

RF TEST REPORT



Report No.: FCC_RF_SL16072901-SPC-007_0205
Supersede Report No.:

Applicant	SpiderCloud Wireless, Inc.		
Product Name	SpiderCloud RadioNode SCRN-310-0205		
Model No.	SCRN-310-0205		
Test Standard	47CFR Part24 47CFR Part27		
Test Method	TIA-603-D: 2010		
FCC ID	Y47RN310B2B5		
Date of test	02/13/2014 - 09/30/2015 09/21/2016 - 09/28/2016		
Issue Date	09/28/2016		
Test Result	<u>Pass</u>	Fail	
Equipment complied with the specification	[x]		
Equipment did not comply with the specification	[]		
Gary Chou			
Gary Chou		Chen Ge	
Test Engineer		Engineer Reviewer	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only			

Issued By:
SIEMIC Laboratories
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Laboratory Introduction

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Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless ,Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRR, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF , Telecom
HongKong	OFTA (US002)	RF , Telecom

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1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_RF_SL16072901-SPC-007_0205	None	Original	09/28/2016

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: SpiderCloud Wireless, Inc.
Product: SpiderCloud RadioNode SCRN-310-0205
Model: SCRN-310-0205

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	SpiderCloud Wireless, Inc.
Applicant Address	475 Sycamore Dr, Milpitas, CA 95035
Manufacturer Name	SpiderCloud Wireless, Inc.
Manufacturer Address	475 Sycamore Dr, Milpitas, CA 95035

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name	SpiderCloud RadioNode SCRN-310-0205
Model No.	SCRN-310-0205
Trade Name	SpiderCloud
Serial No.	16221X19781
Input Power	56VDC (PoE)
Power Adapter Manu/Model	POE36U-1AT-R
Power Adapter SN	-
Hardware version	-
Software version	-
Date of EUT received	09/20/2016
Equipment Class/ Category	TNB
Operating Frequencies	LTE: TX (1930 MHz to 1995 MHz), LTE: RX (1850 MHz to 1915 MHz) LTE: TX (869 MHz to 894 MHz), LTE: RX (824 MHz to 849 MHz)
Port/Connectors	RJ45 (PoE)
Remark	NONE

6.2 Radio Description

Item	LTE	LTE
Operating Band /Radio Type	LTE Band 5	LTE Band 2
Bandwidth	5MHz, 10MHz	5MHz, 10 MHz, 15MHz, 20 MHz
Modulation	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM
Antenna Type	Internal Omni-directional antenna/ External Dipole antenna	Internal Omni-directional antenna/ External Dipole antenna
Antenna Gain	3 dBi / 2dBi	3 dBi / 2dBi
Frequency TX(MHz)	TX: 869 MHz to 894 MHz RX: 824 MHz to 849 MHz	TX: 1930 MHz to 1995 MHz RX: 1850 MHz to 1915 MHz

Item	UMTS
Operating Band /Radio Type	UMTS Band 5
Bandwidth	3.84MHz
Modulation	QPSK
Antenna Type	Internal Omni-directional antenna/ External Dipole antenna
Antenna Gain	3 dBi / 2dBi
Frequency TX(MHz)	TX: 869 MHz to 894 MHz RX: 824 MHz to 849 MHz

6.3 EUT test modes/configuration Description

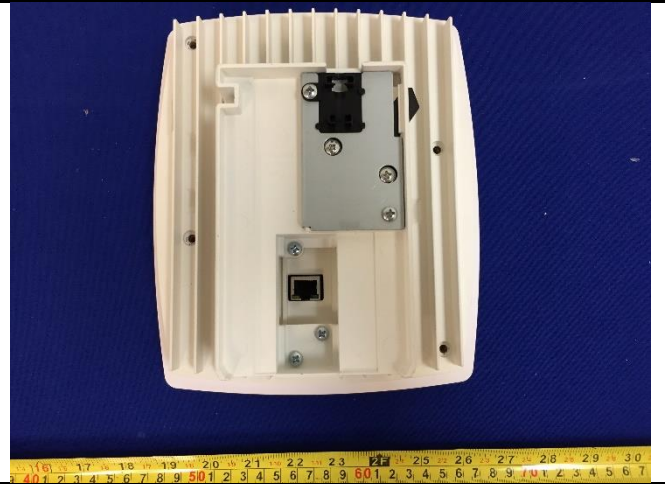
Test mode

Final Test Mode		Note
Final_test_mode_1	Continuous transmission, single channel	LTE
Final_test_mode_2	Continuous transmission, single channel	UMTS
Remark: NONE		

