



**Southfork Solutions, Inc.**

**Advex Monitor**

**FCC 15.247:2017**

**902 - 928 MHz Other Wideband (DTS) Transceiver**

**Report # SOUT0001.1**



NVLAP Lab Code: 200881-0



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# CERTIFICATE OF TEST

Last Date of Test: September 8, 2017  
Southfork Solutions, Inc.  
Model: Advex Monitor

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2017	ANSI C63.10:2013

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	No	N/A	Not required for a battery powered EUT.
6.5, 6.6, 11.12.1, 11.13.2	Spurious Radiated Emissions	Yes	Pass	
7.8.2	Carrier Frequency Separation	No	N/A	Not required for DTS devices.
7.8.3	Number of Hopping Frequencies	No	N/A	Not required for DTS devices.
7.8.4	Dwell Time	No	N/A	Not required for DTS devices.
7.8.6	Band Edge Compliance - Hopping Mode	No	N/A	Not required for DTS devices.
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:

Matt Nuernberg, Operations Manager

*Product compliance is the responsibility of the client; therefore, the tests and equipment modes of operation represented in this report were agreed upon by the client, prior to testing. The results of this test pertain only to the sample(s) tested. The specific description is noted in each of the individual sections of the test report supporting this certificate of test. This report reflects only those tests from the referenced standards shown in the certificate of test. It does not include inspection or verification of labels, identification, marking or user information.*

# REVISION HISTORY



Revision Number		Description	Date	Page Number
00		None		

# ACCREDITATIONS AND AUTHORIZATIONS



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## United States

**FCC** - Designated by the FCC as a Telecommunications Certification Body (TCB). Certification chambers, Open Area Test Sites, and conducted measurement facilities are listed with the FCC.

**A2LA** - Accredited by A2LA to ISO / IEC 17065 as a product certifier. This allows Element to certify transmitters to FCC and IC specifications.

**NVLAP** - Each laboratory is accredited by NVLAP to ISO 17025

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## Canada

**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB). Certification chambers and Open Area Test Sites are filed with ISED.

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## European Union

**European Commission** – Within Element, we have a EU Notified Body validated for the EMCD and RED Directives.

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## Australia/New Zealand

**ACMA** - Recognized by ACMA as a CAB for the acceptance of test data.

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## Korea

**MSIP / RRA** - Recognized by KCC's RRA as a CAB for the acceptance of test data.

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## Japan

**VCCI** - Associate Member of the VCCI. Conducted and radiated measurement facilities are registered.

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## Taiwan

**BSMI** – Recognized by BSMI as a CAB for the acceptance of test data.

**NCC** - Recognized by NCC as a CAB for the acceptance of test data.

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## Singapore

**IDA** – Recognized by IDA as a CAB for the acceptance of test data.

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## Israel

**MOC** – Recognized by MOC as a CAB for the acceptance of test data.

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## Hong Kong

**OFCA** – Recognized by OFCA as a CAB for the acceptance of test data.

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## Vietnam

**MIC** – Recognized by MIC as a CAB for the acceptance of test data.

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## SCOPE

For details on the Scopes of our Accreditations, please visit:

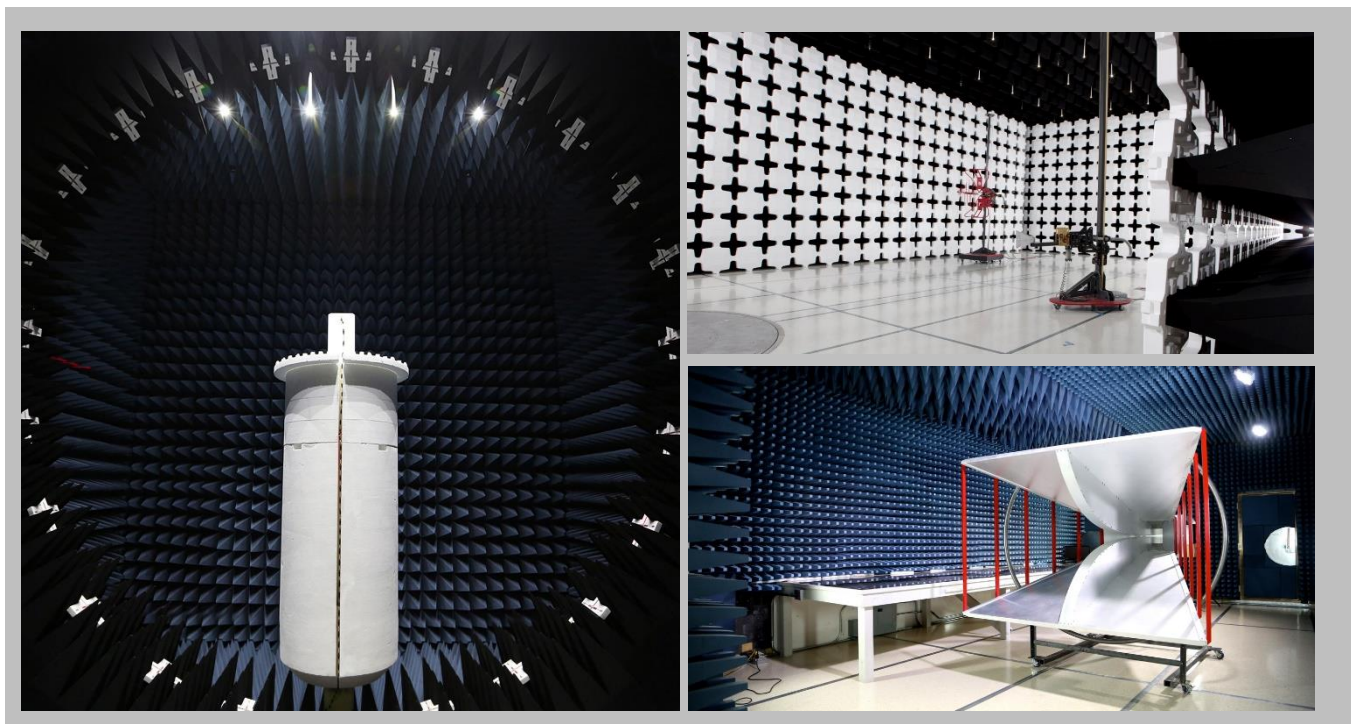
<http://portlandcustomer.element.com/ts/scope/scope.htm>

<http://gsi.nist.gov/global/docs/cabs/designations.html>

# FACILITIES



<b>California</b> Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>New York</b> Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	<b>Oregon</b> Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	<b>Texas</b> Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	<b>Washington</b> Labs NC01-05 19201 120 <sup>th</sup> Ave NE Bothell, WA 98011 (425)984-6600
<b>NVLAP</b>					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
<b>Innovation, Science and Economic Development Canada</b>					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
<b>BSMI</b>					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA</b>					
US0158	US0175	N/A	US0017	US0191	US0157



# MEASUREMENT UNCERTAINTY



## Measurement Uncertainty

When a measurement is made, the result will be different from the true or theoretically correct value. The difference is the result of tolerances in the measurement system that cannot be completely eliminated. To the extent that technology allows us, it has been our aim to minimize this error. Measurement uncertainty is a statistical expression of measurement error qualified by a probability distribution.

