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Report On

Radio Testing of the
Nokia Siemens Networks Oy
Flexi Multiradio 10 BTS RF module 2.6GHz
Radio Access technology: E-UTRA (TDD)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27

COMMERCIAL-IN-CONFIDENCE

FCC ID: VBNFZHE-01

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August 2013



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,
Fareham, Hampshire, United Kingdom, PO15 5RL
Tel: +44 (0) 1489 558100. Website: www.tuv-sud.co.uk

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PREPARED FOR

Nokia Siemens Networks Oy
PO Box 319
Kaapelitie 4
FI-90620
Oulu
Finland

PREPARED BY

A handwritten signature in black ink, appearing to read 'Natalie Bennett', written over a horizontal line.

Natalie Bennett
Senior Administrator (Technical)

APPROVED BY

A handwritten signature in black ink, appearing to read 'Mark Jenkins', written over a horizontal line.

Mark Jenkins
Authorised Signatory

DATED

01 August 2013



CONTENTS

Section	Page No
1 REPORT SUMMARY	3
1.1 Introduction	4
2 DISCLAIMERS AND COPYRIGHT.....	5
2.1 Disclaimers and Copyright.....	6
ANNEX A Nokia Siemens Networks Test Report No: D496476672	A.2



SECTION 1

REPORT SUMMARY

Radio Testing of the
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Flexi Multiradio 10 BTS RF module 2.6GHz
Radio Access technology: E-UTRA (TDD)
In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Radio Testing of the Nokia Siemens Networks Oy Flexi Multiradio 10 BTS RF module 2.6GHz Radio Access technology: E-UTRA (TDD) In accordance with FCC CFR 47 Part 2 and FCC CFR 47 Part 27.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Nokia Siemens Networks Oy
Model Number(s)	FZHE
Serial Number(s)	RY132201016
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 2 (2012) FCC CFR 47 Part 27 (2012)
Order Number	535/90439200
Date	14 June 2013
Start of Test	25 June 2013
Finish of Test	07 July 2013
Name of Engineer(s)	Rami Salomäki Jari Veijola



SECTION 2

DISCLAIMERS AND COPYRIGHT



2.1 DISCLAIMERS AND COPYRIGHT

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ANNEX A

NOKIA SIEMENS NETWORKS TEST REPORT NO: D496476672



Product Service

**TEST REPORT NO: D496476672****FCC ID: VBNFZHE-01**

Date:	Oulu 9. Jul 2013
Pages:	113
Appendices:	-

Equipment Under Test:	Flexi Multiradio 10 BTS RF module 2,6GHz Radio Access technology: E-UTRA (TDD)
Type:	FZHE
Manufacturer:	Nokia Siemens Networks Oy
Address:	P.O. Box 319, Kaapelitie 4, FI-90620, Oulu, Finland
Task:	Conformance test according to the specifications mentioned below
Test Specification(s):	FCC 47 CFR part 2 (10-1-12 edition) and part 27 (10-1-12 edition)
Result:	The EUT complies with the requirements of the specification

The results relate only to the items tested as described in this test report.

Approved by:	Date	Signature
Jaakko Sirviö R&D Line Manager NSN	9. Jul 2013	



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

CONTENTS

- 1. SUMMARY 4
 - 1.1 Test Laboratory 4
 - 1.2 Time Schedule..... 4
 - 1.3 Participants..... 4
- 2. EQUIPMENT UNDER TEST..... 5
 - 2.1 Configuration of EUT..... 5
 - 2.2 Operating Conditions 6
- 3. TEST CONFIGURATION..... 7
 - 3.1 Calibration of the Test Equipment 7
- 4. TEST RESULTS 8
 - 4.1 Test No. 1: RF Power Output (§ 2.1046, § 27.50)..... 8
 - 4.1.1. Limits..... 8
 - 4.1.2. Test Procedure and Results..... 8
 - 4.2 Test No. 2: Modulation Characteristics (§ 2.1047, § 2.201) 12
 - 4.3 Test No. 3: Occupied Bandwidth (§ 2.1049)..... 13
 - 4.3.1. Limits..... 13
 - 4.3.2. Test Procedure and Results..... 13
 - 4.4 Test No. 4: Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 27.53)..... 16
 - 4.4.1. Limits..... 16
 - 4.4.2. Test Procedure and Results..... 16
 - 4.5 Test No. 5: Field Strength of Spurious Radiation (§ 2.1053, § 2.1057, § 27.53)23
 - 4.5.1. Limits..... 23
 - 4.5.2. Test Configuration 23
 - 4.5.3. Test Procedure and Results..... 23



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.6	Test No. 6: Frequency Stability (§ 2.1055, § 27.54)	25
4.6.1.	Purpose	25
4.6.2.	Limits	25
4.6.3.	Test Configuration	25
4.6.4.	Test Procedure and Results	26
5.	TEST DATA AND SCREENSHOTS	35
5.1	Part List of the RF Measurement Test Equipment	35
5.2	Spectral Plots	36
5.2.1.	Test No. 1: RF Power Output	36
5.2.2.	Test No. 2: Modulation Characteristics	49
5.2.3.	Test No. 3: Occupied Bandwidth	50
5.2.4.	Test No. 4: Spurious Emissions at the Antenna Terminals	63
5.2.5.	Test No. 5: Field Strength of Spurious Radiation	112



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

1. SUMMARY

The following tests were performed according to the FCC rules in order to verify the compliance of the EUT with the FCC requirements:

Test No.	Measurement	FCC Rule	Page Number of this Report	Result
1	RF Power Output	§ 2.1046, § 27.50	8	compliant
2	Modulation Characteristics	§ 2.1047, § 2.201	12	compliant
3	Occupied Bandwidth	§ 2.1049	13	compliant
4	Spurious Emissions at Antenna Terminals	§ 2.1051, § 2.1057, § 27.53	16	compliant
5	Field Strength of Spurious Radiation	§ 2.1053, § 2.1057, § 27.53, § 27.55	23	compliant
6	Frequency Stability	§ 2.1055, § 27.54	25	compliant

Table 1 Results – Summary

In accordance with the FCC Rule §15.3 (z) the equipment was tested with the limits that are valid for an *unintentional radiator*.

Measurements guidance: FCC OET laboratory KDB:

-662911 D01 Multiple Transmitter Output v01r02.

1.1 Test Laboratory

Nokia Siemens Networks Oy

P.O. Box 319,

Kaapelitie 4,

FI-90620, Oulu, Finland

Jaakko Sirvio

FCC Reg. No: 411251

1.2 Time Schedule

Test No.	1, 2, 3, 4	5	6
Start of Test:	25 Jun 2013	25 Jun 2013	04 Jul 2013
End of Test:	03 Jul 2013	26 Jun 2013	07 Jul 2013

1.3 Participants

Name	Function	Signature
Rami Salomäki (NSN)	Testing, Setup of EUT	
Jani Veijola (NSN)	Testing, Setup of EUT	

FCC Part 27, subpart M

9 July 2013
Page 4 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

2. EQUIPMENT UNDER TEST

The EUT is a LTE Base transceiver station RF module 2.6GHz with 8 power amplifiers.

The BTS performs the full RAN function of LTE system (evolved UTRA). This is sometimes referred to as collapsed RAN, where equivalent functions of former 3G BTS and 3G RNC are all integrated into BTS. BTS is connected directly to the core network via S1 interface, and to mobile stations via Air interface (Uu). In addition BTSs are optionally connected directly to each others via X2 interface for handover purposes.

The tested equipment is representative for serial production.

2.1 Configuration of EUT

The used different EUT configurations are shown by the following table.

Module Type	Flexi Multiradio BTS RF module 2.6GHz	
Radio Access Technology	E-UTRA	
Duplex mode	Time Division Duplex (TDD)	
Channel Bandwidth	10MHz (Config. A), 20MHz (Config. B)	
Supply Voltage	48.0 V DC	
Frequency Bands		
Channel Bandwidth 10MHz	Lowest tunable freq.	2501.0MHz
	Middle freq.	2593.0MHz
	Highest tunable freq.	2685.0MHz
Channel Bandwidth 20MHz	Lowest tunable freq.	2506.0MHz
	Middle freq.	2593.0MHz
	Highest tunable freq.	2680.0MHz
Single carrier		
Rated Output Power (Prat)	15W (41.8dBm) conducted	
Downlink/Uplink ratio	6/3 to 8/1	
	RX	TX
Number of Antenna Ports	8 (ANT1 to ANT8)	8 (ANT1 to ANT8)
MiMo	Yes	Yes

Table 2 Overview of EUT configuration



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

The tests were performed with one EUT at the antenna ports ANT1, ANT2, ANT3 or ANT4.

The used different EUT configurations are shown by the following table.

Module Name	Serial-No.	Module Type	Config.
FZHE	RY132201016	Radio module	A, B
Other Modules	Module Type	Config.	
FSMF	System module	A, B	
FTIF	Transmission module	A, B	

Table 3 Configuration of EUT

For a functional description of the modules, please refer to the appropriate related parts and exhibit sections of this certification application.

2.2 Operating Conditions

The EUT supports QPSK, 16QAM and 64QAM modulation. If not stated otherwise, the following standard setup procedure for the EUT was used:

The transmitter was set up according to 3GPP TS 36.141 E-UTRA Test Models (E-TM) for all tests:

- E-TM 1.1: All QPSK modulation testing
- E-TM 3.1: All 64QAM modulation testing
- E-TM 3.2: All 16QAM modulation testing

During the measurements, one carrier channel was tested at a time. The carrier was set to the maximum power level to ensure the maximum emission amplitudes during all measurements.

During the tests, the Flexi Multiradio BTS is transmitting a pseudo random bit pattern on the data channels. This ensures that the measurements of the emission characteristics of the transmitter are pursuant to § 2.1049.

Test models E-TM1.1, E-TM3.1 and E-TM3.2 have uplink/downlink ratio 3:6.



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

3. TEST CONFIGURATION

If not stated otherwise, the following measurement configuration was used to perform all measurements (see figure below).

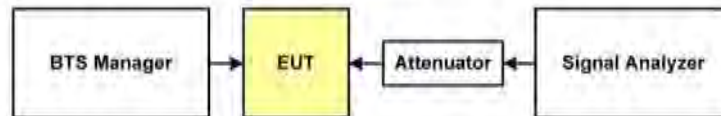


Figure 1 Test Configuration (single output)

The RF output of the transceiver (cell) under test is connected to a signal analyzer via a high power attenuator to protect the input of the signal analyzer from high RF power levels. A description of the analyzer settings is given in each of the sections describing the measurements. The other transceivers are terminated.

A complete list of the measurement equipment is included on page 35 of this measurement report.

3.1 Calibration of the Test Equipment

All relevant test equipment has a valid calibration from an external calibration laboratory. Additionally the signal analyzer has a built-in self-calibration procedure. This calibration procedure was activated prior to the measurements so that the analyzer is deemed accurate. High quality cables were used to connect the measurement equipment to the EUT. The actual loss of the attenuator and the cables was measured with a high precision network analyzer and taken into account for all measurements.



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4. TEST RESULTS

4.1 Test No. 1: RF Power Output (§ 2.1046, § 27.50)

4.1.1. Limits

Para. No. 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.

Sample calculation: $33\text{dBW} + 10\log(10\text{MHz}/5.5\text{MHz}) \text{ dBW} = 34.26 \text{ dBW} =$
 $\sim 2667\text{W}$

4.1.2. Test Procedure and Results

Detachable Antenna: The maximum output power at the antenna terminals was measured using a signal analyzer.

The RF power was measured with a frequency sweep across the carrier (see screenshots). The carrier power was calculated from the signal analyzer by integration over the result. The base station maximum output power is the sum of the measured carrier power and the external attenuation (cable loss of the test set up).

For the MiMo output, RF power was measured from each antenna port individually and the results summed mathematically in accordance to FCC KDB 662911 D01 - guidance.



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

The following table shows the measured output powers at the antenna connector. Screenshots of the measurements are included on pages 36 of this report.

Config A:

Carrier Frequency [MHz]	RF Power Output		Result
	[dBm]	[W]	
QPSK-Modulation ANT1			
2501.0	41.26596	13.34	compliant
2593.0	41.66516	14.74	compliant
2685.0	41.20391	13.19	compliant
QPSK-Modulation ANT2			
2501.0	41.35583	13.66	compliant
2593.0	41.70882	14.82	compliant
2685.0	41.01781	12.84	compliant
QPSK-Modulation ANT3			
2501.0	41.46692	14.02	compliant
2593.0	41.58325	14.40	compliant
2685.0	41.1718	13.10	compliant
QPSK-Modulation ANT4			
2501.0	41.68565	14.74	compliant
2593.0	41.80286	15.15	compliant
2685.0	41.64903	14.61	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2501.0	47.46	55.76	compliant
2593.0	47.72	59.11	compliant
2685.0	47.29	53.54	compliant
16QAM-Modulation ANT1			
2501.0	41.51949	14.19	compliant
2593.0	41.60544	14.47	compliant
2685.0	41.16639	13.08	compliant
16QAM-Modulation ANT2			
2501.0	41.00388	12.60	compliant
2593.0	41.68909	14.75	compliant
2685.0	41.18862	13.15	compliant
16QAM-Modulation ANT3			
2501.0	41.15118	13.04	compliant
2593.0	41.60492	14.47	compliant
2685.0	41.15493	13.06	compliant
16QAM-Modulation ANT4			
2501.0	41.34341	13.63	compliant
2593.0	41.78314	15.08	compliant
2685.0	41.56787	14.35	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2501.0	47.28	53.46	compliant
2593.0	47.69	56.77	compliant
2685.0	47.29	53.63	compliant



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

64QAM-Modulation ANT1			
2501.0	41.42283	13.88	compliant
2593.0	41.69433	14.77	compliant
2685.0	41.22118	13.25	compliant
64QAM-Modulation ANT2			
2501.0	41.15616	13.05	compliant
2593.0	41.91336	15.54	compliant
2685.0	41.0895	12.85	compliant
64QAM-Modulation ANT3			
2501.0	41.06133	12.77	compliant
2593.0	41.36829	13.70	compliant
2685.0	41.24272	13.31	compliant
64QAM-Modulation ANT4			
2501.0	41.41158	13.84	compliant
2593.0	41.82367	15.57	compliant
2685.0	41.46145	14.00	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2501.0	47.29	53.54	compliant
2593.0	47.75	59.58	compliant
2685.0	47.28	53.41	compliant
Measurement Uncertainty:		±0.4dB	

Table 4 RF Power Output (10 MHz Channel BW)

Config B:

Carrier Frequency [MHz]	RF Power Output		Result
	[dBm]	[W]	
QPSK-Modulation ANT1			
2506.0	41.49703	14.12	compliant
2593.0	41.85611	14.64	compliant
2680.0	41.38235	13.75	compliant
QPSK-Modulation ANT2			
2506.0	41.58678	14.34	compliant
2593.0	41.85534	15.33	compliant
2680.0	41.14573	13.02	compliant
QPSK-Modulation ANT3			
2506.0	41.64046	14.59	compliant
2593.0	41.51228	14.17	compliant
2680.0	41.30417	13.50	compliant
QPSK-Modulation ANT4			
2506.0	41.7108	14.83	compliant
2593.0	41.91649	15.55	compliant
2680.0	41.75588	14.98	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2506.0	47.63	57.88	compliant
2593.0	47.76	59.69	compliant

FCC Part 27, subpart M

9 July 2013
Page 10 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

2680.0	47.42	55.25	compliant
16QAM-Modulation ANT1			
2506.0	41.50517	14.14	compliant
2593.0	41.64932	14.62	compliant
2680.0	41.38283	13.75	compliant
16QAM-Modulation ANT2			
2506.0	41.36879	13.70	compliant
2593.0	41.73528	14.91	compliant
2680.0	41.28657	13.45	compliant
16QAM-Modulation ANT3			
2506.0	41.34196	13.62	compliant
2593.0	41.2921	13.47	compliant
2680.0	41.56726	14.35	compliant
16QAM-Modulation ANT4			
2506.0	41.48521	14.08	compliant
2593.0	41.96579	15.72	compliant
2680.0	41.67268	14.70	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2506.0	47.45	55.54	compliant
2593.0	47.69	58.72	compliant
2680.0	47.50	56.25	compliant
64QAM-Modulation ANT1			
2506.0	41.65892	14.65	compliant
2593.0	41.55559	14.31	compliant
2680.0	41.42569	13.89	compliant
64QAM-Modulation ANT2			
2506.0	41.47111	14.03	compliant
2593.0	41.73164	14.90	compliant
2680.0	41.32918	13.58	compliant
64QAM-Modulation ANT3			
2506.0	41.38358	13.75	compliant
2593.0	41.37803	13.73	compliant
2680.0	41.51757	14.18	compliant
64QAM-Modulation ANT4			
2506.0	41.63892	14.58	compliant
2593.0	41.91133	15.53	compliant
2680.0	41.6845	14.74	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated Total			
2506.0	47.56	57.01	compliant
2593.0	47.67	58.47	compliant
2680.0	47.51	56.39	compliant
Measurement Uncertainty:		±0.4dB	

Table 5 RF Power Output (20 MHz Channel BW)

The base station maximum output power was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.2 Test No. 2: Modulation Characteristics (§ 2.1047, § 2.201)

The occupied bandwidth was measured to be 9 MHz (Config. A) and 18 MHz (Config. B), which represents the 99% power bandwidth (see the following section and screenshots on pages 49).

Therefore, the modulation characteristic of the base stations transceiver is:

Config A: 9M00D9W (Channel bandwidth 10 MHz)

Config B: 18M0D9W (Channel bandwidth 20 MHz)

No further testing is required under this section of the FCC rules. No measurements other than the occupied bandwidth are required.

The modulation characteristics were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.3 Test No. 3: Occupied Bandwidth (§ 2.1049)

4.3.1. Limits

Para. No. 2.1049. The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to 0.5% of the emitted power.

4.3.2. Test Procedure and Results

The 99% occupied bandwidth of the carrier emission is measured using a signal analyzer with Resolution Bandwidth set to 30 kHz (less than 1% of bandwidth; see screenshots on page 50 for details). The following tables summarizes the results:

Config A:

Carrier Frequency [MHz]	Occupied Bandwidth [MHz]	Result
QPSK-Modulation ANT1		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
QPSK-Modulation ANT2		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.93088017366	compliant
QPSK-Modulation ANT3		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
QPSK-Modulation ANT4		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
16QAM-Modulation ANT1		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.901447178	compliant
16QAM-Modulation ANT2		
2501.0	8.901447178	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
16QAM-Modulation ANT3		
2501.0	8.91606367583	compliant



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
16QAM-Modulation ANT4		
2501.0	8.901447178	compliant
2593.0	8.91606367583	compliant
2685.0	8.901447178	compliant
64QAM-Modulation ANT1		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
64QAM-Modulation ANT2		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
64QAM-Modulation ANT3		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
64QAM-Modulation ANT4		
2501.0	8.91606367583	compliant
2593.0	8.91606367583	compliant
2685.0	8.91606367583	compliant
Measurement Uncertainty:		±48kHz

Table 6 Occupied Bandwidth (10 MHz Channel BW)

Config B:

Carrier Frequency [MHz]	Occupied Bandwidth [MHz]	Result
QPSK-Modulation ANT1		
2506.0	17.8311143271	compliant
2593.0	17.8602026049	compliant
2680.0	17.8311143271	compliant
QPSK-Modulation ANT2		
2506.0	17.8311143271	compliant
2593.0	17.8602026049	compliant
2680.0	17.8311143271	compliant
QPSK-Modulation ANT3		
2506.0	17.8311143271	compliant
2593.0	17.8602026049	compliant
2680.0	17.8311143271	compliant
QPSK-Modulation ANT4		
2506.0	17.8311143271	compliant



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

2593.0	17.8602026049	compliant
2680.0	17.8311143271	compliant
16QAM-Modulation ANT1		
2506.0	17.8020260492	compliant
2593.0	17.8020260492	compliant
2680.0	17.8020260492	compliant
16QAM-Modulation ANT2		
2506.0	17.8020260492	compliant
2593.0	17.8020260492	compliant
2680.0	17.7729377713	compliant
16QAM-Modulation ANT3		
2506.0	17.8020260492	compliant
2593.0	17.8020260492	compliant
2680.0	17.8020260492	compliant
16QAM-Modulation ANT4		
2506.0	17.8020260492	compliant
2593.0	17.8020260492	compliant
2680.0	17.8020260492	compliant
64QAM-Modulation ANT1		
2506.0	17.8311143271	compliant
2593.0	17.8311143271	compliant
2680.0	17.8311143271	compliant
64QAM-Modulation ANT2		
2506.0	17.8311143271	compliant
2593.0	17.8311143271	compliant
2680.0	17.8311143271	compliant
64QAM-Modulation ANT3		
2506.0	17.8311143271	compliant
2593.0	17.8020260492	compliant
2680.0	17.8311143271	compliant
64QAM-Modulation ANT4		
2506.0	17.8311143271	compliant
2593.0	17.8020260492	compliant
2680.0	17.8311143271	compliant
Measurement Uncertainty:		±48kHz

Table 7 Occupied Bandwidth (20 MHz Channel BW)

The occupied bandwidth was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.4 Test No. 4: Spurious Emissions at Antenna Terminals (§ 2.1051, § 2.1057, § 27.53)

4.4.1. Limits

Para. No. 27.53(1). For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.

(1)(2) For fixed and temporary fixed digital stations, the attenuation shall be not less than $43 + 10 \log(P)$ dB (P = transmitter power in Watts).

The compliance limit was calculated in the following way:

Maximum transmitter output power [W]:	P
Maximum transmitter output power [dBm]:	$30 + 10 \log_{10} P$ (conversion from W to dBm)
Attenuation required by FCC:	$43 + 10 \log_{10} P$
Compliance limit = Maximum transmitter output power - Required attenuation	
	$= 30 + 10 \log_{10} P - (43 + 10 \log_{10} P) = \underline{-13 \text{ dBm}}$

4.4.2. Test Procedure and Results

The tests were carried out in accordance with § 27.53. For all frequency ranges except two (immediately below and above the carrier frequency block) a 1 MHz resolution bandwidth was used for the measurements.

In the 1 MHz frequency bands immediately outside and adjacent to the carrier frequency block the resolution bandwidth is lowered to 1% of the 26 dB occupied bandwidth of the transmitted carrier.

According to § 2.1057, all emissions including the fundamental frequency from the lowest radio frequency generated in the equipment, without going below 9 kHz, up to the 10th harmonic were investigated.

For the MiMo output, measure and sum the spectra across the outputs according to FCC KDB 662911 D01 was used to calculate emission level.

The following tables summarize the worst case detected emission levels (see screenshots on pages 63 for details). The external attenuation (cable loss of the set up) is already added in the results. It can be seen separately as the 'Offset' value in the screenshots.



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A Lower band edge:

Carrier Frequency: 2501.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
	2496.0	-21.08	compliant
QPSK-Modulation ANT2			
	2496.0	-20.88	compliant
QPSK-Modulation ANT3			
	2496.0	-20.85	compliant
QPSK-Modulation ANT4			
	2496.0	-20.84	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-14.89	compliant
16QAM-Modulation ANT1			
	2496.0	-21.64	compliant
16QAM-Modulation ANT2			
	2496.0	-21.98	compliant
16QAM-Modulation ANT3			
	2496.0	-22.20	compliant
16QAM-Modulation ANT4			
	2496.0	-21.99	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-15.93	compliant
64QAM-Modulation ANT1			
	2496.0	-20.22	compliant
64QAM-Modulation ANT2			
	2496.0	-20.11	compliant
64QAM-Modulation ANT3			
	2496.0	-20.15	compliant
64QAM-Modulation ANT4			
	2496.0	-20.07	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-14.12	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 8 Spurious Emissions (Lower band edge) (10 MHz CH BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A Upper band edge:

Carrier Frequency: 2685.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
	2690.0	-21.41	compliant
QPSK-Modulation ANT2			
	2690.0	-21.52	compliant
QPSK-Modulation ANT3			
	2690.0	-21.07	compliant
QPSK-Modulation ANT4			
	2690.0	-21.19	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-15.27	compliant
16QAM-Modulation ANT1			
	2690.0	-21.27	compliant
16QAM-Modulation ANT2			
	2690.0	-21.66	compliant
16QAM-Modulation ANT3			
	2690.0	-21.56	compliant
16QAM-Modulation ANT4			
	2690.0	-21.50	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-15.47	compliant
64QAM-Modulation ANT1			
	2690.0	-21.35	compliant
64QAM-Modulation ANT2			
	2690.0	-21.64	compliant
64QAM-Modulation ANT3			
	2690.0	-21.27	compliant
64QAM-Modulation ANT4			
	2690.0	-21.20	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-15.34	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 9 Spurious Emissions (Upper band edge) (10 MHz CH BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A Spurious emissions:

Carrier Frequency: 2593.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
0.009 - 26900	5181.0	-29.58	compliant
QPSK-Modulation ANT2			
0.009 - 26900	5181.0	-30.75	compliant
QPSK-Modulation ANT3			
0.009 - 26900	5181.0	-29.96	compliant
QPSK-Modulation ANT4			
0.009 - 26900	5181.0	-29.77	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 - 26900	5181.0	-23.97	compliant
16QAM-Modulation ANT1			
0.009 - 26900	5181.0	-30.02	compliant
16QAM-Modulation ANT2			
0.009 - 26900	5181.0	-29.99	compliant
16QAM-Modulation ANT3			
0.009 - 26900	5181.0	-30.31	compliant
16QAM-Modulation ANT4			
0.009 - 26900	5181.0	-29.48	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 - 26900	5181.0	-23.92	compliant
64QAM-Modulation ANT1			
0.009 - 26900	5181.0	-29.80	compliant
64QAM-Modulation ANT2			
0.009 - 26900	5181.0	-29.68	compliant
64QAM-Modulation ANT3			
0.009 - 26900	5181.0	-29.92	compliant
64QAM-Modulation ANT4			
0.009 - 26900	5181.0	-29.62	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 - 26900	5181.0	-23.73	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 10 Spurious Emissions (10 MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B Lower band edge:

Carrier Frequency: 2506.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
	2496.0	-27.12	compliant
QPSK-Modulation ANT2			
	2496.0	-26.76	compliant
QPSK-Modulation ANT3			
	2496.0	-27.46	compliant
QPSK-Modulation ANT4			
	2496.0	-26.58	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-20.95	compliant
16QAM-Modulation ANT1			
	2496.0	-26.98	compliant
16QAM-Modulation ANT2			
	2496.0	-27.46	compliant
16QAM-Modulation ANT3			
	2496.0	-25.67	compliant
16QAM-Modulation ANT4			
	2496.0	-25.51	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-20.31	compliant
64QAM-Modulation ANT1			
	2496.0	-26.73	compliant
64QAM-Modulation ANT2			
	2496.0	-26.65	compliant
64QAM-Modulation ANT3			
	2496.0	-27.15	compliant
64QAM-Modulation ANT4			
	2496.0	-26.72	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2496.0	-20.79	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 11 Spurious Emissions (Lower band edge) (20 MHz CH BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B Upper band edge:

Carrier Frequency: 2680.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
	2690.0	-26.84	compliant
QPSK-Modulation ANT2			
	2690.0	-25.82	compliant
QPSK-Modulation ANT3			
	2690.0	-25.87	compliant
QPSK-Modulation ANT4			
	2690.0	-25.20	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-19.82	compliant
16QAM-Modulation ANT1			
	2690.0	-26.13	compliant
16QAM-Modulation ANT2			
	2690.0	-26.83	compliant
16QAM-Modulation ANT3			
	2690.0	-26.21	compliant
16QAM-Modulation ANT4			
	2690.0	-26.06	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-20.28	compliant
64QAM-Modulation ANT1			
	2690.0	-27.07	compliant
64QAM-Modulation ANT2			
	2690.0	-26.41	compliant
64QAM-Modulation ANT3			
	2690.0	-27.41	compliant
64QAM-Modulation ANT4			
	2690.0	-26.81	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
	2690.0	-20.89	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.8GHz: ±1.2dB, 3.8GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 12 Spurious Emissions (Upper band edge) (20 MHz CH BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B Spurious emissions:

Carrier Frequency: 2593.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation ANT1			
0.009 – 26900	5181.0	-31.23	compliant
QPSK-Modulation ANT2			
0.009 – 26900	5181.0	-30.60	compliant
QPSK-Modulation ANT3			
0.009 – 26900	5181.0	-30.41	compliant
QPSK-Modulation ANT4			
0.009 – 26900	5181.0	-30.08	compliant
QPSK-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 – 26900	5181.0	-24.54	compliant
16QAM-Modulation ANT1			
0.009 – 26900	5181.0	-30.17	compliant
16QAM-Modulation ANT2			
0.009 – 26900	5181.0	-31.01	compliant
16QAM-Modulation ANT3			
0.009 – 26900	5181.0	-30.68	compliant
16QAM-Modulation ANT4			
0.009 – 26900	5181.0	-30.32	compliant
16QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 – 26900	5181.0	-24.51	compliant
64QAM-Modulation ANT1			
0.009 – 26900	5193.0	-30.37	compliant
64QAM-Modulation ANT2			
0.009 – 26900	5193.0	-30.19	compliant
64QAM-Modulation ANT3			
0.009 – 26900	5193.0	-30.26	compliant
64QAM-Modulation ANT4			
0.009 – 26900	5193.0	-30.17	compliant
64QAM-Modulation ANT1+ANT2+ANT3+ANT4 Calculated total			
0.009 - 26900	5193.0	-24.23	compliant
Measurement Uncertainty:		f < 1.0GHz: ±1.1dB, 1.0GHz ≤ f < 3.6GHz: ±1.2dB, 3.6GHz ≤ f < 8.0GHz: ±1.6dB, 8.0GHz ≤ f: ±1.9dB	

Table 13 Spurious Emissions (20 MHz Channel BW)

The measured conducted emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



FCC ID:
VBNEZHE-01

Test Report No:
D496476672

4.5 Test No. 5: Field Strength of Spurious Radiation (§ 2.1053, § 2.1057, § 27.53)

4.5.1. Limits

Para. No. 27.53(m). For BRS and EBS stations, the power of any emissions outside the licensee's frequency bands of operation shall be attenuated below the transmitter power (P) measured in watts.

