Electromagnetic Compatibility Test Report

Tests Performed on a Fybr

Parking Lot Sensor Transciever, Model Sensor III

Radiometrics Document RP-8292

ACCREDITED
TESTING CERT #1495.01

Product Detail:
FCC ID: 2ALBF5009 IC: 22374-5009 Equipment type: Low power transmitter
Test Standards:
US CFR Title 47, Chapter I, FCC Part 15 Subpart C FCC Part 15 CFR Title 47: 2016 Industry Canada RSS-247, Issue 2 This report concerns: Original Grant for Certification FCC Part 15.247

Tests Performed For:	*Test Facility:*
Fybr 640 Cepi Dr., Ste C Chesterfield, MO 63005	**Radiometrics Midwest Corporation** 12 Devonwood Avenue Romeoville, IL 60446-1349 (815) 293-0772

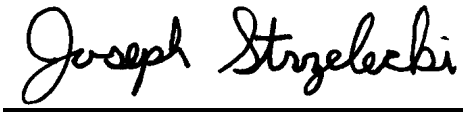
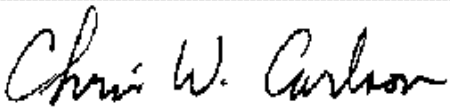
Test Date(s): (Month-Day-Year)
May 17 thru August 1, 2017

Document RP-8292 Revisions:

Rev.	Issue Date	Affected Sections	Revised By
0	August 10, 2017		
1	August 22, 2017	1.0 & 11.4	Joseph Strzelecki

Table of Contents

1.0 ADMINISTRATIVE DATA

Equipment Under Test:	
A Fybr, Parking Lot Sensor Model: Sensor III Serial Number: 0004A3817707 This will be referred to as the EUT in this Report	
Date EUT Received at Radiometrics: (Month-Day-Year)	*Test Date(s): (Month-Day-Year)*
January 27, 2017,	May 17 to August 2, 2017
Test Report Written By:	*Test Witnessed By:*
Joseph Strzelecki Senior EMC Engineer	The tests were not witnessed by Fybr Fybr
Radiometrics' Personnel Responsible for Test:	*Test Report Approved By*
 Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	 Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2.0 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Parking Lot Sensor, Model Sensor III, manufactured by Fybr. The detailed test results are presented in a separate section. The following is a summary of the test results.

Emissions Tests Results

Environmental Phenomena	Frequency Range	FCC Section	RSS- Section	Test Result
6 dB Bandwidth Test	902-928 MHz	15.247 a	RSS-247 (5.2)	Pass
20 dB Bandwidth Test	902-928 MHz	15.247 a	RSS GEN (8.8)	Pass
Peak Output Power	902-928 MHz	15.247 b	RSS-247 (5.4d)	Pass
Spurious Radiated Emissions	30 MHz to 9.5 GHz	15.247 d	RSS-247 (3.3)	Pass
Antenna conducted Unwanted Emissoins	30 MHz to 9.5 GHz	15.247 d	RSS-247 (5.5)	
Power Spectral Density	902-928 MHz	15.247 e	RSS-247 (5.2b)	Pass
RF Radiated Emissions (Unintential Radiation Receive mode)	30-5,000 MHz	15.209	GEN; 7.1.2	Pass

Note: The RSS-210 specification is not currently covered in Radiometrics' Scope of Accreditation. This is technically very similar to FCC, CFR 47 Part 15 which is on Radiometrics scope.

2.1 RF Exposure Compliance Requirements

Since the power output is 10 mW, the EUT meets the FCC requirement for RF exposure and it is exempt from RSS-102 SAR and RF exposure evaluations. There are no power level adjustments available to the end user. The antenna is permanently attached. The detailed calculations for RF Exposure are presented in a separate document.

3.0 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT is a Parking Lot Sensor, Model Sensor III, manufactured by Fybr. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The antenna is permanently attached to the printed circuit board. The antenna is internal to the EUT and it is not readily available to be modified by the end user. Therefore, it meets the 15.203 Requirements.

3.2 Related Submittals

Fybr is not submitting any other products simultaneously for equipment authorization related to the EUT.

4.0 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm or 150-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

During normal installation, it will be placed face up, mounted on the ground in a parking lot. That is the orientation that it was placed on the table.

The EUT was tested as a stand-alone device. Power was supplied with a new battery. The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Parking Lot Sensor	E	Fybr	Sensor III	0004A3817707

* Type: E = EUT, P = Peripheral, S = Support Equipment; H = Host Computer

No cables were connected to the EUT during the tests.

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications to the EUT were made at the test facility prior to the start of compliance testing.

5.0 TEST SPECIFICATIONS

Document	Date	Title
FCC CFR Title 47	2015	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
IC RSS-247 Issue 2	2017	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 4	2014	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)

6.0 TEST PROCEDURE DOCUMENTS

The tests were performed using the procedures from the following specifications:

Document	Date	Title
ANSI C63.4-2014	2014	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	2013	American National Standard for Testing Unlicensed Wireless Devices
558074 D01 DTS Meas Guidance	2016	Guidance for Performing Compliance Measurements On Digital Transmission Systems (DTS) Operating Under §15.247; v03r04

7.0 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber. The floor has a 9' x 9' section of microwave absorber for testing above 1 GHz.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as site number IC 3124A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

8.0 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

9.0 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification and the data contained herein was taken with calibrated test equipment. The results relate only to the EUT listed herein.

10.0 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	01/09/17
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	01/09/17
ANT-03	Tensor	Biconical Antenna	4104	2231	20-250MHz	24 Mo.	12/07/15
ANT-04	Tensor	Biconical Antenna	4104	2246	20-250MHz	24 Mo.	05/16/16
ANT-06	EMCO	Log-Periodic Ant.	3146	1248	200-1000MHz	24 Mo.	11/25/15
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	12/28/16
HPF-07	Mini-Circuits	High Pass Filter	VHF-1500+	31121	1.7-10 GHz	24 Mo.	03/31/16
REC-11	HP / Agilent	Spectrum Analyzer	E7405A	US39110103	9Hz-26.5GHz	24 Mo	03/23/16
REC-20	HP / Agilent	Spectrum Analyzer	85460A/84562A	33330A00135 3410A00178	30Hz-6GHz	24 Mo.	07/13/16
REC-21	Agilent	Spectrum Analyzer	E7405A	MY45118341	9Hz-26.5 GHz	24 Mo.	12/22/15
THM-03	Fluke	Temp/Humid Meter	971	95850465	N/A	12 Mo.	01/11/16

Note: All calibrated equipment is subject to periodic checks.

Software Company	Test Software Name	Version	Applicable Tests
Radiometrics	REREC11D	12.04.15	RF Radiated Emissions (FCC Part 15 & EN 55011/22)
Agilent	PSA/ESA-E/L/EMC	2.4.0.42	Bandwidth and screen shots

11.0 TEST SECTIONS

11.1 Radiated RF Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests.

In addition, a high pass filter was used to reduce the fundamental emission.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

The entire frequency range from 30 to 9300 MHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

11.1.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

FS = RA + AF + CF - AG + HPF + PKA

Where: FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor
AG = Amplifier Gain
HPF = High pass Filter Loss

Note: The actual FCC limits are in uV/m. The data in the results table coverted the limits to dBuV/m.
100 uV/m = 40.0 dBuV/m
150 uV/m = 43.5 dBuV/m
200 uV/m = 46.0 dBuV/m
500 uV/m = 54.0 dBuV/m

11.1.2 Radiated Emissions Test Results

Test Date	5/25 & 5/26/2017
Test Distance	3 Meters
Specification	FCC Part 15 Subpart C & RSS-210
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP
Tested by	Joseph Strzelecki, Richard Tichgelaar

Restricted band Emissions Below 1 GHz

EUT Tx Freq	Emission Freq. MHz	Detector Function	Ant Pol.	Ant. Factor	CBL/Amp Factor	Field Strength dBuV/m	Field Strength Limit	Margin under limit
128.4	31.8	P	H	11.7	-17.8	25.7	43.5	17.8
111.5	26.7	P	H	12.5	-17.8	23.0	43.5	20.5
111.5	26.7	P	H	12.5	-17.8	21.4	43.5	22.1
119.7	33.3	P	V	12.2	-17.8	27.7	43.5	15.8
242.3	33.8	P	V	16.2	-17.4	32.6	46.0	13.4
311.9	29.2	P	V	14.5	-27.2	16.5	46.0	29.5
965.0	28.9	P	V	22.4	-24.4	27.0	54.0	27.0

Judgment: Passed by by at least 10 dB
No other emissions were detected in the restricted bands, from 30-1000 MHz within 10 dB of the limits