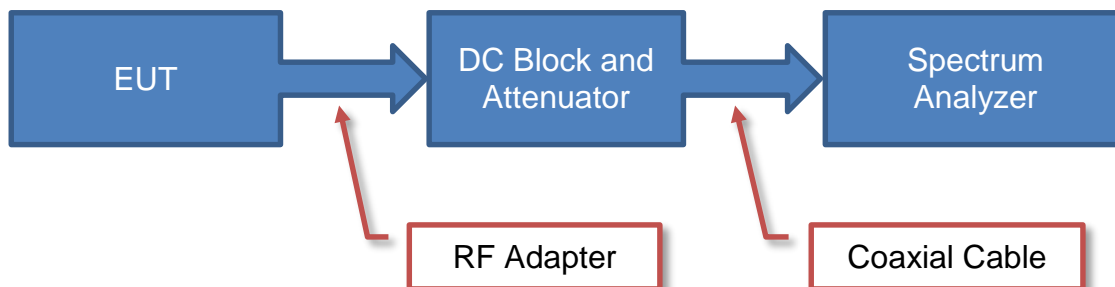
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable test description page. Our measurement data meets or exceeds the measurement uncertainty requirements of the applicable specification; therefore, the test data can be compared directly to the specification limit to determine compliance. The calculations for estimating measurement uncertainty are based upon ETSI TR 100 028 (or CISPR 16-4-2 as applicable), and are available upon request.

The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

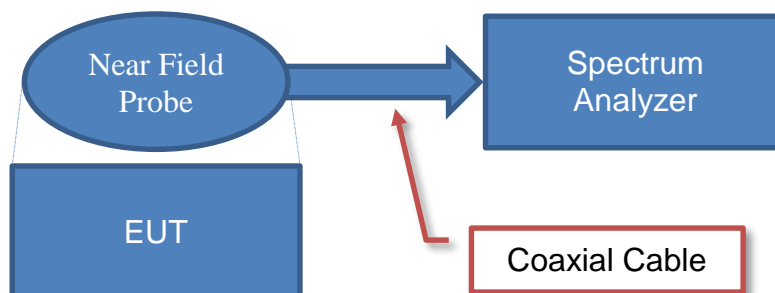
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	2.4 dB	-2.4 dB

# Test Setup Block Diagrams

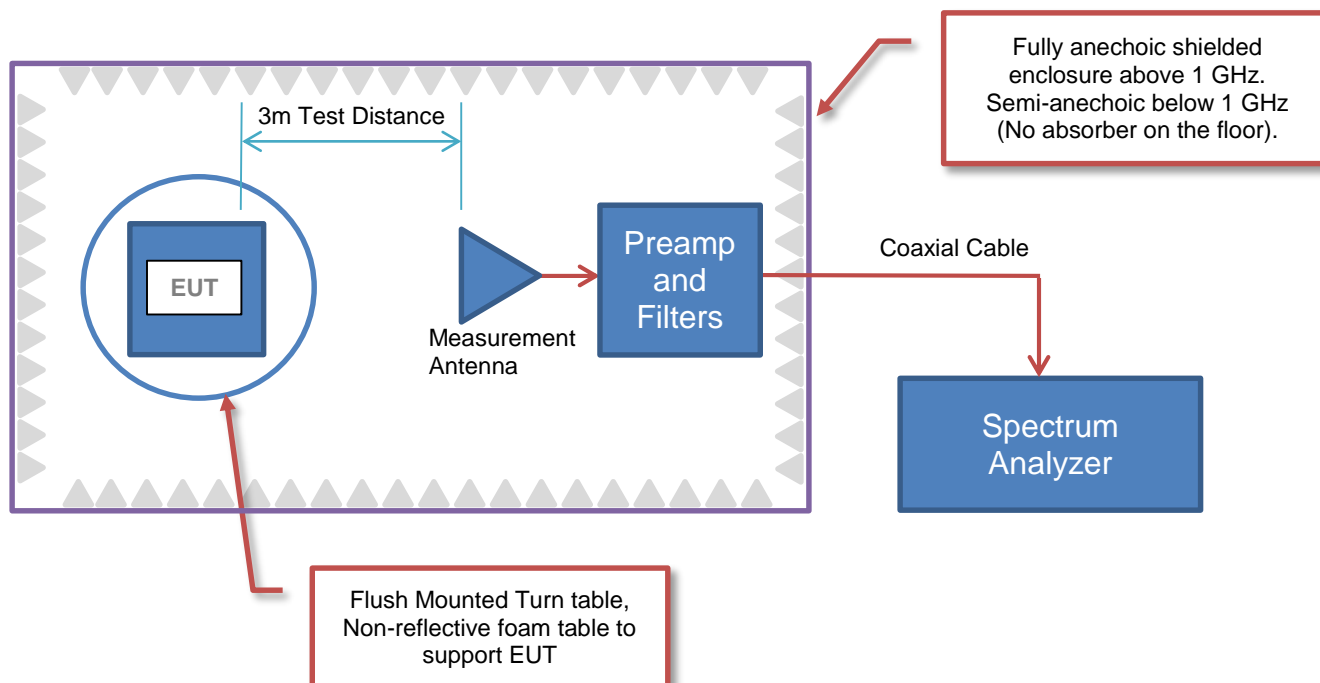
## Antenna Port Conducted Measurements



## Near Field Test Fixture Measurements



## Spurious Radiated Emissions





# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Southfork Solutions, Inc.
<b>Address:</b>	8021 W. 17th South
<b>City, State, Zip:</b>	Idaho Falls, ID 83402
<b>Test Requested By:</b>	Lucas Anderson
<b>Model:</b>	Advex Monitor
<b>First Date of Test:</b>	September 7, 2017
<b>Last Date of Test:</b>	September 8, 2017
<b>Receipt Date of Samples:</b>	September 7, 2017
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

The Advex Monitor will periodically wake from sleep mode and attempt to find wireless commands. If a wireless command is found the Advex Monitor will respond back with its unique asset id and optional payload data.

### Testing Objective:

Seeking to demonstrate compliance under FCC 15.247:2017 for operation in the 902 - 928 MHz Band.