(m)(2) For digital base stations, the attenuation shall be not less than $43 + 10 \log (P)$ dB (P = transmitter power in Watts).

4.5.2. Test Configuration

The measurements were performed in an anechoic chamber. The radiated test site complies with the site attenuation requirements listed in ANSI C63.4 2003 and is listed with the FCC.

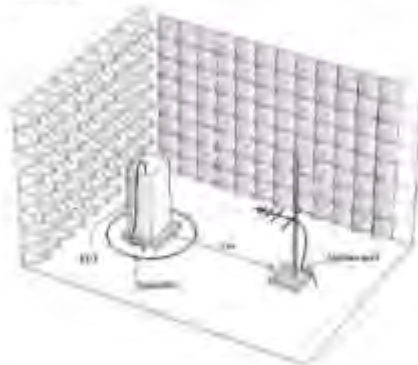


Figure 2 Test Configuration

Photographs of the EUT in the anechoic chamber are shown on page 112 of this measurement report.

4.5.3. Test Procedure and Results

TIA/EIA-603-C-2004, Section 2.2.12

The test was performed in a semi-anechoic shielded room. The EUT was placed on a non-conductive 0.8 m high table standing on the turntable. During the test in the frequency range 30 - 26500 MHz the distance from the EUT to the measuring antenna was 3 m. In order to find the maximum levels of the disturbance radiation the angle of the turntable, the height of the measuring antenna were varied during the tests. The test was performed with the measuring antenna being both in horizontal and vertical polarizations.



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Vertical and horizontal polarizations in the frequency range 30 - 26500 MHz was first measured by using the peak detector. During the peak detector scan the turntable was rotated from 0° to 360° with 30° step with the antenna heights 1.0 m and 2.5 m.

The limit of -13 dBm has been calculated to correspond 84.4 dB (µV/m). Spurious emissions closer than 20 dB to the limit was measured with average detector.

According to § 2.1057, all emissions from the lowest radio frequency generated in the equipment, without going below 9 kHz, up to the 10th harmonic were investigated.

The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The EUT was replaced with a reference substitution antenna with a known gain referenced to an isotropic radiator $G_{Antenna[dBi]}$. This antenna was fed with a signal at the spurious frequency $P_{Gen[dBm]}$. The level of the signal was adjusted to repeat the previously measured level. The resulting

EIRP is the signal level fed to the reference antenna corrected for gain referenced to an isotropic.

The formula below was used to calculate the EIRP of the EUT.

$$P_{EIRP[dBm]} = P_{Gen[dBm]} - L_{Cable[dB]} + G_{Antenna[dBi]}$$

Worst case detected emission levels were measured from configuration B (20MHz channel BW with QPSK modulation) and are reported in the following table (refer to spectral plots included on pages 100 for details). The antenna factor and cable loss is according to the manufacturer's specification.

Config B:

Carrier Frequency: 2506.0 MHz, 2503.0 MHz and 2680.0 MHz			
Frequency Range [MHz]	Emission Frequency [MHz]	Maximum Emission Level [dBm]	Result
QPSK-Modulation TX1			
30 - 26500	More than 20dB below limit -13 dBm		compliant
Measurement Uncertainty:			±5.4dB

Table 14 Field Strength of Spurious Radiation (20 MHz Channel BW)

The measured emission levels were found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.6 Test No. 6: Frequency Stability (§ 2.1055, § 27.54)

4.6.1. Purpose

Frequency stability measurements were performed to verify that the frequency deviation of the emission stays within the licensee’s frequency block under extreme temperature

4.6.2. Limits

Para. No. 27.54. (-30 °C to +50 °C) and supply voltage conditions according to § 2.1055.

4.6.3. Test Configuration

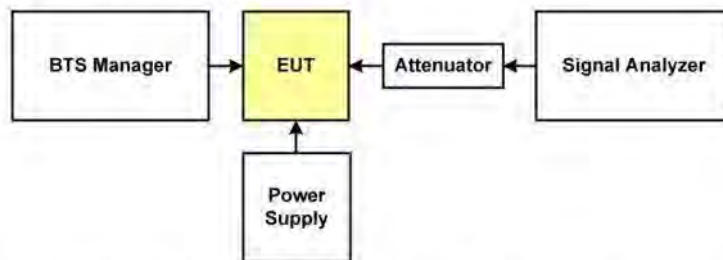


Figure 3 Test Configuration for frequency stability with voltage variation

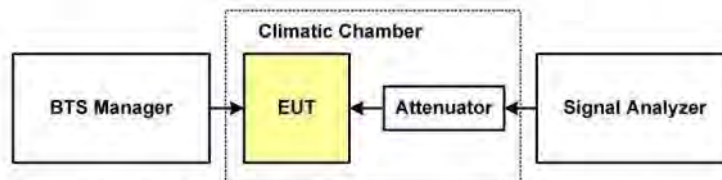


Figure 4 Test Configuration for frequency stability with temperature variation

A complete list of the measurement equipment is included on page 35 of this measurement report.



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

4.6.4. Test Procedure and Results

Frequency Stability with Temperature Variation:

The supply voltage of the EUT was set to the nominal value and the temperature of the environmental chamber was varied in 10 degree steps from -30 degrees celsius to +50 degrees celsius. The EUT was allowed to stabilize at each temperature and the frequency error was measured.

Config A:

Carrier Frequency: 2593.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation ANT1						
-48.0	-30.0	-7.96	-0.003	129	0.05	compliant
-48.0	-20.0	-4.23	-0.002	129	0.05	compliant
-48.0	-10.0	-4.57	-0.002	129	0.05	compliant
-48.0	0.0	-7.58	-0.003	129	0.05	compliant
-48.0	10.0	-6.84	-0.003	129	0.05	compliant
-48.0	30.0	-7.04	-0.003	129	0.05	compliant
-48.0	40.0	-5.53	-0.002	129	0.05	compliant
-48.0	50.0	6.96	0.003	129	0.05	compliant
QPSK Modulation ANT2						
-48.0	-30.0	-5.56	-0.002	129	0.05	compliant
-48.0	-20.0	-7.11	-0.003	129	0.05	compliant
-48.0	-10.0	-2.04	-0.001	129	0.05	compliant
-48.0	0.0	-7.52	-0.003	129	0.05	compliant
-48.0	10.0	-6.09	-0.002	129	0.05	compliant
-48.0	30.0	-8.20	-0.003	129	0.05	compliant
-48.0	40.0	7.21	0.003	129	0.05	compliant
-48.0	50.0	5.92	0.002	129	0.05	compliant
QPSK Modulation ANT3						
-48.0	-30.0	-6.21	-0.002	129	0.05	compliant
-48.0	-20.0	-2.96	-0.001	129	0.05	compliant
-48.0	-10.0	-7.00	-0.003	129	0.05	compliant
-48.0	0.0	-6.16	-0.002	129	0.05	compliant
-48.0	10.0	-7.01	-0.003	129	0.05	compliant
-48.0	30.0	9.89	0.004	129	0.05	compliant
-48.0	40.0	6.71	0.003	129	0.05	compliant
-48.0	50.0	7.04	0.003	129	0.05	compliant
QPSK Modulation ANT4						
-48.0	-30.0	-7.00	-0.003	129	0.05	compliant
-48.0	-20.0	-6.68	-0.003	129	0.05	compliant



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

-48.0	-10.0	-2.84	-0.001	129	0.05	compliant
-48.0	0.0	-9.41	-0.004	129	0.05	compliant
-48.0	10.0	-4.51	-0.002	129	0.05	compliant
-48.0	30.0	8.40	0.003	129	0.05	compliant
-48.0	40.0	7.36	0.003	129	0.05	compliant
-48.0	50.0	-8.99	-0.003	129	0.05	compliant
16QAM Modulation ANT1						
-48.0	-30.0	-5.76	-0.002	129	0.05	compliant
-48.0	-20.0	-4.21	-0.002	129	0.05	compliant
-48.0	-10.0	-4.94	-0.002	129	0.05	compliant
-48.0	0.0	-6.12	-0.002	129	0.05	compliant
-48.0	10.0	-6.99	-0.003	129	0.05	compliant
-48.0	30.0	7.44	0.003	129	0.05	compliant
-48.0	40.0	-8.66	-0.003	129	0.05	compliant
-48.0	50.0	-8.04	-0.003	129	0.05	compliant
16QAM Modulation ANT2						
-48.0	-30.0	-8.36	-0.003	129	0.05	compliant
-48.0	-20.0	-5.64	-0.002	129	0.05	compliant
-48.0	-10.0	-7.90	-0.003	129	0.05	compliant
-48.0	0.0	-7.55	-0.003	129	0.05	compliant
-48.0	10.0	-5.89	-0.002	129	0.05	compliant
-48.0	30.0	-7.36	-0.003	129	0.05	compliant
-48.0	40.0	4.88	0.002	129	0.05	compliant
-48.0	50.0	8.52	0.003	129	0.05	compliant
16QAM Modulation ANT3						
-48.0	-30.0	-4.15	-0.002	129	0.05	compliant
-48.0	-20.0	-7.84	-0.003	129	0.05	compliant
-48.0	-10.0	-6.45	-0.002	129	0.05	compliant
-48.0	0.0	-6.44	-0.002	129	0.05	compliant
-48.0	10.0	-4.98	-0.002	129	0.05	compliant
-48.0	30.0	-7.39	-0.003	129	0.05	compliant
-48.0	40.0	3.87	0.001	129	0.05	compliant
-48.0	50.0	-6.65	-0.003	129	0.05	compliant
16QAM Modulation ANT4						
-48.0	-30.0	-7.60	-0.003	129	0.05	compliant
-48.0	-20.0	-6.35	-0.002	129	0.05	compliant
-48.0	-10.0	-4.32	-0.002	129	0.05	compliant
-48.0	0.0	-5.89	-0.002	129	0.05	compliant
-48.0	10.0	-6.02	-0.002	129	0.05	compliant
-48.0	30.0	-9.05	-0.003	129	0.05	compliant
-48.0	40.0	-6.71	-0.003	129	0.05	compliant
-48.0	50.0	-8.63	-0.003	129	0.05	compliant

FCC Part 27, subpart M

9 July 2013
Page 27 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

64QAM Modulation ANT1						
-48.0	-30.0	-7.21	-0,003	129	0.05	compliant
-48.0	-20.0	-5.45	-0,002	129	0.05	compliant
-48.0	-10.0	-6.06	-0,002	129	0.05	compliant
-48.0	0.0	-8.20	-0,003	129	0.05	compliant
-48.0	10.0	-5.10	-0,002	129	0.05	compliant
-48.0	30.0	7.94	0,003	129	0.05	compliant
-48.0	40.0	7.16	0,003	129	0.05	compliant
-48.0	50.0	-4.64	-0,002	129	0.05	compliant
64QAM Modulation ANT2						
-48.0	-30.0	-5.69	-0,002	129	0.05	compliant
-48.0	-20.0	-3.41	-0,001	129	0.05	compliant
-48.0	-10.0	-2.69	-0,001	129	0.05	compliant
-48.0	0.0	7.12	0,003	129	0.05	compliant
-48.0	10.0	-5.72	-0,002	129	0.05	compliant
-48.0	30.0	9.11	0,004	129	0.05	compliant
-48.0	40.0	-6.10	-0,002	129	0.05	compliant
-48.0	50.0	8.51	0,003	129	0.05	compliant
64QAM Modulation ANT3						
-48.0	-30.0	-5.75	-0,002	129	0.05	compliant
-48.0	-20.0	-3.24	-0,001	129	0.05	compliant
-48.0	-10.0	-4.41	-0,002	129	0.05	compliant
-48.0	0.0	-6.02	-0,002	129	0.05	compliant
-48.0	10.0	-7.17	-0,003	129	0.05	compliant
-48.0	30.0	8.66	0,003	129	0.05	compliant
-48.0	40.0	10.61	0,004	129	0.05	compliant
-48.0	50.0	8.57	0,003	129	0.05	compliant
64QAM Modulation ANT4						
-48.0	-30.0	-8.81	-0,003	129	0.05	compliant
-48.0	-20.0	-8.49	-0,003	129	0.05	compliant
-48.0	-10.0	-3.11	-0,001	129	0.05	compliant
-48.0	0.0	-6.79	-0,003	129	0.05	compliant
-48.0	10.0	-8.25	-0,003	129	0.05	compliant
-48.0	30.0	5.53	0,002	129	0.05	compliant
-48.0	40.0	8.29	0,003	129	0.05	compliant
-48.0	50.0	8.24	0,003	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 15 Frequency stability with temp. var. (10 MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B :

Carrier Frequency: 2583.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation ANT1						
-48.0	-30.0	-8.93	-0.003	129	0.05	compliant
-48.0	-20.0	-7.74	-0.003	129	0.05	compliant
-48.0	-10.0	-4.73	-0.002	129	0.05	compliant
-48.0	0.0	-8.22	-0.003	129	0.05	compliant
-48.0	10.0	-4.39	-0.002	129	0.05	compliant
-48.0	30.0	-12.23	-0.005	129	0.05	compliant
-48.0	40.0	-11.84	-0.005	129	0.05	compliant
-48.0	50.0	-2.87	-0.001	129	0.05	compliant
QPSK Modulation ANT2						
-48.0	-30.0	-7.14	-0.003	129	0.05	compliant
-48.0	-20.0	-10.57	-0.004	129	0.05	compliant
-48.0	-10.0	-5.90	-0.002	129	0.05	compliant
-48.0	0.0	-5.95	-0.002	129	0.05	compliant
-48.0	10.0	-5.24	-0.002	129	0.05	compliant
-48.0	30.0	-10.98	-0.004	129	0.05	compliant
-48.0	40.0	-10.69	-0.004	129	0.05	compliant
-48.0	50.0	-7.79	-0.003	129	0.05	compliant
QPSK Modulation ANT3						
-48.0	-30.0	-11.77	-0.005	129	0.05	compliant
-48.0	-20.0	-7.19	-0.003	129	0.05	compliant
-48.0	-10.0	-4.44	-0.002	129	0.05	compliant
-48.0	0.0	10.53	0.004	129	0.05	compliant
-48.0	10.0	-5.21	-0.002	129	0.05	compliant
-48.0	30.0	-10.78	-0.004	129	0.05	compliant
-48.0	40.0	-10.12	-0.004	129	0.05	compliant
-48.0	50.0	-5.98	-0.002	129	0.05	compliant
QPSK Modulation ANT4						
-48.0	-30.0	-9.30	-0.004	129	0.05	compliant
-48.0	-20.0	-8.84	-0.003	129	0.05	compliant
-48.0	-10.0	-8.19	-0.002	129	0.05	compliant
-48.0	0.0	8.76	0.003	129	0.05	compliant
-48.0	10.0	5.99	0.002	129	0.05	compliant
-48.0	30.0	27.35	0.011	129	0.05	compliant
-48.0	40.0	-13.98	-0.005	129	0.05	compliant
-48.0	50.0	-4.11	-0.002	129	0.05	compliant

FCC Part 27, subpart M

9 July 2013
Page 29 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

18QAM Modulation ANT1						
-48.0	-30.0	-10.71	-0.004	129	0.05	compliant
-48.0	-20.0	-7.40	-0.003	129	0.05	compliant
-48.0	-10.0	-5.53	-0.002	129	0.05	compliant
-48.0	0.0	-9.47	-0.004	129	0.05	compliant
-48.0	10.0	5.10	0.002	129	0.05	compliant
-48.0	30.0	-9.90	-0.004	129	0.05	compliant
-48.0	40.0	-6.95	-0.003	129	0.05	compliant
-48.0	50.0	-4.15	-0.002	129	0.05	compliant
18QAM Modulation ANT2						
-48.0	-30.0	-4.88	-0.002	129	0.05	compliant
-48.0	-20.0	-10.89	-0.004	129	0.05	compliant
-48.0	-10.0	-4.58	-0.002	129	0.05	compliant
-48.0	0.0	-6.79	-0.003	129	0.05	compliant
-48.0	10.0	-4.65	-0.002	129	0.05	compliant
-48.0	30.0	-6.97	-0.003	129	0.05	compliant
-48.0	40.0	-9.83	-0.004	129	0.05	compliant
-48.0	50.0	-8.65	-0.003	129	0.05	compliant
18QAM Modulation ANT3						
-48.0	-30.0	-9.39	-0.004	129	0.05	compliant
-48.0	-20.0	-9.71	-0.004	129	0.05	compliant
-48.0	-10.0	-4.32	-0.002	129	0.05	compliant
-48.0	0.0	-6.27	-0.003	129	0.05	compliant
-48.0	10.0	-7.76	-0.003	129	0.05	compliant
-48.0	30.0	-6.72	-0.003	129	0.05	compliant
-48.0	40.0	-11.39	-0.004	129	0.05	compliant
-48.0	50.0	-6.60	-0.003	129	0.05	compliant
18QAM Modulation ANT4						
-48.0	-30.0	-9.51	-0.004	129	0.05	compliant
-48.0	-20.0	-7.11	-0.003	129	0.05	compliant
-48.0	-10.0	-9.18	-0.004	129	0.05	compliant
-48.0	0.0	-10.05	-0.004	129	0.05	compliant
-48.0	10.0	-8.27	-0.003	129	0.05	compliant
-48.0	30.0	-13.21	-0.005	129	0.05	compliant
-48.0	40.0	-8.59	-0.003	129	0.05	compliant
-48.0	50.0	-6.22	-0.003	129	0.05	compliant
64QAM Modulation ANT1						
-48.0	-30.0	-8.83	-0.003	129	0.05	compliant
-48.0	-20.0	-11.06	-0.004	129	0.05	compliant
-48.0	-10.0	-5.97	-0.002	129	0.05	compliant
-48.0	0.0	-4.68	-0.002	129	0.05	compliant
-48.0	10.0	-5.03	-0.002	129	0.05	compliant

FCC Part 27, subpart M

9 July 2013
Page 30 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

-48.0	30.0	-8.52	-0,003	129	0.05	compliant
-48.0	40.0	-11.22	-0,004	129	0.05	compliant
-48.0	50.0	-7.71	-0,003	129	0.05	compliant
64QAM Modulation ANT2						
-48.0	-30.0	-4.53	-0,002	129	0.05	compliant
-48.0	-20.0	-5.78	-0,002	129	0.05	compliant
-48.0	-10.0	-3.59	-0,001	129	0.05	compliant
-48.0	0.0	-8.24	-0,003	129	0.05	compliant
-48.0	10.0	6.24	0,002	129	0.05	compliant
-48.0	30.0	-7.97	-0,003	129	0.05	compliant
-48.0	40.0	-8.27	-0,003	129	0.05	compliant
-48.0	50.0	-5.52	-0,002	129	0.05	compliant
64QAM Modulation ANT3						
-48.0	-30.0	-11.71	-0,005	129	0.05	compliant
-48.0	-20.0	-8.92	-0,003	129	0.05	compliant
-48.0	-10.0	-6.35	-0,002	129	0.05	compliant
-48.0	0.0	-7.25	-0,003	129	0.05	compliant
-48.0	10.0	-4.70	-0,002	129	0.05	compliant
-48.0	30.0	-7.08	-0,003	129	0.05	compliant
-48.0	40.0	-10.03	-0,004	129	0.05	compliant
-48.0	50.0	-6.56	-0,003	129	0.05	compliant
64QAM Modulation ANT4						
-48.0	-30.0	-8.98	-0,003	129	0.05	compliant
-48.0	-20.0	-6.62	-0,003	129	0.05	compliant
-48.0	-10.0	-3.16	-0,001	129	0.05	compliant
-48.0	0.0	-9.01	-0,003	129	0.05	compliant
-48.0	10.0	-8.48	-0,002	129	0.05	compliant
-48.0	30.0	-23.89	-0,009	129	0.05	compliant
-48.0	40.0	-8.58	-0,003	129	0.05	compliant
-48.0	50.0	-6.94	-0,003	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 16 Frequency stability with temp. var. (20 MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Frequency Stability with Voltage Variation:

The EUT was placed in a climatic chamber and allowed to stabilize at +20 degrees celsius for at least 30 minutes. With the supply voltage of the EUT set to 85% of the nominal value, the frequency error was measure. This procedure was repeated at 100% and 115% of the nominal supply voltage value.

Config A:

Carrier Frequency: 2593.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation ANT1						
-40.8	20.0	8.01	0,003	129	0.05	compliant
-48.0	20.0	7.73	0,003	129	0.05	compliant
-55.2	20.0	9.80	0,004	129	0.05	compliant
QPSK Modulation ANT2						
-40.8	20.0	8.78	0,003	129	0.05	compliant
-48.0	20.0	8.43	0,003	129	0.05	compliant
-55.2	20.0	7.96	0,003	129	0.05	compliant
QPSK Modulation ANT3						
-40.8	20.0	-5.71	-0,002	129	0.05	compliant
-48.0	20.0	-7.48	-0,003	129	0.05	compliant
-55.2	20.0	9.25	0,004	129	0.05	compliant
QPSK Modulation ANT4						
-40.8	20.0	-7.42	-0,003	129	0.05	compliant
-48.0	20.0	-6.18	-0,002	129	0.05	compliant
-55.2	20.0	-5.54	-0,002	129	0.05	compliant
16QAM Modulation ANT1						
-40.8	20.0	-6.21	-0,002	129	0.05	compliant
-48.0	20.0	6.71	0,003	129	0.05	compliant
-55.2	20.0	-4.84	-0,002	129	0.05	compliant
16QAM Modulation ANT2						
-40.8	20.0	6.05	0,002	129	0.05	compliant
-48.0	20.0	-8.06	-0,003	129	0.05	compliant
-55.2	20.0	-6.68	-0,003	129	0.05	compliant
16QAM Modulation ANT3						
-40.8	20.0	-8.40	-0,003	129	0.05	compliant
-48.0	20.0	7.46	0,003	129	0.05	compliant
-55.2	20.0	9.15	0,004	129	0.05	compliant
16QAM Modulation ANT4						
-40.8	20.0	6.20	0,002	129	0.05	compliant
-48.0	20.0	-8.51	-0,003	129	0.05	compliant

FCC Part 27, subpart M

9 July 2013
Page 32 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

-55.2	20.0	-4.91	-0.002	129	0.05	compliant
64QAM Modulation ANT1						
-40.8	20.0	9.95	0.004	129	0.05	compliant
-48.0	20.0	10.80	0.004	129	0.05	compliant
-55.2	20.0	8.39	0.003	129	0.05	compliant
64QAM Modulation ANT2						
-40.8	20.0	9.97	0.004	0.004	0.004	0.004
-48.0	20.0	11.90	0.005	0.005	0.005	0.005
-55.2	20.0	7.65	0.003	0.003	0.003	0.003
64QAM Modulation ANT3						
-40.8	20.0	7.82	0.003	129	0.05	compliant
-48.0	20.0	9.29	0.004	129	0.05	compliant
-55.2	20.0	8.80	0.003	129	0.05	compliant
64QAM Modulation ANT4						
-40.8	20.0	-7.72	-0.003	129	0.05	compliant
-48.0	20.0	-8.27	-0.003	129	0.05	compliant
-55.2	20.0	-8.52	-0.003	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 17 Frequency stability with voltage var. (10 MHz Channel BW)

Config B:

Carrier Frequency: 2593.0 MHz						
Supply Voltage (DC) [V]	Ambient Temperature [°C]	Frequency Deviation		Manufacturer's Specification		Result
		[Hz]	[ppm]	[Hz]	[ppm]	
QPSK Modulation ANT1						
-40.8	20.0	-7.08	-0.003	129	0.05	compliant
-48.0	20.0	-5.75	-0.002	129	0.05	compliant
-55.2	20.0	4.97	0.002	129	0.05	compliant
QPSK Modulation ANT2						
-40.8	20.0	-4.53	-0.002	129	0.05	compliant
-48.0	20.0	-5.43	-0.002	129	0.05	compliant
-55.2	20.0	-5.58	-0.002	129	0.05	compliant
QPSK Modulation ANT3						
-40.8	20.0	3.19	0.001	129	0.05	compliant
-48.0	20.0	4.57	0.002	129	0.05	compliant
-55.2	20.0	-4.75	-0.002	129	0.05	compliant
QPSK Modulation ANT4						
-40.8	20.0	-7.65	-0.003	129	0.05	compliant
-48.0	20.0	-6.64	-0.003	129	0.05	compliant
-55.2	20.0	-5.85	-0.002	129	0.05	compliant



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

16QAM Modulation ANT1						
-40.8	20.0	-7.51	-0,003	129	0.05	compliant
-48.0	20.0	-8.10	-0,003	129	0.05	compliant
-55.2	20.0	-5.43	-0,002	129	0.05	compliant
16QAM Modulation ANT2						
-40.8	20.0	-6.88	-0,003	129	0.05	compliant
-48.0	20.0	-6.18	-0,002	129	0.05	compliant
-55.2	20.0	-5.60	-0,002	129	0.05	compliant
16QAM Modulation ANT3						
-40.8	20.0	-7.77	-0,003	129	0.05	compliant
-48.0	20.0	-6.34	-0,002	129	0.05	compliant
-55.2	20.0	-6.01	-0,002	129	0.05	compliant
16QAM Modulation ANT4						
-40.8	20.0	-6.83	-0,003	129	0.05	compliant
-48.0	20.0	-6.45	-0,002	129	0.05	compliant
-55.2	20.0	-4.11	-0,002	129	0.05	compliant
64QAM Modulation ANT1						
-40.8	20.0	-7.71	-0,003	129	0.05	compliant
-48.0	20.0	-7.05	-0,003	129	0.05	compliant
-55.2	20.0	-6.28	-0,002	129	0.05	compliant
64QAM Modulation ANT2						
-40.8	20.0	-6.30	-0,002	129	0.05	compliant
-48.0	20.0	-5.60	-0,002	129	0.05	compliant
-55.2	20.0	-5.85	-0,002	129	0.05	compliant
64QAM Modulation ANT3						
-40.8	20.0	-5.71	-0,002	129	0.05	compliant
-48.0	20.0	-5.07	-0,002	129	0.05	compliant
-55.2	20.0	-6.45	-0,002	129	0.05	compliant
64QAM Modulation ANT4						
-40.8	20.0	-7.96	-0,003	129	0.05	compliant
-48.0	20.0	-5.15	-0,002	129	0.05	compliant
-55.2	20.0	-4.57	-0,002	129	0.05	compliant
Measurement Uncertainty:					±1.0 Hz	

Table 18 Frequency stability with voltage var. (20 MHz Channel BW)

The measured frequency stability was found to be compliant with the manufacturer's specifications and with all requirements of the FCC rules.



