RF TEST REPORT

SIEMIC
GLOBAL TESTING & CERTIFICATIONS
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Report No.: FCC_RF_SL16012801-SPC-049_0205 Rev 1.0
Supersede Report No.: FCC_RF_SL16012801-SPC-049_0205

Applicant	SpiderCloud Wireless, Inc.
Product Name	Universal Small Cell 8818 LTE/LTE Module
Model No.	USC8818-C25-K9
Test Standard	47CFR Part22 47CFR Part27
Test Method	TIA-603-D: 2010
FCC ID	Y478818C25
Date of test	10/26/2015 - 11/02/2015 02/15/2016 - 02/29/2016
Issue Date	03/02/2016
Test Result	Pass Fail
Equipment complied with the specification	[x]
Equipment did not comply with the specification	[ ]

Gary Chou	Chen Ge
Test Engineer	Engineering Reviewer

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Test result presented in this test report is applicable to the tested sample only

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA

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A2LA ACCREDITED
TESTING CERT # 2742-01

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.

In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

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/RRA, 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_SL16012801-SPC-049_0205	None	Original	03/02/2016
FCC_RF_SL16012801-SPC-049_0205 Rev 1.0	Rev 1.0	Updated rule part	03/10/2017

2 Executive Summary

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

Company: SpiderCloud Wireless, Inc.
Product: Universal Small Cell 8818 LTE/LTE module
Model: USC8818-C25-K9

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	408 E. Plumeria Drive,San Jose, CA 95134
Manufacturer Name	SpiderCloud Wireless, Inc.
Manufacturer Address	408 E. Plumeria Drive,San Jose, CA 95134

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	Universal Small Cell 8818 LTE/LTE Module
Model No.	USC8818-C25-K9
Trade Name	SpiderCloud
Serial No.	02722-01-001
Input Power	48VDC
Power Adapter Manu/Model	N/A
Date of EUT received	10/20/2015
Equipment Class/ Category	PCB, TNB
Operating Frequencies	LTE/UMTS: TX (1930 MHz to 1995 MHz), RX (1850 MHz to 1915 MHz) TX (869 MHz to 894 MHz), RX (824 MHz to 849 MHz)
Port/Connectors	N/A
Remark	NONE

6.2 Radio Description

Item	LTE	LTE
Operating Band /Radio Type	LTE Band 5	LTE Band 2
Bandwidth	5MHz, 10MHz, 15MHz, 20MHz	5MHz, 10MHz, 15MHz, 20MHz
Modulation	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM
Antenna Type	Internal Omni-directional antenna	Internal Omni-directional antenna
Antenna Gain	2 dBi	2 dBi
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	UMTS
Operating Band /Radio Type	UMTS Band 5	UMTS Band 2
Bandwidth	3.84MHz	3.84MHz
Modulation	QPSK	QPSK
Antenna Type	Internal Omni-directional antenna	Internal Omni-directional antenna
Antenna Gain	2 dBi	2 dBi
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

6.3 EUT test modes/configuration Description

Test mode

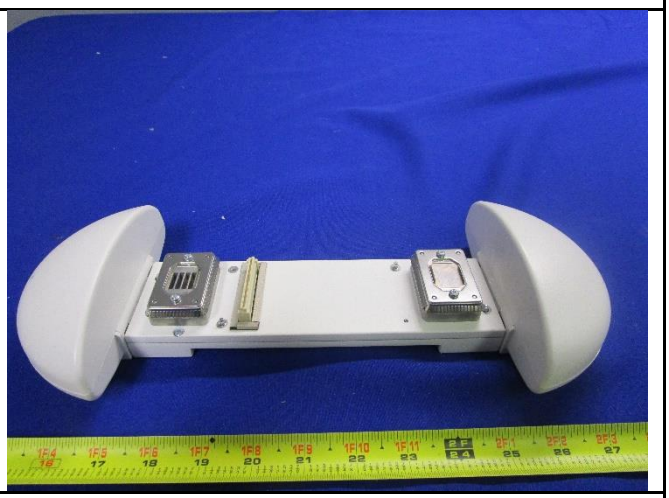
Final Test Mode		Note
Final_test_mode_1	Continuous transmission, single channel	LTE
Final_test_mode_2	Continuous transmission, single channel	UMTS
Remark: LTE/UMTS band 2 and band 5 are evaluated.		