6.4 EUT Photos - External



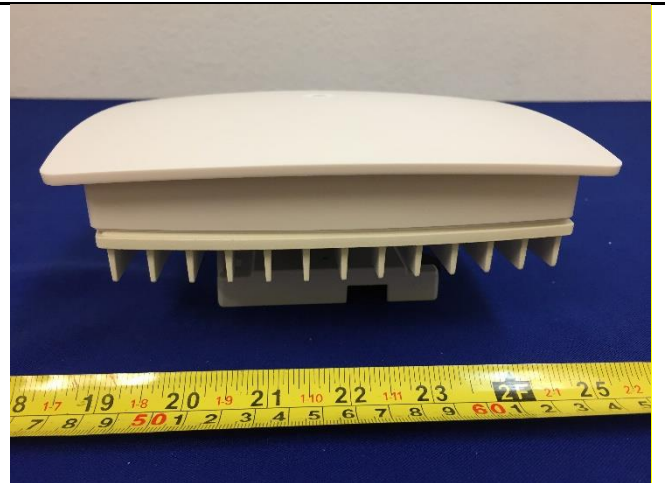
Top View



Bottom View



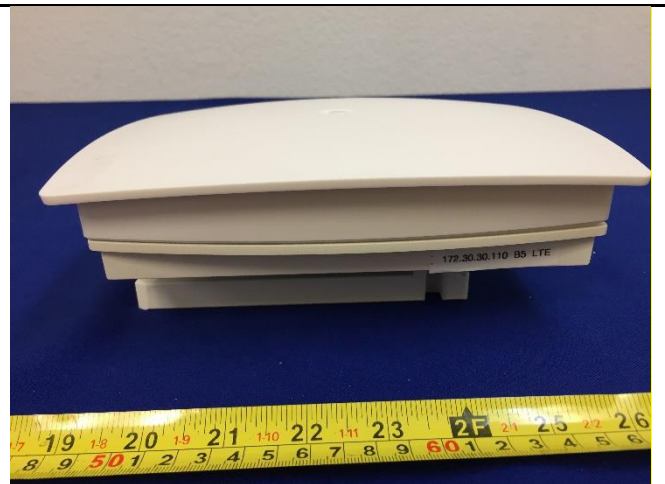
Front View



Rear View



Left Side View



Right Side View

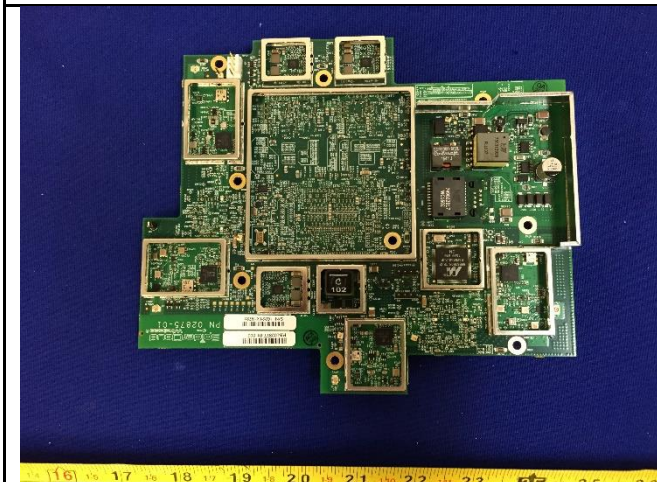
6.5 EUT Photos - Internal



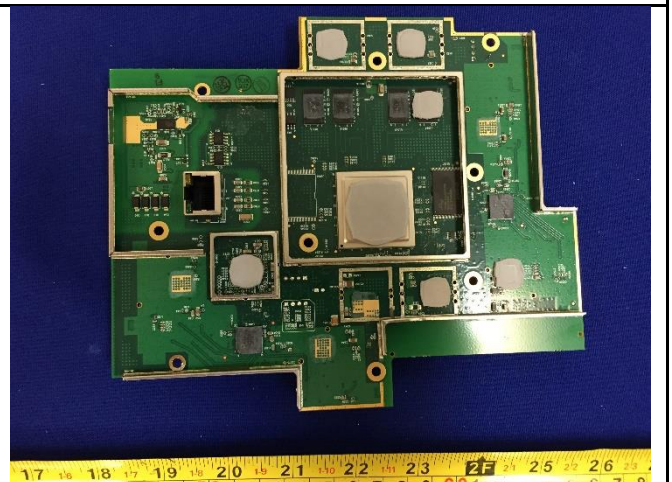
Open case Top view



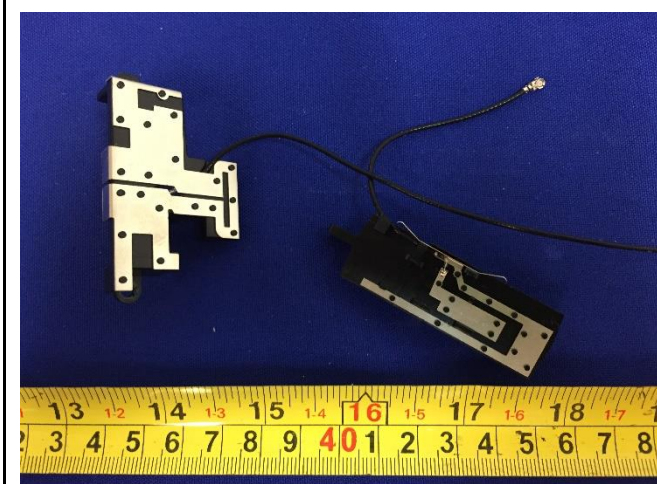
Main PCB with shielding - Top View



Main PCB without shielding - Top View



Main PCB without shielding - Bottom View



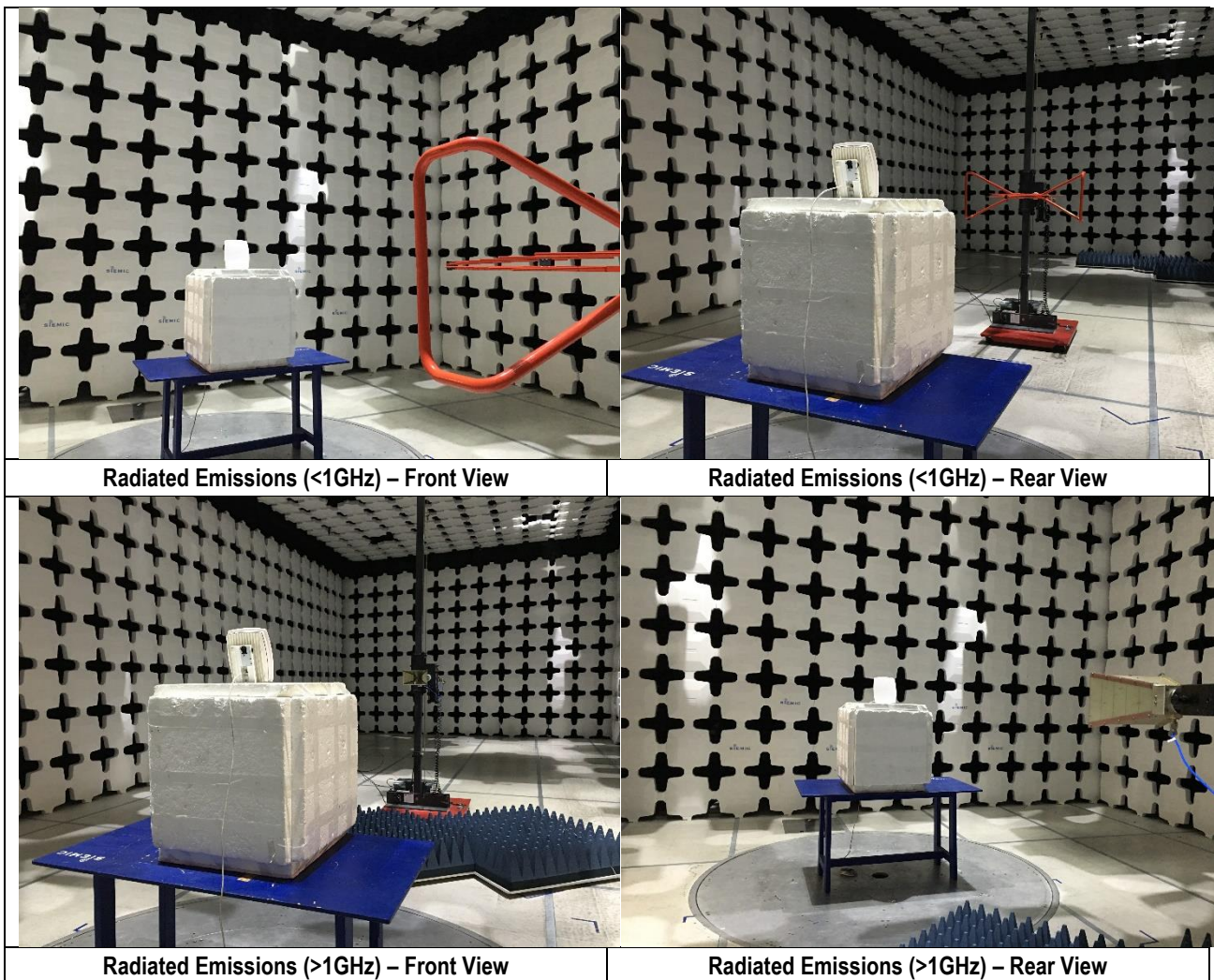
Internal antennas



External antennas

6.6 EUT Test Setup Photos

Internal Antenna:

