

FCC MEASUREMENT AND TEST REPORT

For

ZTE Corporation

ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen,
Guangdong, China 518057

FCC ID: Q78-R8978S2600M

This Report Concerns: ☒ Original Report		Equipment Type: LTE Remote Radio Unit	
Test Engineer:	Bloom <i>Bloom</i>		
Report No.:	RF20140051RP-2		
Test Date:	Nov 4 – Nov 20, 2014		
Issue Date:	Nov 26, 2014		
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Note: The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of ZTE Corporation. This report must not be used by the client to claim product certification 、 approval 、 or endorsement by any agency of the US Government.

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1 GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The ZTE Corporation's product, model number: ZXSDR R8978 S2600M or the "EUT" as referred to in this report is a LTE Remote Radio Unit.

Technical specification:

Total Weight: 21kg

Volume: 22L

Dimensions (H*W*D): 430 mm x400 mm x 128 mm

Input voltage: -48VDC (-57VDC to -37VDC)

Frequency range: 2496MHz~2596 MHz

Carrier and bandwidth: 2carriers, 40MHz

Max RF output power: 43dBm one port

Modulation type of emission: LTE

Appearance of EUT:

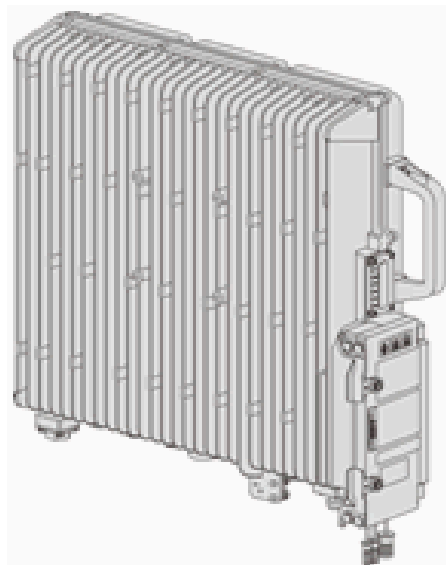


Figure 1 External View of the ZXSDR R8978 S2600M

Objective

This Type approval report is prepared on behalf of ZTE Corporation in accordance with Part 2、Part 15、Part 27 of the Federal Communication Commission rules.

Related Submittal(s)/GrPort(s)

No related submittal(s).

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2. as well as the following parts:

Part 24 Wireless Communication Services

Applicable Standards: TIA EIA 137-A, TIA EIA 97-D, TIA/EIA 603-C, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

All radiated and conducted measurement was performed at ZTE Corporation Reliability Testing Center. The radiated testing was performed at an Portenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Shenzhen ZTE Technology Service Co., Ltd to collect test data is located in the ZTE Plaza, Hi-tech Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China, Tel: +86-755-26770349, Fax: +86-755-26771999. Test site at ZTETS Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 0007895832. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

2 SYSTEM TEST CONFIGURATION

Description of Test Configuration

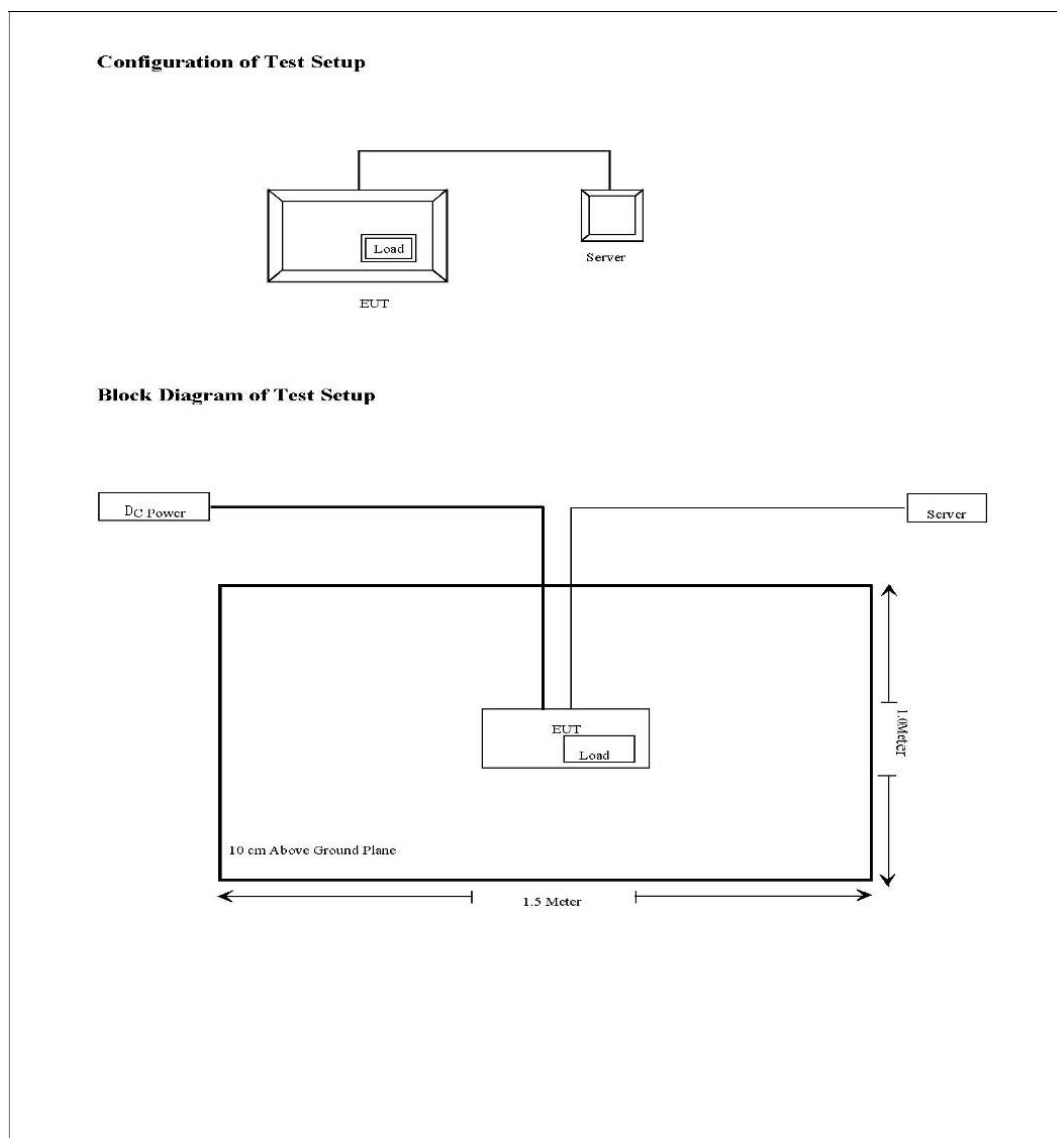
Justification

The EUT was configured for testing according to TIA/EIA-603C.

The final qualification test was performed with EUT operating at normal mode.

Equipment Modifications

ZTE Corporation has not done any modification on the EUT.



3 SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 2.1046 , §27.50	RF power output	Compliant
§ 2.1091 , §1.1037	RF Exposure	Compliant
§ 2.1047	Modulation Characteristic	Compliant
§ 2.1053, §27.53	Spurious Radiated Emissions	Compliant
§ 2.1051, §27.53	Spurious Emissions AT Antenna Terminals	Compliant
§ 2.1049, §27.53	Occupied Bandwidth	Compliant
§ 2.1055	Frequency stability	Compliant

4 RF POWER OUTPUT

Applicable Standard: FCC § 2.1046 , §27.50

According to FCC §2.1046 & 27.50(h)

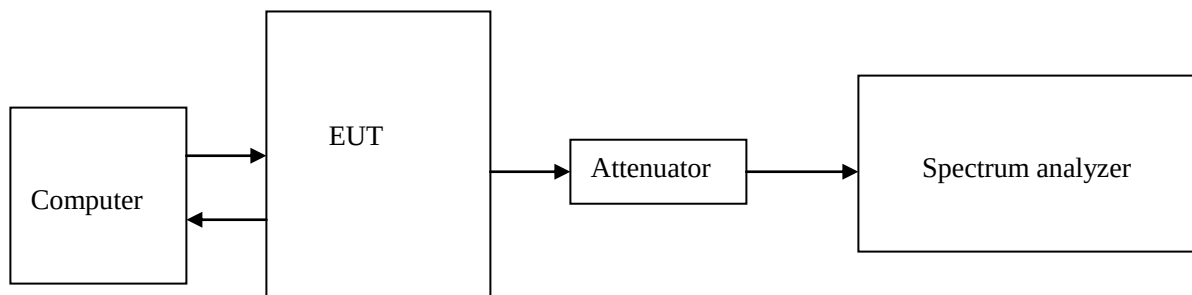
1) Main, booster and base stations. (i) The maximum EIRP of a main, booster or base station shall not exceed $33 \text{ dBW} + 10\log(X/Y) \text{ dBW}$, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51240300	2013.12.10	2014.12.10
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2014.06.13	2015.06.13

***statement of traceability:** ZTE Corporation Reliability Testing Center attests that all calibration has been performed per the NVLAP requirements, traceable to NIST.

Test Procedure



The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. External attenuation Loss is 40dB, Cable Loss is about 6.1dB, the detector is peak.

Radiated power (dBm) = Conducted power (dBm) + Portenna gain (dBi) – Signal attenuation in the connecting cable between the transmitter and Portenna (dB)

Portenna gain (dBi):17dBi

Signal attenuation in the connecting cable between the transmitter and Portenna (dB):0.6dB

Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

Test Result: Pass

Test Mode: Transmitting LTE

Test Data:

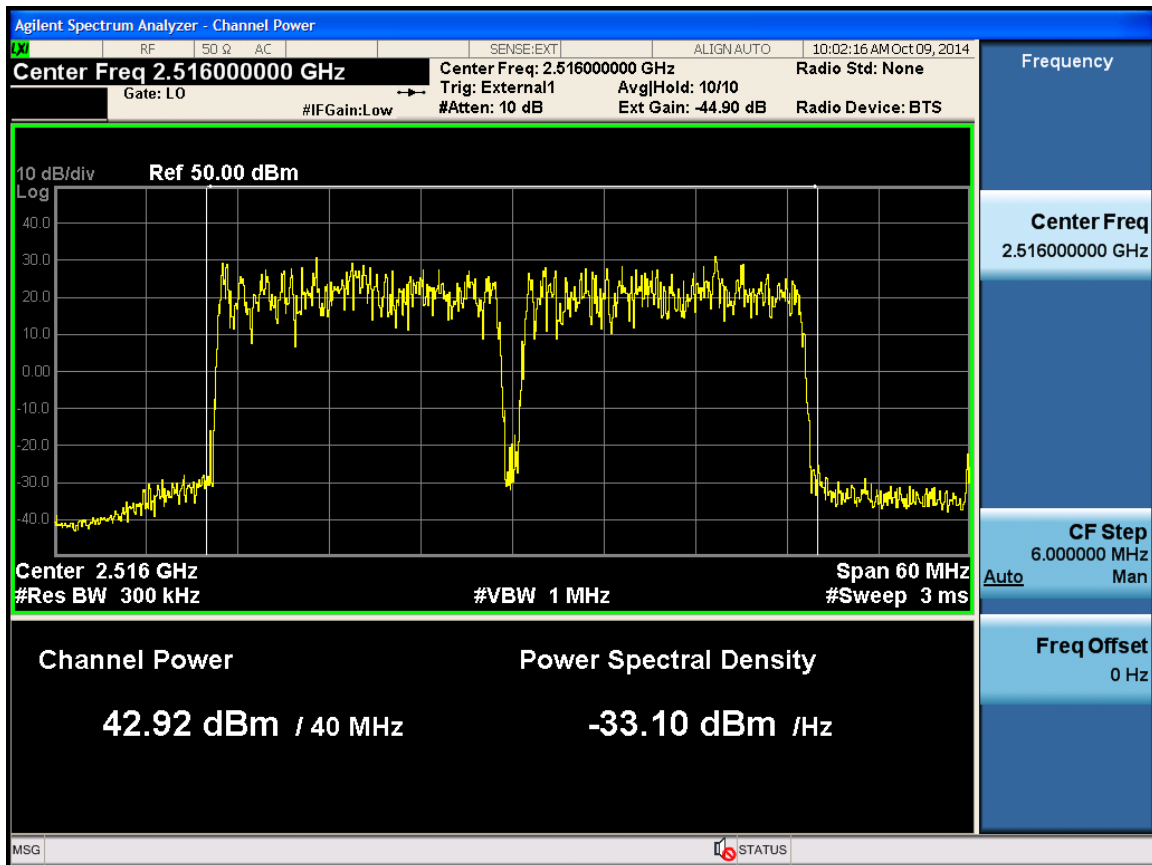
Channel Bandwidth: 20M+20M (1 port)

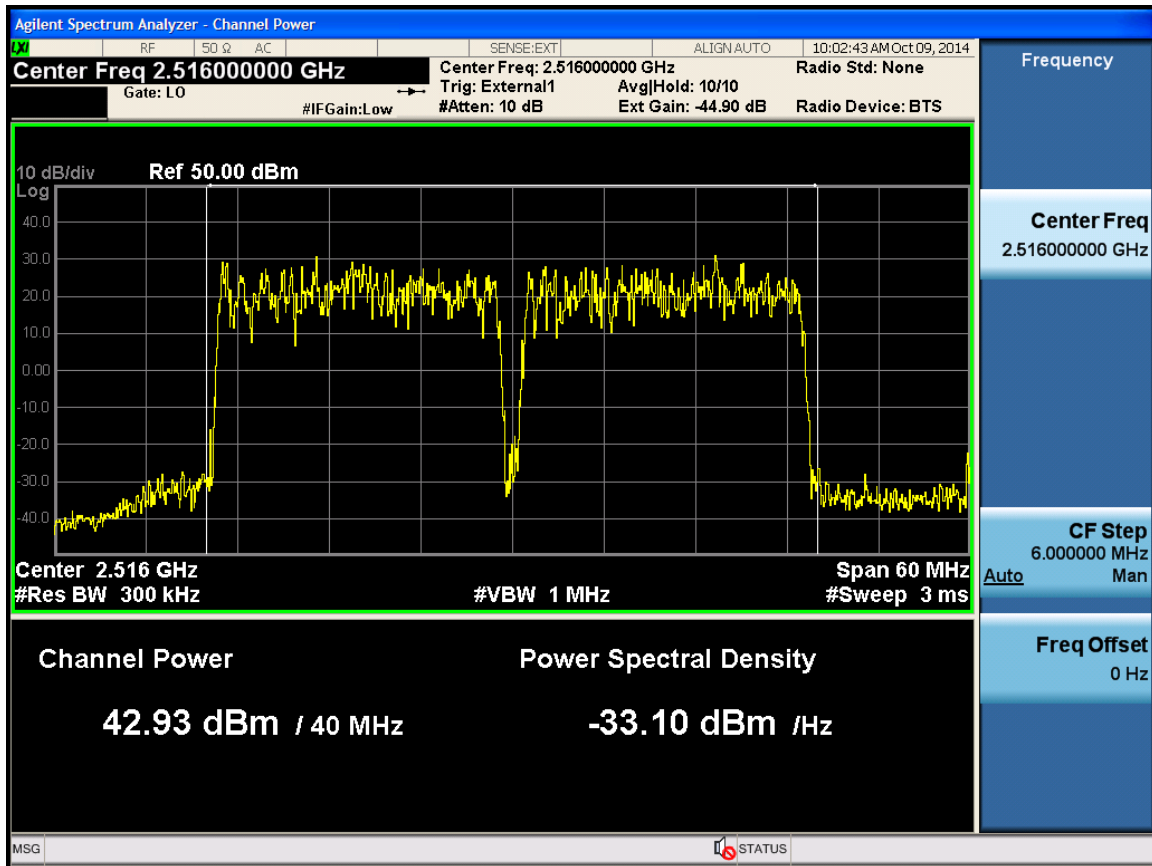
Port	Carrier Freq. c1+c2(MHz)	Output Power					
		QPSK		16QAM		64QAM	
		dBm	W	dBm	W	dBm	W
0	2506+2526	42.92	19.59	42.87	19.36	42.92	19.59
1		42.93	19.63	42.83	19.19	42.93	19.63
2		42.94	19.68	42.90	19.50	42.99	19.91
3		42.94	19.68	42.88	19.41	42.99	19.91
4		42.95	19.72	42.94	19.68	42.91	19.54
5		42.96	19.77	42.99	19.91	42.96	19.77
6		42.97	19.82	42.90	19.50	42.96	19.77
7		42.9	19.50	42.84	19.23	42.94	19.68
0	2536+2556	42.81	19.10	42.85	19.28	42.85	19.28
1		42.8	19.05	43.02	20.04	42.93	19.63
2		42.89	19.45	42.86	19.32	43.03	20.09
3		42.81	19.10	42.97	19.82	42.93	19.63
4		42.82	19.14	42.88	19.41	43.05	20.18
5		42.97	19.82	42.86	19.32	42.93	19.63
6		43.01	20.00	42.85	19.28	43.03	20.09
7		42.81	19.10	42.91	19.54	42.89	19.45
0	2566+2586	42.84	19.23	42.91	19.54	43.07	20.28
1		42.93	19.63	42.87	19.36	43.06	20.23
2		42.96	19.77	42.84	19.23	42.95	19.72
3		43.07	20.28	42.95	19.72	42.97	19.82
4		42.93	19.63	42.81	19.10	43.06	20.23
5		43.08	20.32	42.96	19.77	43.05	20.18

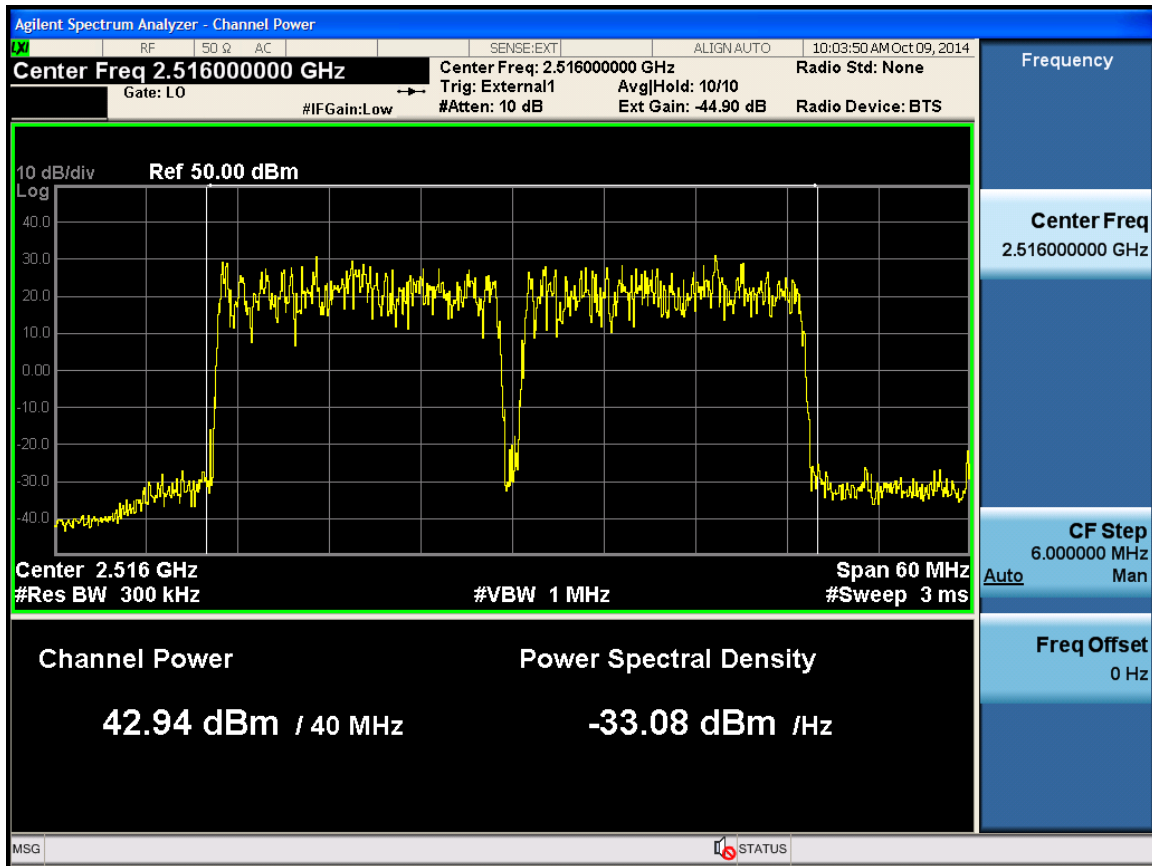
6		42.93	19.63	42.81	19.10	43.02	20.04
7		43.05	20.18	42.92	19.59	43.03	20.09

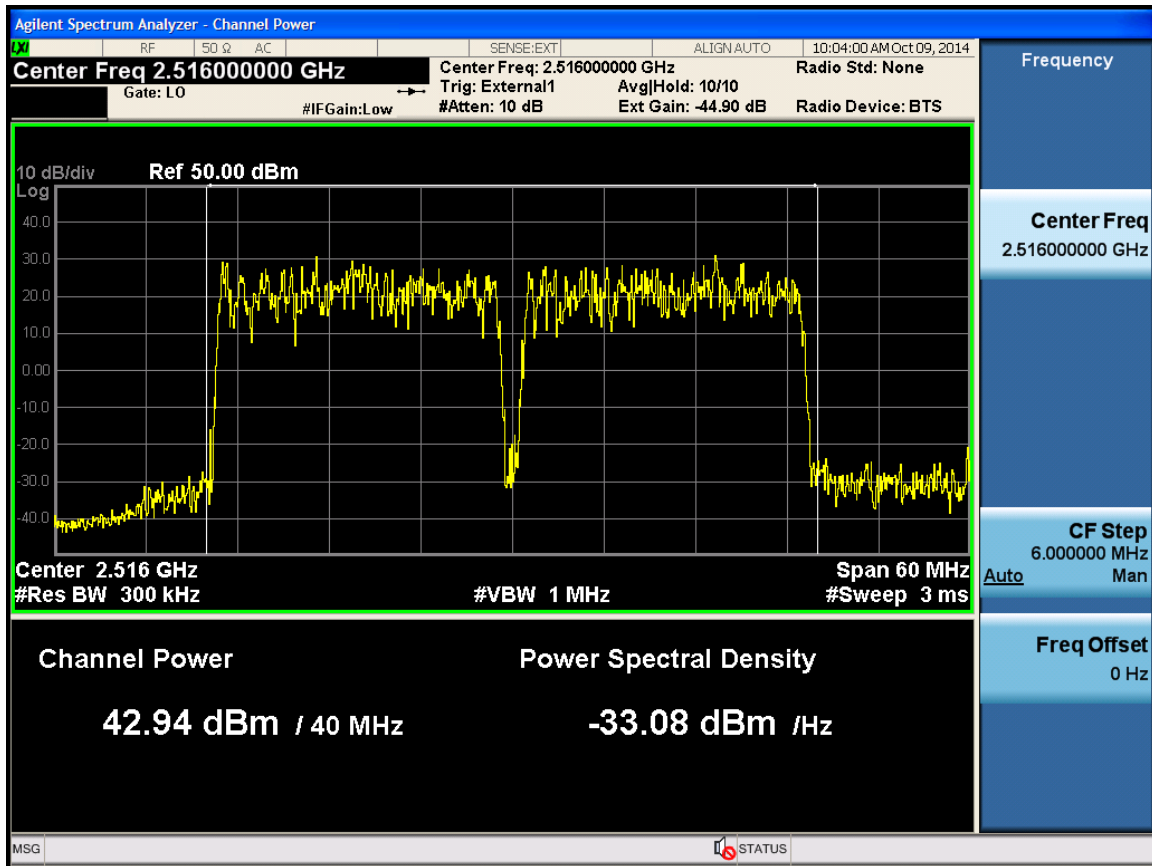
Channel Bandwidth: 20M+20M (8 ports)

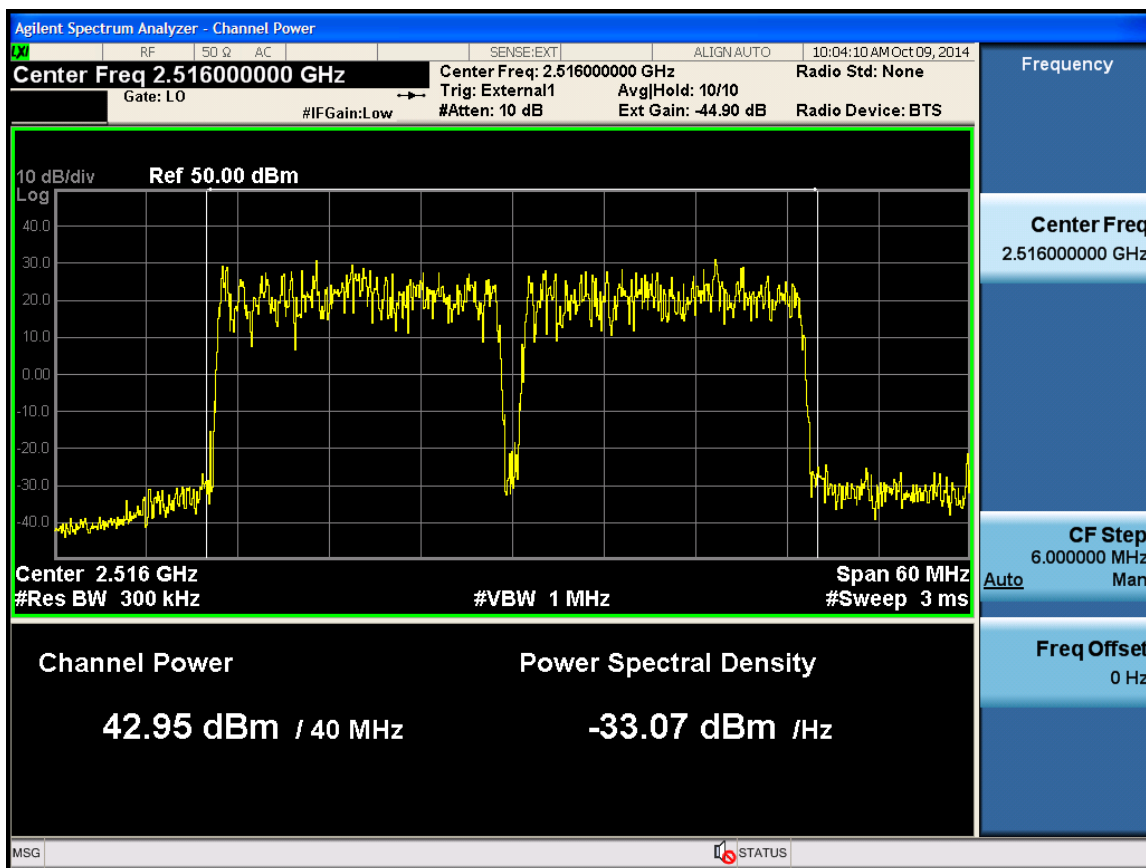
Carrier Freq. c1+c2(MHz)	Output Power									limit(d Bw
	QPSK			16QAM			64QAM			
	dBm	EIRP(dBm)	EIRP(dBw)	dBm	EIRP(dBm)	EIRP(dBw)	dBm	EIRP(dBm)	EIRP(dBw)	
2506+2526	51.97	68.37	38.37	51.92	68.32	38.32	51.98	68.38	38.38	<41.2
2536+2556	51.90	68.30	38.30	51.93	68.33	38.33	51.99	68.39	38.39	<41.2
2566+2586	52.01	68.41	38.41	51.92	68.32	38.32	52.06	68.46	38.46	<41.2