# CONFIGURATIONS



## Configuration SOUT0001- 1

Software/Firmware Running during test	
Description	Version
Firmware	gen4150kHz

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Advex Monitor	Southfork Solutions Inc.	Gen 4	83129

## Configuration SOUT0001- 3

Software/Firmware Running during test	
Description	Version
Firmware	gen4150kHz

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Advex Monitor	Southfork Solutions, Inc.	Gen 4	251683437

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	9/7/2017	Spurious Radiated Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	9/8/2017	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	9/8/2017	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	9/8/2017	Band Edge Compliance	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
5	9/8/2017	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	9/8/2017	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	9/8/2017	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2017.06.01

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

## MODES OF OPERATION

Transmitting at 902.5MHz

## POWER SETTINGS INVESTIGATED

Battery

## CONFIGURATIONS INVESTIGATED

SOUT0001 - 1

## FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	18000 MHz
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## SAMPLE CALCULATIONS

Radiated Emissions: Field Strength = Measured Level + Antenna Factor + Cable Factor - Amplifier Gain + Distance Adjustment Factor + External Attenuation

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HGS	8/7/2017	12 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	1/6/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	2/14/2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	2/14/2017	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	7/12/2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Filter - High Pass	Micro-Tronics	HPM50108	LFM	9/22/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	2/14/2017	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	12/1/2016	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	6/23/2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	12/1/2016	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	12/1/2016	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	1/6/2016	24 mo

## MEASUREMENT BANDWIDTHS

Frequency Range (MHz)	Peak Data (kHz)	Quasi-Peak Data (kHz)	Average Data (kHz)
0.01 - 0.15	1.0	0.2	0.2
0.15 - 30.0	10.0	9.0	9.0
30.0 - 1000	100.0	120.0	120.0
Above 1000	1000.0	N/A	1000.0

## TEST DESCRIPTION

The highest gain antenna of each type to be used with the EUT was tested. The EUT was configured for the required transmit frequencies and the modes as showed in the data sheets.

For each configuration, the spectrum was scanned throughout the specified range as part of the exploratory investigation of the emissions. These "pre-scans" are not included in the report. Final measurements on individual emissions were then made and included in this test report.

The individual emissions from the EUT were maximized by rotating the EUT on a turntable, adjusting the position of the EUT and EUT antenna in three orthogonal axis if required, and adjusting the measurement antenna height and polarization (per ANSI C63.10). A preamp and high pass filter (and notch filter) were used for this test in order to provide sufficient

measurement sensitivity.

Measurements were made with the required detectors and annotated on the data for each individual point using the following annotation:

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

Measurements were made to satisfy the specific requirements of the test specification for out of band emissions as well as the restricted band requirements.

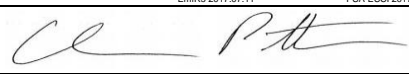
If there are no detectable emissions above the noise floor, the data included may show noise floor measurements for reference only.

Measurements at the edges of the allowable band may be presented in an alternative method as provided for in the ANSI C63.10 Marker-Delta method. This method involves performing an in-band fundamental measurement followed by a screen capture of the fundamental and out-of-band emission using reduced measurement instrumentation bandwidths. The amplitude delta measured on this screen capture is applied to the fundamental emission value to show the out-of-band emission level as applied to the limit.

As provided the EUT operated at a 52.9% duty cycle using the testing software. A duty cycle correction factor (DCCF) has been applied to correct this to a 100% duty cycle. The formula used for this is  $DCCF = 10 \cdot \log(100/52.9)$ . In the field, the EUT operates at a 2.3% duty cycle. To account for this the formula is  $DCCF = 20 \cdot \log(2.3/100)$ . To combine the two values the formula is  $DCCF = 10 \cdot \log(100/52.9) + 20 \cdot \log(2.3/100) = -30\text{dB}$ .

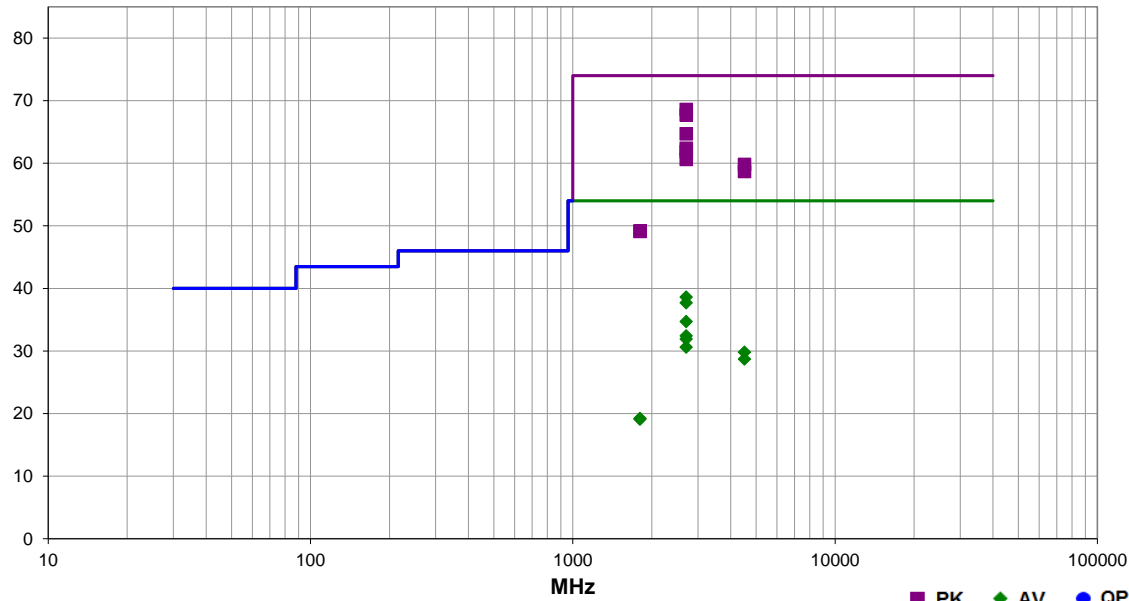
# SPURIOUS RADIATED EMISSIONS



Work Order:	SOUT0001	Date:	09/07/17	
Project:	None	Temperature:	22.1 °C	
Job Site:	MN05	Humidity:	44.3% RH	
Serial Number:	83129	Barometric Pres.:	1019 mbar	
EUT:	Advex Monitor			
Configuration:	1			
Customer:	Southfork Solutions, Inc.			
Attendees:	Luke Anderson			
EUT Power:	Battery			
Operating Mode:	Transmitting at 902.5MHz			
Deviations:	None			
Comments:	None			

