TEST REPORT

Test Report No. : UL-RPT-RP11025775JD01A V3.0

Manufacturer	:	EGATEL S.L.
Model No.	:	Smart LNB
FCC ID	:	2AGKM820003-02
Test Standard(s)	:	FCC Part 25

1. This test report shall not be reproduced in full or partial, without the written approval of UL VS LTD.
2. The results in this report apply only to the sample tested.
3. The sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. Version 3.0 supersedes all previous versions.

Date of Issue: 27 January 2016

Checked by:

Sarah Williams
Engineer, Radio Laboratory

Company Signatory:

Steven White
Service Lead, Radio Laboratory,
UL VS LTD

ilac-MRA UKAS TESTING 0644

This laboratory is accredited by UKAS. The tests reported herein have been performed in accordance with its' terms of accreditation.

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Table of Contents

1. Customer Information

Company Name:	EGATEL S.L.
Address:	Av. Ourense, 1 Parque Tecnolóxico de Galicia 32901 Ourense Spain

2. Summary of Testing

2.1. General Information

Specification Reference:	47CFR25
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 25 Satellite Communications
Site Registration:	209735
Location of Testing:	UL VS LTD, Unit 3 Horizon, Wade Road, Kingsland Business Park, Basingstoke, Hampshire, RG24 8AH, United Kingdom
Test Dates:	02 December 2015 to 17 December 2015

2.2. Summary of Test Results

FCC Reference (47CFR)	Measurement	Result
Part 25.204	Transmitter Power Spectral Density	✓
Part 2.1049	Occupied Bandwidth	✓
Part 25.202	Transmitter Conducted Emissions	✓
Part 25.202	Transmitter Radiated Emissions	✓
Part 25.202	Transmitter Frequency Stability (Temperature & Voltage Variation)	✓

Key to Results

✓ = Complied ✗ = Did not comply

2.3. Methods and Procedures

Reference:	FCC KDB 971168 D01 v02r02, October 17, 2014
Title:	Measurement Guidance for Certification of Licensed Digital Transmitters
Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Description:	Interactive Satellite Terminal
Brand Name:	Egatel
Model Name or Number:	Smart LNB
Test Sample Serial Numbers:	311510061 (IDU) & 3115155009 (ODU)
Hardware Version:	820001.02.R03 (IDU) & 820002.02.R03 (ODU)
Software Version:	n25q064a_full_v0.3 (IDU) & s25fl512_full_v206F_v1.4_v0.2_v0.2 (ODU)
FCC ID:	2AGKM820003-02

3.2. Description of EUT

The Equipment Under Test was an interactive satellite terminal operating in the Ku band using DSSS and burst transmission. The EUT comprised an outdoor unit (ODU) to be connected to the arm of a dish antenna and an indoor unit (IDU). The EUT was powered by an AC adapter.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Intended Operating Environment:	Commercial / Light Industry	
Equipment Category:	Interactive Satellite Terminal	
Type of Unit:	Radio Transceiver	
Power Supply Requirement:	30 VDC	
Modulation Type:	QPSK with spreading factors 16, 32, 64, 128 and 256	
Channel Spacing:	2.5 MHz, 5 MHz and 10 MHz	
Transmit Frequency Range:	13750 MHz to 14500 MHz	
Transmit Channel Description:	**Channel ID**	**Channel Frequency (MHz)**
	Bottom	13750
	Middle	14125
	Top	14500

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	Orthomode Transducer (OMT)
Brand Name:	Not stated
Model Name or Number:	Not stated
Serial Number:	Not stated

Description:	AC Switching Adapter
Brand Name:	Not stated
Model Name or Number:	M300200P911
Serial Number:	10500120D15072002262

Description:	Laptop Computer
Brand Name:	Dell Latitude
Model Name or Number:	D610
Serial Number:	PC329NT

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):

- Transmitting at maximum power using QPSK modulation with spreading factors 16, 32, 64, 128 and 256.
- Transmitting a CW tone during Radio Frequency Tolerance tests.
- Operating on bottom, middle and top channels with 2.5 MHz, 5 MHz and 10 MHz channel bandwidth.
- Operating in a test mode to allow continuous transmission.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- A laptop computer was used to configure the EUT during testing using a browser based GUI. The laptop was connected to the IDU via Ethernet.
- The IDU and ODU were connected using an F type satellite coaxial cable provided by the customer.
- A test fixture (orthomode transducer) was supplied by the customer to adapt the circular waveguide flange at the EUT antenna port to rectangular flanges allowing the connection of test equipment. The maximum path loss of the test fixture was declared as 0.5 dB.
- Transmitter radiated spurious emissions tests were performed with the antenna port terminated into a 50 Ω load.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to *Section 6. Measurement Uncertainty* for details.

In accordance with UKAS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Power Spectral Density

Test Summary:

Test Engineer:	Ben Mercer	**Test Dates:**	02 December 2015 & 03 December 2015
Test Sample Serial Numbers:	311510061 & 3115155009		

FCC Reference:	Part 25.204(a)
Test Method Used:	FCC KDB 971168 Section 5.4.1

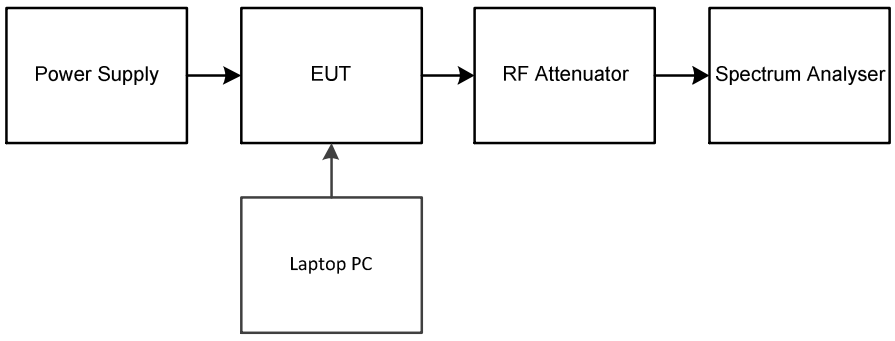
Environmental Conditions:

Temperature (°C):	24 to 25
Relative Humidity (%):	40 to 41

Note(s):

1. Transmitter Power Spectral Density tests were performed using a spectrum analyser in accordance with FCC KDB 971168 Section 5.4.1.
2. Part 25.204 specifies the spectral density requirement in a 4 kHz bandwidth. The closest selectable resolution bandwidth of 4.3 kHz was set, and video bandwidth was set to 13 kHz. An RMS detector was used, sweep time was set to auto and trace averaging was employed over 100 traces. The span was set to 2 times the authorised bandwidth. The number of measurement points was set to at least 2 x span / resolution bandwidth. A marker was placed at the peak of the signal and the results recorded in the tables below.
3. The spectrum analyser was connected to the antenna port on the EUT using suitable attenuation and coaxial cable. A reference level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and coaxial cable.
4. The customer provided an OMT to adapt the circular waveguide flange at the antenna port to rectangular flanges to enable conducted measurements. The customer stated the worst case loss of the OMT as 0.5 dB. This loss was not known at the time of test, and has been added to the measured results in the tables below.

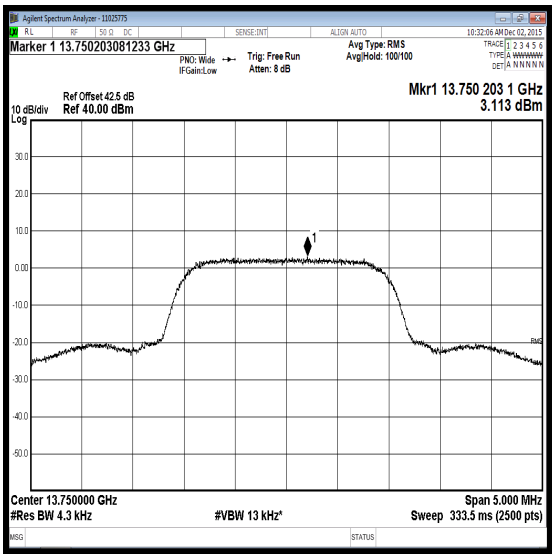
Test setup:



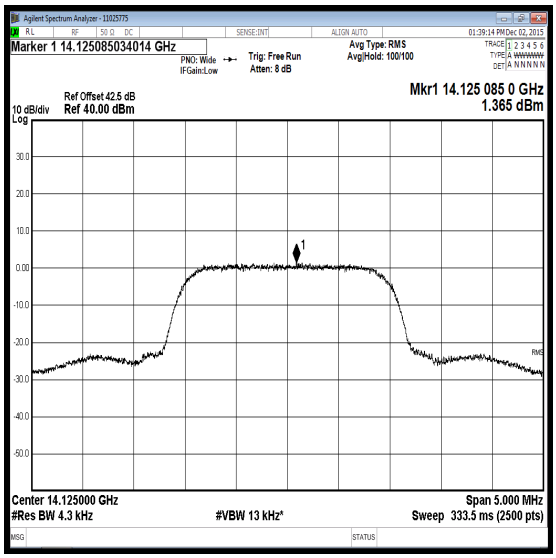
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF128 / Vertical

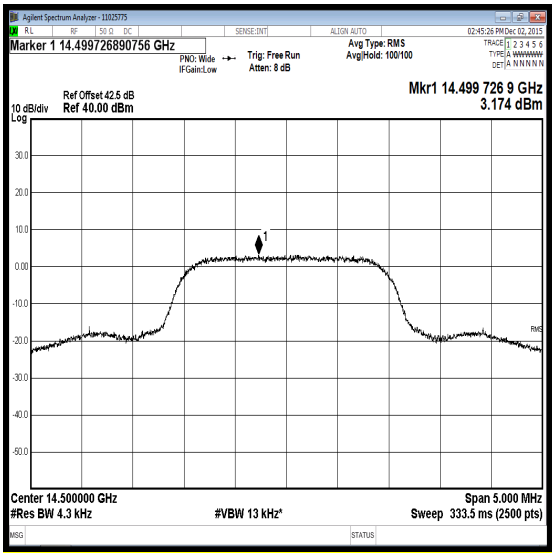
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	3.6	-26.4	38.9	12.5	40.0	27.5	Complied
Middle	1.9	-28.1	39.2	11.1	40.0	28.9	Complied
Top	3.7	-26.3	39.4	13.1	40.0	26.9	Complied



Bottom Channel



Middle Channel

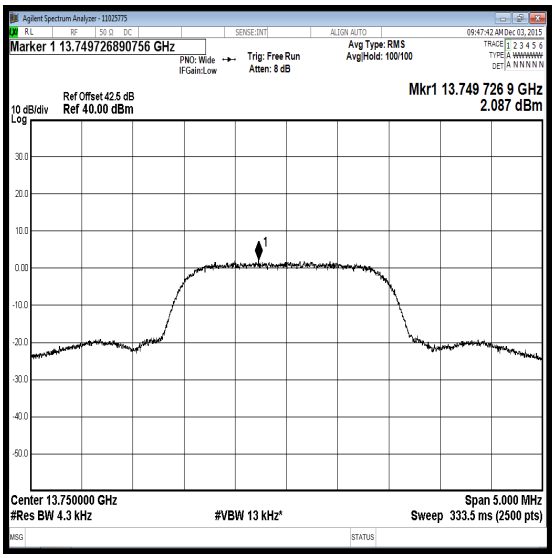


Top Channel

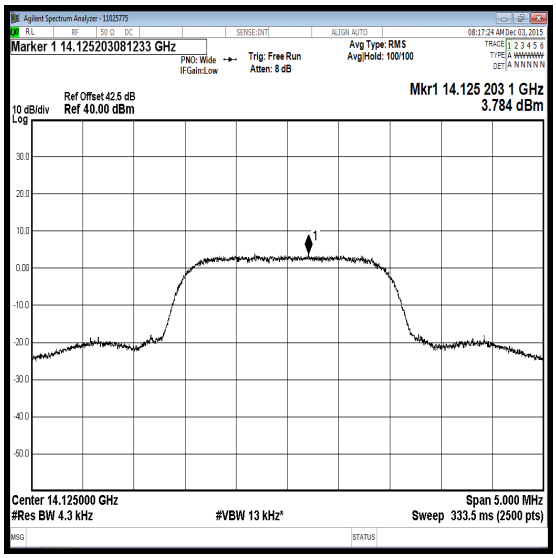
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF128 / Horizontal

Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	2.6	-27.4	38.9	11.5	40.0	28.5	Complied
Middle	4.3	-25.7	39.2	13.5	40.0	26.5	Complied
Top	4.1	-25.9	39.4	13.5	40.0	26.5	Complied



Bottom Channel



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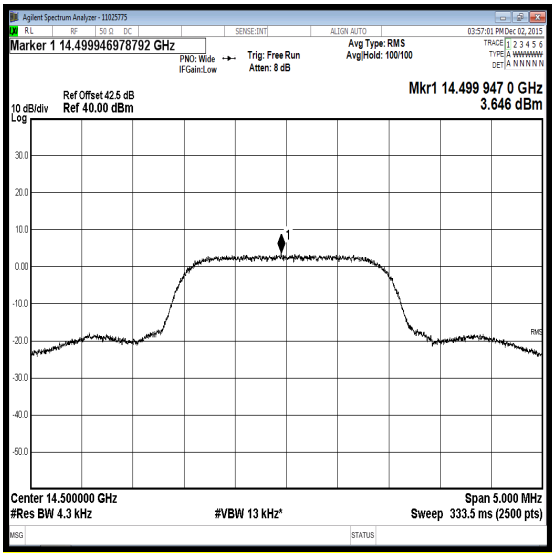
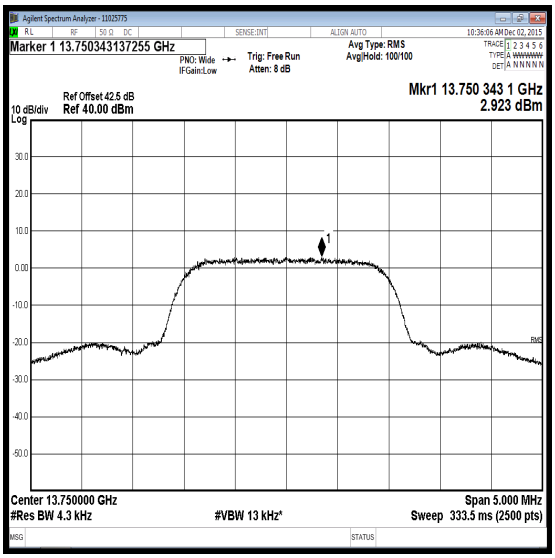


Top Channel

Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF64 / Vertical

Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	3.4	-26.6	38.9	12.3	40.0	27.7	Complied
Middle	2.0	-28.0	39.2	11.2	40.0	28.8	Complied
Top	3.8	-26.2	39.4	13.2	40.0	26.8	Complied



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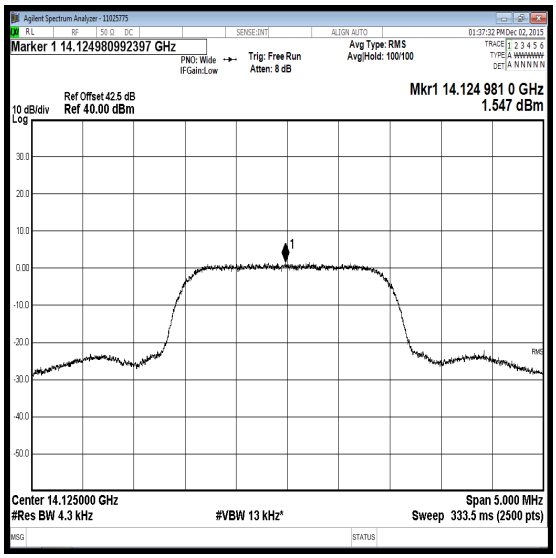
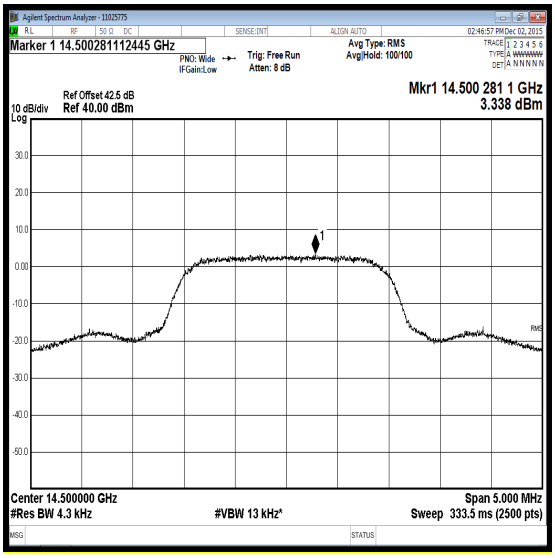