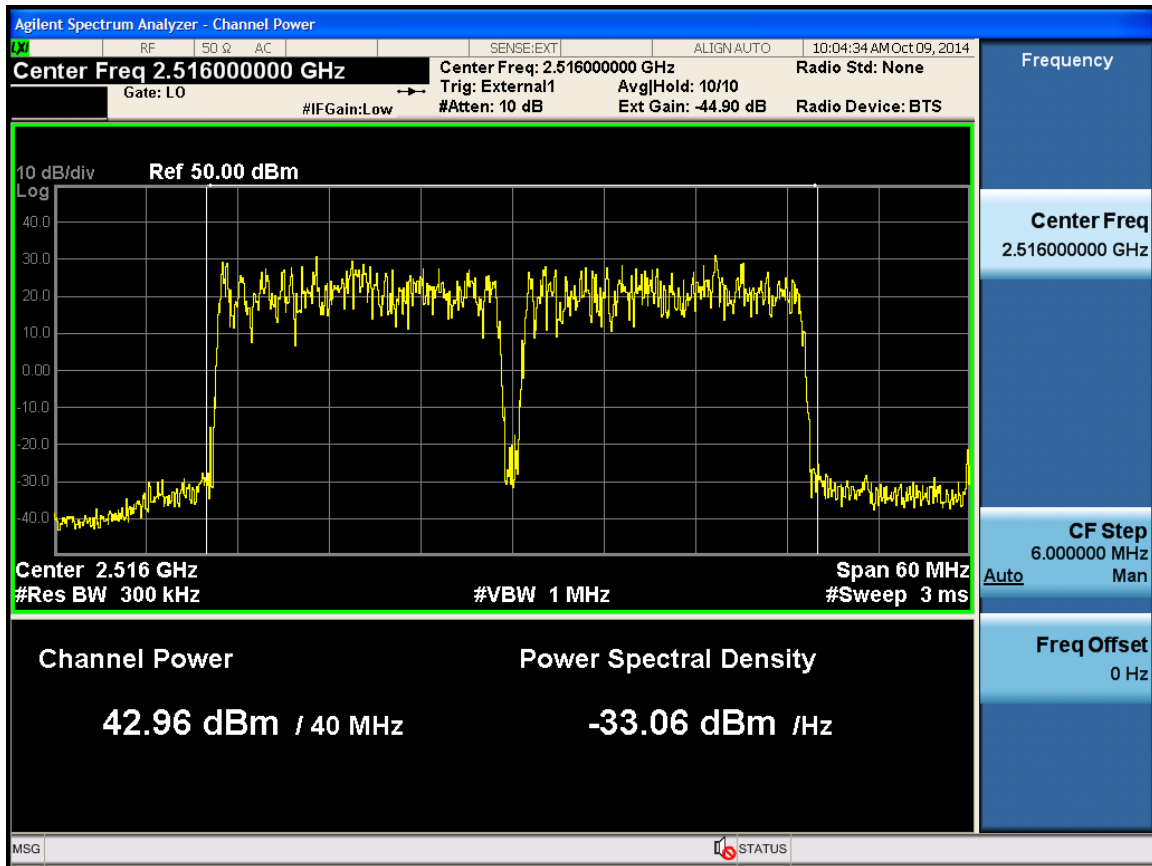


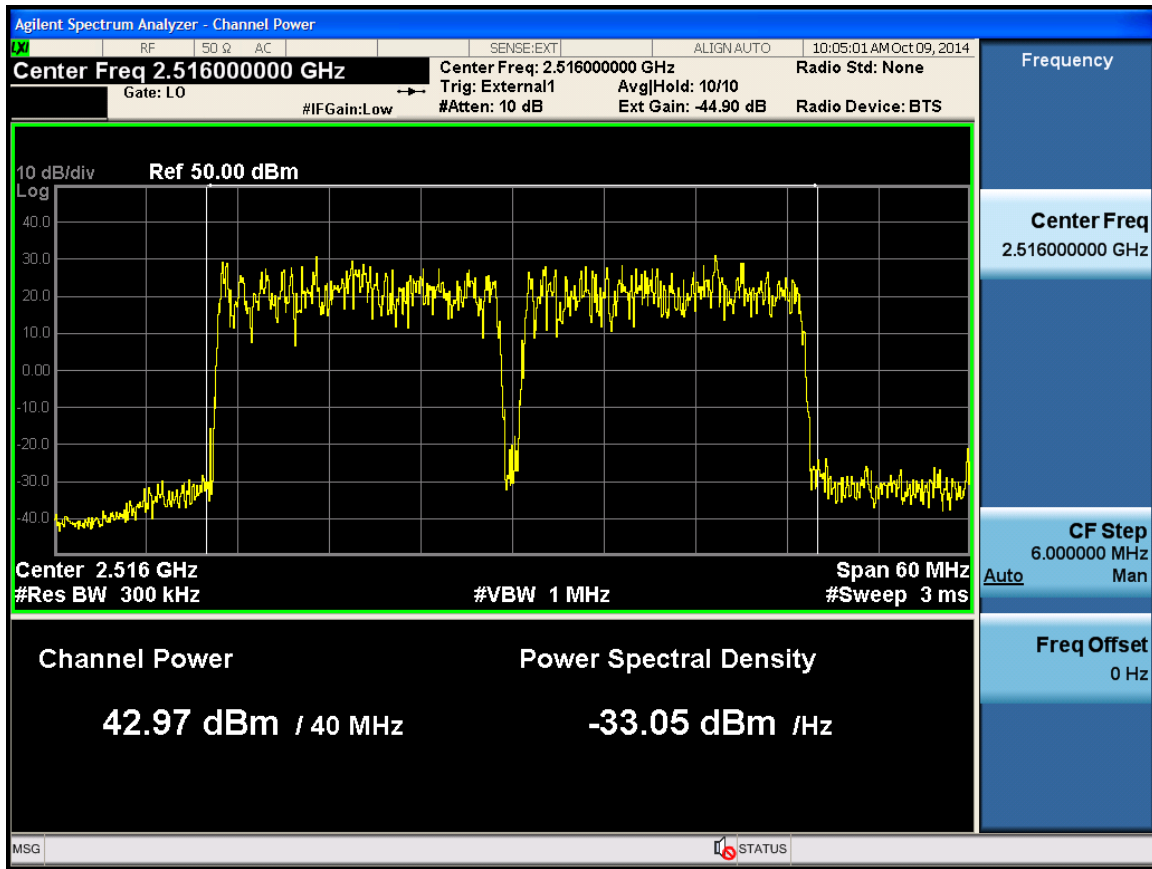


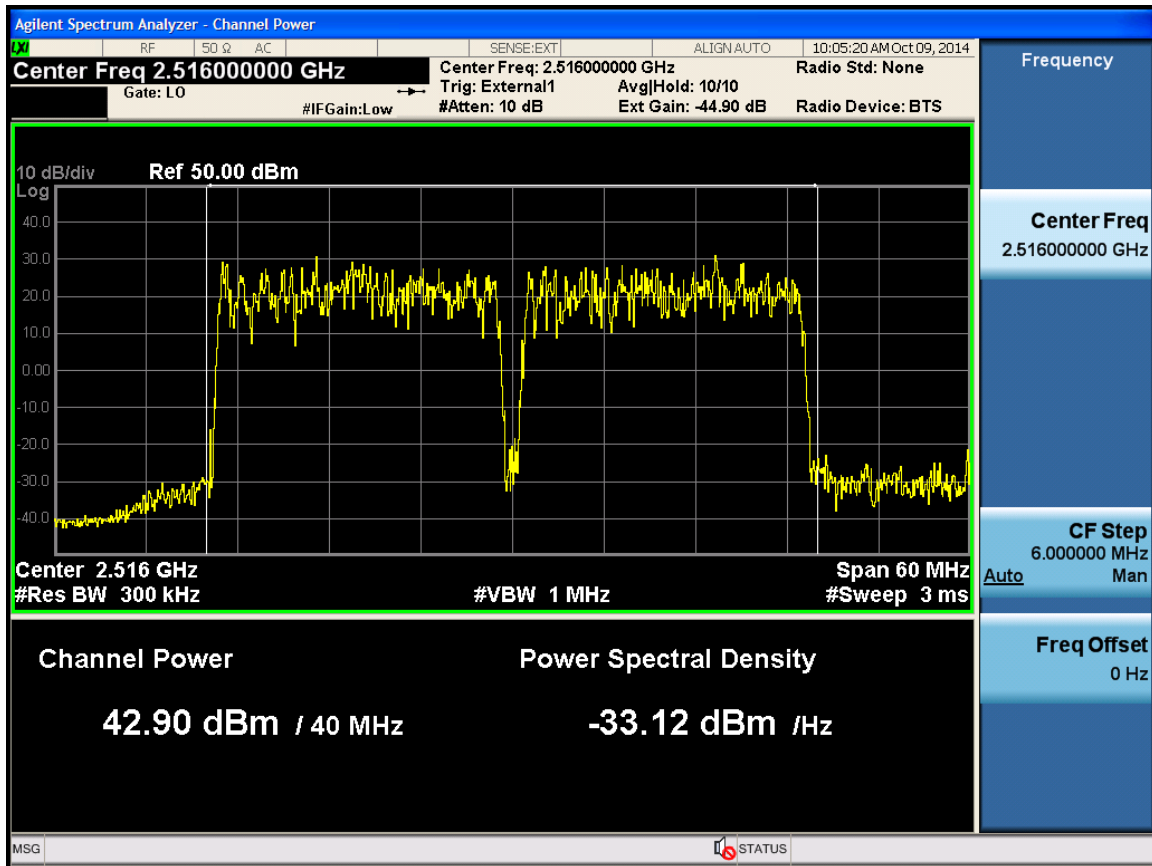


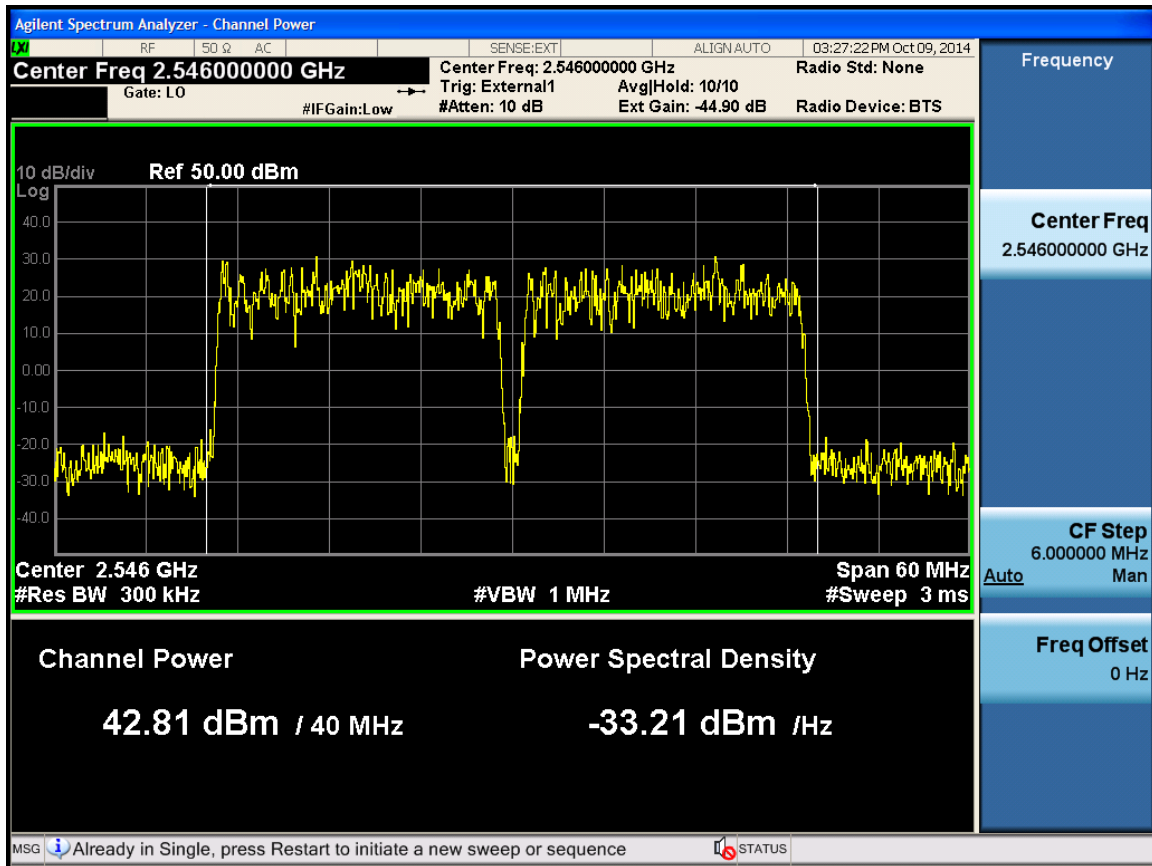


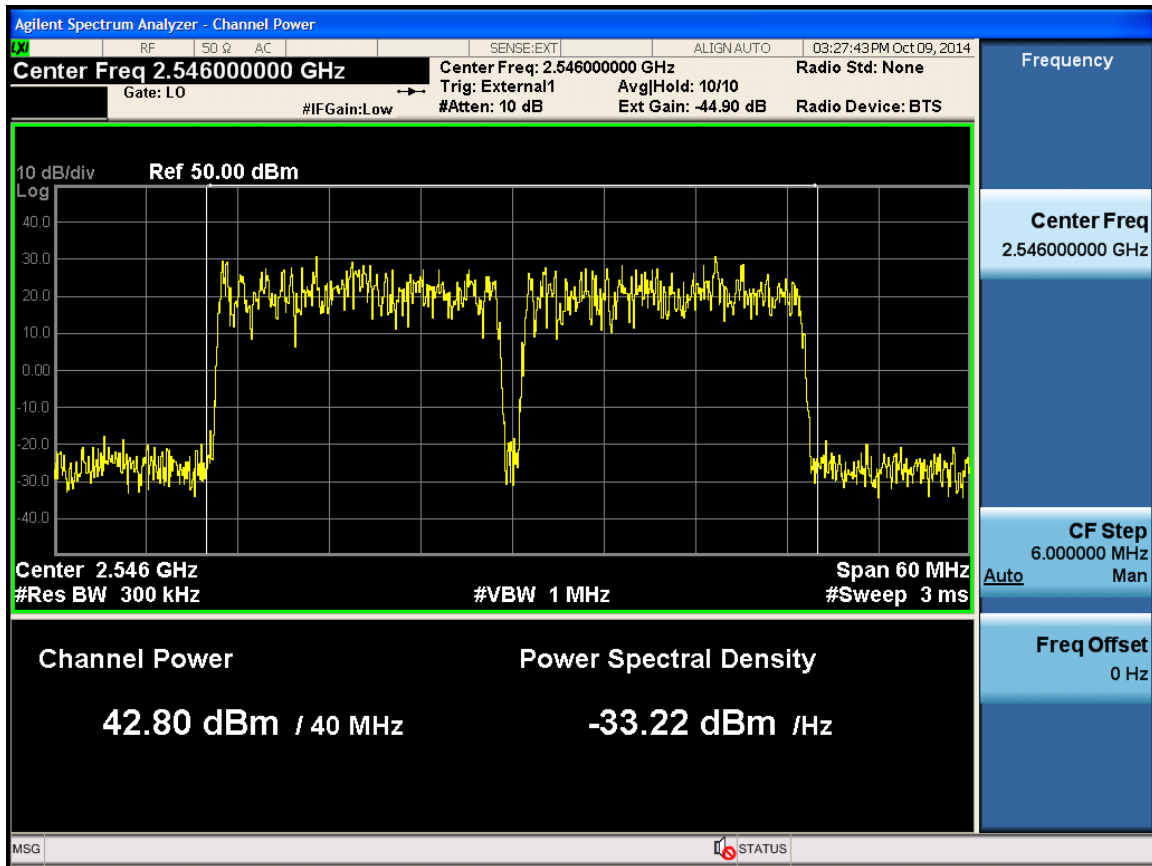


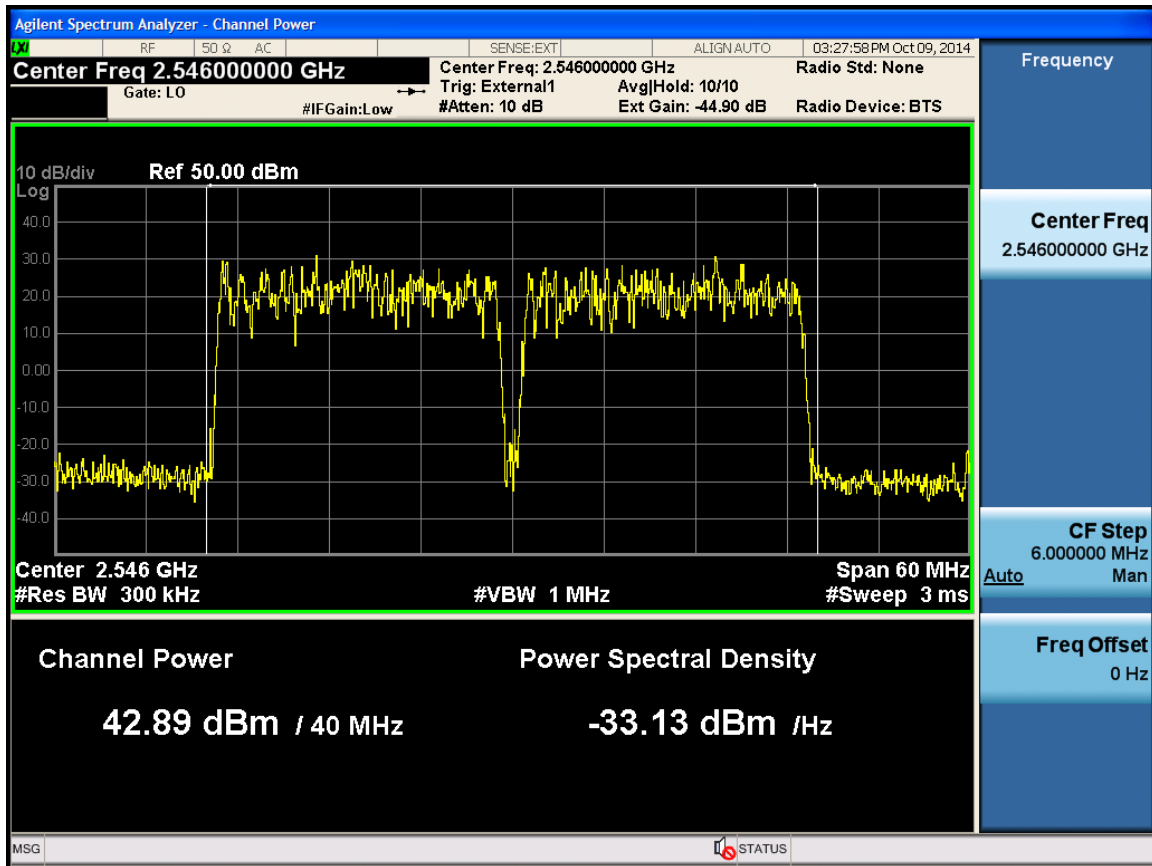


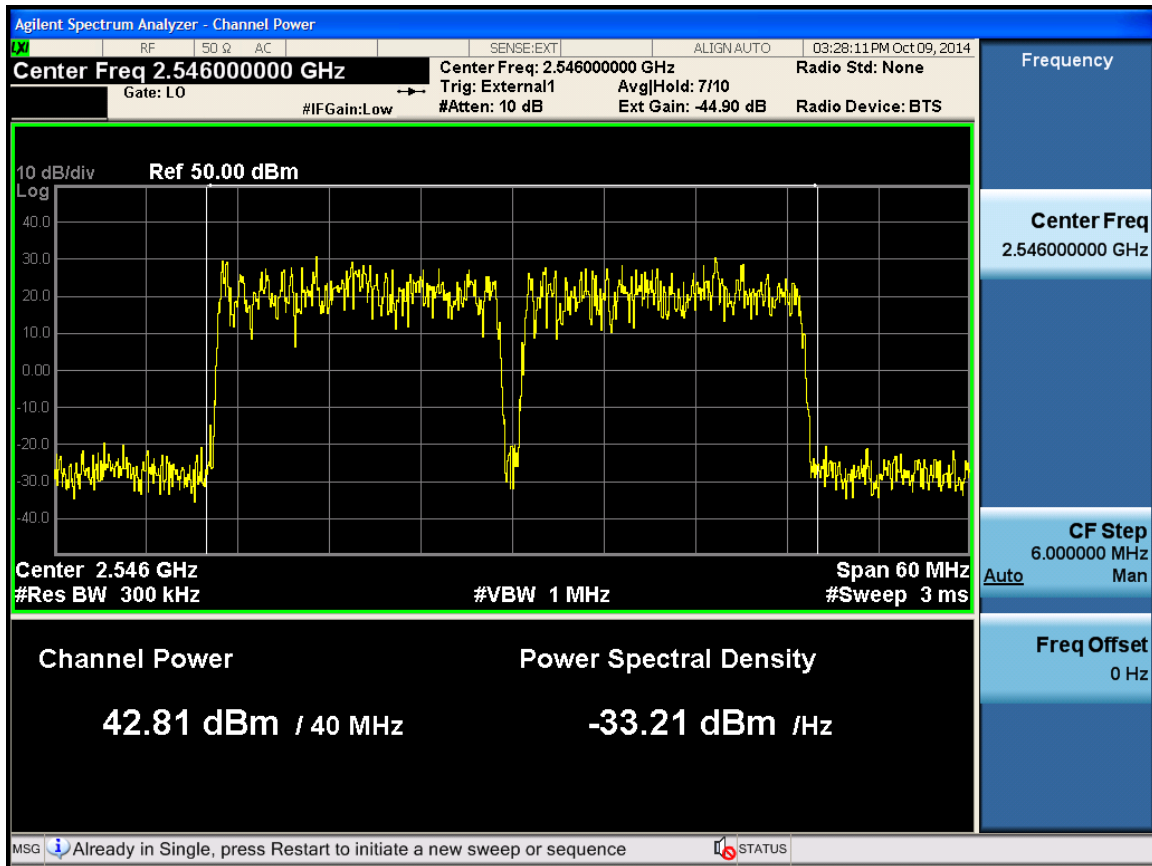


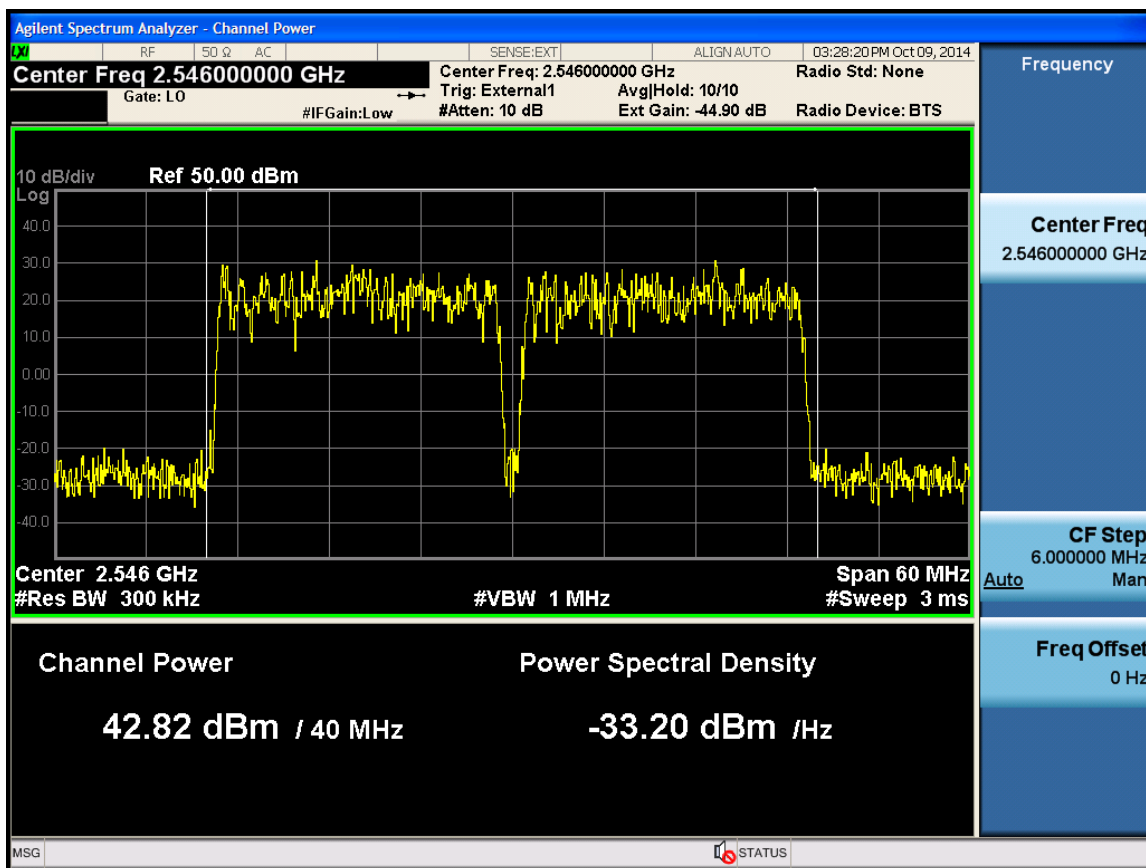


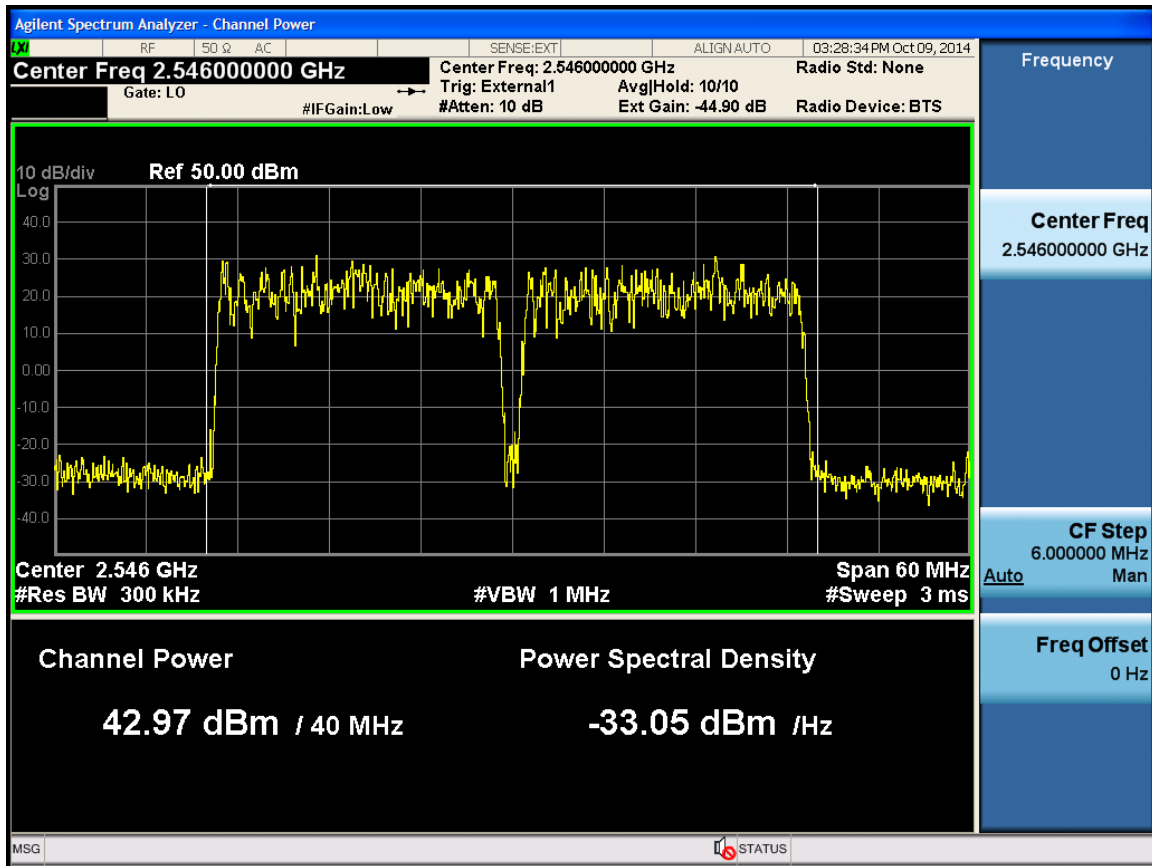


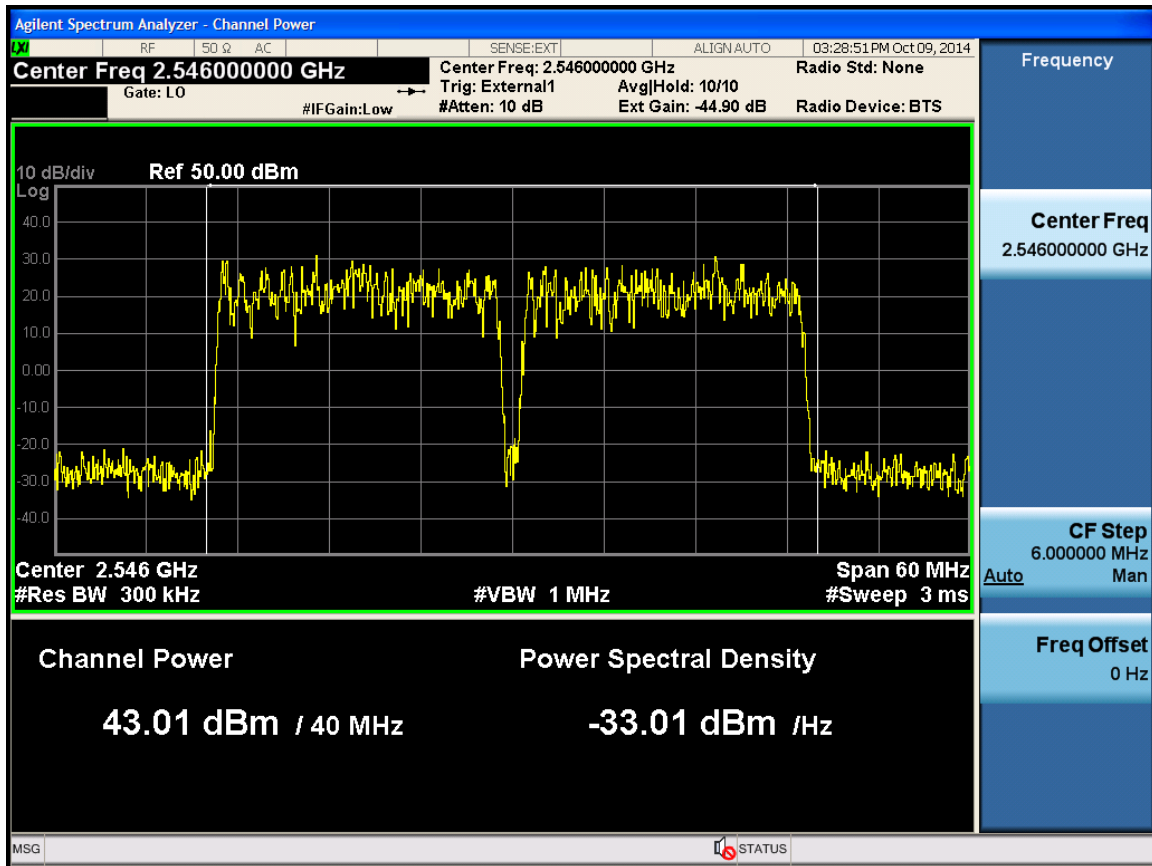


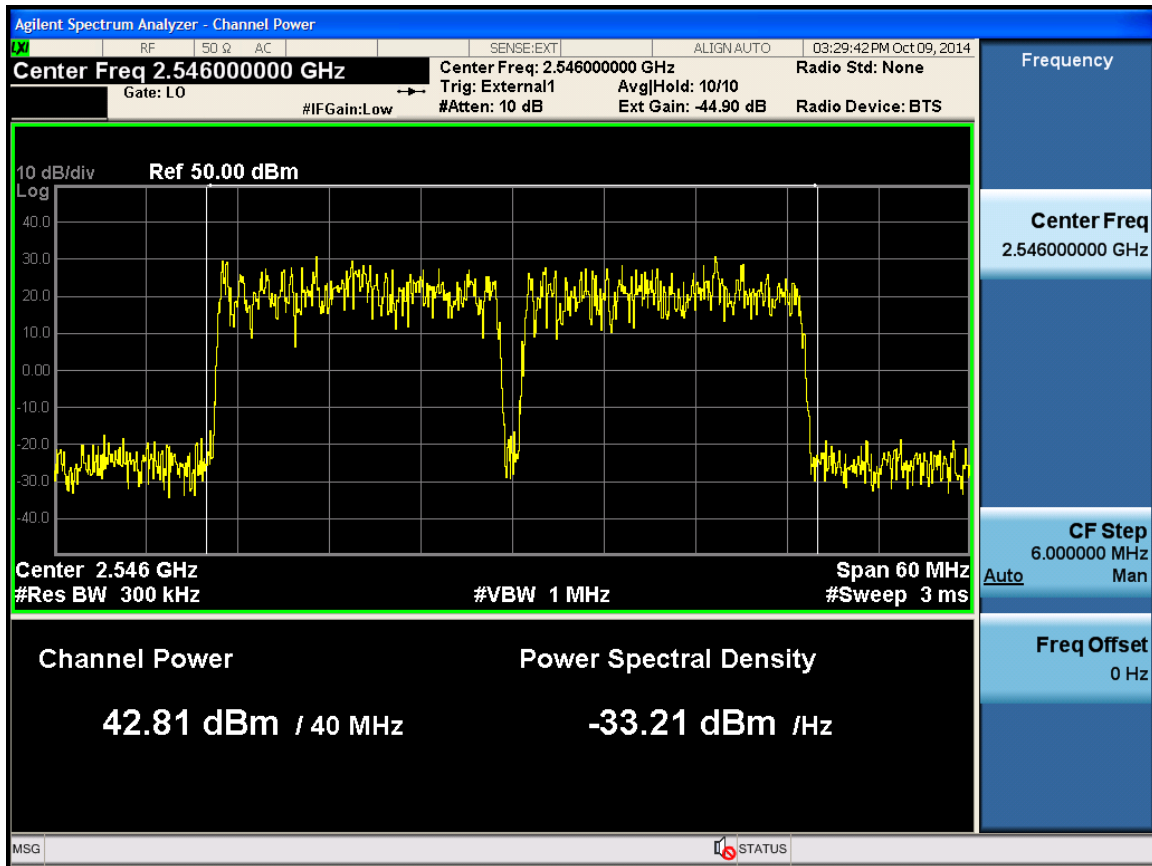


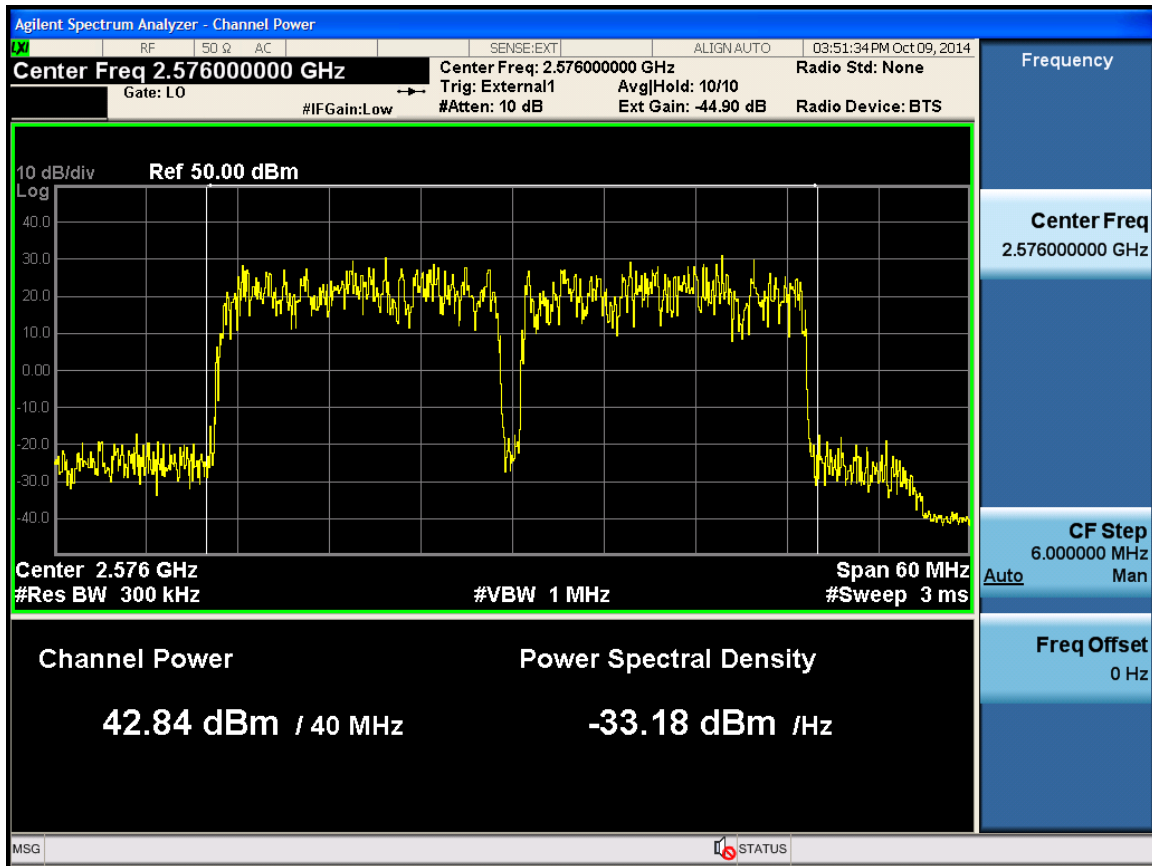


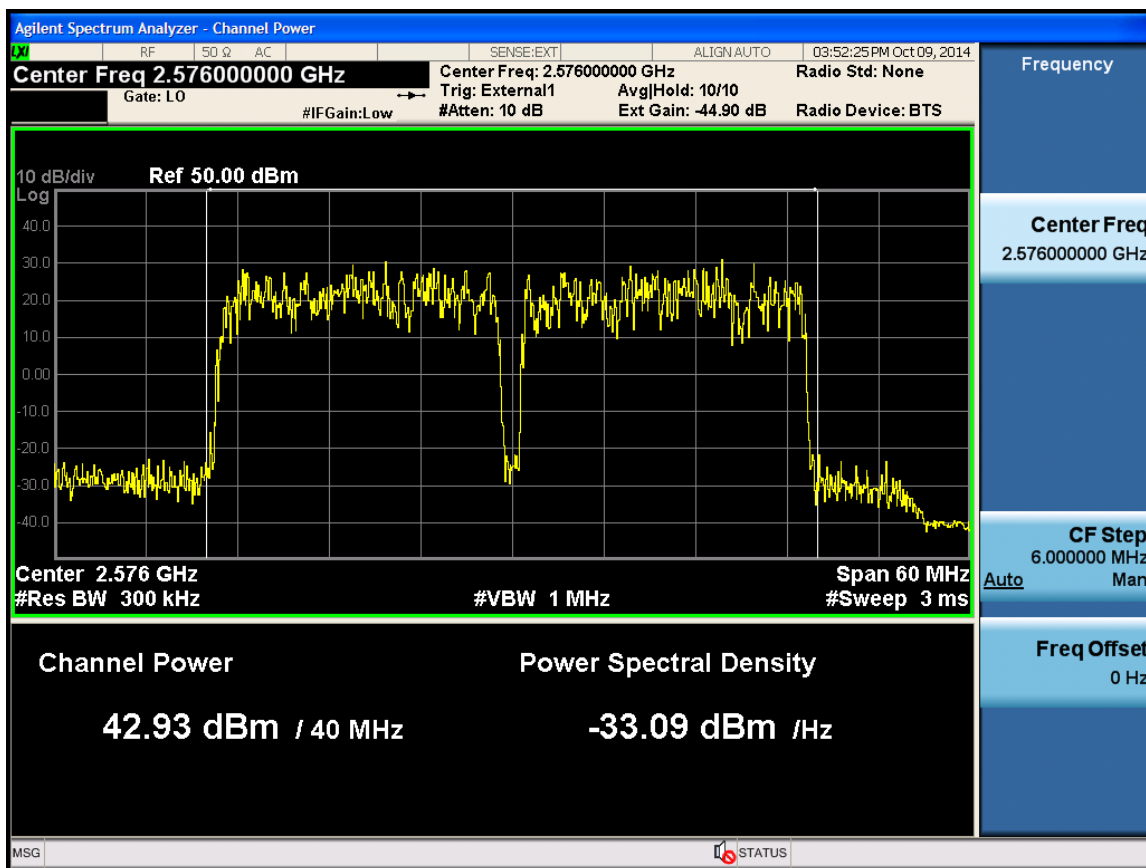


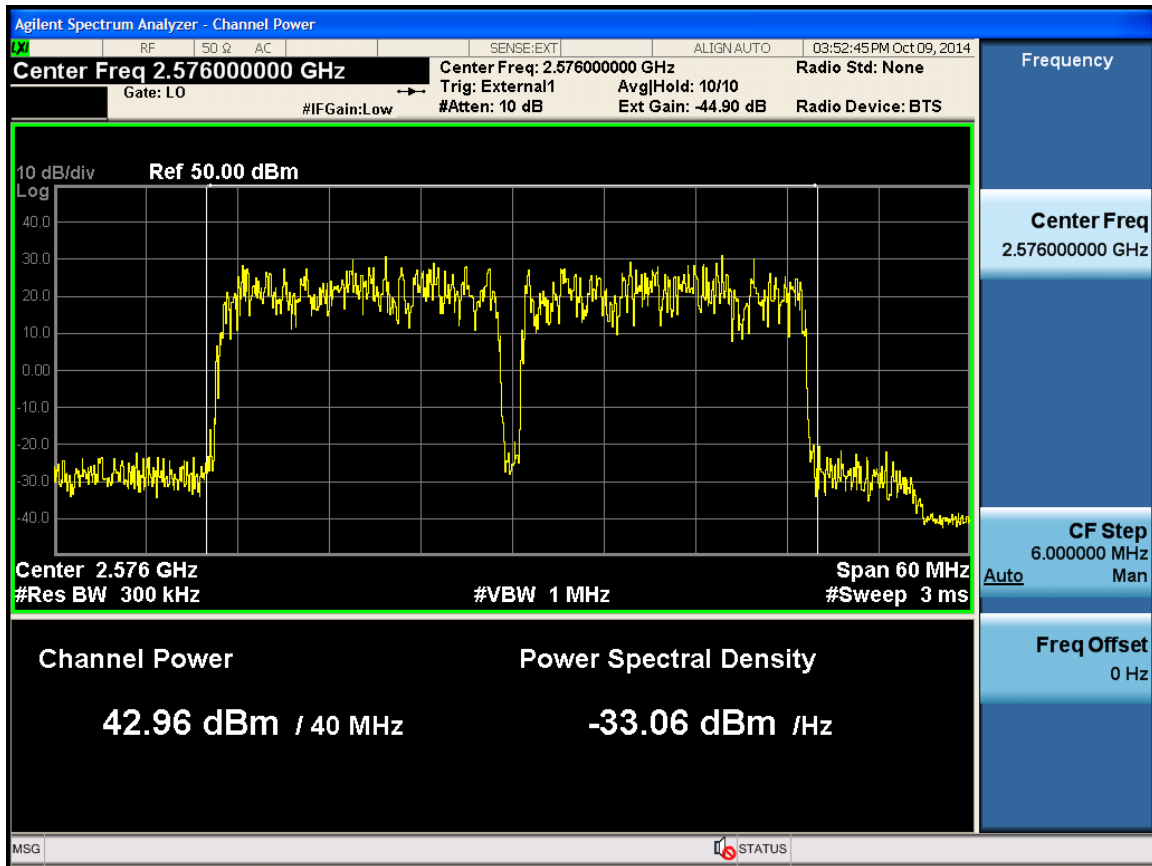


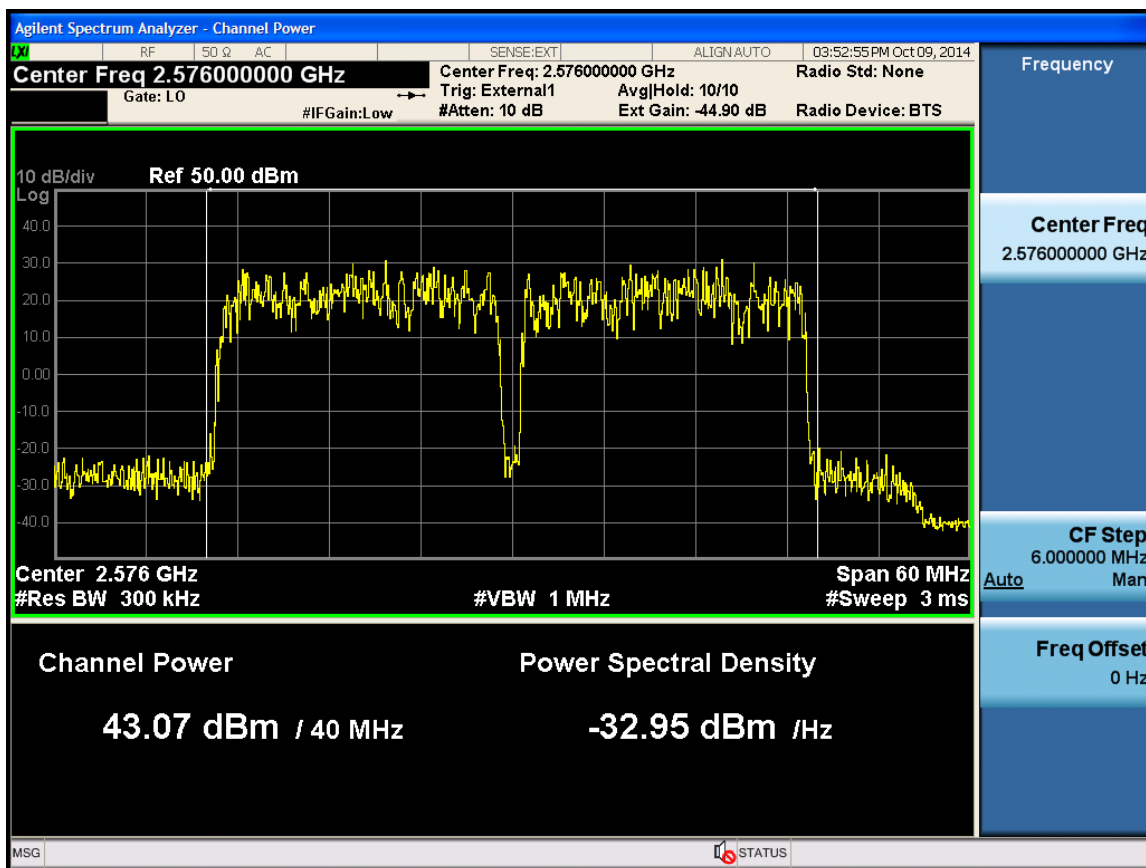


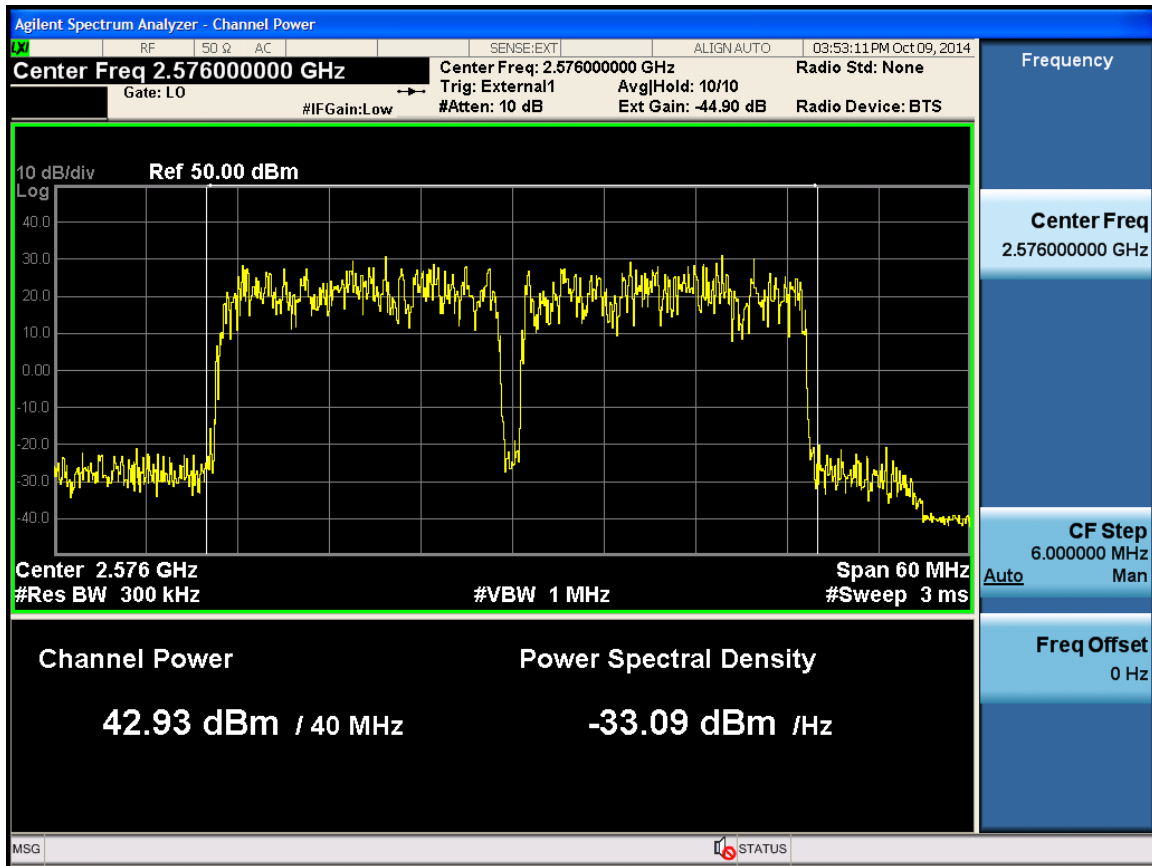


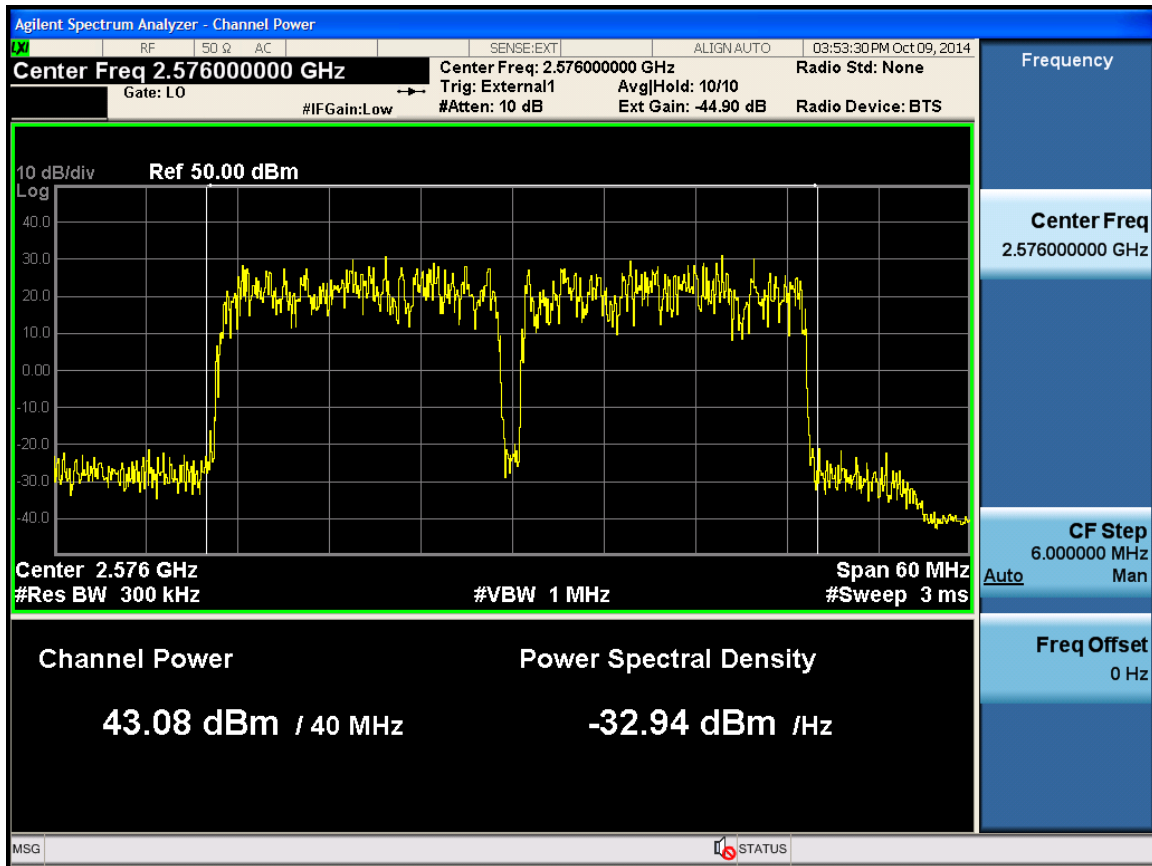


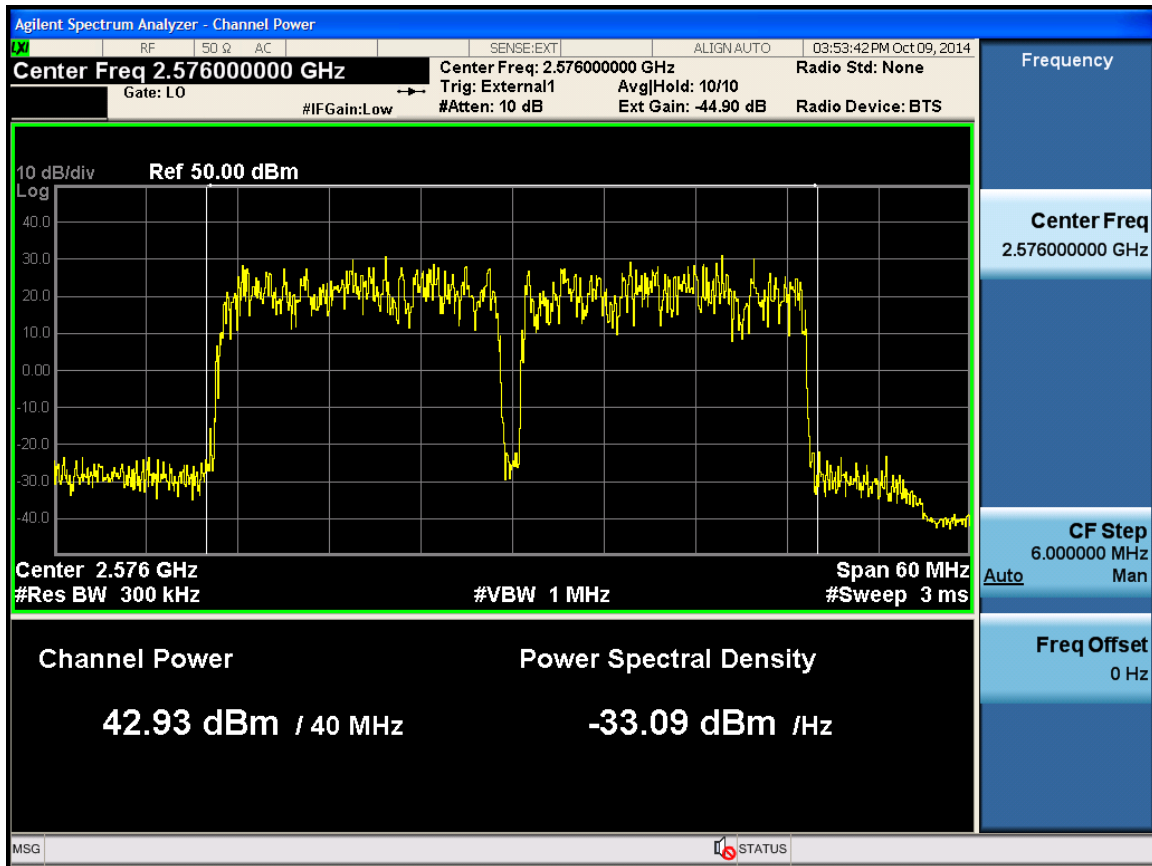