6.4 EUT Photos - External

Top View

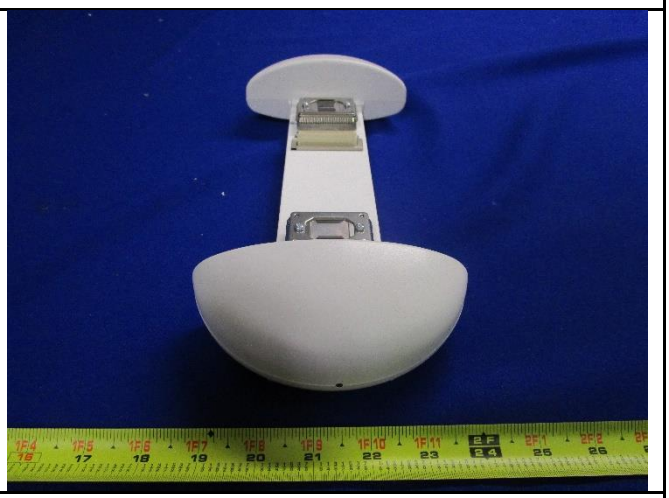
Bottom View

Front View



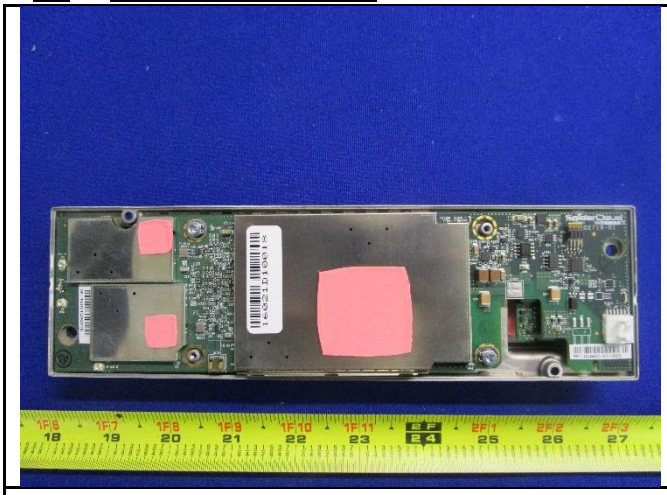
Rear View

Left Side View

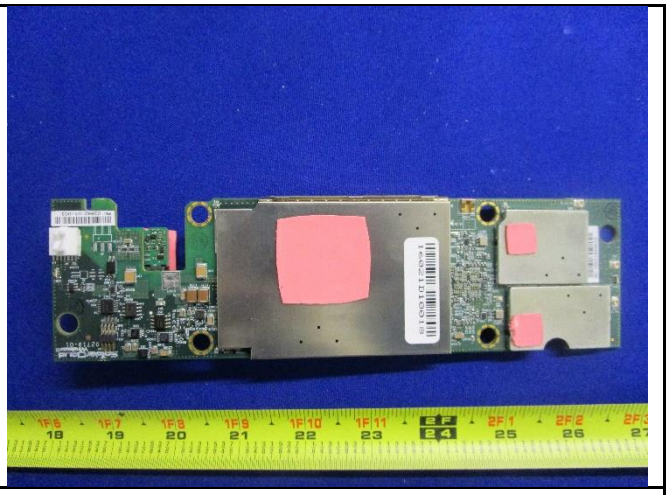


Right Side View

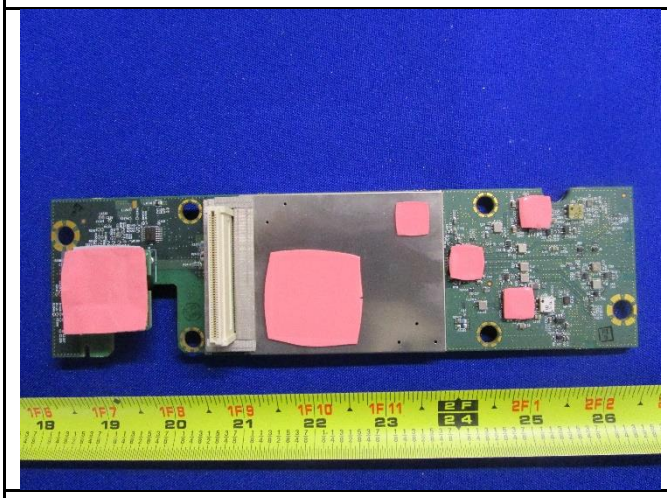
6.5 EUT Photos - Internal



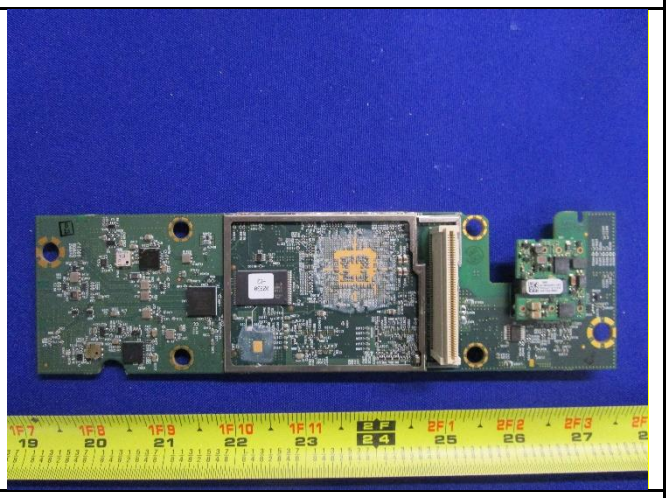
EUT - Open Case View



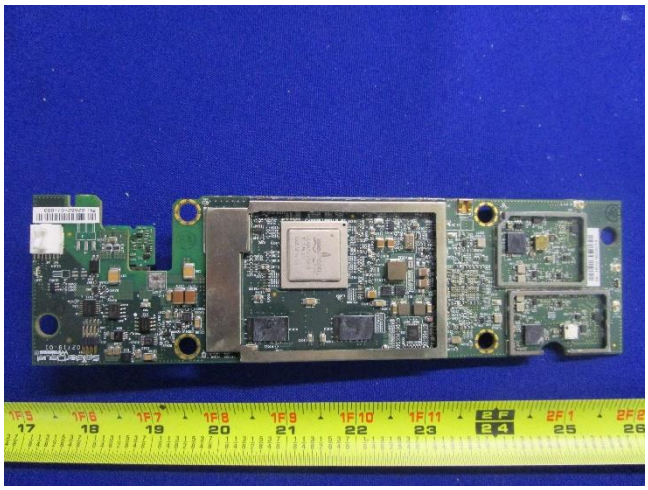
Main PCB - Top View



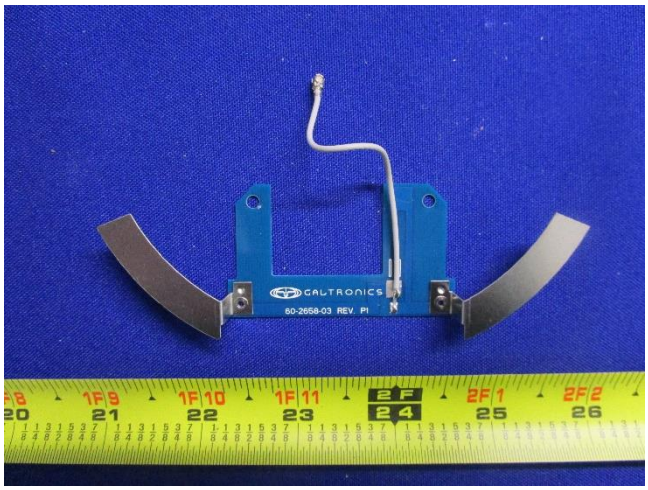
Main PCB - Bottom View



Main PCB - Top View without shielding



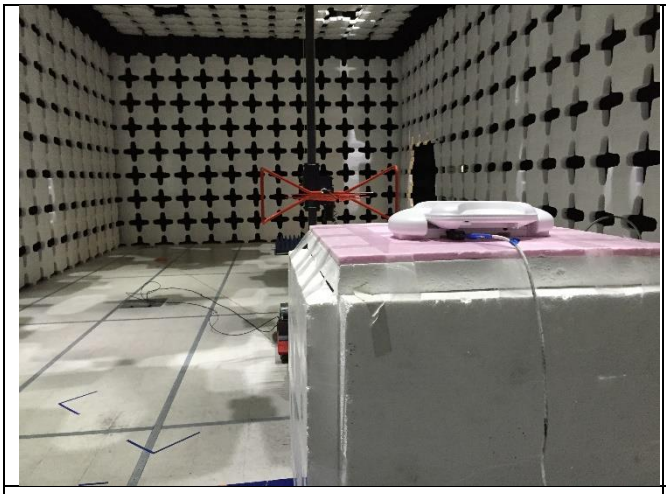
Main PCB - Bottom View without shielding



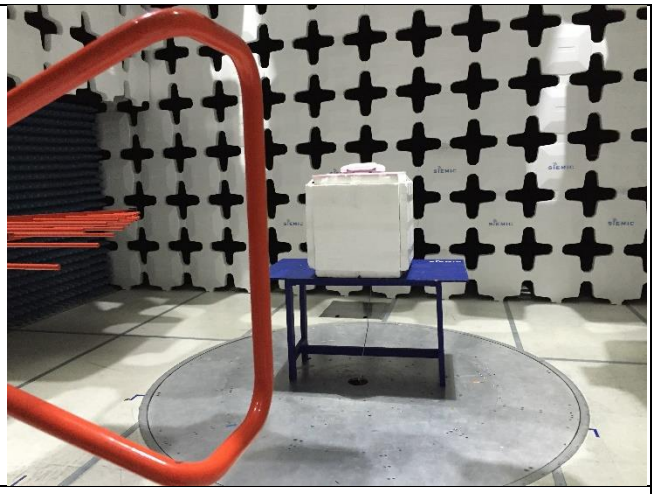
Antenna 1

	
Antenna 2	

6.6 EUT Test Setup Photos



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	-
2	Service Node	SCSN-9000	14193C26505	SpiderCloud	-
3	Access Point	AIR-CAP3702I-A-K9	FTX1848RA30	Cisco	-

7.2 Test Software Description

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

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	1. All measurement uncertainties do not take into consideration for all presented test results. 2. 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

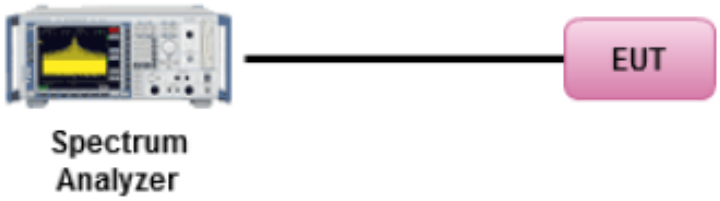
Test Item	Frequency Range	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	30MHz – 1GHz	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
Band Edge and Radiated Spurious Emissions	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
47CFR27.50	-	The maximum effective radiated power (ERP) of fixed and base station must not exceed 1000 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.	☒

Test Setup				
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	10/26/2015 - 11/02/2015 02/15/2016 - 02/29/2016	Environmental condition	Temperature Relative Humidity Atmospheric Pressure	22°C 48% 1008mbar
Remark	For LTE mode, EUT is using 2x2 MIMO, which has 2 transmit antennas. They are correlated to each other. The directional gain is calculated per the formula at below, Directional gain dBi = Gmax + 10 Log10 N The max gain of single antenna is 2 dBi. So the directional gain = 5 dBi			
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:

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	17.15	17.16	20.17	5	25.17
	Mid	1960.0	17.39	17.41	20.41	5	25.41
	High	1987.5	17.22	17.22	20.23	5	25.23
5MHz BW, 64QAM	Low	1932.5	17.04	17.01	20.04	5	25.04
	Mid	1960.0	17.24	17.16	20.21	5	25.21
	High	1987.5	17.06	17.07	20.08	5	25.08
10MHz BW, QPSK	Low	1935.0	17.03	17.04	20.05	5	25.05
	Mid	1960.0	17.11	17.10	20.12	5	25.12
	High	1985.0	17.29	17.28	20.30	5	25.30
10MHz BW, 64QAM	Low	1935.0	17.14	17.15	20.16	5	25.16
	Mid	1960.0	17.28	17.32	20.31	5	25.31
	High	1985.0	17.22	17.18	20.21	5	25.21
15MHz BW, QPSK	Low	1937.5	17.22	17.19	20.22	5	25.22
	Mid	1960.0	17.29	17.29	20.30	5	25.30
	High	1982.5	17.33	17.33	20.34	5	25.34
15MHz BW, 64QAM	Low	1937.5	17.30	17.28	20.30	5	25.30
	Mid	1960.0	17.14	17.13	20.15	5	25.15
	High	1982.5	17.14	17.13	20.15	5	25.15
20MHz BW, QPSK	Low	1940.0	17.07	17.10	20.10	5	25.10
	Mid	1960.0	17.27	17.25	20.27	5	25.27
	High	1980.0	16.97	17.00	20.00	5	25.00
20MHz BW, 64QAM	Low	1940.0	17.13	17.12	20.14	5	25.14
	Mid	1960.0	17.14	17.19	20.18	5	25.18
	High	1980.0	17.21	17.20	20.22	5	25.22

Test Data for WCDMA

Type	Channel	Frequency (MHz)	Measured PW (dBm)	Max Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
3.84MHz BW, QPSK	Low	1932.4	18.34	18.34	2	20.34
	Mid	1960.0	18.56	18.56	2	20.56
	High	1987.6	20.52	20.52	2	22.52

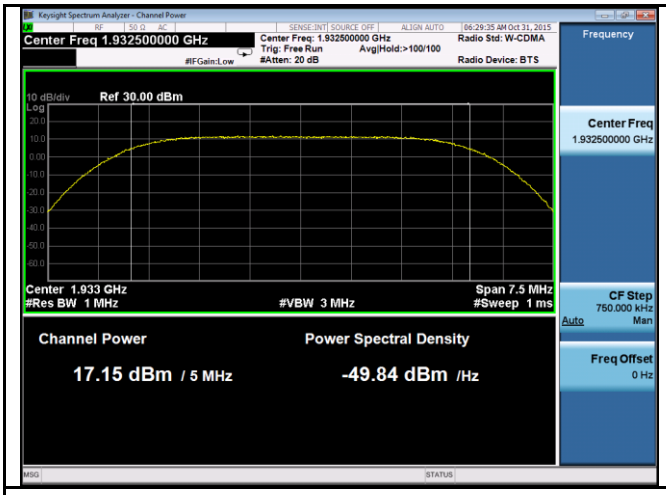
Test Data for LTE band 5:

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	17.30	17.38	20.35	5	25.35
	Mid	881.5	17.33	17.32	20.34	5	25.34
	High	891.5	17.36	17.35	20.37	5	25.37
5MHz BW, 64QAM	Low	871.5	17.10	17.25	20.19	5	25.19
	Mid	881.5	17.16	17.04	20.11	5	25.11
	High	891.5	17.16	17.15	20.17	5	25.17
10MHz BW, QPSK	Low	874.0	17.58	17.59	20.60	5	25.60
	Mid	881.5	17.47	17.34	20.42	5	25.42
	High	889.0	17.34	17.42	20.39	5	25.39
10MHz BW, 64QAM	Low	874.0	17.02	16.99	20.02	5	25.02
	Mid	881.5	17.13	17.13	20.14	5	25.14
	High	889.0	17.16	17.24	20.21	5	25.21
15MHz BW, QPSK	Low	876.5	17.40	17.35	20.39	5	25.39
	Mid	881.5	17.22	17.16	20.20	5	25.20
	High	886.5	17.39	17.42	20.42	5	25.42
15MHz BW, 64QAM	Low	876.5	17.29	17.26	20.29	5	25.29
	Mid	881.5	17.37	17.38	20.39	5	25.39
	High	886.5	17.24	17.28	20.27	5	25.27
20MHz BW, QPSK	Low	879.0	17.45	17.42	20.45	5	25.45
	Mid	881.5	17.27	17.25	20.27	5	25.27
	High	884.0	17.51	17.53	20.53	5	25.53
20MHz BW, 64QAM	Low	879.0	17.38	17.37	20.39	5	25.39
	Mid	881.5	17.68	17.67	20.69	5	25.69
	High	884.0	17.31	17.25	20.29	5	25.29

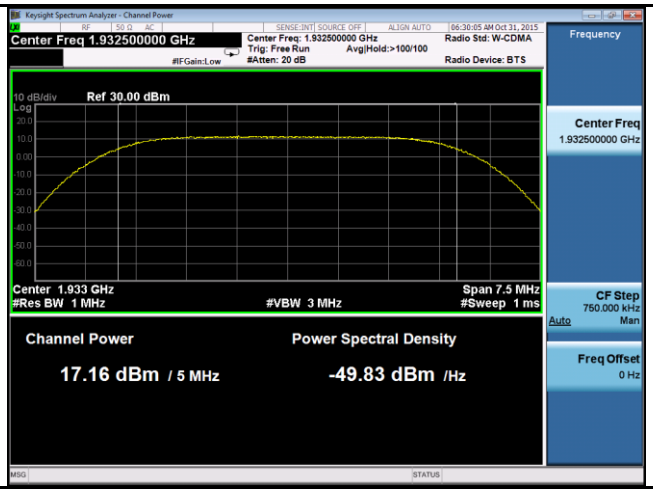
Test Data for WCDMA

Type	Channel	Frequency (MHz)	Measured PW (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
3.84MHz BW, QPSK	Low	871.4	19.78	2	21.78
	Mid	881.6	19.85	2	21.85
	High	891.6	19.56	2	21.56

