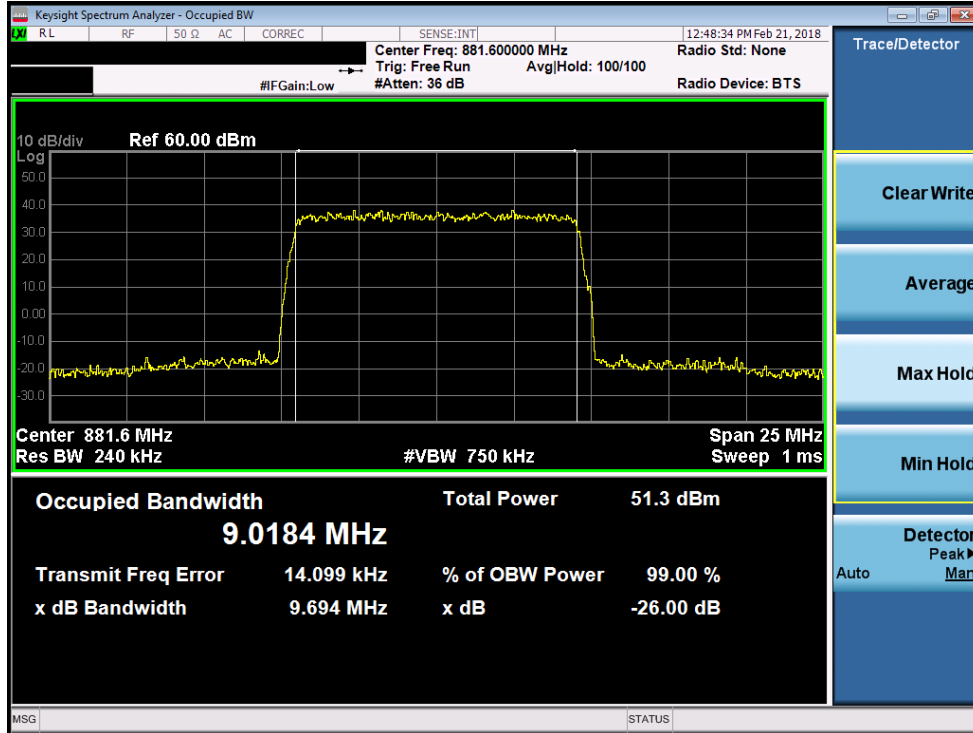


Plot 7-109. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK)