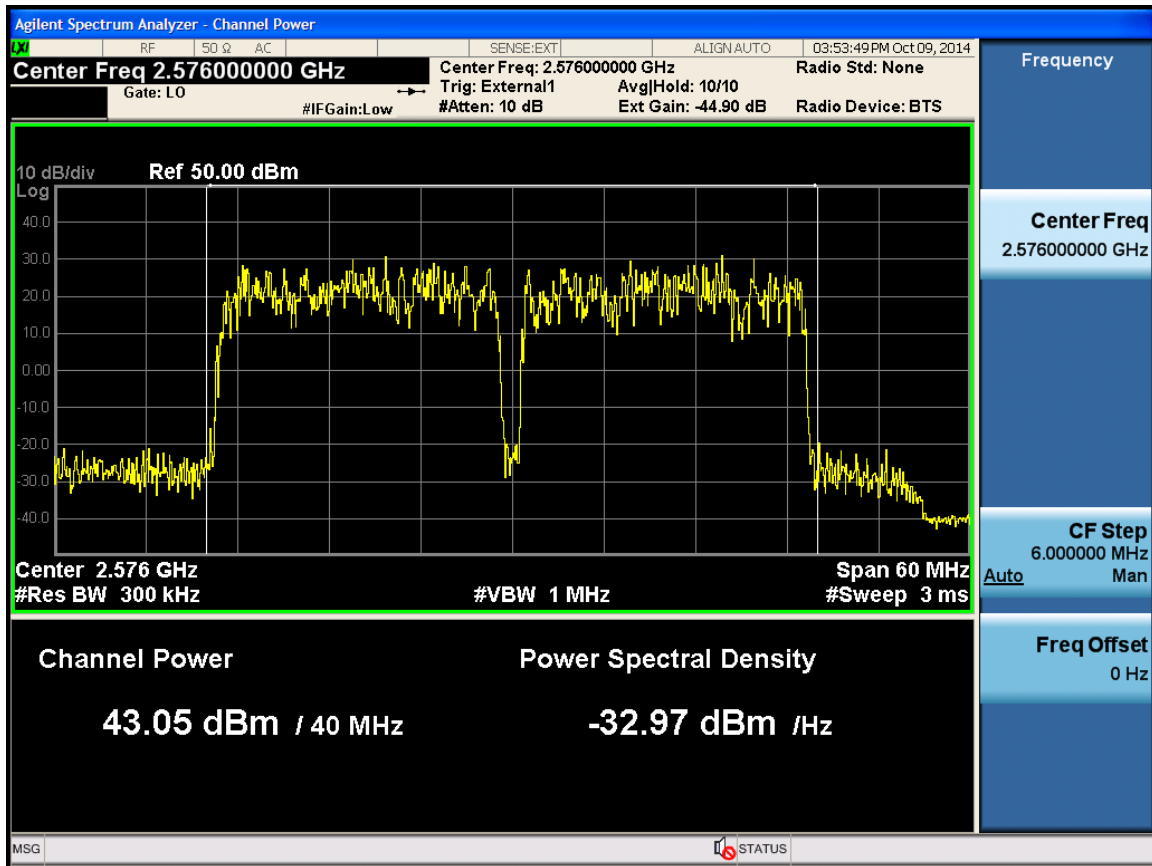


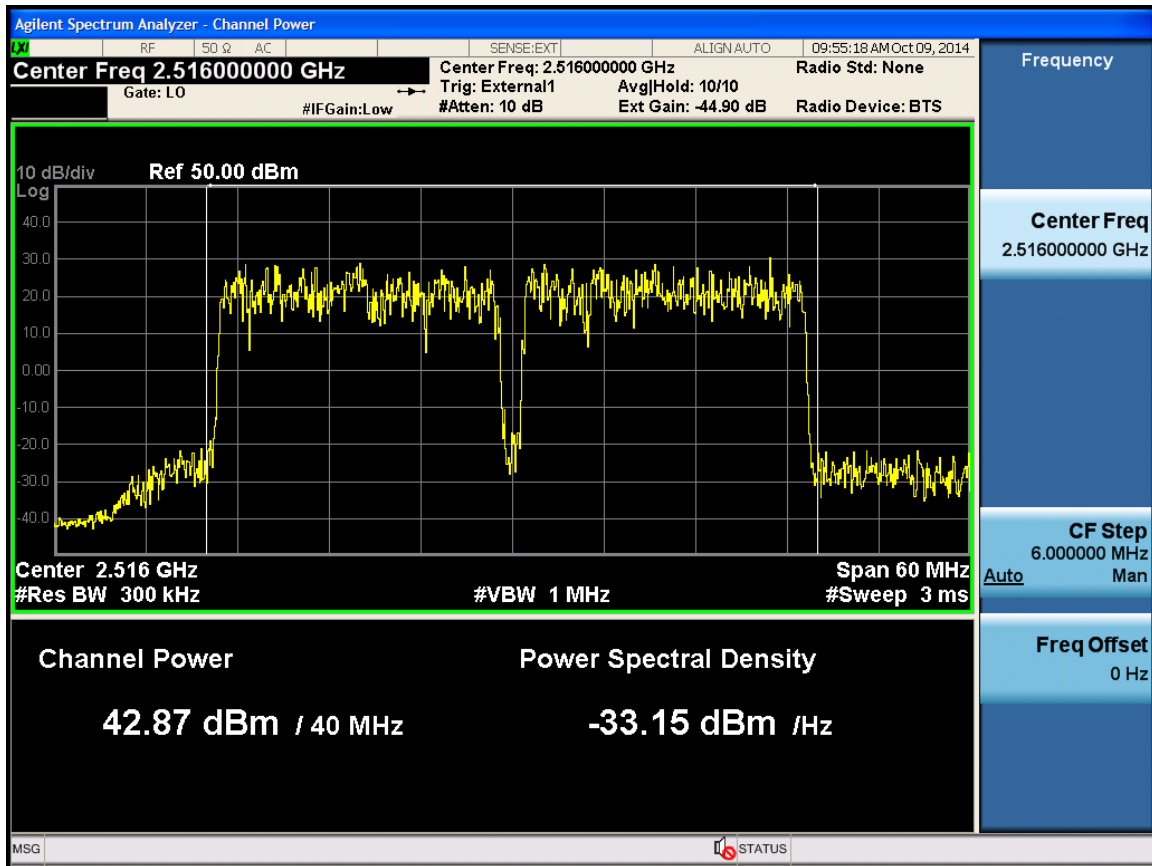


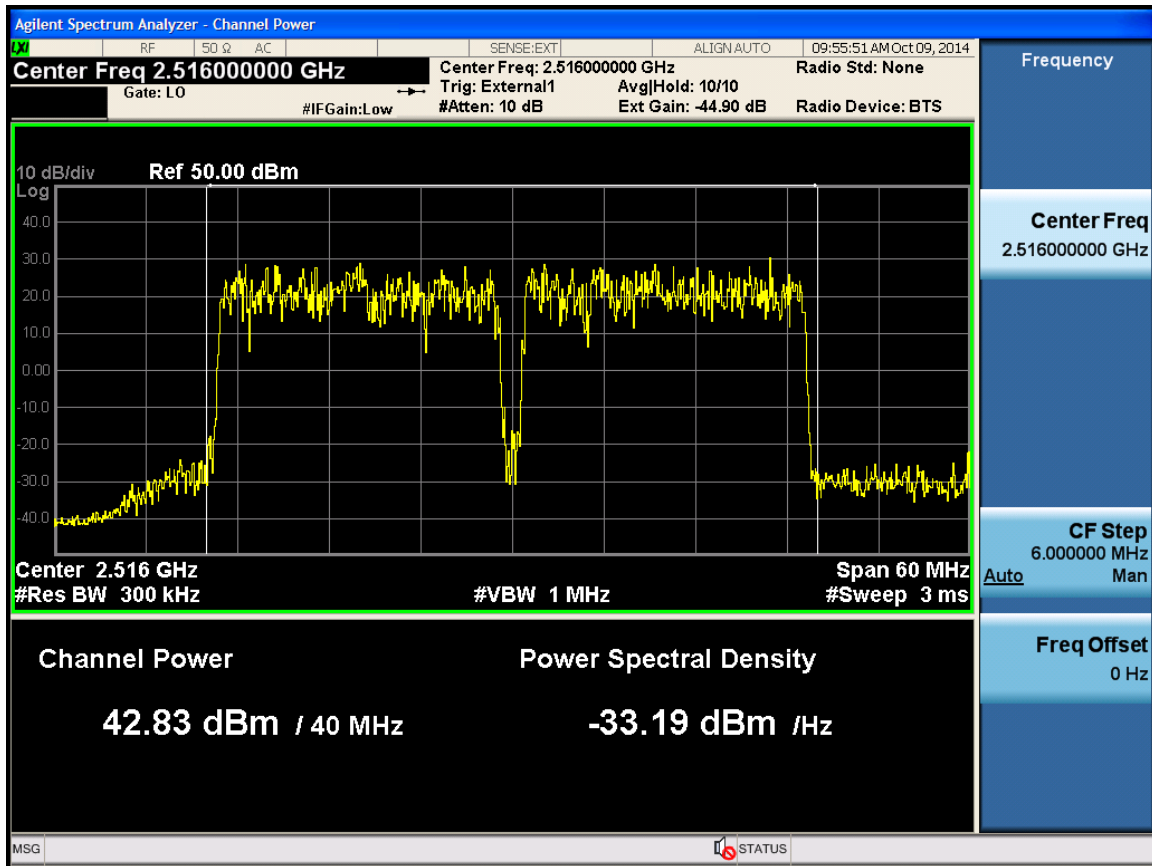


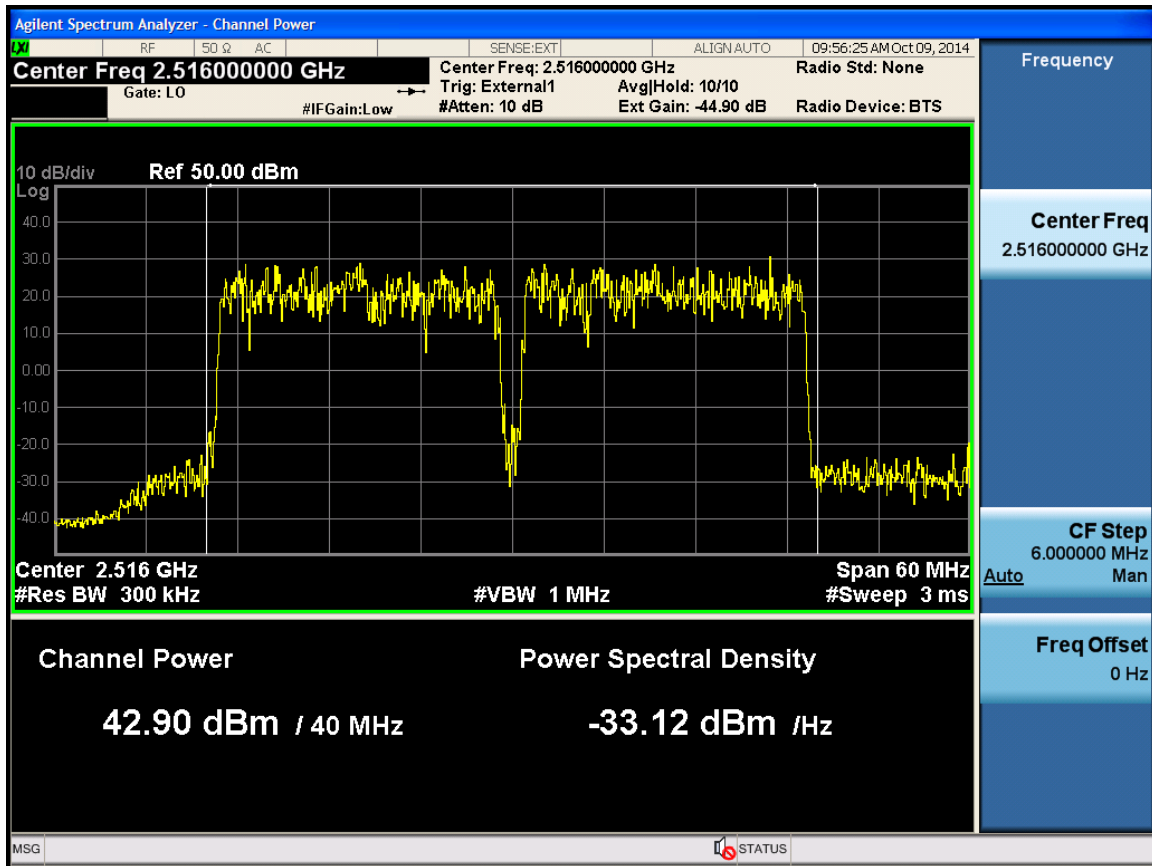


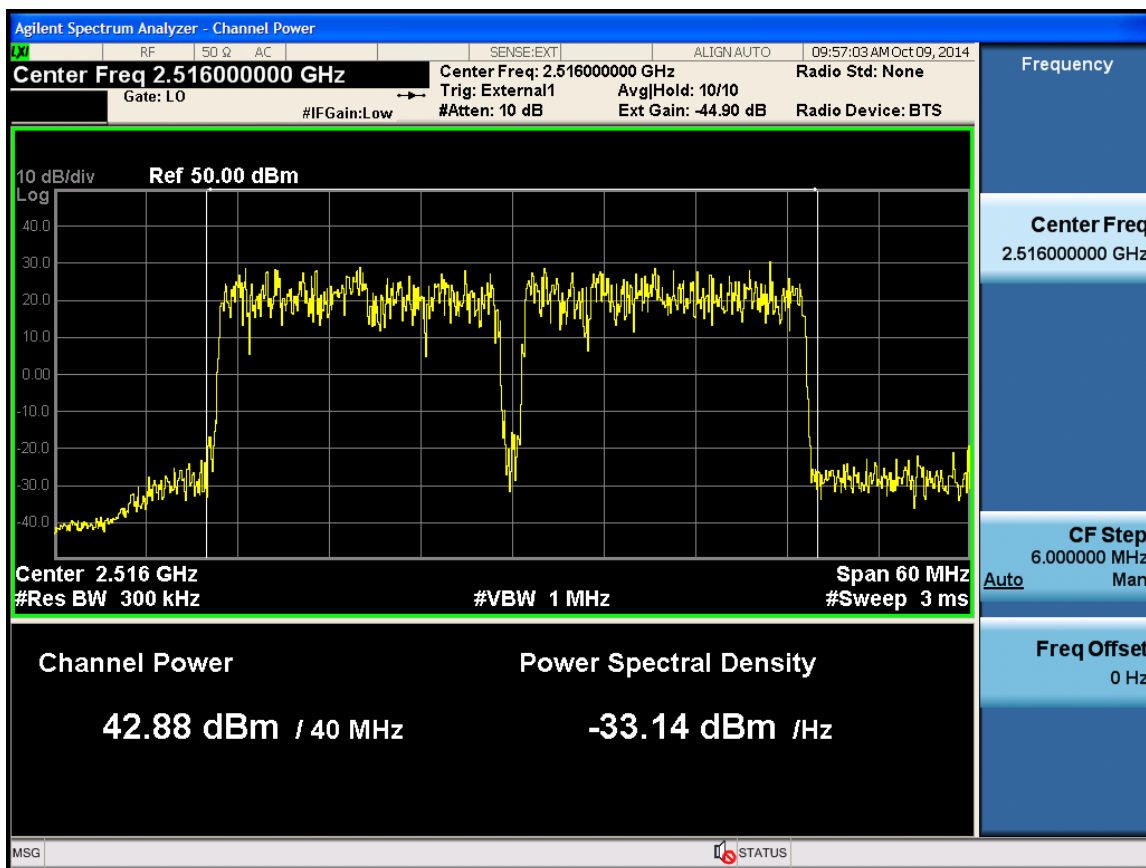


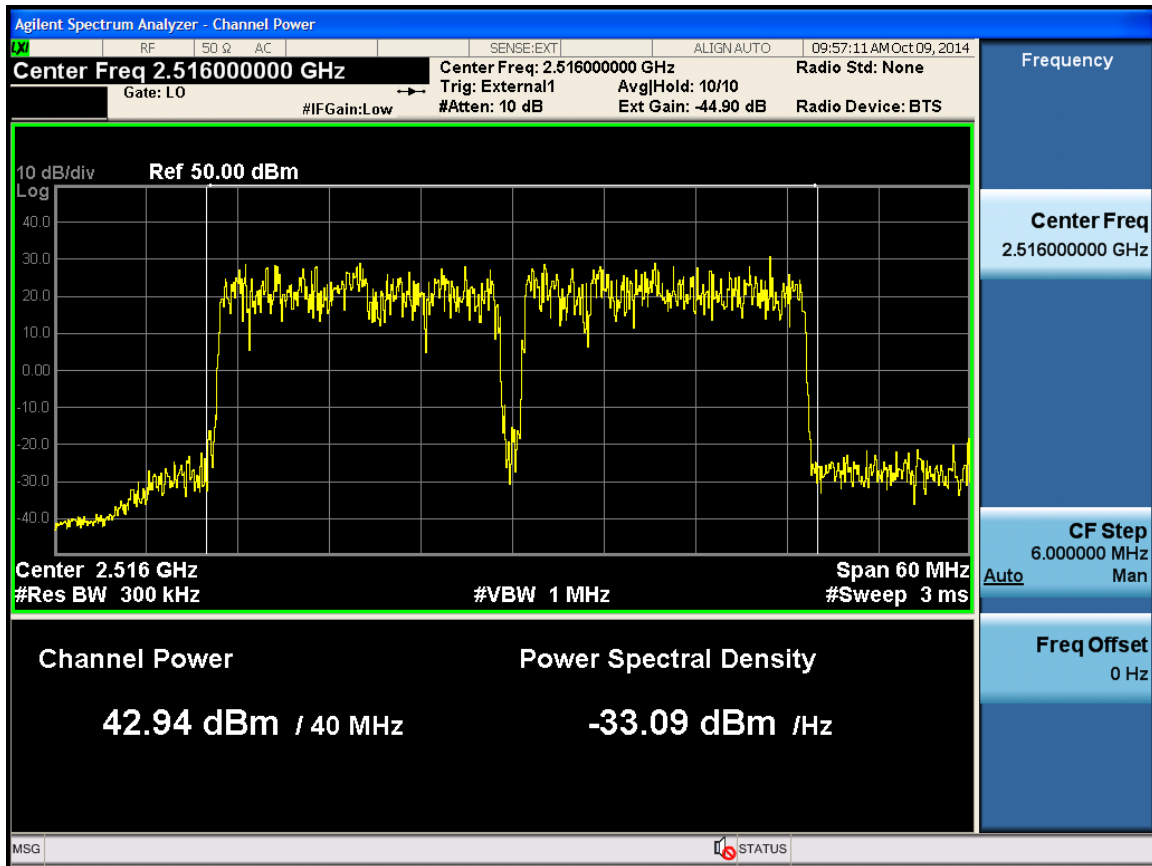


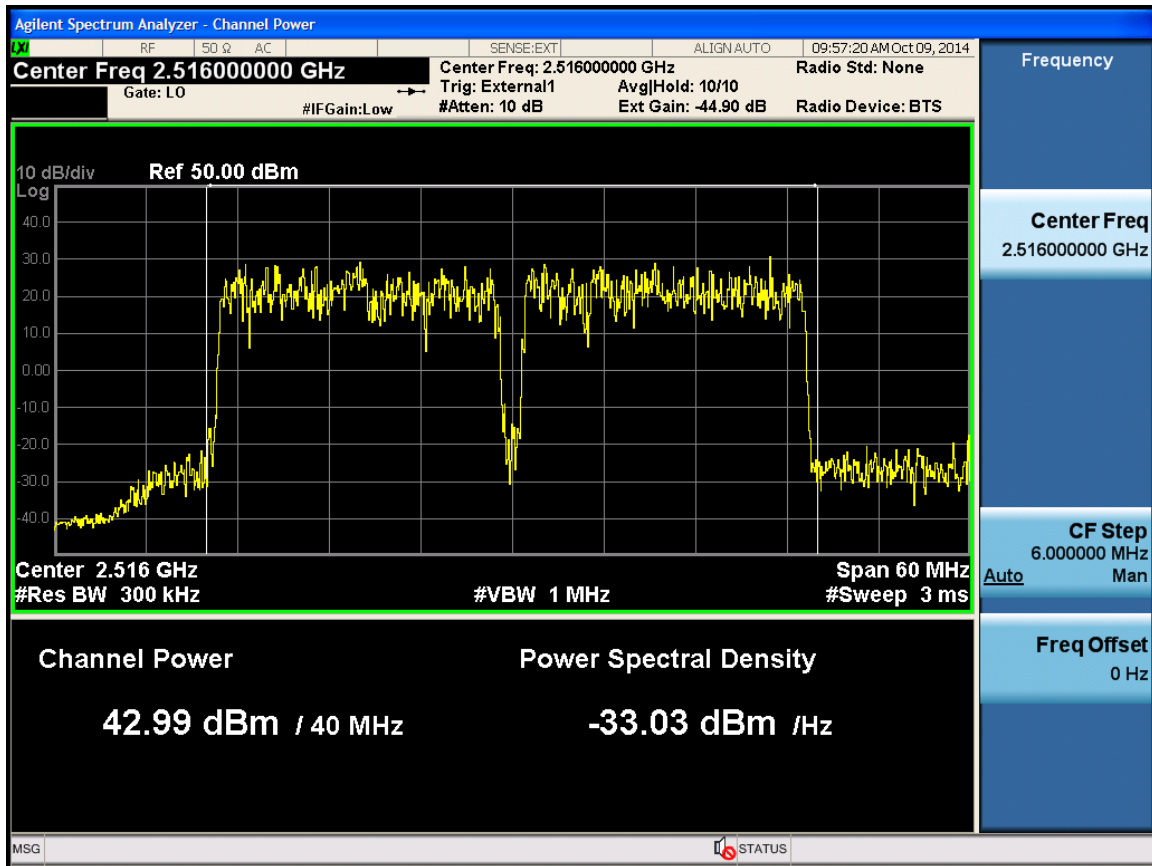


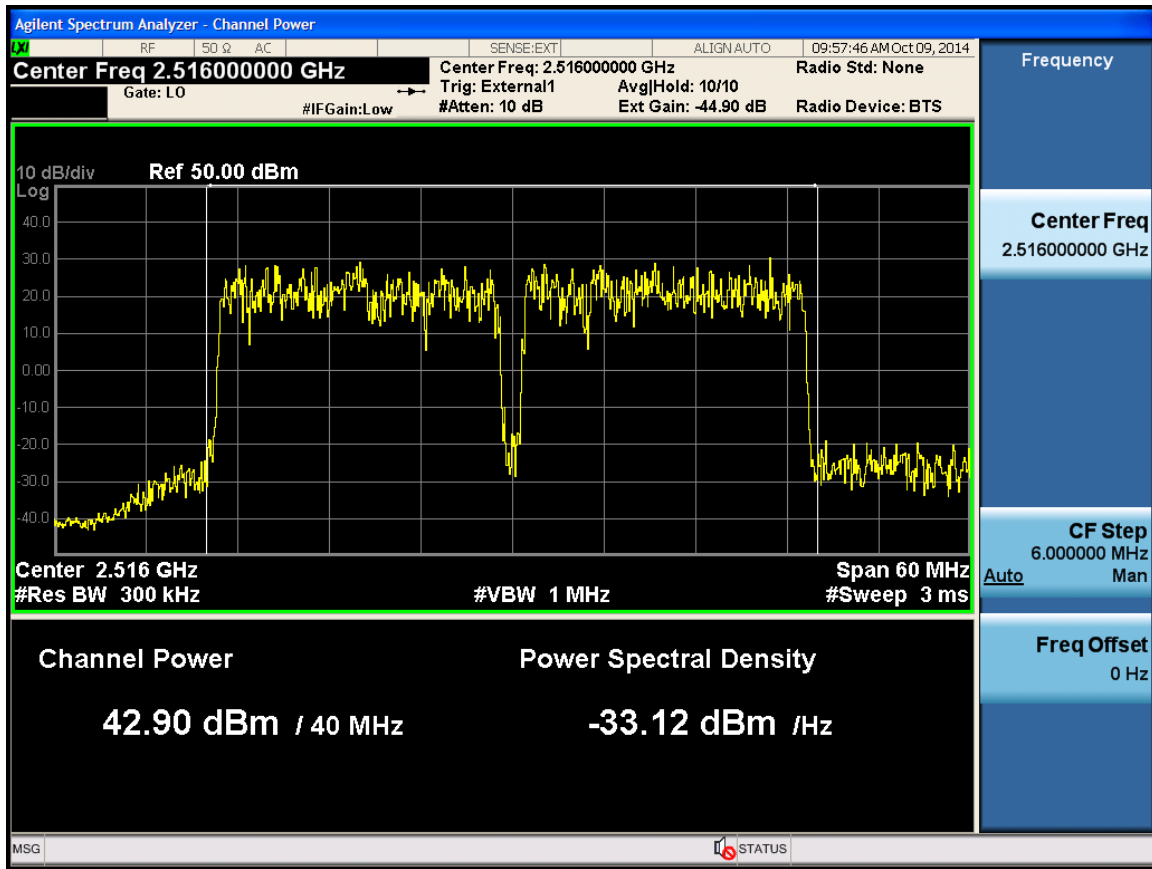


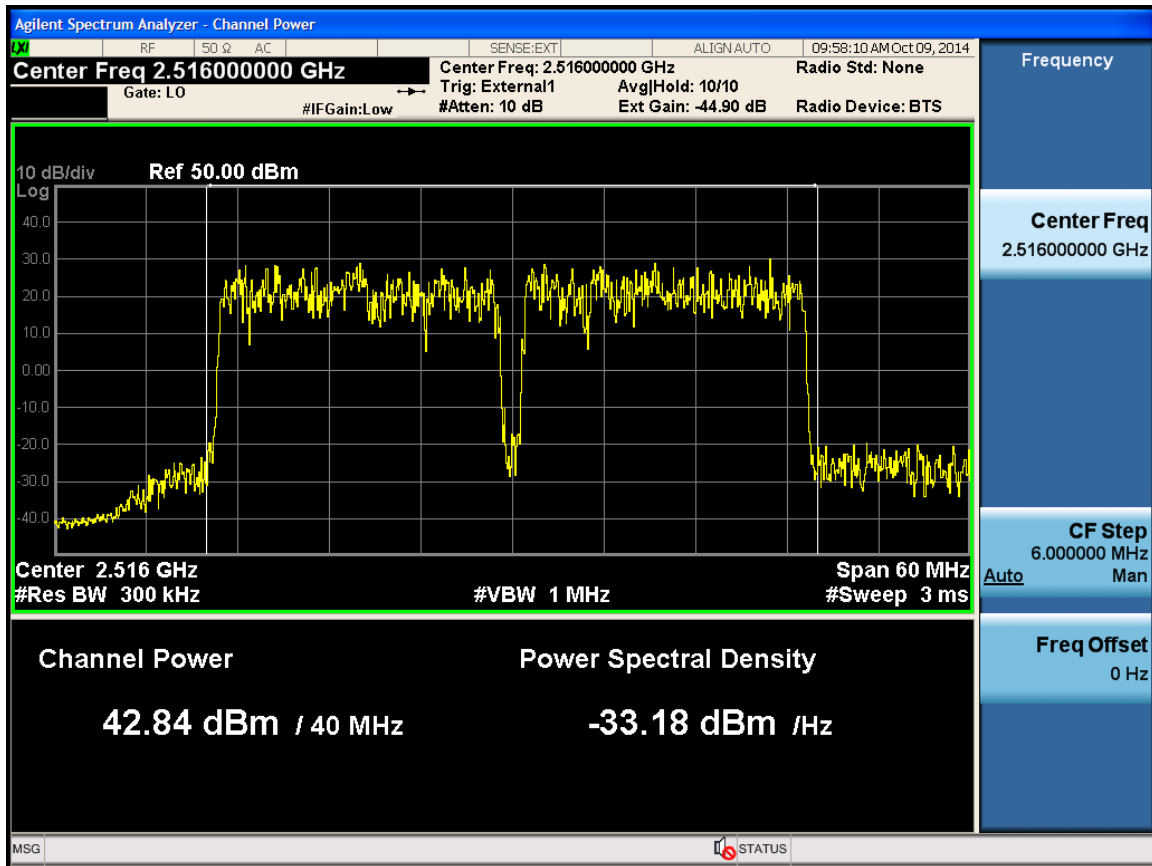


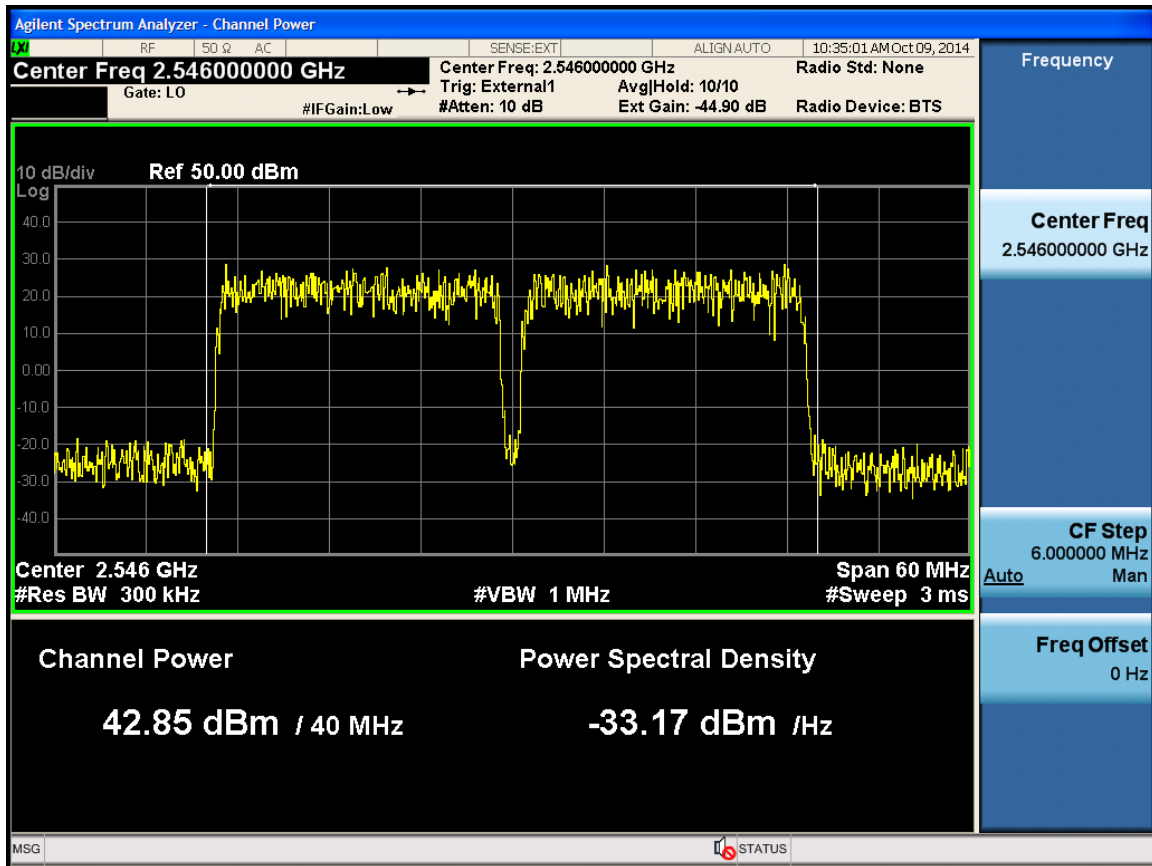


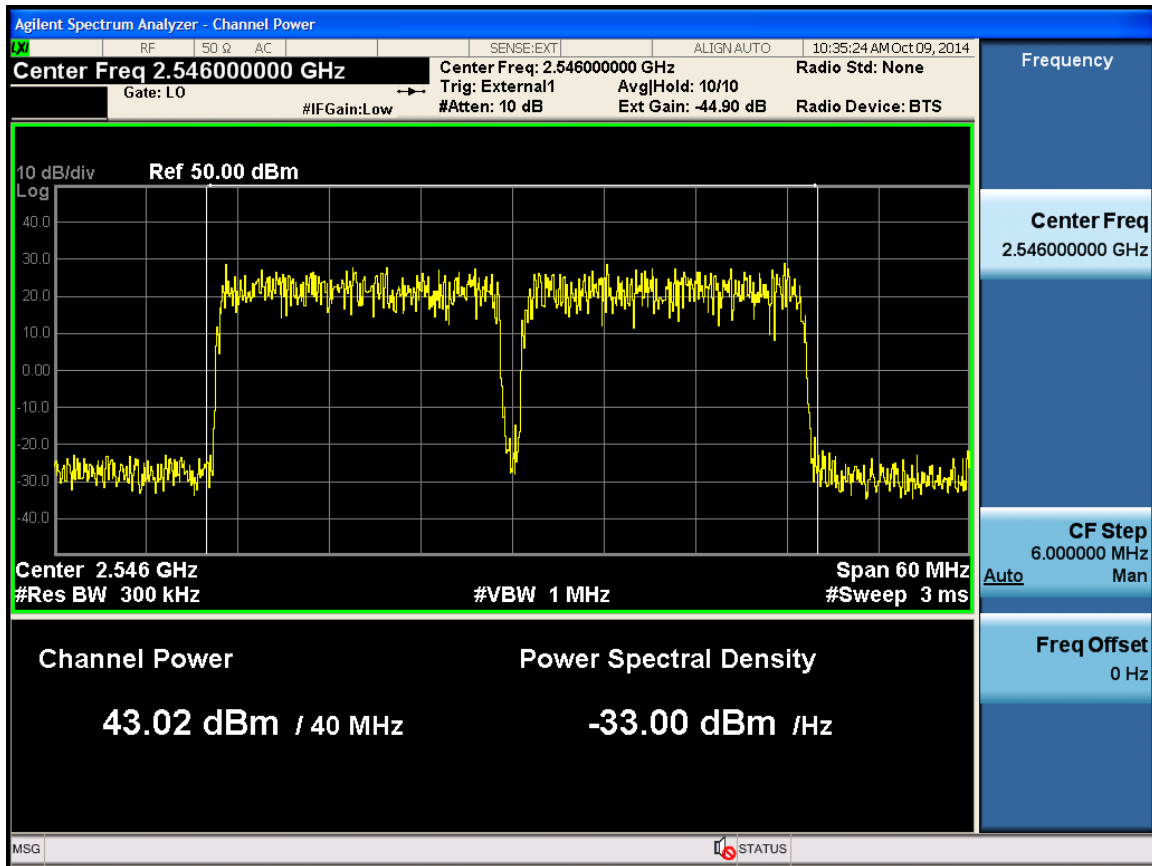


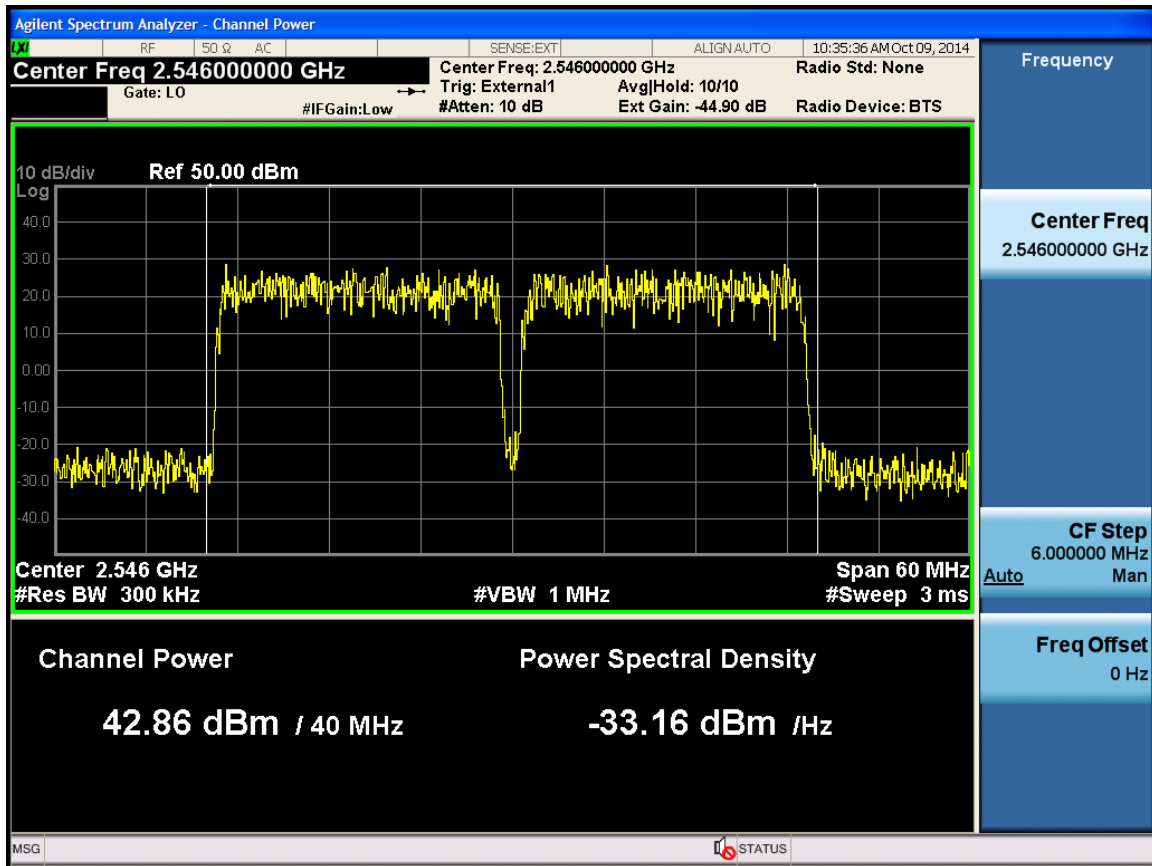


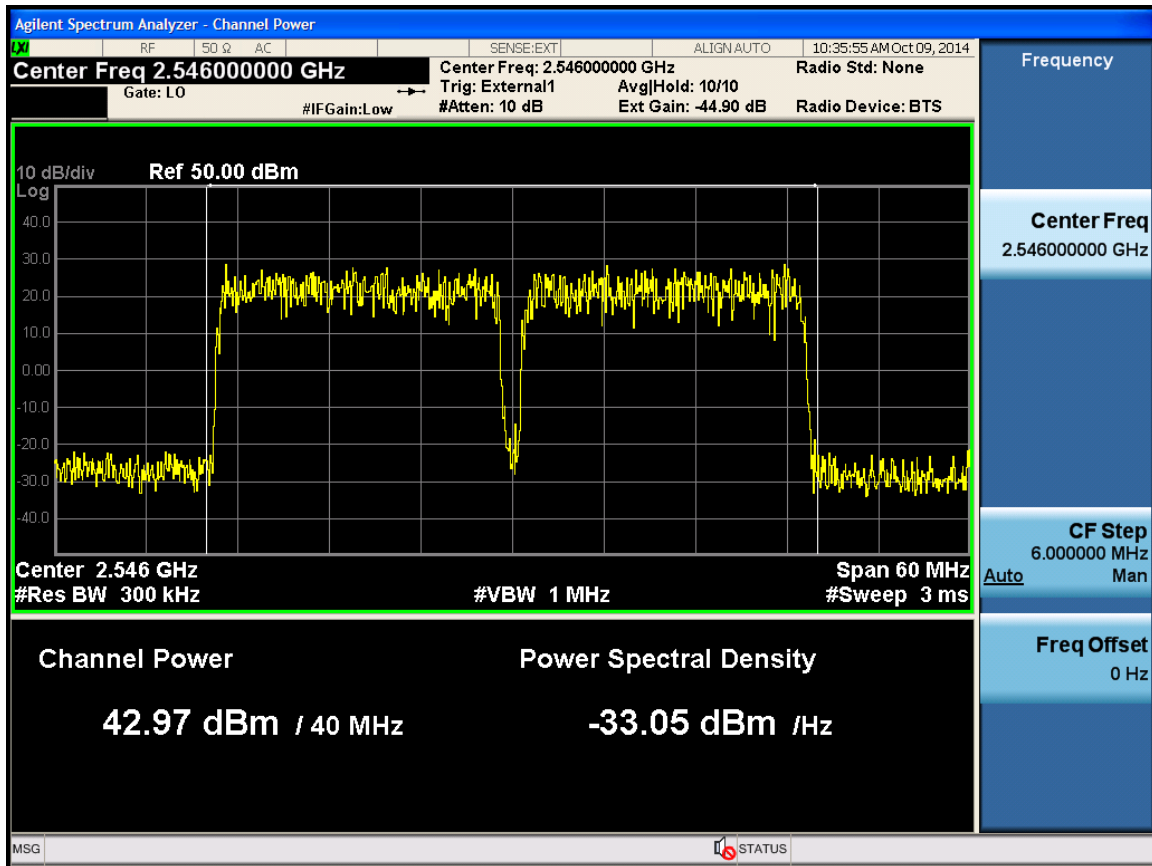


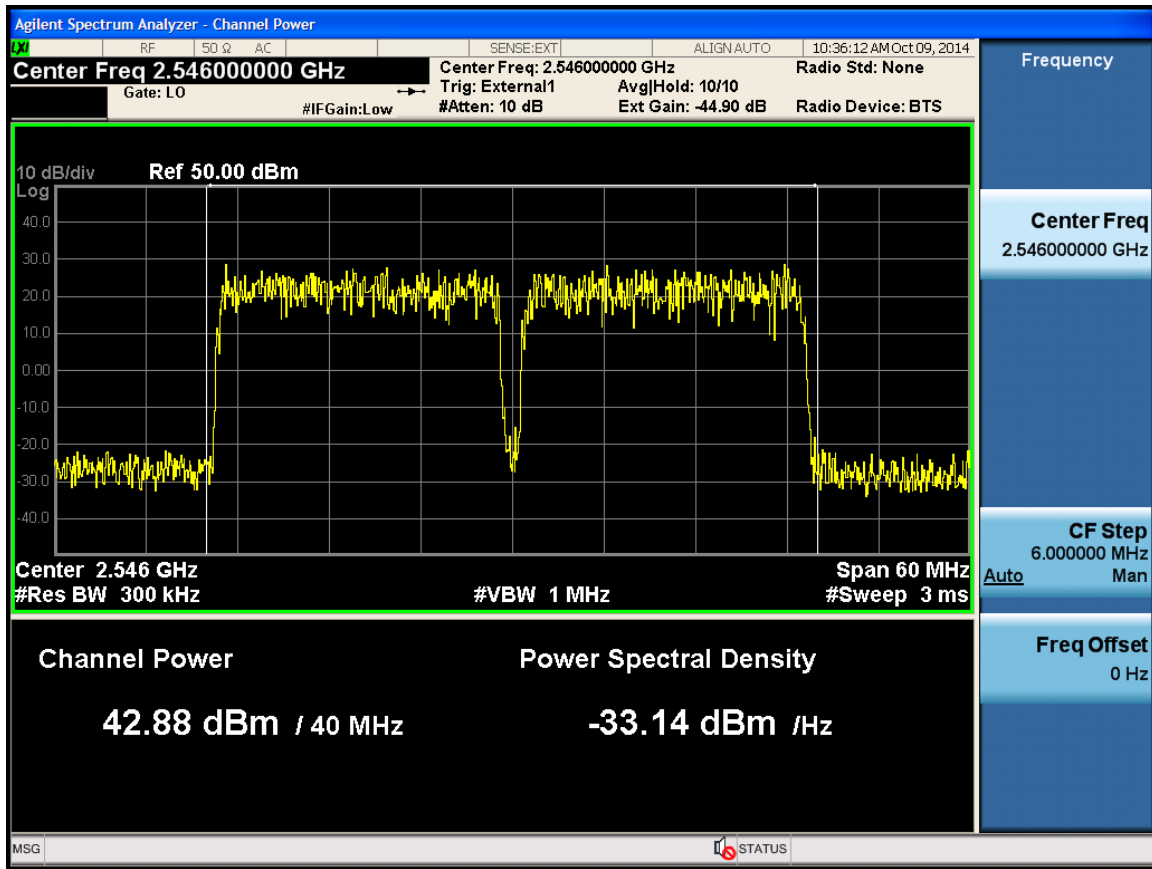


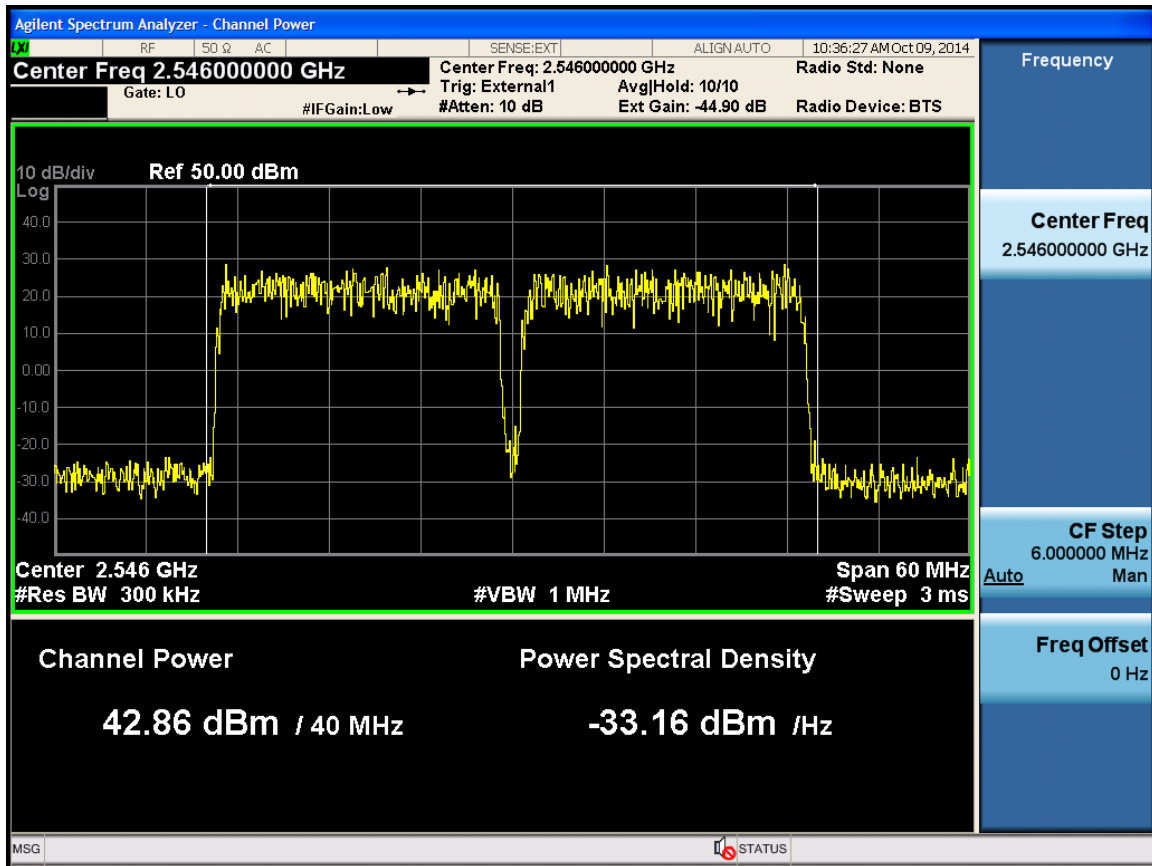


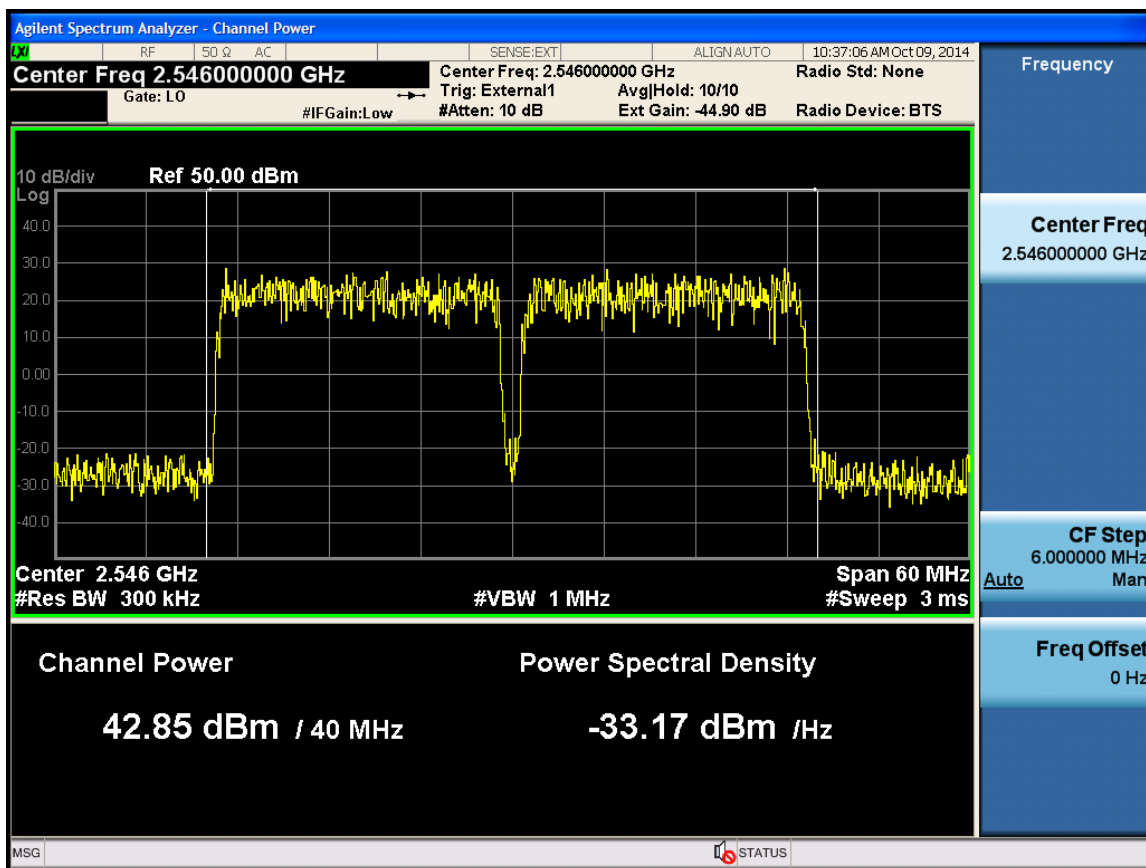


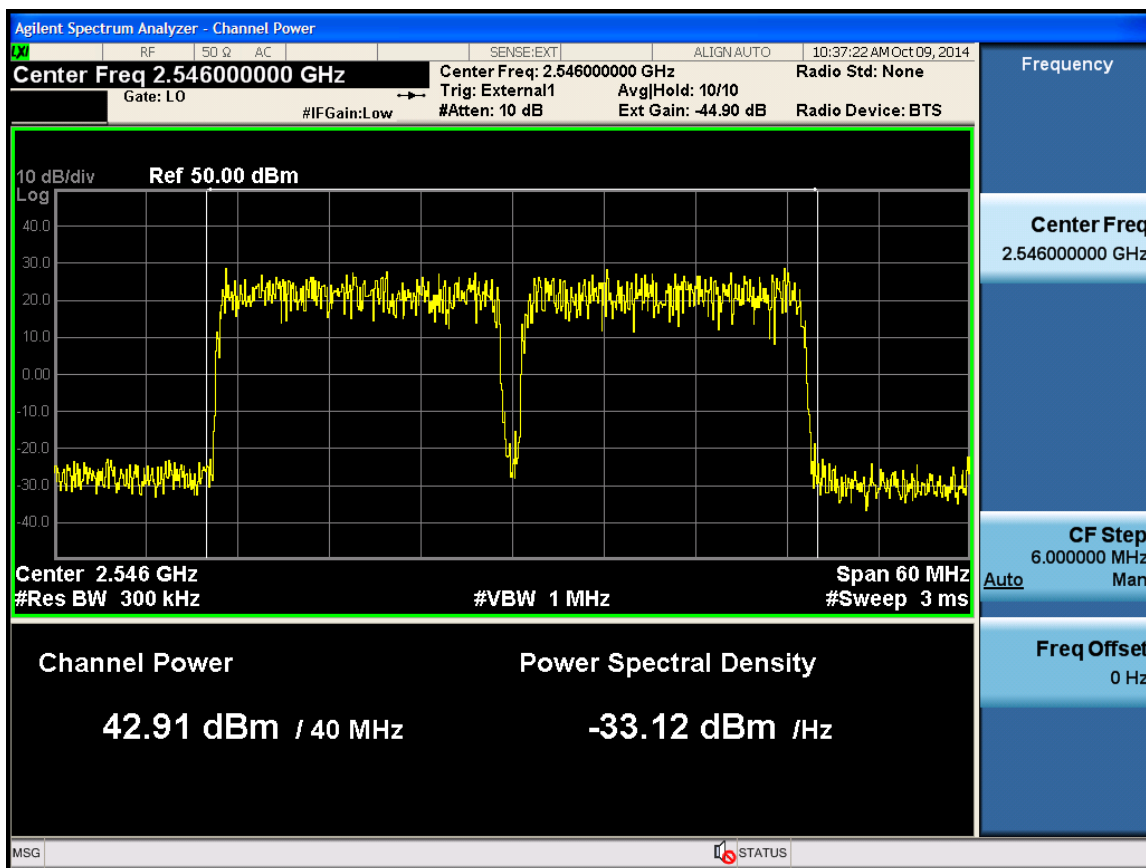


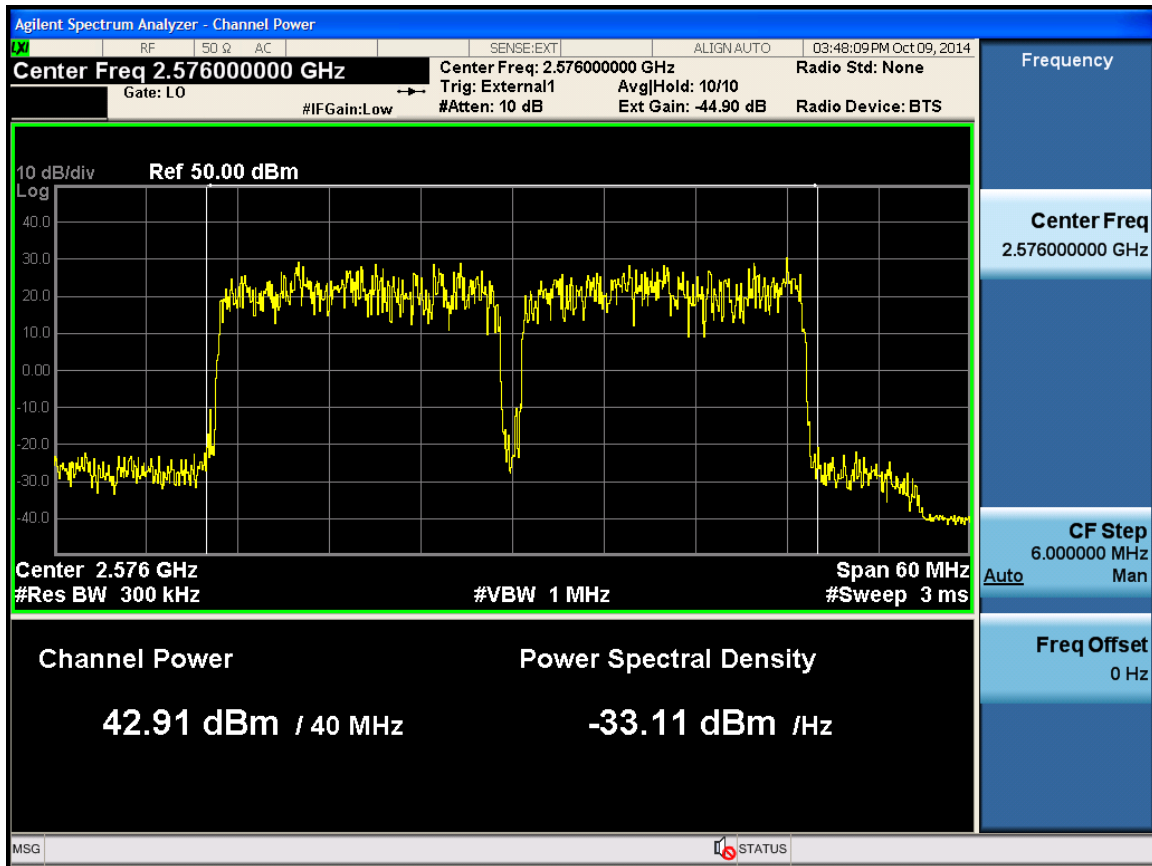