Test Specifications	Test Method
FCC 15.247:2017	ANSI C63.10:2013

Run #	10	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2707.208	70.7	-2.1	1.0	17.0		0.0	Vert	PK	0.0	68.6	74.0	-5.4	EUT Vert
2707.892	69.8	-2.1	1.0	229.0		0.0	Horz	PK	0.0	67.7	74.0	-6.3	EUT Horz
2707.883	66.8	-2.1	1.0	308.9		0.0	Horz	PK	0.0	64.7	74.0	-9.3	EUT On Side
2707.858	64.5	-2.1	1.0	336.9		0.0	Vert	PK	0.0	62.4	74.0	-11.6	EUT On Side
2707.167	64.0	-2.1	1.3	282.0		0.0	Horz	PK	0.0	61.9	74.0	-12.1	EUT Vert
2707.667	62.7	-2.1	1.0	157.0		0.0	Vert	PK	0.0	60.6	74.0	-13.4	EUT Horz
4512.125	54.6	5.2	2.3	187.0		0.0	Horz	PK	0.0	59.8	74.0	-14.2	EUT Horz
4513.108	53.5	5.2	1.0	350.0		0.0	Vert	PK	0.0	58.7	74.0	-15.3	EUT Vert
2707.208	70.7	-2.1	1.0	17.0	-30.0	0.0	Vert	AV	0.0	38.6	54.0	-15.4	EUT Vert
2707.892	69.8	-2.1	1.0	229.0	-30.0	0.0	Horz	AV	0.0	37.7	54.0	-16.3	EUT Horz
2707.883	66.8	-2.1	1.0	308.9	-30.0	0.0	Horz	AV	0.0	34.7	54.0	-19.3	EUT On Side
2707.858	64.5	-2.1	1.0	336.9	-30.0	0.0	Vert	AV	0.0	32.4	54.0	-21.6	EUT On Side
2707.167	64.0	-2.1	1.3	282.0	-30.0	0.0	Horz	AV	0.0	31.9	54.0	-22.1	EUT Vert
2707.667	62.7	-2.1	1.0	157.0	-30.0	0.0	Vert	AV	0.0	30.6	54.0	-23.4	EUT Horz
4512.125	54.6	5.2	2.3	187.0	-30.0	0.0	Horz	AV	0.0	29.8	54.0	-24.2	EUT Horz
1805.233	53.5	-4.3	1.0	9.0		0.0	Horz	PK	0.0	49.2	74.0	-24.8	EUT Horz
1804.833	53.4	-4.3	1.0	17.0		0.0	Vert	PK	0.0	49.1	74.0	-24.9	EUT Vert
4513.108	53.5	5.2	1.0	350.0	-30.0	0.0	Vert	AV	0.0	28.7	54.0	-25.3	EUT Vert
1805.233	53.5	-4.3	1.0	9.0	-30.0	0.0	Horz	AV	0.0	19.2	54.0	-34.8	EUT Horz
1804.833	53.4	-4.3	1.0	17.0	-30.0	0.0	Vert	AV	0.0	19.1	54.0	-34.9	EUT Vert

# DUTY CYCLE



XMIT 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

There is no compliance requirement to be met by this test, so therefore no Pass / Fail criteria.

The measurements were made using a zero span on the spectrum analyzer to see the pulses in the time domain. The transmit power was set to its default maximum.

The duty cycle was calculated by dividing the transmission pulse duration (T) by the total period of a single on and total off time.

If the transmit duty cycle < 98 percent, burst gating may have been used during some of the other tests in this report to only take the measurement during the burst duration.