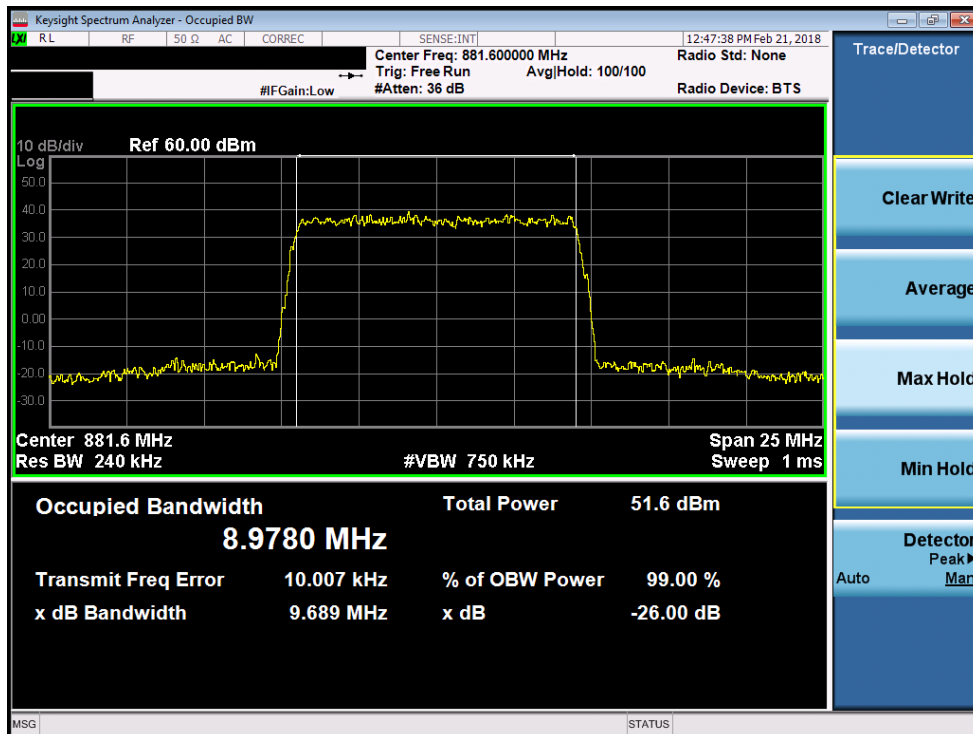


Plot 7-110. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 72 of 175



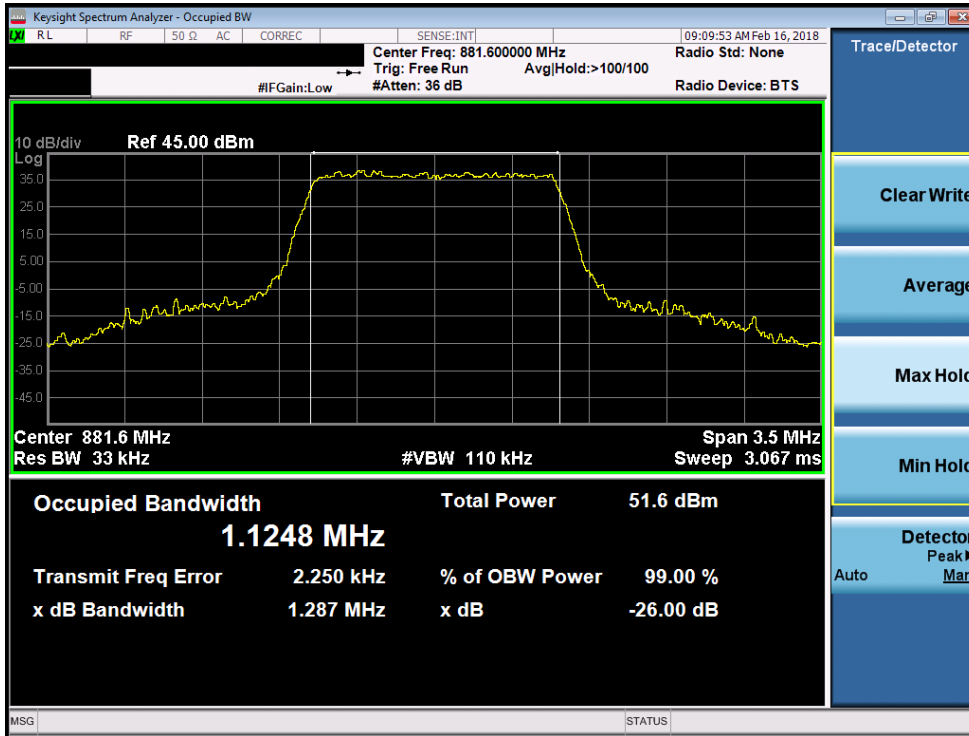
Plot 7-111. Occupied Bandwidth Plot (Band 5 - 10.0MHz 64-QAM)



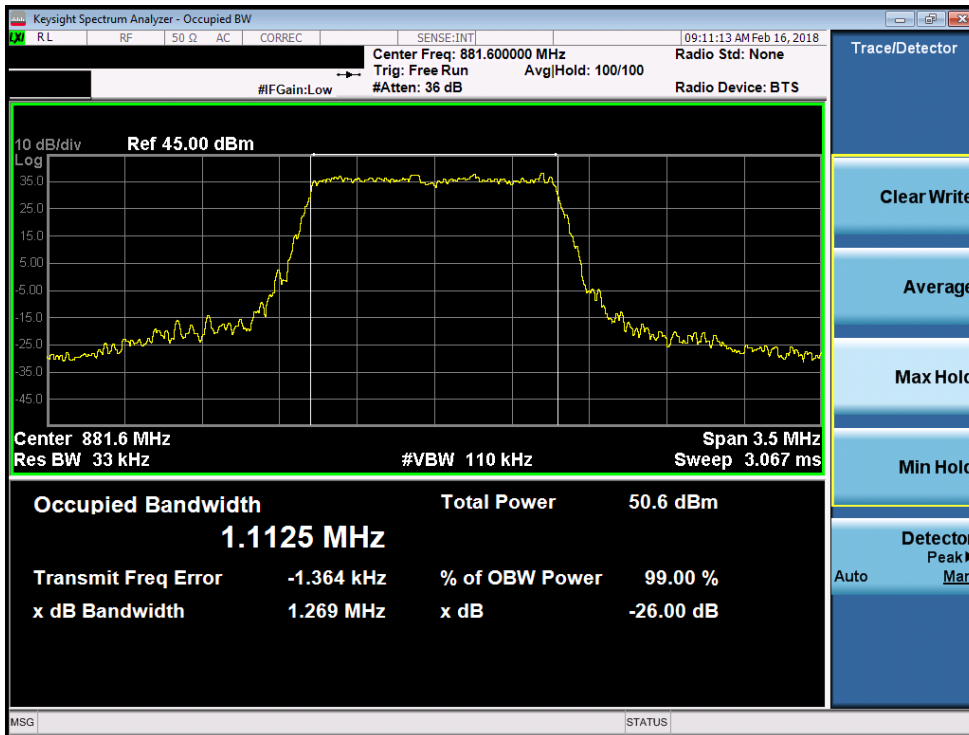
Plot 7-112. Occupied Bandwidth Plot (Band 5 - 10.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 73 of 175