Product Service

FCC ID:
VBNFZHE-01Test Report No:
D496476672

5. TEST DATA AND SCREENSHOTS

5.1 Part List of the RF Measurement Test Equipment

No.	Test Equipment	Manufacturer & Type	Serial Number	Calibration date	Calibration due	Test No.
1	Signal Analyzer	Rohde & Schwarz: FSV 30	100781	05/2013	05/2014	1, 2, 3, 4, 6
2	Vector Signal Generator	Rohde & Schwarz: SMU200A	100935	07/2012	07/2014	1, 2, 3, 6
3	Signal Generator	Rohde & Schwarz: SMP02	836402/015	03/2013	03/2015	1, 2, 3, 6
4	Vector Network Analyzer	Rohde & Schwarz: ZVA40	100146	02/2013	02/2014	4
5	Vector Network Analyzer	Rohde & Schwarz: ZVL13	101177	02/2013	02/2014	4
6	Calibration Unit	Rohde & Schwarz: ZV-Z54	100125	03/2013	03/2014	4
7	Calibration Kit	Hewlett-Packard: HP85032B	2919A04843	07/2012	07/2013	4
8	Power Meter	Rohde & Schwarz: NRP-Z21	100354	01/2013	01/2015	1, 2, 3, 6
9	Frequency Standard	Datum 8040	30007339	01/2013	01/2014	6
10	Multimeter	Fluke 83	65870302	12/2012	12/2013	1, 2, 3, 4, 6
11	Humidity and Temperature Indicator	Vaisala: HMI 31	P3730008	01/2013	01/2014	1, 2, 3, 4, 6
12	DC Power Supply	Sorensen: SGI 80/188	1245A00011	cnn	-	1, 2, 3, 4, 6
13	Interface Unit	Orbis: TX SSU Platform 700-2700A	SSU-1113-2155	cnn	-	1, 2, 3, 6
14	Attenuator	Aeroflex/Weinschel: 66-20-33	BV3346	cnn	-	4
15	EMI Test Receiver	R&S ESU40	100262	03/2013	03/2014	5
16	Horn Antenna	Emco 3115	6346	10/2012	10/2013	5
17	Bilog Antenna	Chase CBL6112	2003	04/2013	04/2014	5
18	Log Periodic Antenna	R&S 1-26.5GHz	356749/012	07/2012	07/2013	5
19	Amplifier	Miteq AFSX4	902638	cnn	-	5
20	Antenna Mast	Deisel HD240	2401323194	cnn	-	5
21	Mast Controller	Deisel HD100	1001331	cnn	-	5

Table 19 Part List of the RF Measurement Test Equipment



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

5.2 Spectral Plots

5.2.1. Test No. 1: RF Power Output

The value 'Power' is the carrier power (RF Power Output) measured by the signal analyzer. 'Offset' is the external attenuation (cable loss of the test set up). The sum of both values is the base station maximum RF output power given on page 9. The external attenuation is frequency dependant. Thus the various 'Offset' values in the screenshots may differ.

Config A ANT1:

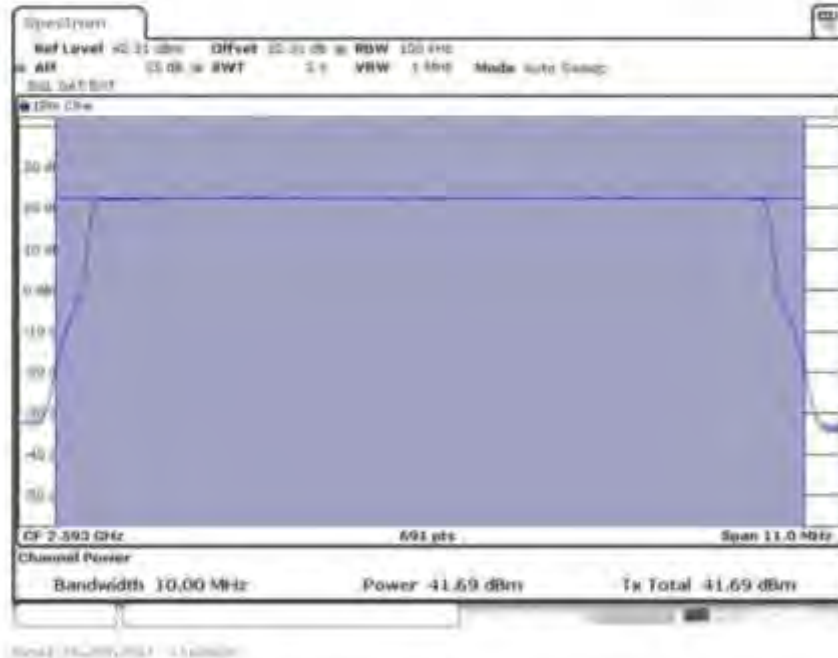


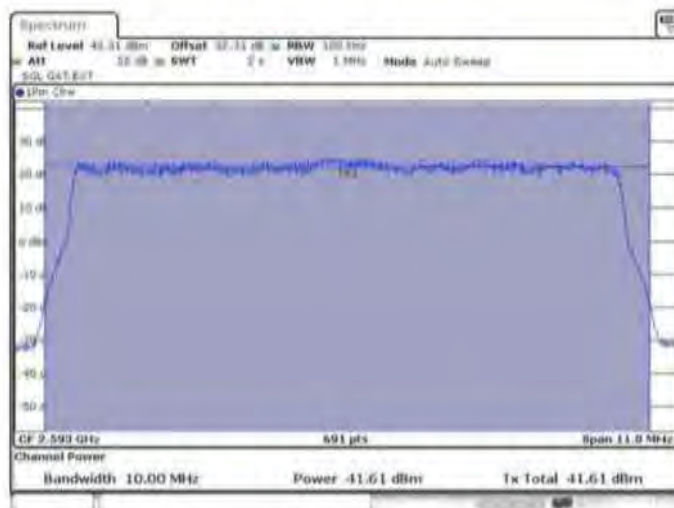
Figure 5 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)



Product Service

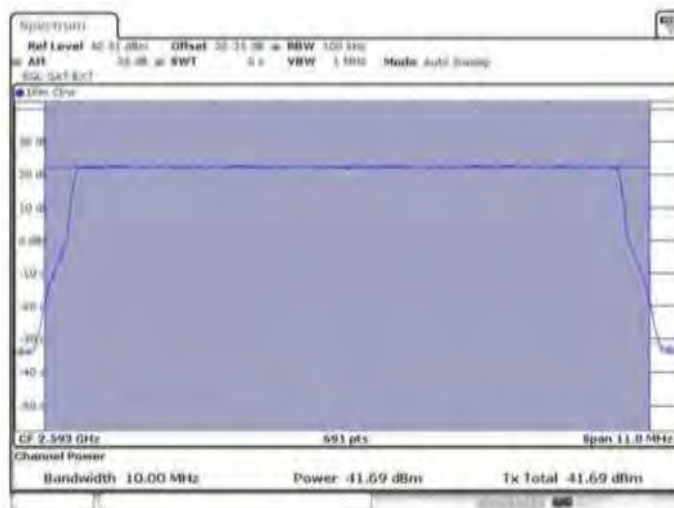
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Notes: 1720012013 0000000

Figure 6 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)



Notes: 1720012013 0000000

Figure 7 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 37 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A ANT2:

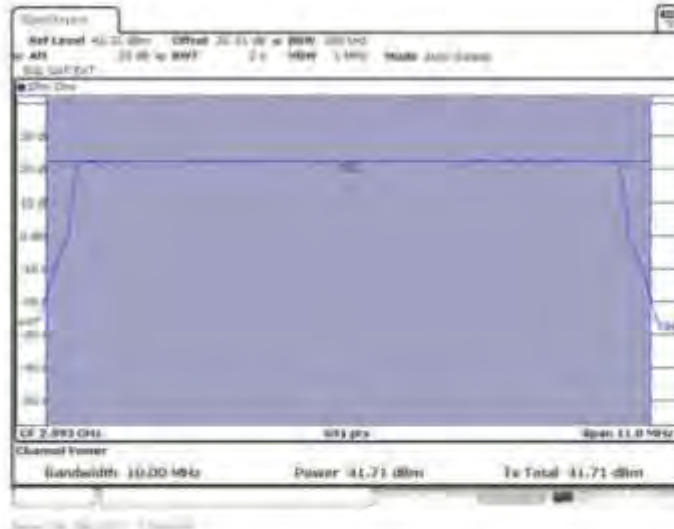


Figure 8 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

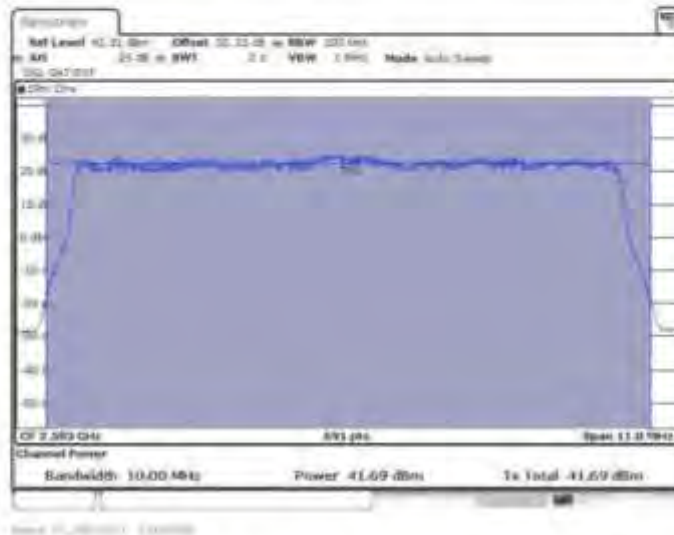


Figure 9 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 38 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

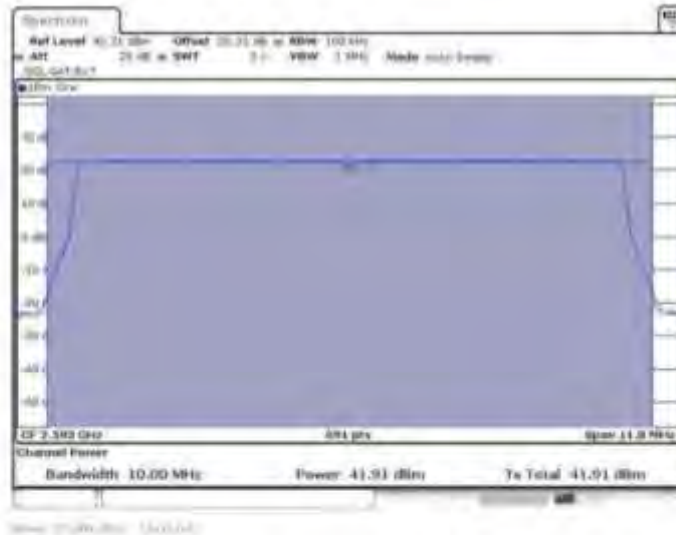


Figure 10 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT3:

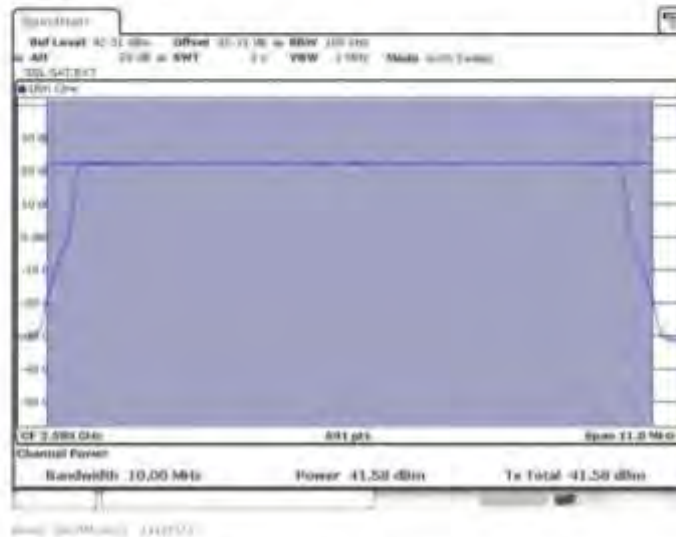


Figure 11 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

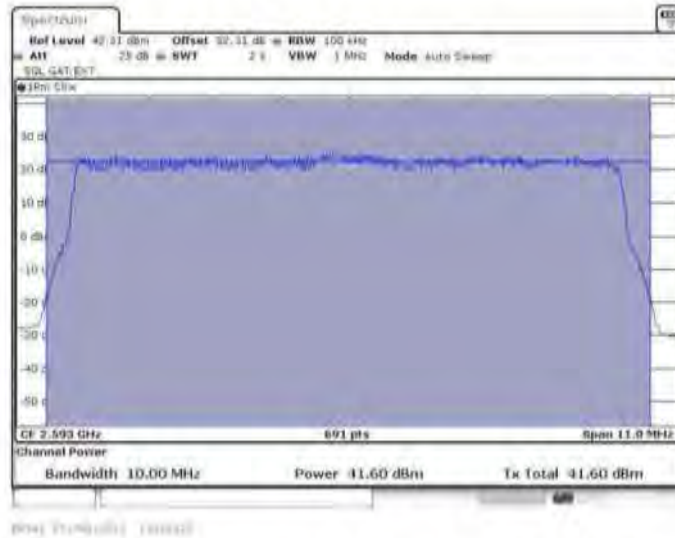


Figure 12 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)

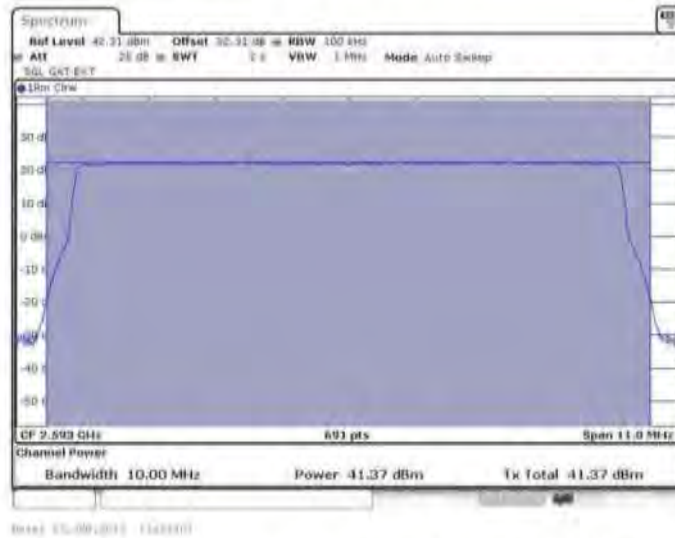


Figure 13 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 40 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A ANT4:

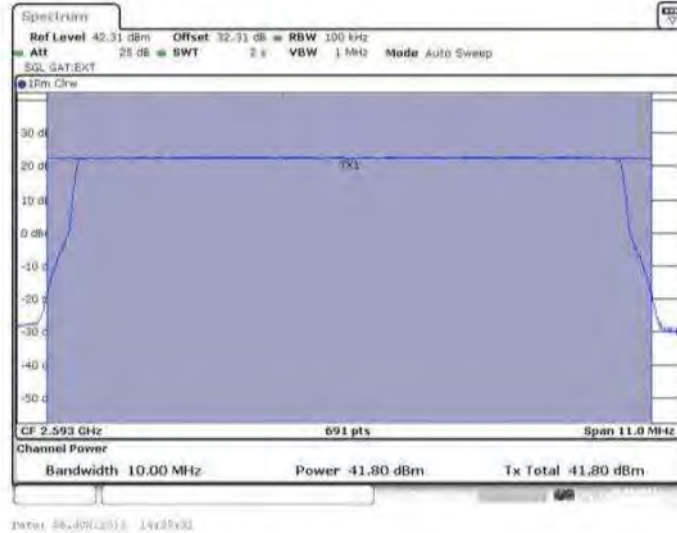


Figure 14 RF Power Output – QPSK (2593.0 MHz) (10MHz Channel BW)

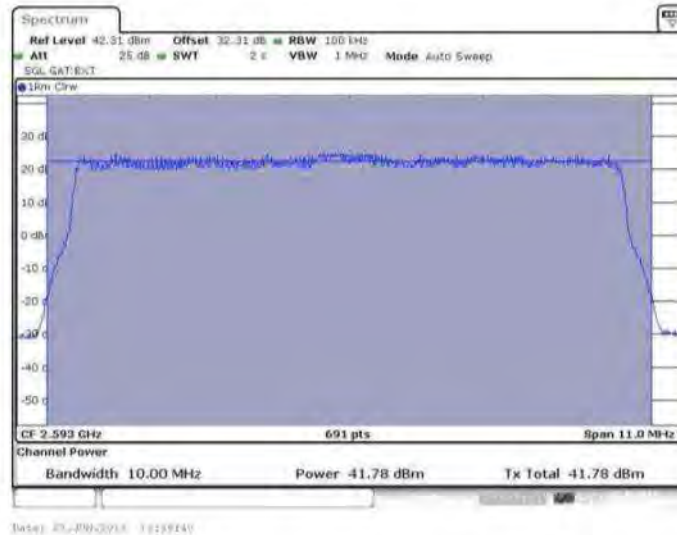


Figure 15 RF Power Output – 16QAM (2593.0 MHz) (10MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

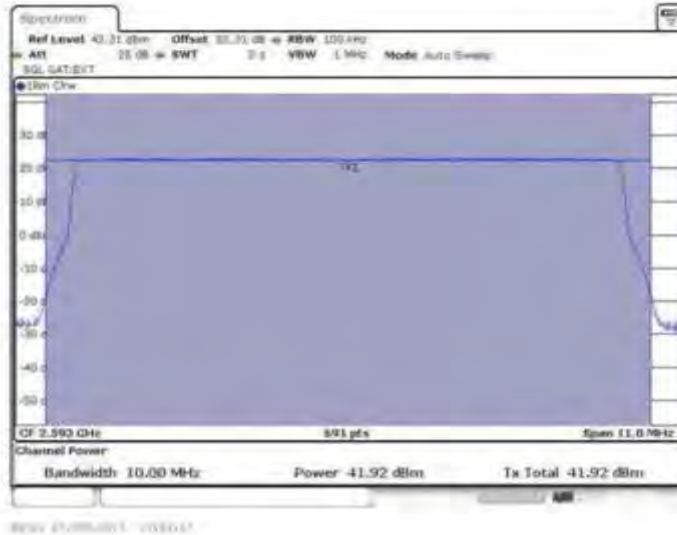


Figure 16 RF Power Output – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config B ANT1:

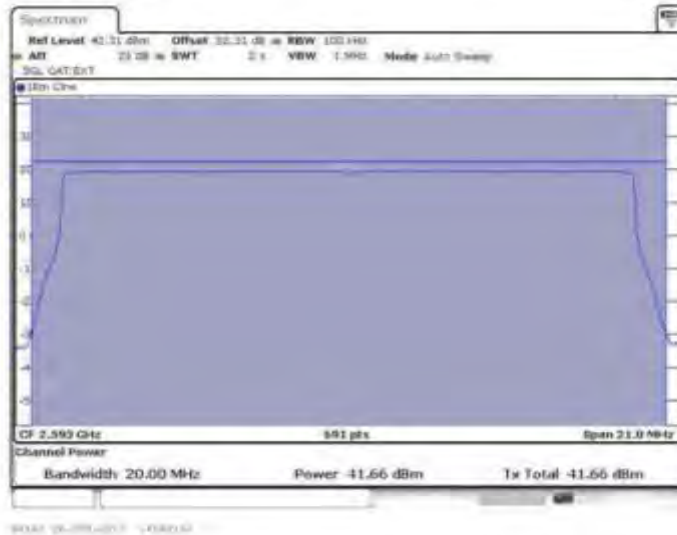


Figure 17 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

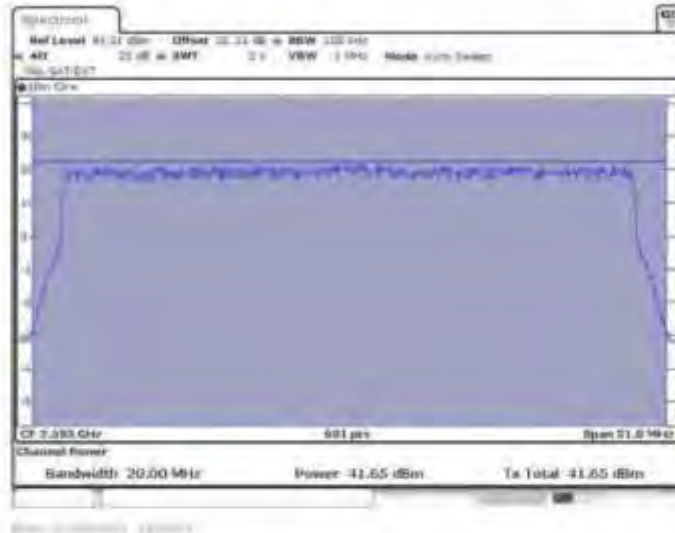


Figure 18 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

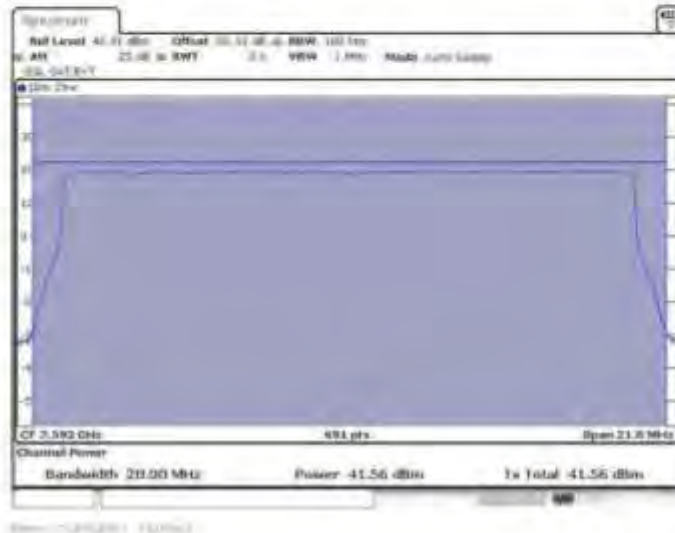


Figure 19 RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 43 of 113



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B ANT2:

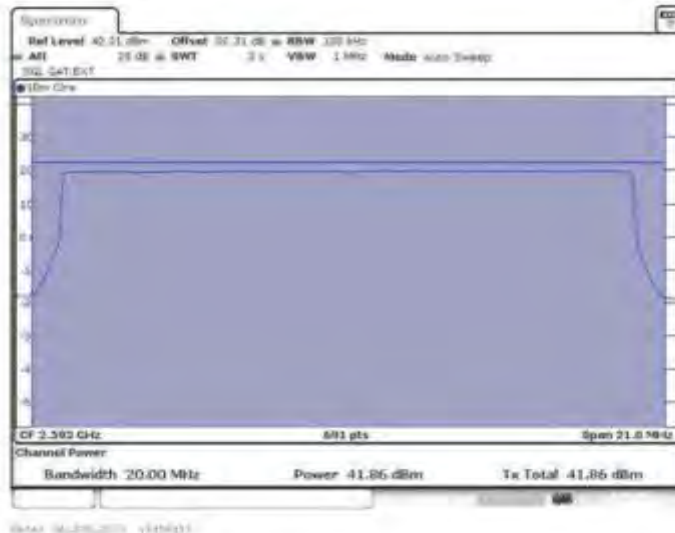


Figure 20 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

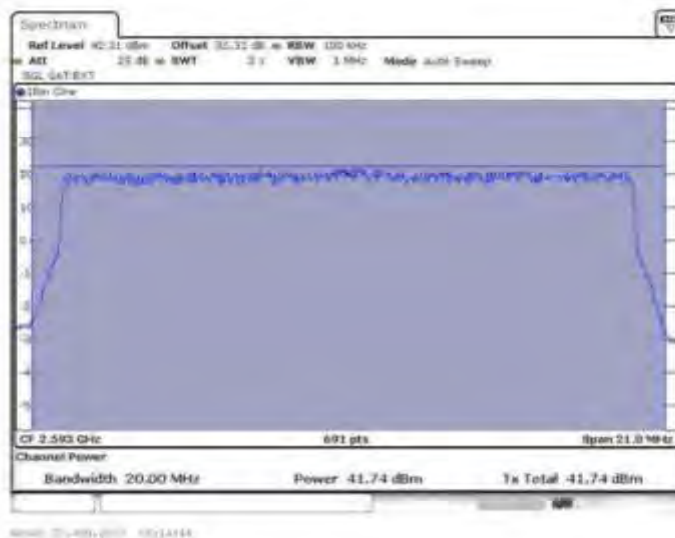


Figure 21 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

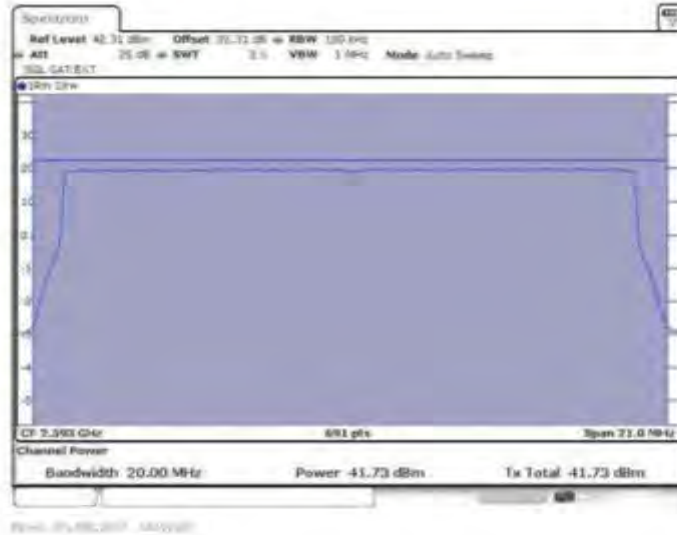


Figure 22 RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT3:

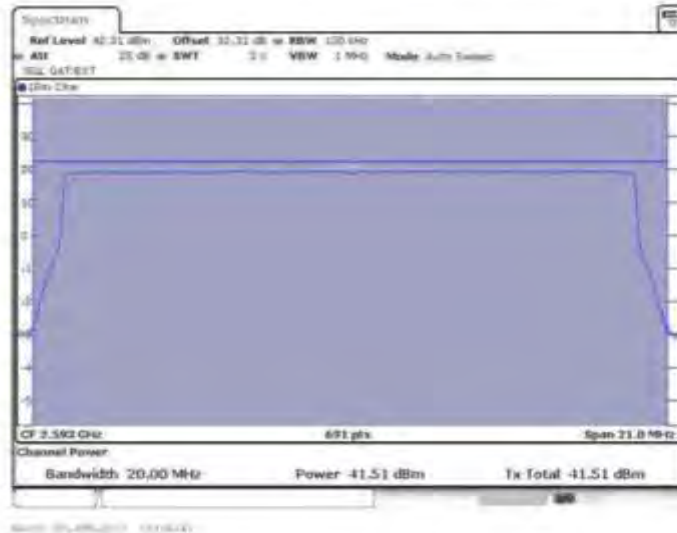


Figure 23 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)



Product Service

FCC ID:
VBNFZHE-01

Test Report No:
D496476672

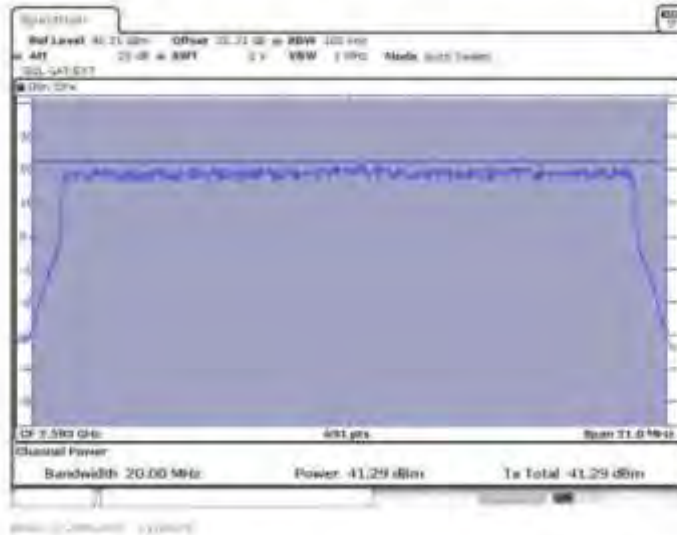


Figure 24 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)

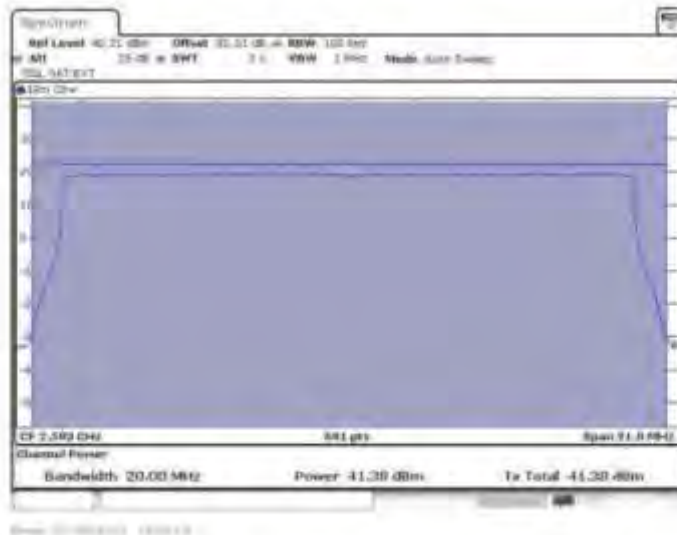


Figure 25 RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 46 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B ANT4:

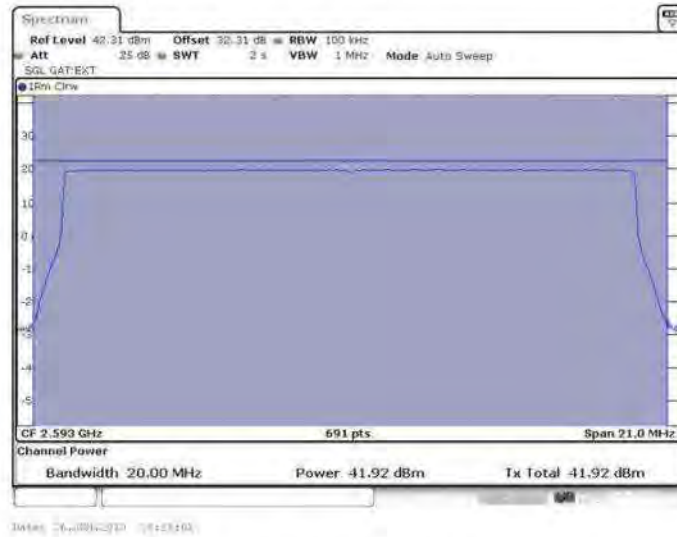


Figure 26 RF Power Output – QPSK (2593.0 MHz) (20MHz Channel BW)

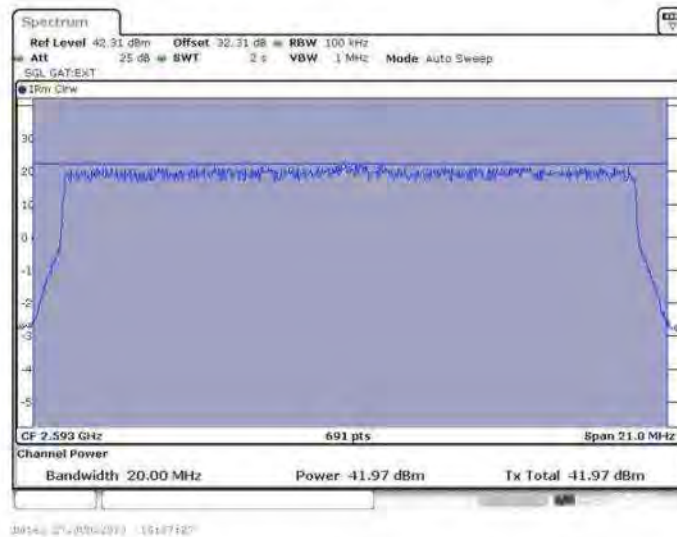


Figure 27 RF Power Output – 16QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

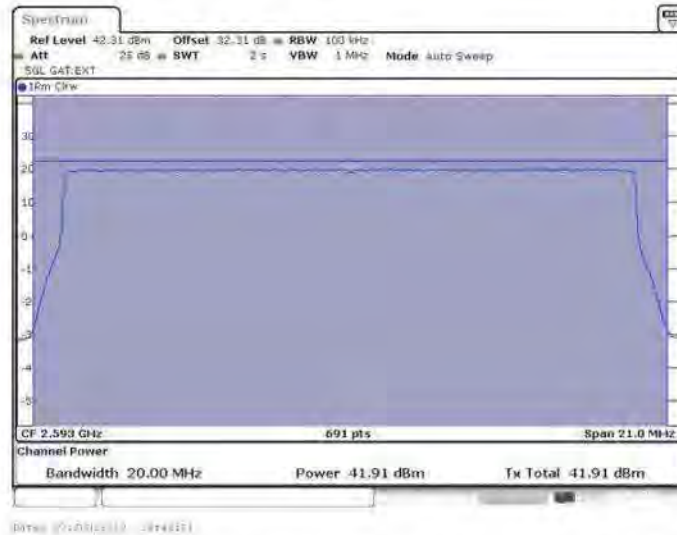


Figure 28RF Power Output – 64QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

5.2.2. Test No. 2: Modulation Characteristics

No additional measurements are required for the modulation characteristics. Please refer to test no. 3, occupied bandwidth on pages 13.



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

5.2.3. Test No. 3: Occupied Bandwidth

The value 'OBW' is the measured occupied bandwidth.

Config A ANT1:

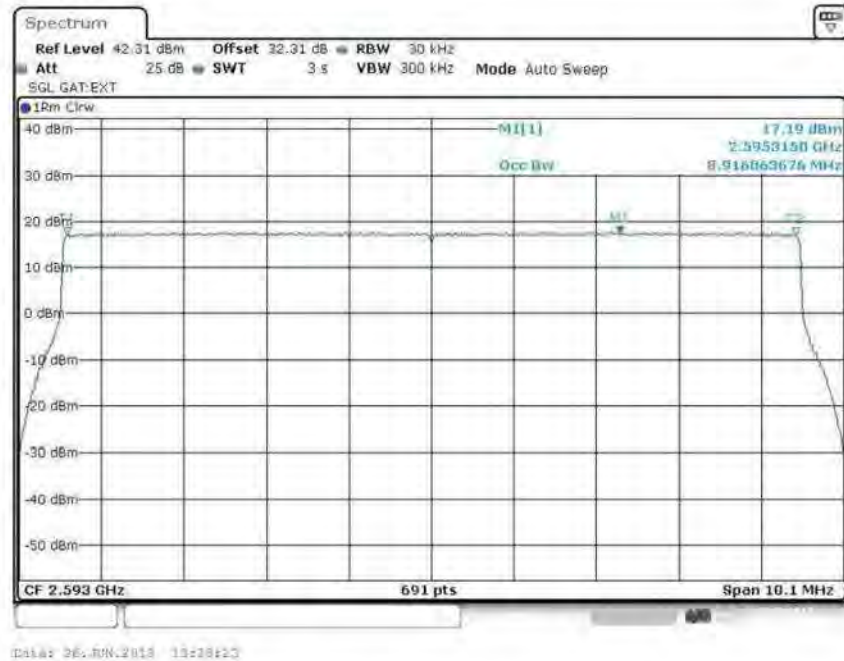


Figure 29 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

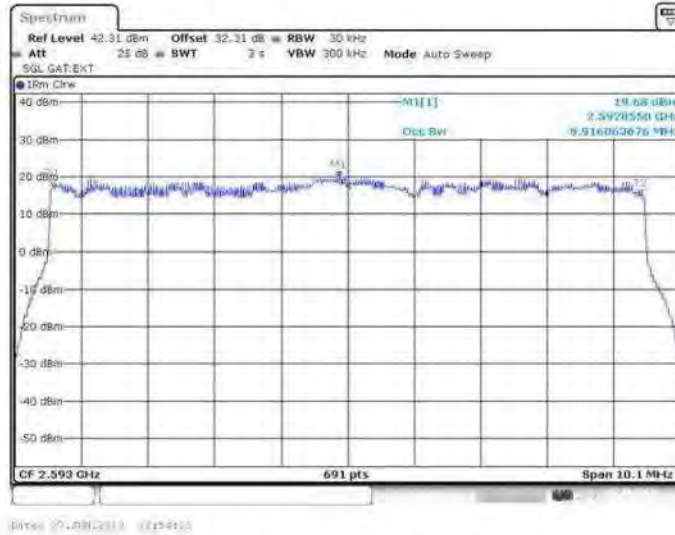


Figure 30 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

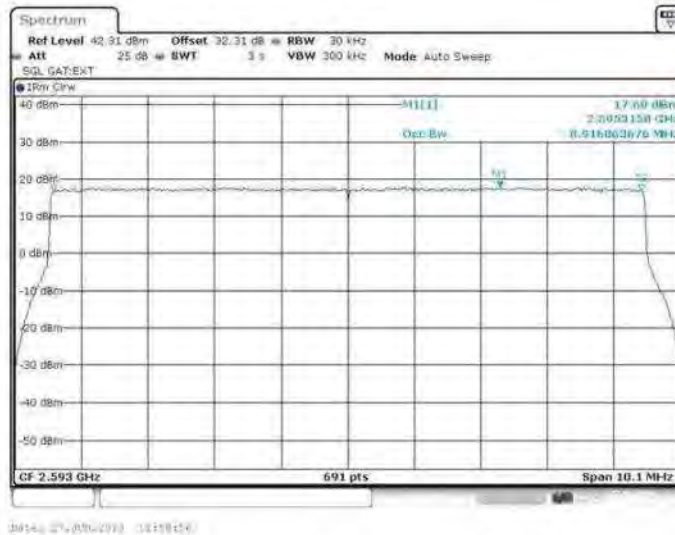


Figure 31 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 51 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A ANT2:

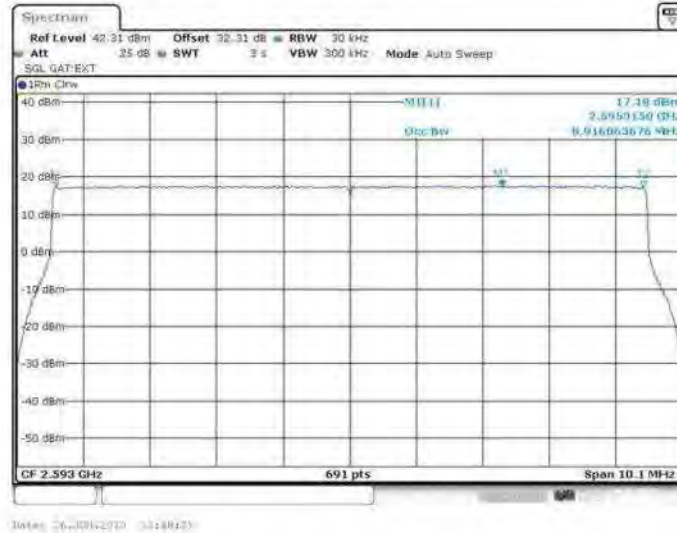


Figure 32 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

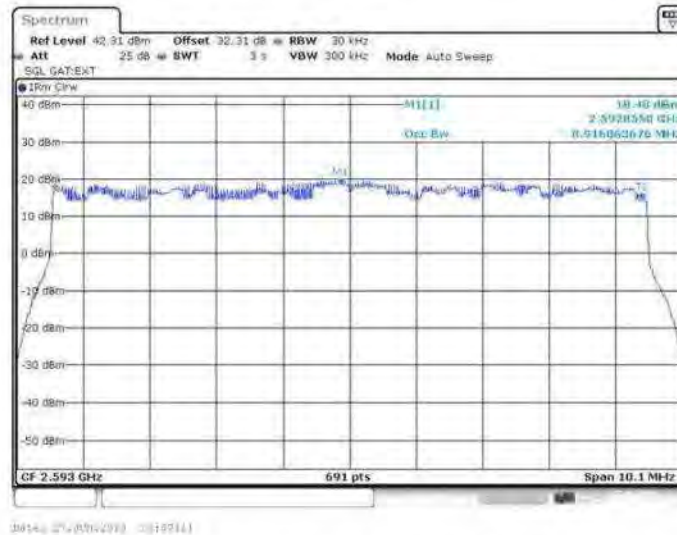


Figure 33 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

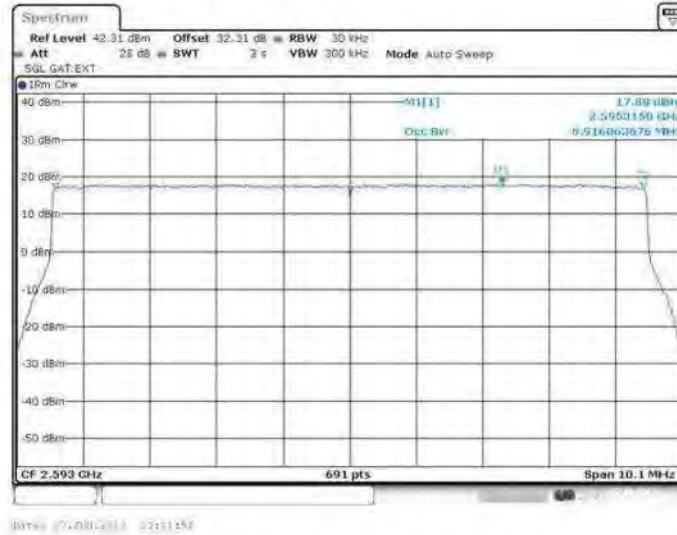


Figure 34 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT3:

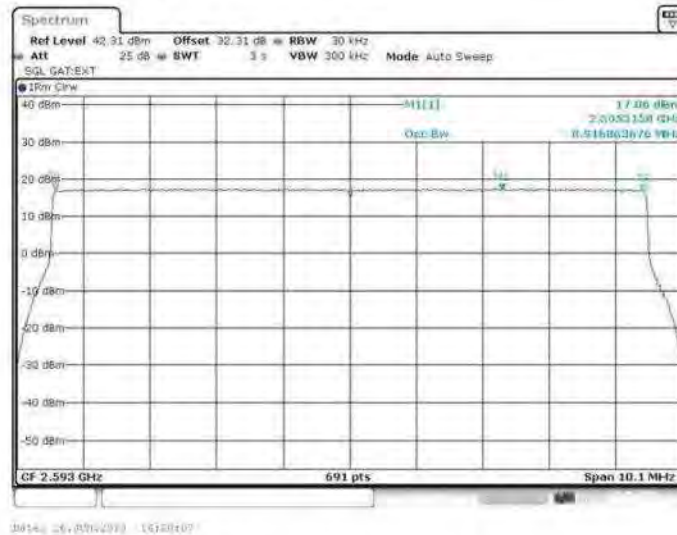


Figure 35 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 53 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

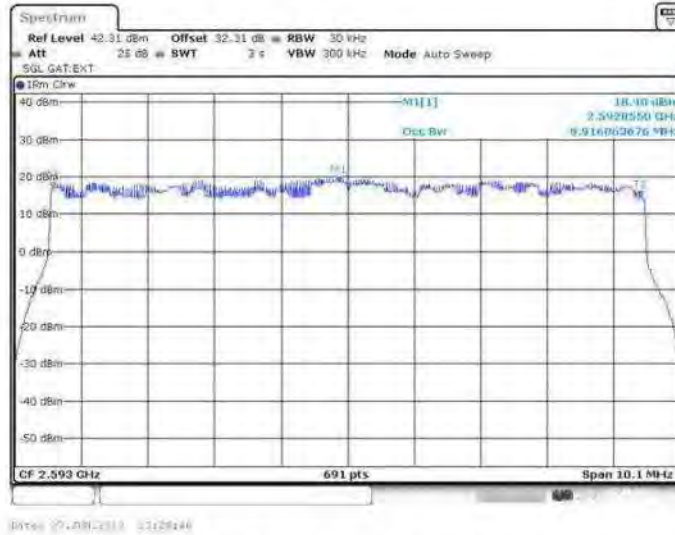


Figure 36 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)

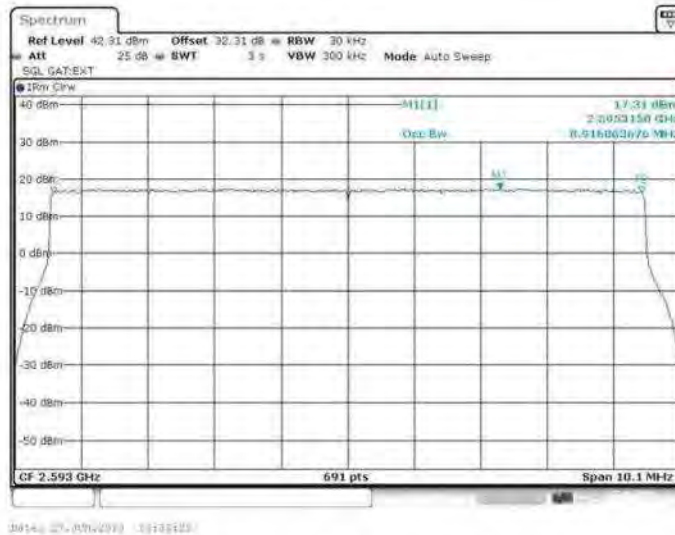


Figure 37 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 54 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config A ANT4:

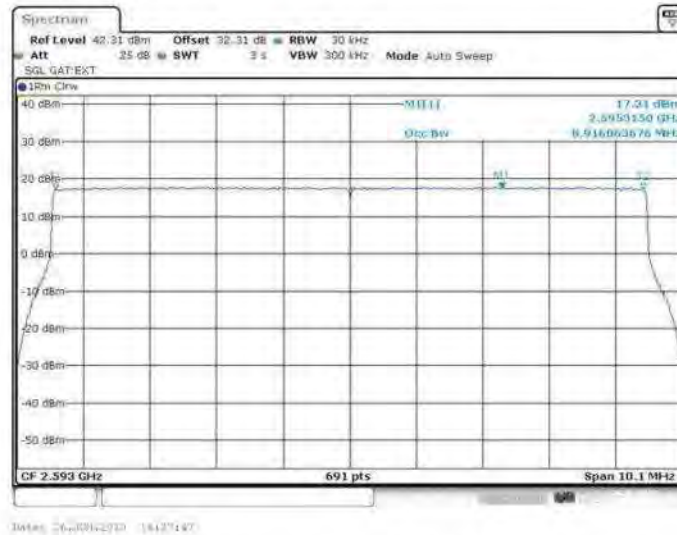


Figure 38 Occupied Bandwidth – QPSK (2593.0 MHz) (10MHz Channel BW)

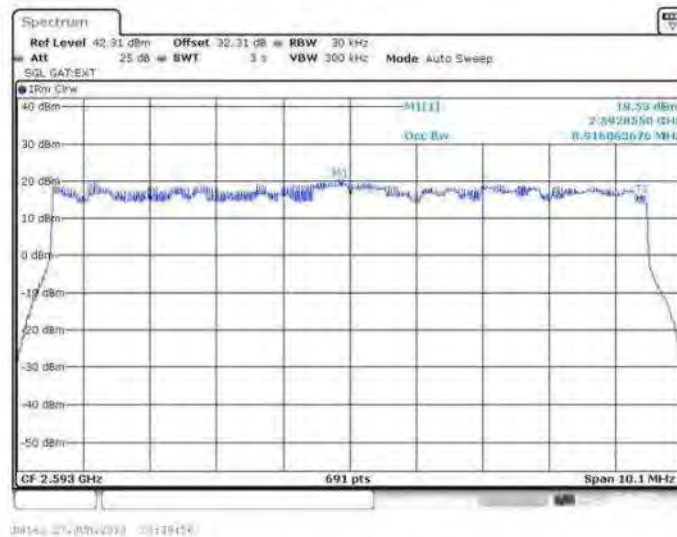


Figure 39 Occupied Bandwidth – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

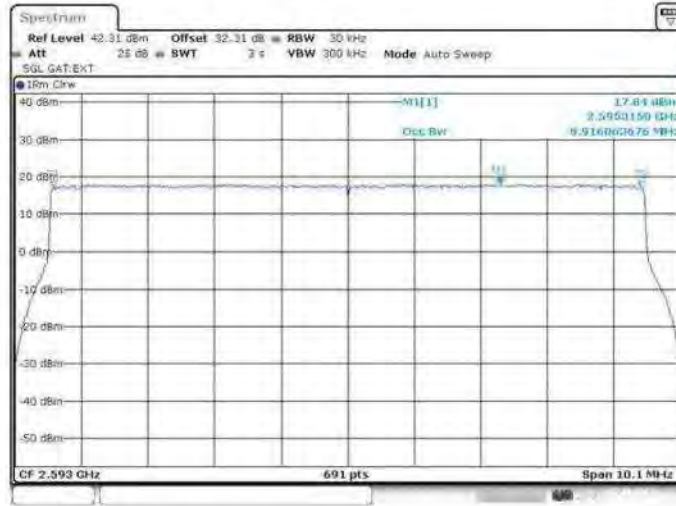


Figure 40 Occupied Bandwidth – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config B ANT1:

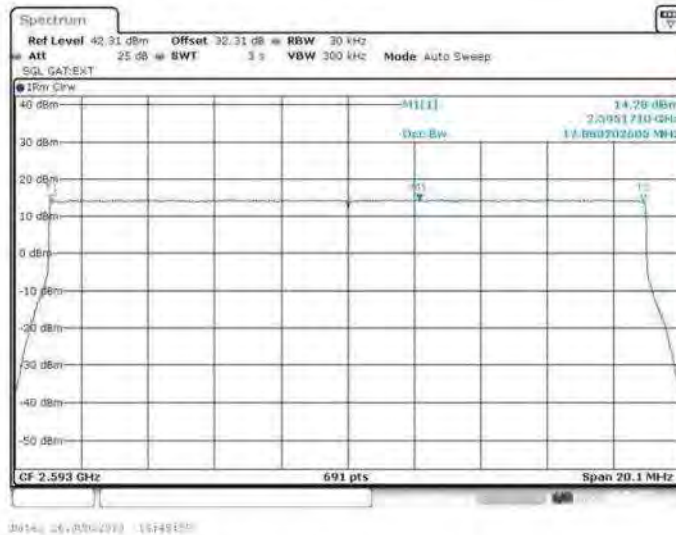


Figure 41 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

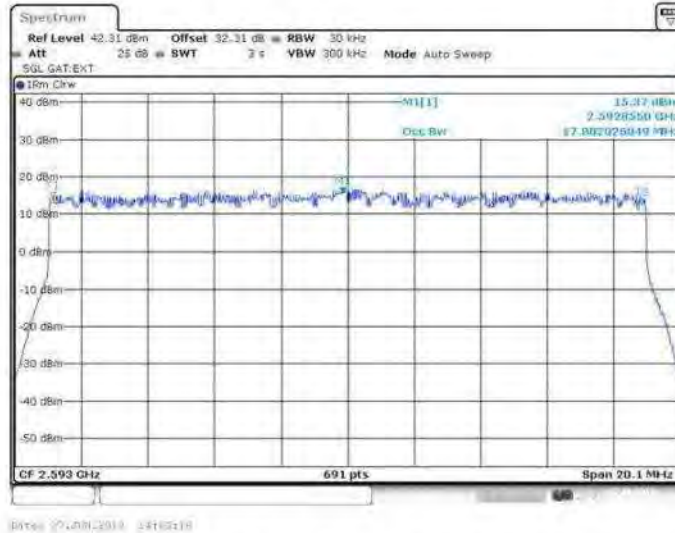


Figure 42 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

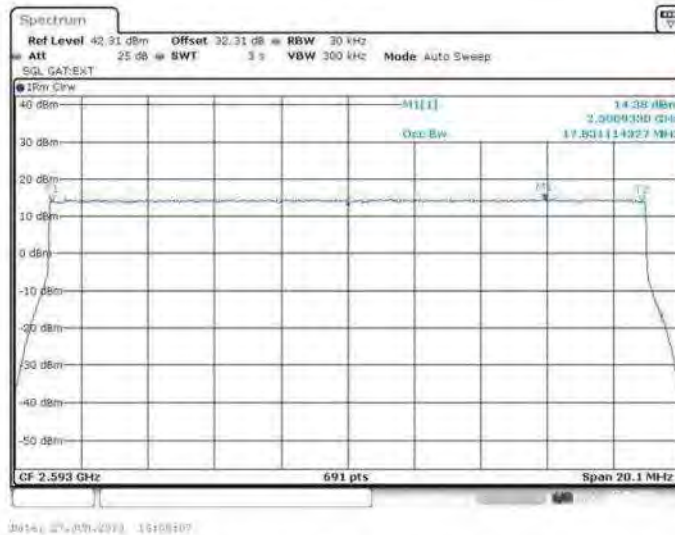


Figure 43 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 57 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B ANT2:

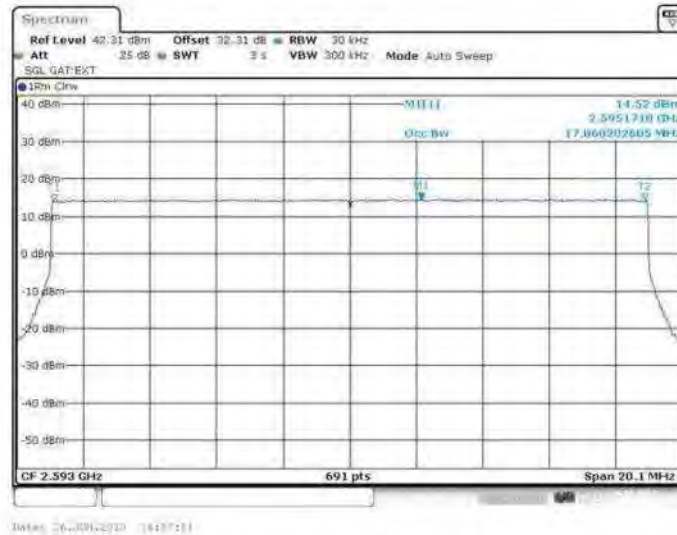


Figure 44 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

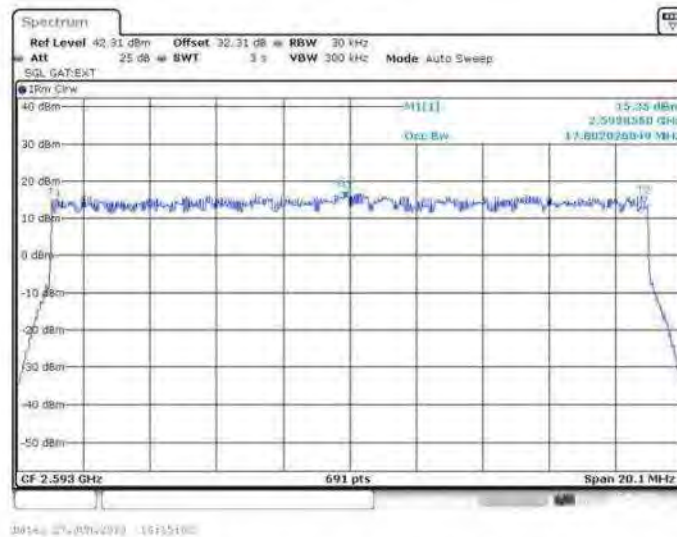


Figure 45 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

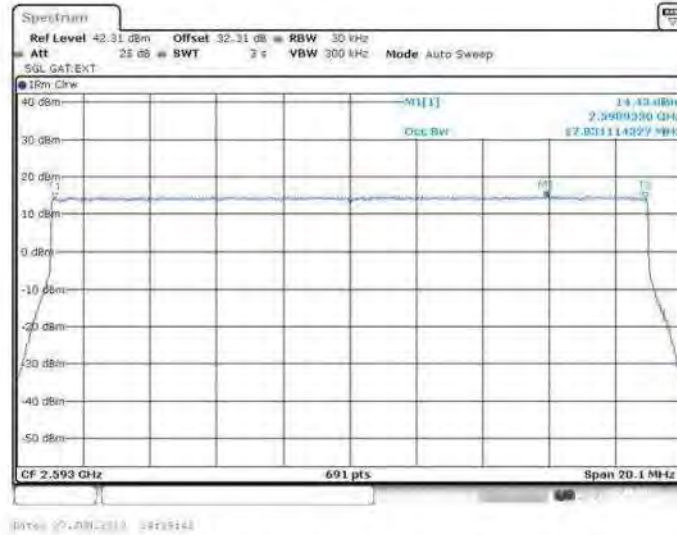


Figure 46 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT3:

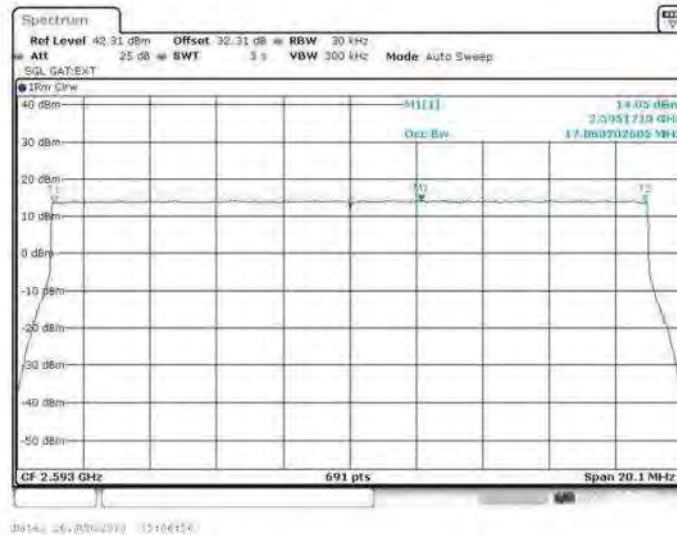


Figure 47 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

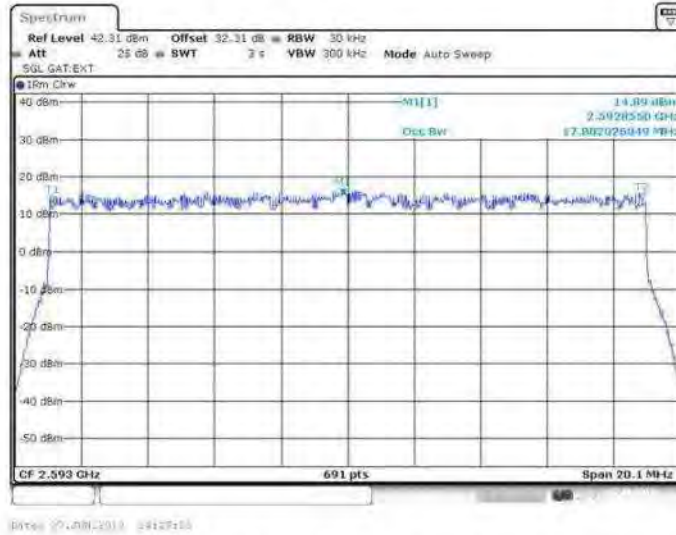


Figure 48 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)

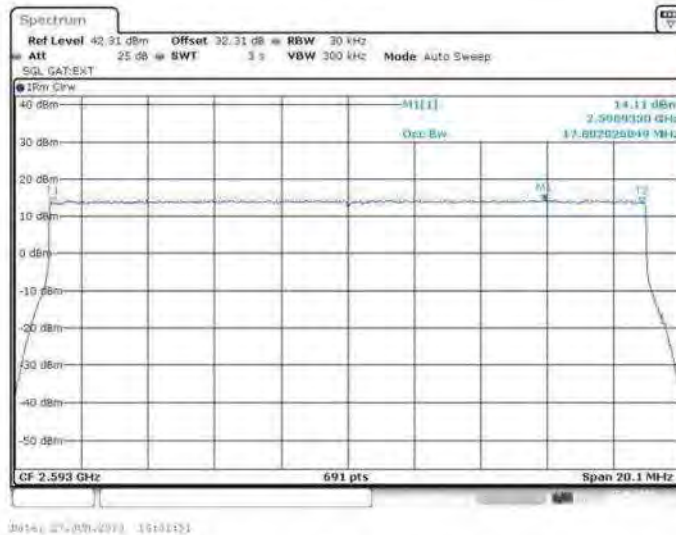


Figure 49 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)

FCC Part 27, subpart M

9 July 2013
Page 60 of 113



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

Config B ANT4:

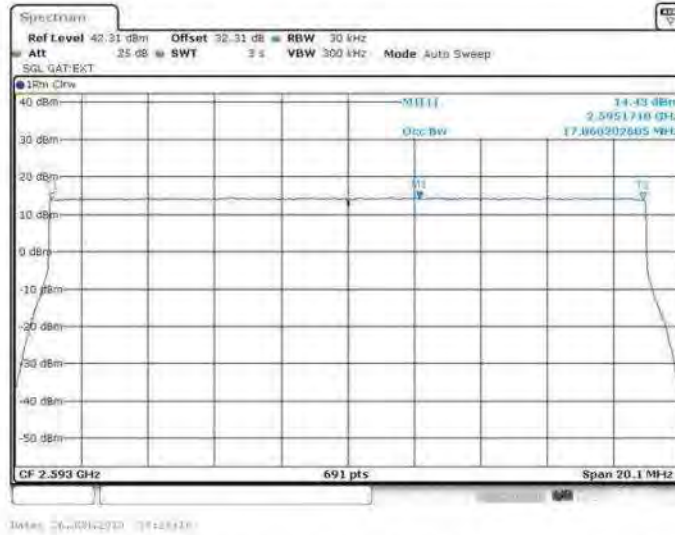


Figure 50 Occupied Bandwidth – QPSK (2593.0 MHz) (20MHz Channel BW)

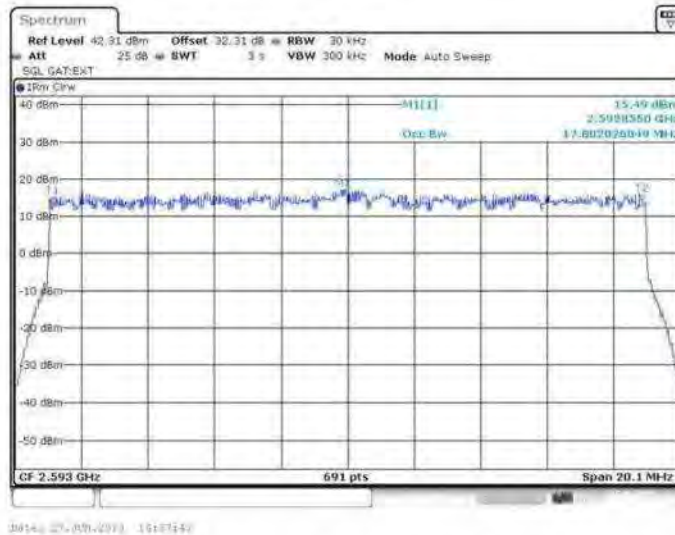


Figure 51 Occupied Bandwidth – 16QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

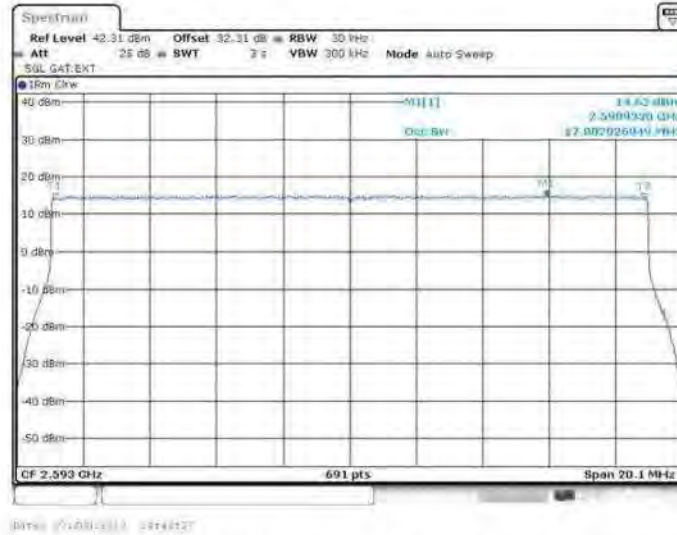


Figure 52 Occupied Bandwidth – 64QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

5.2.4. Test No. 4: Spurious Emissions at the Antenna Terminals

The external attenuation (cable loss of the setup) can be seen as the 'Offset' value in the screenshots. The external attenuation is frequency dependant. Thus the various 'Offset' values in the screenshots may differ.

Config A ANT1:

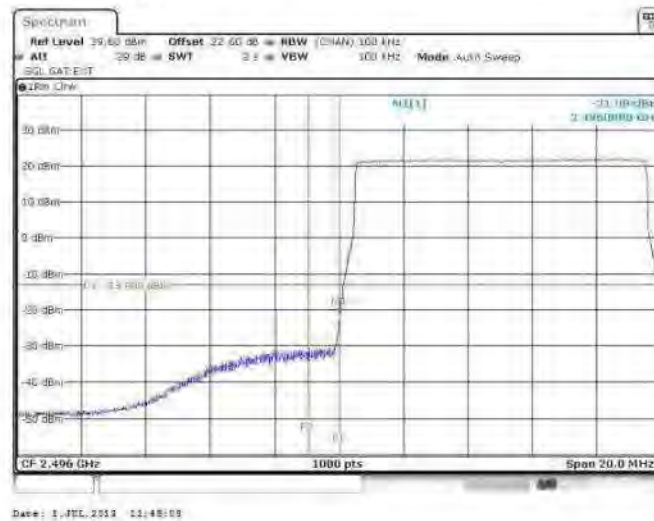


Figure 53 Spurious Emissions (Lower Band Edge) – QPSK (2501.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 54 Spurious Emissions (Upper Band Edge) – QPSK (2685.0 MHz) (10MHz Channel BW)

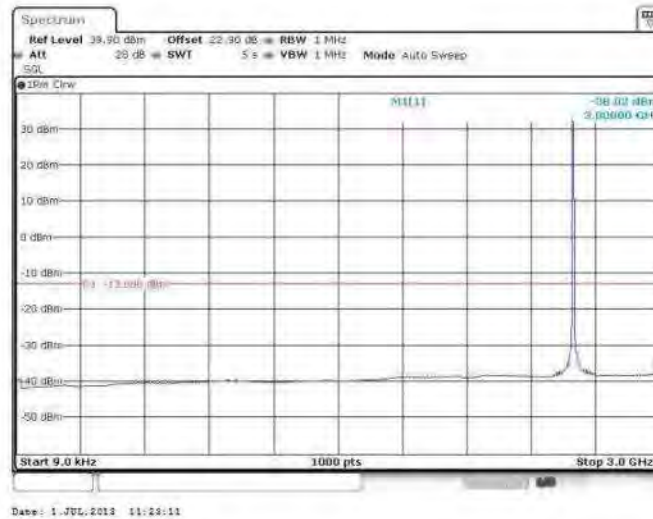


Figure 55 Figure 5 27: Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

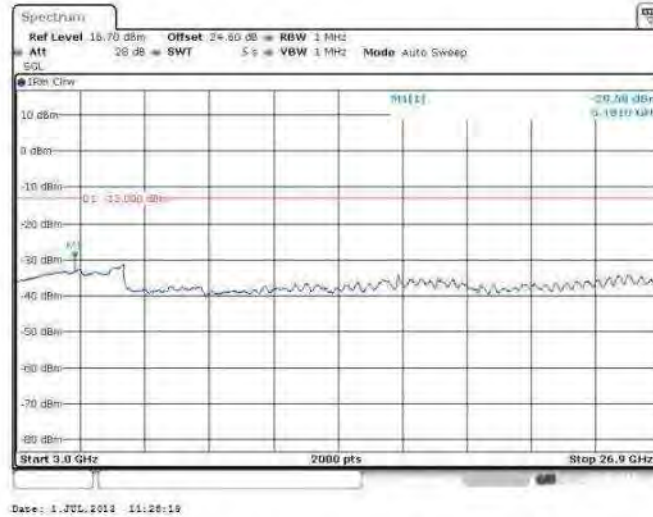


Figure 56 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(10MHz Channel BW)

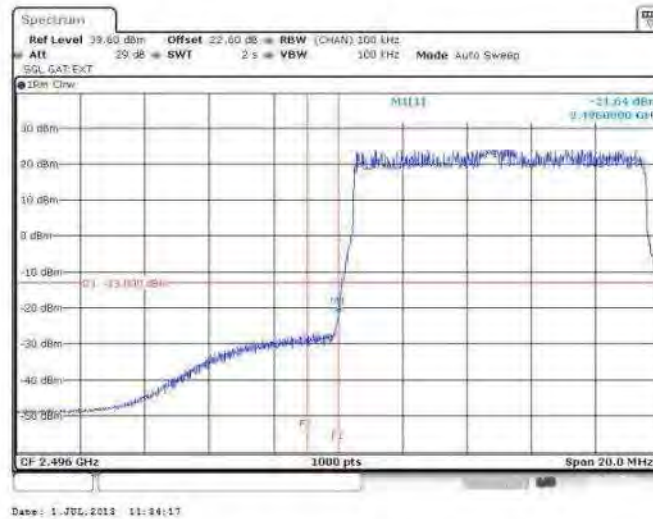


Figure 57 Spurious Emissions (Lower Band Edge) – 16QAM (2501.0 MHz)
(10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

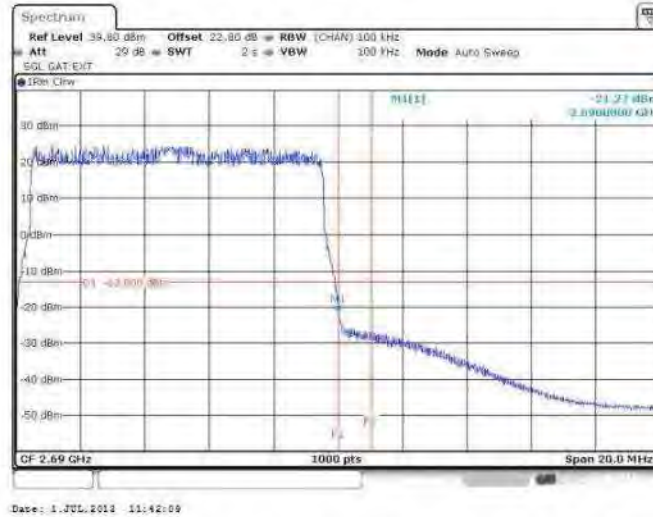


Figure 58 Spurious Emissions (Upper Band Edge) – 16QAM (2685.0 MHz) (10MHz Channel BW)

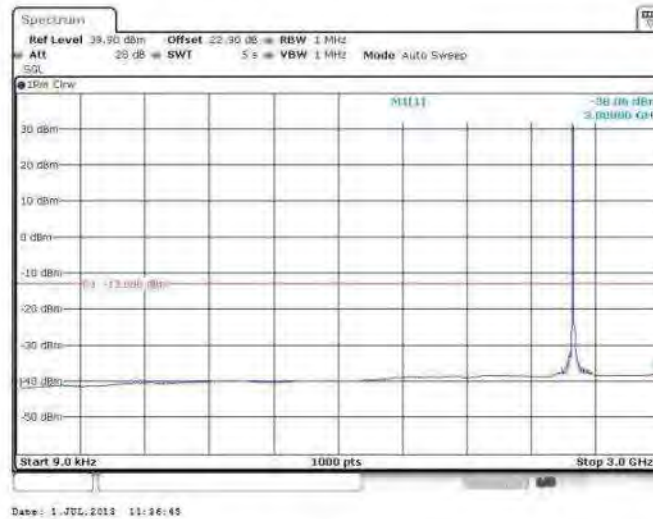


Figure 59 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

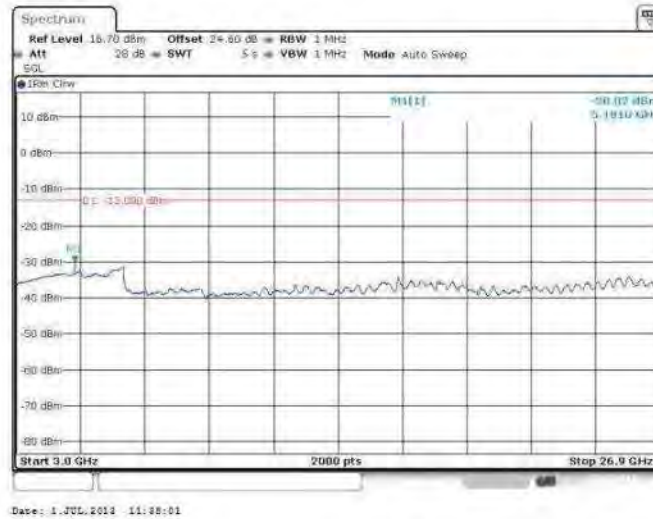


Figure 60 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)



Figure 61 Spurious Emissions (Lower Band Edge) – 64QAM (2501.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

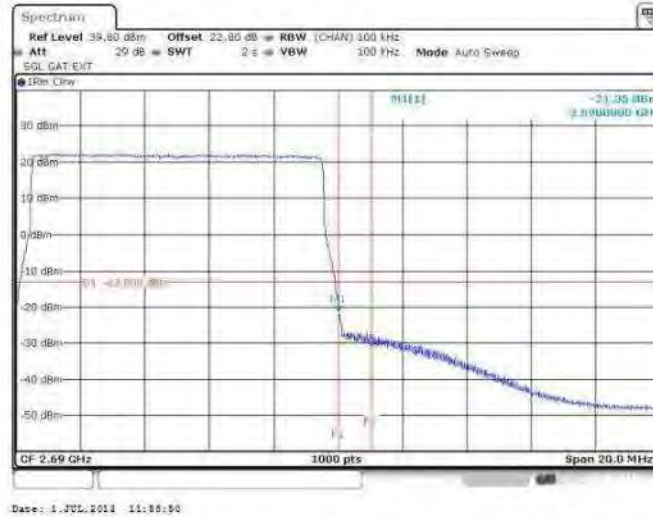


Figure 62 Spurious Emissions (Upper Band Edge) – 64QAM (2685.0 MHz) (10MHz Channel BW)

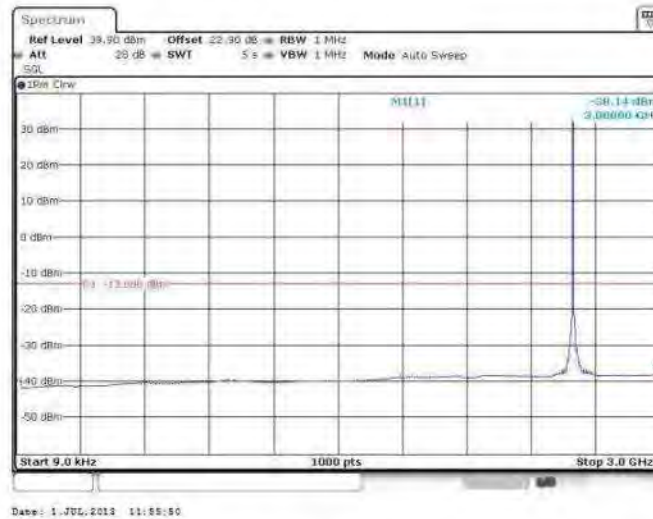


Figure 63 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

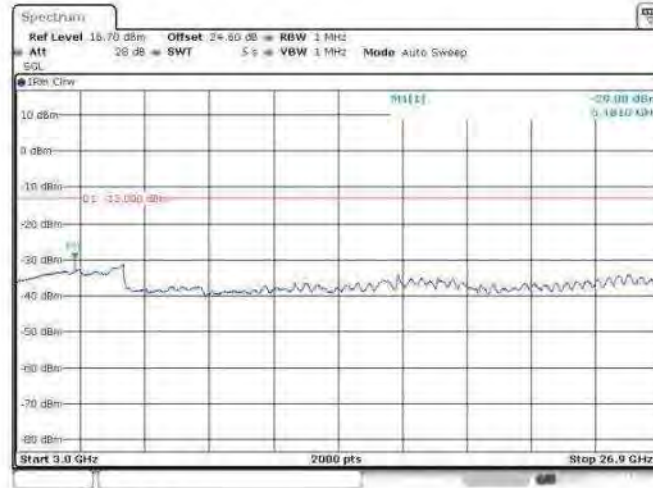


Figure 64 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz) (10MHz Channel BW)

Config A ANT2:



Figure 65 Spurious Emissions (Lower Band Edge) – QPSK (2501.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 66 Spurious Emissions (Upper Band Edge) – QPSK (2685.0 MHz) (10MHz Channel BW)

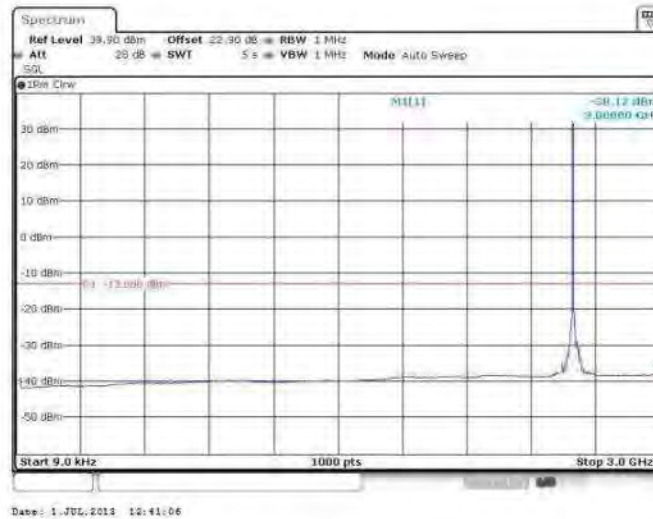


Figure 67 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

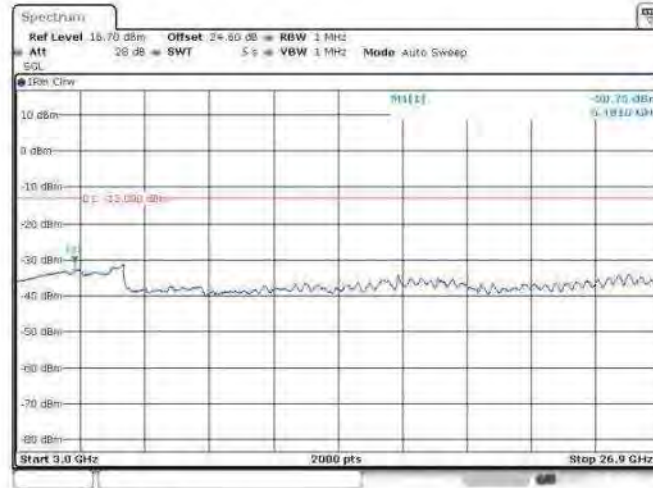


Figure 68 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz) (10MHz Channel BW)