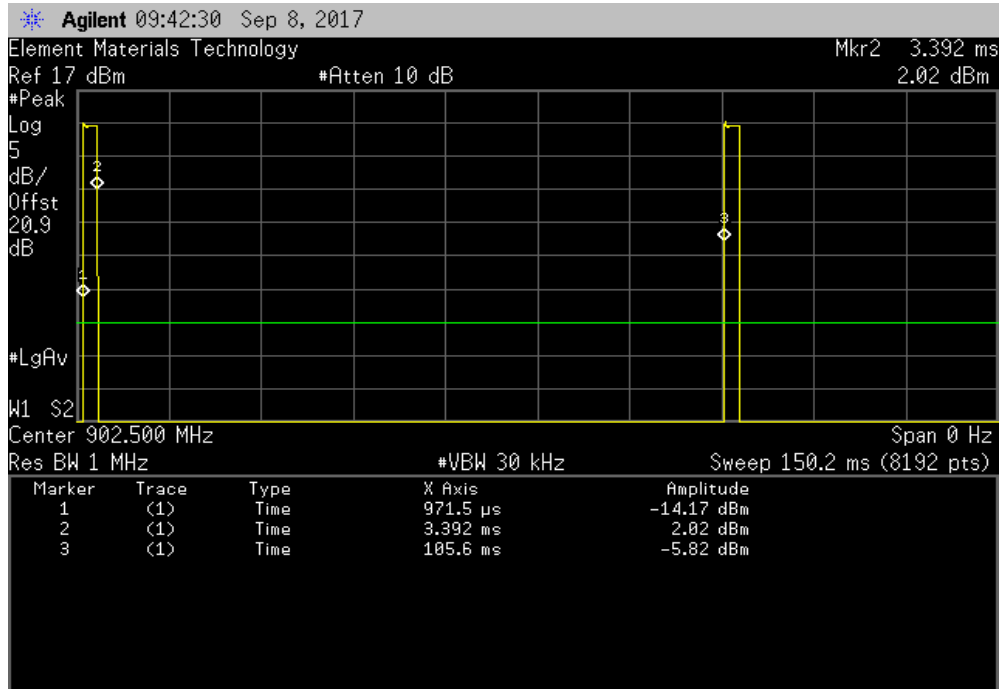
TbtTx 2017.07.11 XMit 2017.02.08

# DUTY CYCLE

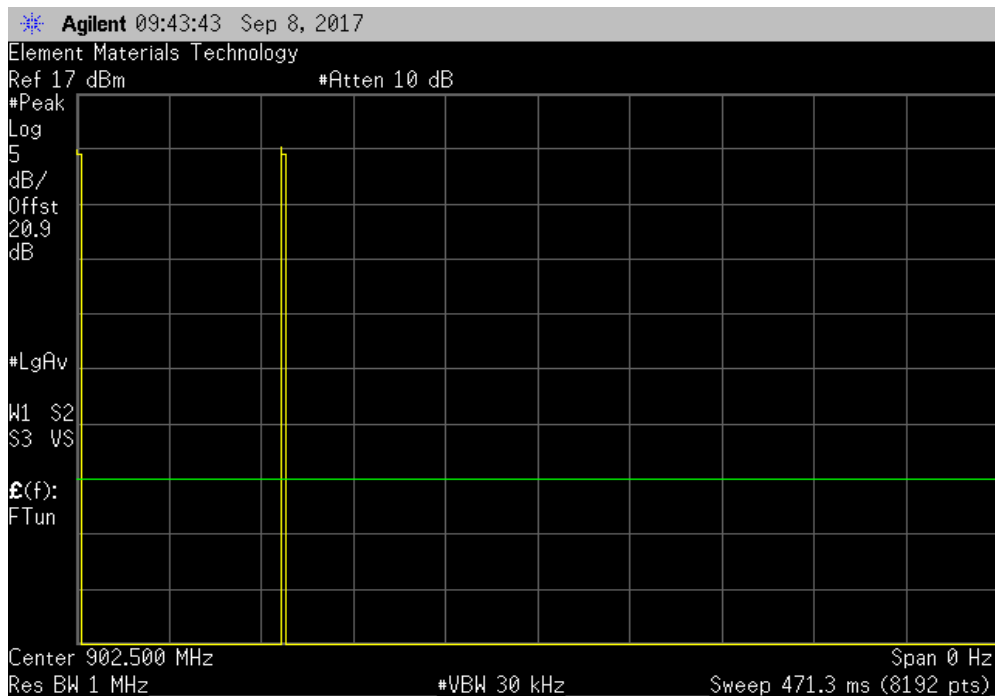


TMTx 2017.07.11 XMI 2017.02.08

902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.42 ms	104.61 ms	1	2.3	N/A	N/A



902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	2	N/A	N/A	N/A



# DUTY CYCLE



XMit 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The Duty Cycle (x) of the single channel operation of the radio as controlled by the provided test software was measured for each of the EUT operating modes.

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# DUTY CYCLE



TbTx 2017.07.11 XMi 2017.02.08

<b>EUT:</b> Advex Monitor		<b>Work Order:</b> SOUT0001	
<b>Serial Number:</b> 251683437		<b>Date:</b> 09/08/17	
<b>Customer:</b> Southfork Solutions, Inc.		<b>Temperature:</b> 22.3 °C	
<b>Attendees:</b> Luke Anderson		<b>Humidity:</b> 44.9% RH	
<b>Project:</b> None		<b>Barometric Pres.:</b> 1026 mbar	
<b>Tested by:</b> Kyle McMullan	<b>Power:</b> Battery	<b>Job Site:</b> MN08	

<b>TEST SPECIFICATIONS</b>		<b>Test Method</b>	
FCC 15.247:2017		ANSI C63.10:2013	

**COMMENTS**

The measurement was taken using software that increased the duty cycle to an unrealist level. A level not possible for a production unit. This software was used to make it practical to measure Spurious Radiated Emissions.

**DEVIATIONS FROM TEST STANDARD**

None

<b>Configuration #</b>	3	<i>Kyle McMullan</i> Signature
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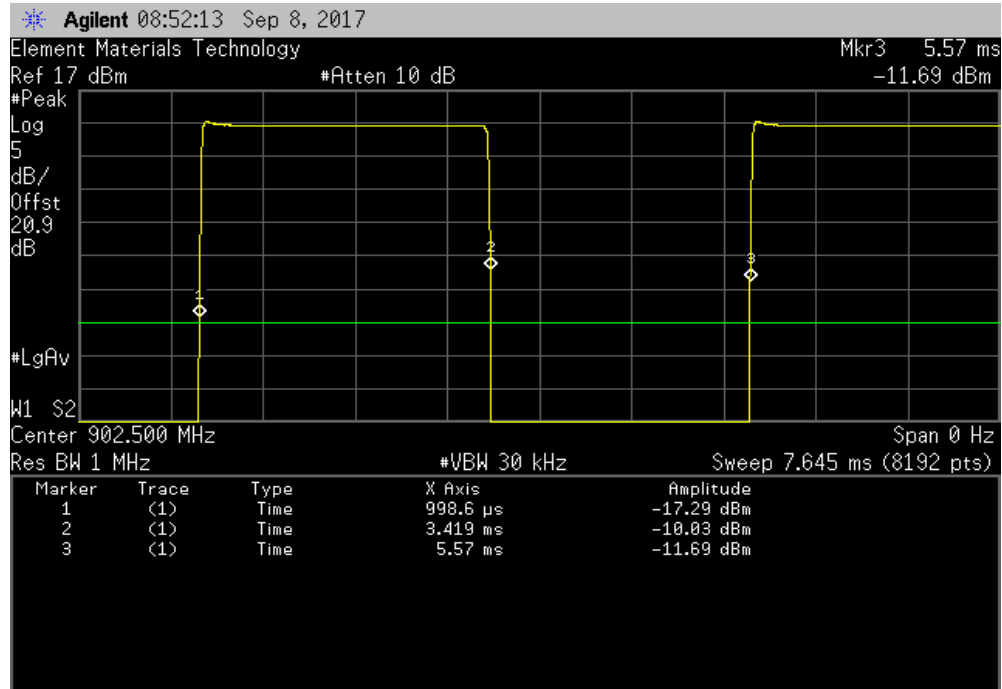
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
902.5 MHz	2.42 ms	4.572 ms	1	52.9	N/A	N/A
902.5 MHz	N/A	N/A	5	N/A	N/A	N/A

# DUTY CYCLE

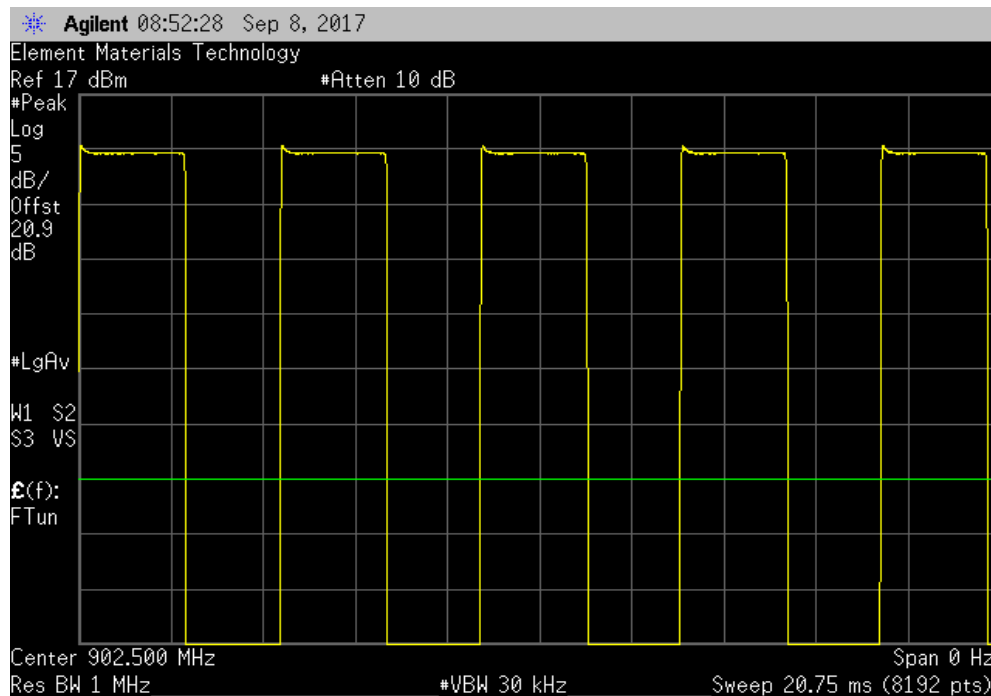


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902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.42 ms	4.572 ms	1	52.9	N/A	N/A



902.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



# OCCUPIED BANDWIDTH



XMIT 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The EUT was set to the channels and modes listed in the datasheet.