Band 5 – Antenna 2

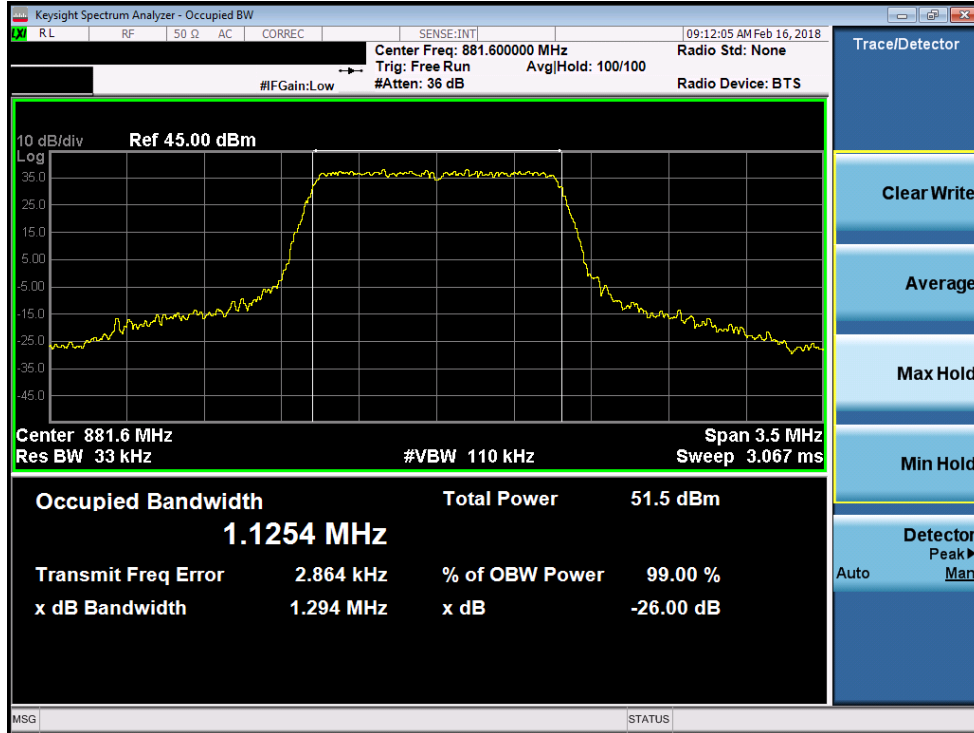


Plot 7-113. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK)

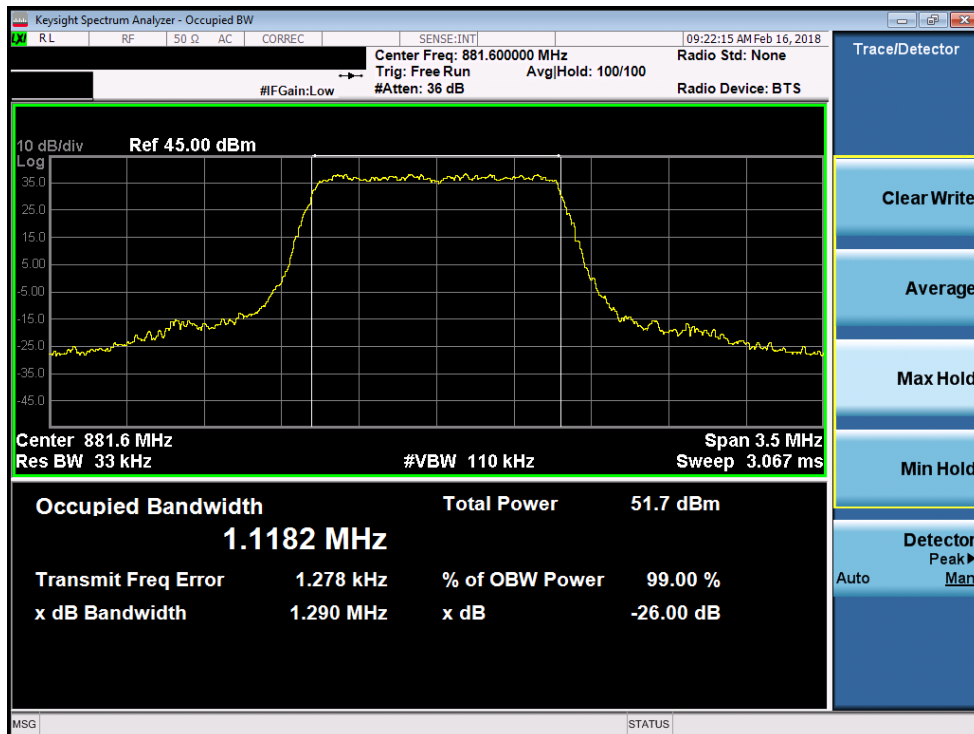


Plot 7-114. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 74 of 175

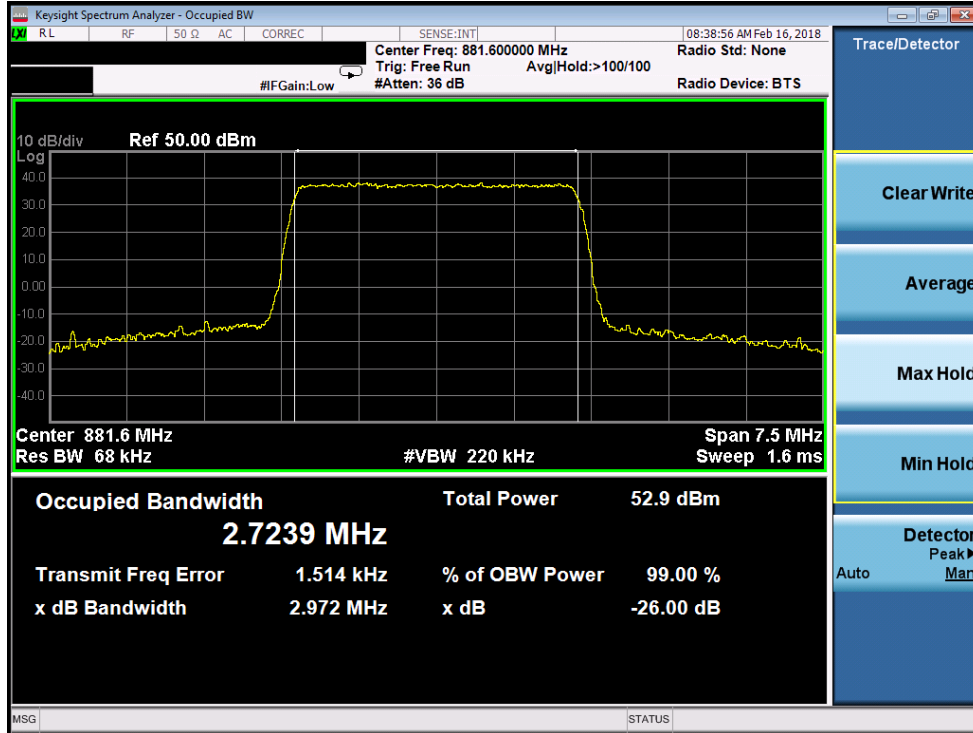


Plot 7-115. Occupied Bandwidth Plot (Band 5 - 1.4MHz 64-QAM)