Middle Channel

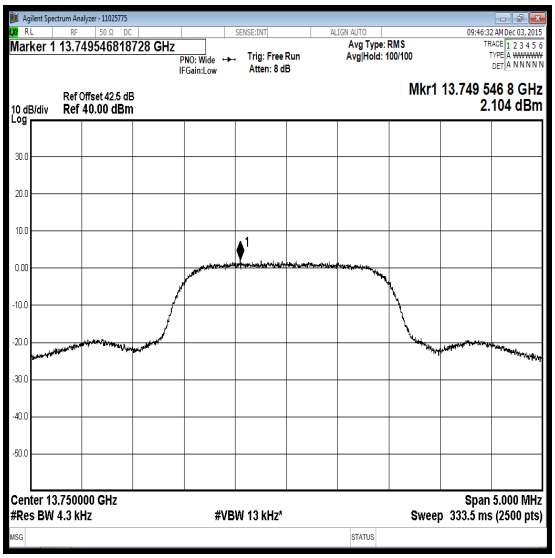


Top Channel

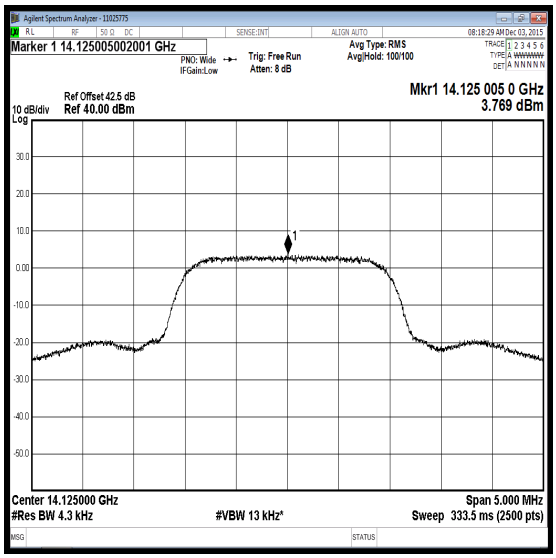
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF64 / Horizontal

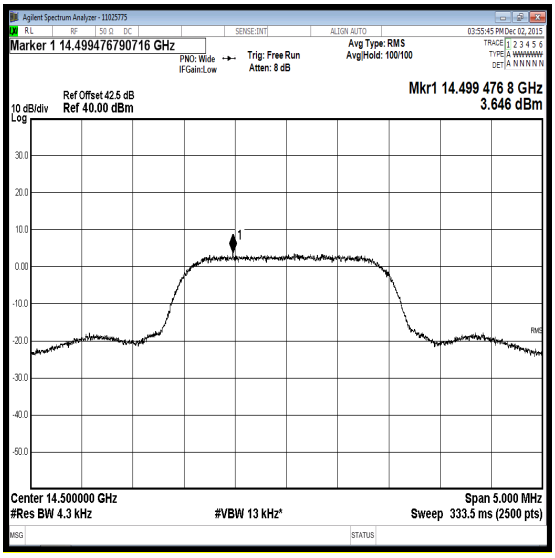
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	2.6	-27.4	38.9	11.5	40.0	28.5	Complied
Middle	4.3	-25.7	39.2	13.5	40.0	26.5	Complied
Top	4.1	-25.9	39.4	13.5	40.0	26.5	Complied



Bottom Channel



Middle Channel

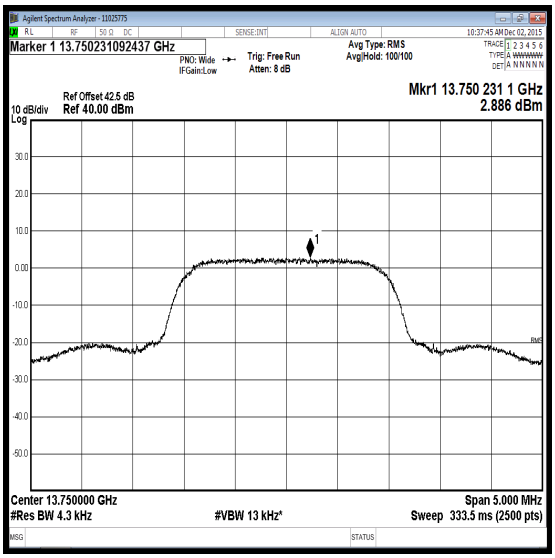


Top Channel

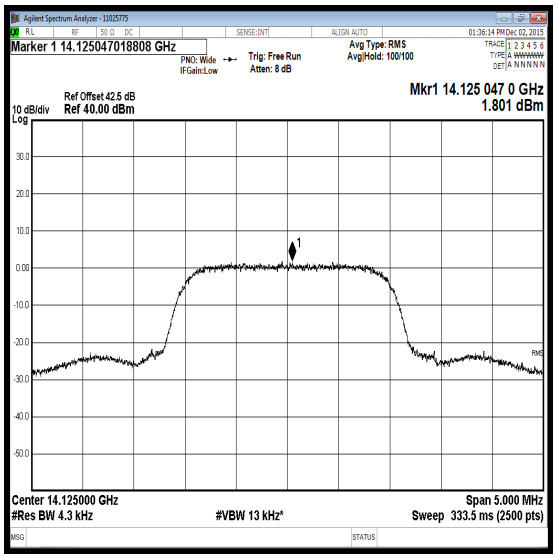
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF32 / Vertical

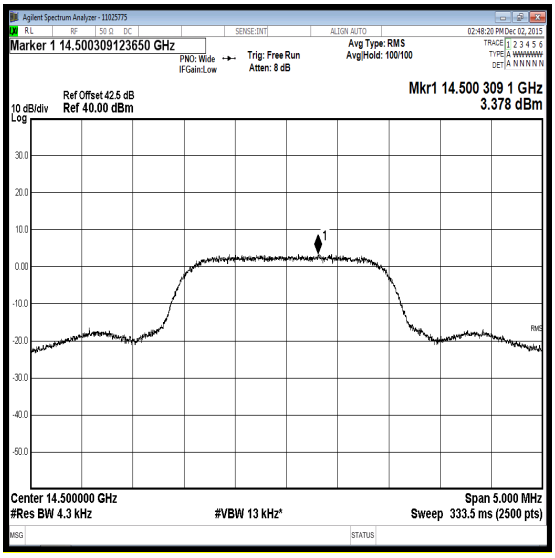
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	3.4	-26.6	38.9	12.3	40.0	27.7	Complied
Middle	2.3	-27.7	39.2	11.5	40.0	28.5	Complied
Top	3.9	-26.1	39.4	13.3	40.0	26.7	Complied



Bottom Channel



Middle Channel

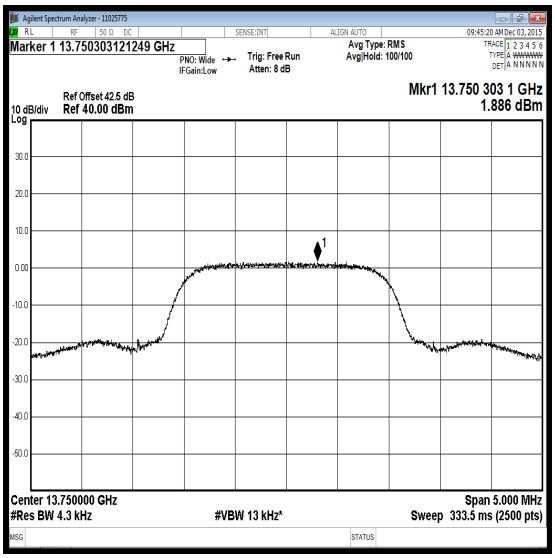


Top Channel

Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF32 / Horizontal

Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	2.4	-27.6	38.9	11.3	40.0	28.7	Complied
Middle	4.0	-26.0	39.2	13.2	40.0	26.8	Complied
Top	3.9	-26.1	39.4	13.3	40.0	26.7	Complied



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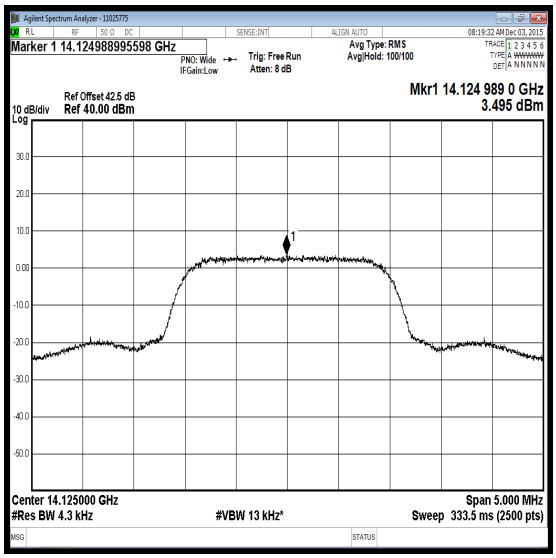
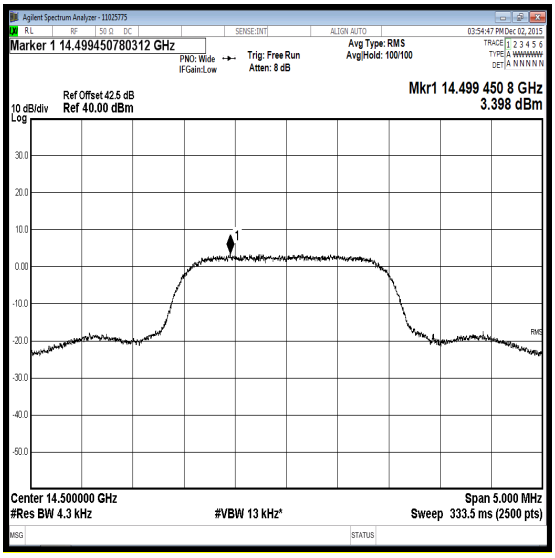


Middle Channel

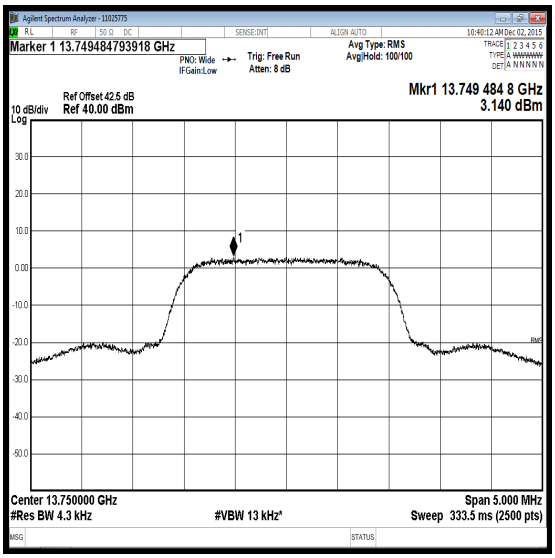


Top Channel

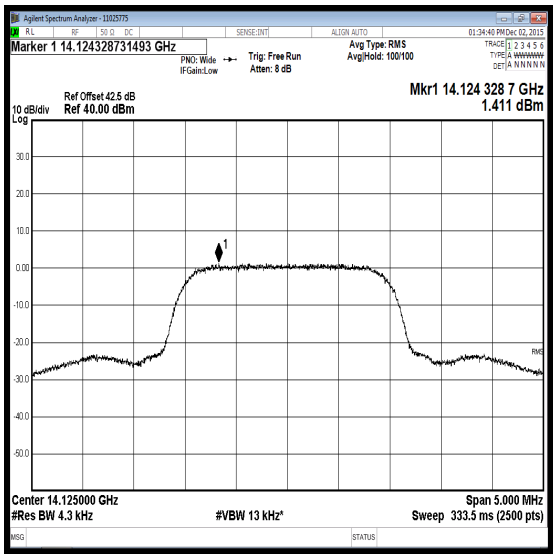
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF16 / Vertical

Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	3.6	-26.4	38.9	12.5	40.0	27.5	Complied
Middle	1.9	-28.1	39.2	11.1	40.0	28.9	Complied
Top	3.8	-26.2	39.4	13.2	40.0	26.8	Complied



Bottom Channel



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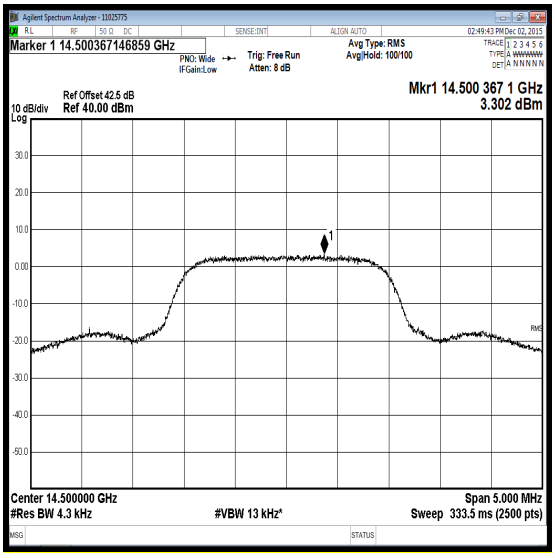
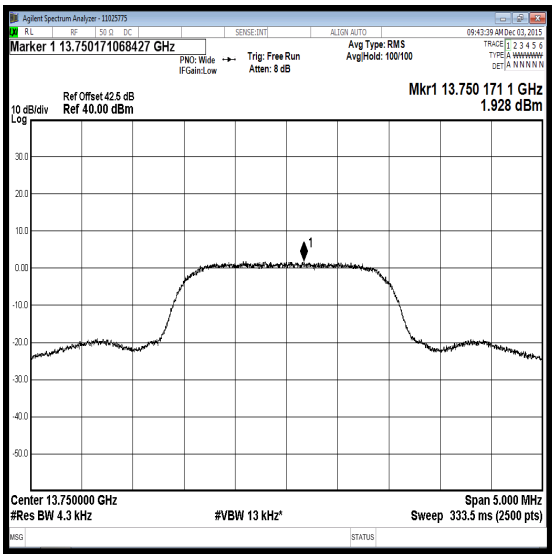


Top Channel

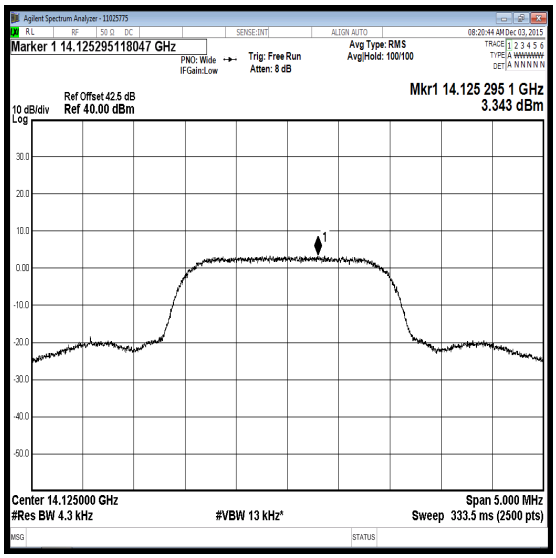
Transmitter Power Spectral Density (continued)

Results: 2.5 MHz / SF16 / Horizontal

Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	2.4	-27.6	38.9	11.3	40.0	28.7	Complied
Middle	3.8	-26.2	39.2	13.0	40.0	27.0	Complied
Top	4.0	-26.0	39.4	13.4	40.0	26.6	Complied



Bottom Channel



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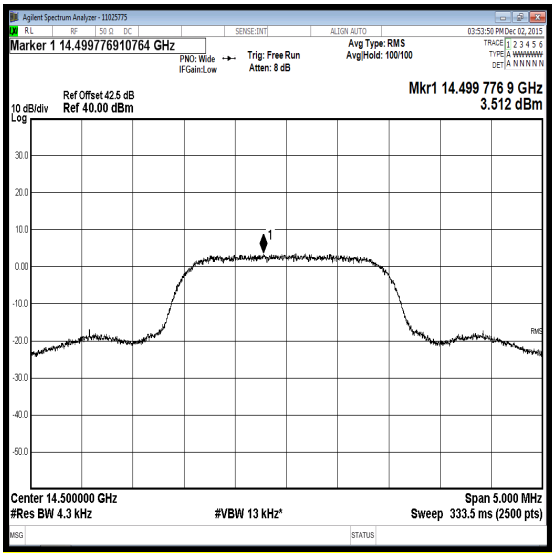
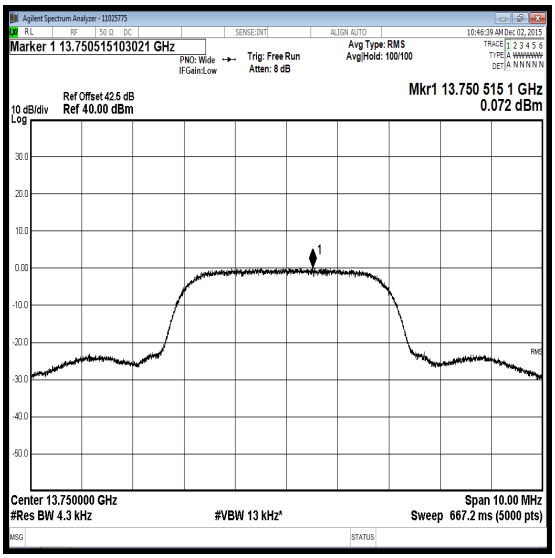