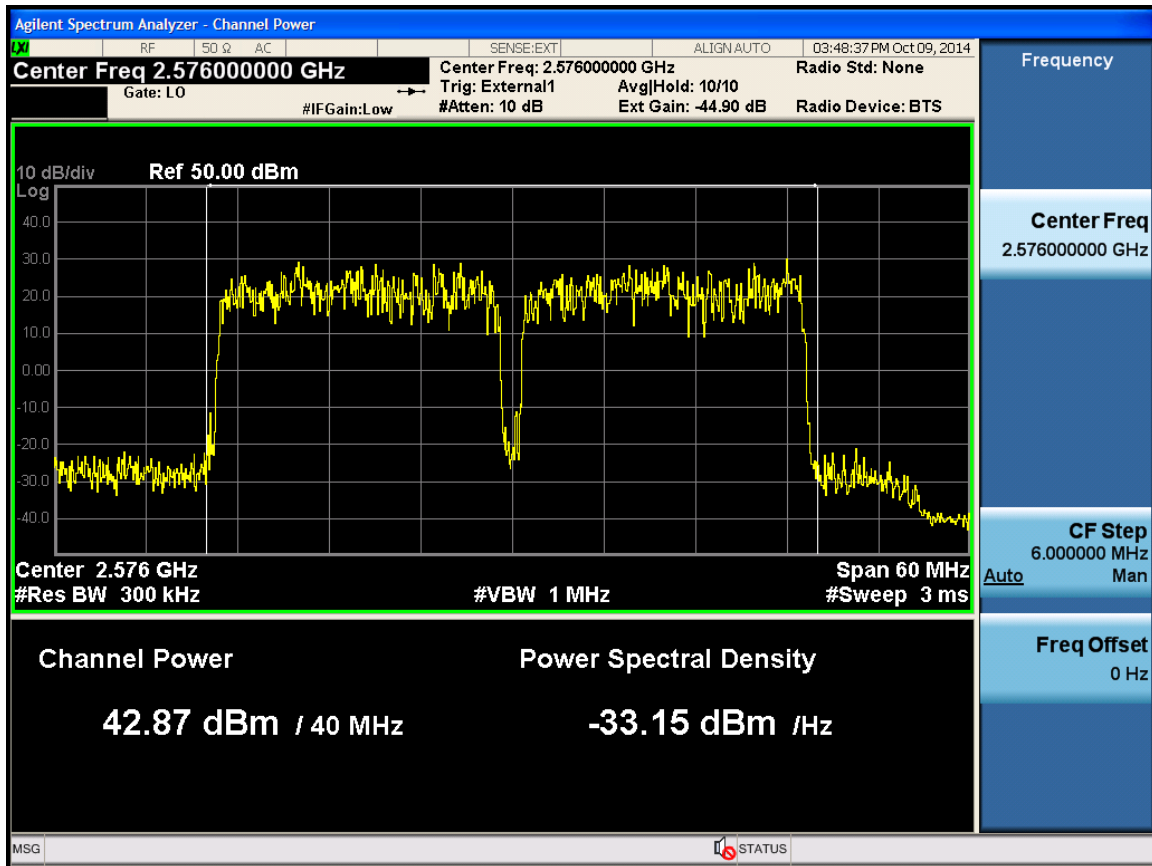


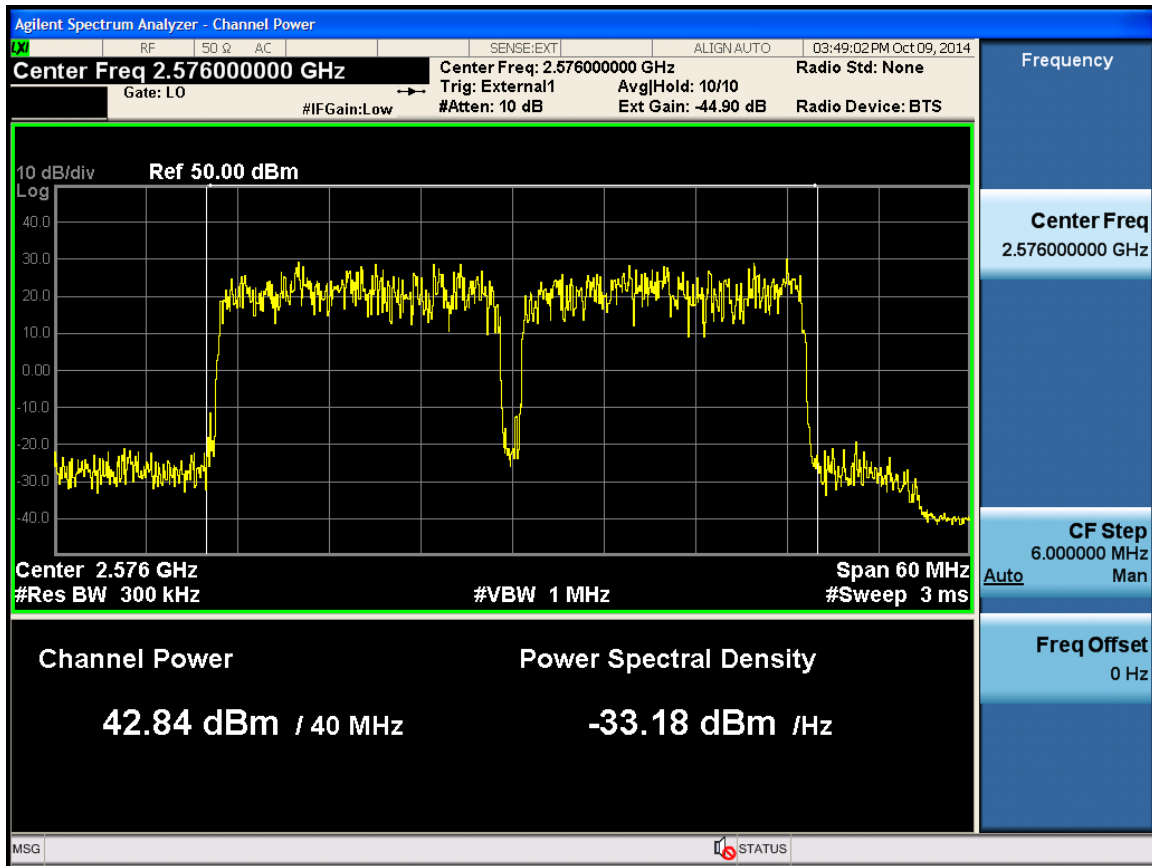


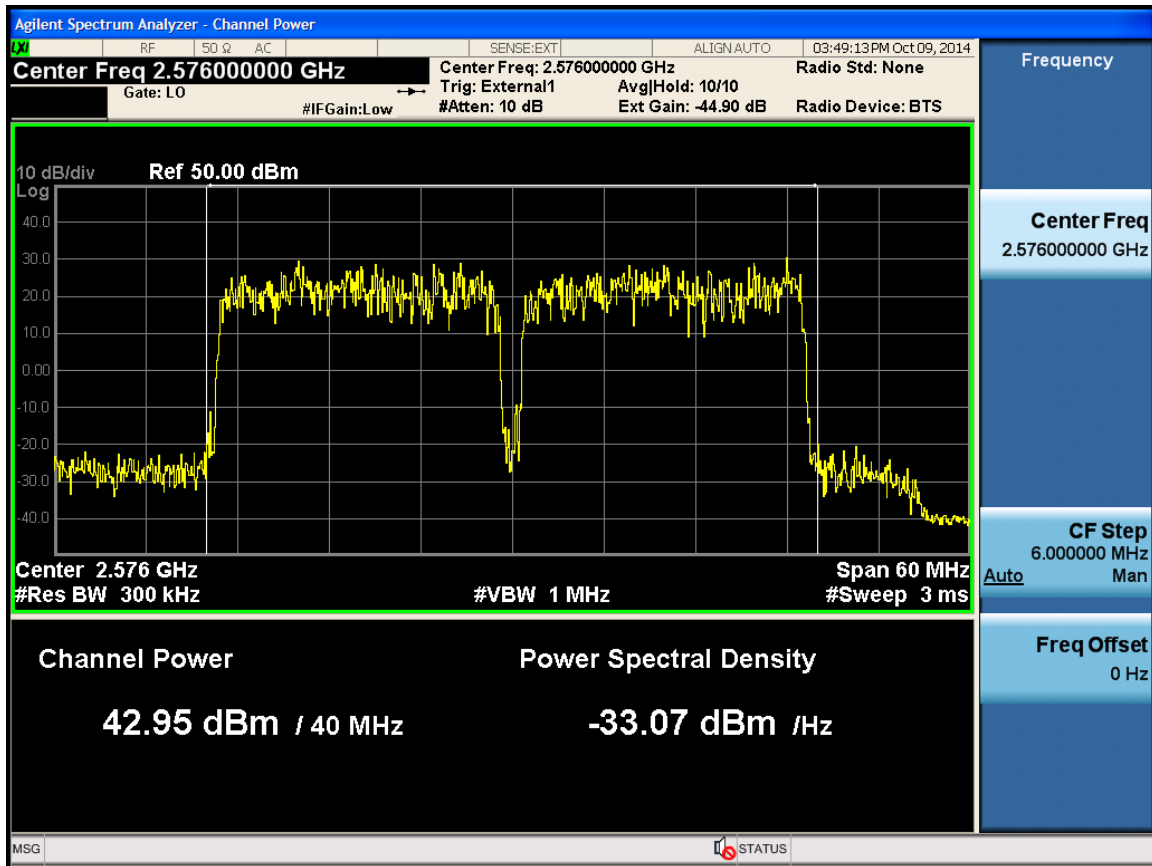


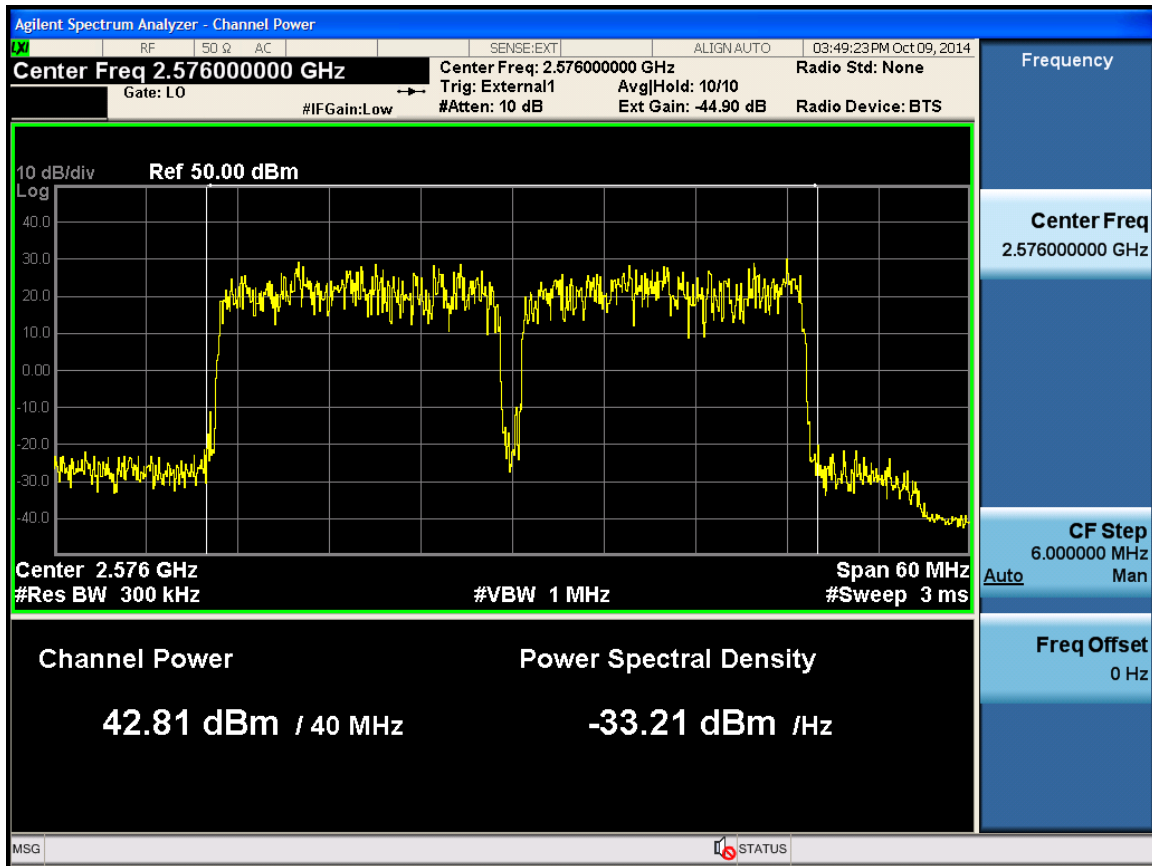


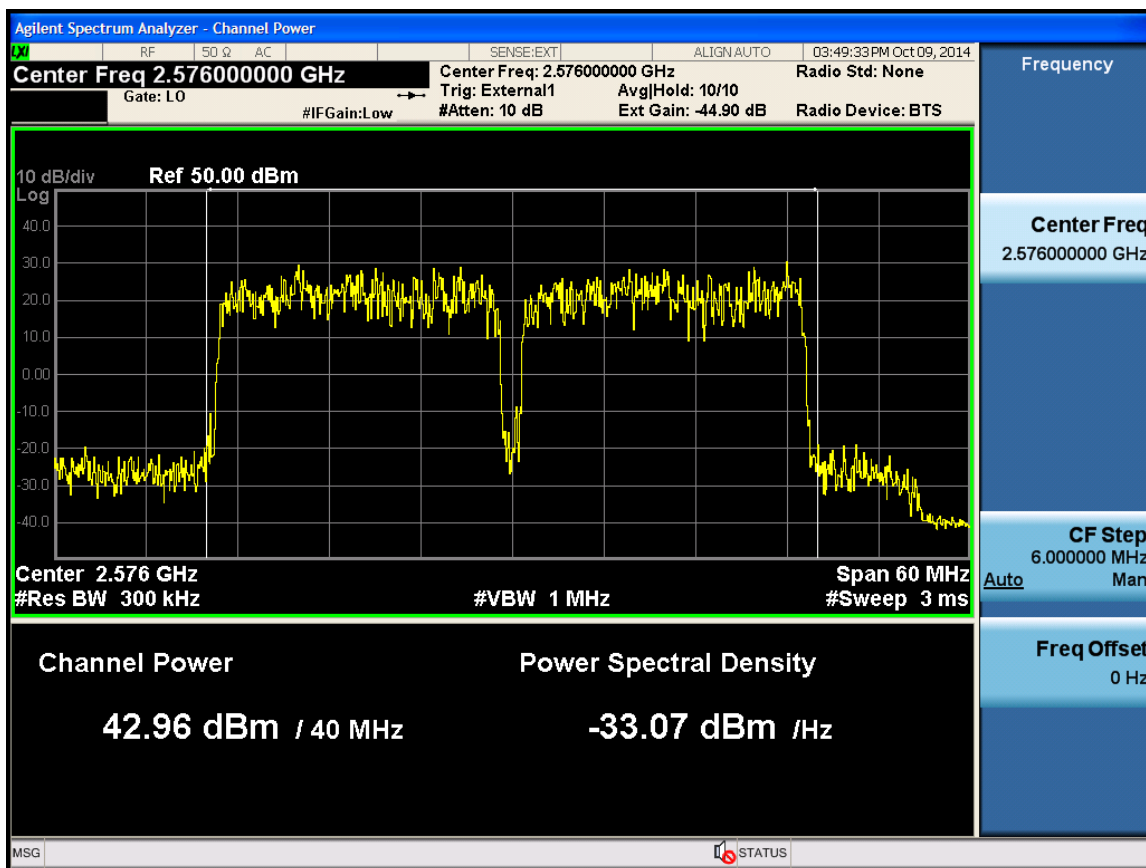


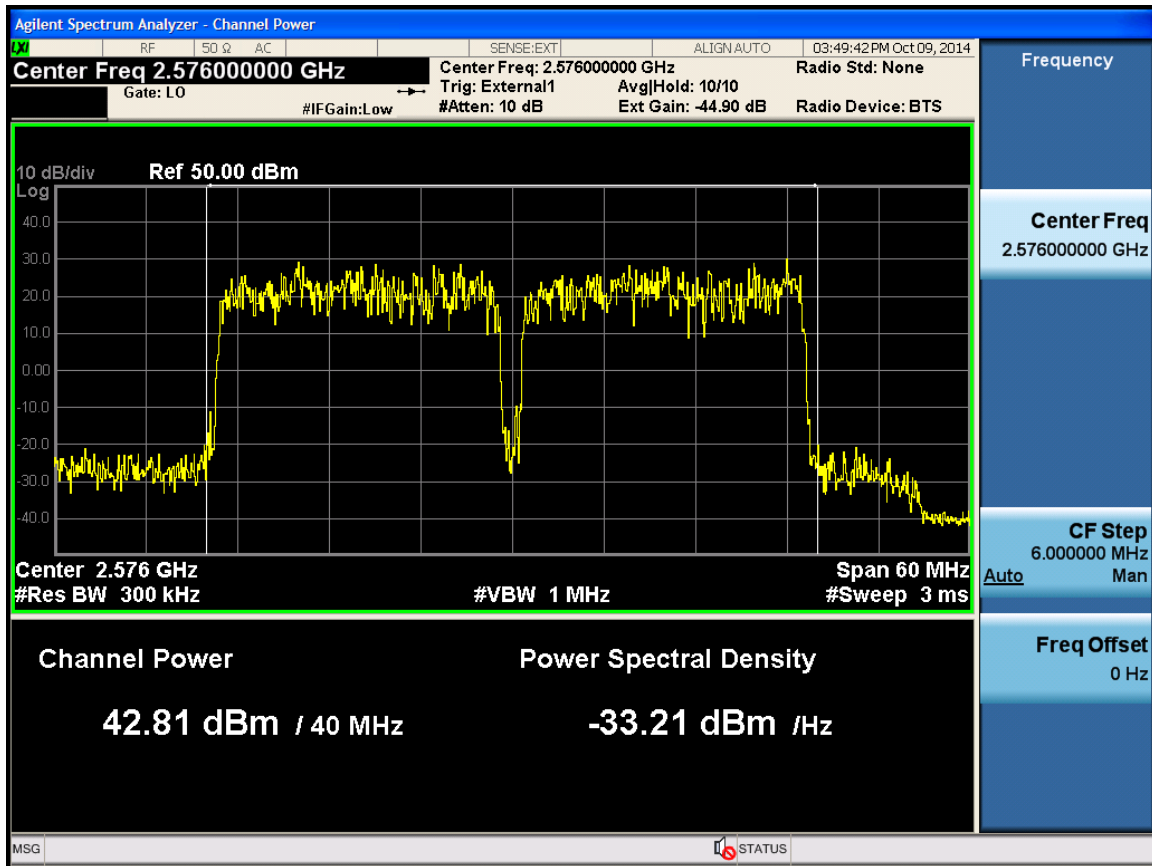


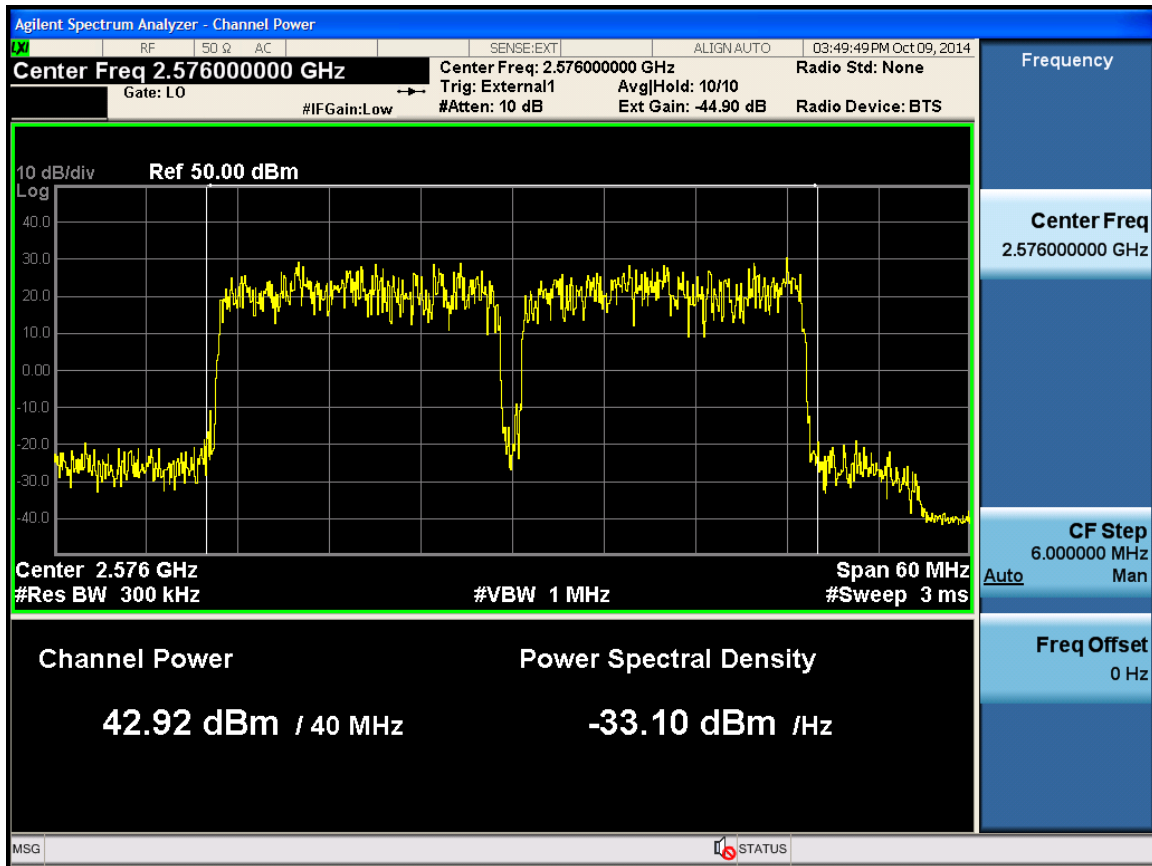


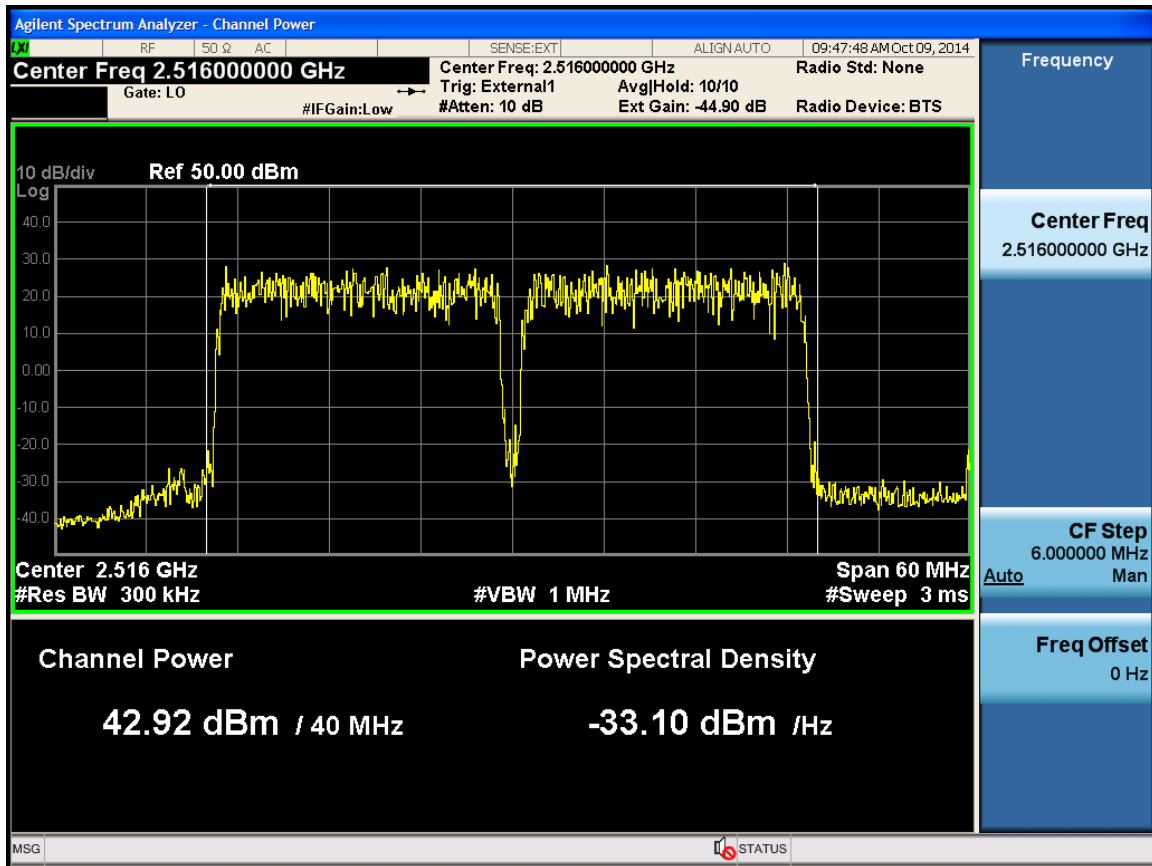


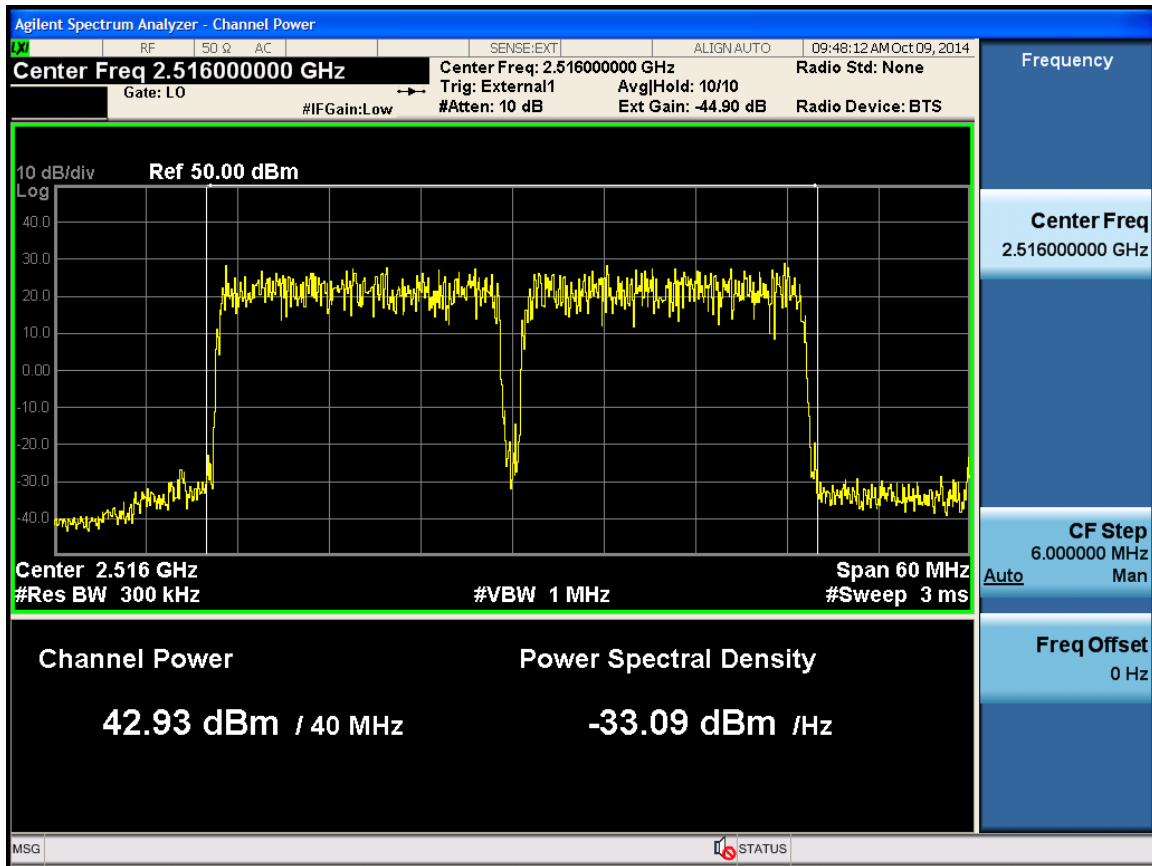


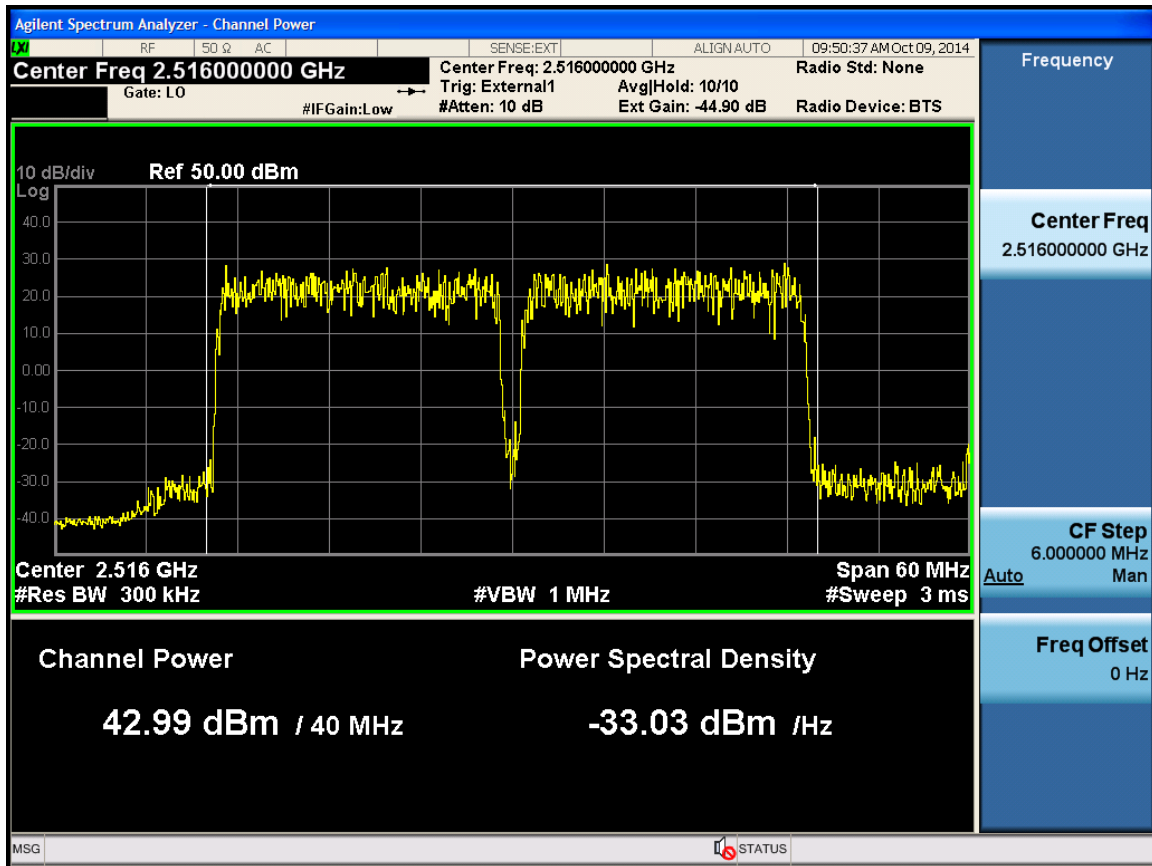


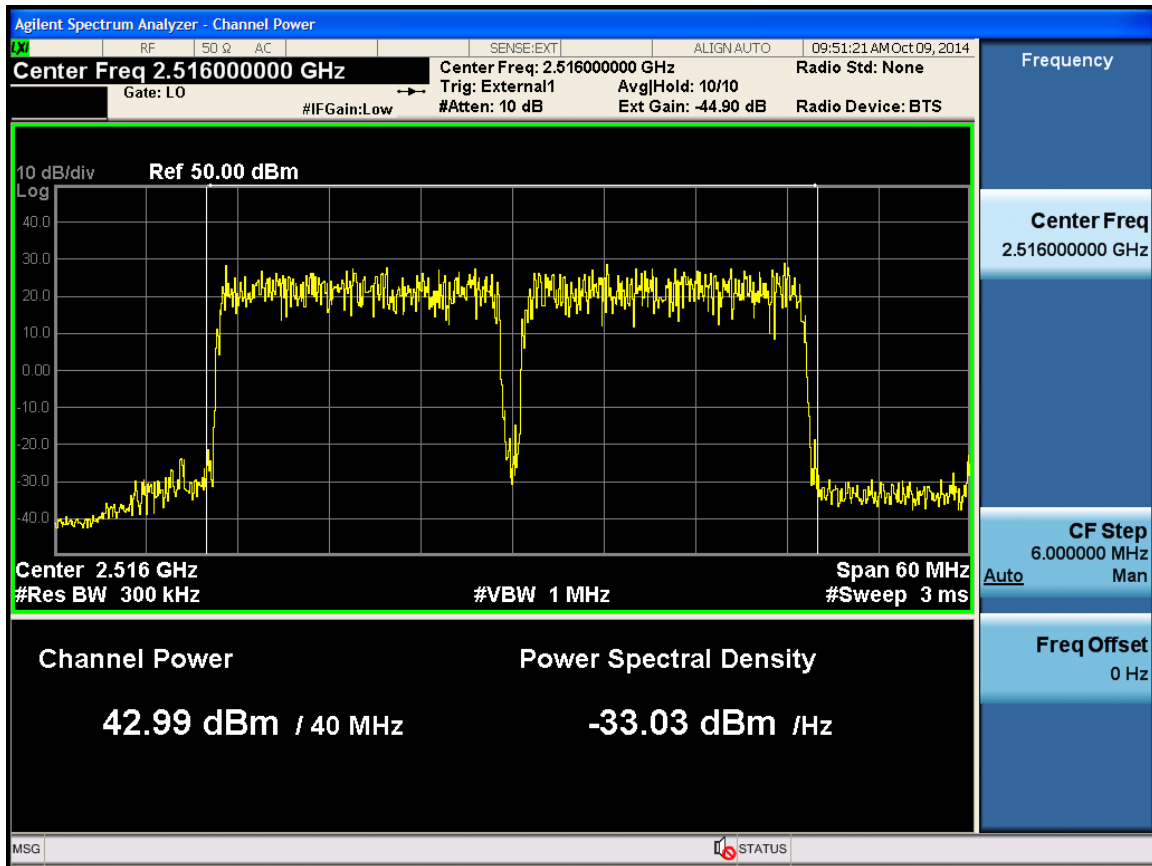


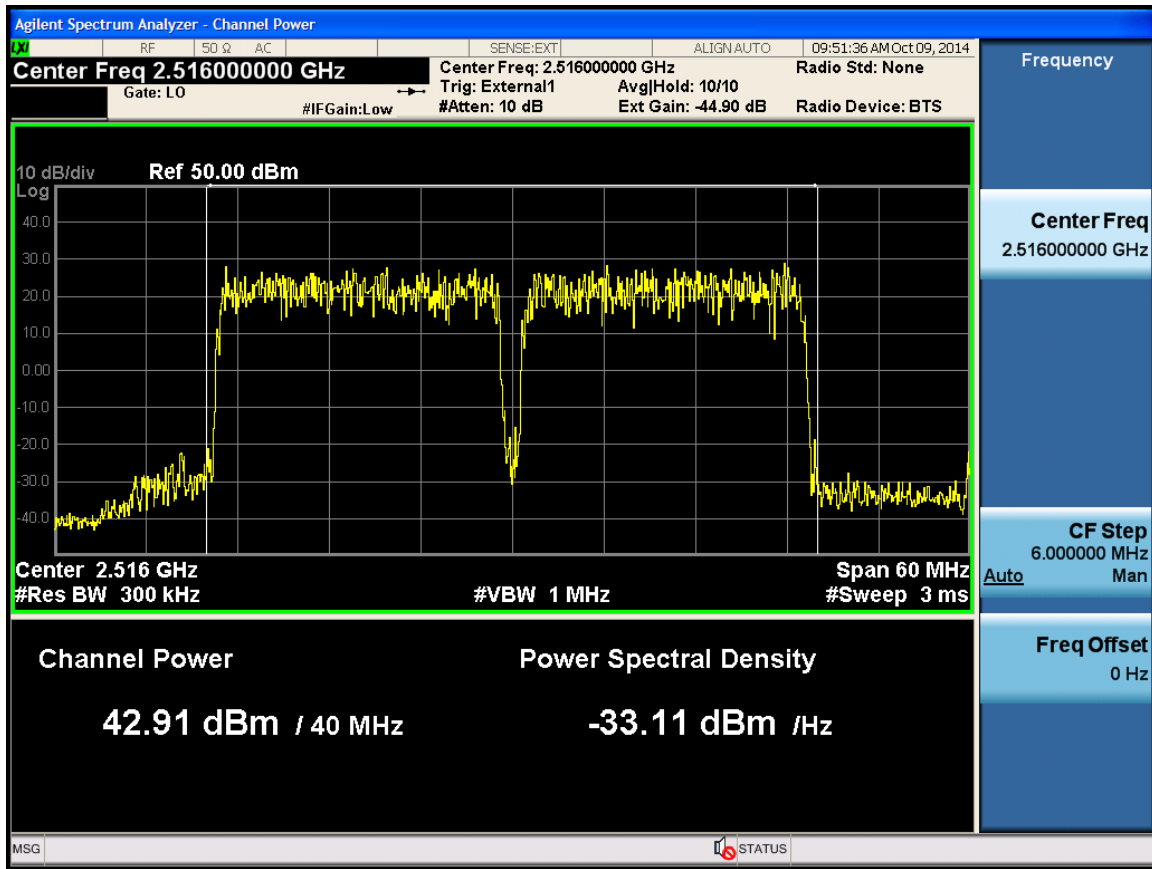


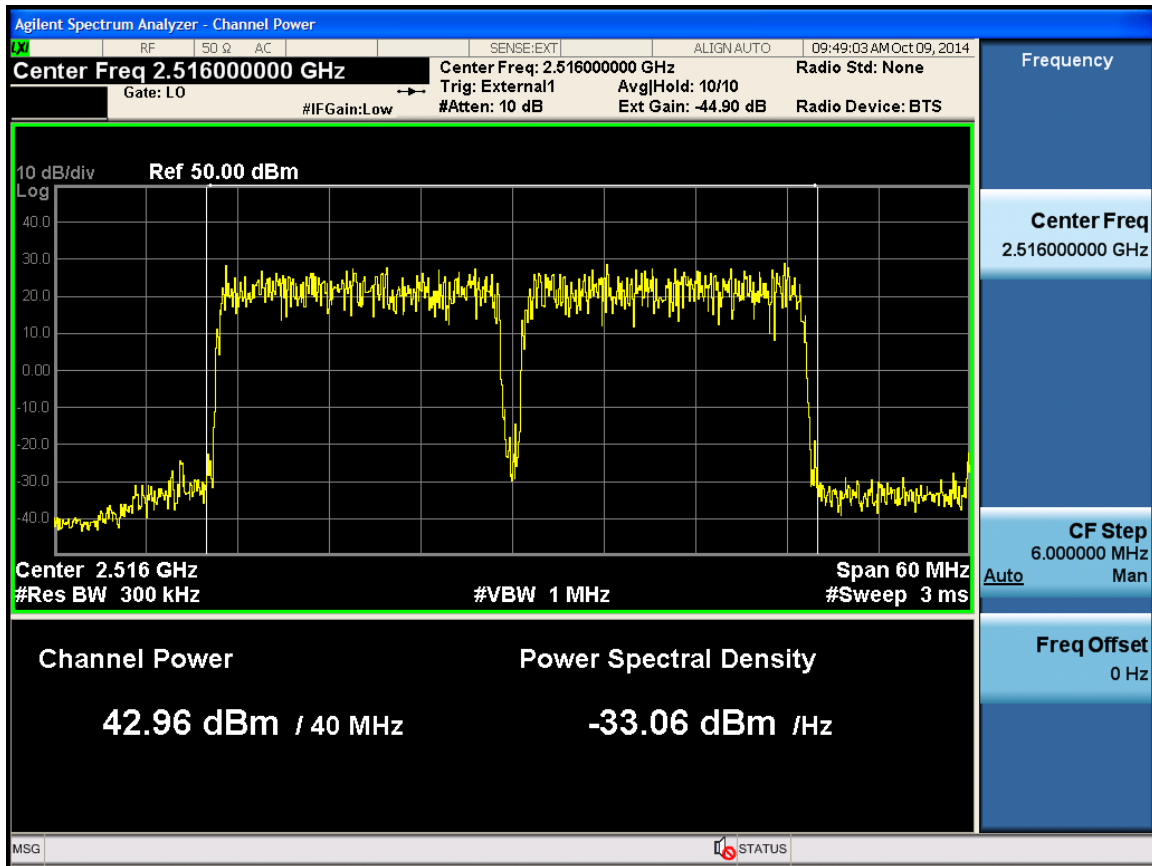


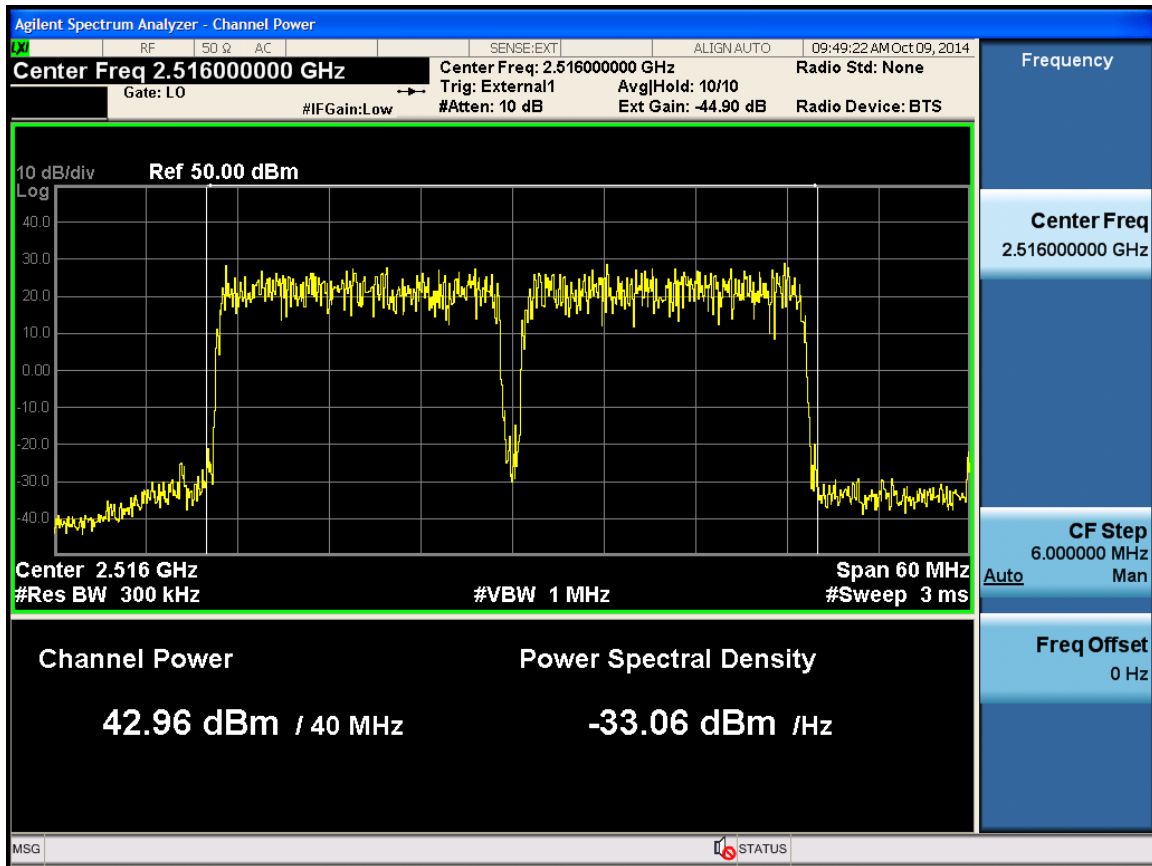


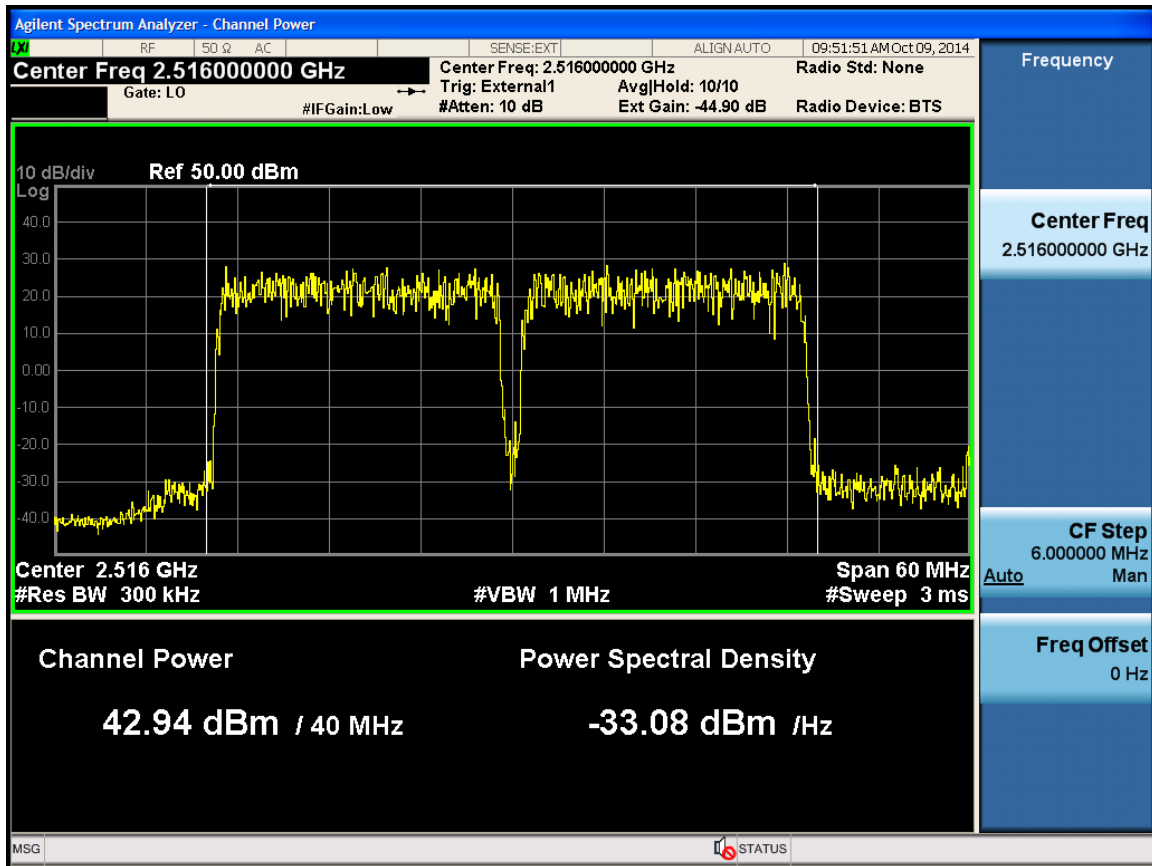


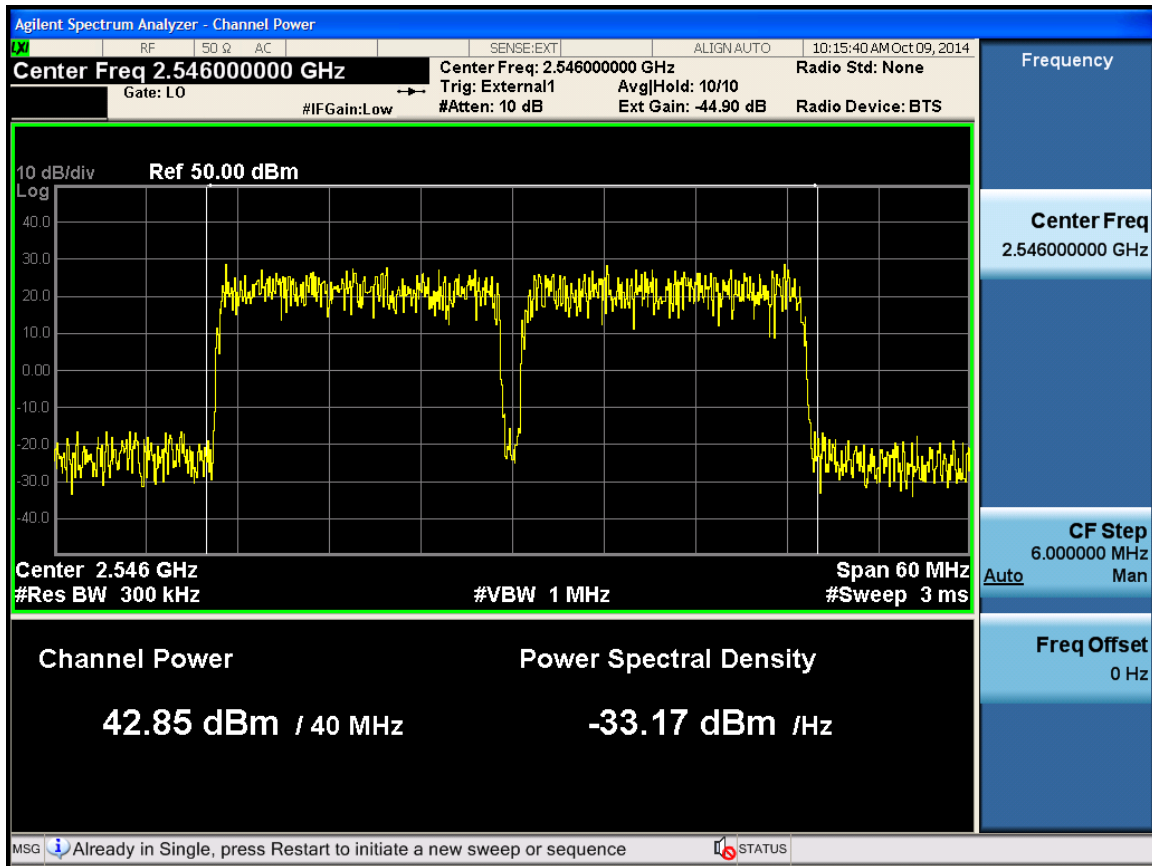


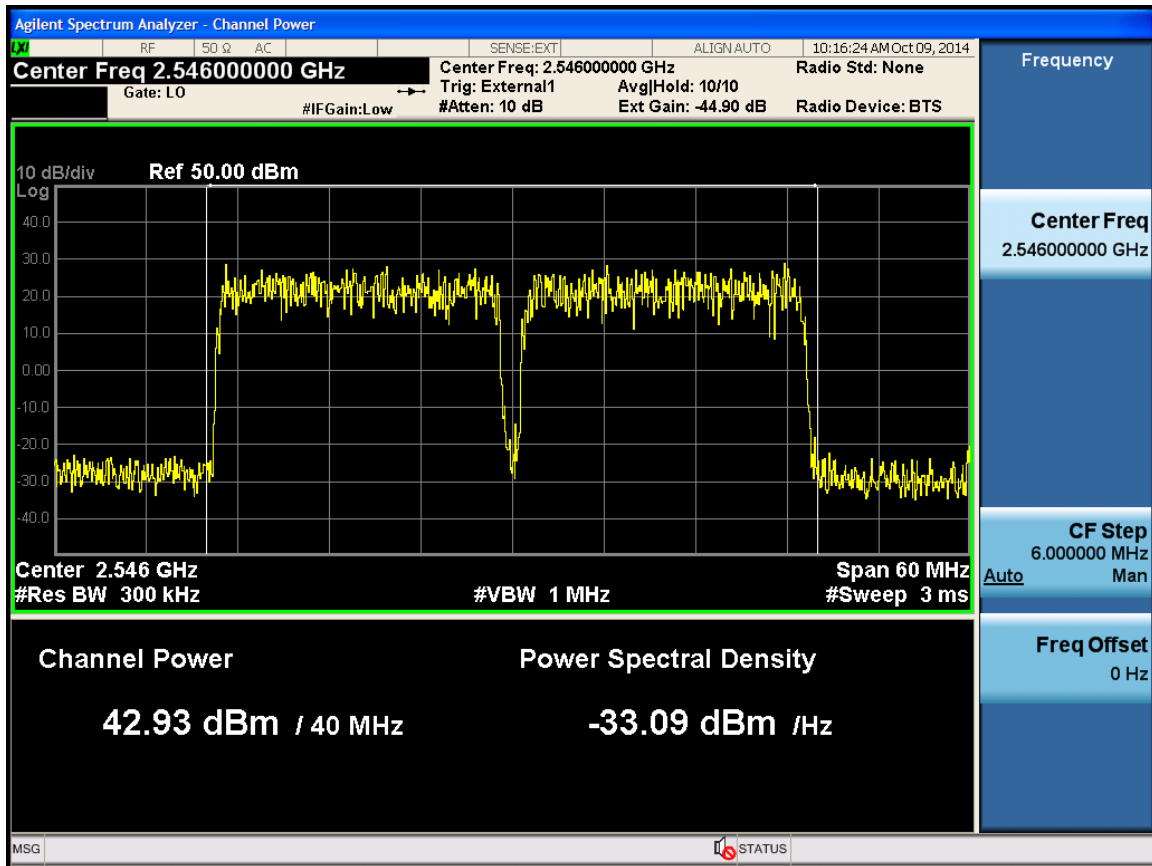


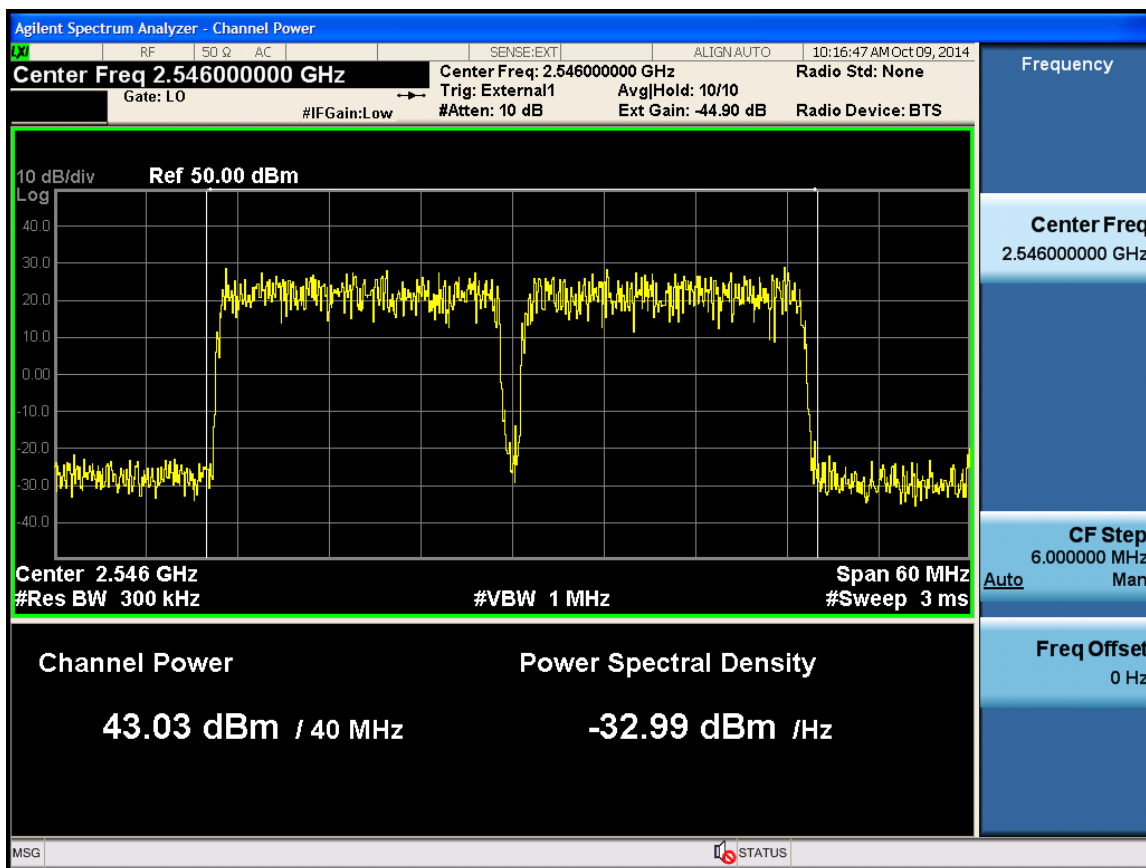