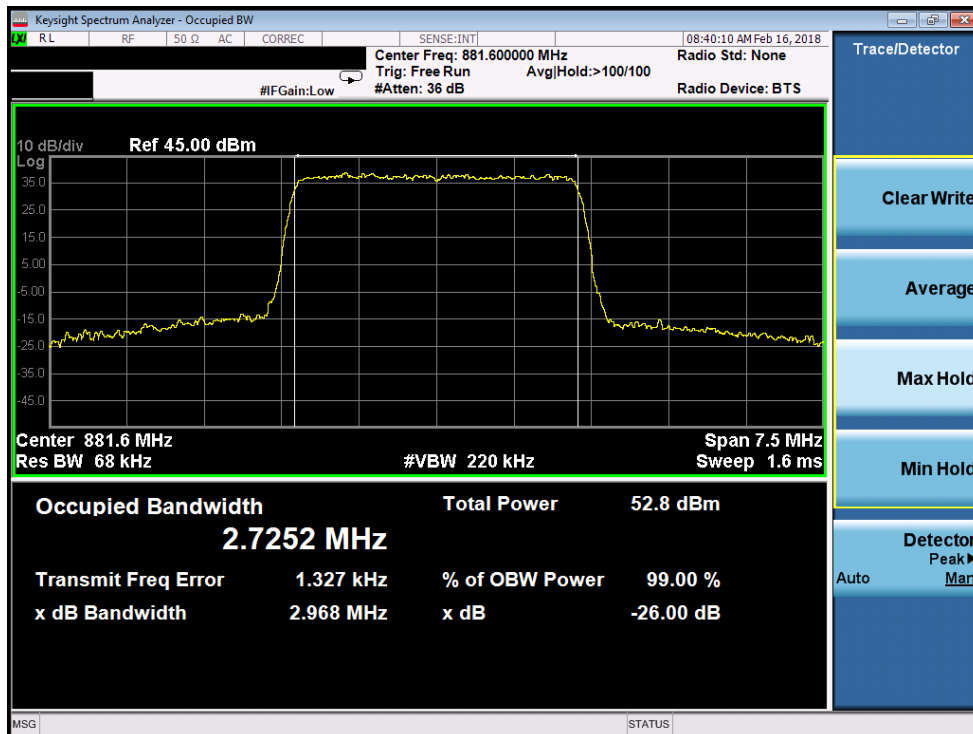


Plot 7-116. Occupied Bandwidth Plot (Band 5 - 1.4MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 75 of 175

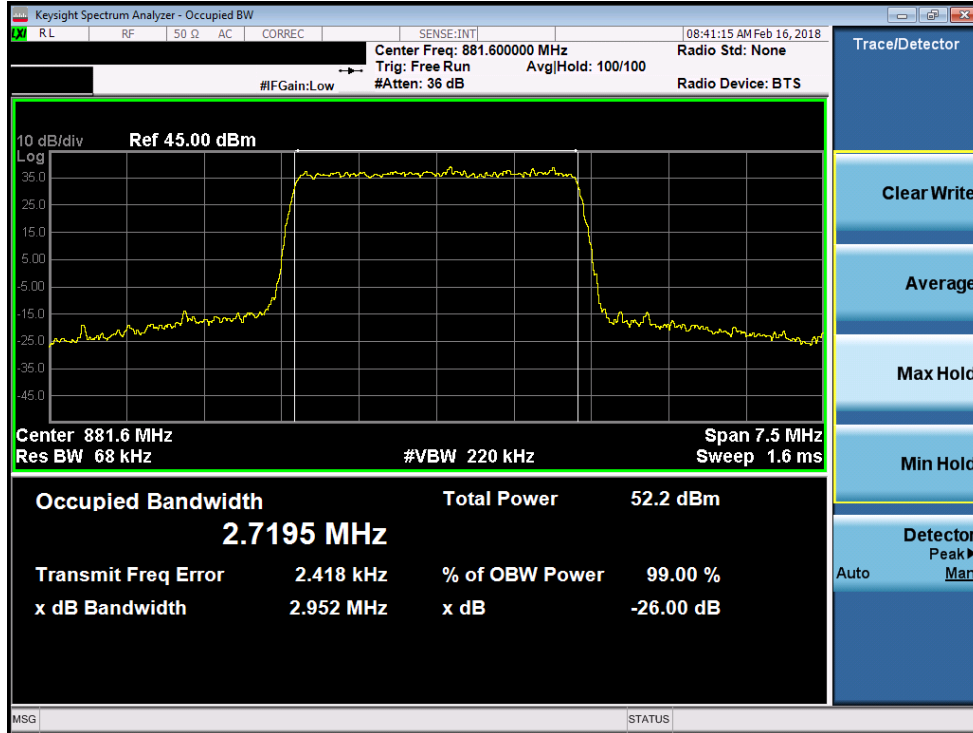


Plot 7-117. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK)