Top Channel

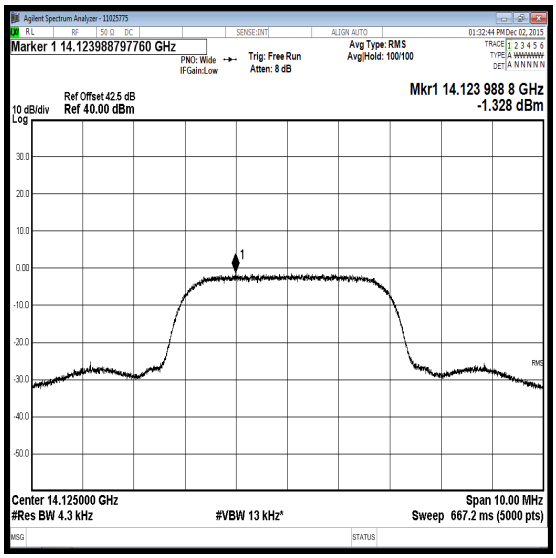
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF256 / Vertical

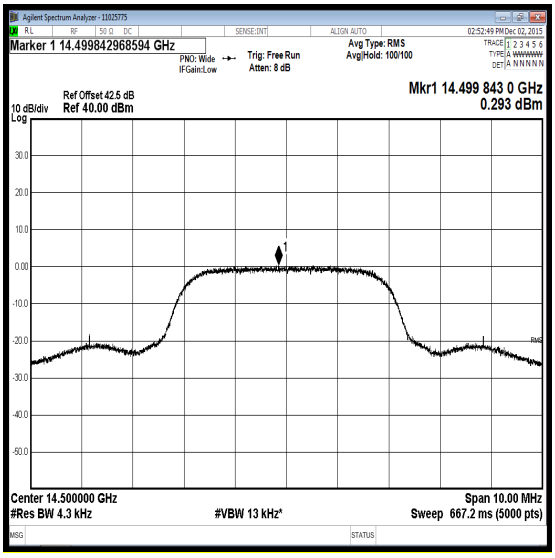
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	0.6	-29.4	38.9	9.5	40.0	30.5	Complied
Middle	-0.8	-30.8	39.2	8.4	40.0	31.6	Complied
Top	0.8	-29.2	39.4	10.2	40.0	29.8	Complied



Bottom Channel



Middle Channel

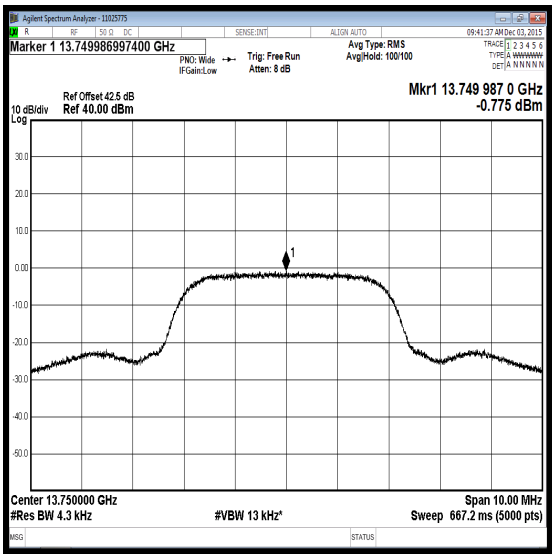


Top Channel

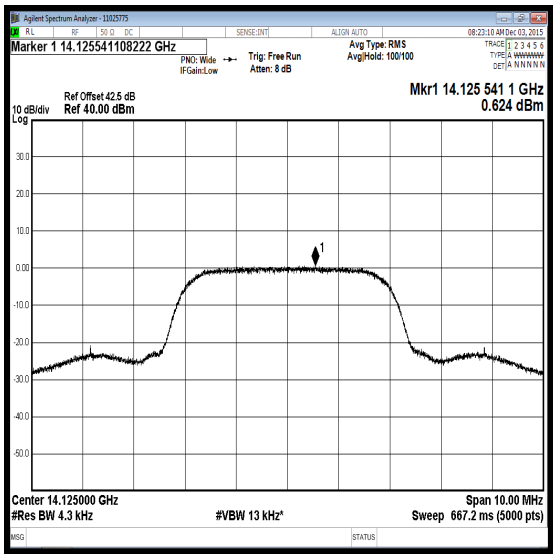
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF256 / Horizontal

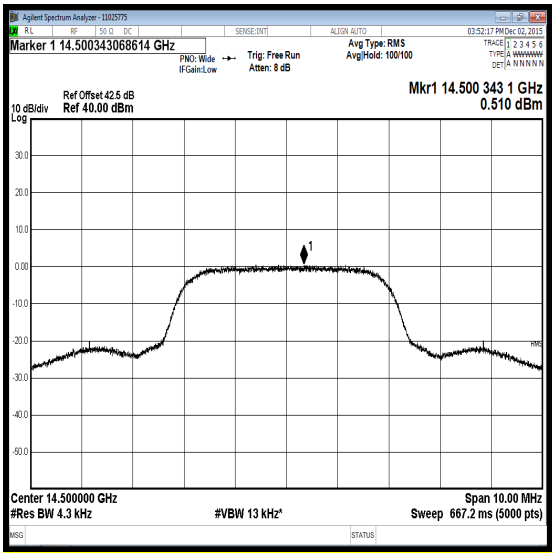
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-0.3	-30.3	38.9	8.6	40.0	31.4	Complied
Middle	1.1	-28.9	39.2	10.3	40.0	29.7	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

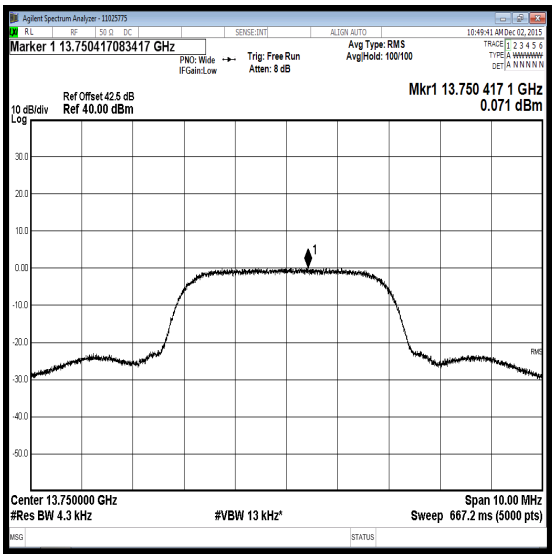


Top Channel

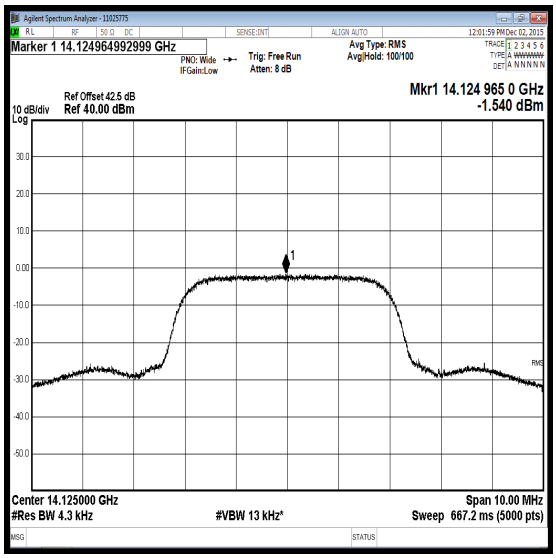
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF128 / Vertical

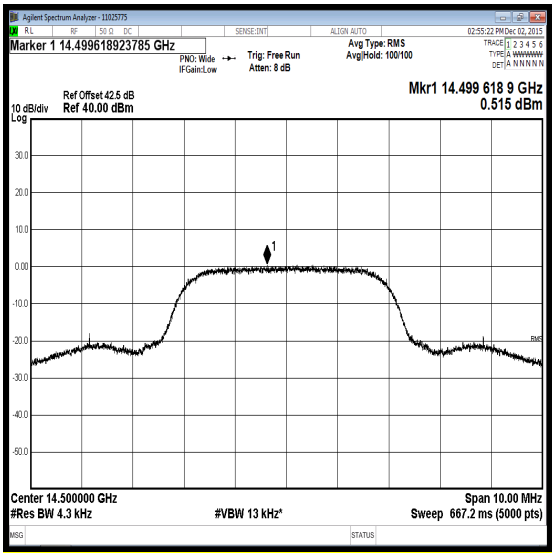
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	0.6	-29.4	38.9	9.5	40.0	30.5	Complied
Middle	-1.0	-31.0	39.2	8.2	40.0	31.8	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

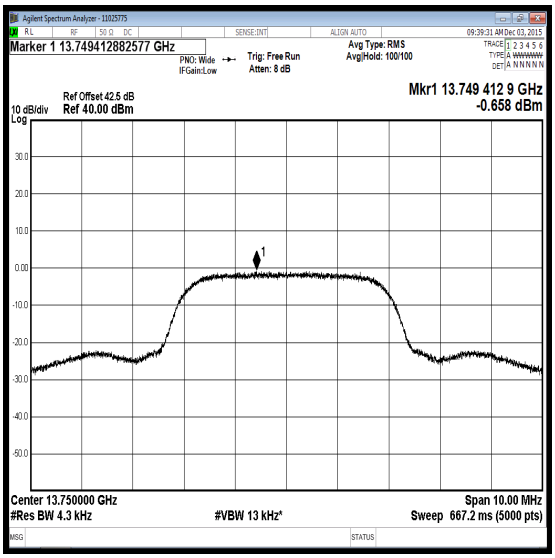


Top Channel

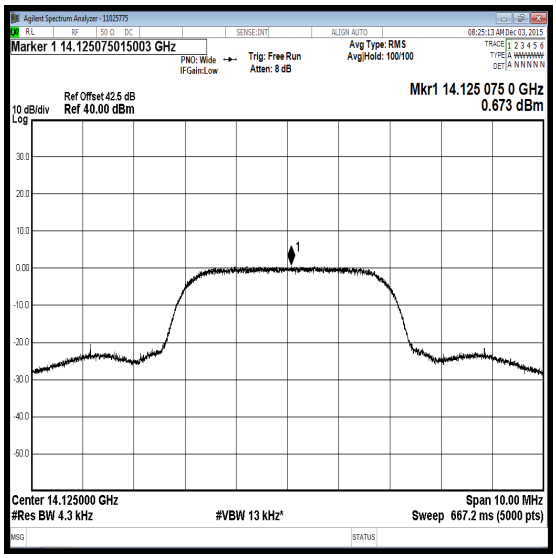
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF128 / Horizontal

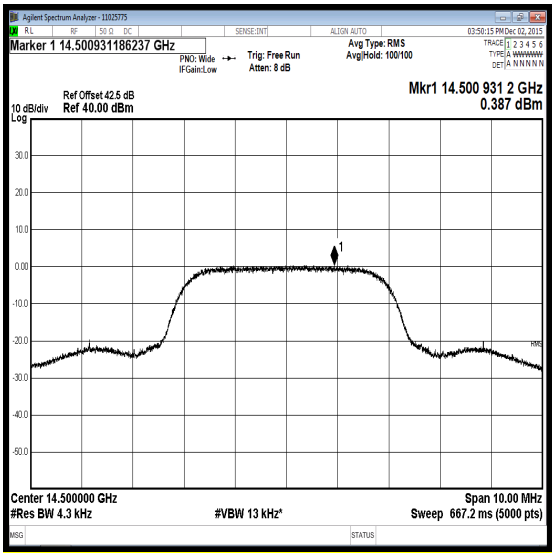
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-0.2	-30.2	38.9	8.7	40.0	31.3	Complied
Middle	1.2	-28.8	39.2	10.4	40.0	29.6	Complied
Top	0.9	-29.1	39.4	10.3	40.0	29.7	Complied



Bottom Channel



Middle Channel

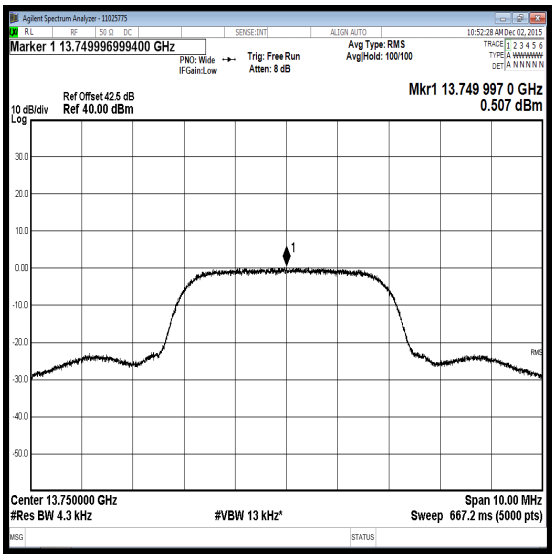


Top Channel

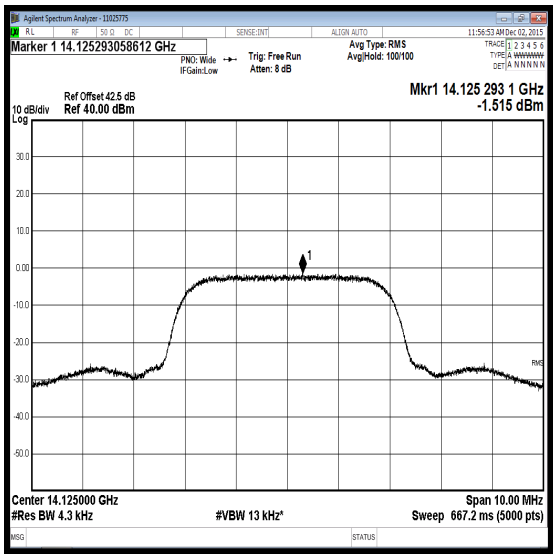
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF64 / Vertical

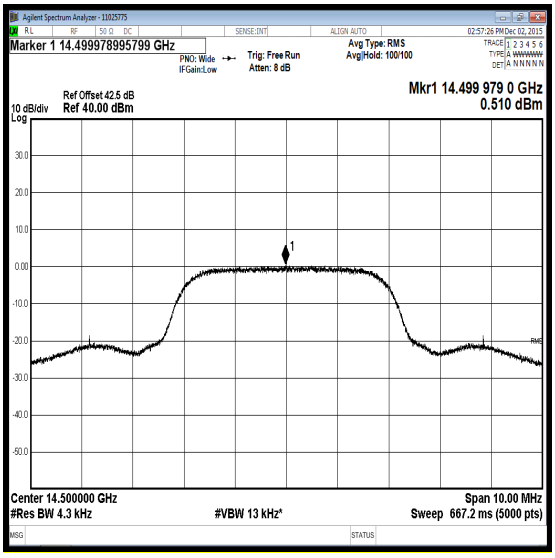
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	1.0	-29.0	38.9	9.9	40.0	30.1	Complied
Middle	-1.0	-31.0	39.2	8.2	40.0	31.8	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