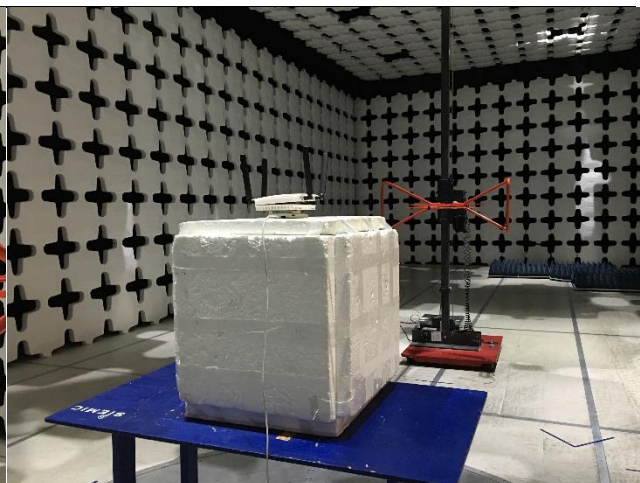


Note: The spurious emission in different EUT orientation was investigated, including the EUT standing up position and the laying down position. The EUT orientation shown in above setup photo is the worst case position.

External Antenna:



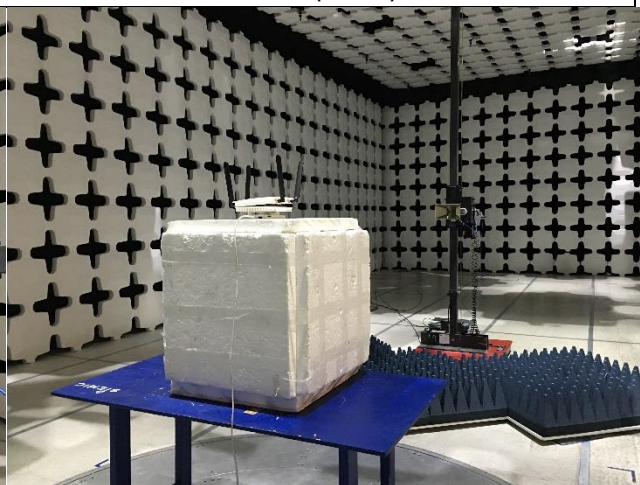
Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

Note: The spurious emission in different EUT orientation was investigated, including the EUT standing up position and the laying down position. The EUT orientation shown in above setup photo is the worst case position.

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	PoE Adatper	POE36U-1AT-R	P90212324A1	Phihong	-

7.2 Test Software Description

Test Item	Software	Description
RF testing	ePerview	Enable EUT continuous TX mode and change to different channel (LTE)
RF testing	Perview	Enable EUT continuous TX mode and change to different channel (UMTS)

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
E.R.P/ E.I.R.P	FCC	47CFR24.232, 47CFR27.50	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Occupied Bandwidth	FCC	47CFR24.238(a), 47CFR27.53	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Peak-Average Ratio	FCC	47CFR24.232, 47CFR27.50	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Spurious and harmonic Emission at antenna port	FCC	47CFR2.1051, 47CFR24.238, 47CFR27.53	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Band Edge	FCC	47CFR2.1053, 47CFR24.238, 47CFR27.53	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Radiated spurious and harmonic emission	FCC	47CFR2.1053, 47CFR24.238, 47CFR27.53	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Frequency stability	FCC	47CFR2.1055, 47CFR24.135, 47CFR27.54	FCC	TIA-603-D: 2010	☒ Pass ☐ N/A
Remark	- All measurement uncertainties do not take into consideration for all presented test results. - The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.				

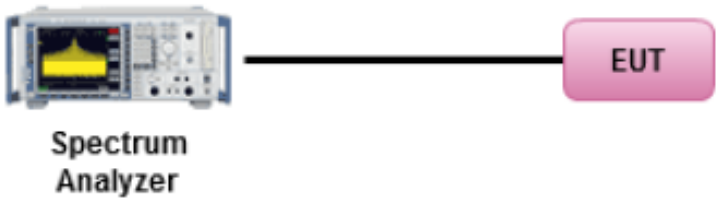
9 Measurement Uncertainty

Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	1GHz – 40GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+4.3dB/-4.1dB

10 Measurements, Examination and Derived Results

10.1 RF Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR 22.913(a)	-	The maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.	☐
47CFR24.232	-	Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.	☒
47CFR27.50	-	The maximum effective radiated power (ERP) of fixed and base station must not exceed 1000 Watts.	☒
Test Setup	 The diagram illustrates the test setup. On the left is a Spectrum Analyzer with a yellow signal trace on its screen. A black line connects the Spectrum Analyzer to a pink rounded rectangle on the right labeled 'EUT'.		
Test Procedure	- EUT was set for low, mid, high channel with modulated mode and highest RF output power. - The spectrum analyzer was connected to the antenna terminal.		
Test Date	09/24/2015 – 09/30/2015 09/21/2016 – 09/28/2016	Environmental condition	Temperature 22°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	NONE		
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

Test was done by Chen Ge at RF Test Site.

Test Data for LTE band 2:

For internal antenna, Gain=3dBi.