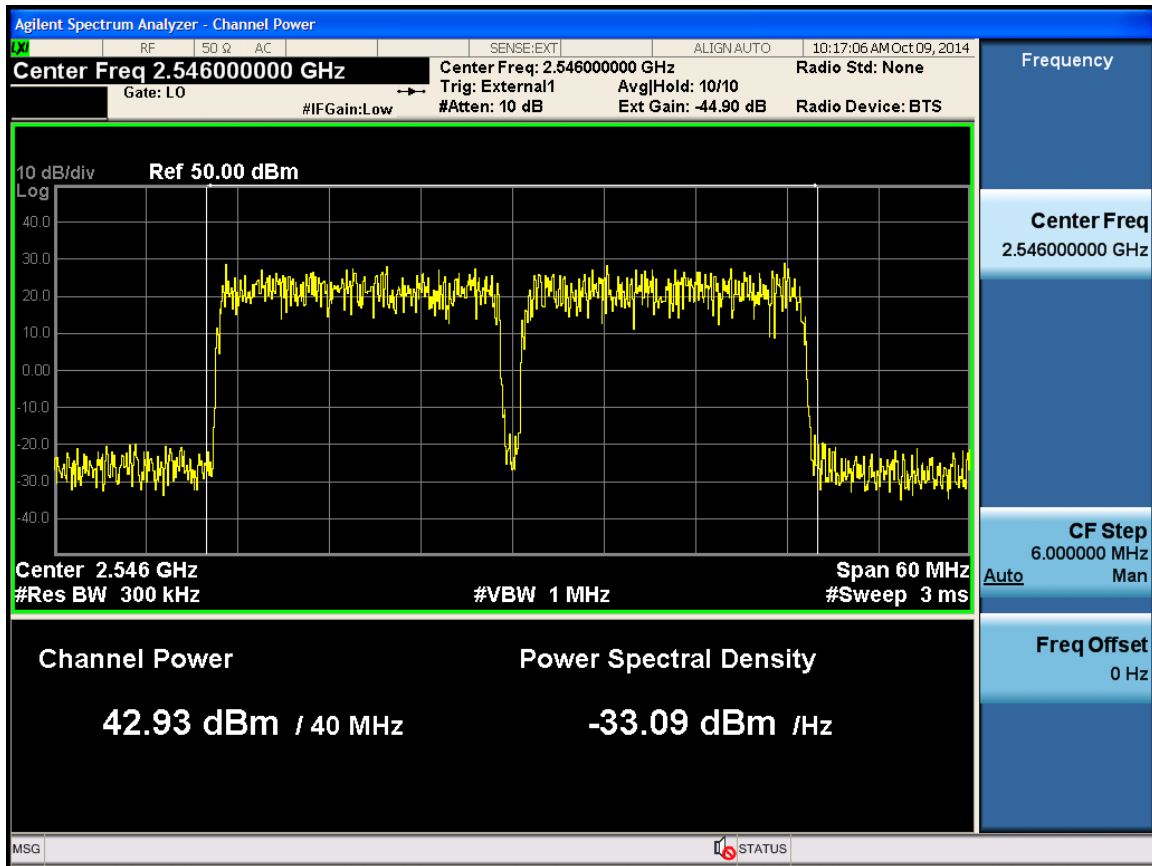


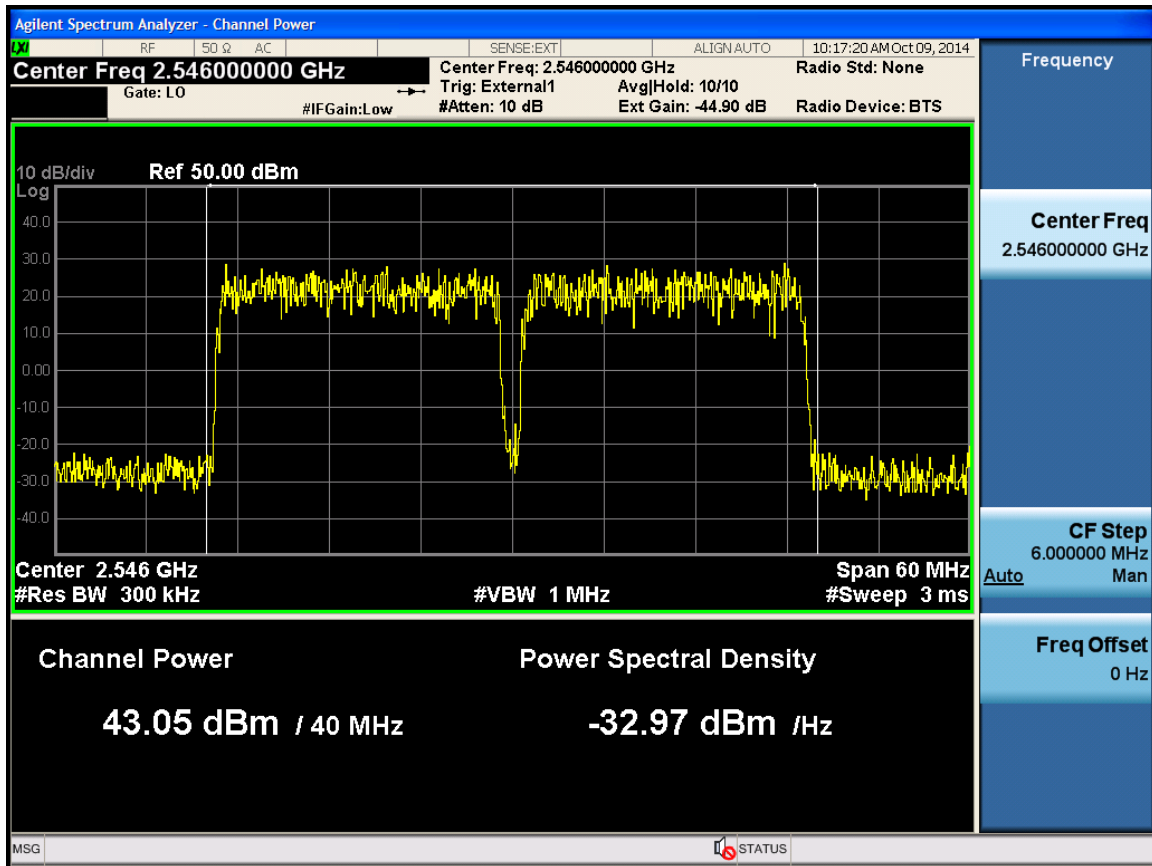


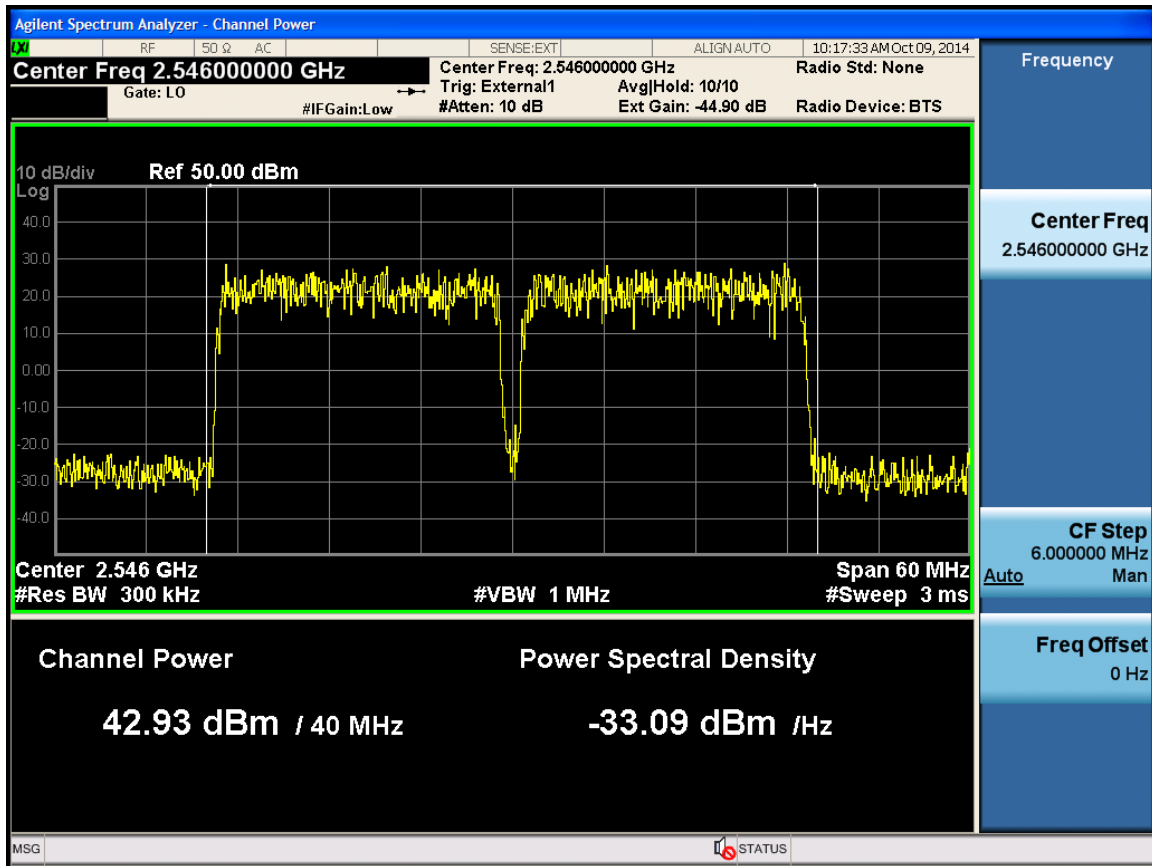


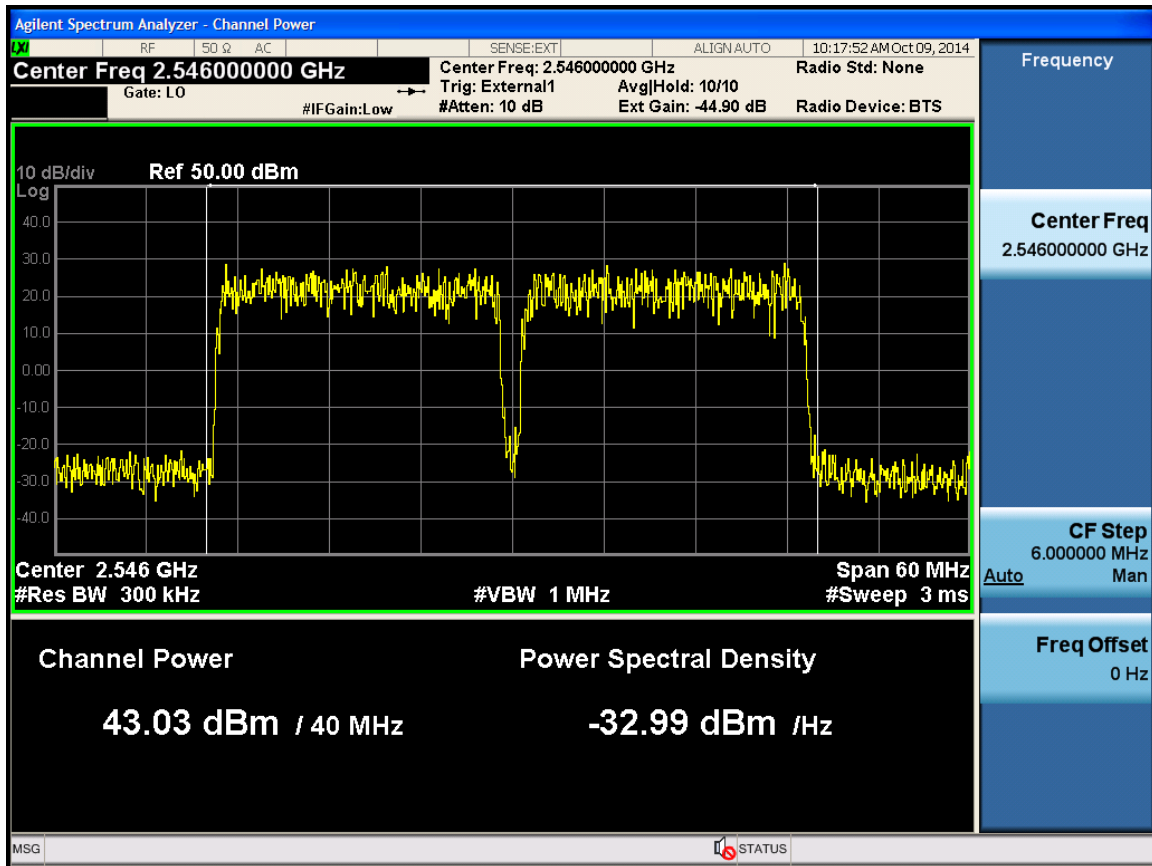


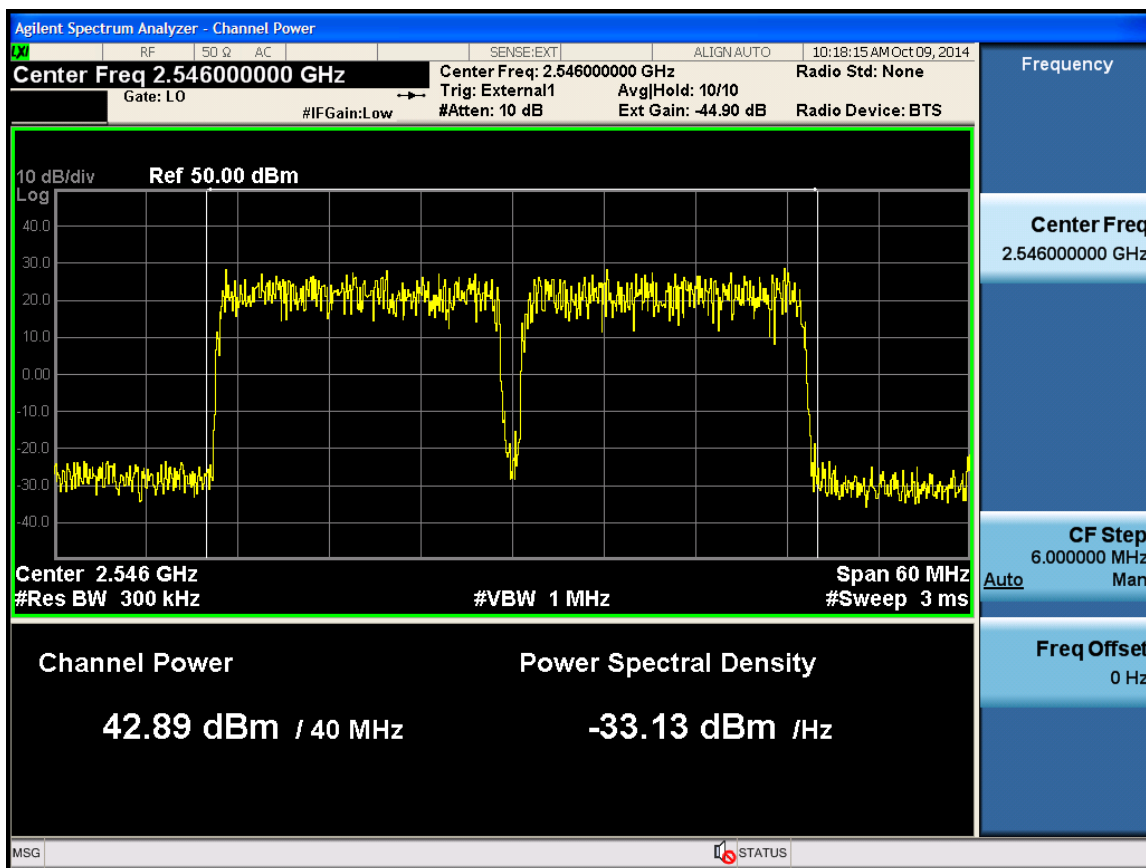


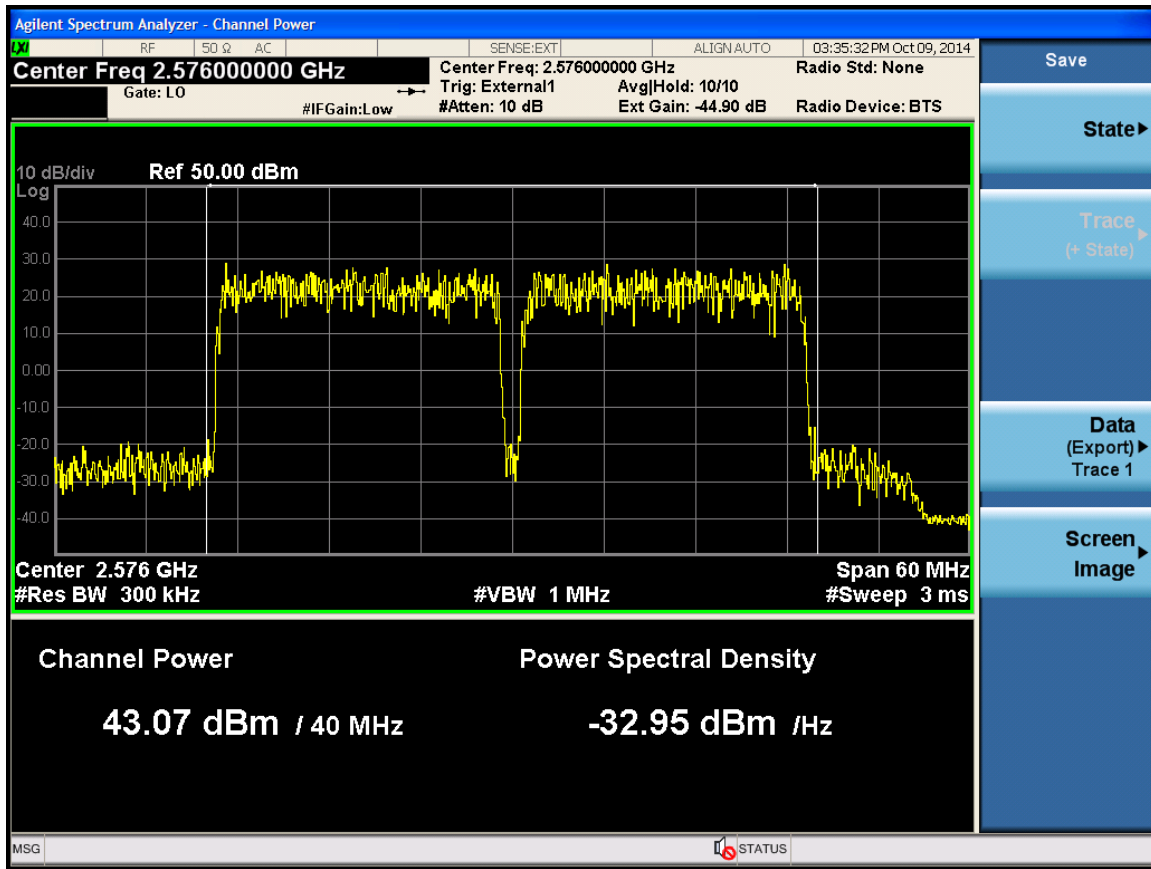


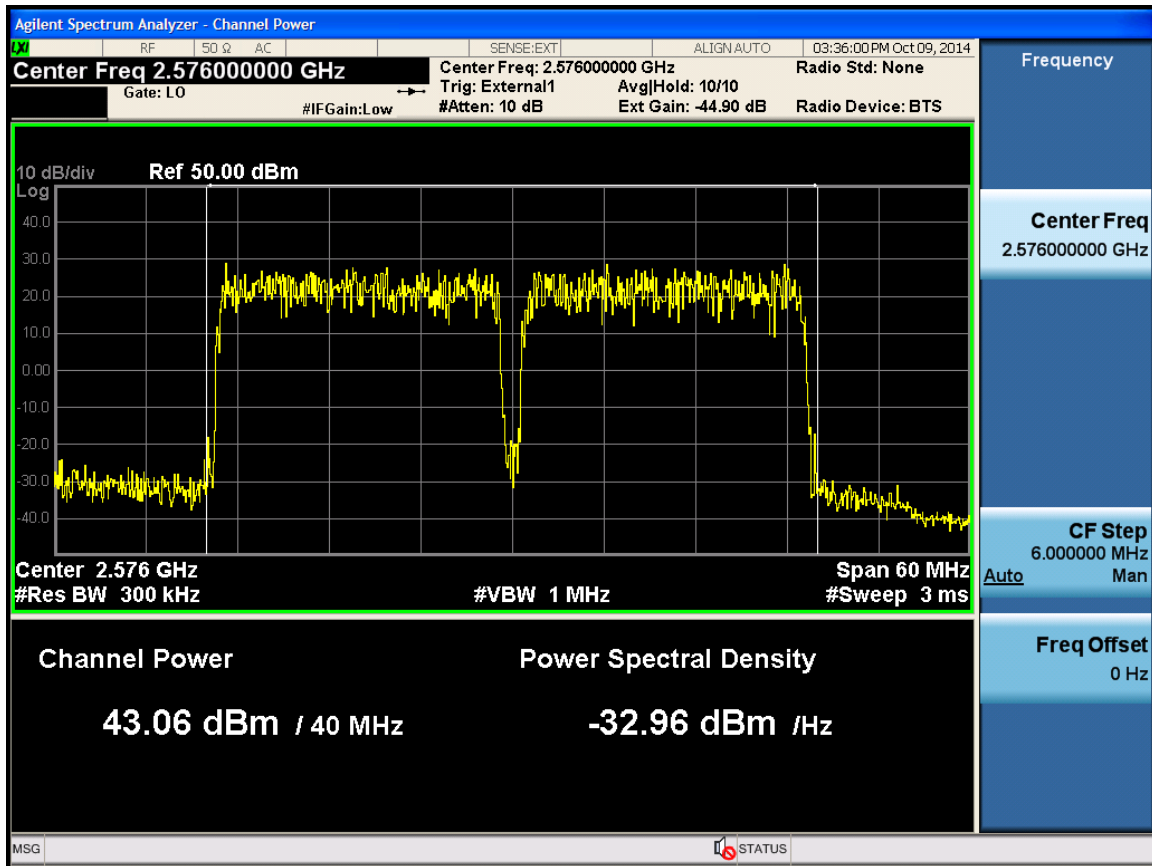


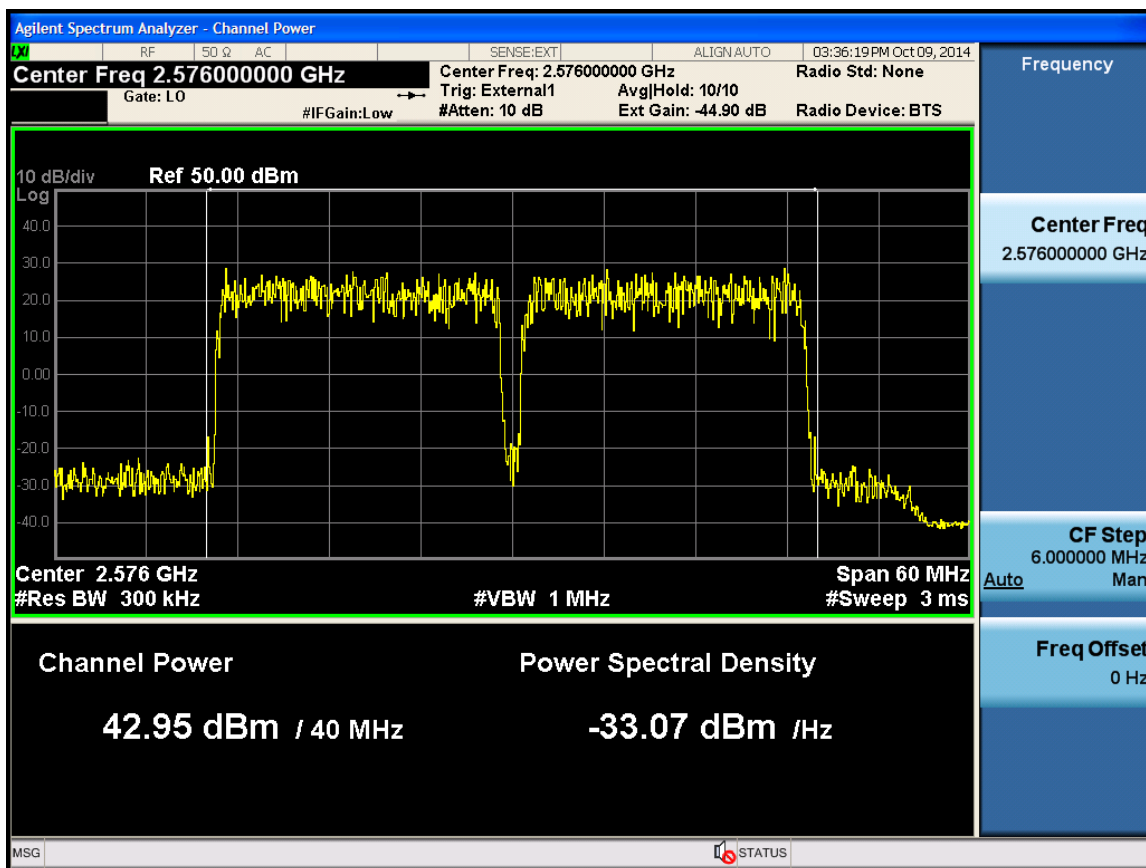


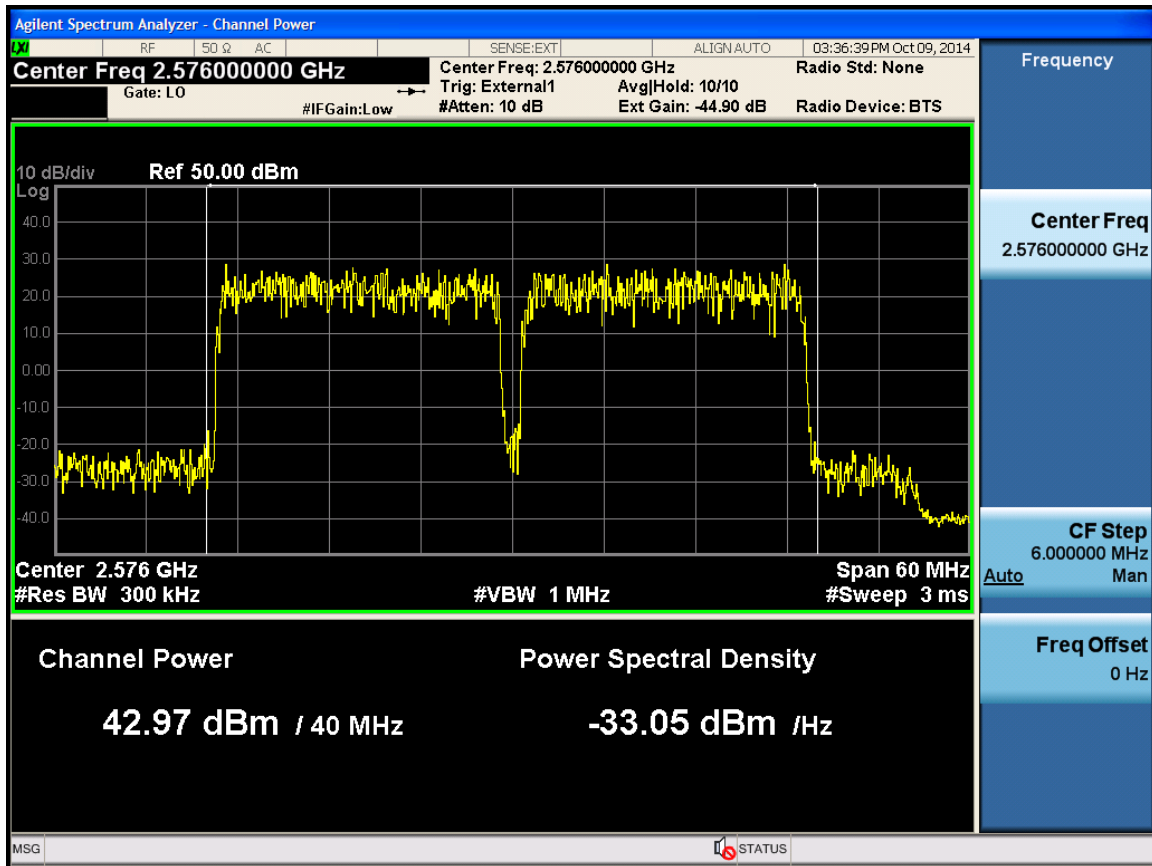


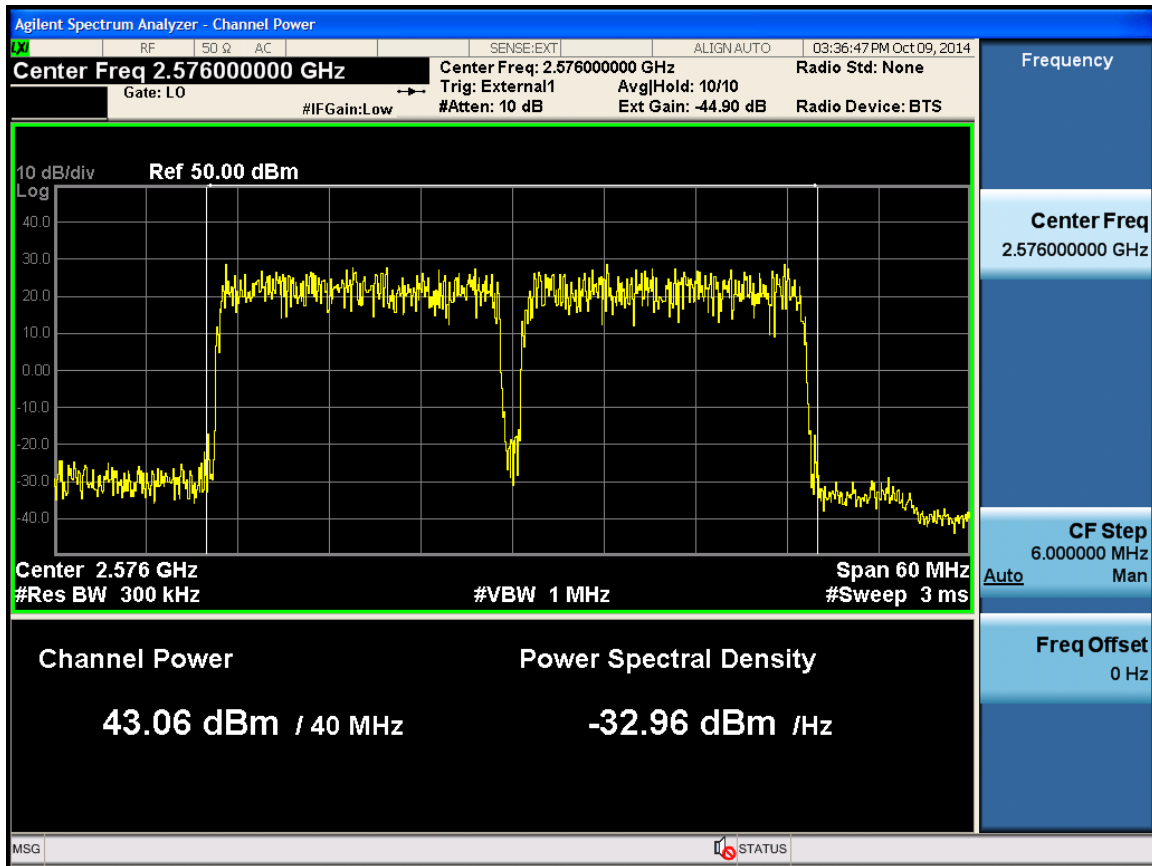


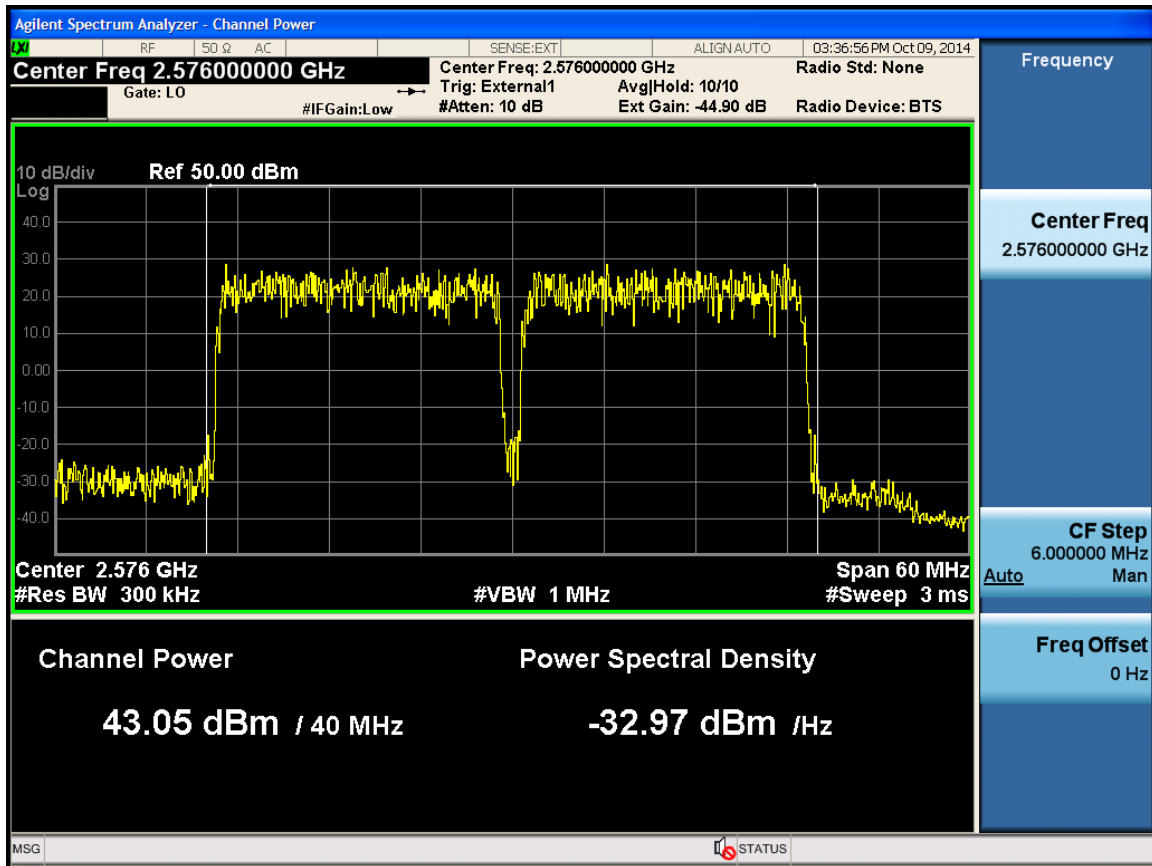


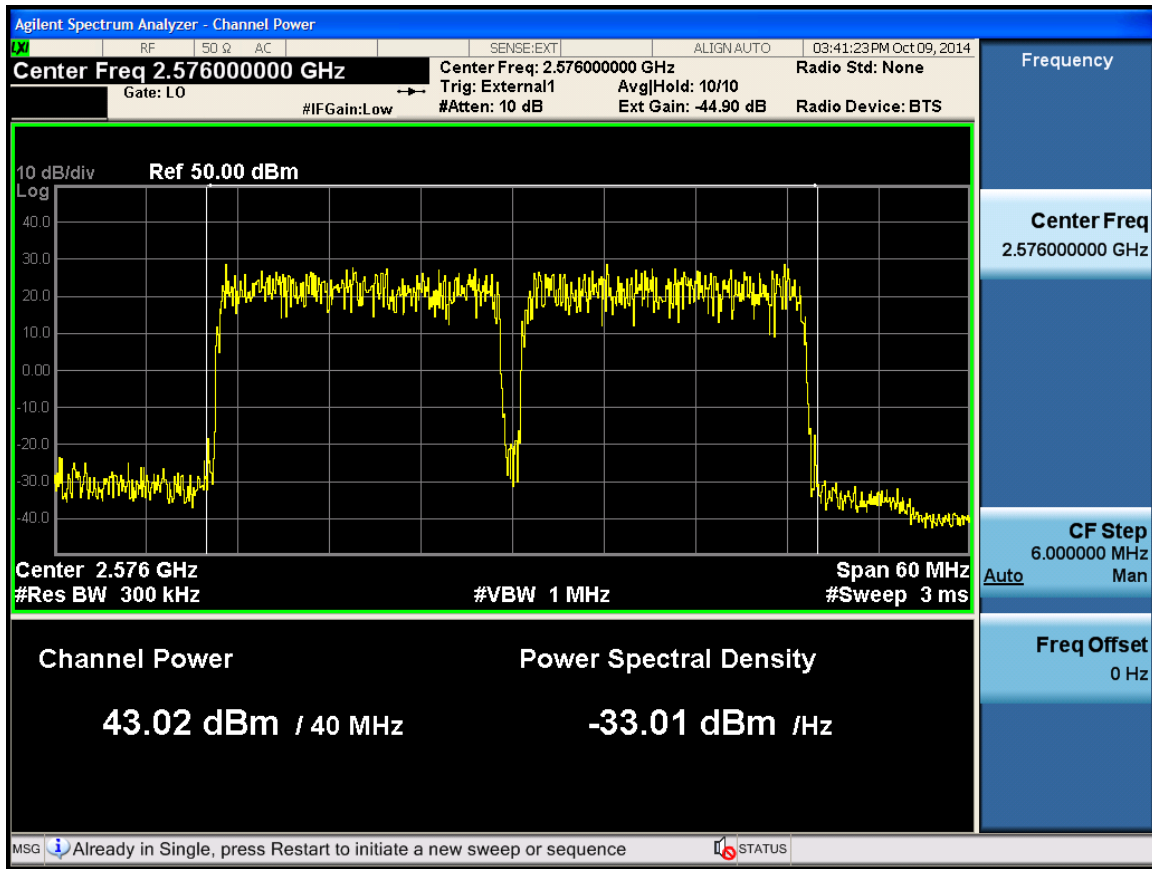


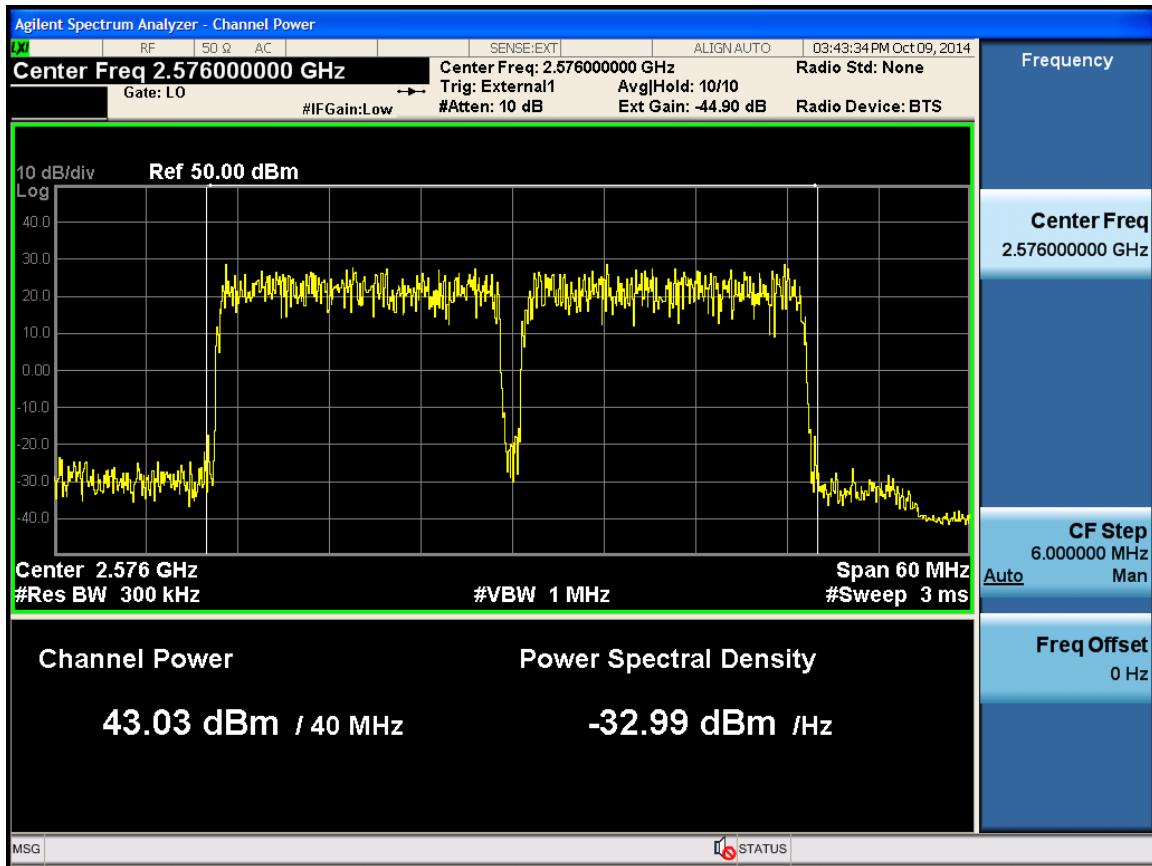












5 RF EXPOSURE

Applicable standard: FCC §2.1091 §1.1037

Limit

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated. Limits for Maximum Permissible Exposure (MPE)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