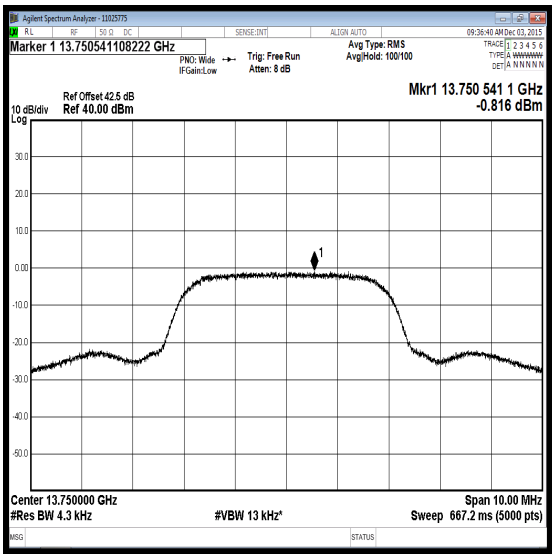


Top Channel

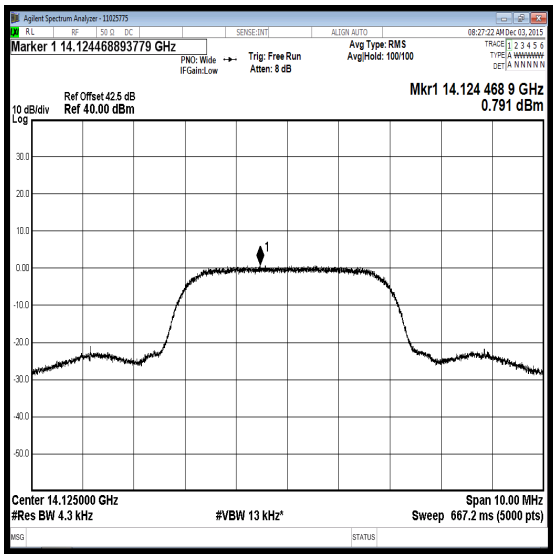
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF64 / Horizontal

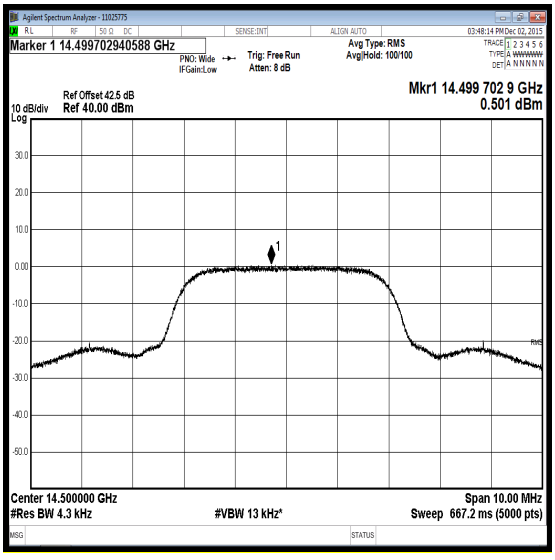
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-0.3	-30.3	38.9	8.6	40.0	31.4	Complied
Middle	1.3	-28.7	39.2	10.5	40.0	29.5	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

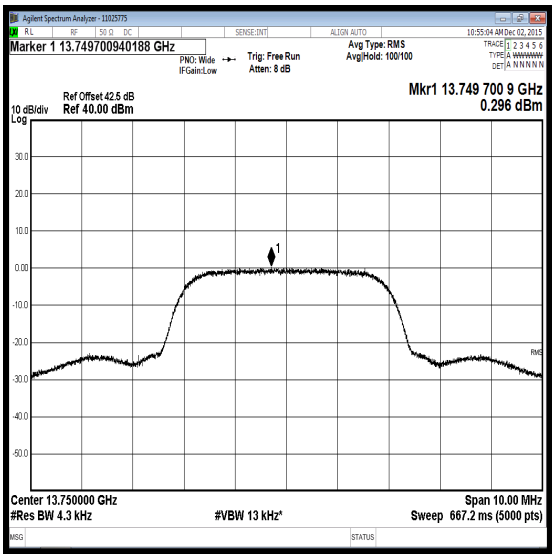


Top Channel

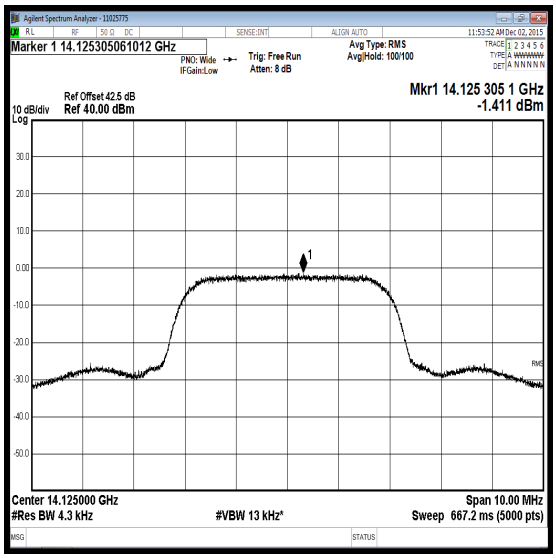
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF32 / Vertical

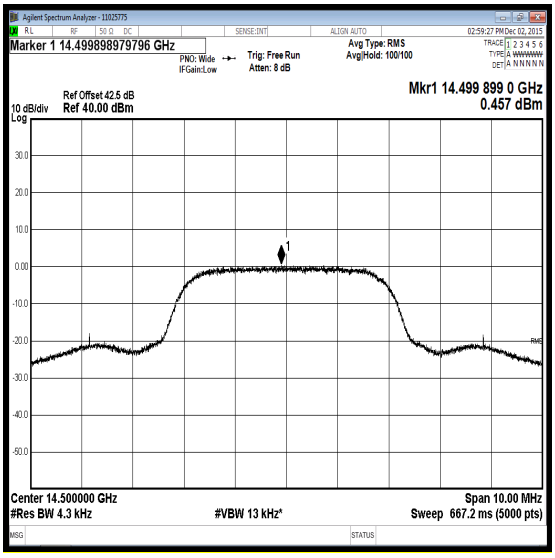
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	0.8	-29.2	38.9	9.7	40.0	30.3	Complied
Middle	-0.9	-30.9	39.2	8.3	40.0	31.7	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

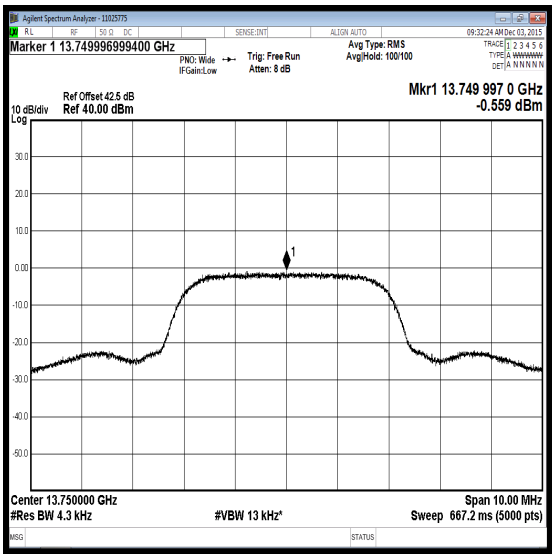


Top Channel

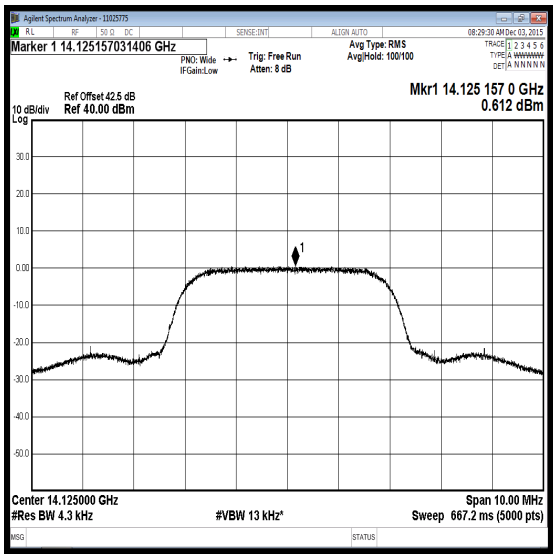
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF32 / Horizontal

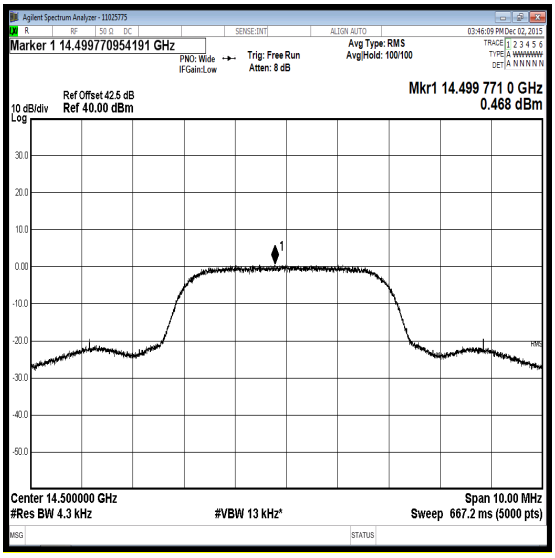
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-0.1	-30.1	38.9	8.8	40.0	31.2	Complied
Middle	1.1	-28.9	39.2	10.3	40.0	29.7	Complied
Top	1.0	-29.0	39.4	10.4	40.0	29.6	Complied



Bottom Channel



Middle Channel

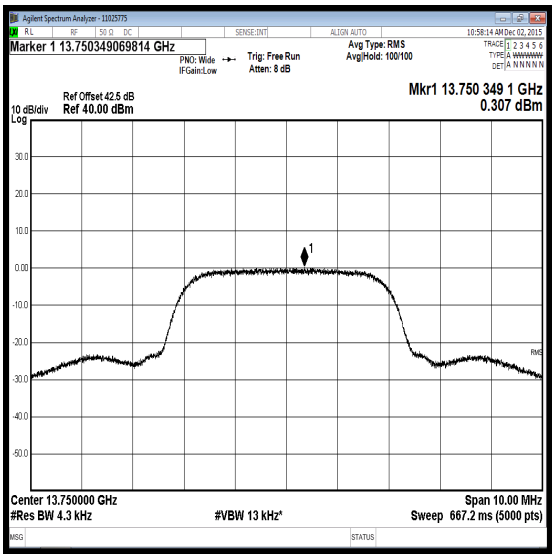


Top Channel

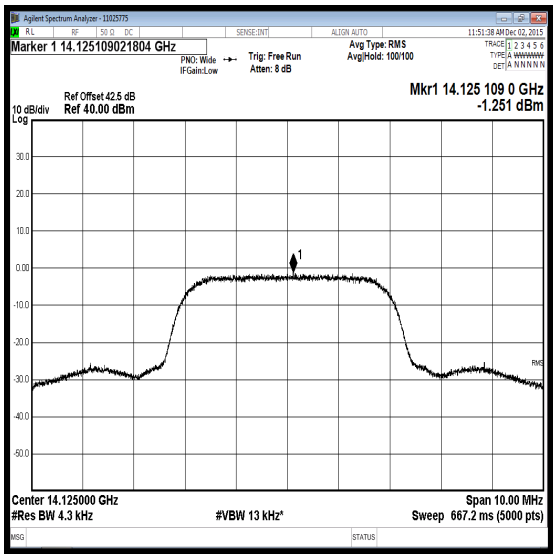
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF16 / Vertical

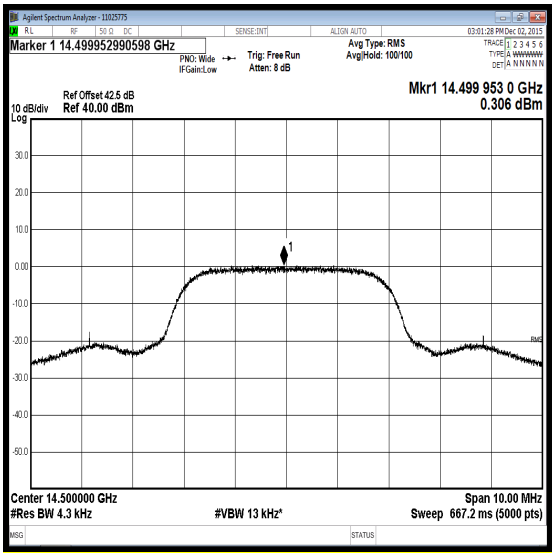
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	0.8	-29.2	38.9	9.7	40.0	30.3	Complied
Middle	-0.8	-30.8	39.2	8.4	40.0	31.6	Complied
Top	0.8	-29.2	39.4	10.2	40.0	29.8	Complied



Bottom Channel



Middle Channel

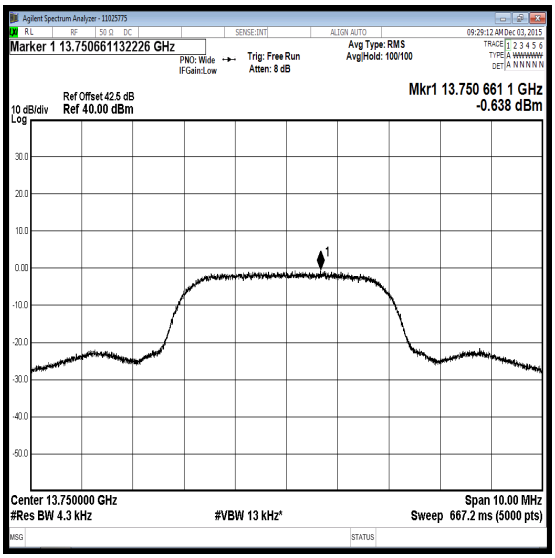


Top Channel

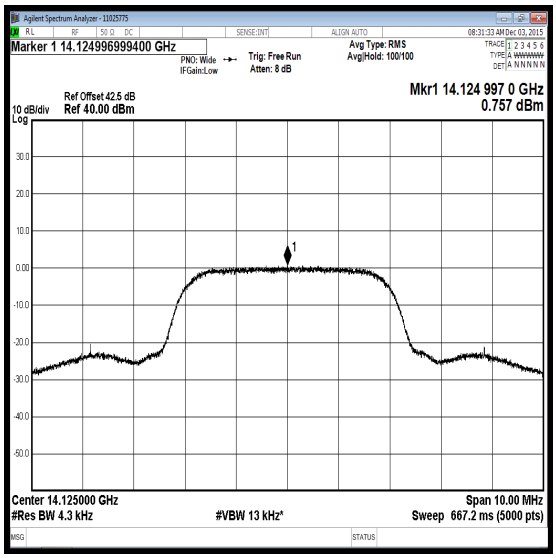
Transmitter Power Spectral Density (continued)

Results: 5 MHz / SF16 / Horizontal

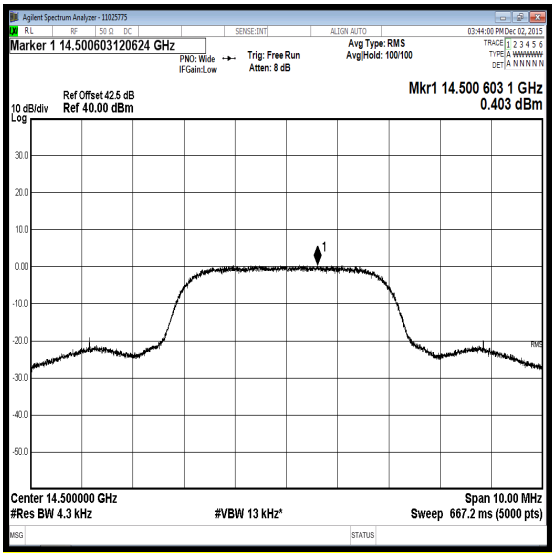
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-0.1	-30.1	38.9	8.8	40.0	31.2	Complied
Middle	1.3	-28.7	39.2	10.5	40.0	29.5	Complied
Top	0.9	-29.1	39.4	10.3	40.0	29.7	Complied



Bottom Channel



Middle Channel

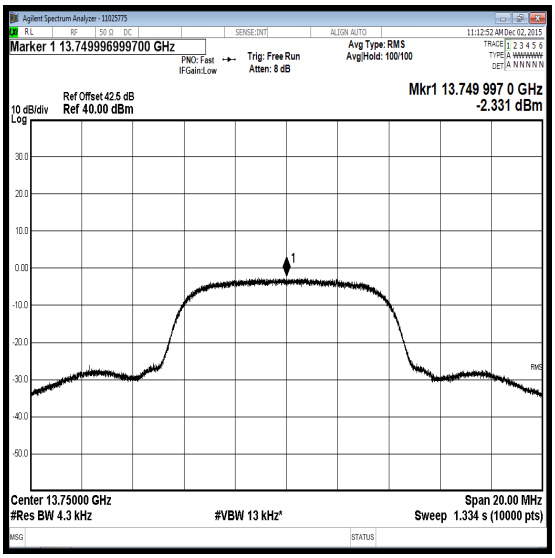


Top Channel

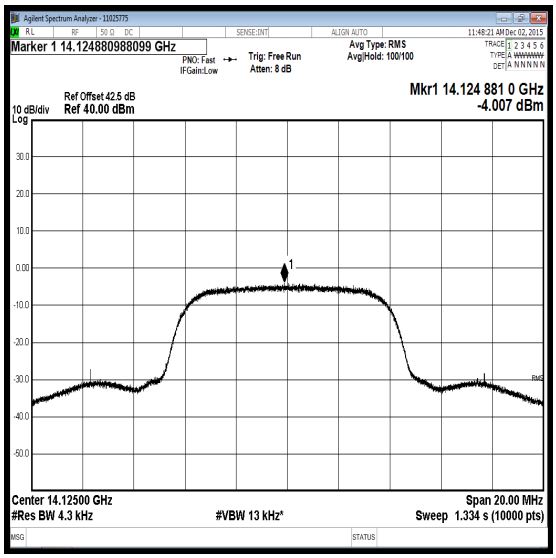
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF256 / Vertical