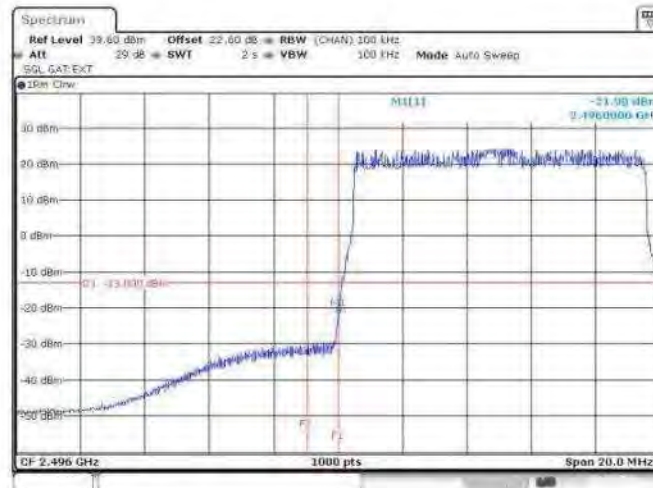
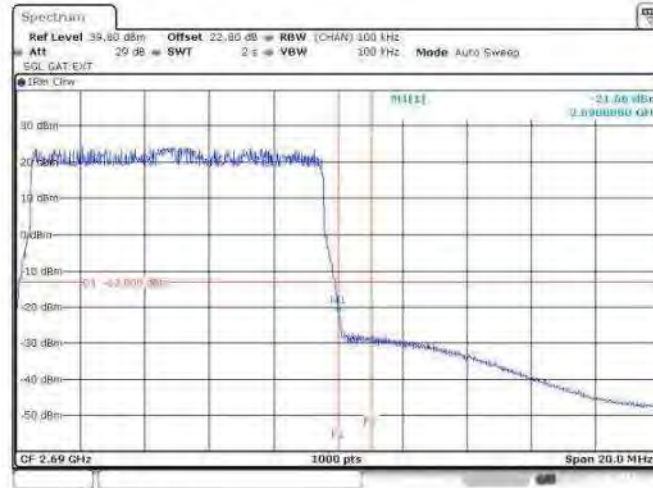


Figure 69 Spurious Emissions (Lower Band Edge) – 16QAM (2501.0 MHz) (10MHz Channel BW)



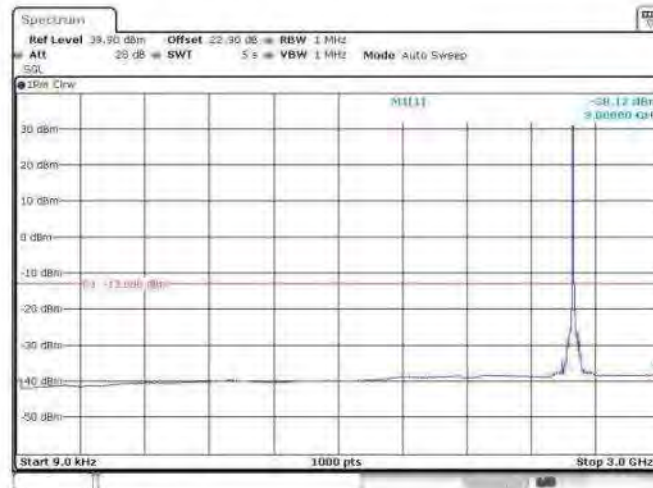
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2013 12:52:16

Figure 70 Spurious Emissions (Upper Band Edge) – 16QAM (2685.0 MHz) (10MHz Channel BW)



Date: 1 JUL 2013 12:49:19

Figure 71 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

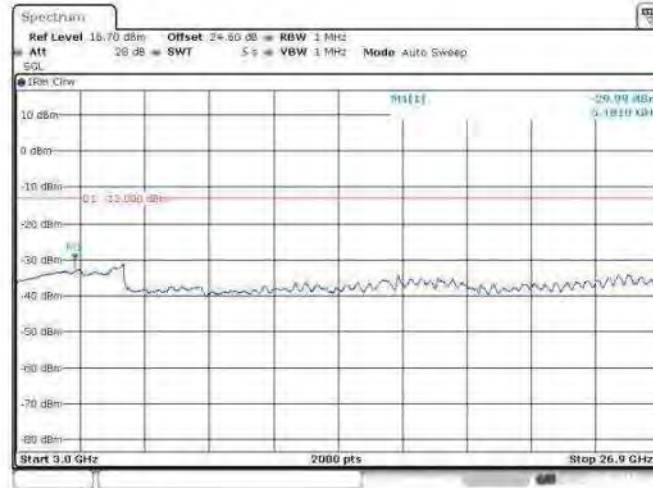


Figure 72 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)

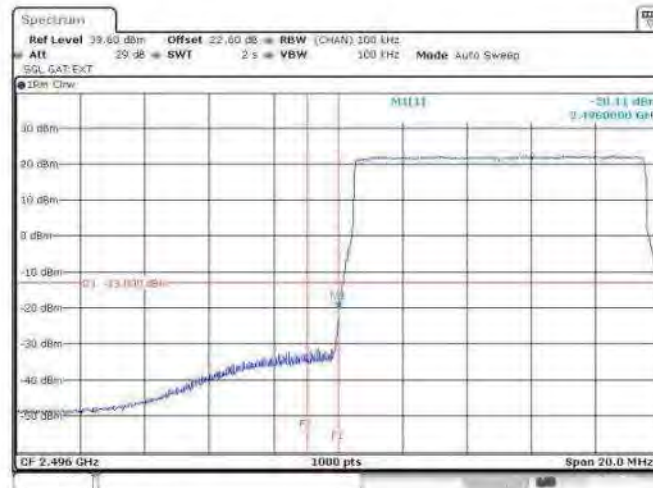


Figure 73 Spurious Emissions (Lower Band Edge) – 64QAM (2501.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

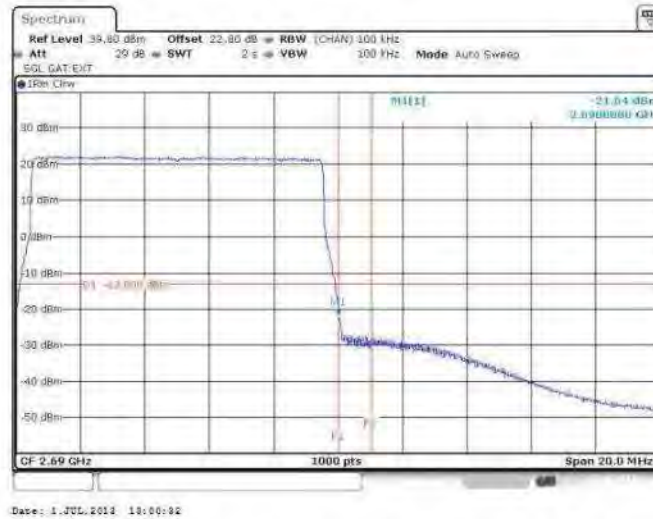


Figure 74 Spurious Emissions (Upper Band Edge) – 64QAM (2685.0 MHz) (10MHz Channel BW)

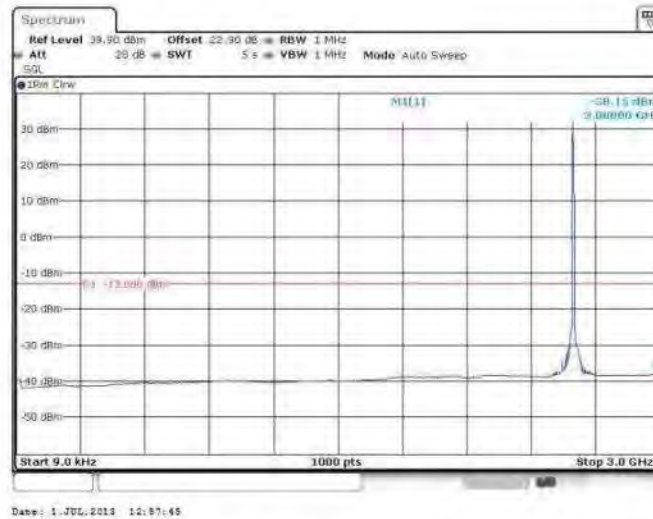
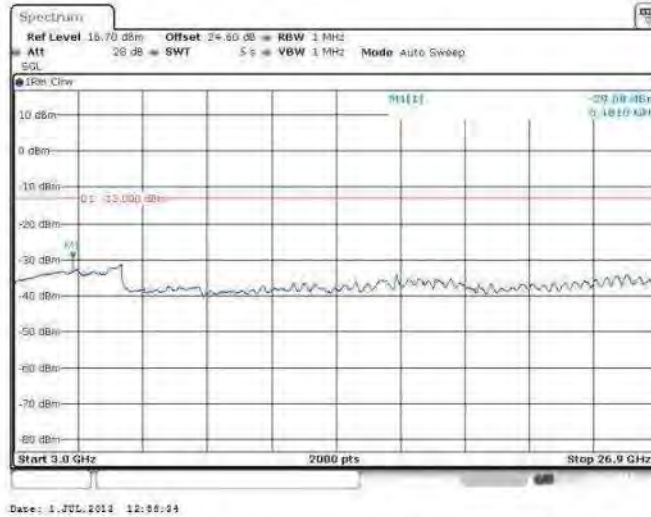


Figure 75 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz) (10MHz Channel BW)

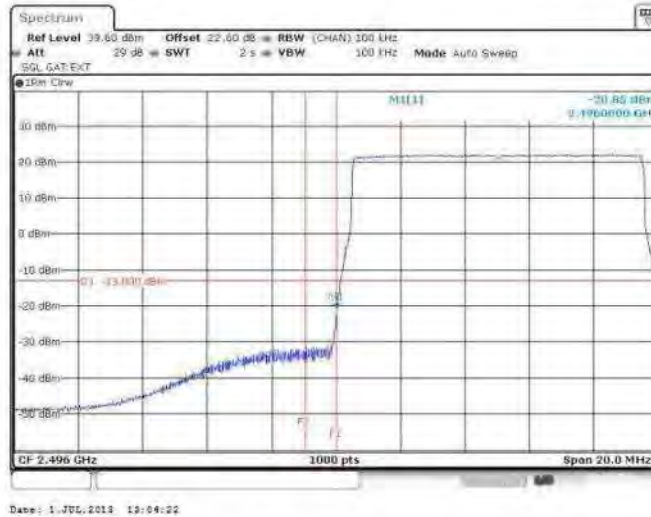


FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 76 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz)
(10MHz Channel BW)**
Config A ANT3:



**Figure 77 Spurious Emissions (Lower Band Edge) – QPSK (2501.0 MHz)
(10MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

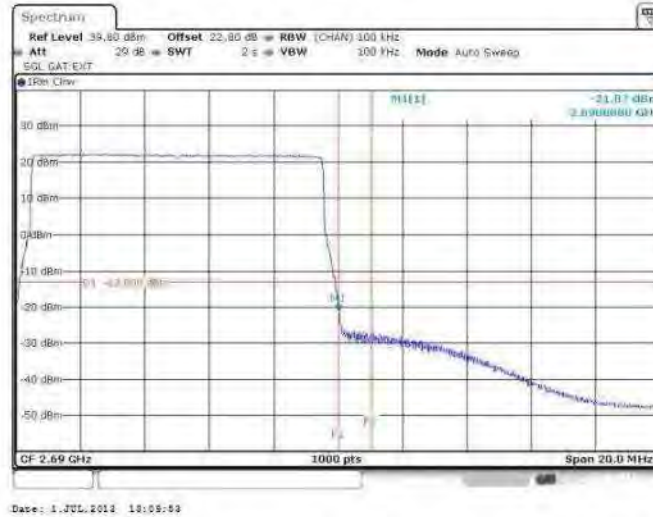


Figure 78 Spurious Emissions (Upper Band Edge) – QPSK (2685.0 MHz) (10MHz Channel BW)

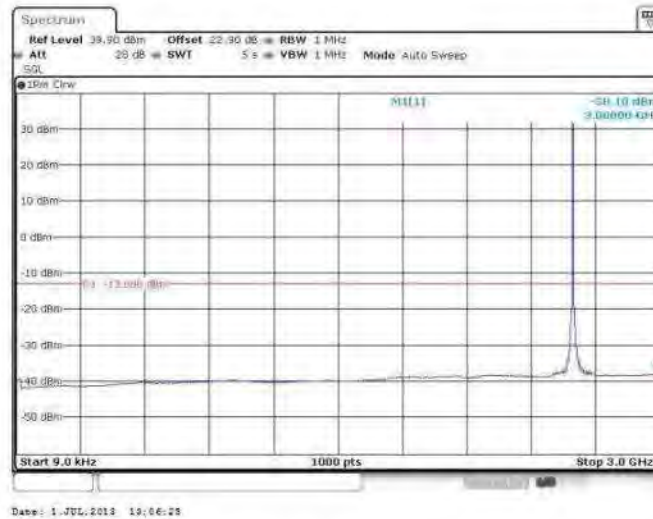


Figure 79 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

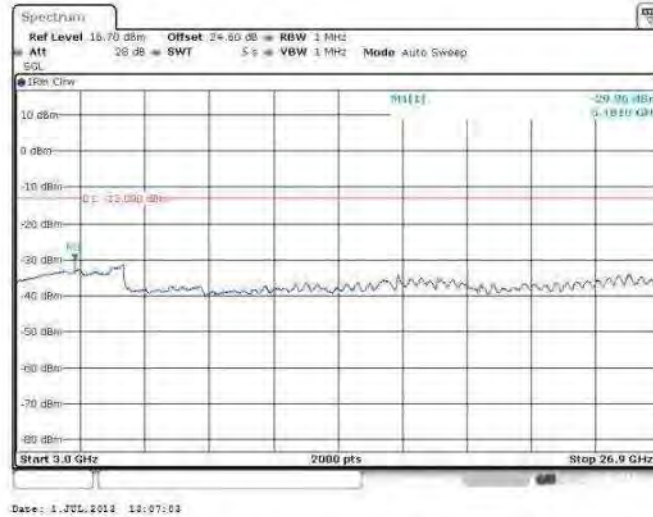


Figure 80 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(10MHz Channel BW)

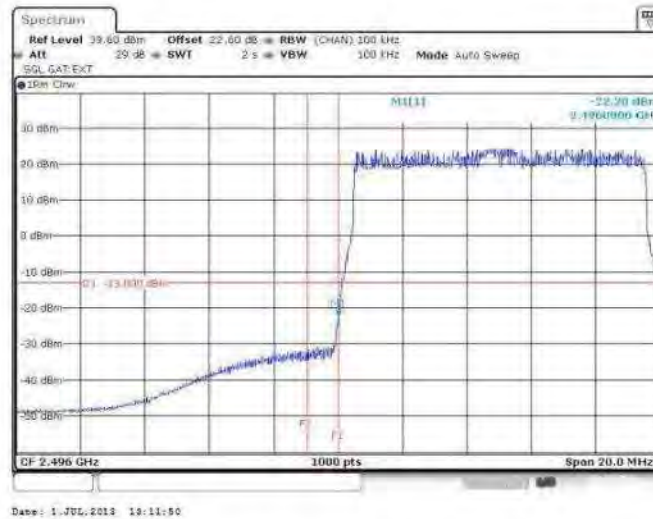


Figure 81 Spurious Emissions (Lower Band Edge) – 16QAM (2501.0 MHz)
(10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

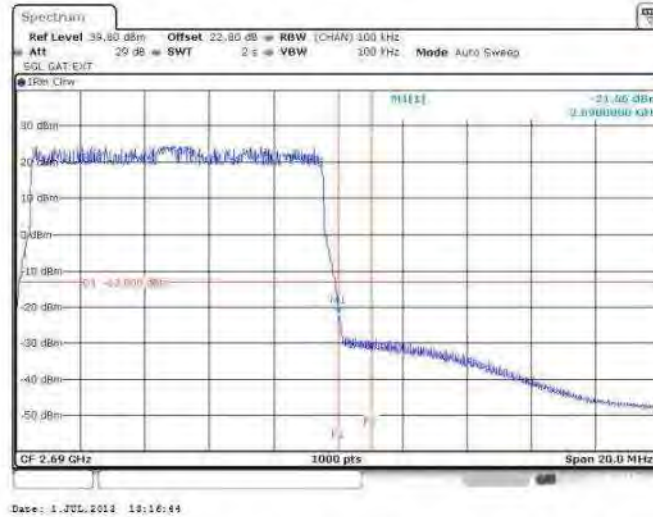


Figure 82 Spurious Emissions (Upper Band Edge) – 16QAM (2685.0 MHz) (10MHz Channel BW)

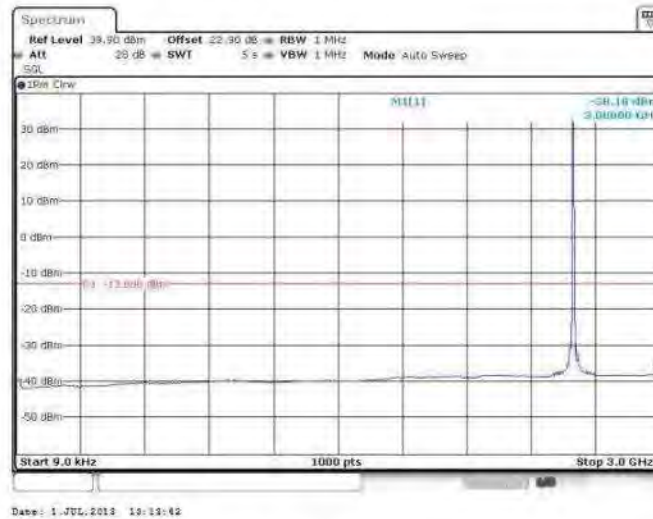


Figure 83 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

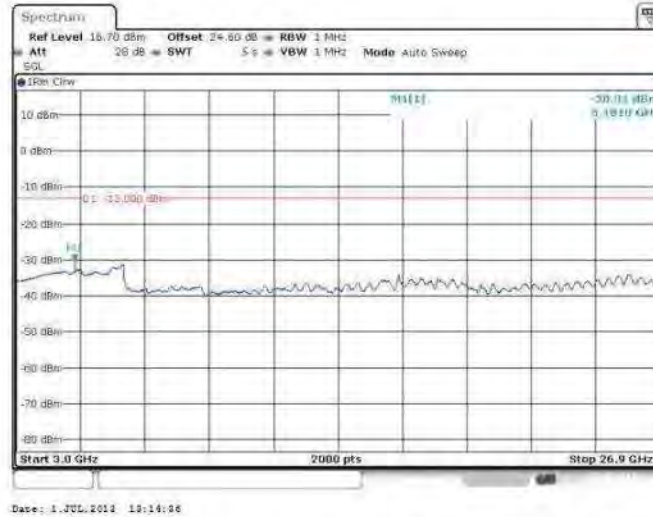


Figure 84 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)

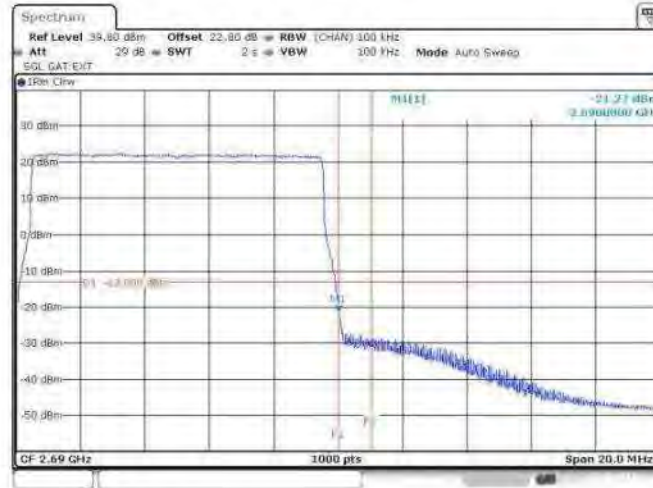


Figure 85 Spurious Emissions (Lower Band Edge) – 64QAM (2501.0 MHz) (10MHz Channel BW)



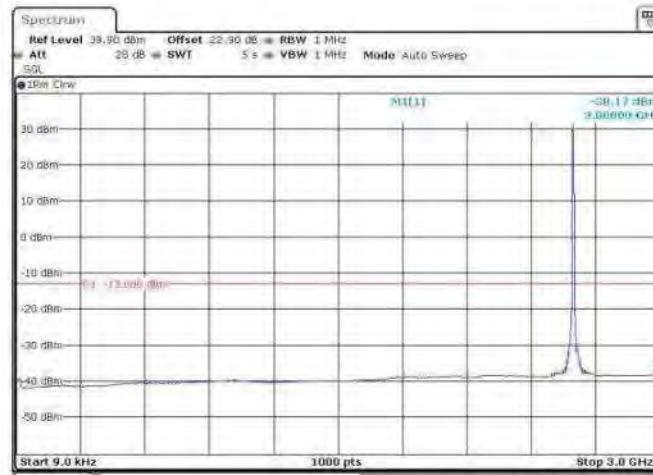
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2012 18:24:10

Figure 86 Spurious Emissions (Upper Band Edge) – 64QAM (2685.0 MHz) (10MHz Channel BW)



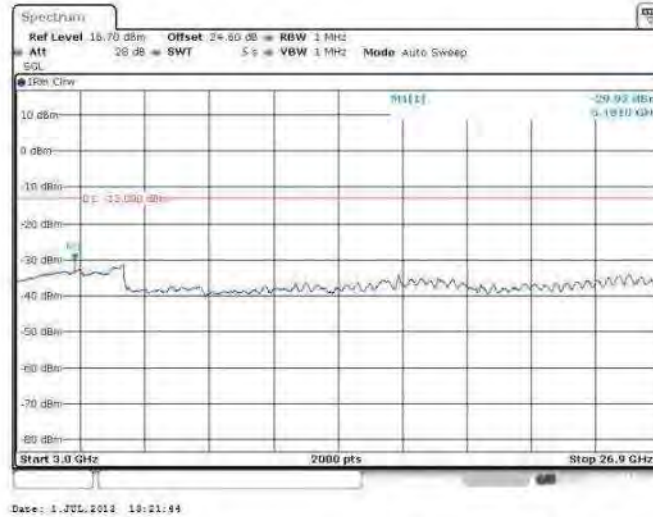
Date: 1 JUL 2013 19:20:55

Figure 87 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 88 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz)
(10MHz Channel BW)**
Config A ANT4:



**Figure 89 Spurious Emissions (Lower Band Edge) – QPSK (2501.0 MHz)
(10MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

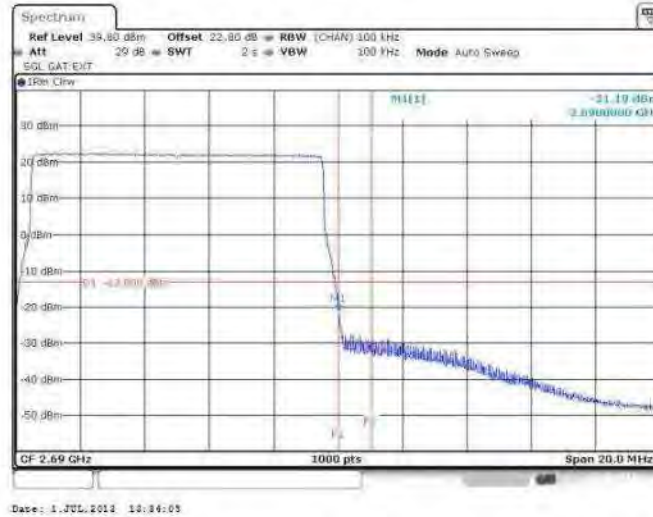


Figure 90 Spurious Emissions (Upper Band Edge) – QPSK (2685.0 MHz) (10MHz Channel BW)

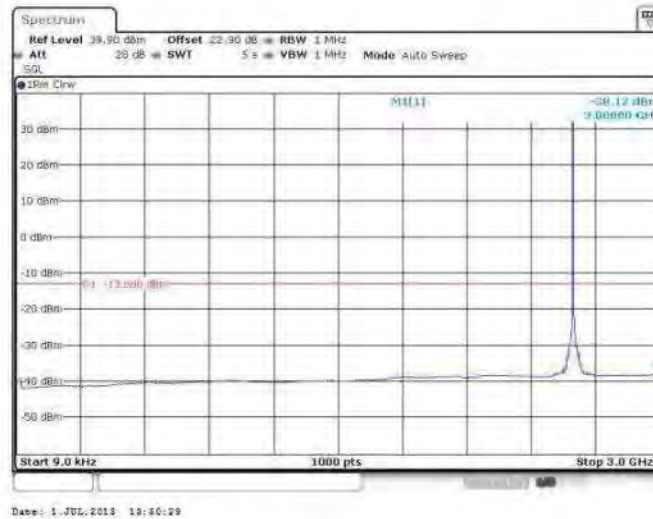


Figure 91 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

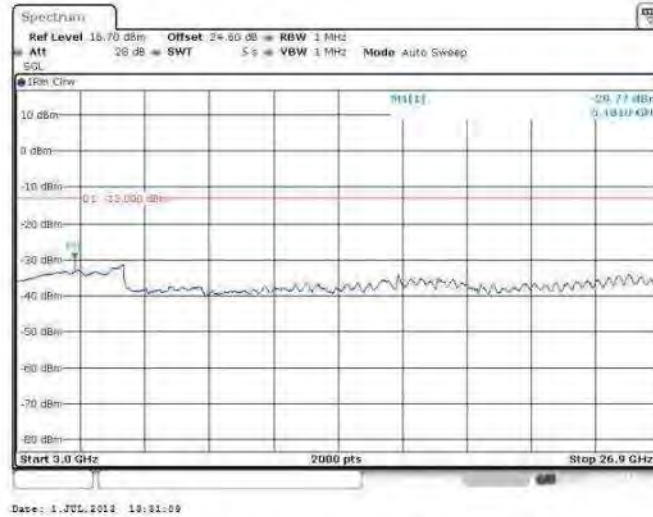


Figure 92 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(10MHz Channel BW)

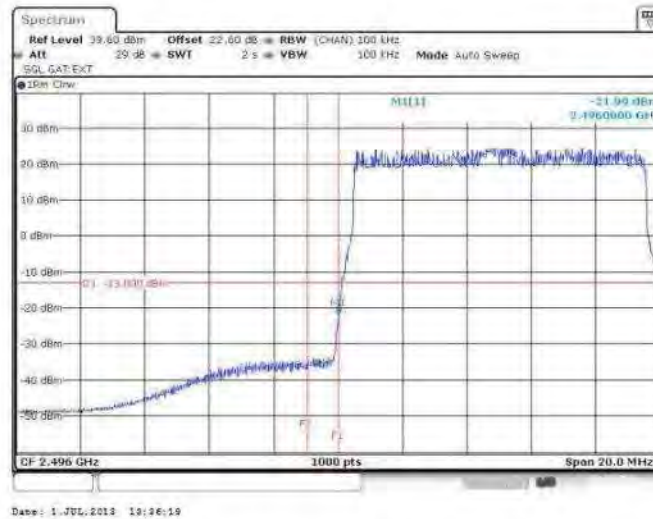


Figure 93 Spurious Emissions (Lower Band Edge) – 16QAM (2501.0 MHz)
(10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

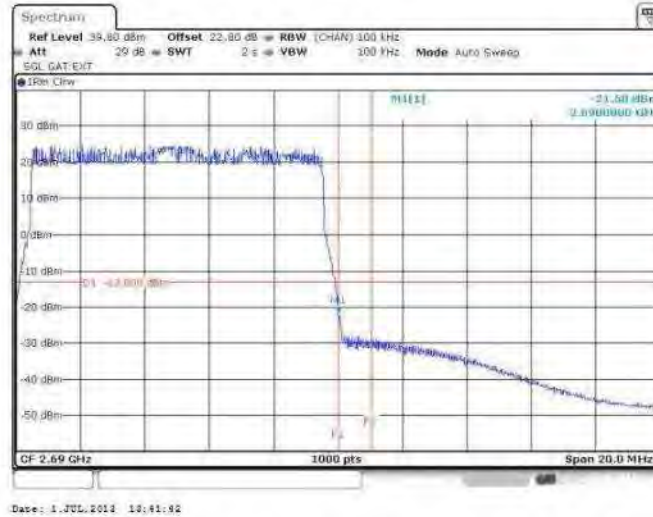


Figure 94 Spurious Emissions (Upper Band Edge) – 16QAM (2685.0 MHz) (10MHz Channel BW)