Type	Channel	Frequency (MHz)	Measured PW –Port 1(dBm)	Measured PW –Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	1932.5	21.25	21.23	24.25	3	27.25
	Mid	1960.0	20.88	20.89	23.90	3	26.90
	High	1987.5	20.82	20.78	23.81	3	26.81
5MHz BW, 64QAM	Low	1932.5	20.80	20.84	23.83	3	26.83
	Mid	1960.0	20.43	20.45	23.45	3	26.45
	High	1987.5	20.78	20.84	23.82	3	26.82
10MHz BW, QPSK	Low	1935.0	21.52	21.63	24.59	3	27.59
	Mid	1960.0	21.06	21.02	24.05	3	27.05
	High	1985.0	20.70	20.71	23.72	3	26.72
10MHz BW, 64QAM	Low	1935.0	21.05	21.05	24.06	3	27.06
	Mid	1960.0	20.52	20.54	23.54	3	26.54
	High	1985.0	20.10	20.07	23.10	3	26.10
15MHz BW, QPSK	Low	1937.5	21.56	21.55	24.57	3	27.57
	Mid	1960.0	20.88	20.87	23.89	3	26.89
	High	1982.5	20.33	20.30	23.33	3	26.33
15MHz BW, 64QAM	Low	1937.5	21.07	21.05	24.07	3	27.07
	Mid	1960.0	20.39	20.38	23.40	3	26.40
	High	1982.5	20.82	20.84	23.84	3	26.84
20MHz BW, QPSK	Low	1940.0	20.93	20.84	23.90	3	26.90
	Mid	1960.0	21.07	21.13	24.11	3	27.11
	High	1980.0	20.72	20.70	23.72	3	26.72
20MHz BW, 64QAM	Low	1940.0	21.27	21.28	24.29	3	27.29
	Mid	1960.0	21.63	21.58	24.62	3	27.62
	High	1980.0	21.25	21.19	24.23	3	27.23

For external antenna, Gain=2dBi.

Type	Channel	Frequency (MHz)	Measured PW –Port 1(dBm)	Measured PW –Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	1932.5	21.25	21.23	24.25	2	26.25
	Mid	1960.0	20.88	20.89	23.90	2	25.90
	High	1987.5	20.82	20.78	23.81	2	25.81
5MHz BW, 64QAM	Low	1932.5	20.80	20.84	23.83	2	25.83
	Mid	1960.0	20.43	20.45	23.45	2	25.45
	High	1987.5	20.78	20.84	23.82	2	25.82
10MHz BW, QPSK	Low	1935.0	21.52	21.63	24.59	2	26.59
	Mid	1960.0	21.06	21.02	24.05	2	26.05
	High	1985.0	20.70	20.71	23.72	2	25.72
10MHz BW, 64QAM	Low	1935.0	21.05	21.05	24.06	2	26.06
	Mid	1960.0	20.52	20.54	23.54	2	25.54
	High	1985.0	20.10	20.07	23.10	2	25.10
15MHz BW, QPSK	Low	1937.5	21.56	21.55	24.57	2	26.57
	Mid	1960.0	20.88	20.87	23.89	2	25.89
	High	1982.5	20.33	20.30	23.33	2	25.33
15MHz BW, 64QAM	Low	1937.5	21.07	21.05	24.07	2	26.07
	Mid	1960.0	20.39	20.38	23.40	2	25.40
	High	1982.5	20.82	20.84	23.84	2	25.84
20MHz BW, QPSK	Low	1940.0	20.93	20.84	23.90	2	25.90
	Mid	1960.0	21.07	21.13	24.11	2	26.11
	High	1980.0	20.72	20.70	23.72	2	25.72
20MHz BW, 64QAM	Low	1940.0	21.27	21.28	24.29	2	26.29
	Mid	1960.0	21.63	21.58	24.62	2	26.62
	High	1980.0	21.25	21.19	24.23	2	26.23

Test Data for LTE band 5:

For internal antenna, Gain=3dBi.

Type	Channel	Frequency (MHz)	Measured PW –Port 1(dBm)	Measured PW –Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	871.5	21.10	21.25	24.19	3	27.19
	Mid	881.5	21.03	21.26	24.16	3	27.16
	High	891.5	21.60	21.32	24.47	3	27.47
5MHz BW, 64QAM	Low	871.5	21.02	21.29	24.17	3	27.17
	Mid	881.5	21.29	21.45	24.38	3	27.38
	High	891.5	21.18	21.48	24.34	3	27.34
10MHz BW, QPSK	Low	874.0	21.11	21.38	24.26	3	27.26
	Mid	881.5	21.16	21.45	24.32	3	27.32
	High	889.0	21.30	21.49	24.41	3	27.41
10MHz BW, 64QAM	Low	874.0	21.20	21.63	24.43	3	27.43
	Mid	881.5	21.26	21.57	24.43	3	27.43
	High	889.0	21.16	21.42	24.30	3	27.30

For external antenna, Gain=2dBi.

Type	Channel	Frequency (MHz)	Measured PW –Port 1(dBm)	Measured PW –Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	871.5	21.10	21.25	24.19	2	26.19
	Mid	881.5	21.03	21.26	24.16	2	26.16
	High	891.5	21.60	21.32	24.47	2	26.47
5MHz BW, 64QAM	Low	871.5	21.02	21.29	24.17	2	26.17
	Mid	881.5	21.29	21.45	24.38	2	26.38
	High	891.5	21.18	21.48	24.34	2	26.34
10MHz BW, QPSK	Low	874.0	21.11	21.38	24.26	2	26.26
	Mid	881.5	21.16	21.45	24.32	2	26.32
	High	889.0	21.30	21.49	24.41	2	26.41
10MHz BW, 64QAM	Low	874.0	21.20	21.63	24.43	2	26.43
	Mid	881.5	21.26	21.57	24.43	2	26.43
	High	889.0	21.16	21.42	24.30	2	26.30

Test Data for WCDMA band 5:

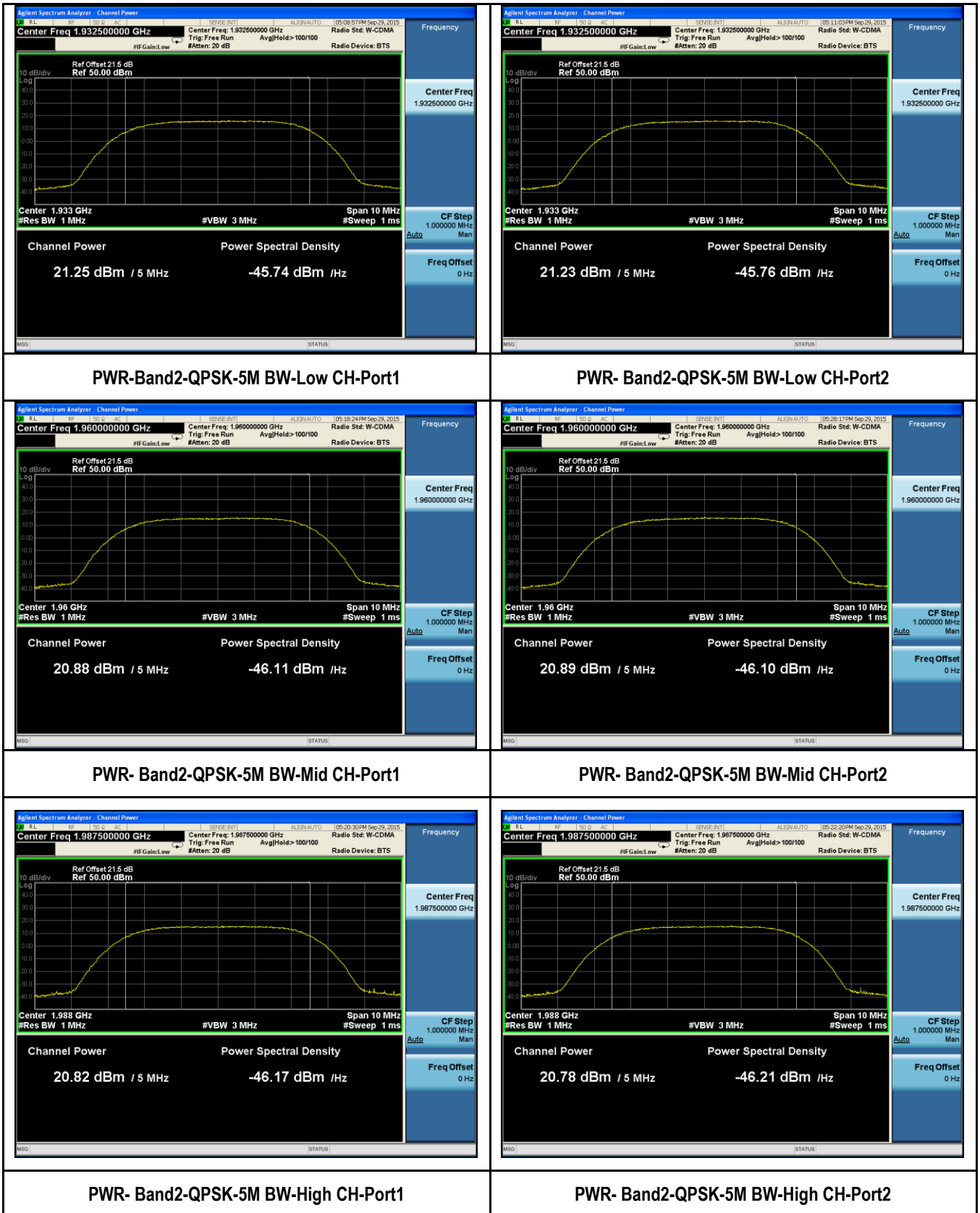
For internal antenna, Gain=3dBi.

Type	Channel	Frequency (MHz)	Measured PW (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
3.84MHz BW, QPSK	Low	871.4	23.93	3	26.93
	Mid	881.6	24.23	3	27.23
	High	891.6	24.09	3	27.09

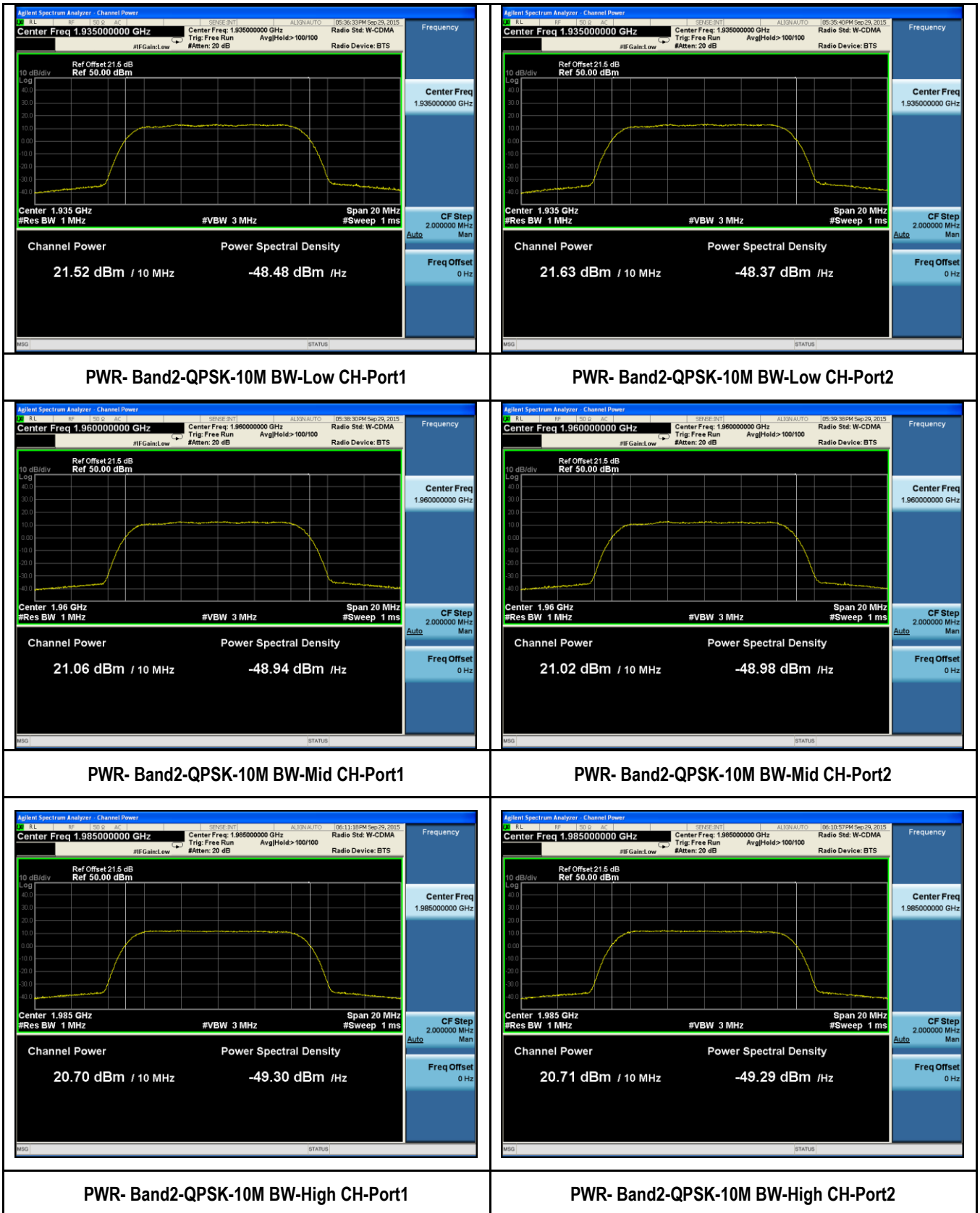
For external antenna, Gain=2dBi.