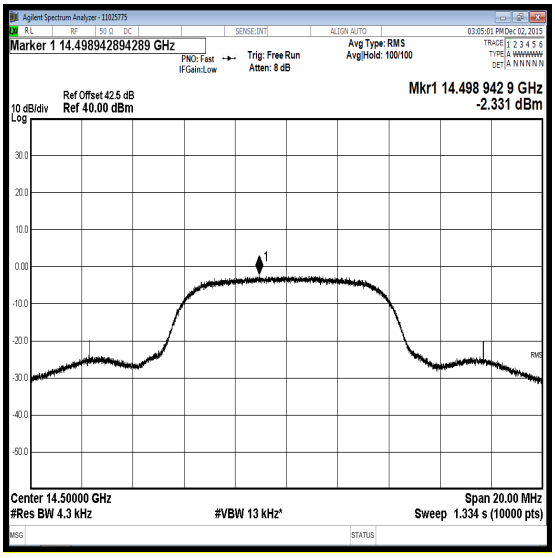
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-1.8	-31.8	38.9	7.1	40.0	32.9	Complied
Middle	-3.5	-33.5	39.2	5.7	40.0	34.3	Complied
Top	-1.8	-31.8	39.4	7.6	40.0	32.4	Complied



Bottom Channel



Middle Channel

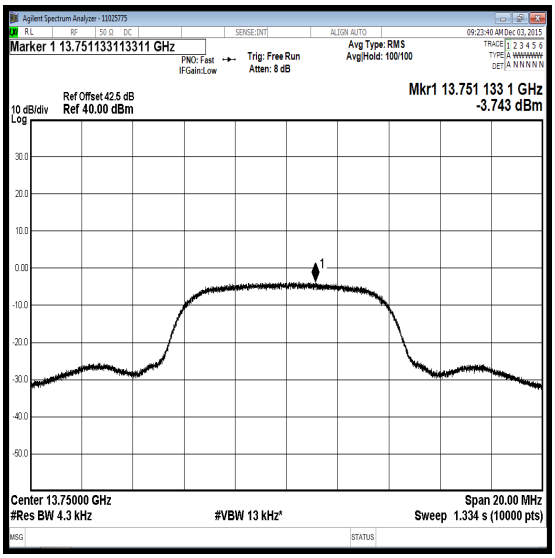


Top Channel

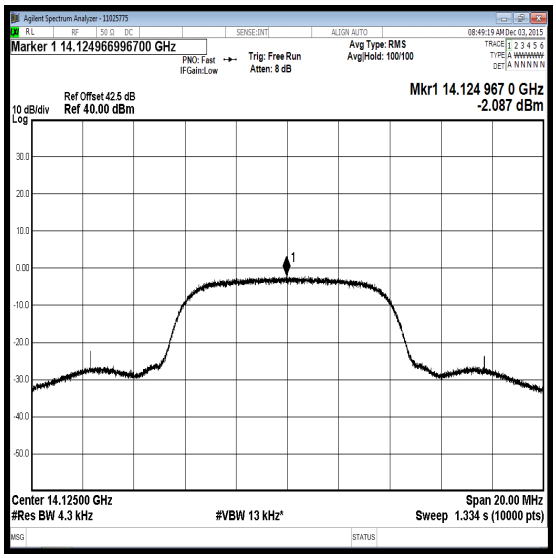
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF256 / Horizontal

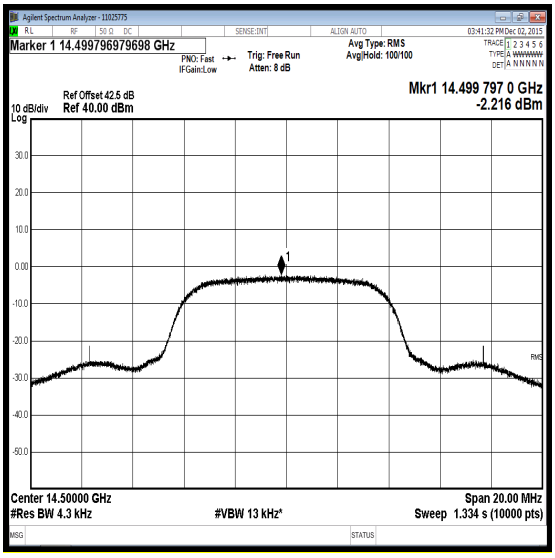
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-3.2	-33.2	38.9	5.7	40.0	34.3	Complied
Middle	-1.6	-31.6	39.2	7.6	40.0	32.4	Complied
Top	-1.7	-31.7	39.4	7.7	40.0	32.3	Complied



Bottom Channel



Middle Channel

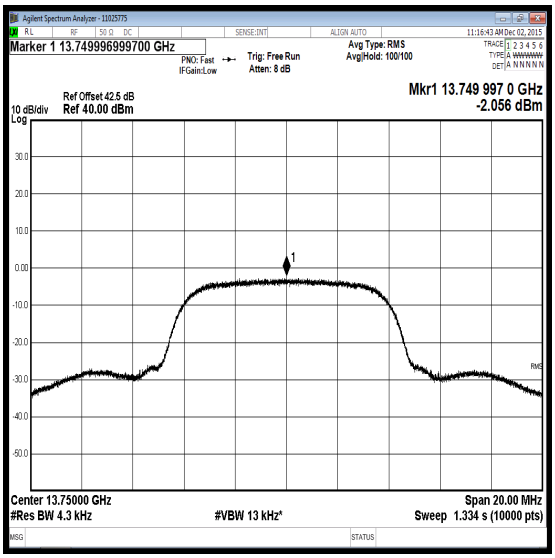


Top Channel

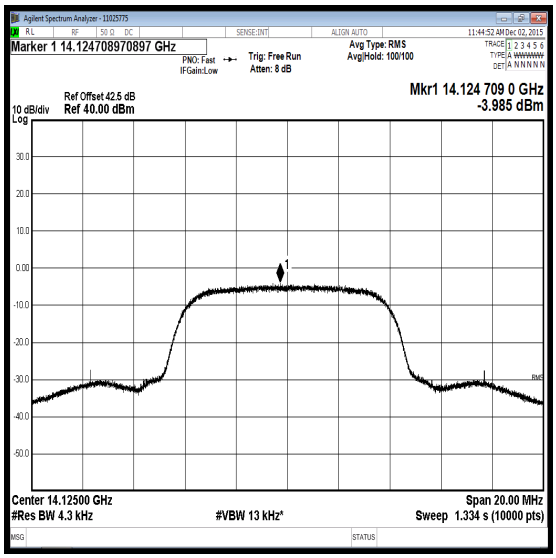
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF128 / Vertical

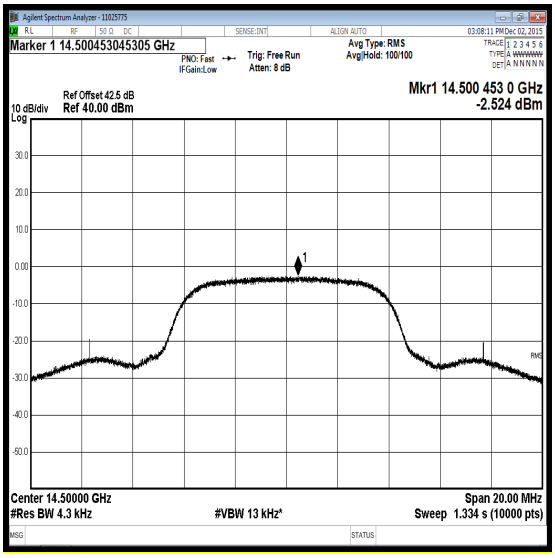
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-1.6	-31.6	38.9	7.3	40.0	32.7	Complied
Middle	-3.5	-33.5	39.2	5.7	40.0	34.3	Complied
Top	-2.0	-32.0	39.4	7.4	40.0	32.6	Complied



Bottom Channel



Middle Channel

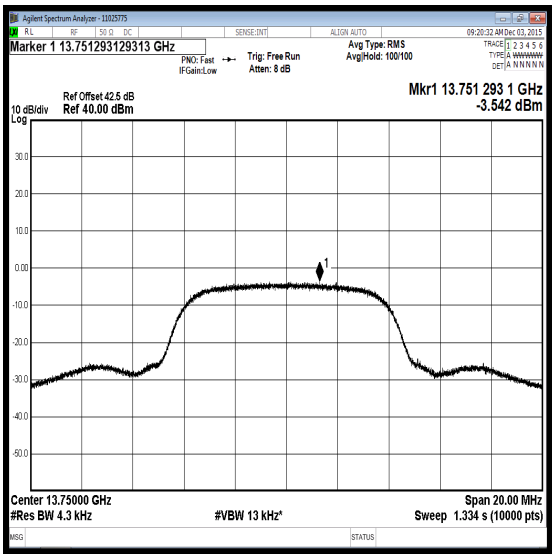


Top Channel

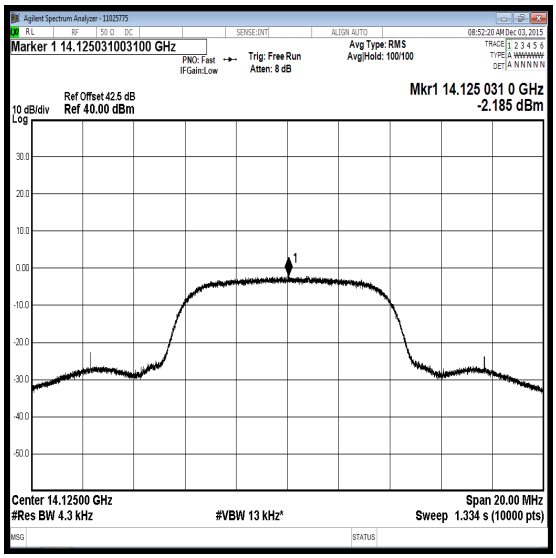
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF128 / Horizontal

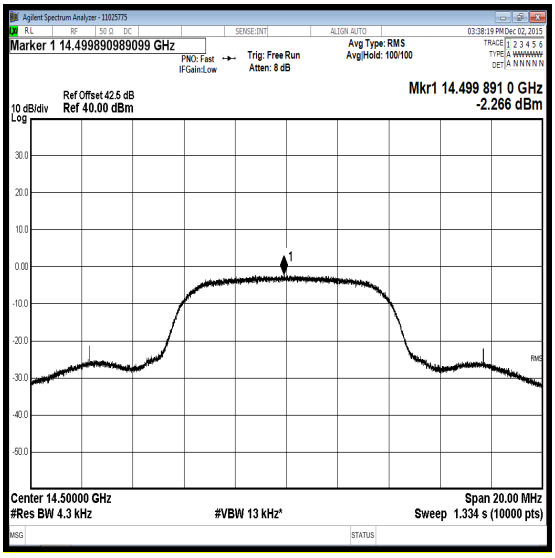
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-3.0	-33.0	38.9	5.9	40.0	34.1	Complied
Middle	-1.7	-31.7	39.2	7.5	40.0	32.5	Complied
Top	-1.8	-31.8	39.4	7.6	40.0	32.4	Complied



Bottom Channel



Middle Channel

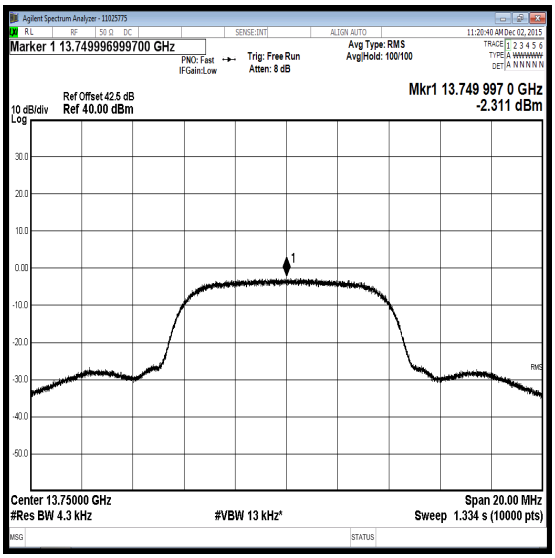


Top Channel

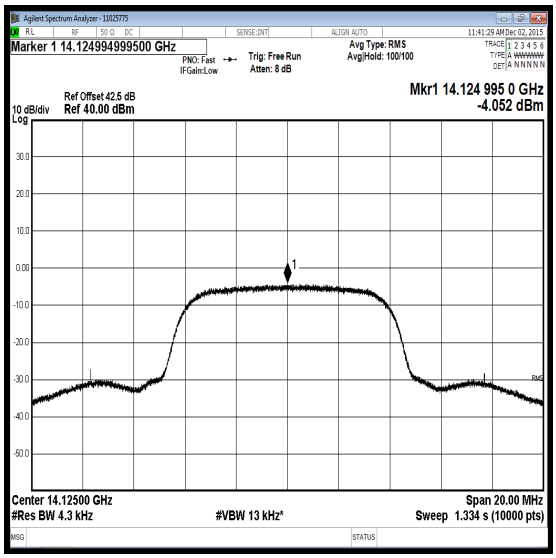
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF64 / Vertical

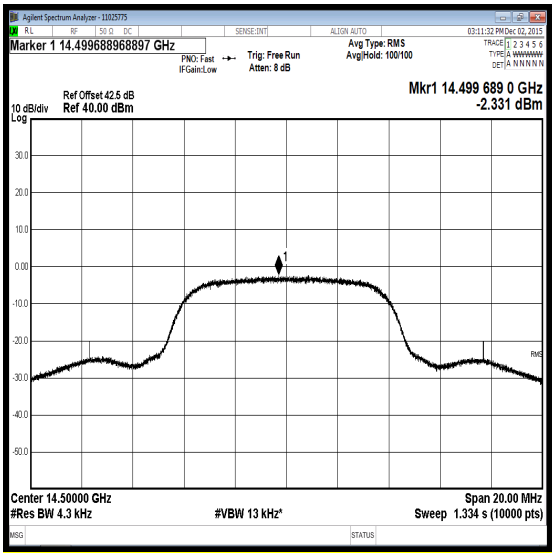
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-1.8	-31.8	38.9	7.1	40.0	32.9	Complied
Middle	-3.6	-33.6	39.2	5.6	40.0	34.4	Complied
Top	-1.8	-31.8	39.4	7.4	40.0	32.4	Complied



Bottom Channel



Middle Channel

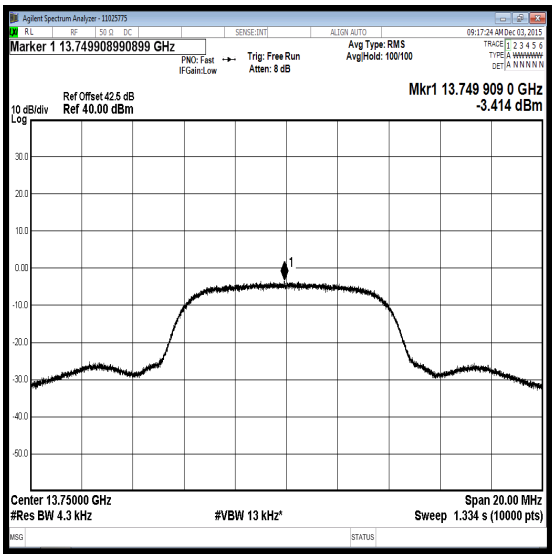


Top Channel

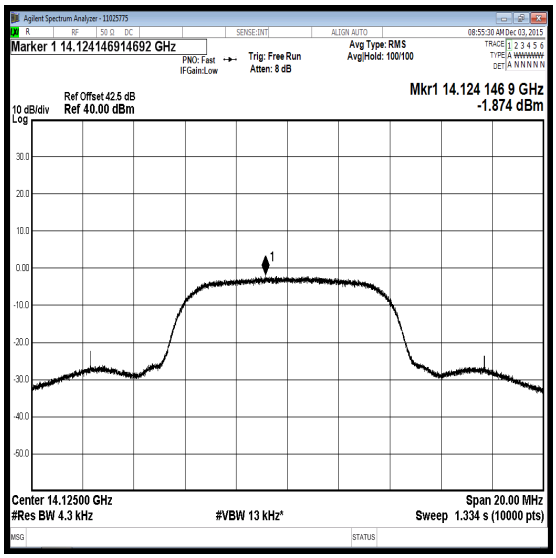
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF64 / Horizontal