Test Plots for Band 2-QPSK-5MHz



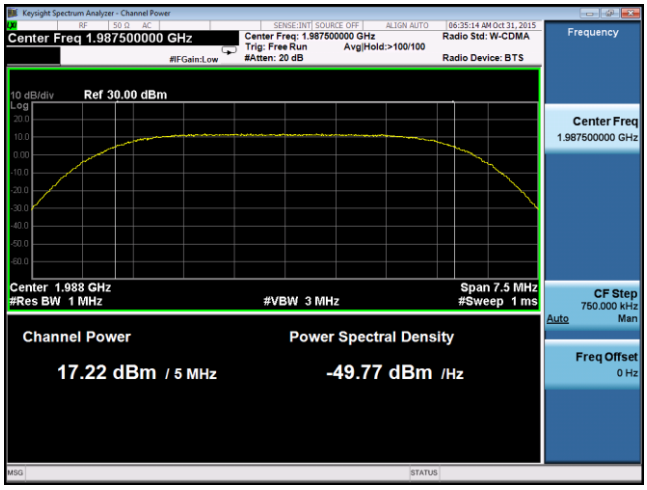
PWR-Band2-QPSK-5M BW-Low CH-Port1



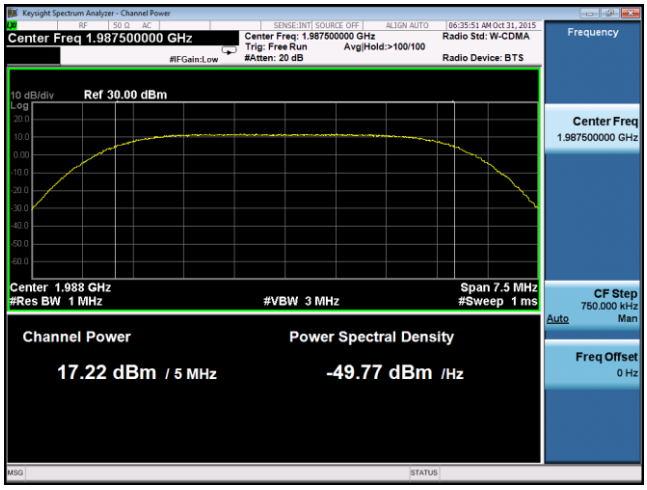
PWR- Band2-QPSK-5M BW-Low CH-Port2

PWR- Band2-QPSK-5M BW-Mid CH-Port1

PWR- Band2-QPSK-5M BW-Mid CH-Port2



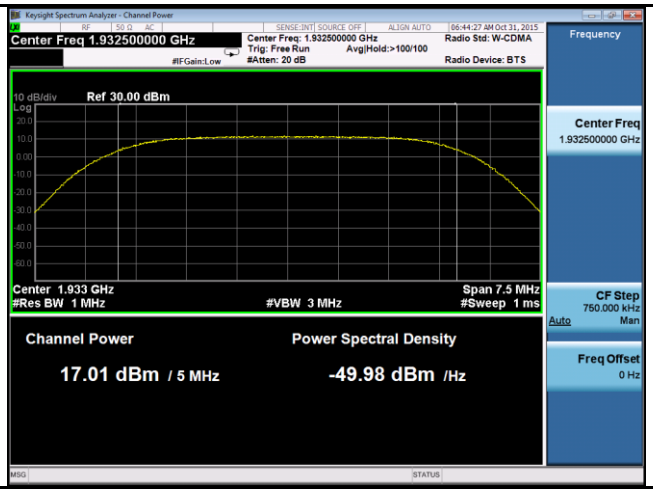
PWR- Band2-QPSK-5M BW-High CH-Port1



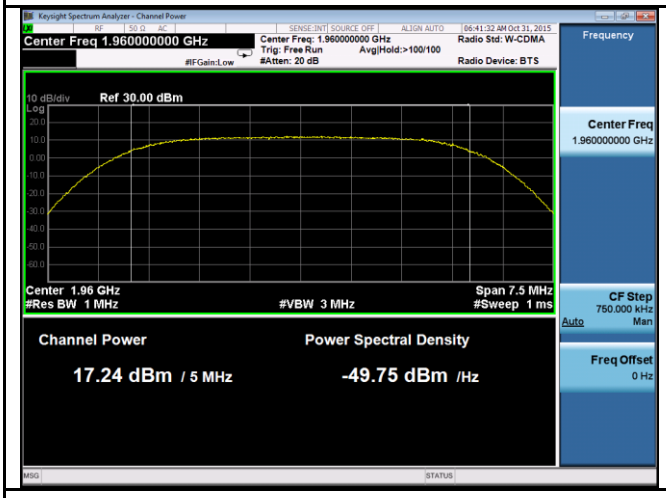
PWR- Band2-QPSK-5M BW-High CH-Port2

Test Plots for Band 2-64QAM-5MHz

PWR-Band2-64QAM-5M BW-Low CH-Port1

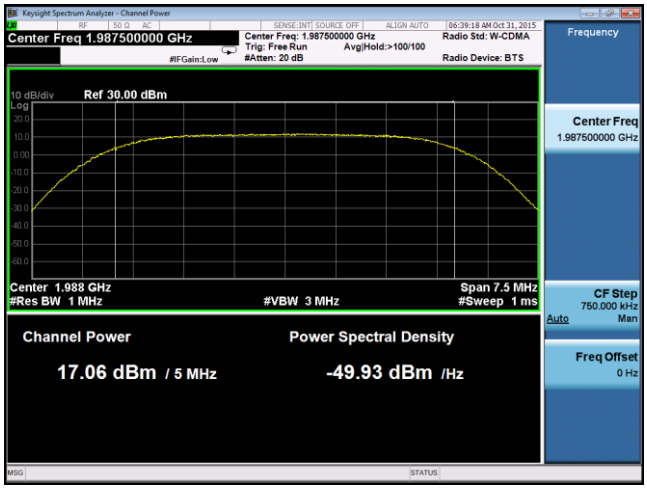


PWR- Band2-64QAM-5M BW-Low CH-Port2

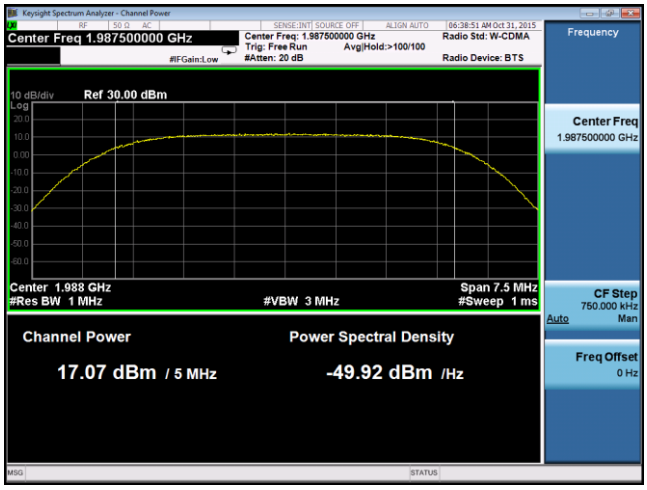


PWR- Band2-64QAM-5M BW-Mid CH-Port1

PWR- Band2-64QAM-5M BW-Mid CH-Port2



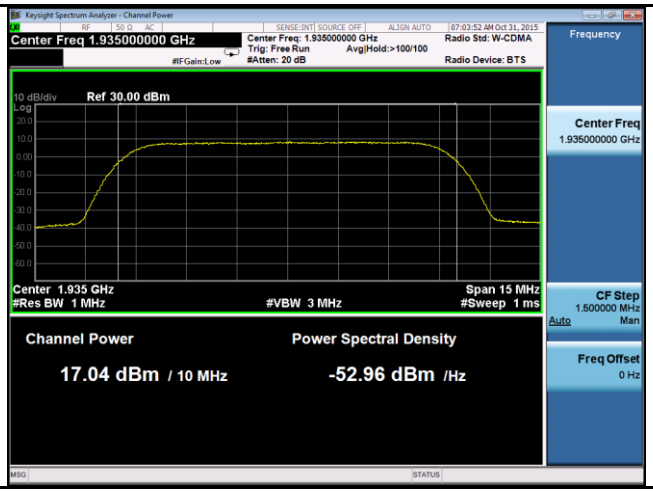