Test Data

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \text{EIRP} / 4\pi R^2$$

Where: S = power density

EIRP= equivalent isotropically radiated power=ERP+2.15dB

R = distance to the center of radiation of the antenna= [(ERP+2.15dB)/4πS]^{1/2}

According to §27.50 , the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 1000 Watts.

Frequency 2576MHz is between 1500MHz and 100,000MHz, and the Maximum S=1mW/cm²

$$\Rightarrow R=4.22\text{m.}$$

This equipment should be installed and operated with minimum distance 4.22m between the radiator& your body.

Test Result: pass

6 MODULATION CHARACTERISTICS

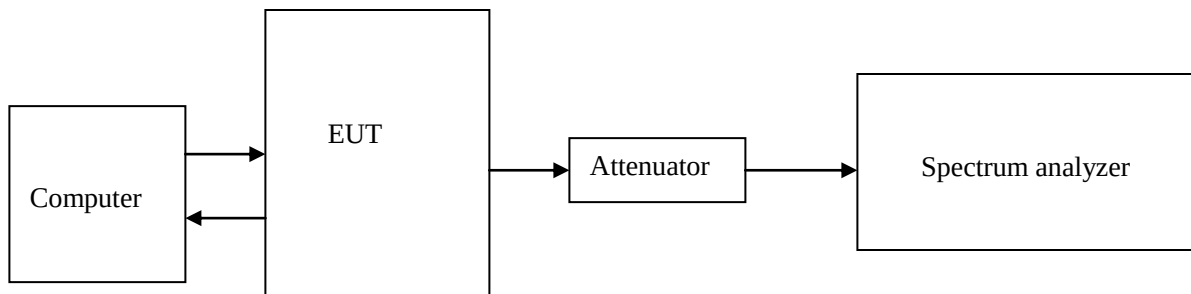
Applicable Standard: FCC § 2.1047, §27.50

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51240300	2013.12.10	2014.12.10