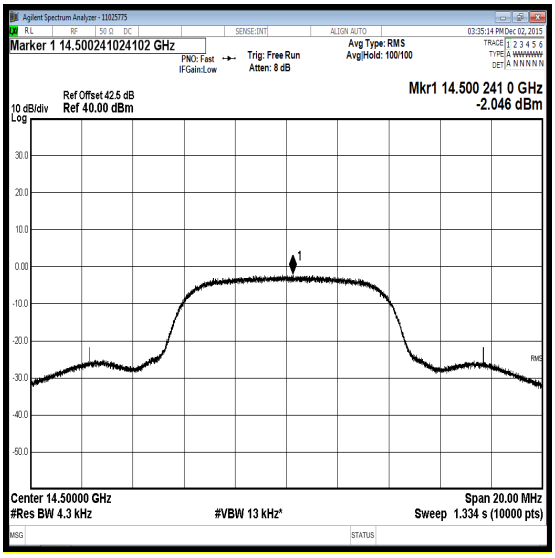
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-2.9	-32.9	38.9	6.0	40.0	34.0	Complied
Middle	-1.4	-31.4	39.2	7.8	40.0	32.2	Complied
Top	-1.5	-31.5	39.4	7.9	40.0	32.1	Complied



Bottom Channel



Middle Channel

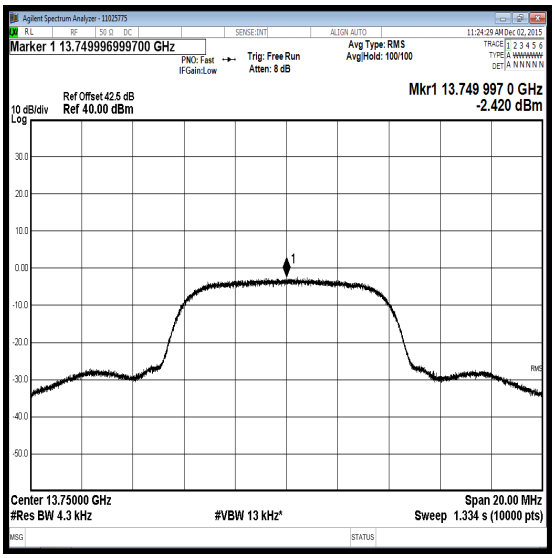


Top Channel

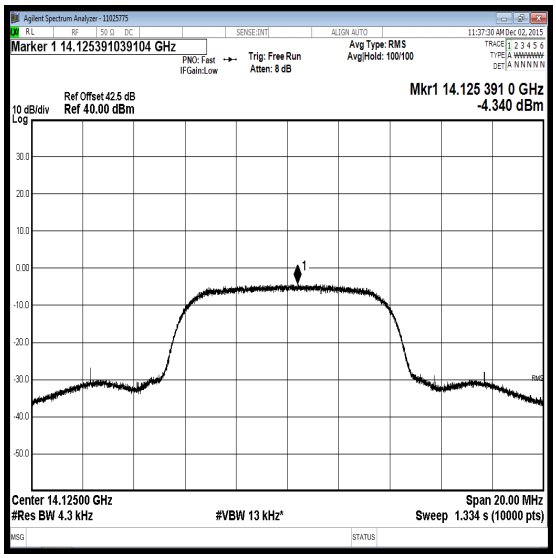
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF32 / Vertical

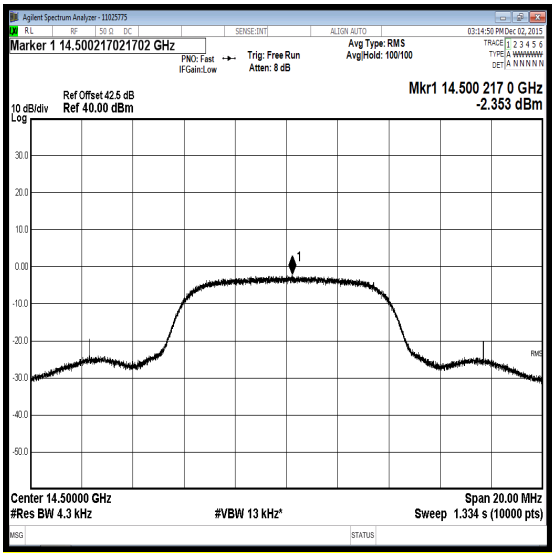
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-1.9	-31.9	38.9	7.0	40.0	33.0	Complied
Middle	-3.8	-33.8	39.2	5.4	40.0	34.6	Complied
Top	-1.9	-31.9	39.4	7.5	40.0	32.5	Complied



Bottom Channel



Middle Channel

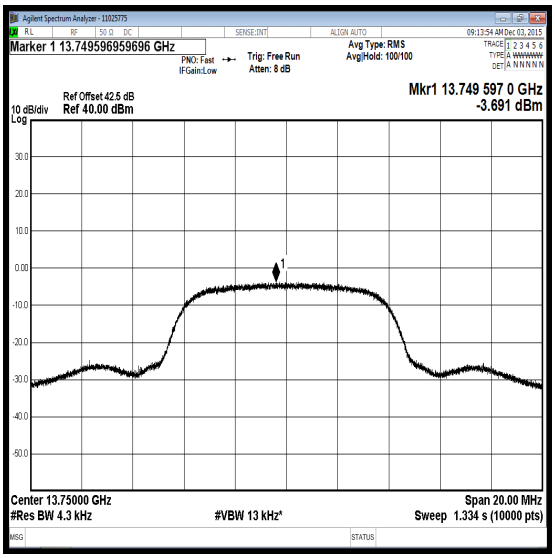


Top Channel

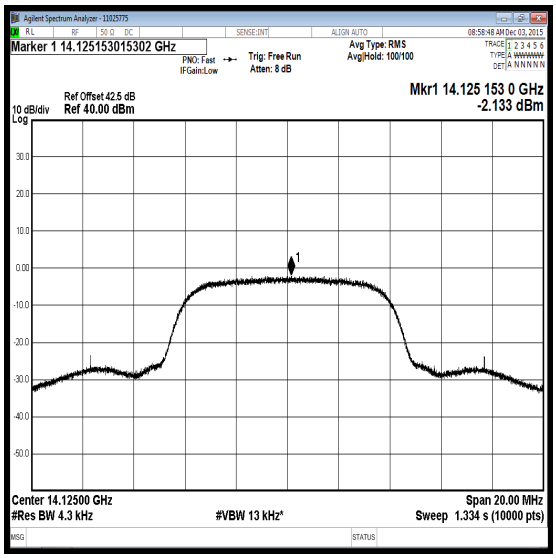
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF32 / Horizontal

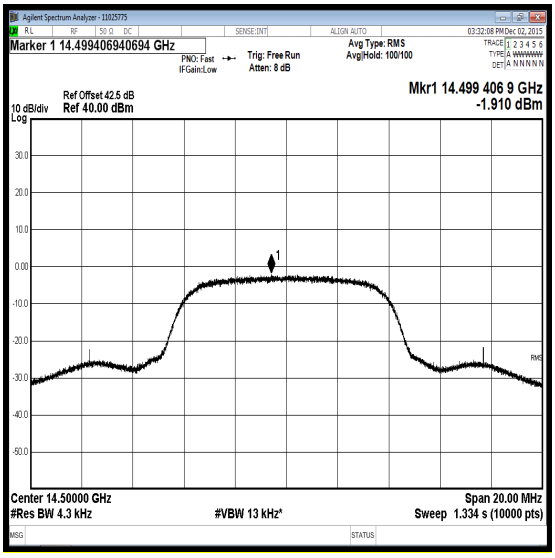
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-3.2	-33.2	38.9	5.7	40.0	34.3	Complied
Middle	-1.6	-31.6	39.2	7.6	40.0	32.4	Complied
Top	-1.4	-31.4	39.4	8.0	40.0	32.0	Complied



Bottom Channel



Middle Channel

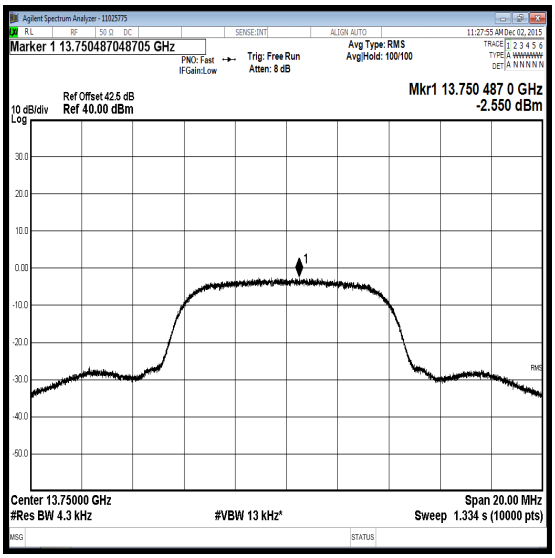


Top Channel

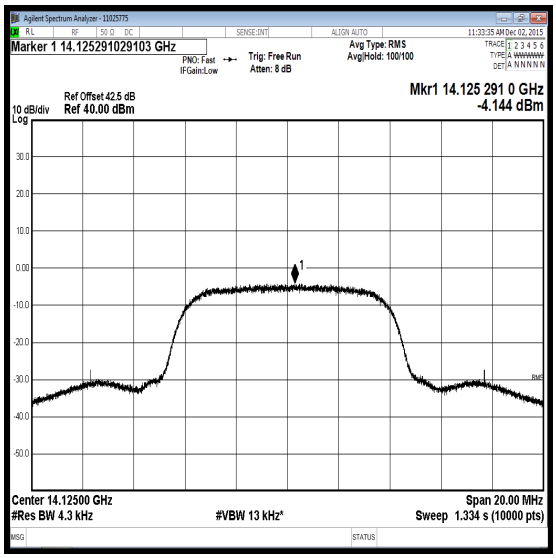
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF16 / Vertical

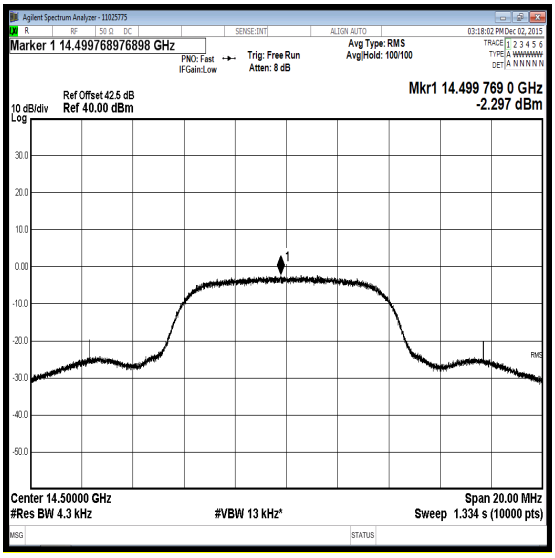
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-2.1	-32.1	38.9	6.8	40.0	33.2	Complied
Middle	-3.6	-33.6	39.2	5.6	40.0	34.4	Complied
Top	-1.8	-31.8	39.4	7.6	40.0	32.4	Complied



Bottom Channel



Middle Channel

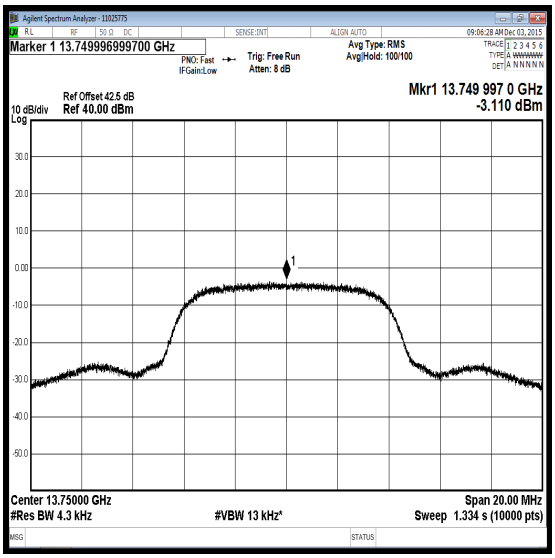


Top Channel

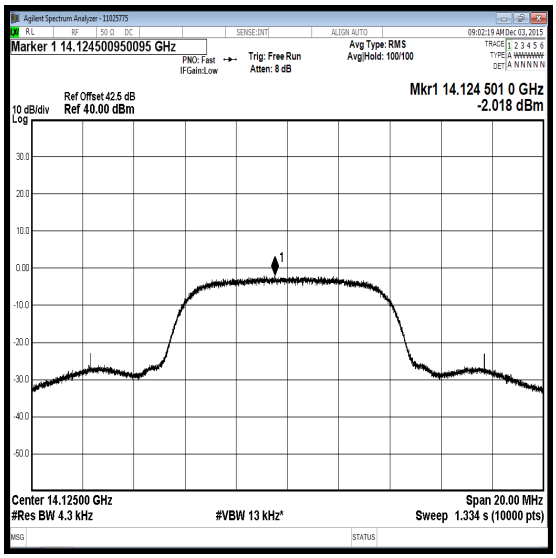
Transmitter Power Spectral Density (continued)

Results: 10 MHz / SF16 / Horizontal

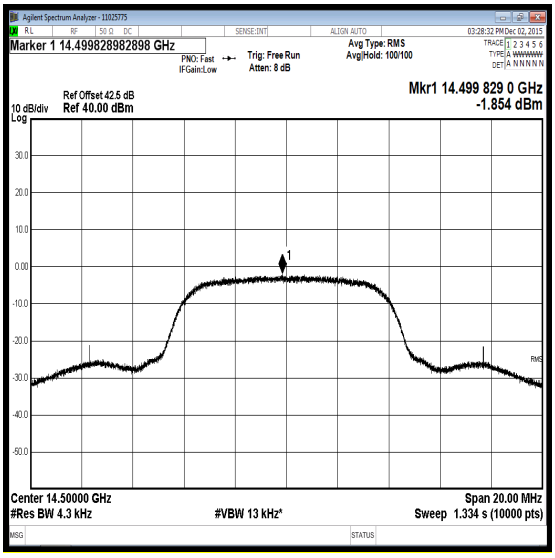
Channel	Output Power (dBm / 4 kHz)	Output Power (dBW / 4 kHz)	Antenna Gain (dBi)	EIRP (dBW / 4 kHz)	EIRP Limit (dBW / 4 kHz)	Margin (dB)	Result
Bottom	-2.6	-32.6	38.9	6.3	40.0	33.7	Complied
Middle	-1.5	-31.5	39.2	7.7	40.0	32.3	Complied
Top	-1.4	-31.4	39.4	8.0	40.0	32.0	Complied



Bottom Channel



Middle Channel



Top Channel

Transmitter Power Spectral Density (continued)

Test Equipment Used:

Asset No.	Instrument	Manufacturer	Type No.	Serial No.	Date Calibration Due	Cal. Interval (Months)
M1659	Thermohygrometer	JM Handelspunkt	30.5015.13	Not stated	23 Apr 2016	12
A2526	Attenuator	AtlanTecRF	AN18W5-20	832828#1	Calibrated before use	-
A2523	Attenuator	AtlanTecRF	AN18W5-10	832827#1	Calibrated before use	-
A2524	Attenuator	AtlanTecRF	AN18W5-10	832827#2	Calibrated before use	-
C1363	Coax Cable	Rosenberger Micro-Coax	FA147A	68088-01	Calibrated before use	-
M1832	Spectrum Analyser	Agilent	N9010A	MY53470303	26 Mar 2016	24
G085	Signal Generator	Hewlett Packard	83650L	3614A00104	11 Nov 2016	24
M1145	Power Meter	Hewlett Packard	437B	3737U26557	11 Aug 2016	12
M1592	Power Sensor	Hewlett Packard	8487A	3318A02094	22 Sep 2016	12
A2554	Terminator	Micronde	R404610	Not stated	Calibrated before use	-
A2555	Terminator	Micronde	R404610	Not stated	Calibrated before use	-

5.2.2. Transmitter Occupied Bandwidth (Bandwidth Limitations)

Test Summary:

Test Engineer:	Ben Mercer	**Test Date:**	03 December 2015
Test Sample Serial Numbers:	311510061 & 3115155009		

FCC Reference:	Part 2.1049
Test Method Used:	FCC KDB 971168 Section 4.2

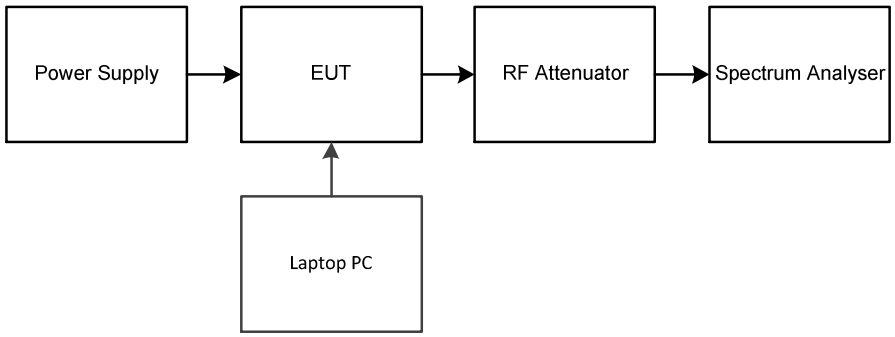
Environmental Conditions:

Temperature (°C):	25
Relative Humidity (%):	41

Note(s):

1. Occupied Bandwidth tests were performed using a spectrum analyser in accordance with FCC KDB 971168 Section 4.2.
2. The spectrum analyser resolution bandwidth was set to between 1% and 5% of the occupied bandwidth. The video bandwidth was set to at least 3 times the resolution bandwidth. The frequency span was set to five times the authorised bandwidth in order to capture all modulation products.
3. A max hold trace with peak detector was employed over 100 sweeps, and the 99% bandwidth function of the analyser was used to measure the occupied bandwidth.