PWR- Band2-64QAM-5M BW-High CH-Port1



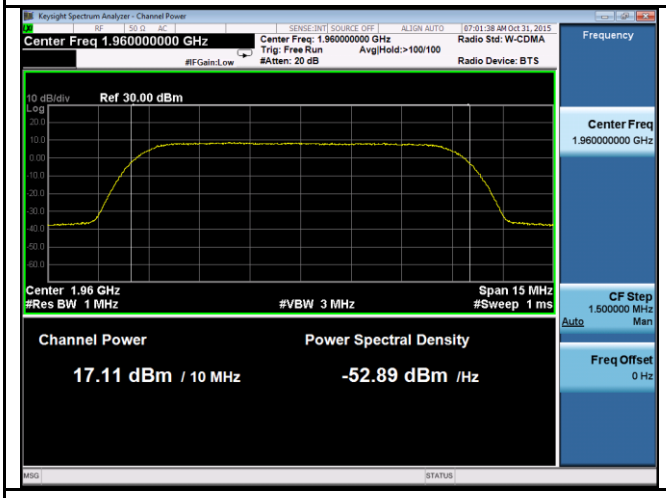
PWR- Band2-64QAM-5M BW-High CH-Port2

Test Plots for Band 2-QPSK-10MHz

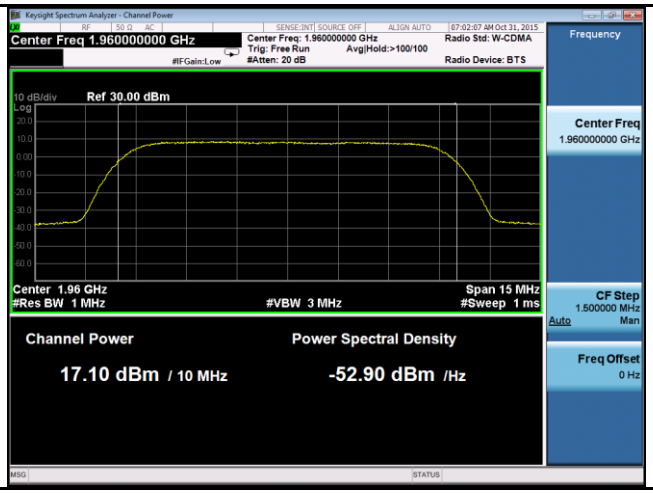
PWR-Band2-QPSK-10M BW-Low CH-Port1



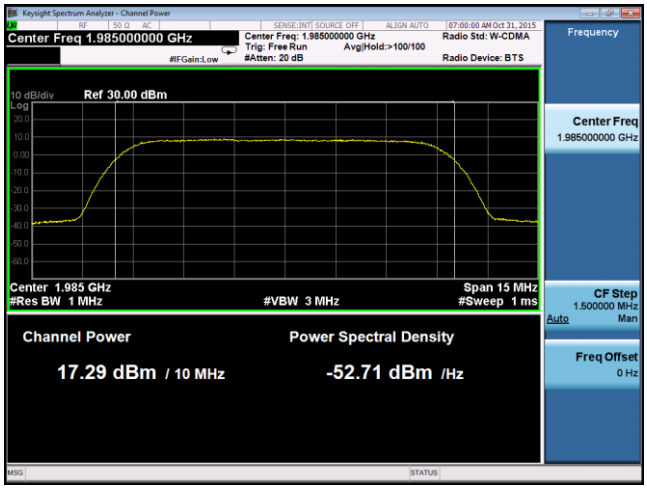
PWR- Band2-QPSK-10M BW-Low CH-Port2



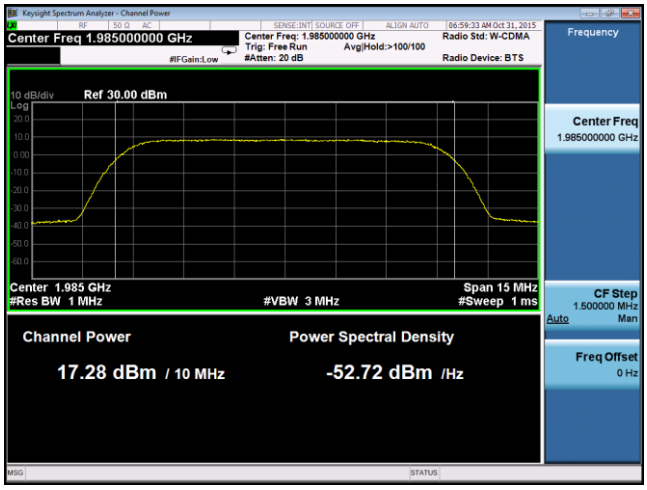
PWR- Band2-QPSK-10M BW-Mid CH-Port1



PWR- Band2-QPSK-10M BW-Mid CH-Port2



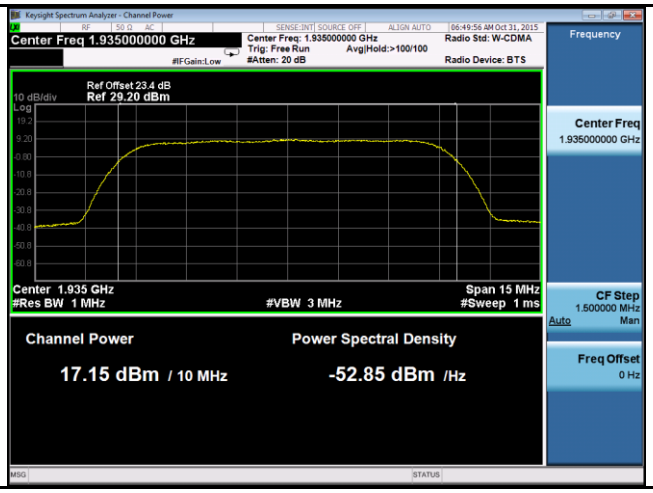
PWR- Band2-QPSK-10M BW-High CH-Port1



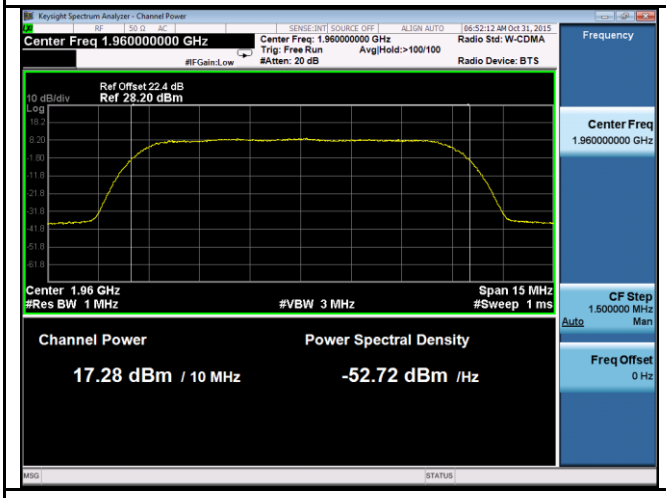
PWR- Band2-QPSK-10M BW-High CH-Port2

Test Plots for Band 2-64QAM-10MHz

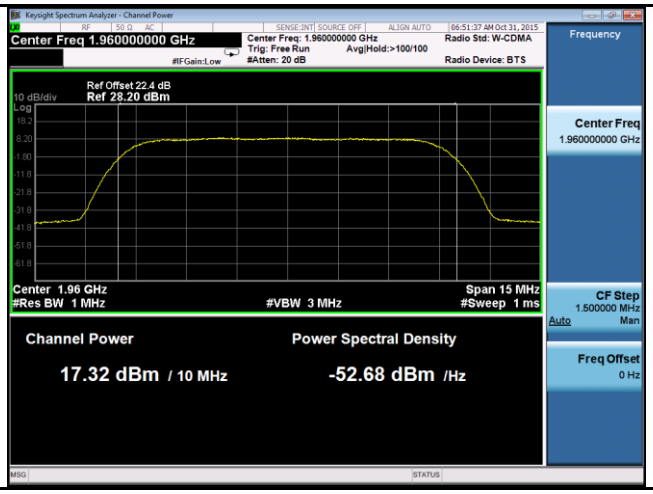
PWR- Band2-64QAM-10M BW-Low CH-Port1



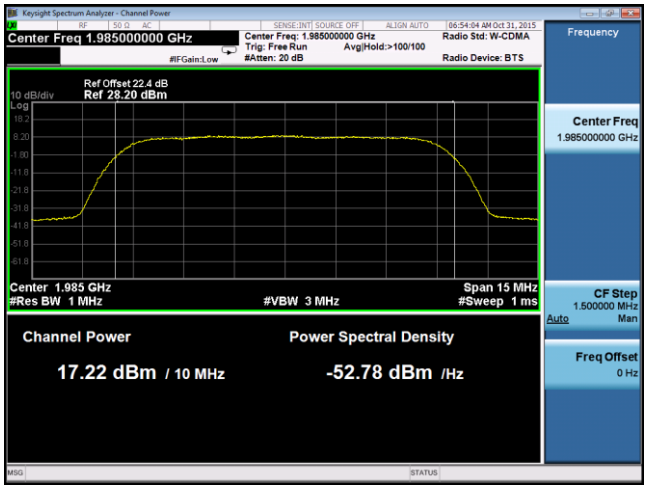