Type	Channel	Frequency (MHz)	Measured PW (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
3.84MHz BW, QPSK	Low	871.4	23.93	2	25.93
	Mid	881.6	24.23	2	26.23
	High	891.6	24.09	2	26.09

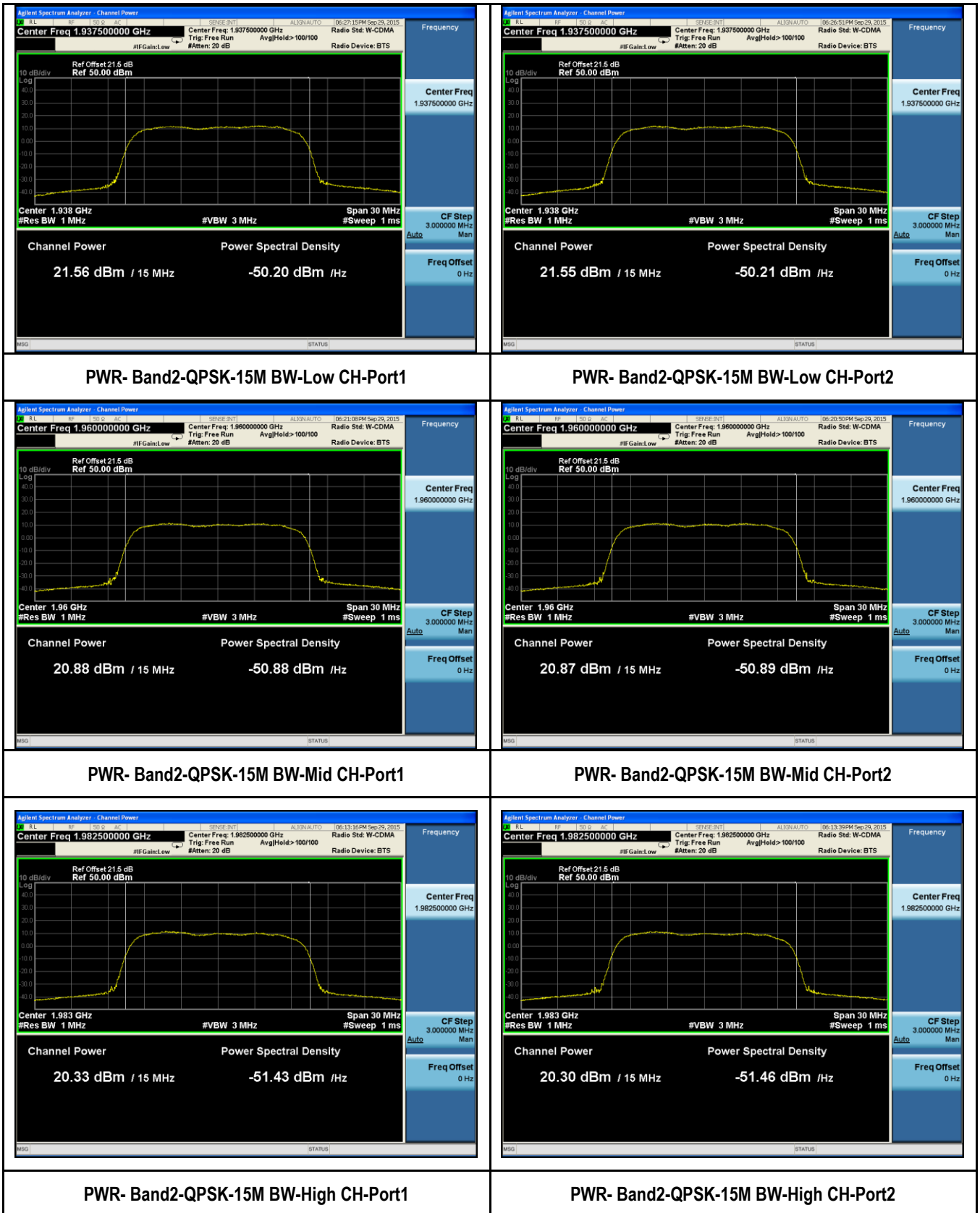
Test Plots for Band 2-QPSK-5MHz