The 6dB occupied bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The 99.0% occupied bandwidth was also measured at the same time which can be needed during Output Power depending on the applicable method.

# OCCUPIED BANDWIDTH



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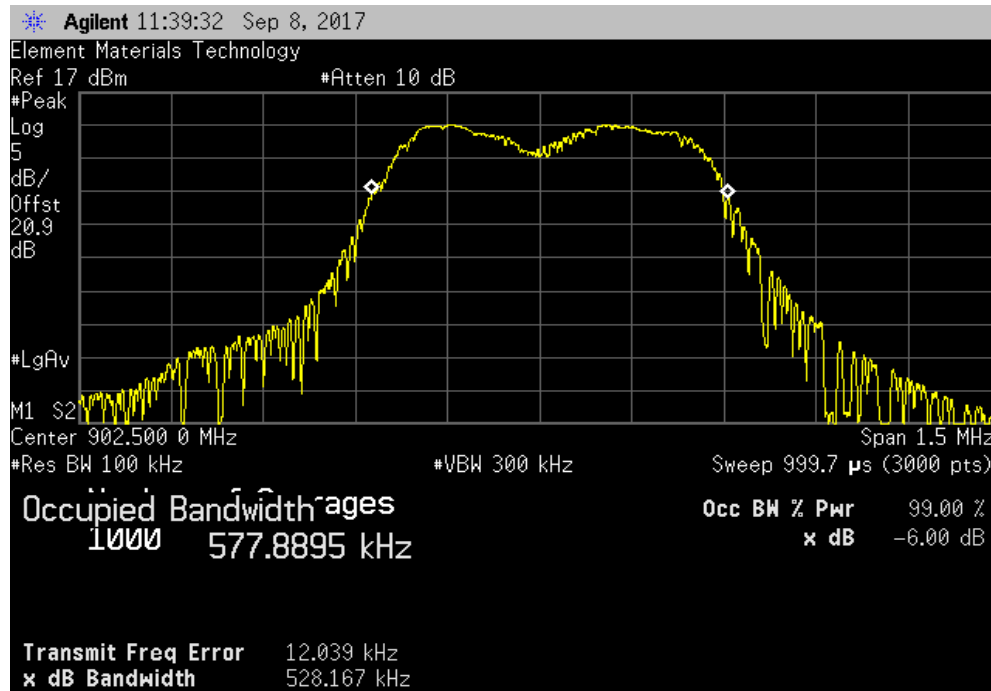
EUT: Advex Monitor		Work Order: SOUT0001	
Serial Number: 251683437		Date: 09/08/17	
Customer: Southfork Solutions, Inc.		Temperature: 22.3 °C	
Attendees: Luke Anderson		Humidity: 44.5% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Kyle McMullan		Power: Battery	Job Site: MN08
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2017		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature <i>Kyle McMullan</i>	
		Value	Limit (>) Result
902.5 MHz		528.167 kHz	500 kHz Pass

# OCCUPIED BANDWIDTH



TMTx 2017.07.11 XMI 2017.02.08

902.5 MHz				Value	Limit	Result
				(>)		
				528.167 kHz	500 kHz	Pass



# OUTPUT POWER



XMH 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

Prior to measuring peak transmit power the DTS bandwidth (B) was measured.

The method found in ANSI C63.10:2013 Section 11.9.1.1 was used because the RBW on the analyzer was greater than the DTS Bandwidth of the radio.

**De Facto EIRP Limit:** The EUT meets the de facto EIRP limit of +36 dBm.

# OUTPUT POWER



TbT\* 2017.07.11 XMi 2017.02.08

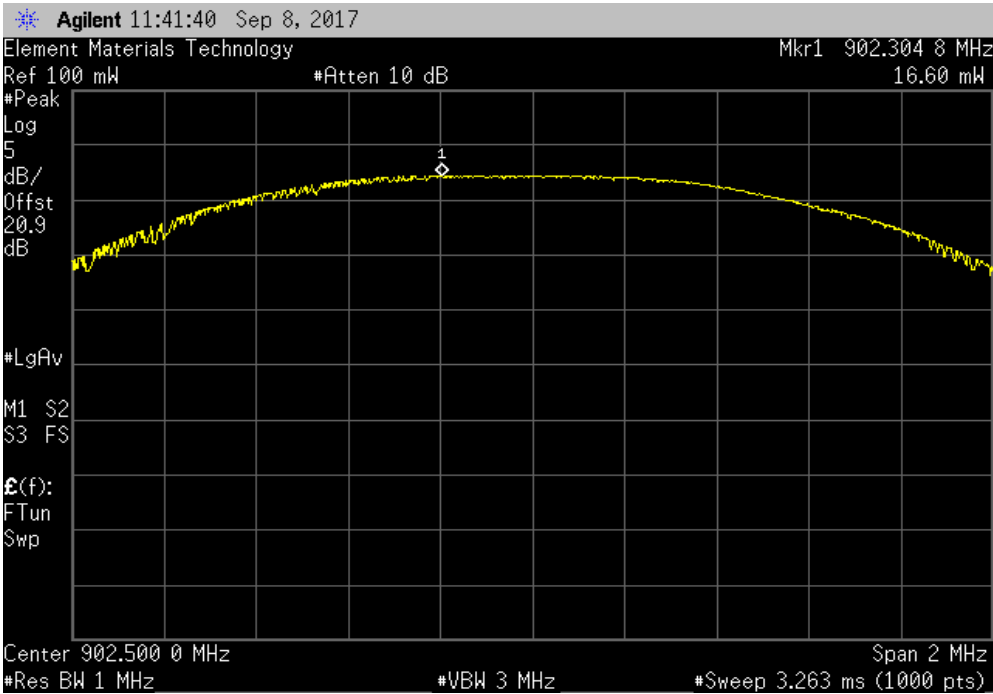
EUT: Advex Monitor		Work Order: SOUT0001	
Serial Number: 251683437		Date: 09/08/17	
Customer: Southfork Solutions, Inc.		Temperature: 22.3 °C	
Attendees: Luke Anderson		Humidity: 44.1% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Kyle McMullan		Power: Battery	
Job Site: MN08			
<b>TEST SPECIFICATIONS</b>			
FCC 15.247:2017		Test Method	
		ANSI C63.10:2013	
<b>COMMENTS</b>			
None			
<b>DEVIATIONS FROM TEST STANDARD</b>			
None			
Configuration #	3	Signature <i>Kyle McMullan</i>	
		Value	Limit (<)
902.5 MHz		16.60 mW	1 W
			Result
			Pass

OUTPUT POWER



TMTx 2017.07.11 XMI 2017.02.08

902.5 MHz						
				Value	Limit (<)	Result
				16.60 mW	1 W	Pass



# POWER SPECTRAL DENSITY



XMIT 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

Per the procedure outlined in ANSI C63.10 the peak power spectral density was measured in a 3 kHz RBW.