PWR- Band2-64QAM-10M BW-Low CH-Port2



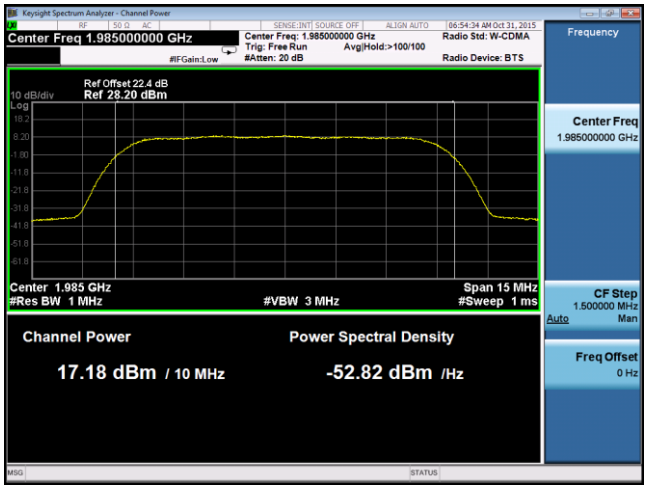
PWR- Band2-64QAM-10M BW-Mid CH-Port1



PWR- Band2-64QAM-10M BW-Mid CH-Port2

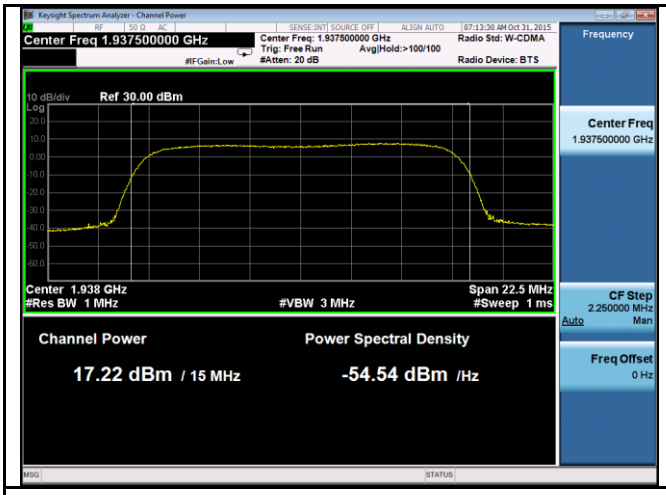


PWR- Band2-64QAM-10M BW-High CH-Port1

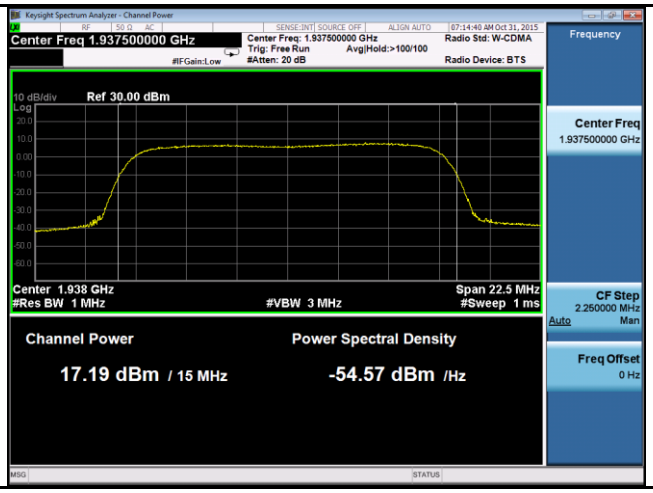


PWR- Band2-64QAM-10M BW-High CH-Port2

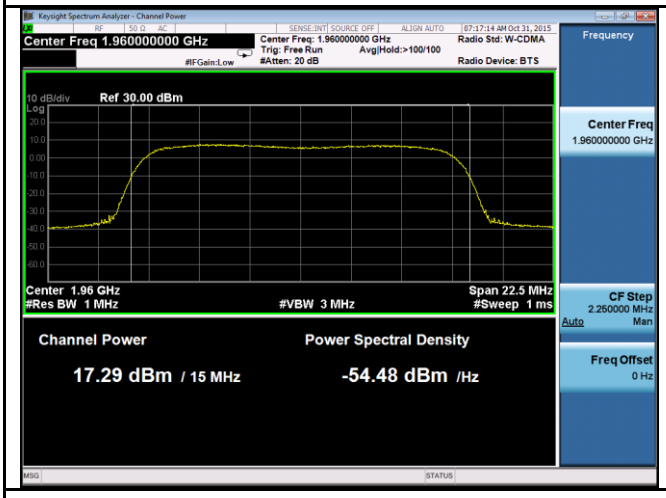
Test Plots for Band 2-QPSK-15MHz



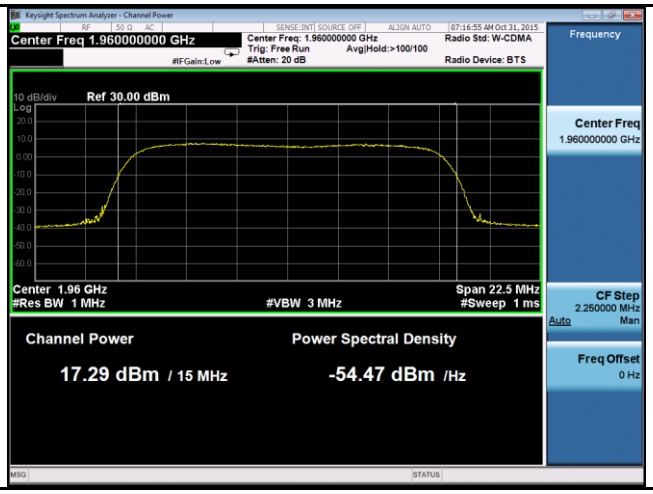
PWR-Band2-QPSK-15M BW-Low CH-Port1



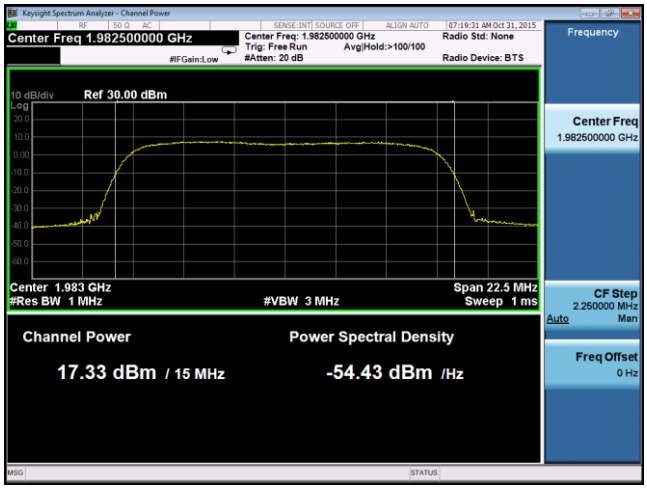
PWR- Band2-QPSK-15M BW-Low CH-Port2



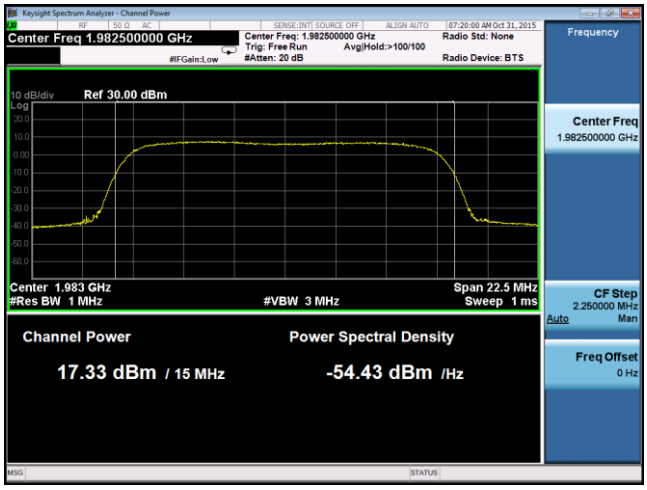
PWR- Band2-QPSK-15M BW-Mid CH-Port1



PWR- Band2-QPSK-15M BW-Mid CH-Port2

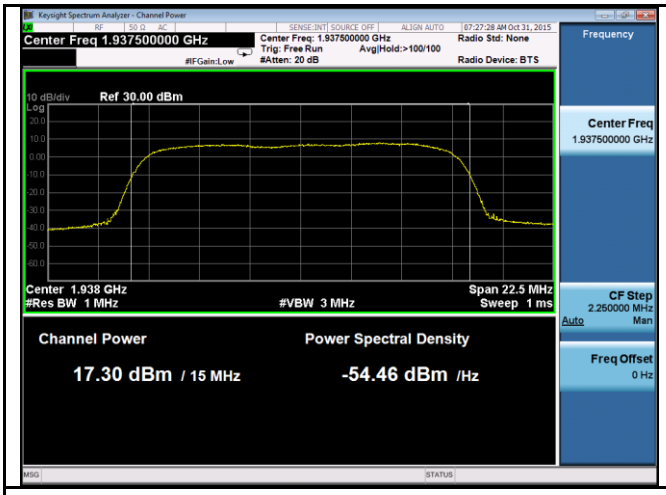


PWR- Band2-QPSK-15M BW-High CH-Port1