Test Plots for Band 2-QPSK-10MHz



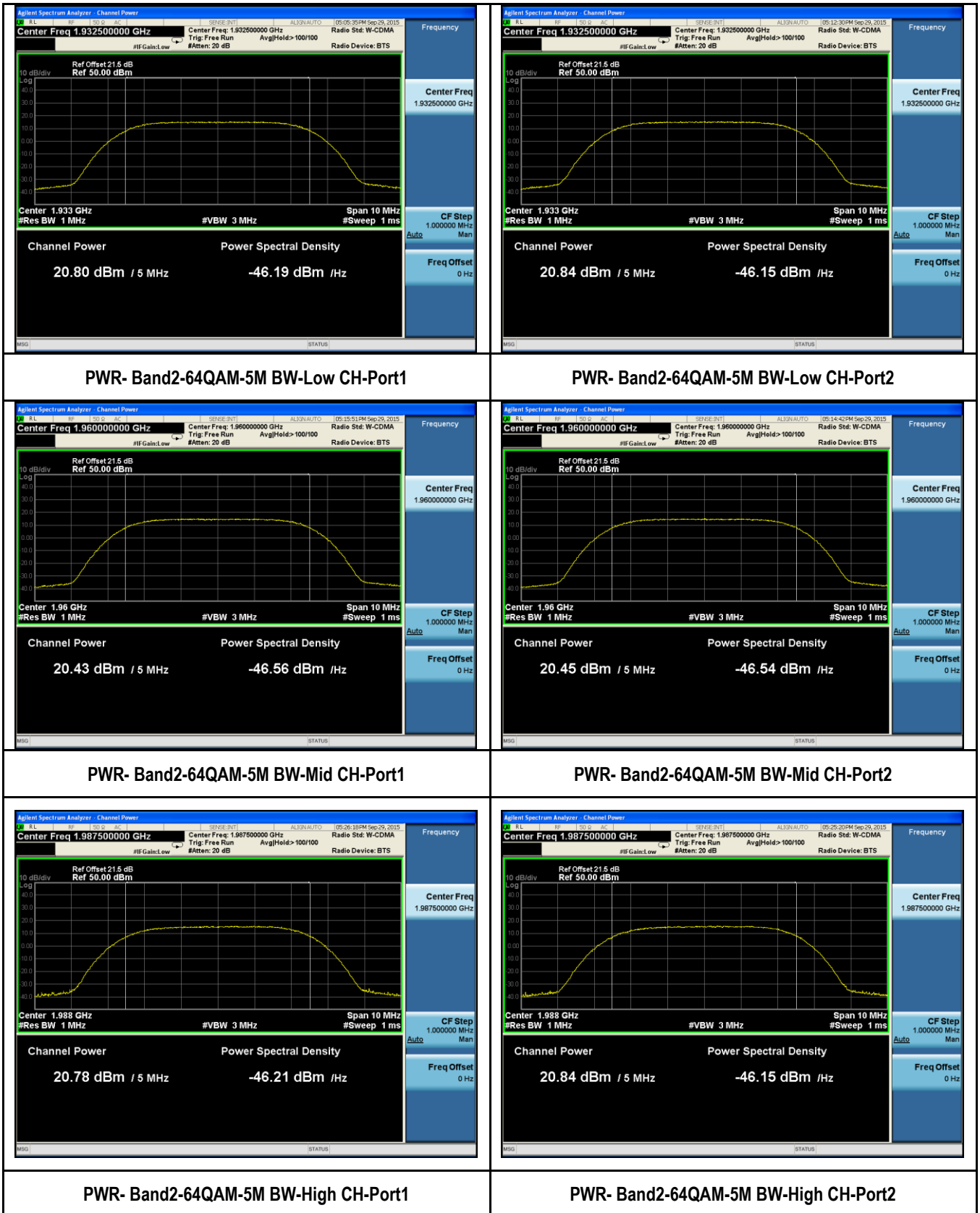
Test Plots for Band 2-QPSK-15MHz



Test Plots for Band 2-QPSK-20MHz



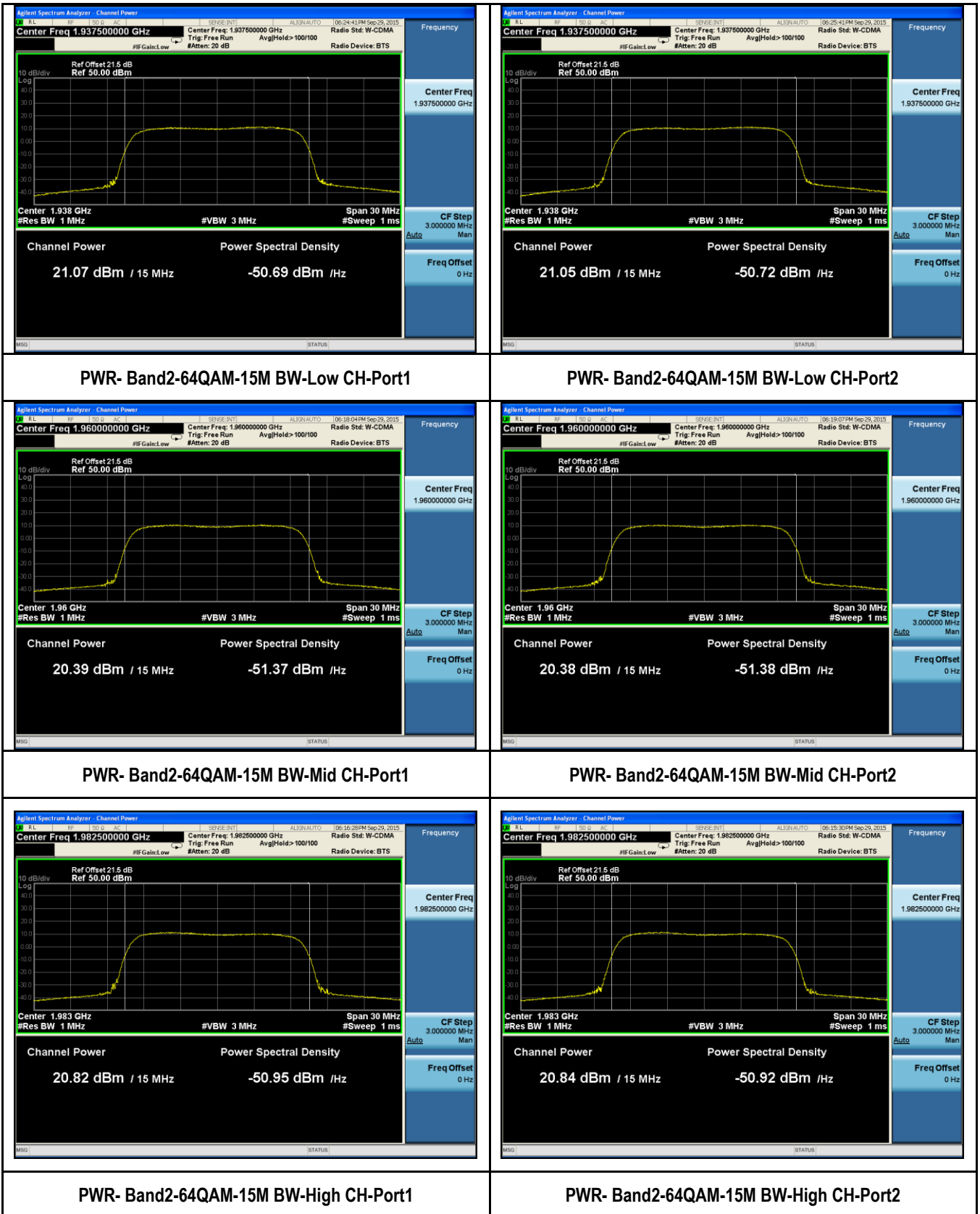
Test Plots for Band 2-64QAM-5MHz