# POWER SPECTRAL DENSITY



TbTx 2017.07.11 XMt 2017.02.08

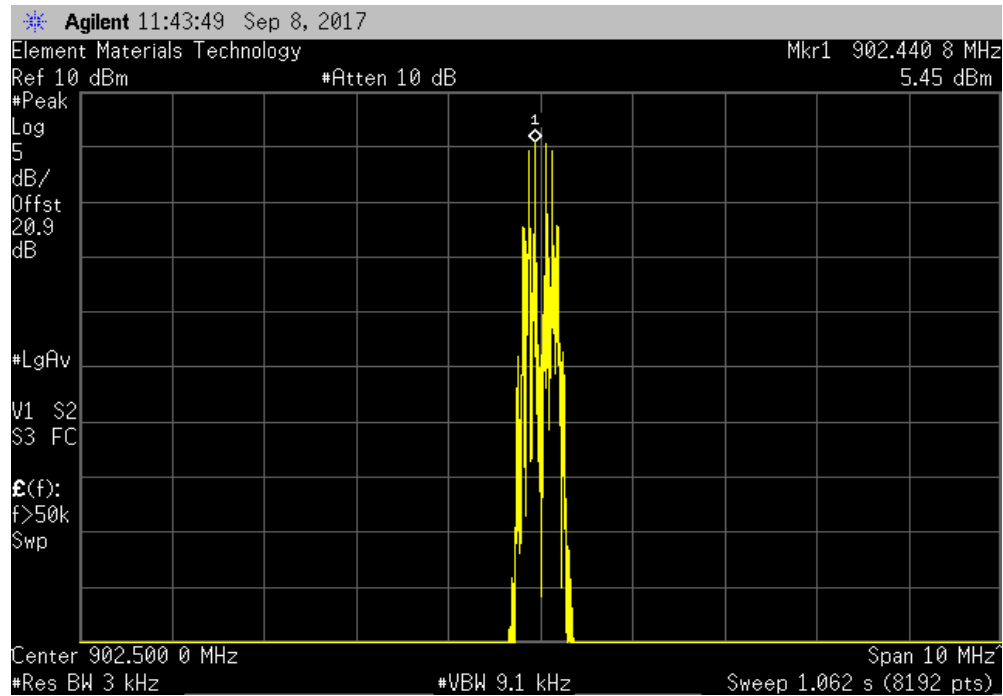
EUT: Advex Monitor		Work Order: SOUT0001	
Serial Number: 251683437		Date: 09/08/17	
Customer: Southfork Solutions, Inc.		Temperature: 22.2 °C	
Attendees: Luke Anderson		Humidity: 43.8% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Kyle McMullan		Power: Battery	
Job Site: MN08			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2017		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature <i>Kyle McMullan</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
902.5 MHz		5.45	8
			Pass

# POWER SPECTRAL DENSITY



TMTx 2017.07.11 XMI 2017.02.08

902.5 MHz				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				5.45	8	Pass



# SPURIOUS CONDUCTED EMISSIONS



XMIT 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions were measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting at the data rate(s) listed in the datasheet. For each transmit frequency, the spectrum was scanned throughout the specified frequency range.

# SPURIOUS CONDUCTED EMISSIONS



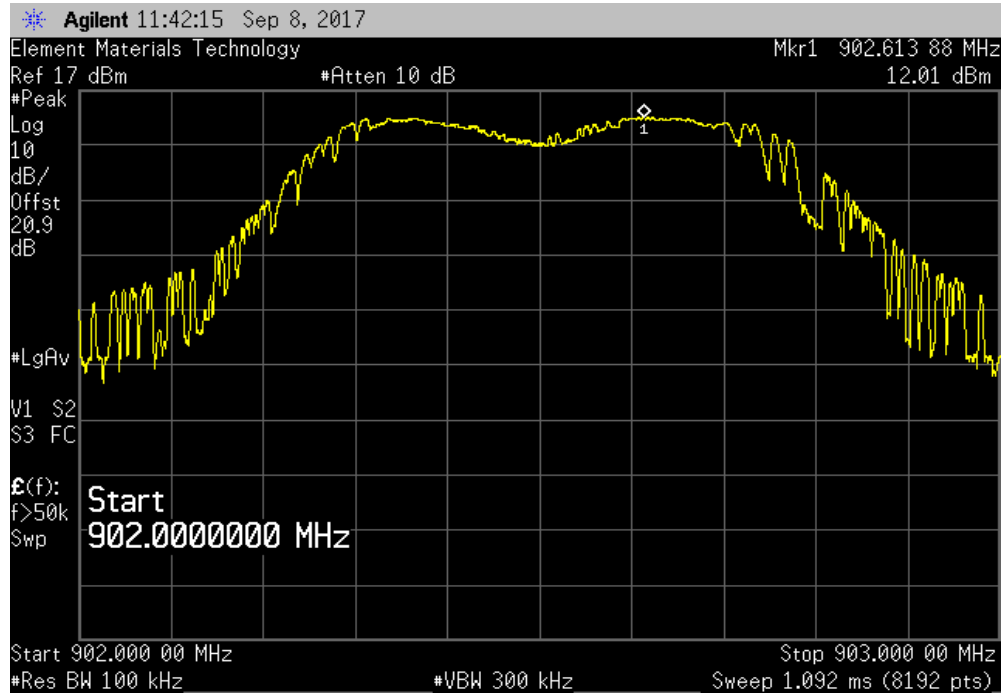
EUT: Advex Monitor		Work Order: SOUT0001	
Serial Number: 251683437		Date: 09/08/17	
Customer: Southfork Solutions, Inc.		Temperature: 22.2 °C	
Attendees: Luke Anderson		Humidity: 43.8% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Kyle McMullan	Power: Battery	Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2017		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature <i>Kyle McMullan</i>	
		Frequency Range	Max Value (dBc)
902.5 MHz		Fundamental	N/A
902.5 MHz		30 MHz - 12 GHz	-41.84
			Limit ≤ (dBc)
			-20
			Result
			N/A
			Pass