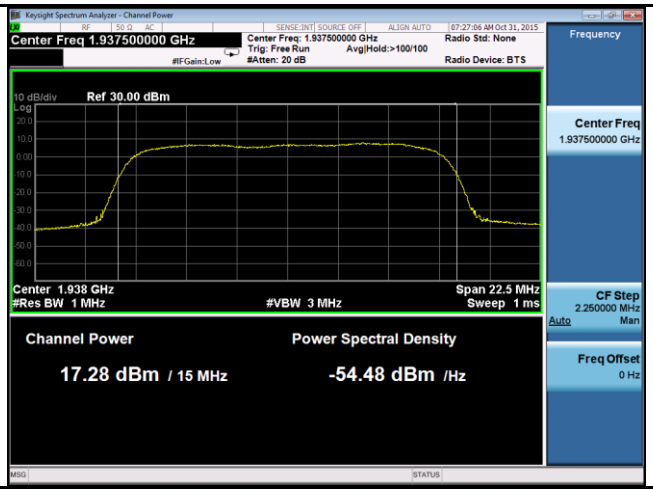


PWR- Band2-QPSK-15M BW-High CH-Port2

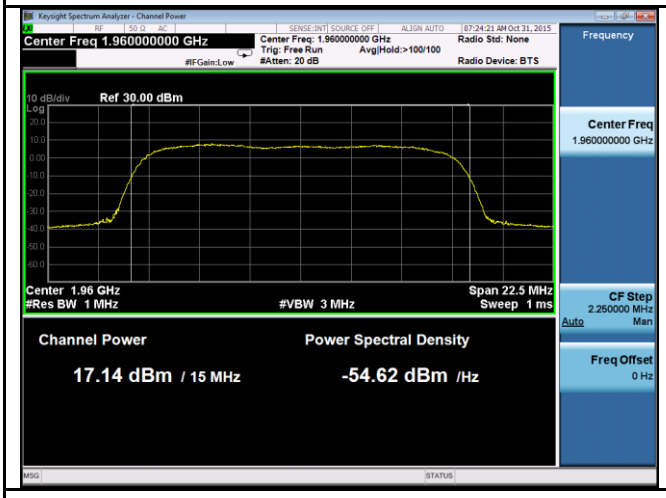
Test Plots for Band 2-64QAM-15MHz



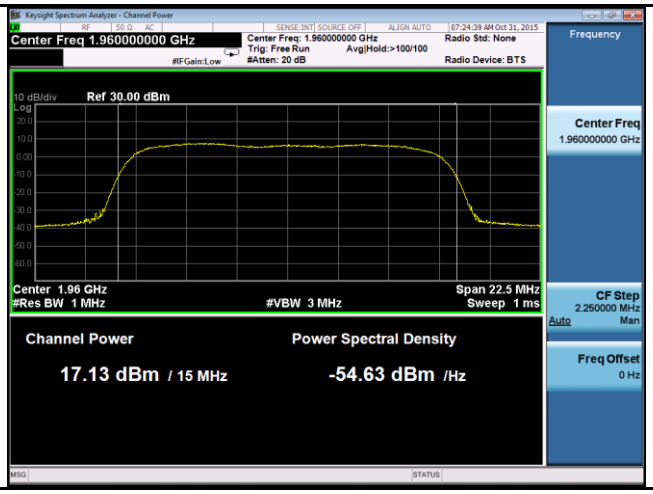
PWR- Band2-64QAM-15M BW-Low CH-Port1



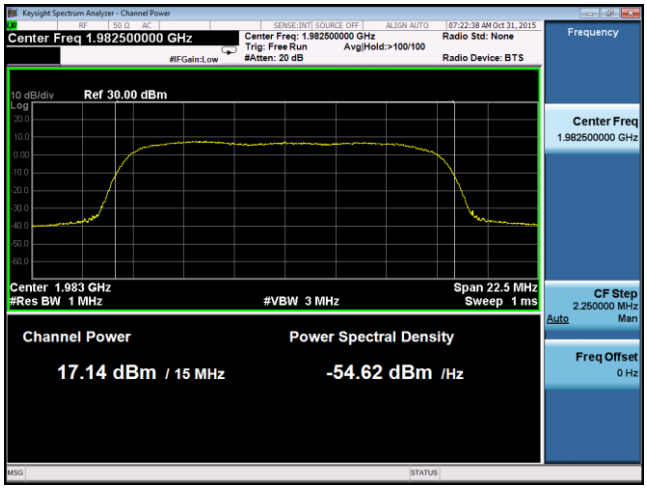
PWR- Band2-64QAM-15M BW-Low CH-Port2



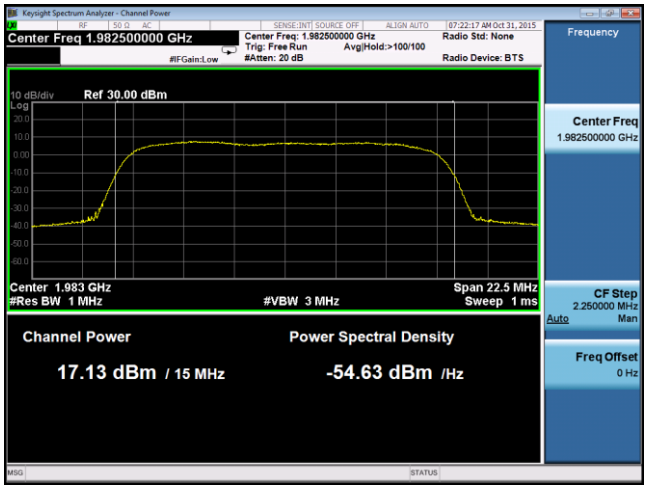
PWR- Band2-64QAM-15M BW-Mid CH-Port1



PWR- Band2-64QAM-15M BW-Mid CH-Port2



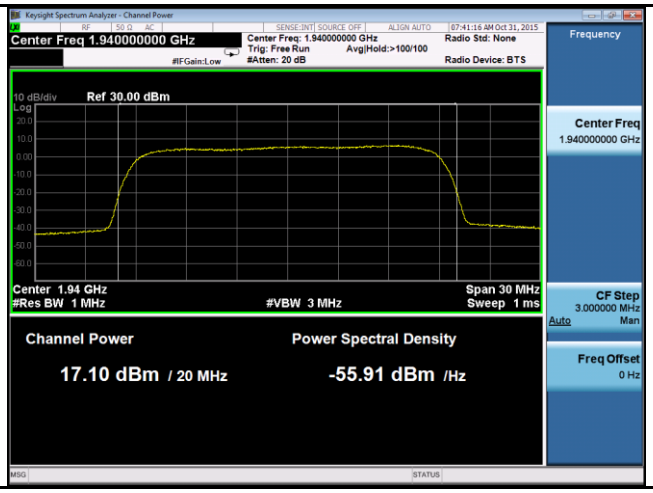
PWR- Band2-64QAM-15M BW-High CH-Port1



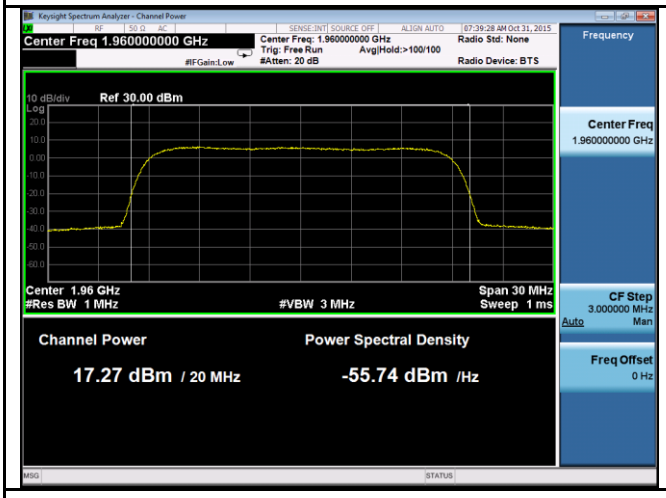
PWR- Band2-64QAM-15M BW-High CH-Port2

Test Plots for Band 2-QPSK-20MHz

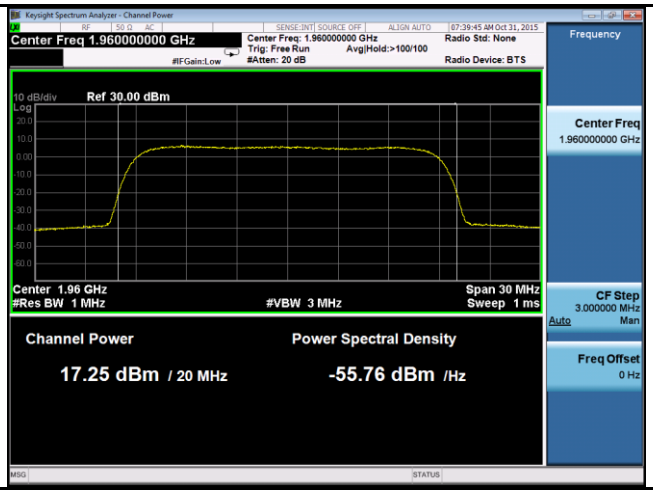
PWR-Band2-QPSK-20M BW-Low CH-Port1