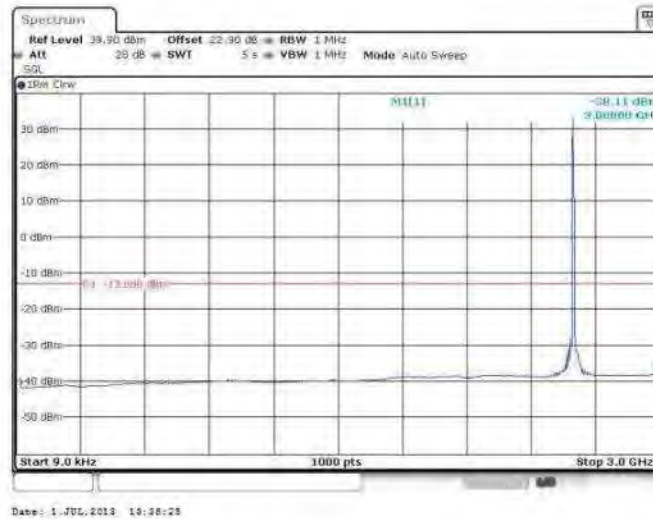
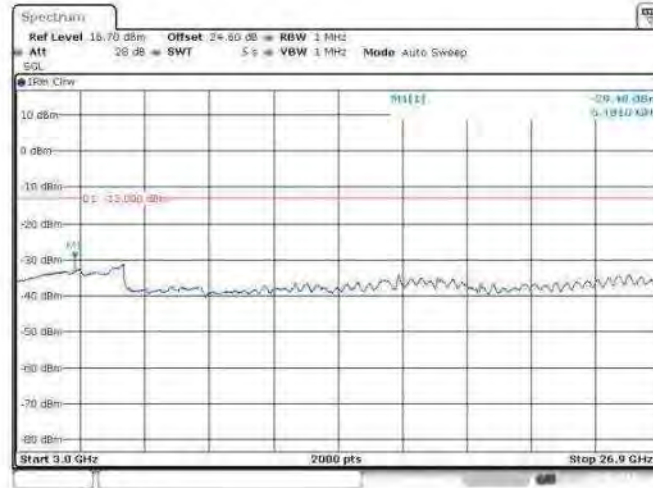


Figure 95 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2012 18:35:11

Figure 96 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz)
(10MHz Channel BW)



Date: 1 JUL 2013 18:44:00

Figure 97 Spurious Emissions (Lower Band Edge) – 64QAM (2501.0 MHz)
(10MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 98 Spurious Emissions (Upper Band Edge) – 64QAM (2685.0 MHz) (10MHz Channel BW)

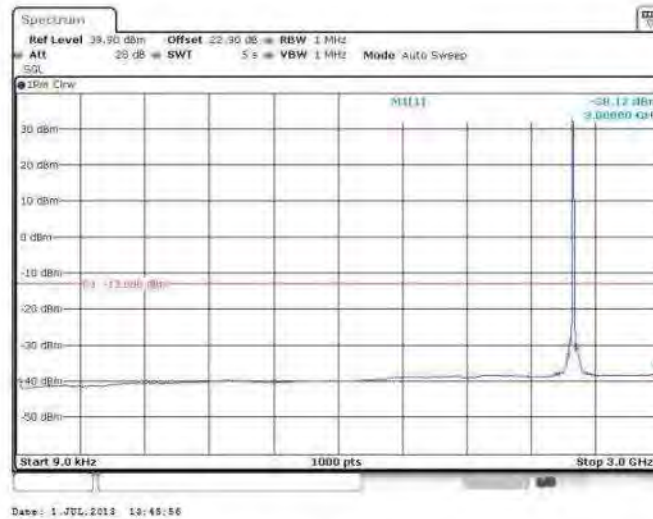
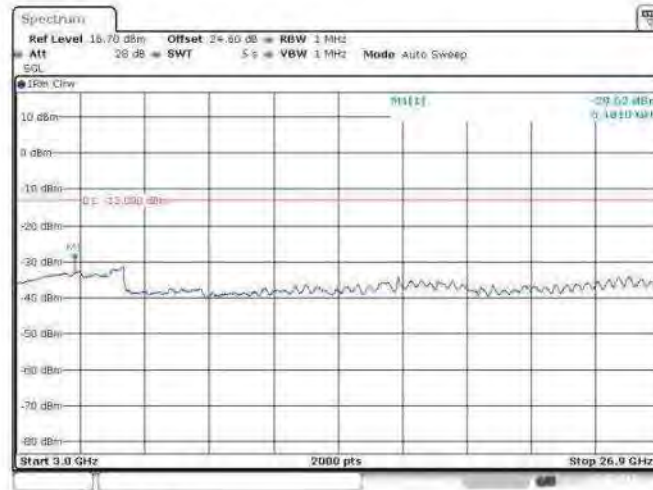


Figure 99 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz) (10MHz Channel BW)



FCC ID:
VBNFZHE-01

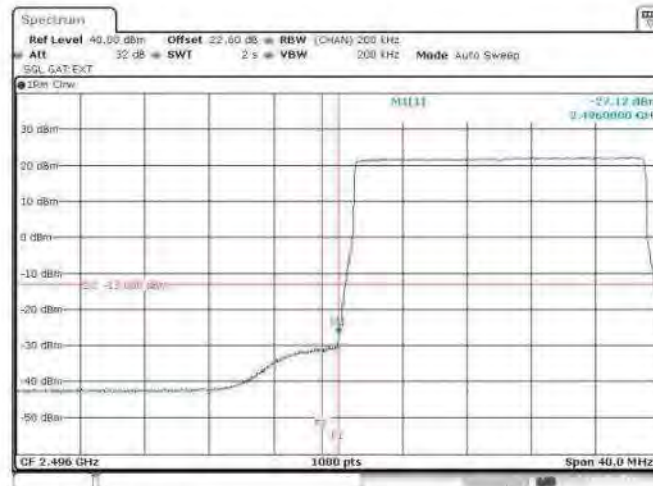
Test Report No:
D496476672



Date: 1 JUL 2013 14:38:27

**Figure 100 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz)
(10MHz Channel BW)**

Config B ANT1:



Date: 1 JUL 2013 15:22:35

**Figure 101 Spurious Emissions (Lower Band Edge) – QPSK (2506.0 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 102 Spurious Emissions (Upper Band Edge) – QPSK (2680.0 MHz) (20MHz Channel BW)

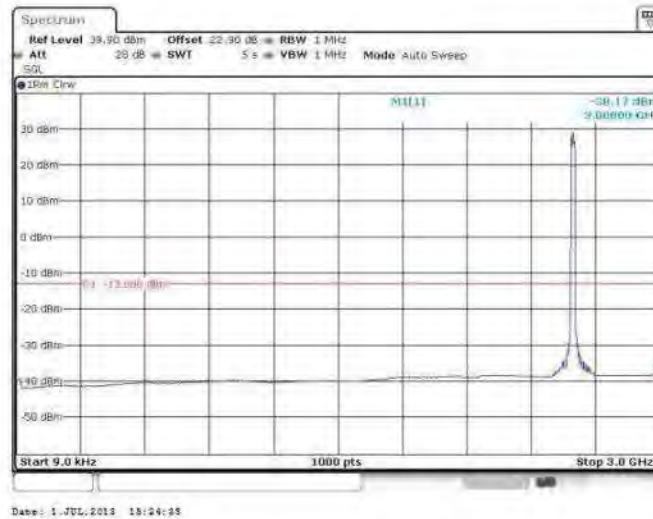
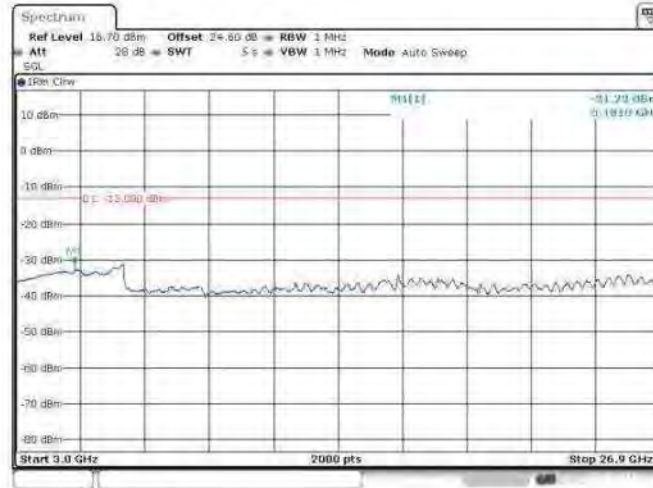


Figure 103 Spurious Emissions (9kHz – 3GHz) - QPSK (2593.0 MHz) (20MHz Channel BW)

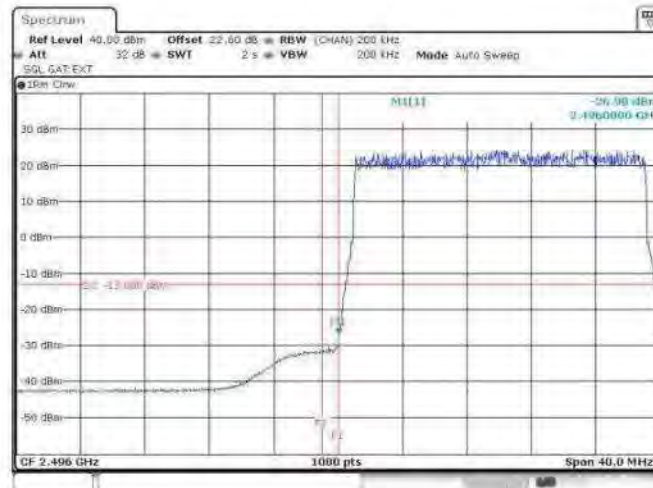


FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 104 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(20MHz Channel BW)**



**Figure 105 Spurious Emissions (Lower Band Edge) – 16QAM (2506.0 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

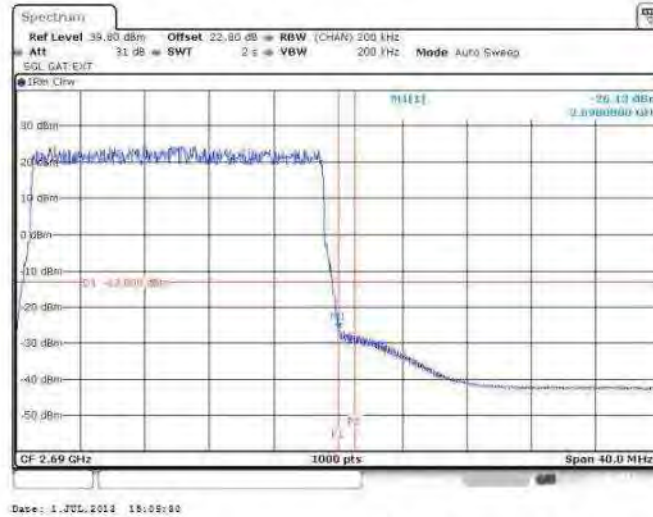


Figure 106 Spurious Emissions (Upper Band Edge) – 16QAM (2680.0 MHz)
(20MHz Channel BW)

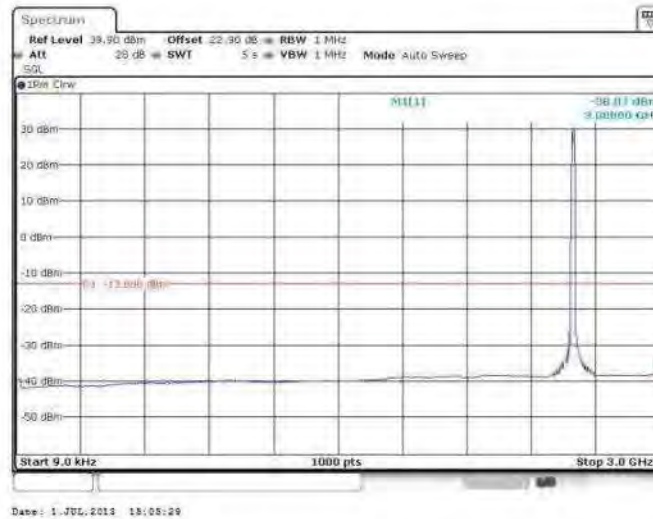
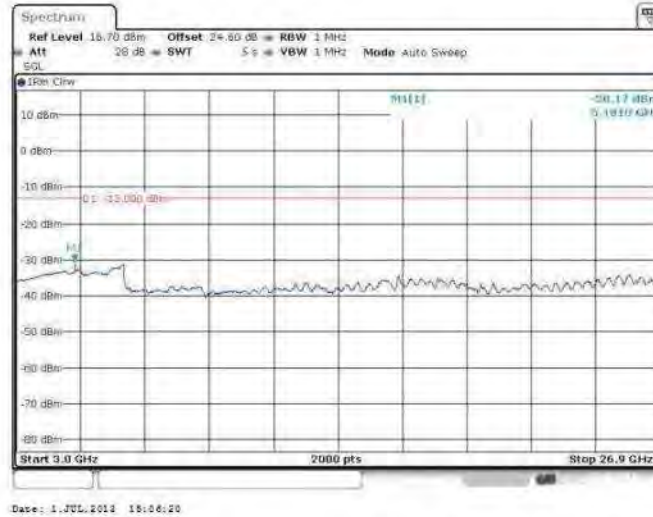


Figure 107 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz)
(20MHz Channel BW)

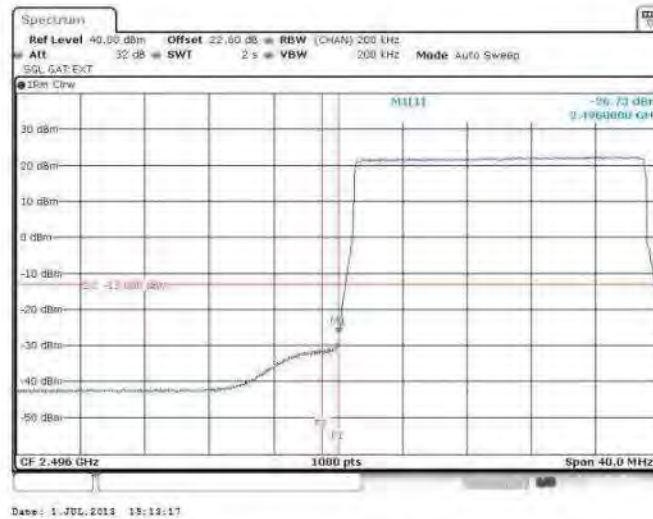


FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 108 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz)
(20MHz Channel BW)**



**Figure 109 Spurious Emissions (Lower Band Edge) – 64QAM (2506.0 MHz)
(20MHz Channel BW)**

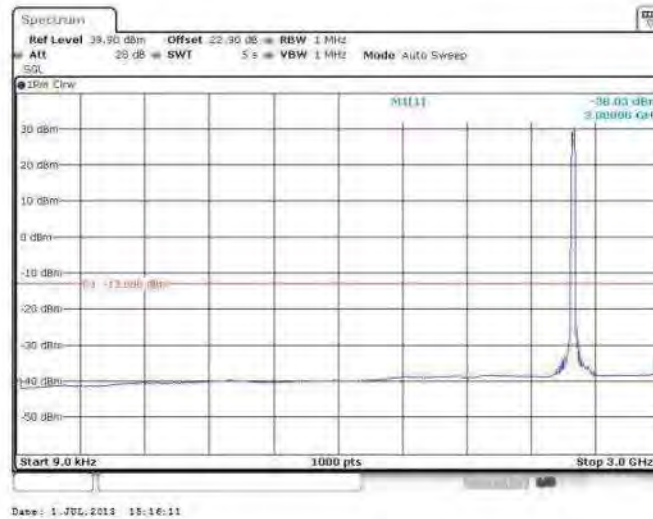


FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 110 Spurious Emissions (Upper Band Edge) – 64QAM (2680.0 MHz)
(20MHz Channel BW)**

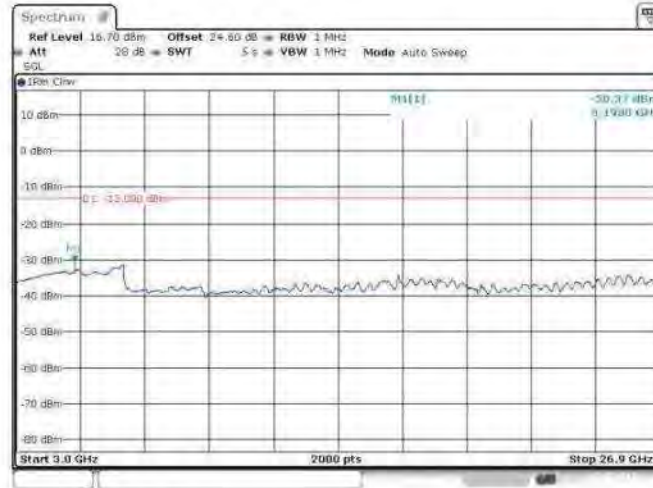


**Figure 111 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2012 14:52:24

Figure 112 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT2:



Date: 1 JUL 2013 09:21:31

Figure 113 Spurious Emissions (Lower Band Edge) – QPSK (2506.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 114 Spurious Emissions (Upper Band Edge) – QPSK (2680.0 MHz) (20MHz Channel BW)

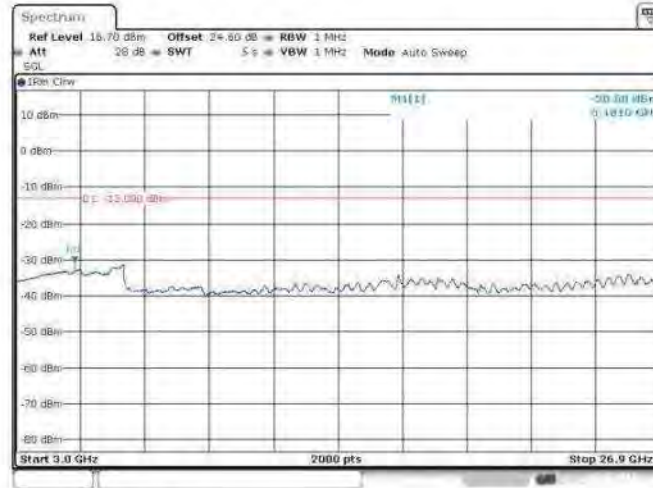


Figure 115 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (20MHz Channel BW)



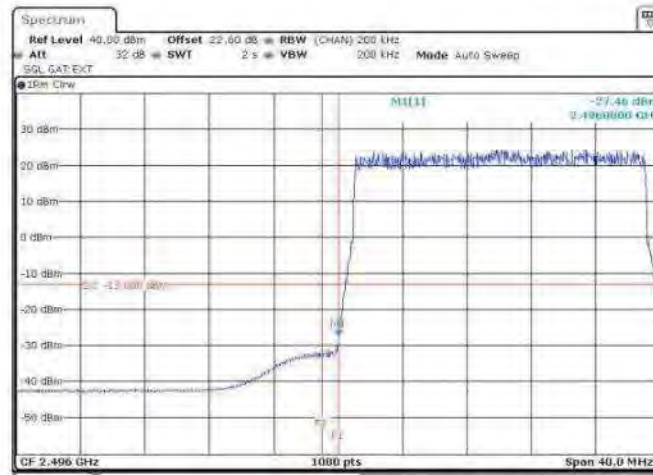
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2012 08:24:47

**Figure 116 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(20MHz Channel BW)**



Date: 1 JUL 2013 10:40:53

**Figure 117 Spurious Emissions (Lower Band Edge)- 16QAM (2506.0 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

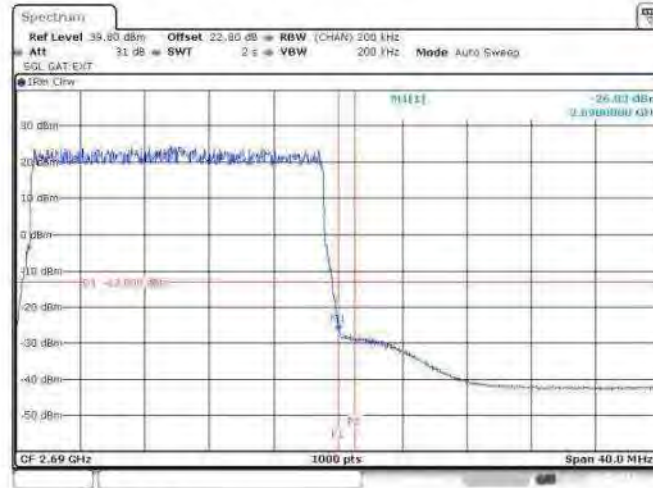


Figure 118 Spurious Emissions (Upper Band Edge) – 16QAM (2680.0 MHz)
(20MHz Channel BW)

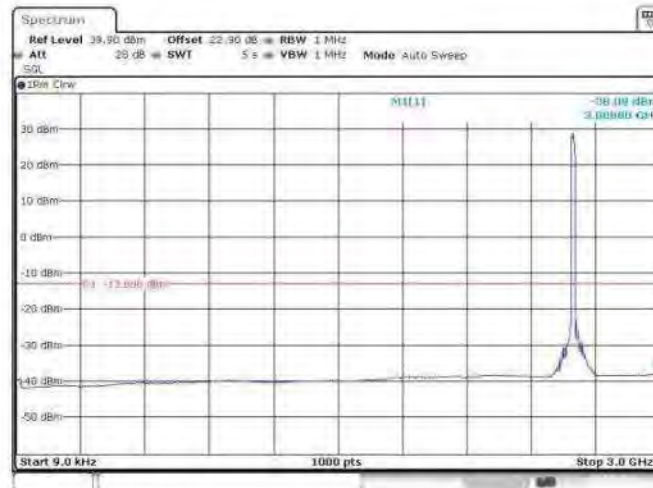


Figure 119 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz)
(20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

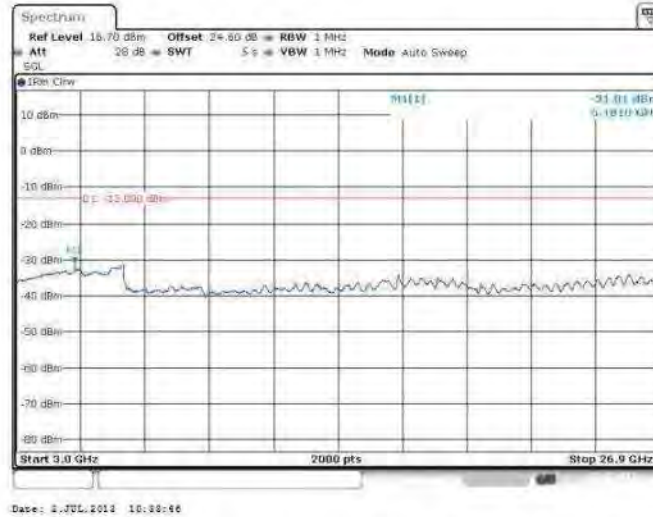


Figure 120 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz)
(20MHz Channel BW)



Figure 121 Spurious Emissions (Lower Band Edge) – 64QAM (2506.0 MHz)
(20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 122 Spurious Emissions (Upper Band Edge) – 64QAM (2680.0 MHz)
(20MHz Channel BW)

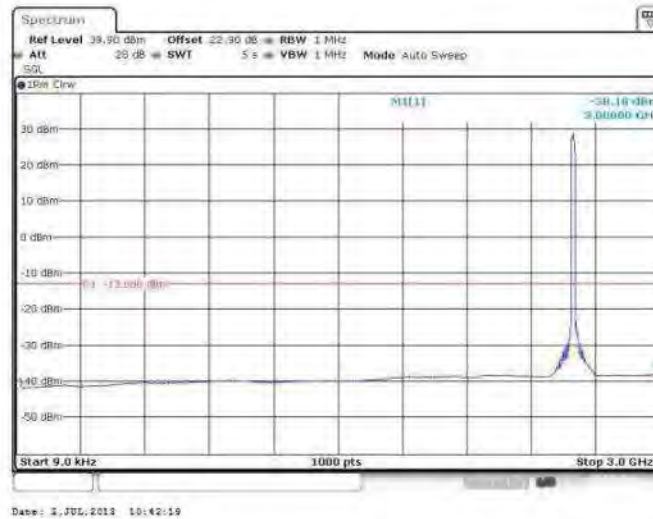
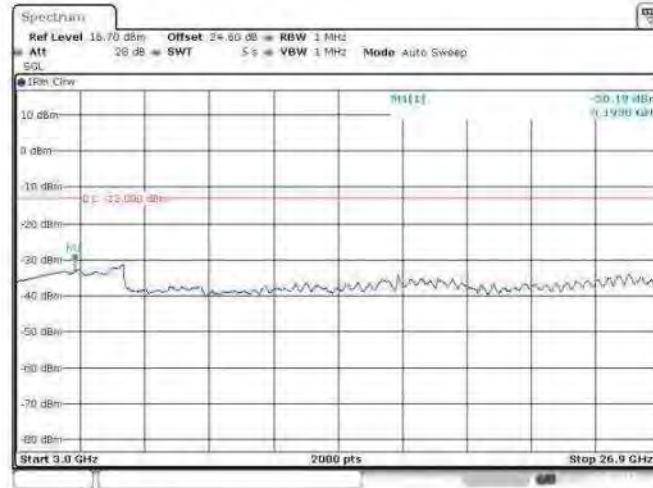


Figure 123 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz)
(20MHz Channel BW)



FCC ID:
VBNFZHE-01

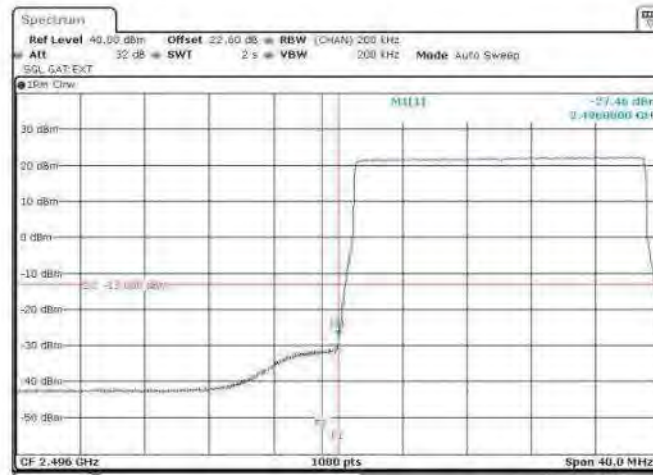
Test Report No:
D496476672



Date: 1 JUL 2012 14:56:27

Figure 124 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT3:



Date: 1 JUL 2013 10:50:16

Figure 125 Spurious Emissions (Lower Band Edge) – QPSK (2506.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 126 Spurious Emissions (Upper Band Edge) – QPSK (2680.0 MHz) (20MHz Channel BW)