Restricted band Emissions above 1 GHz and Fundamental emssions

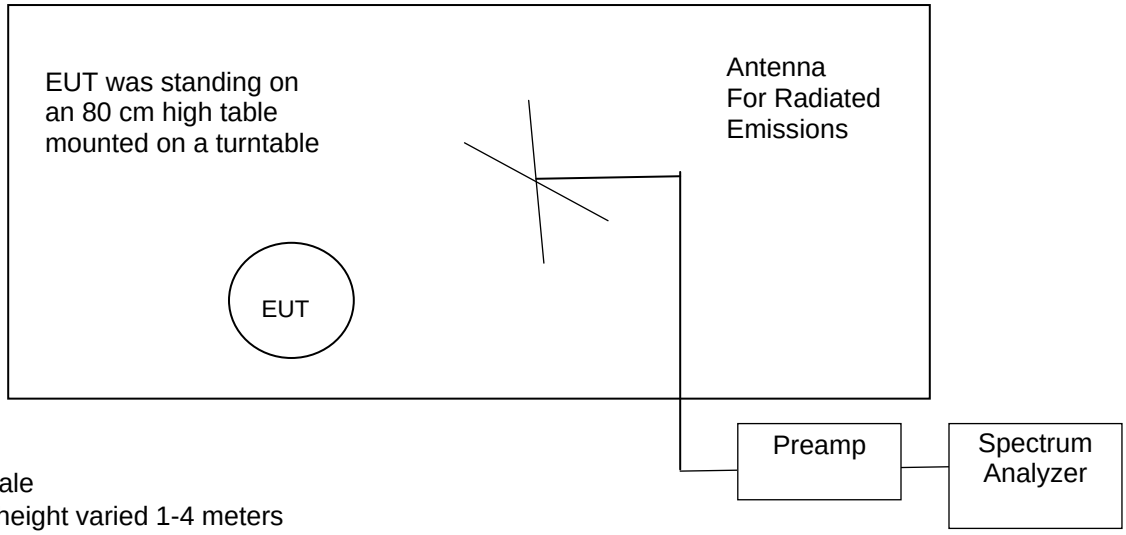
							EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak	Ave	Peak	Ave	Corr.	Emission	Tot. FS		Limit		Under
#	Freq	Vertical		Horizontal		Fact.	Freq MHz	dBuV/m		dBuV/m		Limit
1	903	75.9	73.9	82.0	80.0	19.3	903.0	101.3	99.3	125	125	23.7
3	903	45.4	39.9	48.2	42.7	-2.1	2709.0	46.1	40.6	74	54	13.4
4	903	49.0	43.0	49.4	43.4	3.2	3612.0	52.6	46.6	74	54	7.4
5	903	39.2	32.2	41.6	34.6	6.8	4515.0	48.4	41.4	74	54	12.6
6	903	43.6	35.0	42.0	33.4	10.6	5418.0	54.2	45.6	74	54	8.4
8	903	40.0	30.0	40.9	30.9	15.7	7224.0	56.6	46.6	74	54	7.4
9	903	41.8	30.8	43.2	32.2	16.8	8127.0	60.0	49.0	74	54	5.0
10	903	44.7	31.1	44.3	30.7	18.2	9030.0	62.9	49.3	74	54	4.7
1	915	75.5	73.5	82.6	80.6	20.1	915.0	102.7	100.7	125	125	22.3
3	915	45.8	40.3	46.0	40.5	-2.0	2745.0	44.0	38.5	74	54	15.5
4	915	45.9	39.9	47.9	41.9	3.5	3660.0	51.4	45.4	74	54	8.6
5	915	39.7	32.7	40.6	33.6	7.3	4575.0	47.9	40.9	74	54	13.1
7	915	41.1	32.1	42.0	33.0	12.2	6405.0	54.2	45.2	74	54	8.8
8	915	39.0	29.0	38.9	28.9	15.5	7320.0	54.5	44.5	74	54	9.5
9	915	41.4	30.4	42.9	31.9	17.0	8235.0	59.9	48.9	74	54	5.1
10	915	44.6	30.5	42.7	28.6	20.5	9150.0	65.1	51.0	74	54	3.0
1	927	72.8	70.8	82.3	80.3	19.9	927.0	102.2	100.2	125	125	22.8
3	927	46.3	40.8	46.0	40.5	-1.9	2781.0	44.4	38.9	74	54	15.1
4	927	45.4	39.4	43.9	37.9	3.7	3708.0	49.1	43.1	74	54	10.9
5	927	39.2	32.2	38.7	31.7	7.4	4635.0	46.6	39.6	74	54	14.4
8	927	38.5	28.5	38.0	28.0	15.0	7416.0	53.5	43.5	74	54	10.5
9	927	39.1	28.1	40.8	29.8	17.5	8343.0	58.3	47.3	74	54	6.7
Column Numbers												
1	2	3	4	5	6	7	8	9	10	11	12	13

Notes on Columns:
Column #1. hrm = Harmonic; BE = Band Edge emissions
Column #2. Frequency of Transmitter.
Column #3. Uncorrected Vertical readings from the spectrum analyzer
Column #4. Raw Average reading; The average reading was converted from the peak reading.
Ave = Peak – Dwell time correction factor from section 10.3.2 herein.
Column #5. Uncorrected Horizontal readings from the spectrum analyzer
Column #6. Raw Average reading; The average reading was converted from the peak reading.
Ave = Peak – Dwell time correction factor from section 10.3.2 herein.
Column #7. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
Column #8. Frequency of Tested Emission
Column #9. Highest peak field strength at listed frequency.
Column #10. Highest Average field strength at listed frequency.
Column #11. Peak Limit. Non restricted bands limits was measured to be 87.3 dBuV/m.
Column #12. Average Limit. Non restricted bands limits was measured to 67.3 dBuV/m.
Column #13. The margin (last column) is the worst case margin under the peak or average limits for that row.

Judgment: Passed by 3.0 dB
No other Emissions were detected from 30 to 9,500 MHz within 10 dB of the limits.

Figure 1. Drawing of Radiated Emissions Setup

Chamber E, anechoic



Notes:
- Not to Scale
- Antenna height varied 1-4 meters
- Distance from antenna to tested system is 3 meters
- AC cords not shown. They are connected to AC outlet with low-pass filter on turntable

Frequency Range	Receive Antenna	Pre-Amplifier	Spectrum Analyzer	High Pass Filter
30 to 1000 MHz	ANT-44	AMP-22	REC-11	None
30 to 1000 MHz	ANT-44	AMP-22	REC-11	None
1 to 10 GHz	ANT-13	AMP-05	REC-11	HPF-07

11.2 Occupied Bandwidth Data

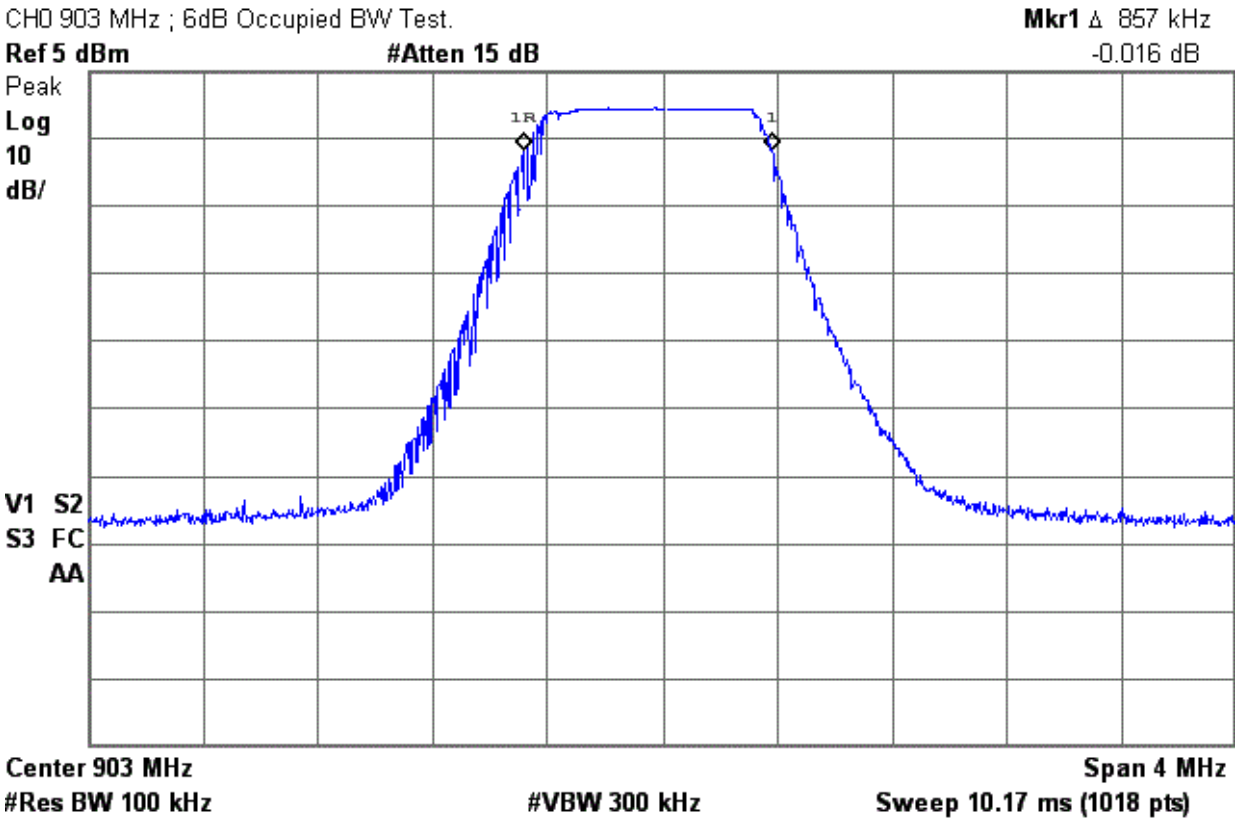
The test procedures were in accordance to FCC DTS Measurement Guideline 558074 D01, Section 8.1. The occupied bandwidth of the RF output was measured using a spectrum analyzer. The bandwidth was measured using the peak detector function and a narrow resolution bandwidth.

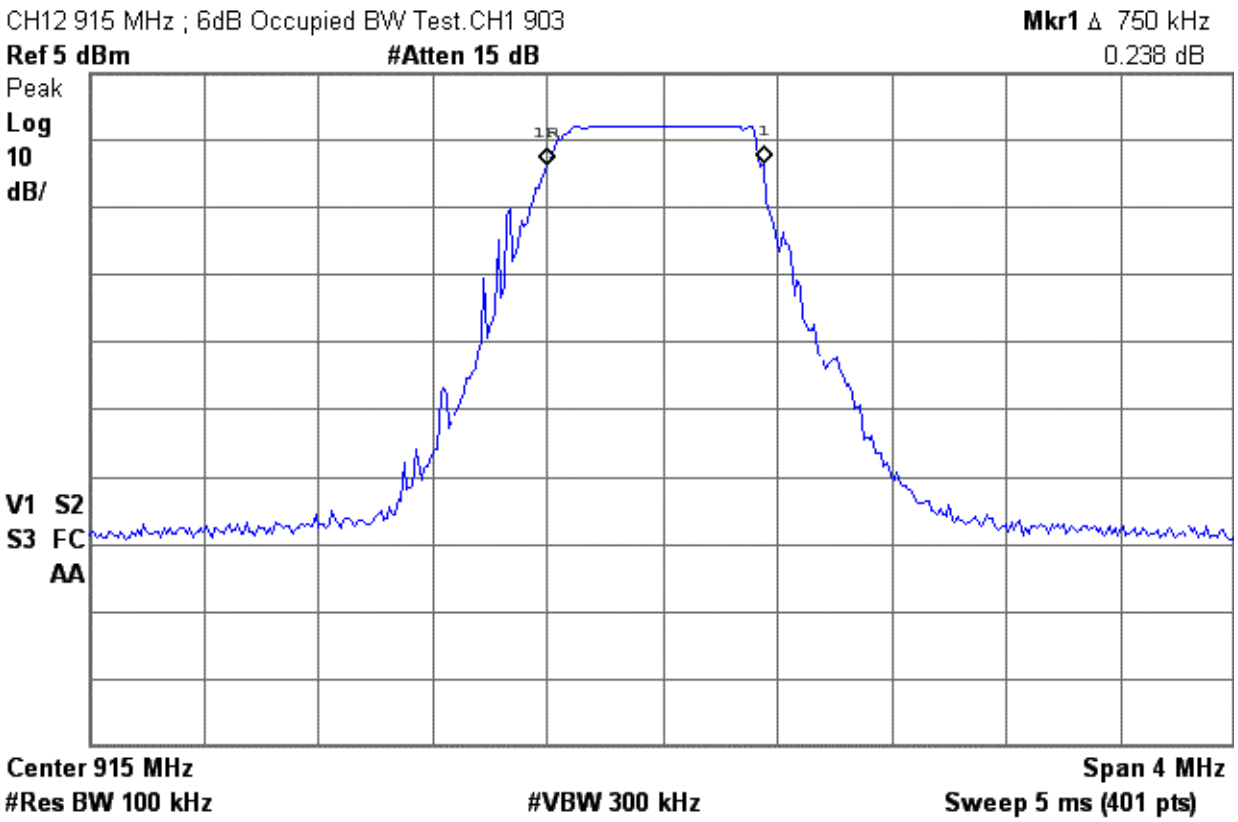
A broadband antenna was used to receive the modulated signal. The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The spectrum analyzer display was digitized and plotted. A limit was drawn on the plots based on the level of the modulated carrier. The plots of the occupied bandwidth for the EUT are supplied on the following page.