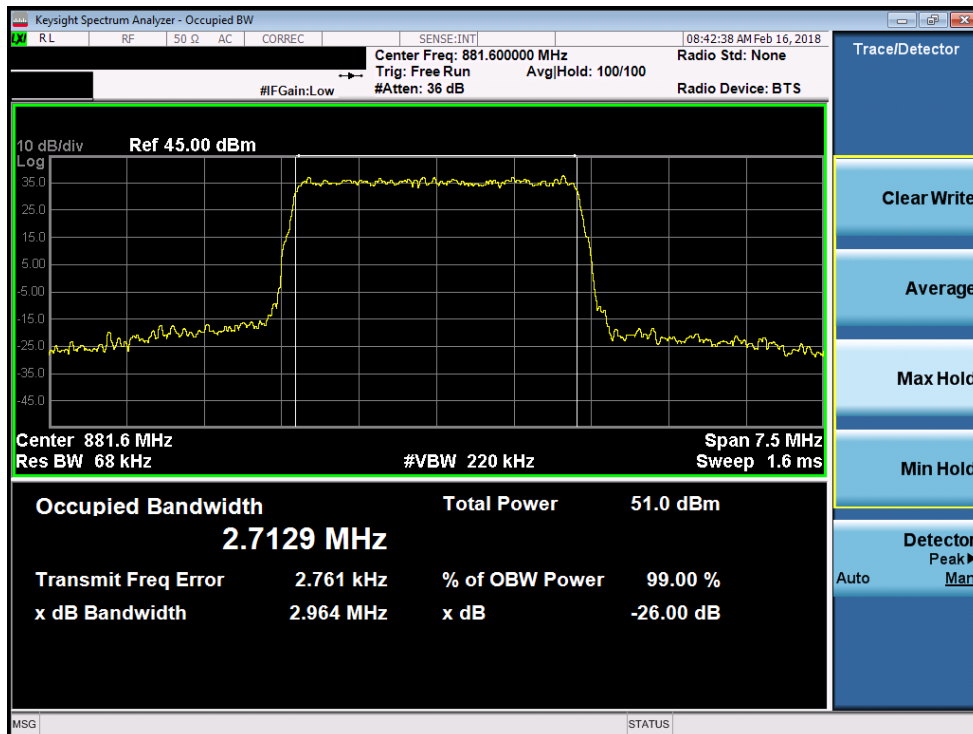


Plot 7-118. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 76 of 175

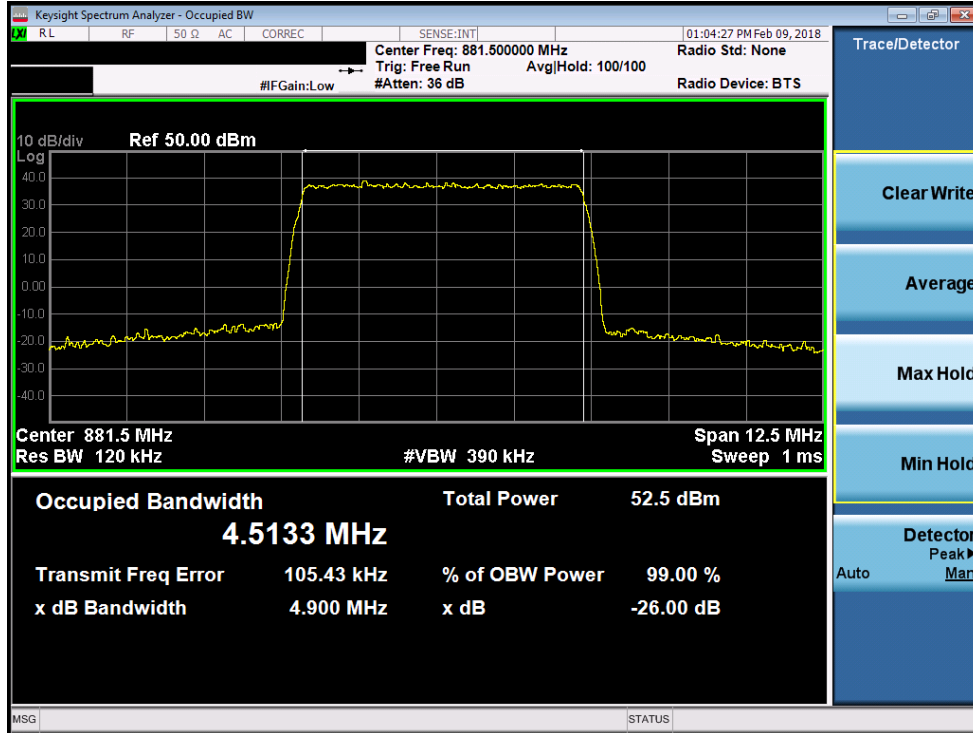


Plot 7-119. Occupied Bandwidth Plot (Band 5 - 3.0MHz 64-QAM)