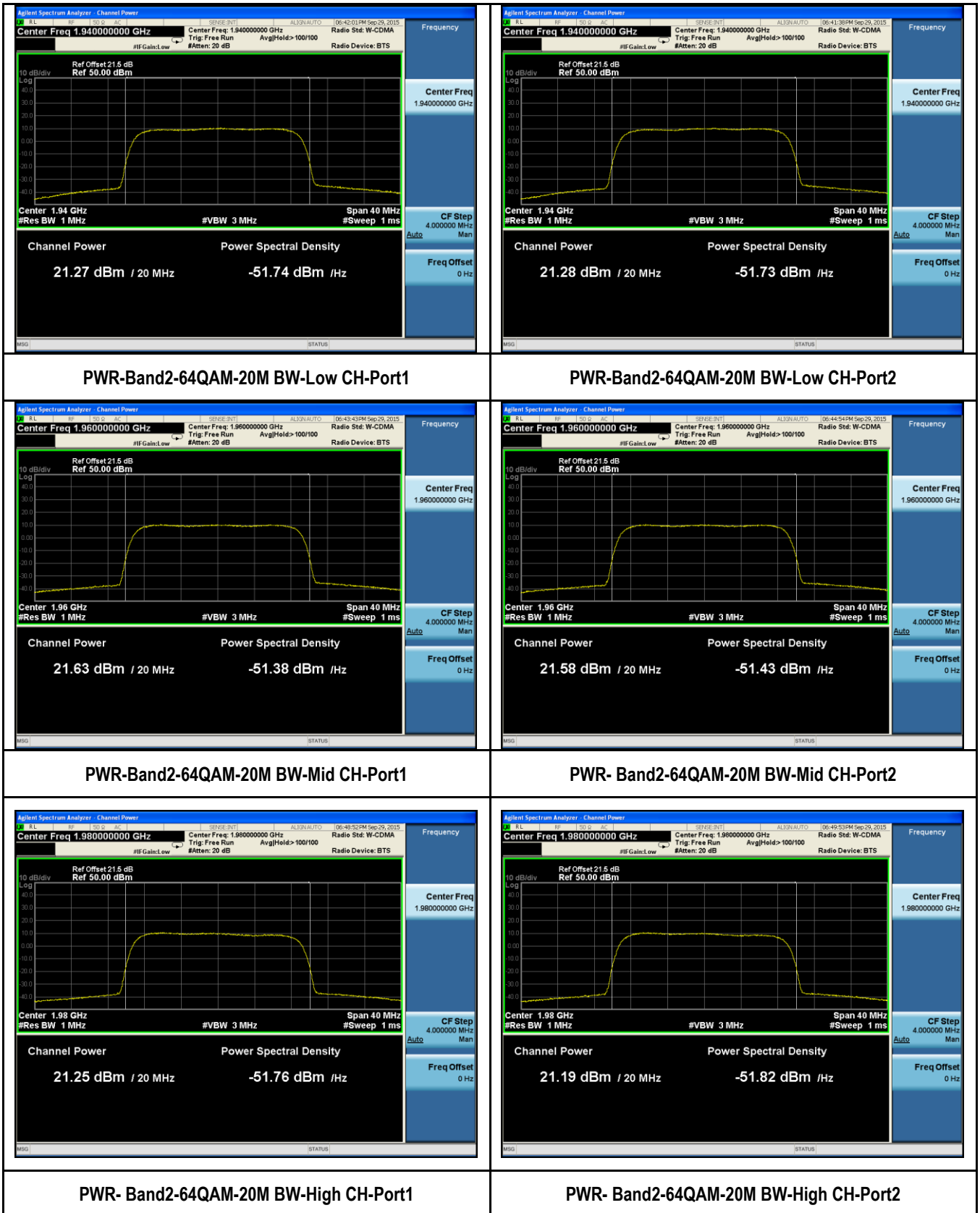
Test Plots for Band 2-64QAM-10MHz



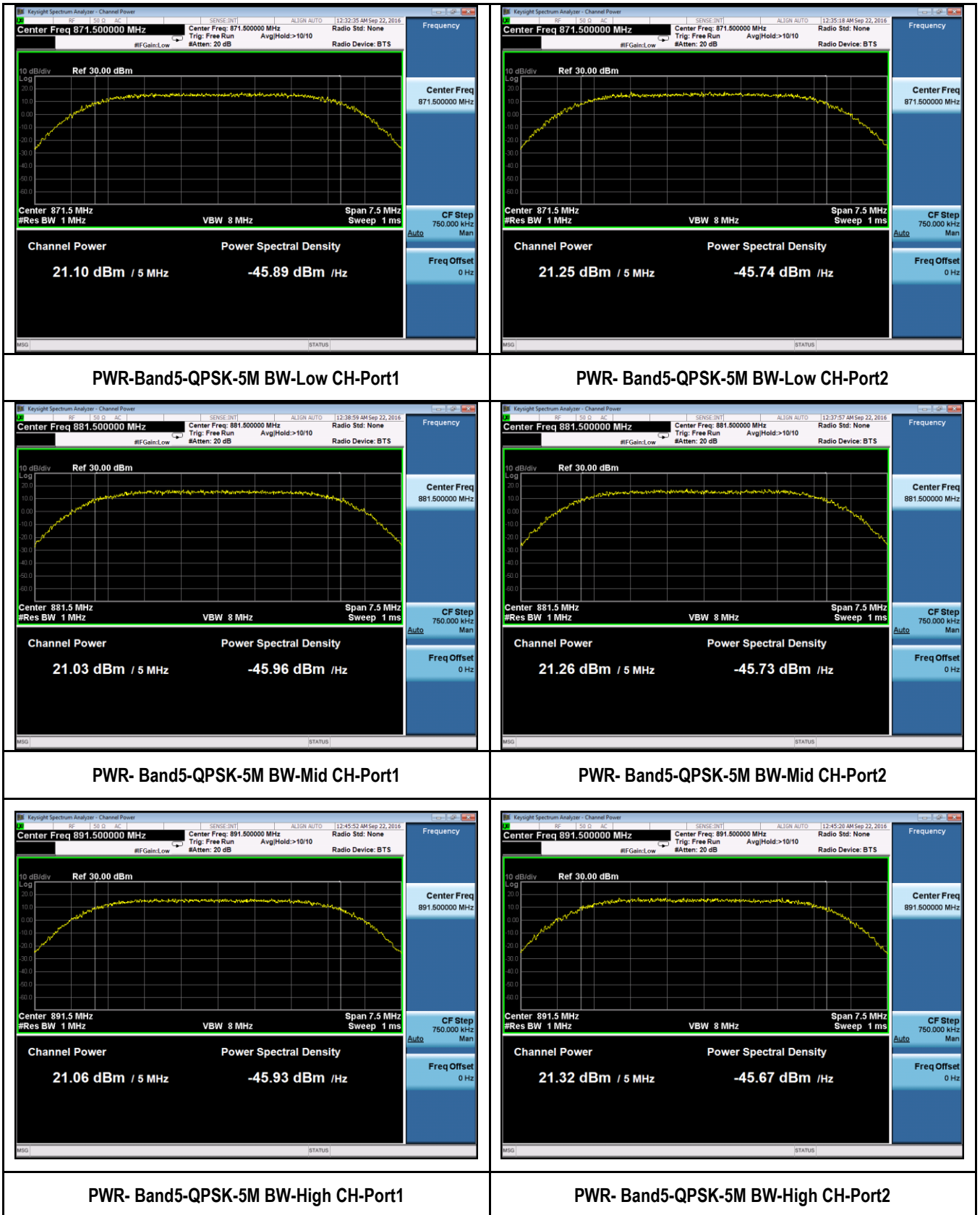
Test Plots for Band 2-64QAM-15MHz



Test Plots for Band 2-64QAM-20MHz



Test Plots for Band 5-QPSK-5MHz



Test Plots for Band 5-64QAM-5MHz