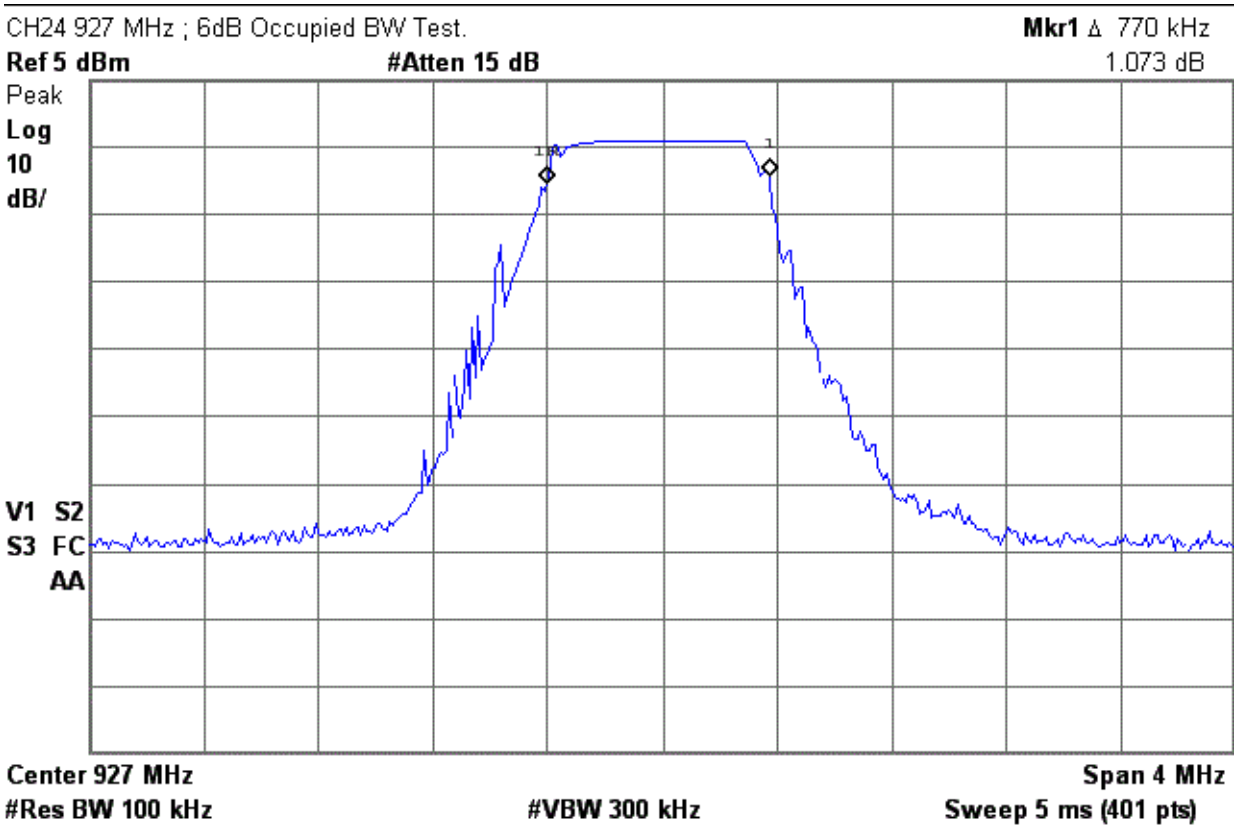
Channel MHz	99% EBW kHz	6 dB EBW kHz
903	708	857
915	708	750
927	717	770

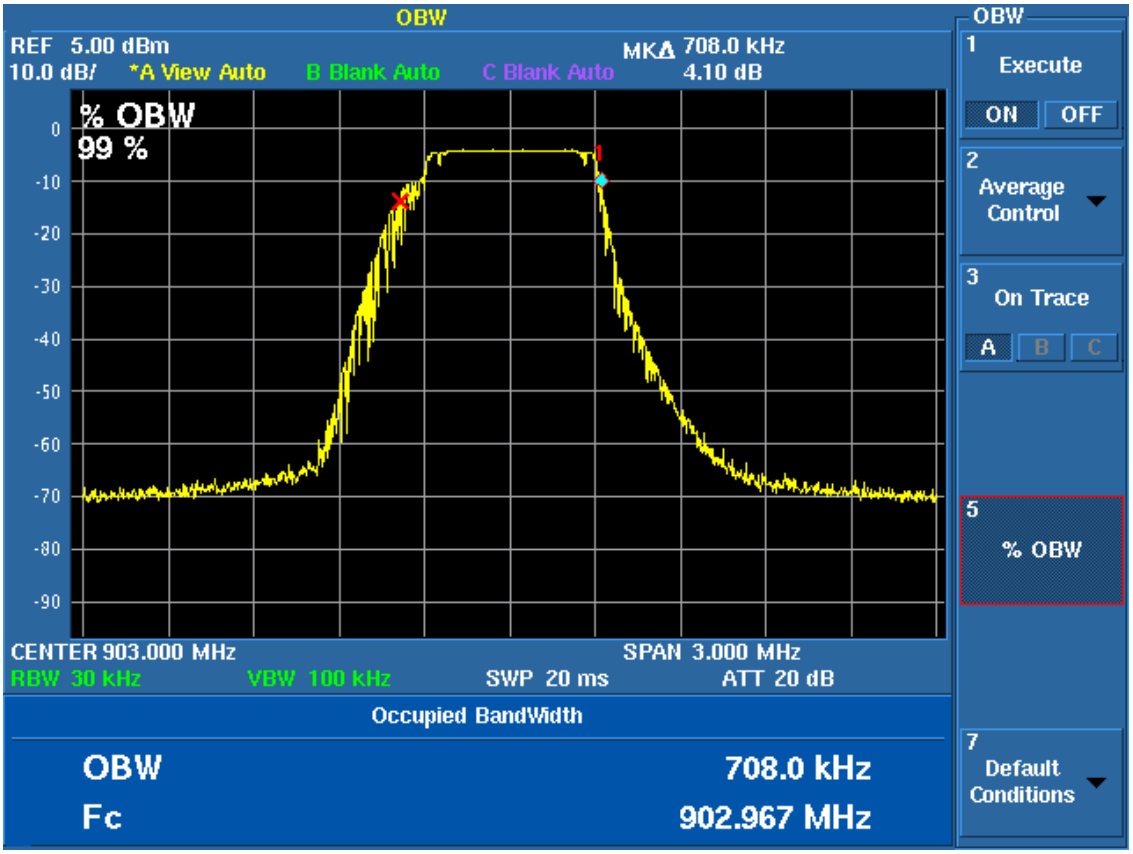
The 6 dB bandwidth is greater than 500 kHz
Judgement: Pass