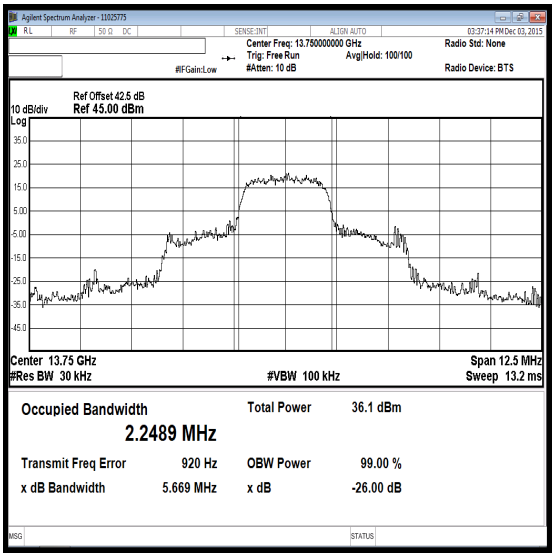
Test setup:



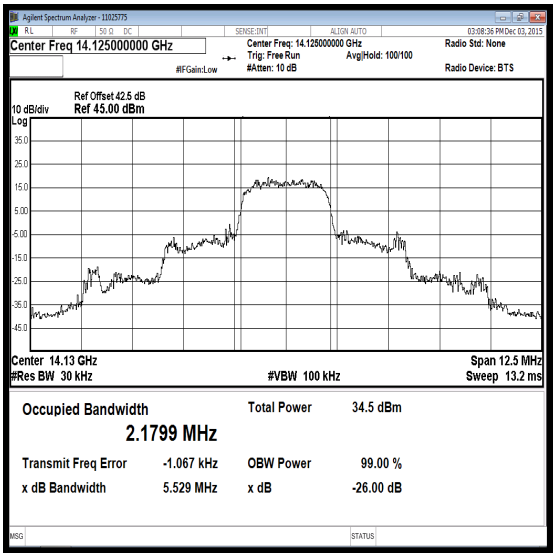
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF128 / Vertical

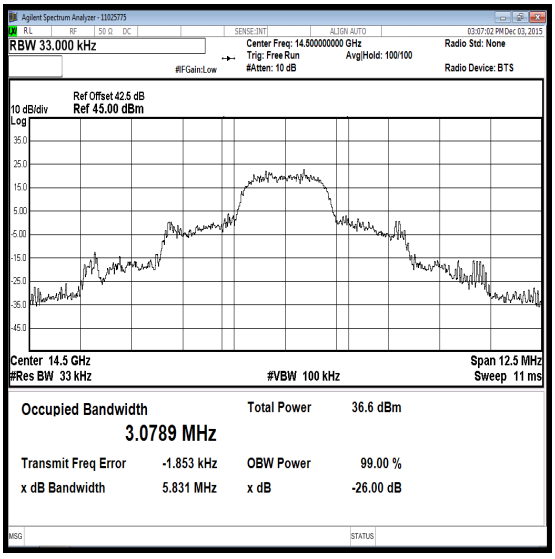
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.249
Middle	30	100	2.180
Top	33	100	3.079



Bottom Channel



Middle Channel

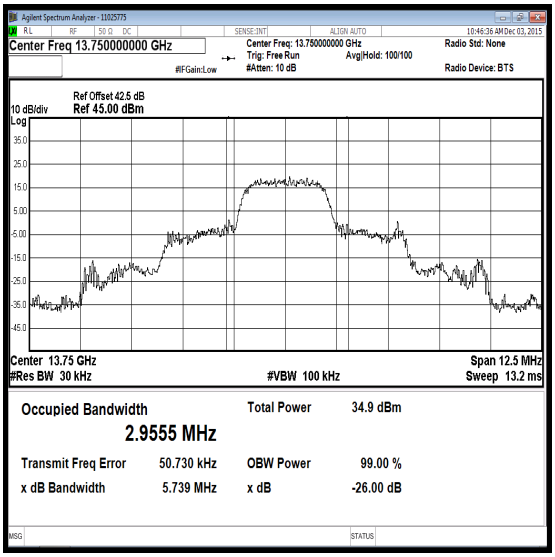


Top Channel

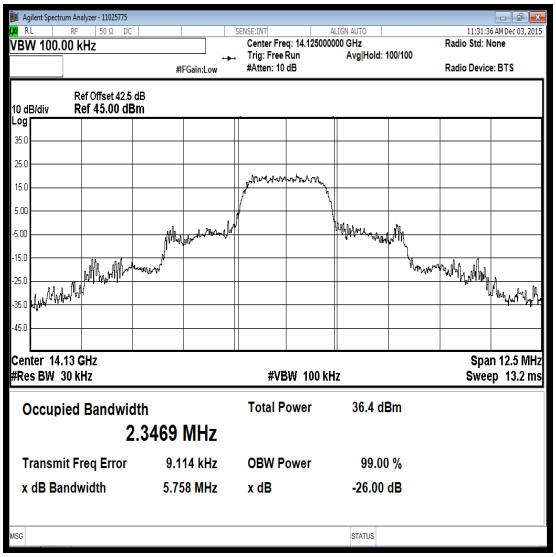
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF128 / Horizontal

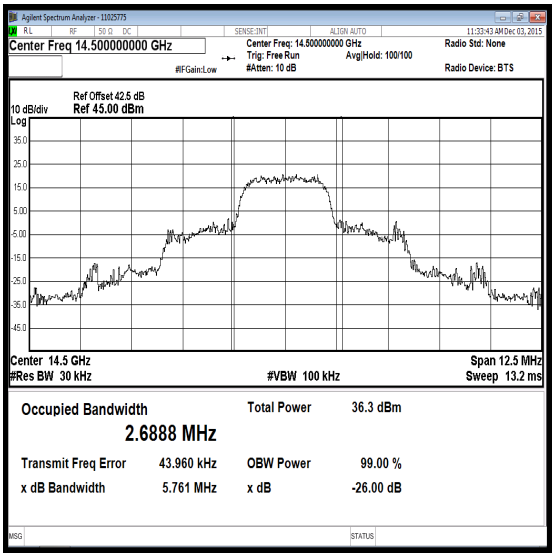
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.956
Middle	30	100	2.347
Top	30	100	2.689



Bottom Channel



Middle Channel

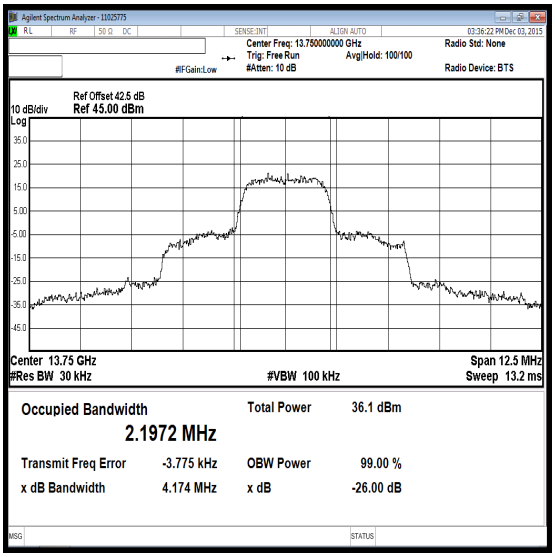


Top Channel

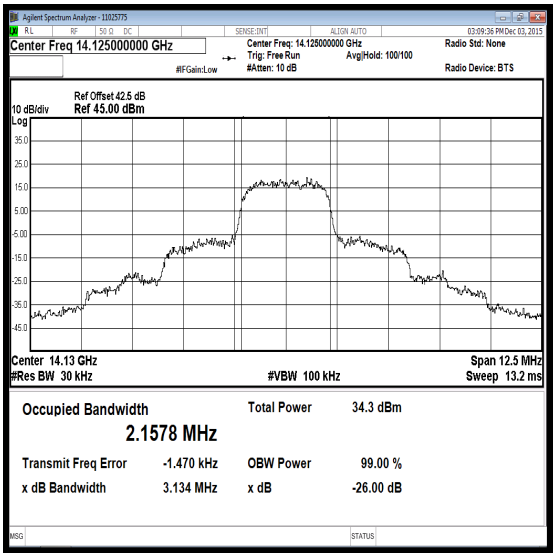
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF64 / Vertical

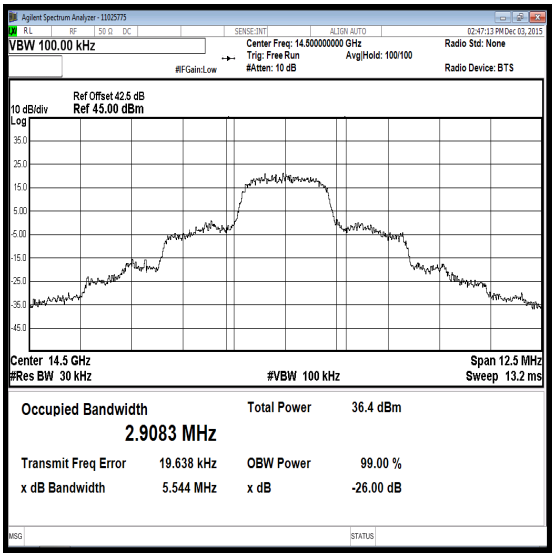
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.197
Middle	30	100	2.158
Top	30	100	2.908



Bottom Channel



Middle Channel

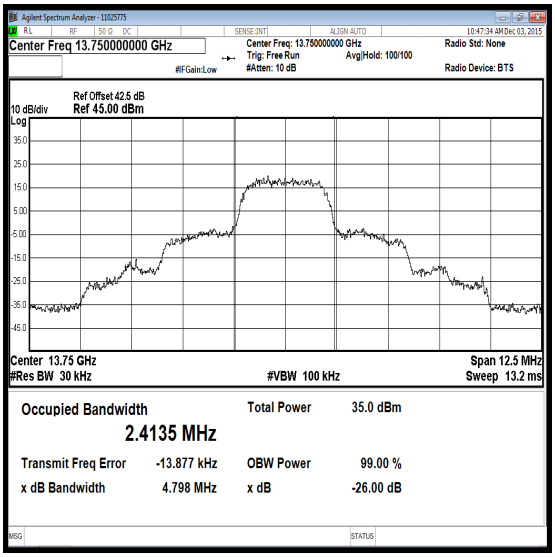


Top Channel

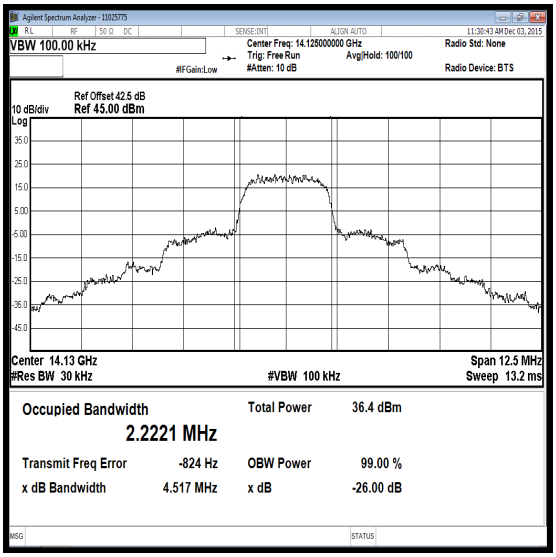
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF64 / Horizontal

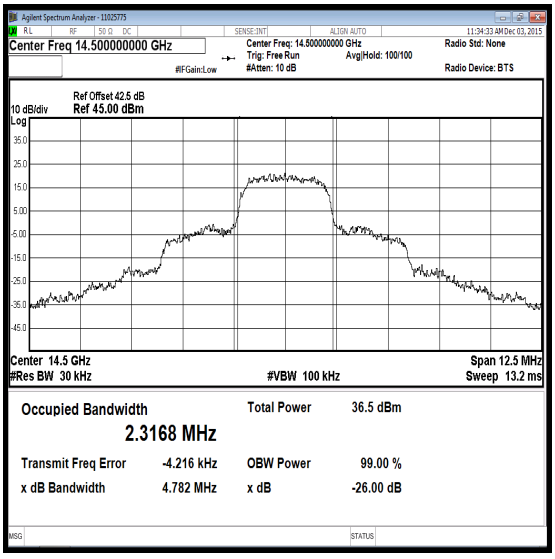
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.414
Middle	30	100	2.222
Top	30	100	2.317



Bottom Channel



Middle Channel

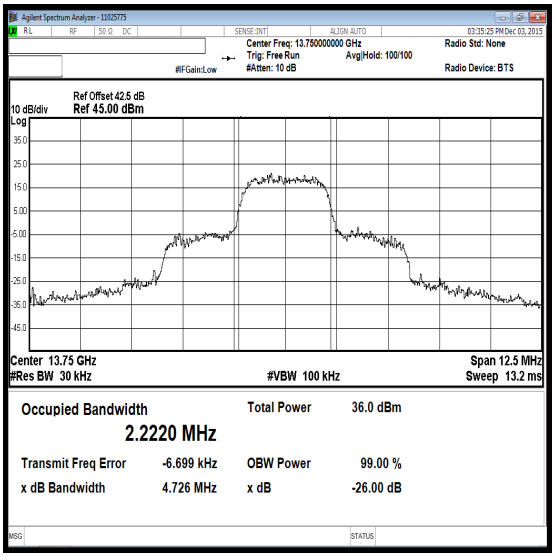


Top Channel

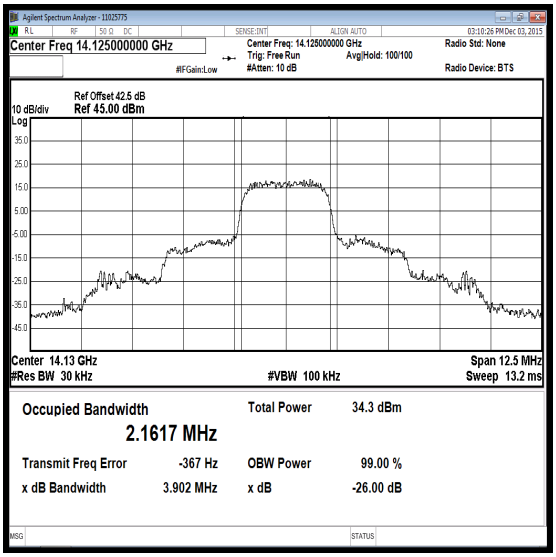
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF32 / Vertical