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2014.06.13	2015.06.13

***statement of traceability:** ZTE Corporation Reliability Testing Center attests that all calibration has been performed per the NVLAP requirements, traceable to NIST.

Test Procedure



The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation. External attenuation Loss is 36.8dB. Configure RRU output different modulation signals and test EVM by spectrum analyzer.

Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

Test Result: Pass

Test Mode: Transmitting LTE

Test Data:

Channel Bandwidth: 20M+20M

Port	Carrier Freq. c1+c2(MHz)	Occupied Bandwidth(MHz)		
		QPSK	16QAM	64QAM
0	2506	6.96	5.35	4.15
1		6.97	5.35	4.15
2		6.95	5.36	4.15
3		6.94	5.3	4.15
4		6.98	5.35	4.16
5		6.96	5.34	4.15
6		6.96	5.34	4.15
7		6.95	5.35	4.16
0	2526	6.96	5.37	4.14
1		6.97	5.36	4.16
2		6.96	5.35	4.17
3		6.95	5.33	4.18
4		6.91	5.1	4.16
5		6.93	5.09	4.14
6		6.97	5.37	4.13
7		6.98	5.36	4.14
0	2536	7.05	5.32	4.24
1		7.04	5.33	4.24
2		7.05	5.32	4.25
3		7.05	5.31	4.24
4		7.03	5.32	4.25
5		7.01	5.32	4.25
6		7.05	5.32	4.26
7		7.06	5.31	4.24
0	2556	7.05	5.34	4.15
1		7	5.35	4.14
2		7.05	5.36	4.13
3		7.04	5.36	4.14
4		7.05	5.36	4.14
5		7.03	5.31	4.14
6		7.04	5.35	4.15

7		7.04	5.34	4.14
0	2566	6.95	5.36	4.16
1		6.94	5.37	4.15
2		6.95	5.37	4.16
3		6.93	5.36	4.15
4		6.94	5.36	4.15
5		6.95	5.35	4.13
6		6.93	5.36	4.14
7		6.94	5.34	4.14
0	2586	6.93	5.37	4.16
1		6.96	5.39	4.15
2		6.96	5.35	4.16
3		6.94	5.37	4.15
4		6.92	5.37	4.15
5		6.97	5.38	4.13
6		6.93	5.39	4.14
7		6.93	5.37	4.14