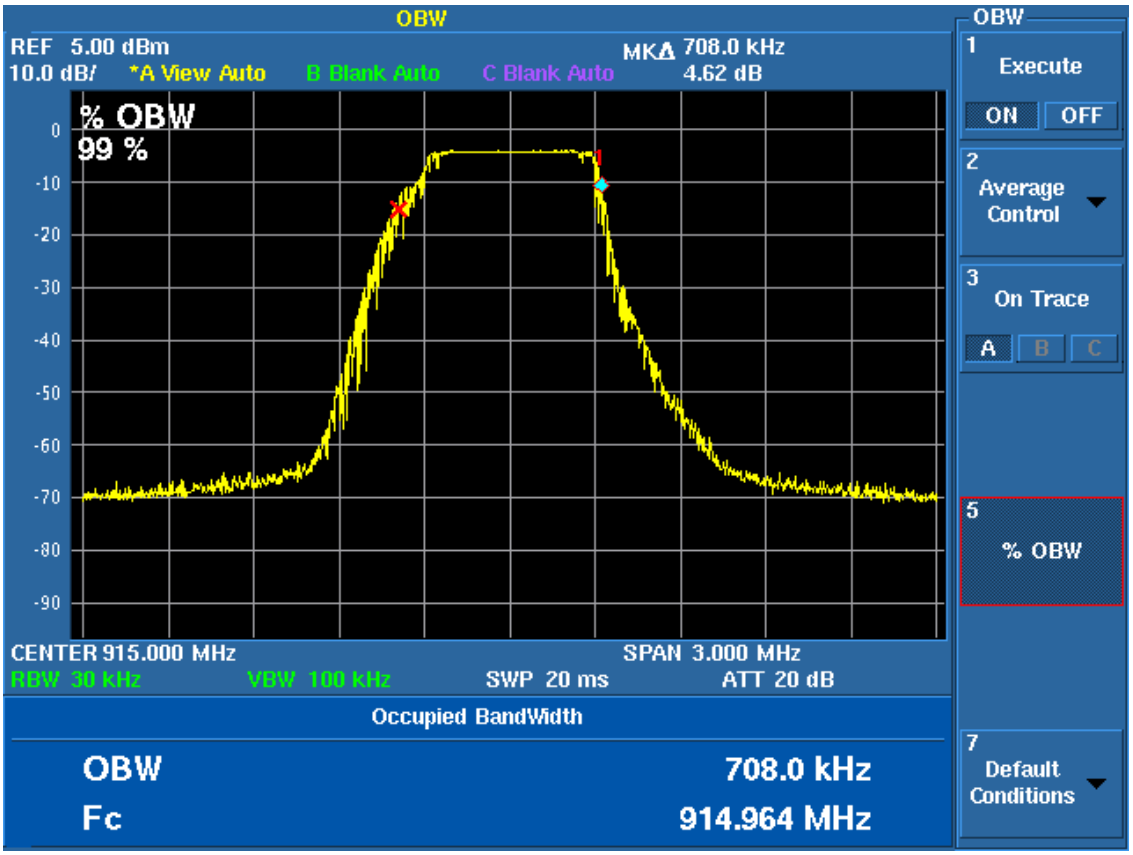
Figure 2. Occupied Bandwidth Plots

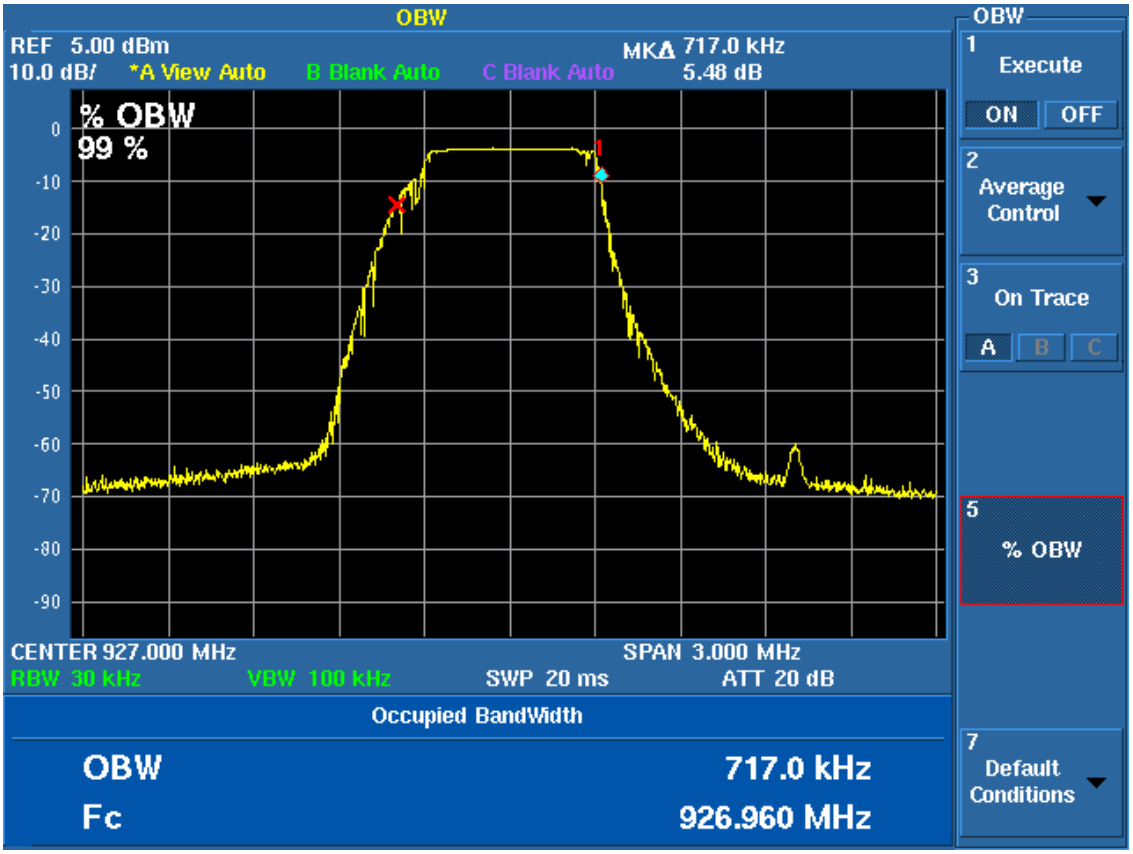



CH12 915 MHz ; 6dB Occupied BW Test.CH1 903
Mkr1 Δ 750 kHz
0.238 dB
Ref 5 dBm
#Atten 15 dB
Peak
Log
10
dB/
V1 S2
S3 FC
AA
Center 915 MHz
Span 4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)


CH24 927 MHz ; 6dB Occupied BW Test.
Mkr1 Δ 770 kHz
1.073 dB
Ref 5 dBm
#Atten 15 dB
Peak
Log
10
dB/
V1 S2
S3 FC
AA
Center 927 MHz
Span 4 MHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 5 ms (401 pts)


OBW
REF 5.00 dBm
10.0 dB/ *A View Auto B Blank Auto C Blank Auto
MKΔ 708.0 kHz
4.10 dB
% OBW
99 %
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
CENTER 903.000 MHz
SPAN 3.000 MHz
RBW 30 kHz VBW 100 kHz SWP 20 ms ATT 20 dB
Occupied BandWidth
OBW 708.0 kHz
Fc 902.967 MHz
OBW
1 Execute
ON OFF
2 Average Control
3 On Trace
A B C
5 % OBW
7 Default Conditions


OBW
REF 5.00 dBm
10.0 dB/ *A View Auto B Blank Auto C Blank Auto
MKΔ 708.0 kHz
4.62 dB
% OBW
99 %
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
CENTER 915.000 MHz
SPAN 3.000 MHz
RBW 30 kHz VBW 100 kHz SWP 20 ms ATT 20 dB
Occupied BandWidth
OBW 708.0 kHz
Fc 914.964 MHz
OBW
1 Execute
ON OFF
2 Average Control
3 On Trace
A B C
5 % OBW
7 Default Conditions



11.3 Peak Output Power

The test procedures were in accordance to FCC DTS Measurement Guideline 558074 D01, Section 9.1.1.

The EUT antenna port was connected to the Spectrum analyzer Via a low loss coaxial cable. The power output test method from ANSI C63.10 section 6.10.2.1 c) was used for this test. The spectrum analyzer was set to the following settings:

Span = 5 MHz RBW = 1 MHz; VBW = 3 MHz; Sweep = auto
Detector function = peak; Trace = max hold

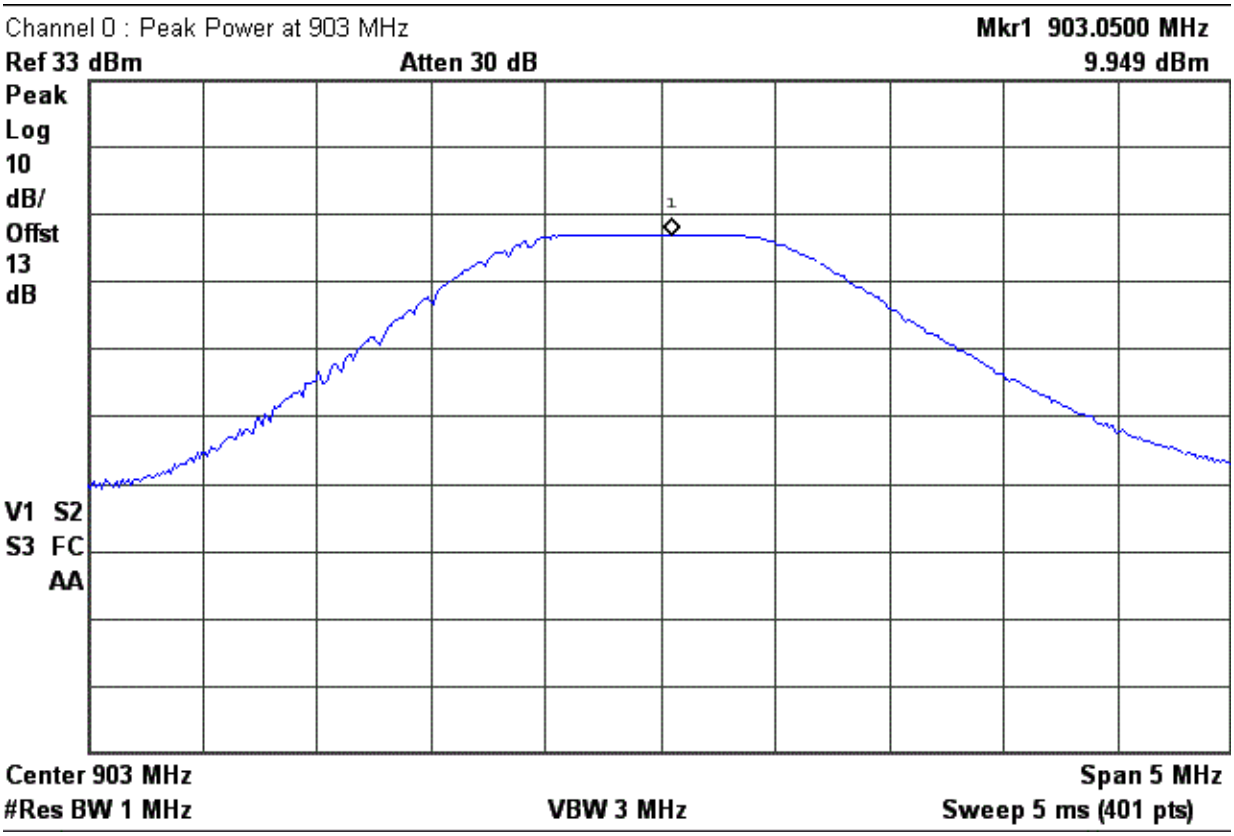
The trace was allowed to stabilize. The indicated level is the peak output power.