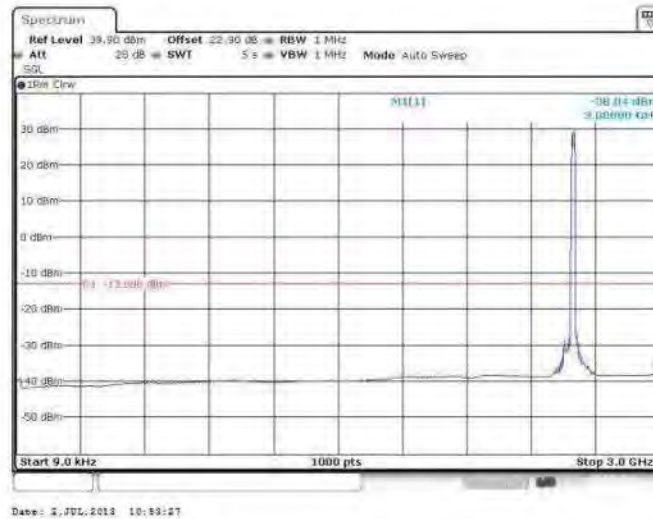


Figure 127 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

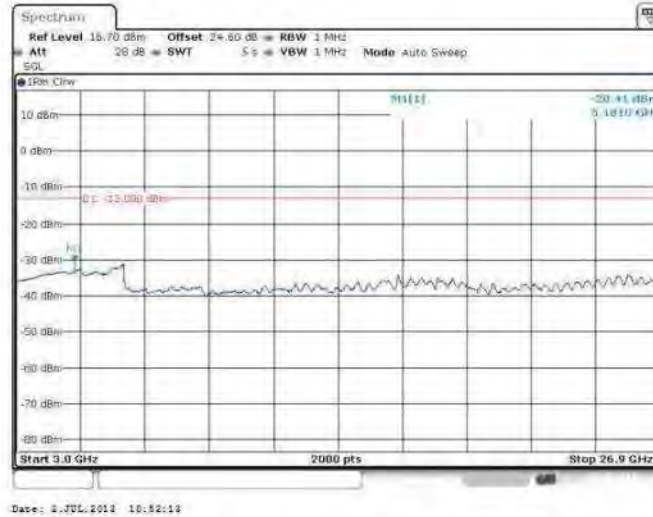


Figure 128 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz) (20MHz Channel BW)

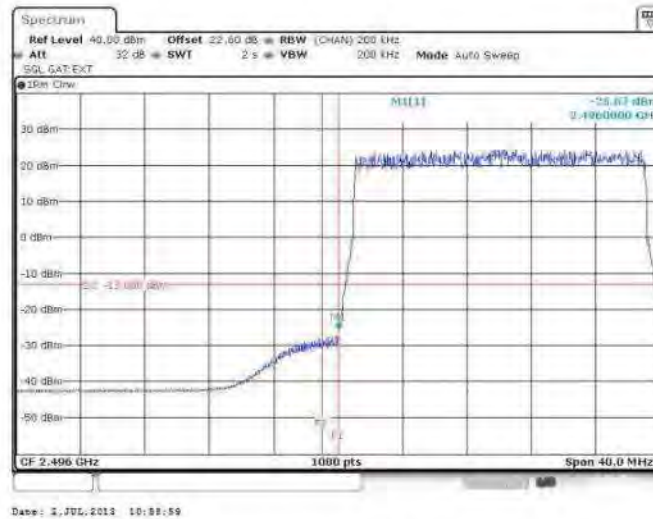


Figure 129 Spurious Emissions (Lower Band Edge)- 16QAM (2506.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

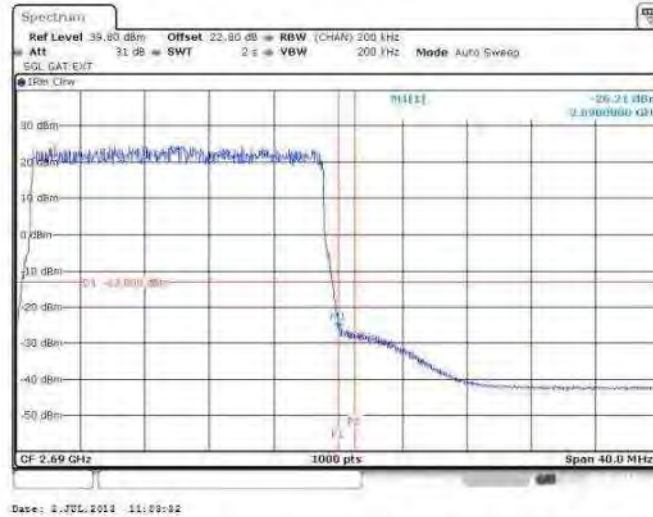


Figure 130 Spurious Emissions (Upper Band Edge) – 16QAM (2680.0 MHz) (20MHz Channel BW)

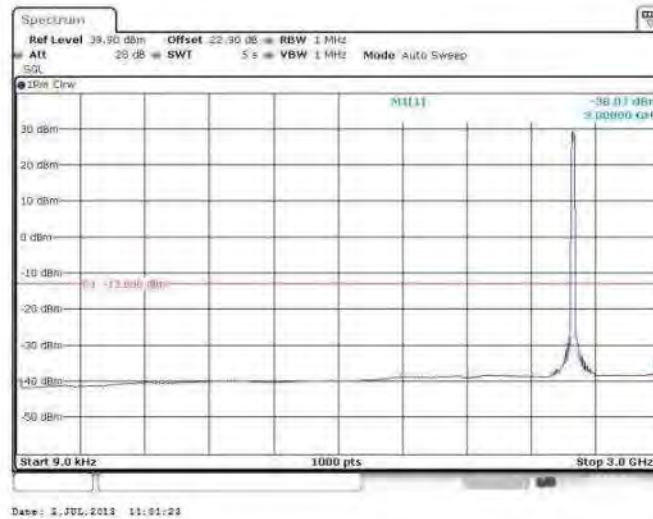


Figure 131 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

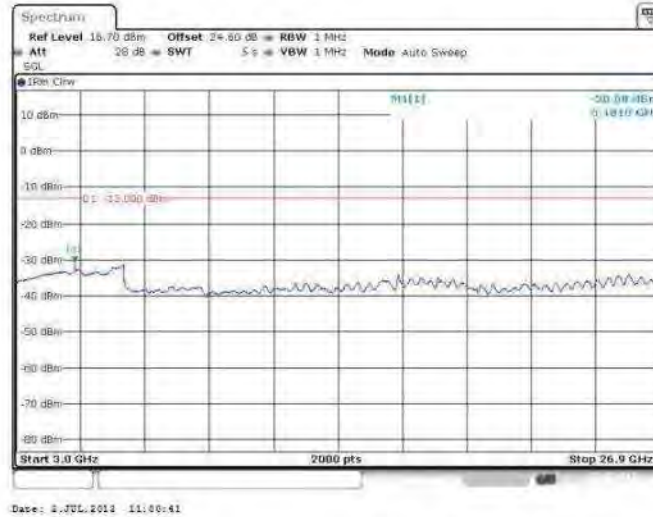


Figure 132 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz) (20MHz Channel BW)

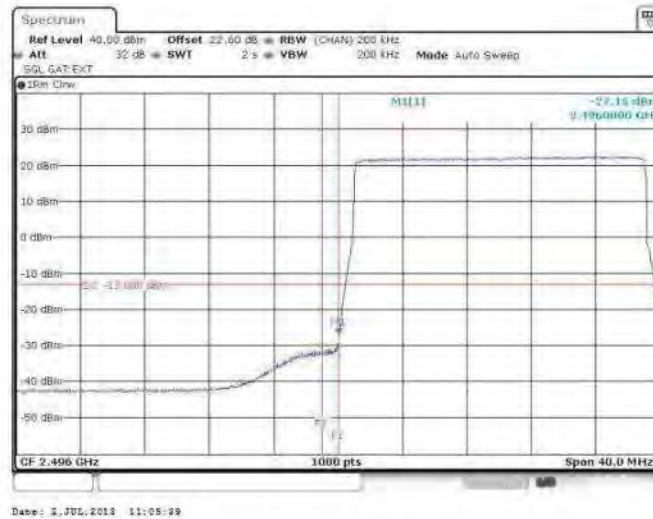


Figure 133 Spurious Emissions (Lower Band Edge) – 64QAM (2506.0 MHz) (20MHz Channel BW)



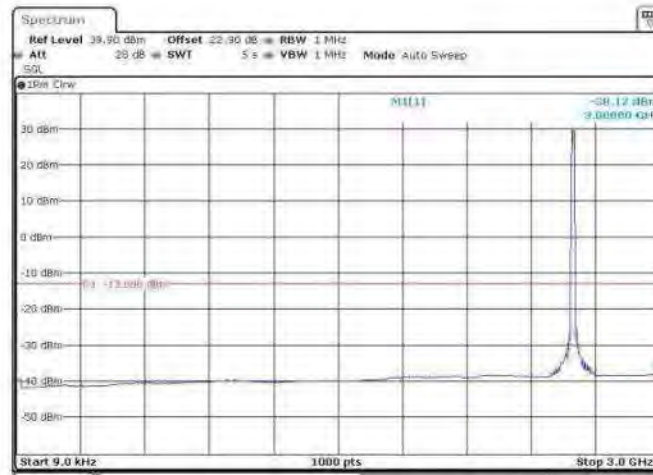
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2013 11:12:56

Figure 134 Spurious Emissions (Upper Band Edge) – 64QAM (2680.0 MHz)
(20MHz Channel BW)



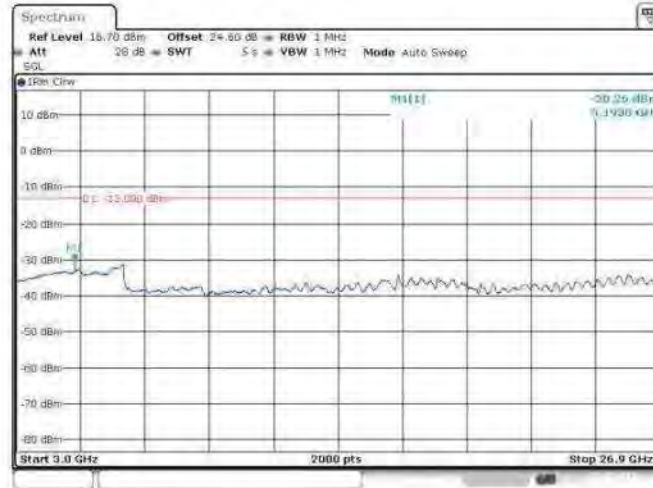
Date: 1 JUL 2013 11:09:34

Figure 135 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz)
(20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 2 JUL 2013 11:08:13

Figure 136 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz) (20MHz Channel BW)

Config B ANT4:



Date: 2 JUL 2013 11:14:01

Figure 137 Spurious Emissions (Lower Band Edge) – QPSK (2506.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Figure 138 Spurious Emissions (Upper Band Edge) – QPSK (2680.0 MHz) (20MHz Channel BW)

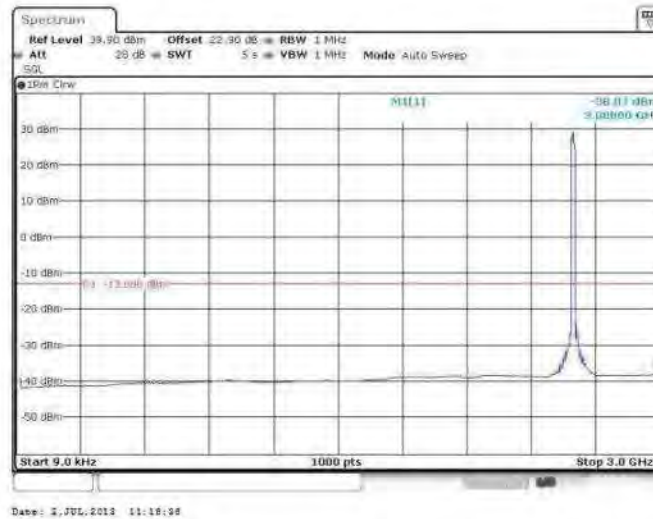
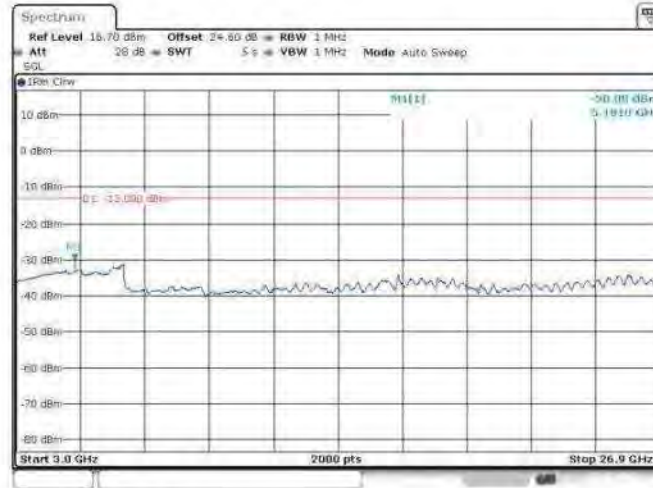


Figure 139 Spurious Emissions (9kHz – 3GHz) – QPSK (2593.0 MHz) (20MHz Channel BW)

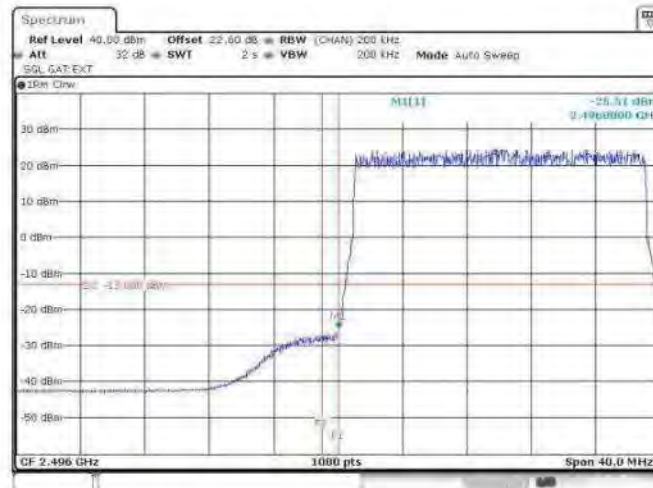


FCC ID:
VBNFZHE-01

Test Report No:
D496476672



**Figure 140 Spurious Emissions (3GHz – 26.900GHz) – QPSK (2593.0 MHz)
(20MHz Channel BW)**



**Figure 141 Spurious Emissions (Lower Band Edge) – 16QAM (2506.0 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

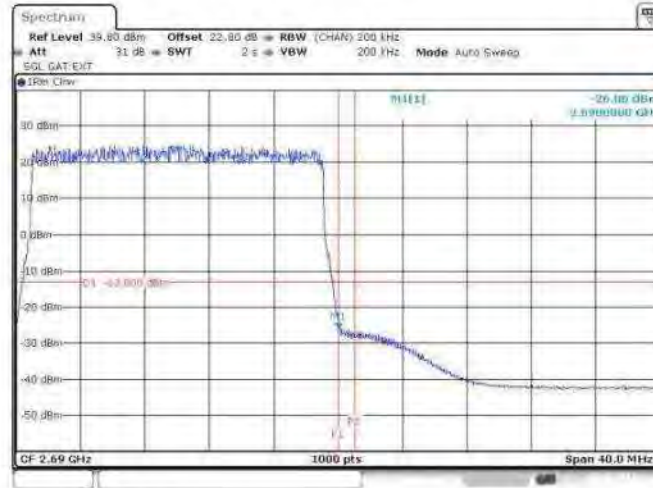


Figure 142 Spurious Emissions (Upper Band Edge) – 16QAM (2680.0 MHz) (20MHz Channel BW)

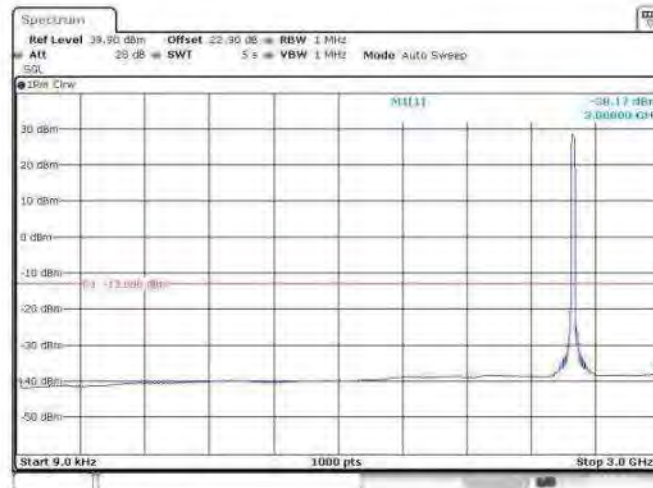
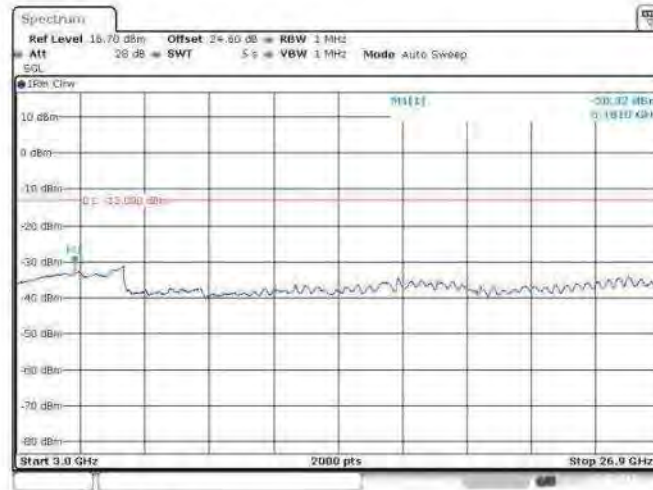


Figure 143 Spurious Emissions (9kHz – 3GHz) – 16QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2013 14:47:26

**Figure 144 Spurious Emissions (3GHz – 26.900GHz) – 16QAM (2593.0 MHz)
(20MHz Channel BW)**



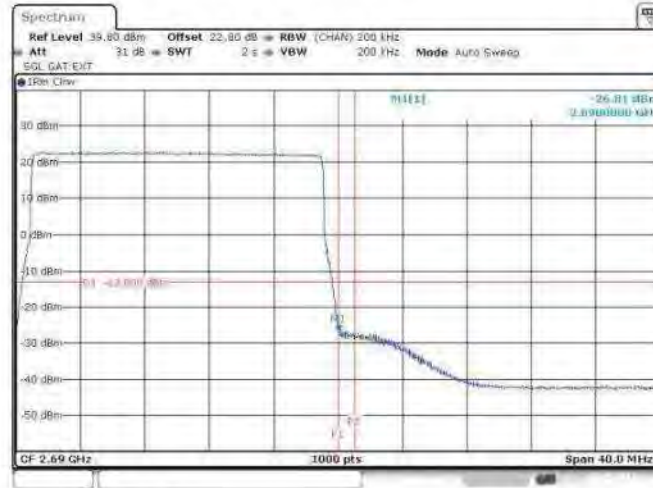
Date: 1 JUL 2013 11:21:22

**Figure 145 Spurious Emissions (Lower Band Edge) – 64QAM (2506.0 MHz)
(20MHz Channel BW)**



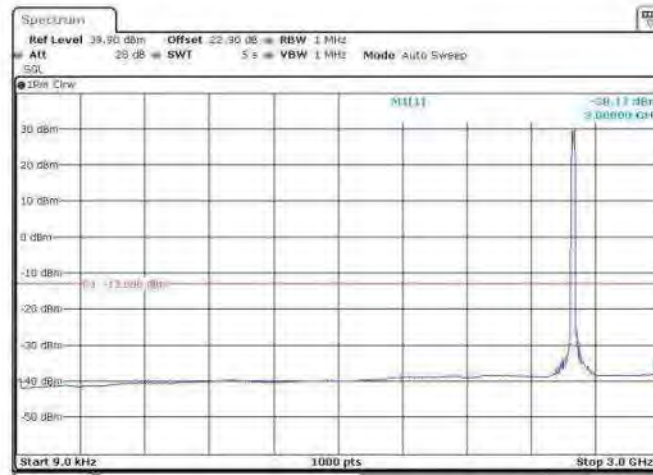
FCC ID:
VBNFZHE-01

Test Report No:
D496476672



Date: 1 JUL 2013 11:45:22

Figure 146 Spurious Emissions (Upper Band Edge) – 64QAM (2680.0 MHz) (20MHz Channel BW)



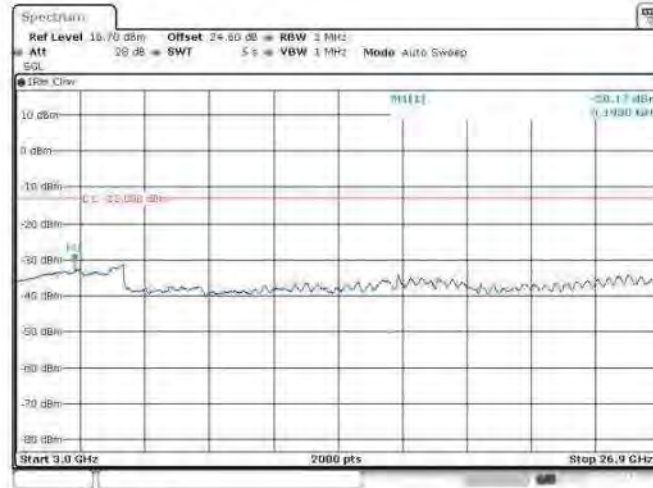
Date: 1 JUL 2013 11:44:52

Figure 147 Spurious Emissions (9kHz – 3GHz) – 64QAM (2593.0 MHz) (20MHz Channel BW)



FCC ID:
VBNFZHE-01

Test Report No:
D496476672



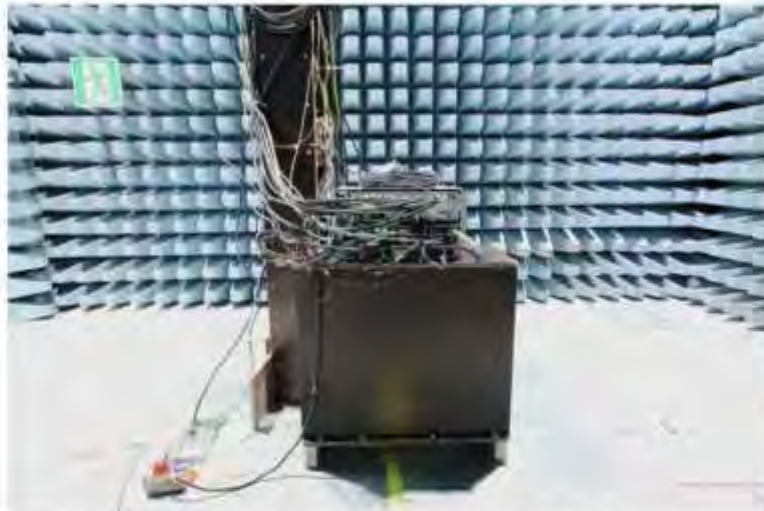
Date: 9 JUL 2013 11:33:22

**Figure 148 Spurious Emissions (3GHz – 26.900GHz) – 64QAM (2593.0 MHz)
(20MHz Channel BW)**

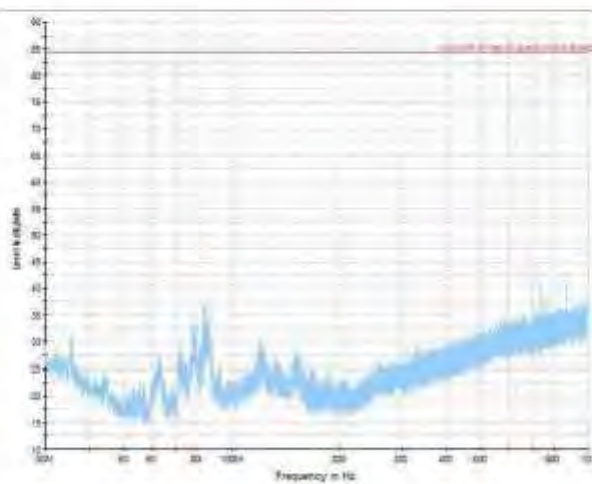
FCC ID:
VBNFZHE-01

Test Report No:
D496476672

5.2.5. Test No. 5: Field Strength of Spurious Radiation



**Figure 149 Photograph of the anechoic chamber with the EUT
Config B:**



**Figure 150 Radiated Emission 30 MHz – 1 GHz (2506.0, 2593 and 2680 MHz)
(20MHz Channel BW)**



FCC ID:
VBNFZHE-01

Test Report No:
D496476672

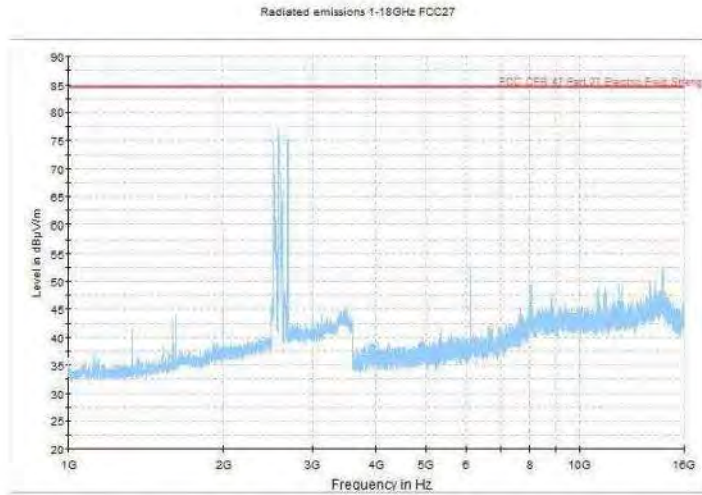


Figure 151 Radiated Emission 1 GHz – 16 GHz (2506.0, 2593 and 2680 MHz) (20MHz Channel BW)

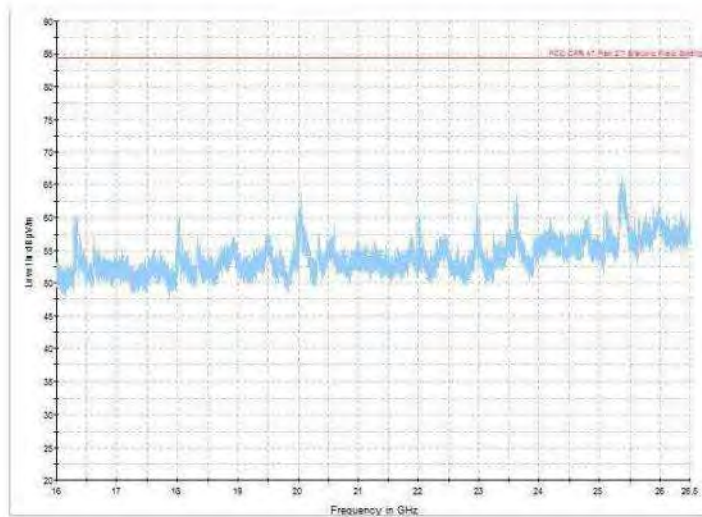


Figure 152 Radiated Emission 16 GHz – 26.5 GHz (2506.0, 2593 and 2680 MHz) (20MHz Channel BW)