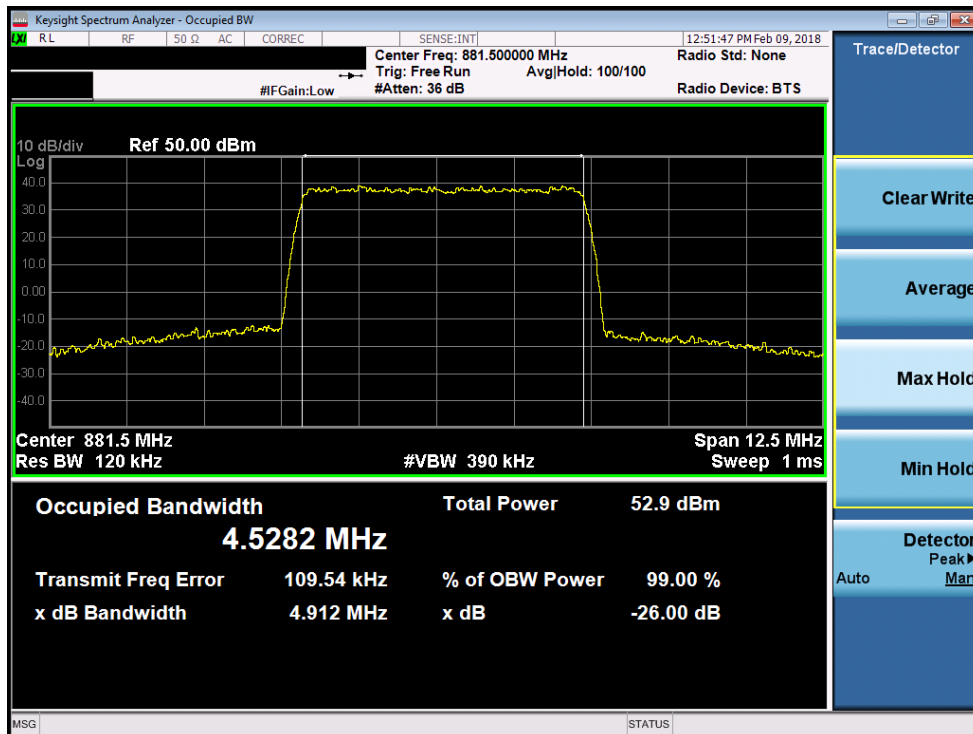


Plot 7-120. Occupied Bandwidth Plot (Band 5 - 3.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 77 of 175

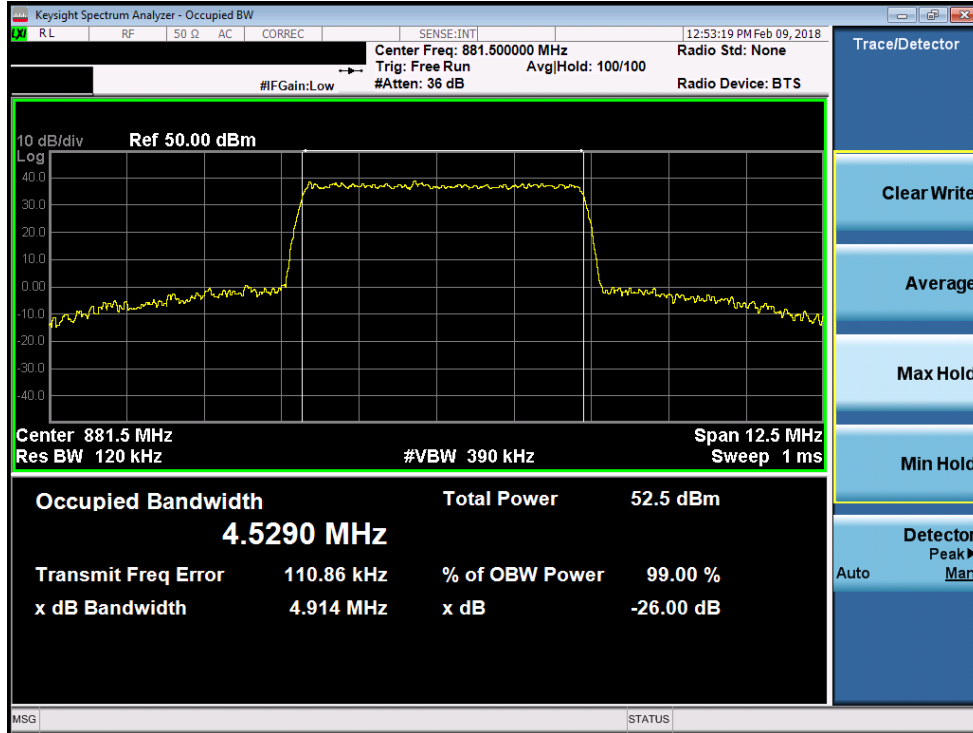


Plot 7-121. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK)