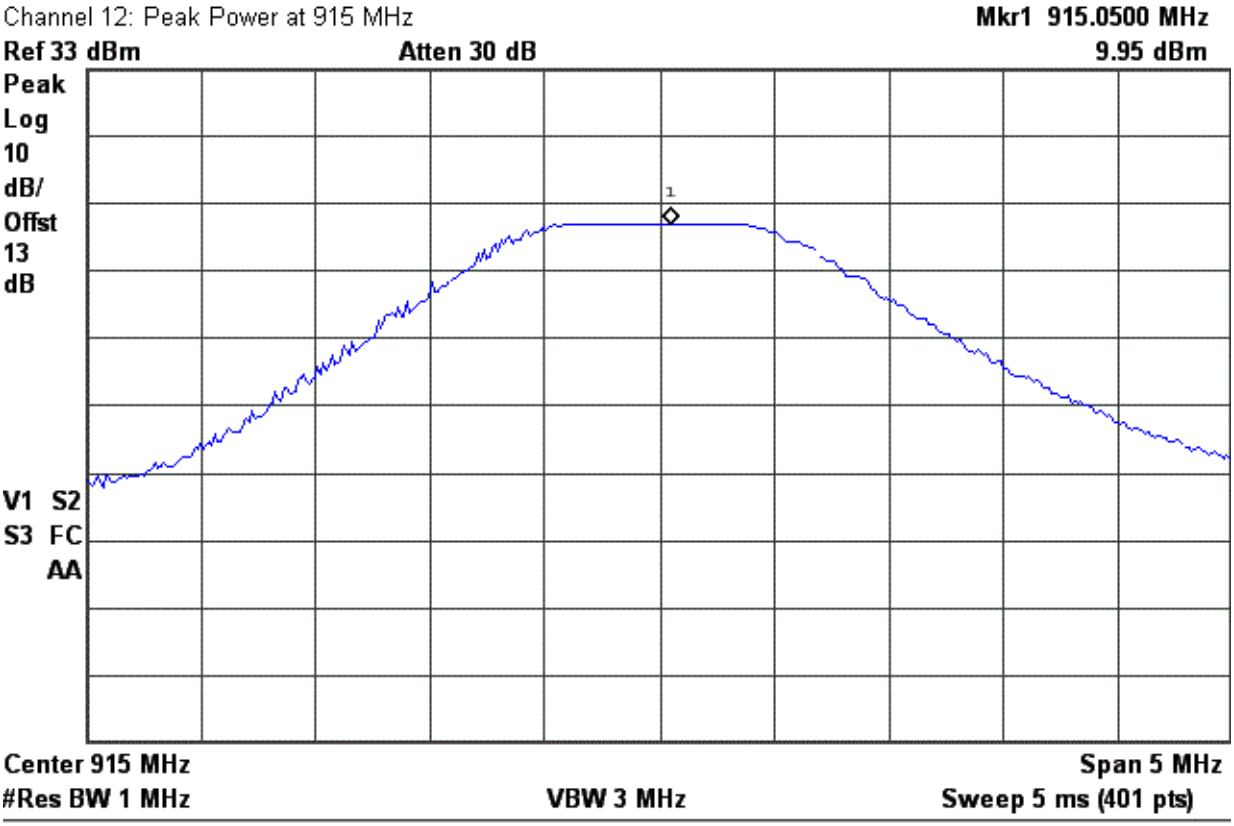
Tested by: Joseph Strzelecki, Richard Tichgelaar
Test Date: 08/02/2017

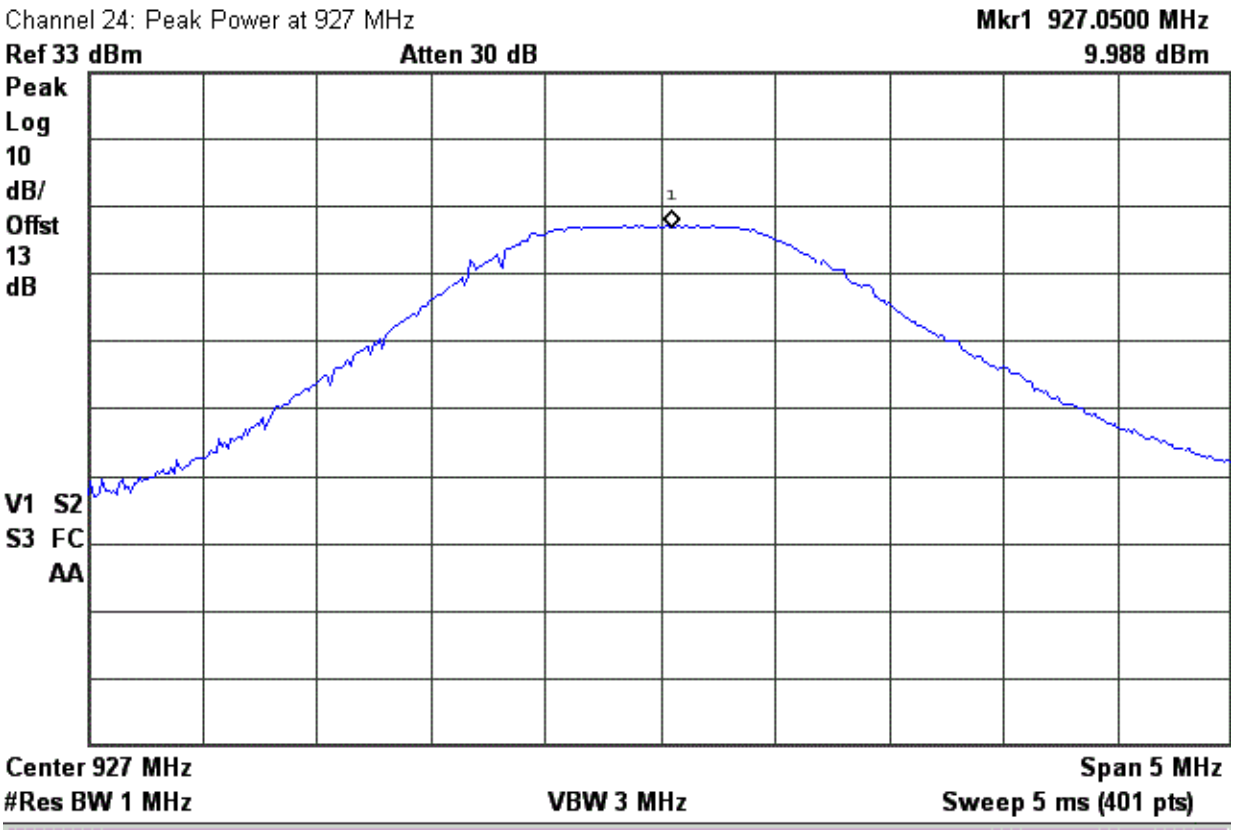
Frequency (MHz)	Reading (dBm)	Total Power (dBm)		Limit (dBm)
		dBm	Watts	
903	9.95	9.95	0.00989	30
915	9.95	9.95	0.00989	30
927	9.99	9.99	0.00998	30

Since the gain of the antenna is always less than 6 dB, the limit is not reduced. The antenna gain is 1 dBi.

Judgment: Passed by 20.0 dB


Channel 0 : Peak Power at 903 MHz
Mkr1 903.0500 MHz
Ref 33 dBm
Atten 30 dB
9.949 dBm
Peak
Log
10
dB/
Offst
13
dB
1
V1 S2
S3 FC
AA
Center 903 MHz
Span 5 MHz
#Res BW 1 MHz
VBW 3 MHz
Sweep 5 ms (401 pts)


Channel 12: Peak Power at 915 MHz
Mkr1 915.0500 MHz
Ref 33 dBm
Atten 30 dB
9.95 dBm
Peak
Log
10
dB/
Offst
13
dB
1
V1 S2
S3 FC
AA
Center 915 MHz
Span 5 MHz
#Res BW 1 MHz
VBW 3 MHz
Sweep 5 ms (401 pts)



11.4 Power Spectral Density

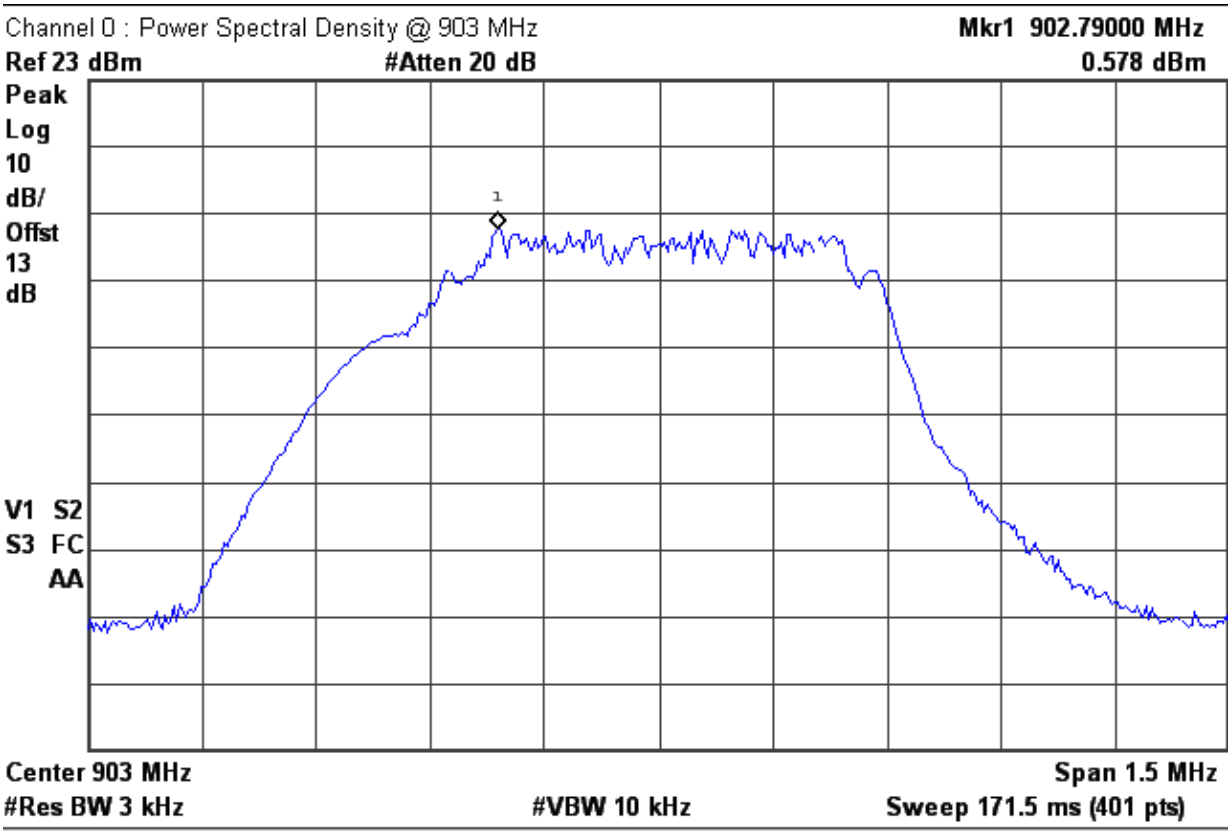
The PSD test method from ANSI C63.10 section 11.10.2 and FCC DTS Measurement Guideline 558074 D01, Section 10.2. The spectrum analyzer was set to the following settings:

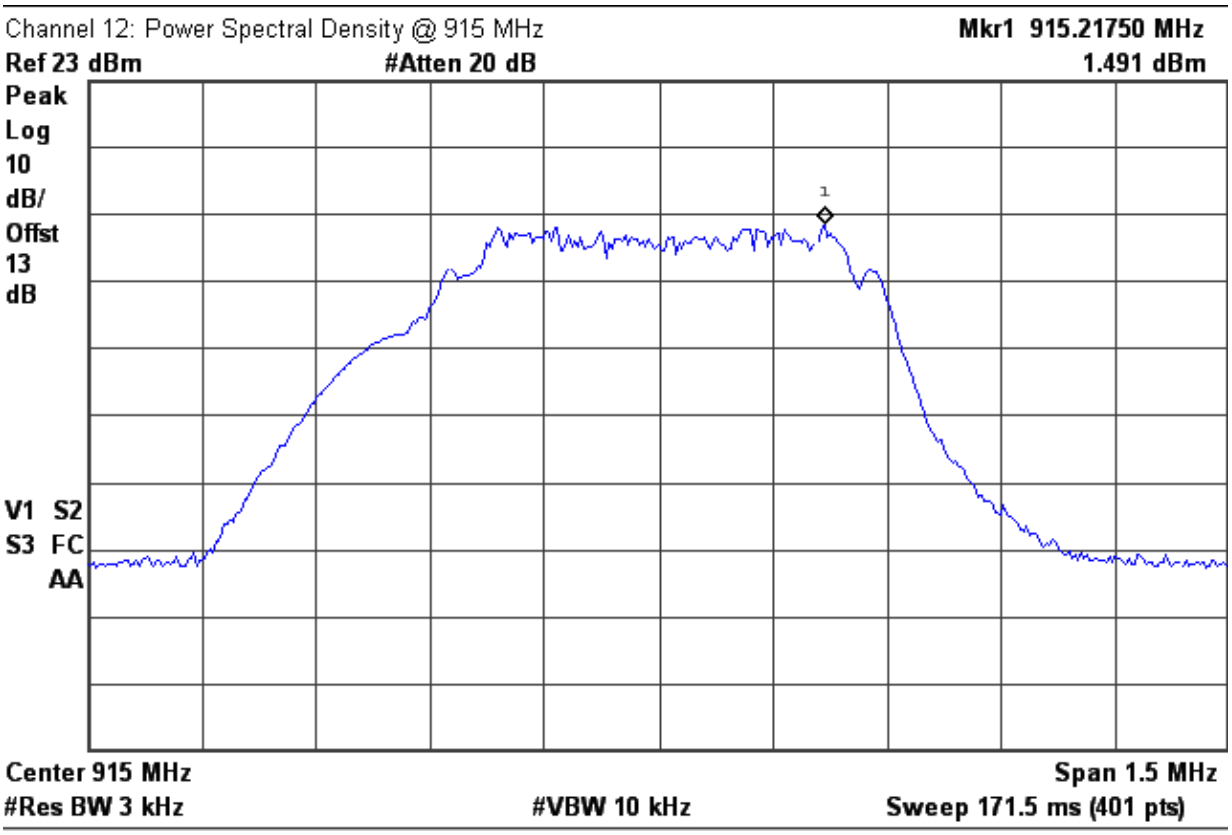
Span = 1.5x DTS Bandwidth; RBW = 3 kHz; VBW = 10 kHz

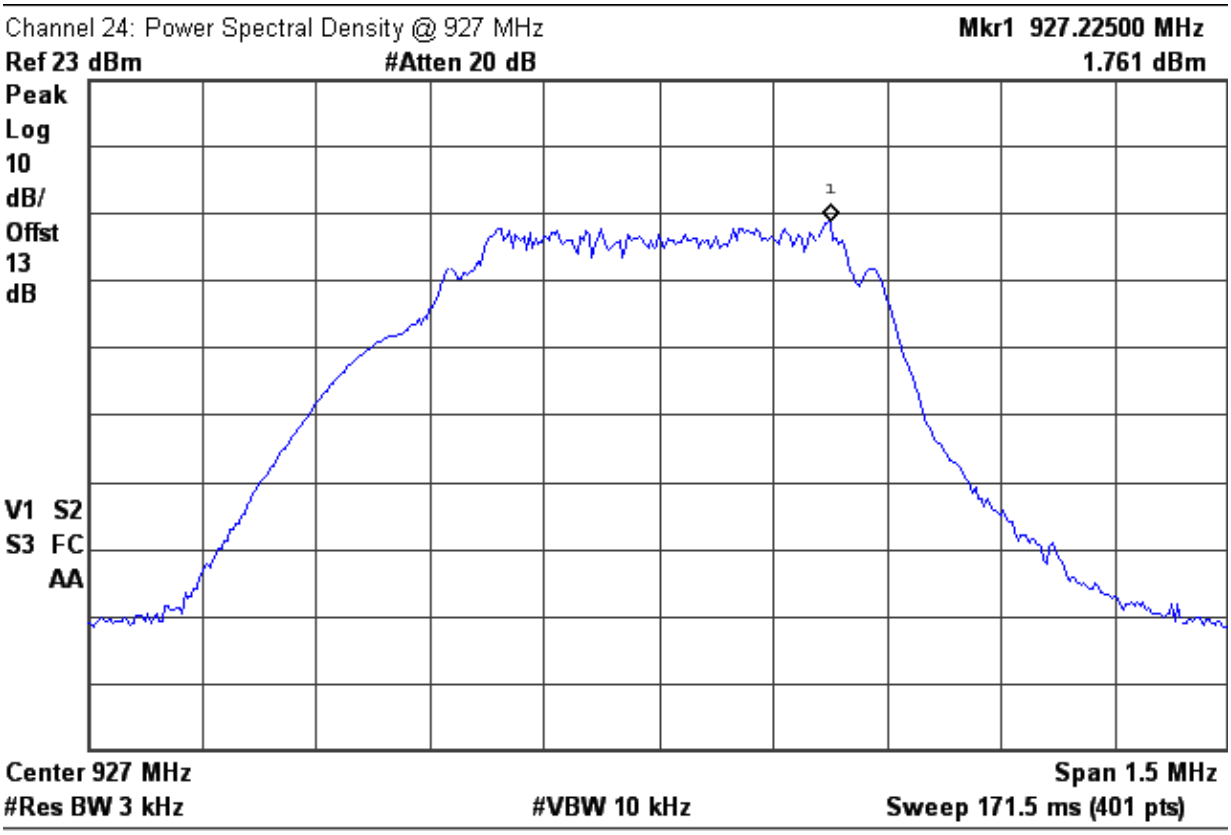
Tested by: Richard Tichgelaar
Test Date: 08/02/2017

Frequency (MHz)	3 kHz Spectral Density (dBm)	Limit (dBm)
903	0.6	8.0
915	1.5	8.0
927	1.8	8.0

Judgment: Passed by 6.2 dB


Channel 0 : Power Spectral Density @ 903 MHz
Mkr1 902.79000 MHz
Ref 23 dBm
#Atten 20 dB
0.578 dBm
Peak
Log
10
dB/
Offst
13
dB
V1 S2
S3 FC
AA
Center 903 MHz
Span 1.5 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 171.5 ms (401 pts)


Channel 12: Power Spectral Density @ 915 MHz
Mkr1 915.21750 MHz
Ref 23 dBm
#Atten 20 dB
1.491 dBm
Peak
Log
10
dB/
Offst
13
dB
V1 S2
S3 FC
AA
Center 915 MHz
Span 1.5 MHz
#Res BW 3 kHz
#VBW 10 kHz
Sweep 171.5 ms (401 pts)