# SPURIOUS CONDUCTED EMISSIONS

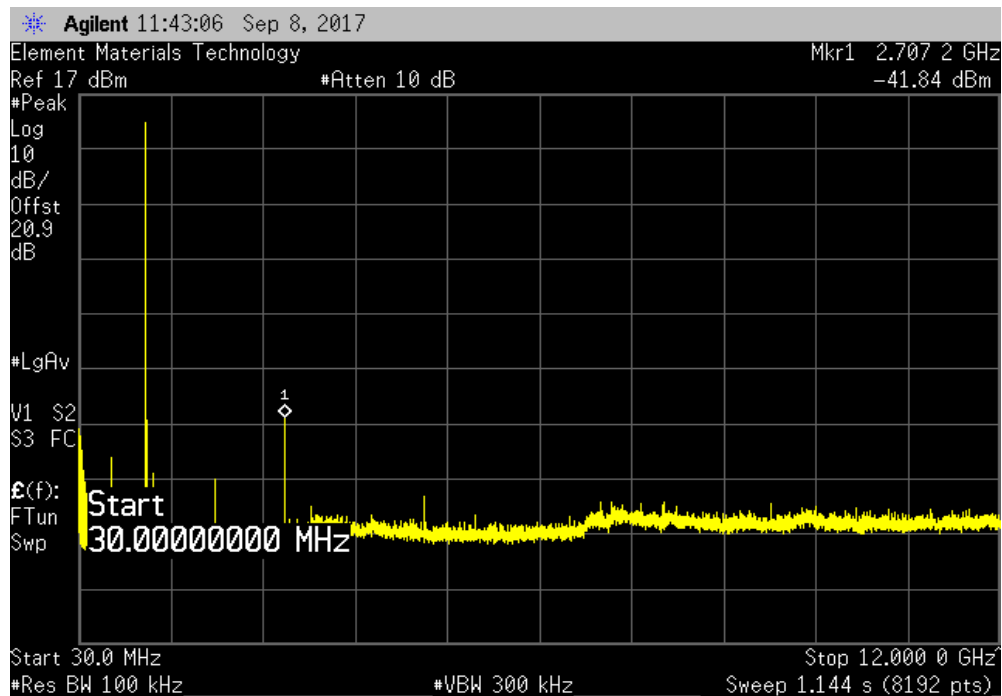


TMTx 2017.07.11 XMI 2017.02.08

902.5 MHz						
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental			N/A	N/A	N/A	



902.5 MHz						
Frequency Range			Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12 GHz			-41.84	-20	Pass	



# BAND EDGE COMPLIANCE



XMIT 2017.02.08

Testing was performed using the mode(s) of operation and configuration(s) noted within the report. The individuals and/or the organization requesting the test provided the modes, configurations and settings used to complete the evaluation. The actual test parameters are specified in the test data, this includes items such as investigated frequency range (scanned) and test levels. The testing methods and performance specifications, as well as the test site used for the evaluation are indicated in the test data.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	E4422B	TGQ	3/17/2015	3/17/2018
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	NCR	NCR
Block - DC	Fairview Microwave	SD3379	AMI	9/15/2016	9/15/2017
Attenuator	S.M. Electronics	SA26B-20	RFW	2/14/2017	2/14/2018
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	3/16/2017	3/16/2018

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer. The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

The spectrum was scanned below the lower band edge and above the higher band edge.

# BAND EDGE COMPLIANCE



TstTx 2017.07.11 XMit 2017.02.08

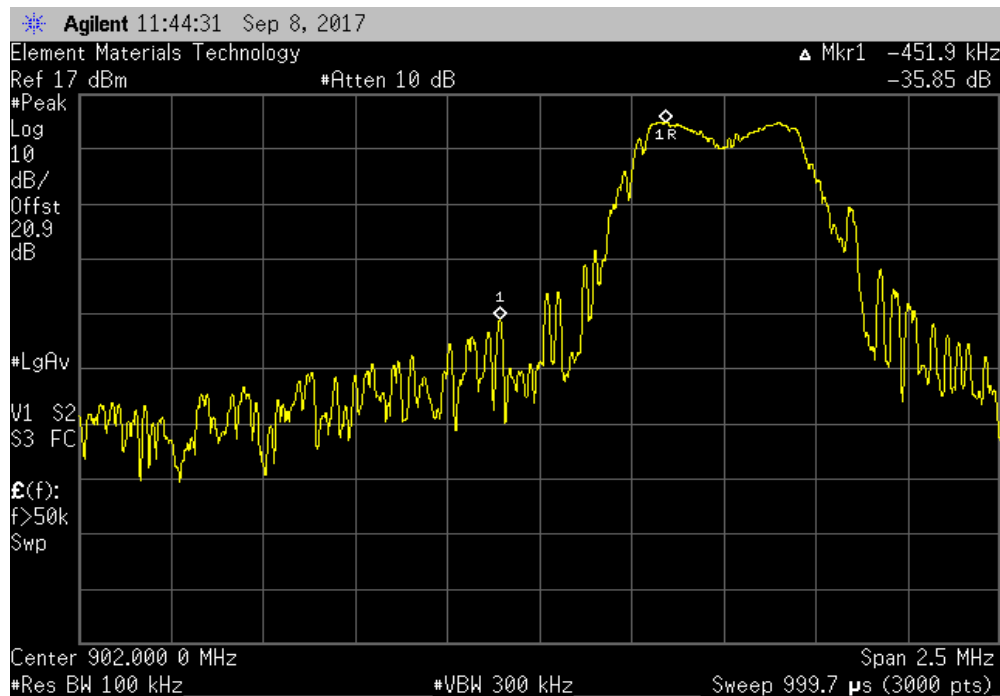
EUT: Advex Monitor		Work Order: SOUT0001	
Serial Number: 251683437		Date: 09/08/17	
Customer: Southfork Solutions, Inc.		Temperature: 22.2 °C	
Attendees: Luke Anderson		Humidity: 43.5% RH	
Project: None		Barometric Pres.: 1026 mbar	
Tested by: Kyle McMullan		Job Site: MN08	
Power: Battery			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2017		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	3	Signature <i>Kyle McMullan</i>	
		Value (dBc)	Limit ≤ (dBc) Result
Low Band, 902.5 MHz		-35.85	-20 Pass
High Band, 902.5 MHz		-73.9	-20 Pass

# BAND EDGE COMPLIANCE



TMTx 2017.07.11 XMI 2017.02.08

Low Band, 902.5 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-35.85	-20	Pass



High Band, 902.5 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-73.9	-20	Pass