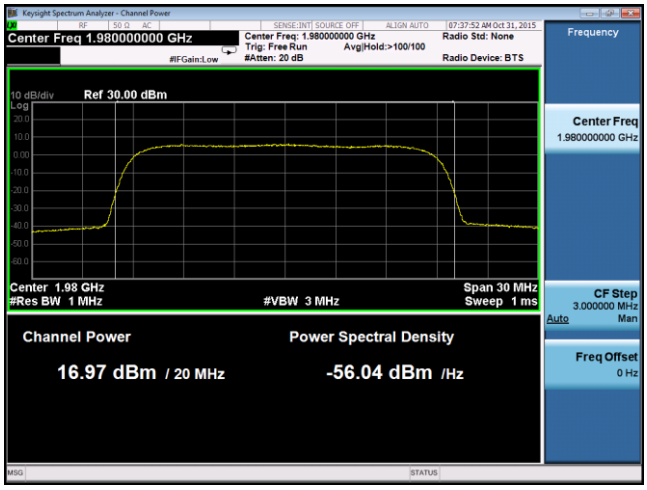
PWR-Band2-QPSK-20M BW-Low CH-Port2



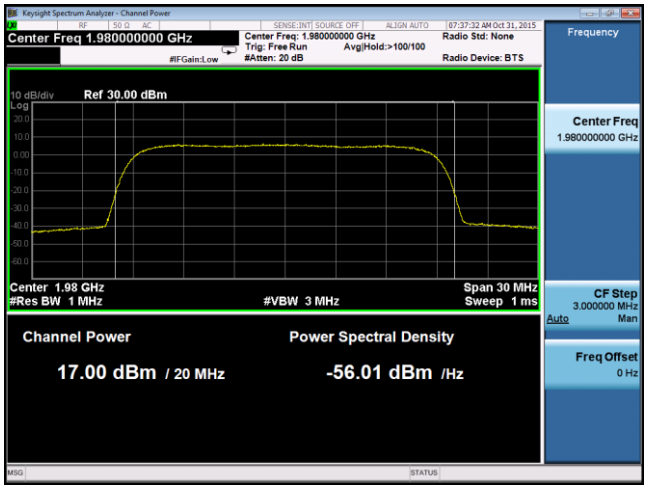
PWR-Band2-QPSK-20M BW-Mid CH-Port1



PWR-Band2-QPSK-20M BW-Mid CH-Port2



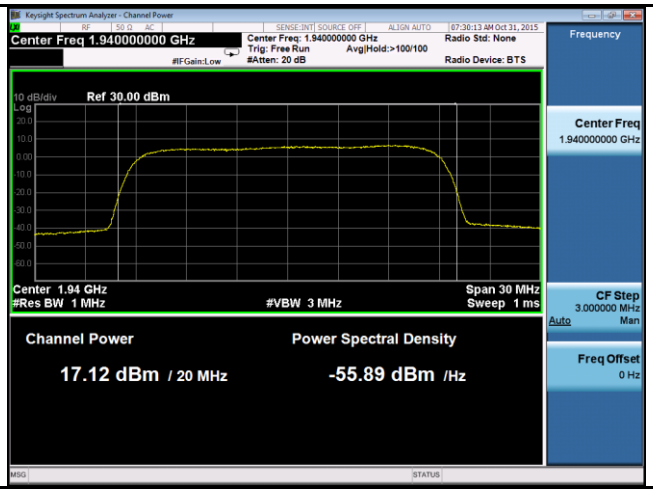
PWR-Band2-QPSK-20M BW-High CH-Port1



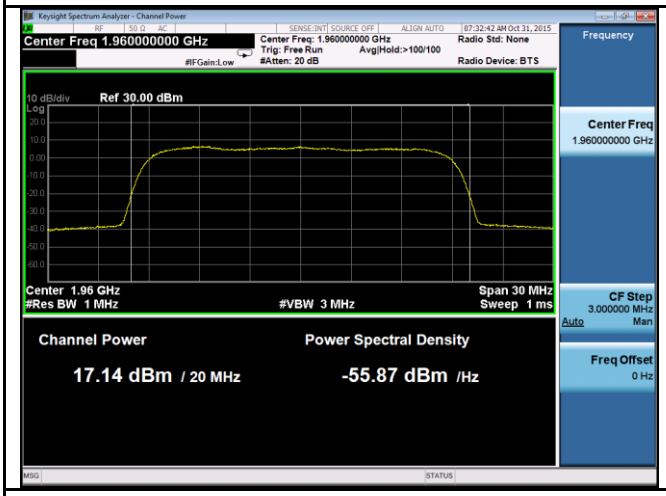
PWR-Band2-QPSK-20M BW-High CH-Port2

Test Plots for Band 2-64QAM-20MHz

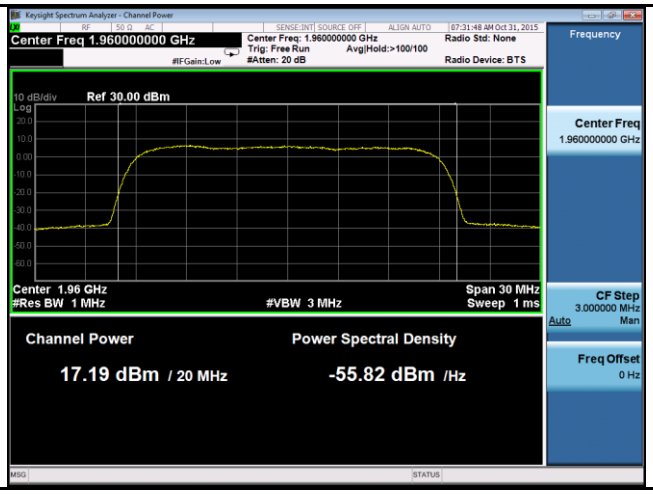
PWR-Band2-64QAM-20M BW-Low CH-Port1



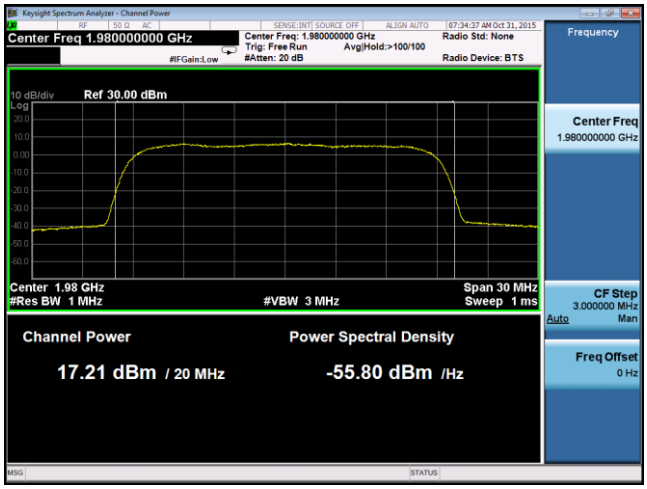
PWR-Band2-64QAM-20M BW-Low CH-Port2



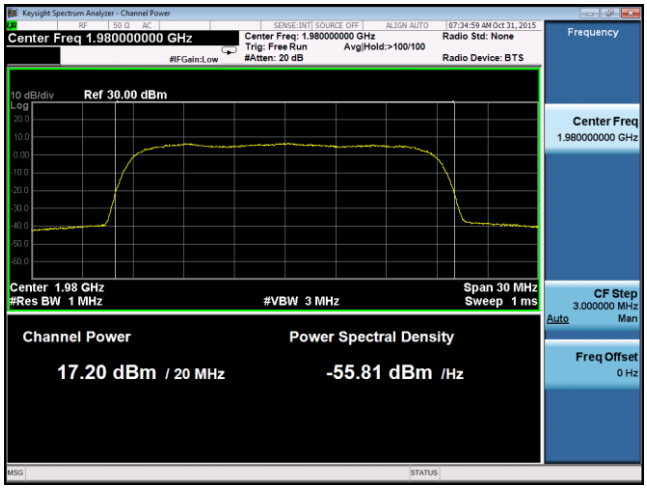
PWR-Band2-64QAM-20M BW-Mid CH-Port1



PWR-Band2-64QAM-20M BW-Mid CH-Port2



PWR-Band2-64QAM-20M BW-High CH-Port1



PWR-Band2-64QAM-20M BW-High CH-Port2