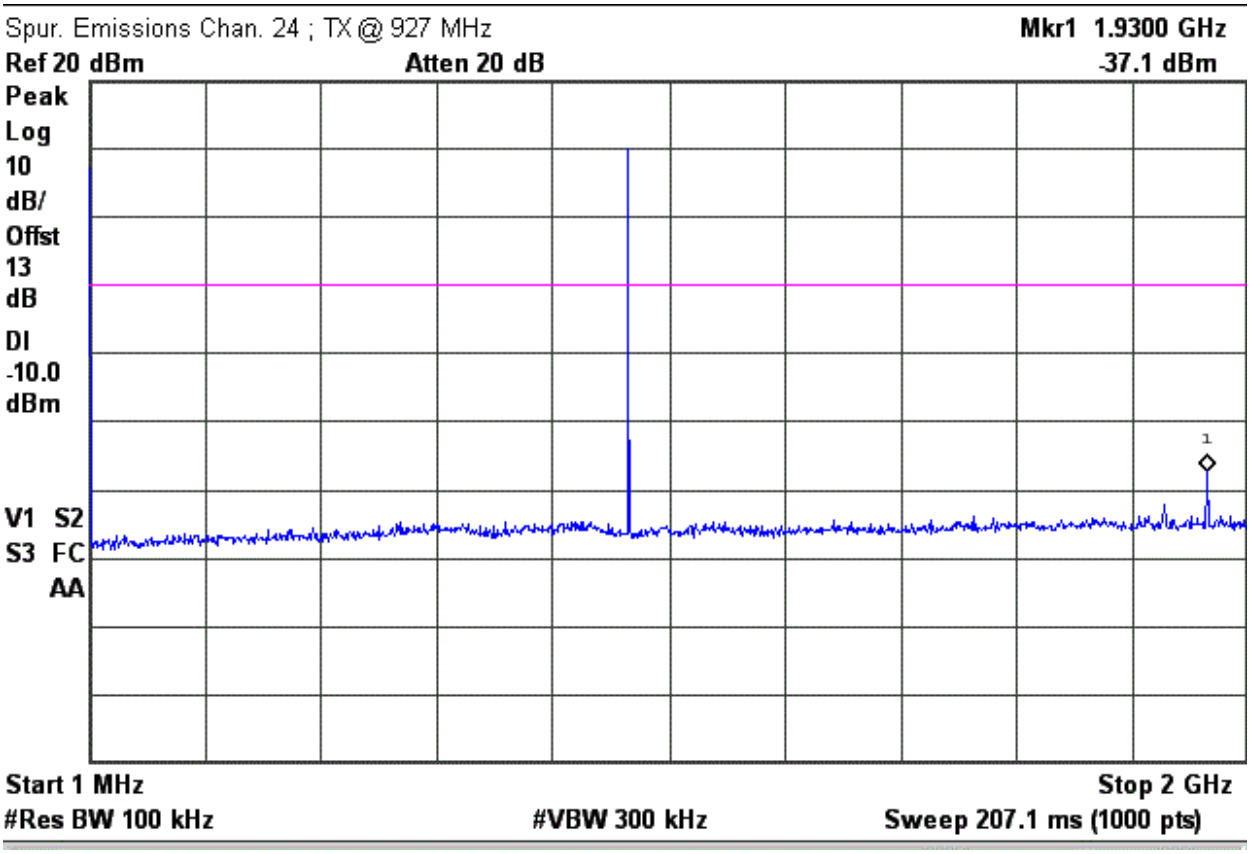


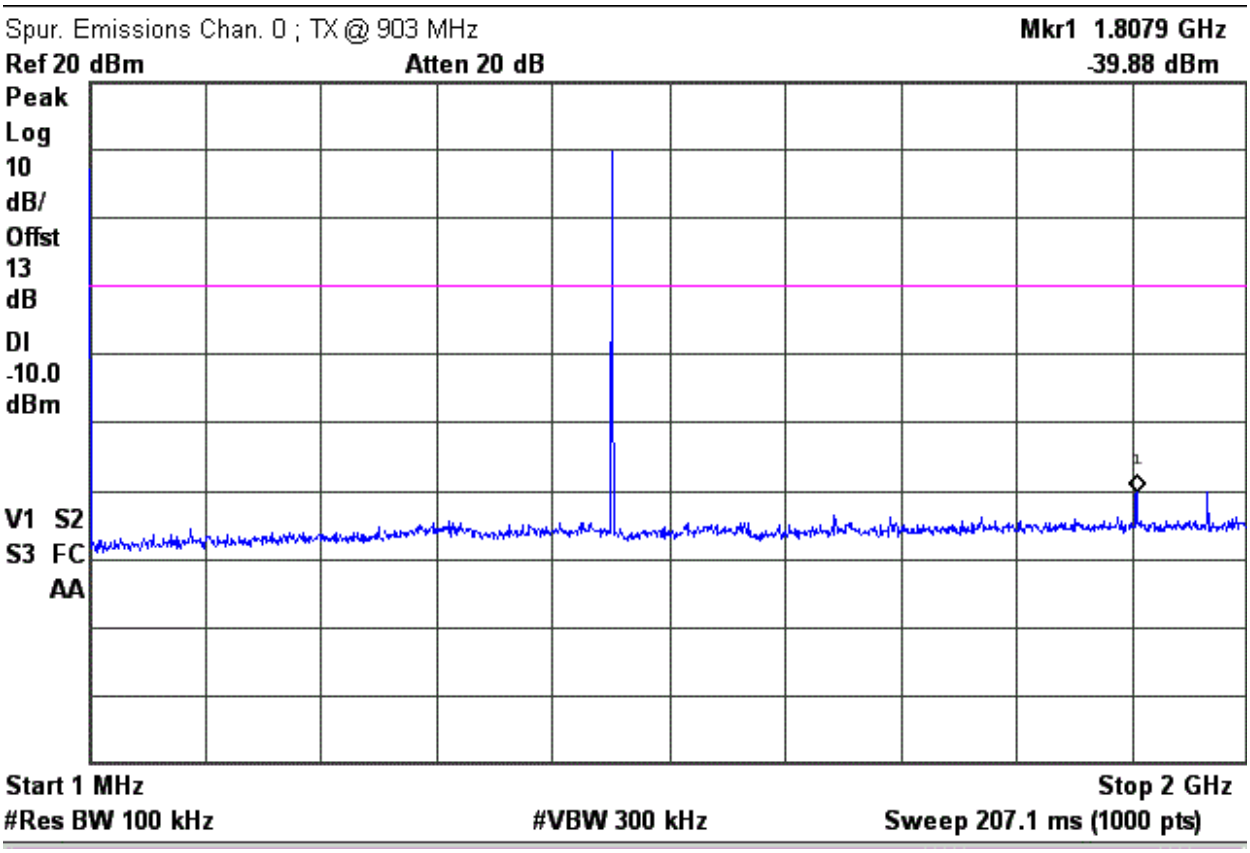
11.5 Spurious RF Conducted Emissions at Antenna Port

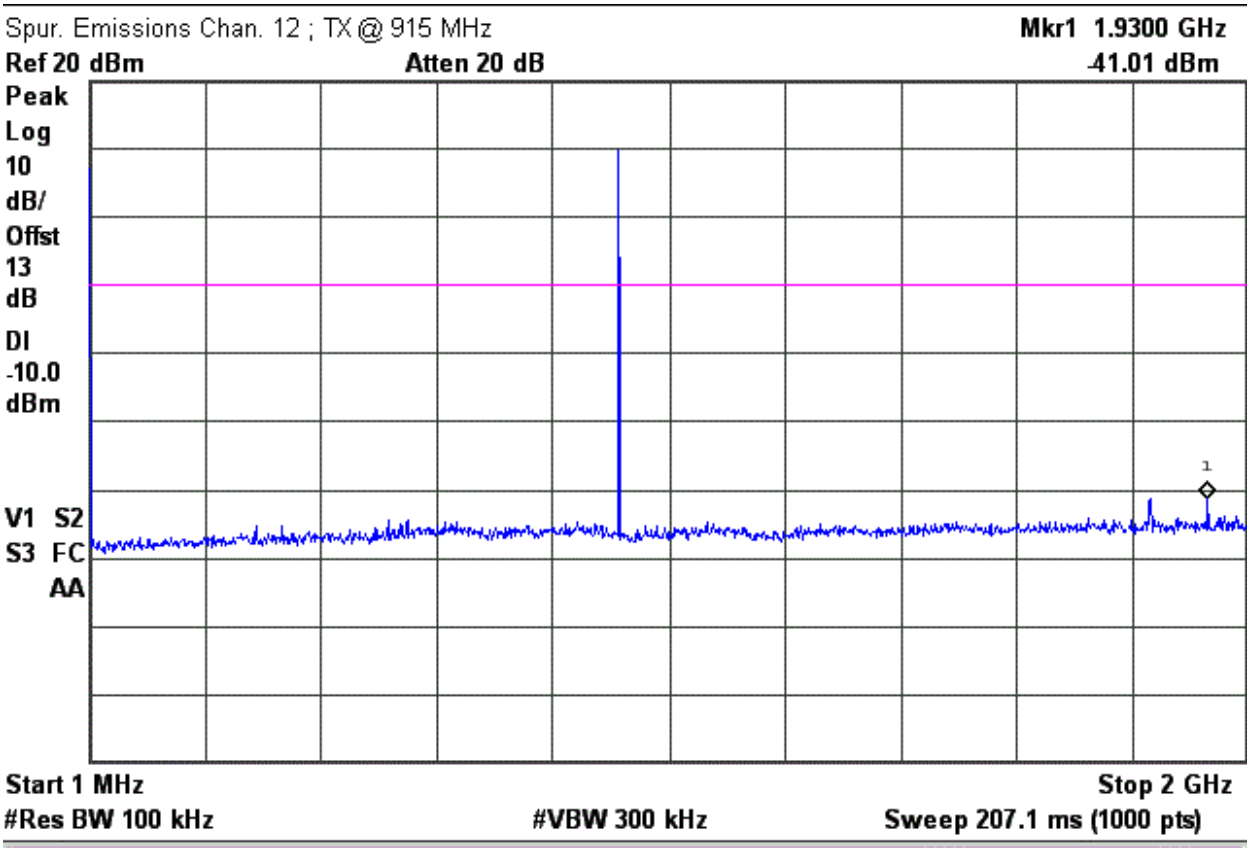
Tested by: Joseph Strzelecki, Richard Tichgelaar
Test Date: 07/28/2017

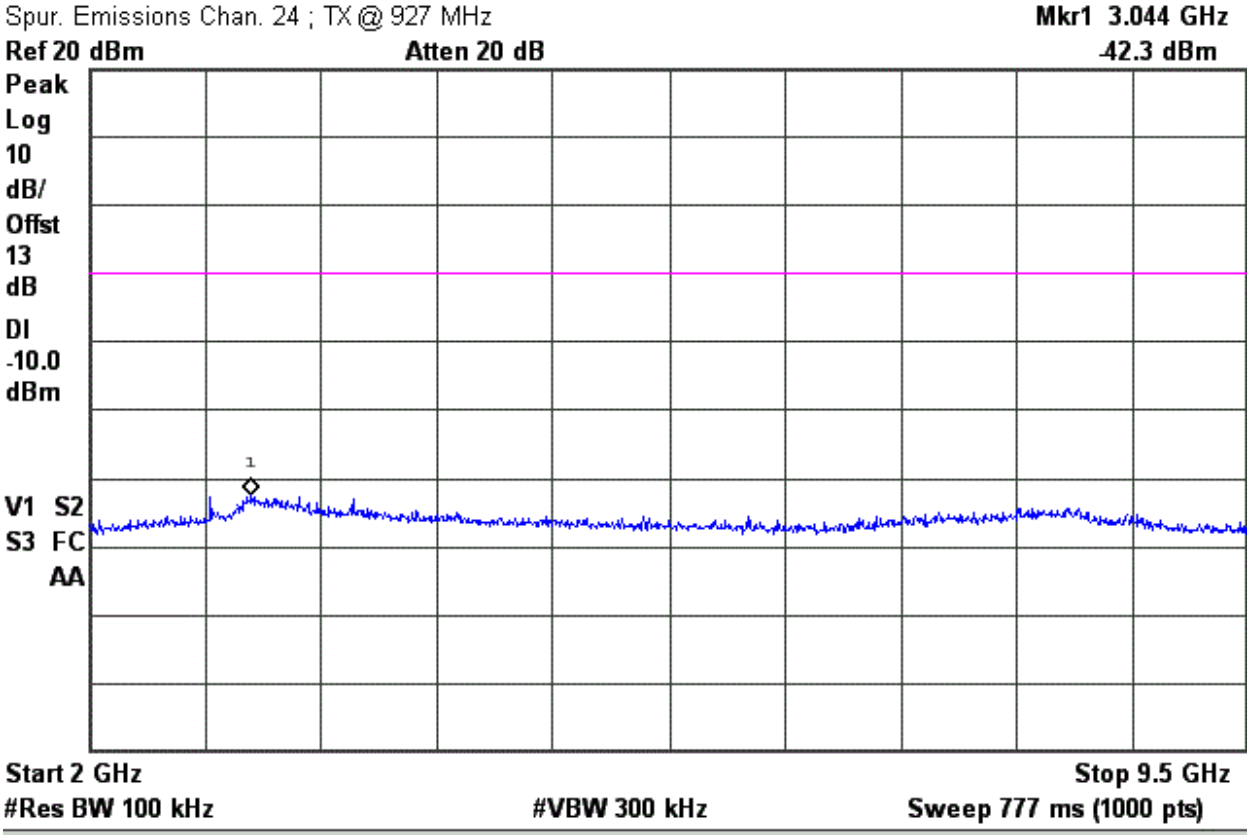
The spectrum analyzer was set to the MAX HOLD mode to record all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic. The trace was allowed to stabilize. The first two plots were made while stepping through three frequencies (Low middle and high). Each frequency was on for 30 seconds.