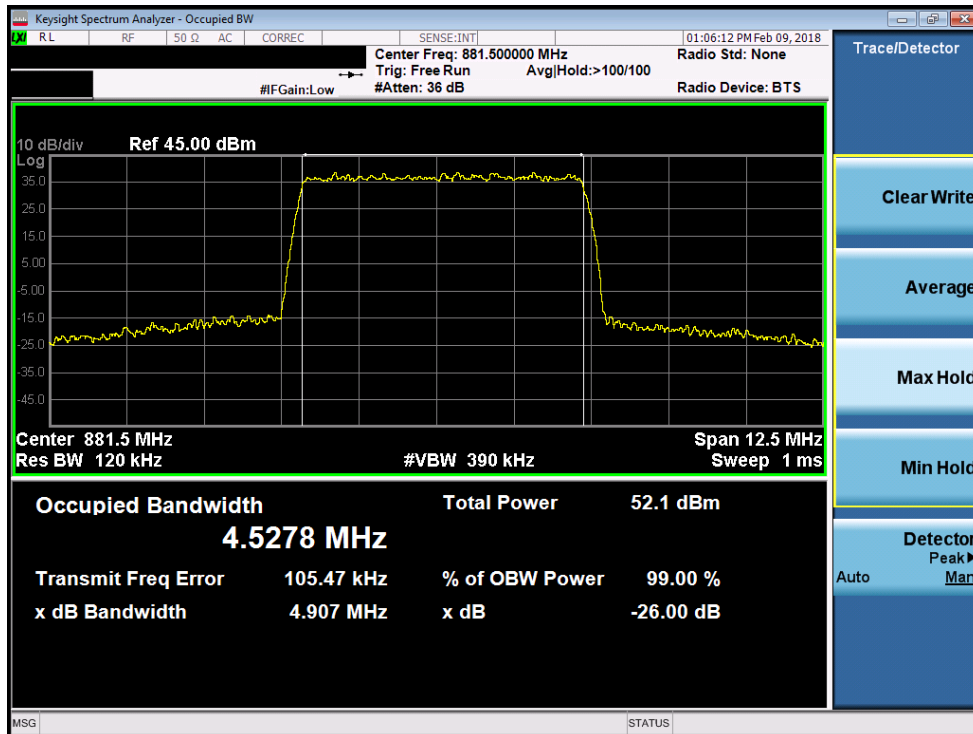


Plot 7-122. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 78 of 175

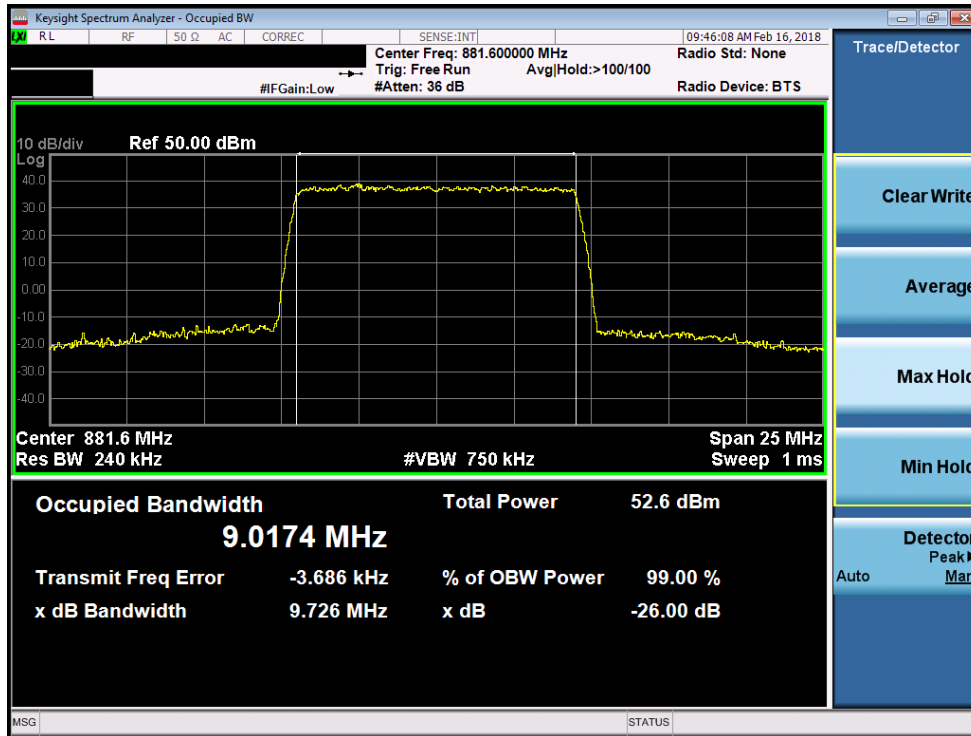


Plot 7-123. Occupied Bandwidth Plot (Band 5 - 5.0MHz 64-QAM)

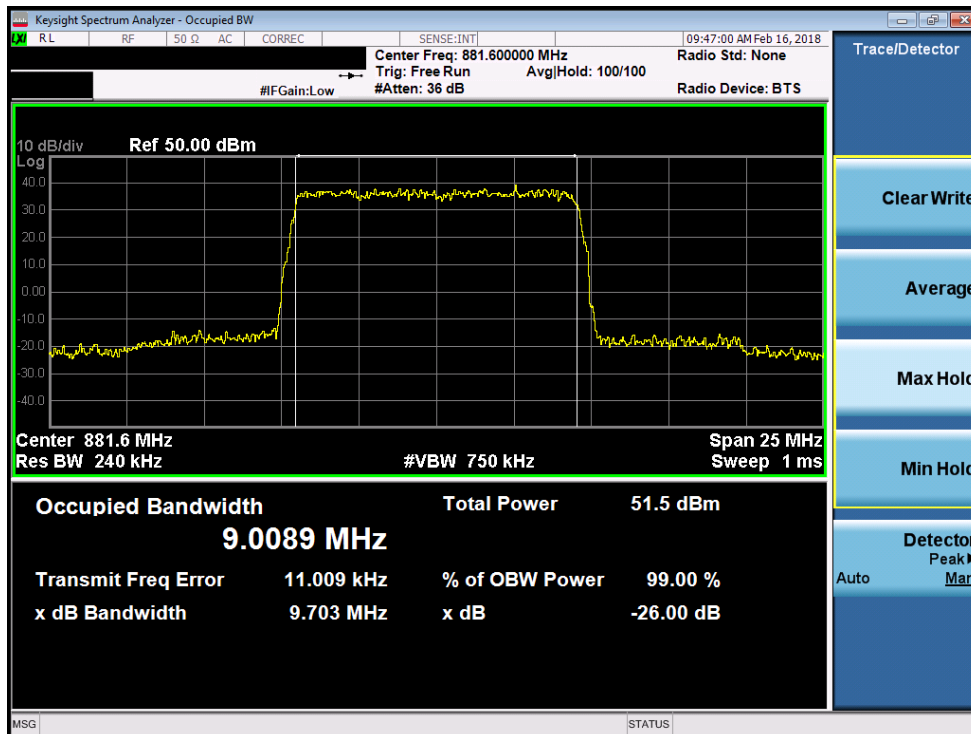


Plot 7-124. Occupied Bandwidth Plot (Band 5 - 5.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02.QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 79 of 175