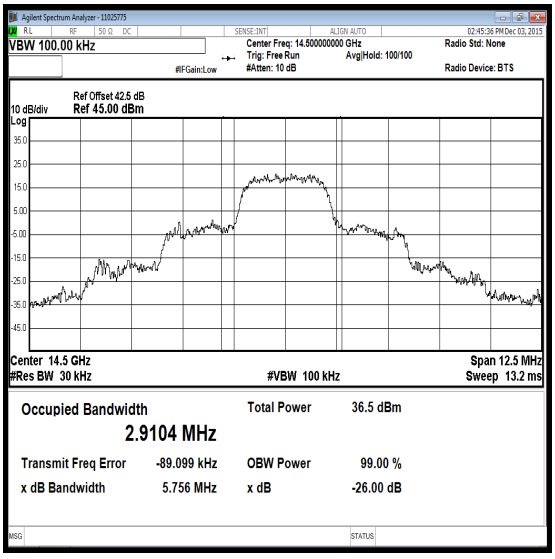
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.222
Middle	30	100	2.162
Top	30	100	2.910



Bottom Channel



Middle Channel

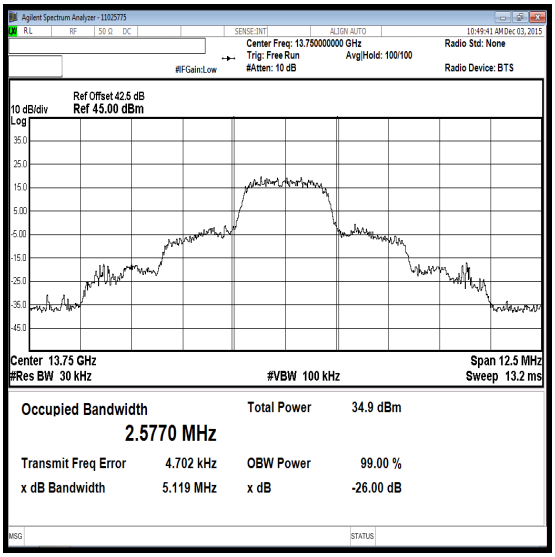


Top Channel

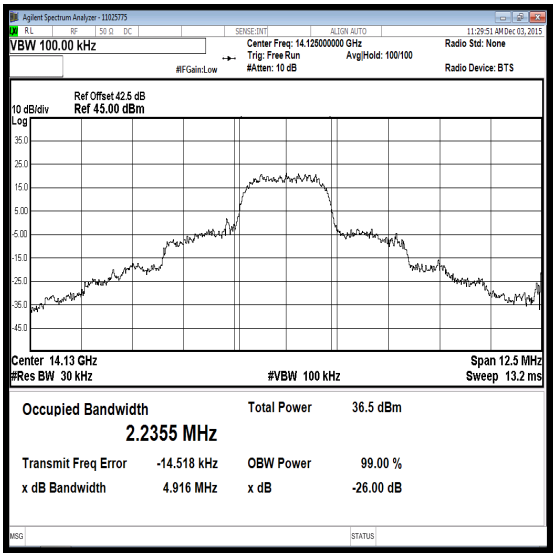
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF32 / Horizontal

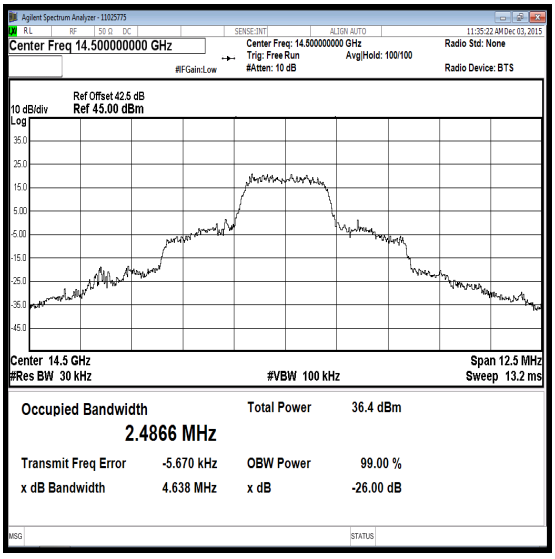
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.577
Middle	30	100	2.236
Top	30	100	2.487



Bottom Channel



Middle Channel

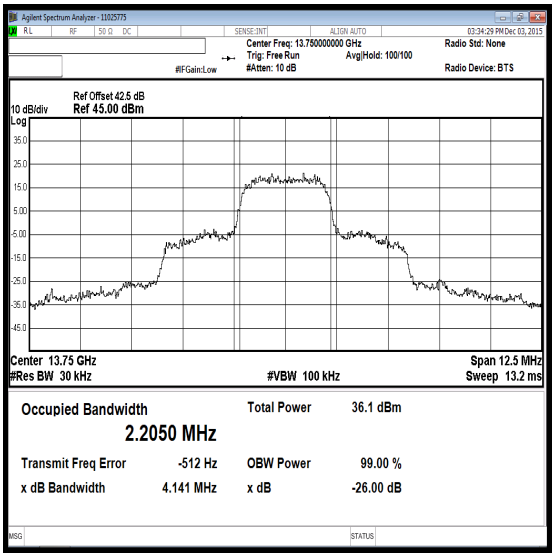


Top Channel

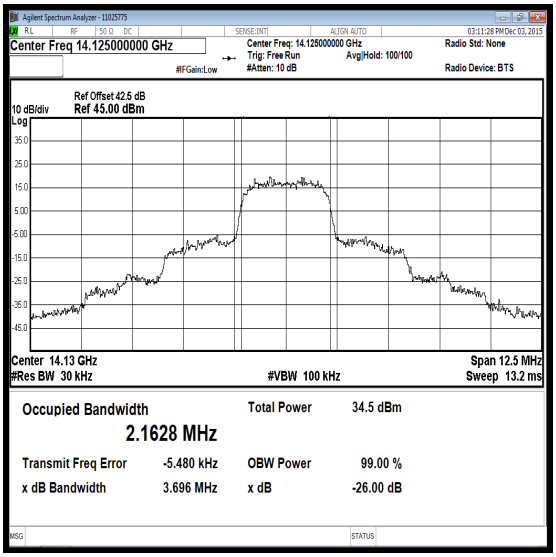
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF16 / Vertical

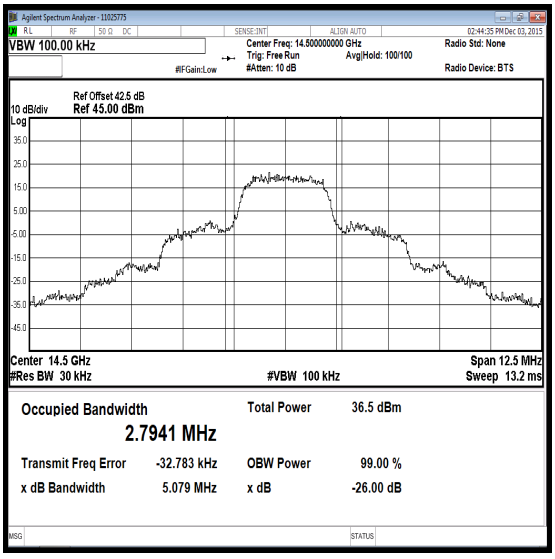
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.205
Middle	30	100	2.163
Top	30	100	2.794



Bottom Channel



Middle Channel

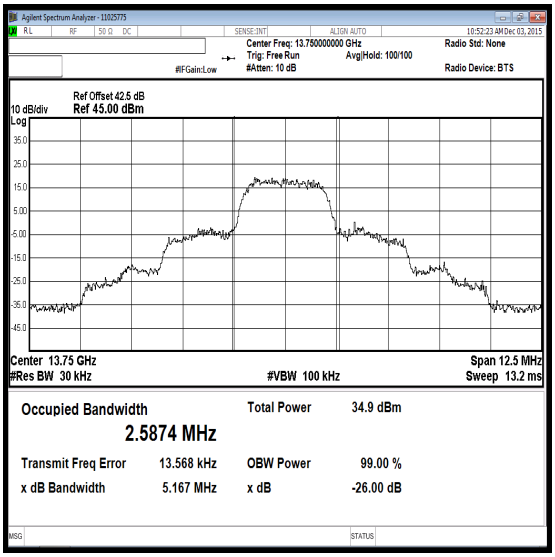


Top Channel

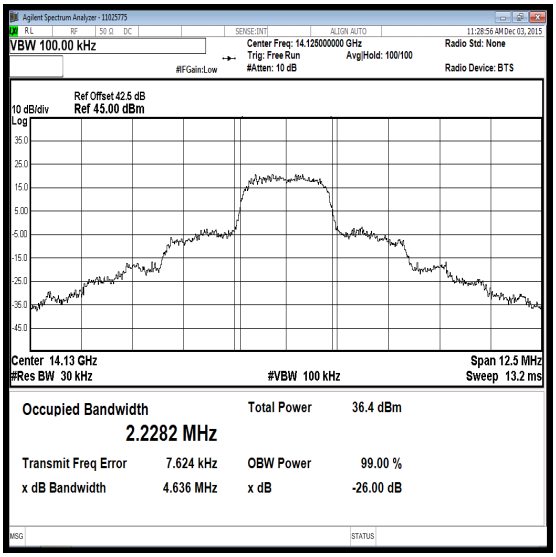
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 2.5 MHz / SF16 / Horizontal

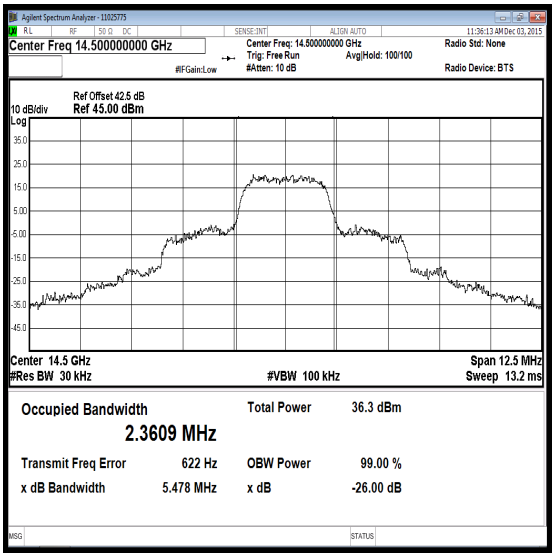
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	30	100	2.587
Middle	30	100	2.228
Top	30	100	2.361



Bottom Channel



Middle Channel

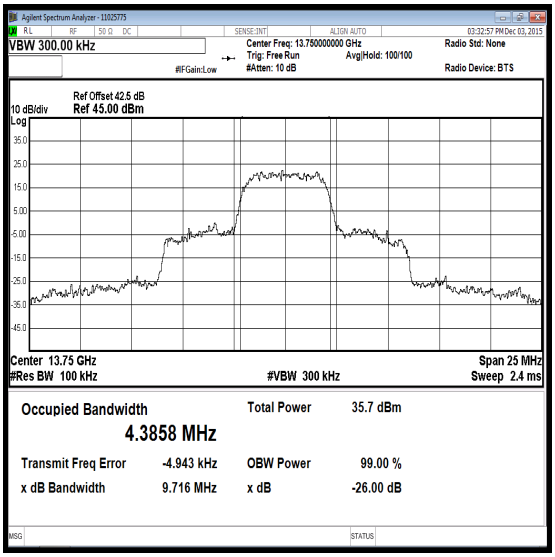


Top Channel

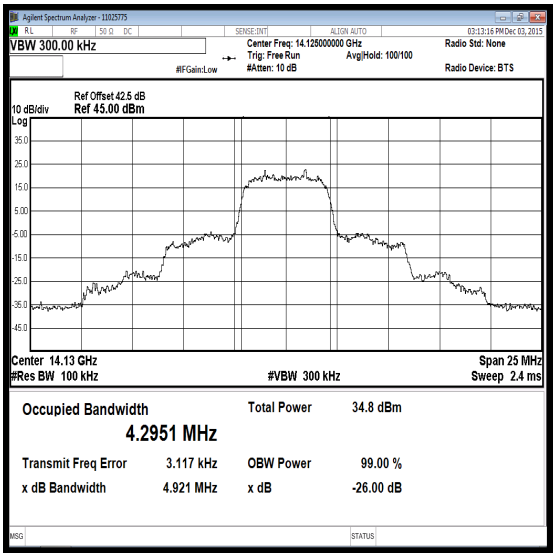
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 5 MHz / SF256 / Vertical

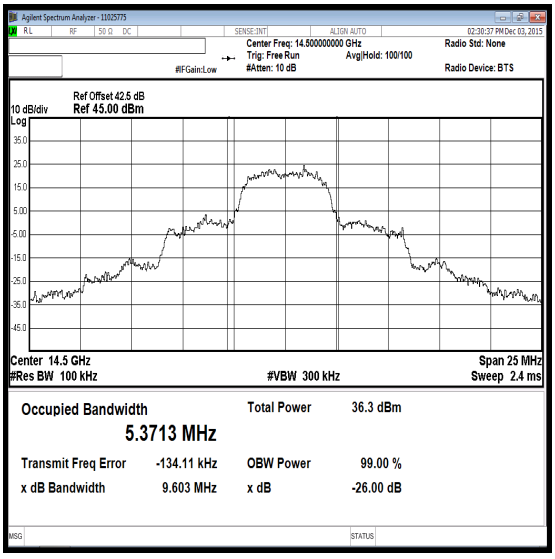
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	100	300	4.386
Middle	100	300	4.295
Top	100	300	5.371



Bottom Channel



Middle Channel

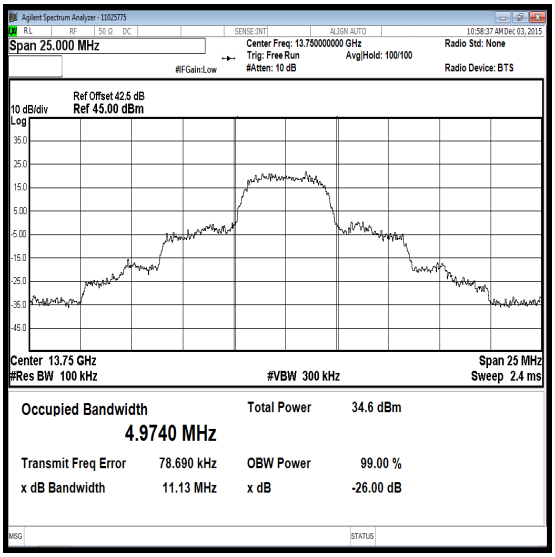


Top Channel

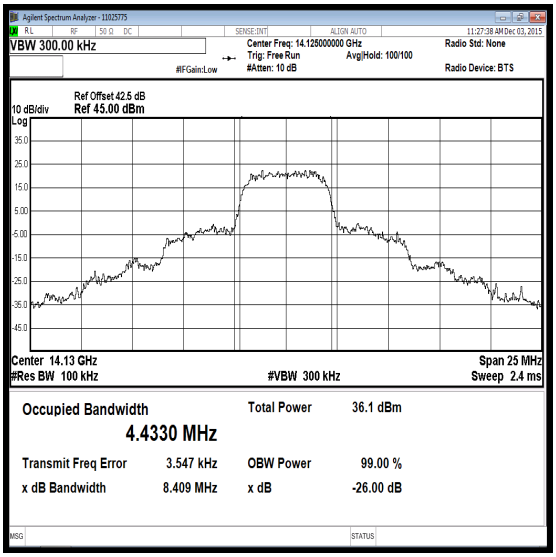
Transmitter Occupied Bandwidth (Bandwidth Limitations) (continued)

Results: 5 MHz / SF256 / Horizontal

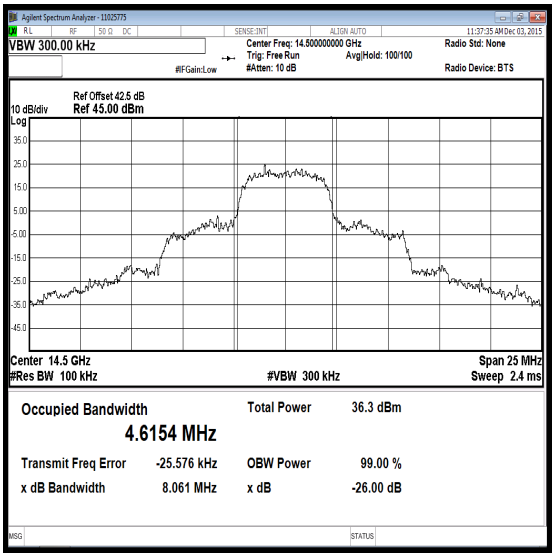
Channel	RBW (kHz)	VBW (kHz)	Occupied Bandwidth (MHz)
Bottom	100	300	4.974
Middle	100	300	4.433
Top	100	300	4.615



Bottom Channel



Middle Channel



Top Channel