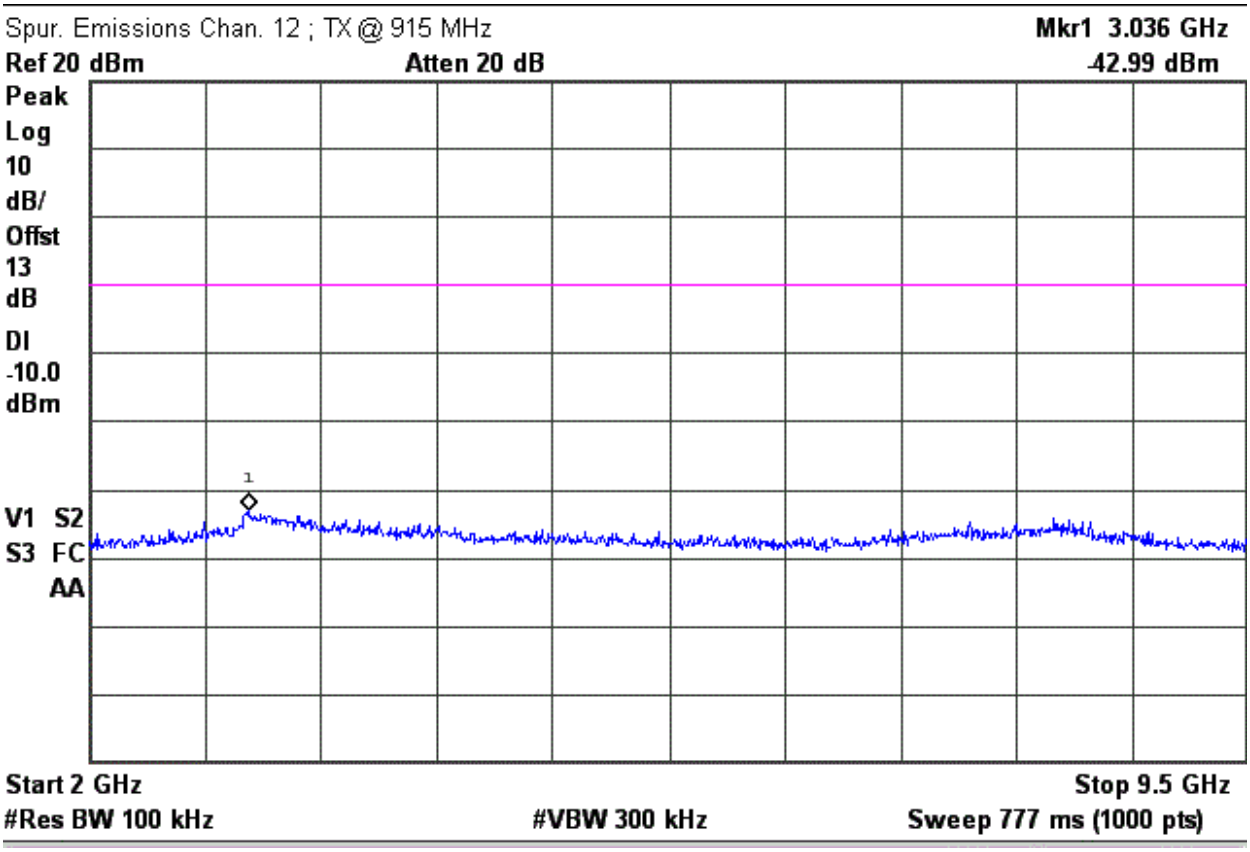
The EUT was tested in continous mode and peak readings were made from 1 MHz up through the 10th harmonic. The limit is 20 dB lower than the peak of the lowest fundamental. The data is shown graphically.

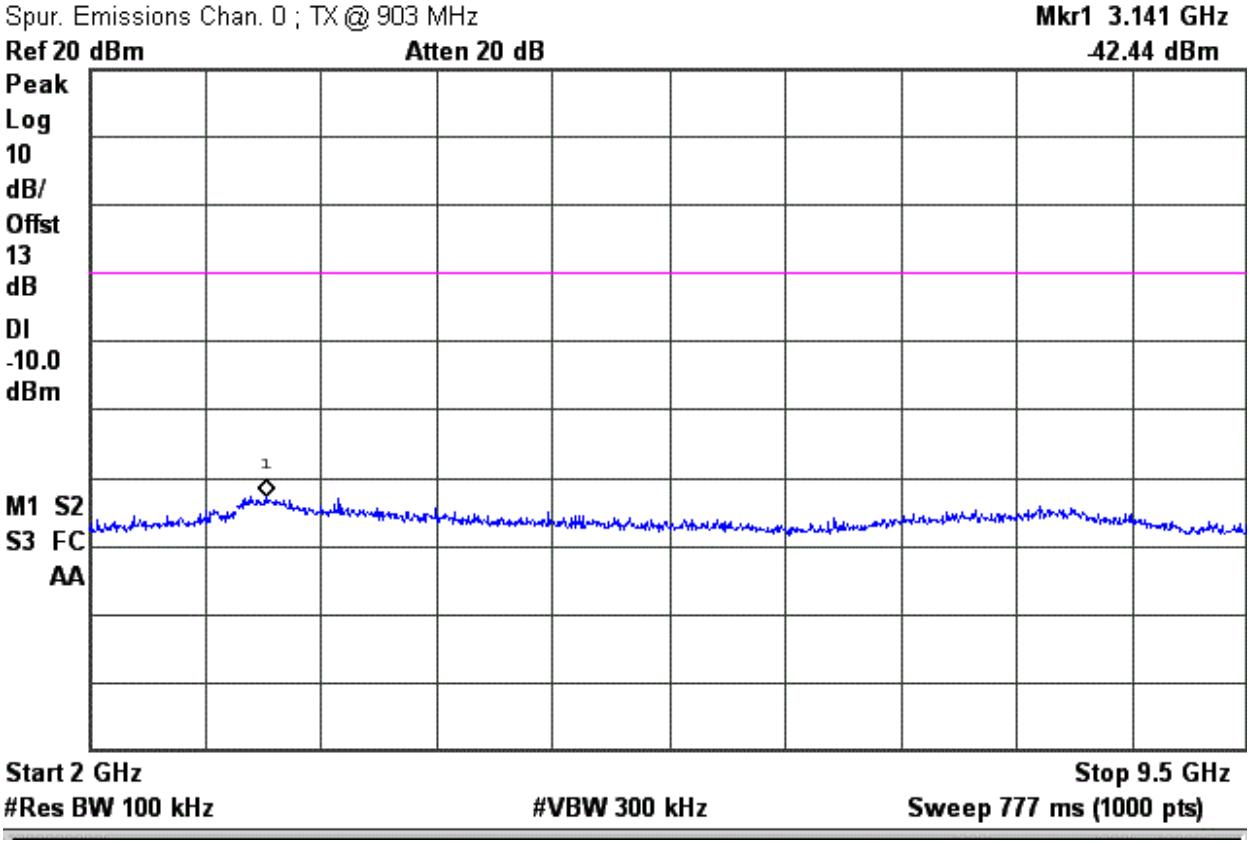

Spur. Emissions Chan. 24 ; TX @ 927 MHz
Mkr1 1.9300 GHz
Ref 20 dBm
Atten 20 dB
-37.1 dBm
Peak
Log
10
dB/
Offst
13
dB
Dl
-10.0
dBm
V1 S2
S3 FC
AA
Start 1 MHz
Stop 2 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 207.1 ms (1000 pts)


Spur. Emissions Chan. 0 ; TX @ 903 MHz
Mkr1 1.8079 GHz
Ref 20 dBm
Atten 20 dB
-39.88 dBm
Peak
Log
10
dB/
Offst
13
dB
Dl
-10.0
dBm
V1 S2
S3 FC
AA
Start 1 MHz
Stop 2 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 207.1 ms (1000 pts)


Spur. Emissions Chan. 12 ; TX @ 915 MHz
Mkr1 1.9300 GHz
Ref 20 dBm
Atten 20 dB
-41.01 dBm
Peak
Log
10
dB/
Offst
13
dB
Dl
-10.0
dBm
V1 S2
S3 FC
AA
Start 1 MHz
Stop 2 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 207.1 ms (1000 pts)


Spur. Emissions Chan. 24 ; TX @ 927 MHz
Mkr1 3.044 GHz
Ref 20 dBm
Atten 20 dB
-42.3 dBm
Peak
Log
10
dB/
Offst
13
dB
Dl
-10.0
dBm
V1 S2
S3 FC
AA
Start 2 GHz
Stop 9.5 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 777 ms (1000 pts)





Judgement: Pass by at least 10 dB

11.6 Unintentional Emissions (Receive Mode)

Manufacturer	Fybr	Specification	FCC Part 15.209 & RSS-210
Model	Sensor III	Test Date	05/27/2017
Serial Number	0004A3817707	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP		
Notes	Corr. Factors = Antenna factor + Cable Loss – Preamp Gain		
Configuration	Receive mode		

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna Polarization	Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
					EUT	Limit	
44.6	27.1	P	H	-2.6	24.5	40.0	15.5
103.7	27.6	P	H	-6.8	20.8	43.5	22.7
548.0	29.8	P	H	0.8	30.6	46.0	15.4
884.6	27.9	P	H	6.1	34.0	75.0	41.0
42.6	26.2	P	V	-2.2	24.0	40.0	16.0
44.6	25.8	P	V	-2.6	23.2	40.0	16.8
58.1	27.4	P	V	-6.7	20.7	40.0	19.3
394.7	29.6	P	V	-2.2	27.4	46.0	18.6
925.3	28.3	P	V	7.0	35.3	94.0	58.7
957.3	27.6	P	V	8.0	35.6	75.0	39.4

Judgement: Pass by at least 15 dB.

No other Emissions were detected from 30 to 5000 MHz within 15 dB of the limits.