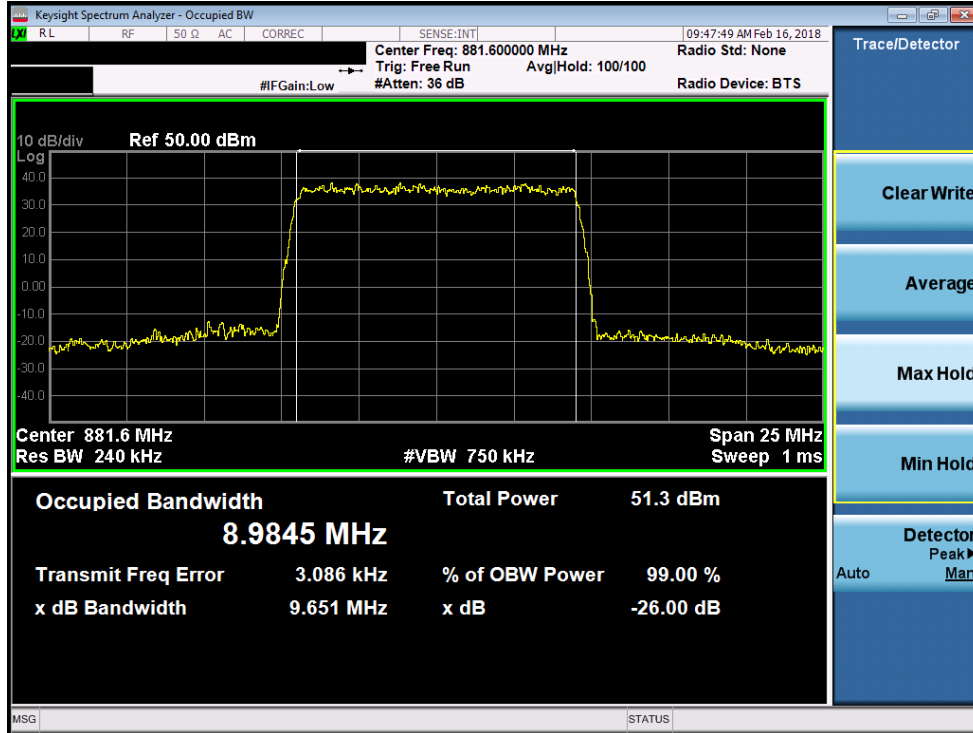


Plot 7-125. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK)

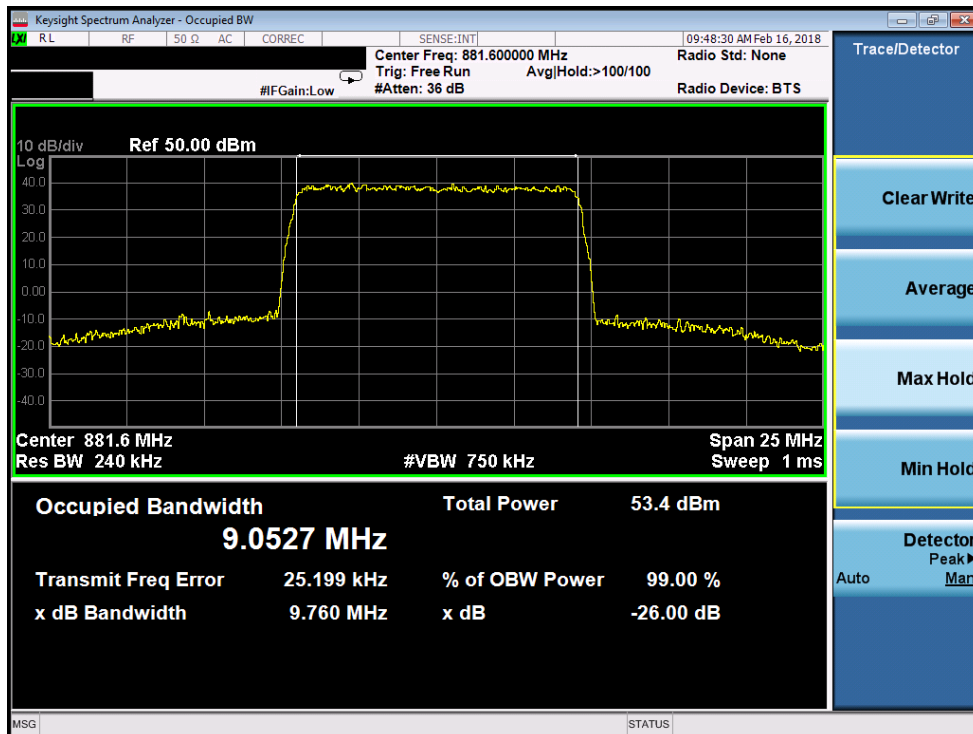


Plot 7-126. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 80 of 175



Plot 7-127. Occupied Bandwidth Plot (Band 5 - 10.0MHz 64-QAM)



Plot 7-128. Occupied Bandwidth Plot (Band 5 - 10.0MHz 256-QAM)

FCC ID: QLJ4GRFN-005		MEASUREMENT REPORT (CERTIFICATION)		Approved by: Quality Manager
Test Report S/N: 1M1801290011-02-QLJ	Test Dates: 2/5-2/22/2018	EUT Type: Remote Radio Head		Page 81 of 175