APANA Inc

XB1301

FCC 15.247:2017

902 - 928 MHz Transceiver

Report # PECK0002.1

NVLAP Lab Code: 200630-0

CERTIFICATE OF TEST

Last Date of Test: May 11, 2017
APANA Inc
Model: XB1301

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2017	ANSI C63.10:2013
FCC 15.247:2017	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
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	
11.9.2.2.4	Equivalent Isotropic Radiated Power (EIRP)	Yes	Pass	
11.9.2.2.4	Output Power	Yes	Pass	
11.10.5	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, 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

2017.1.25

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

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.

European Union

European Commission – Validated by the European Commission as a Notified Body under the R&TTE Directive.

Australia/New Zealand

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

Korea

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

Japan

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

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.

Singapore

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

Israel

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

Hong Kong

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

Vietnam

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

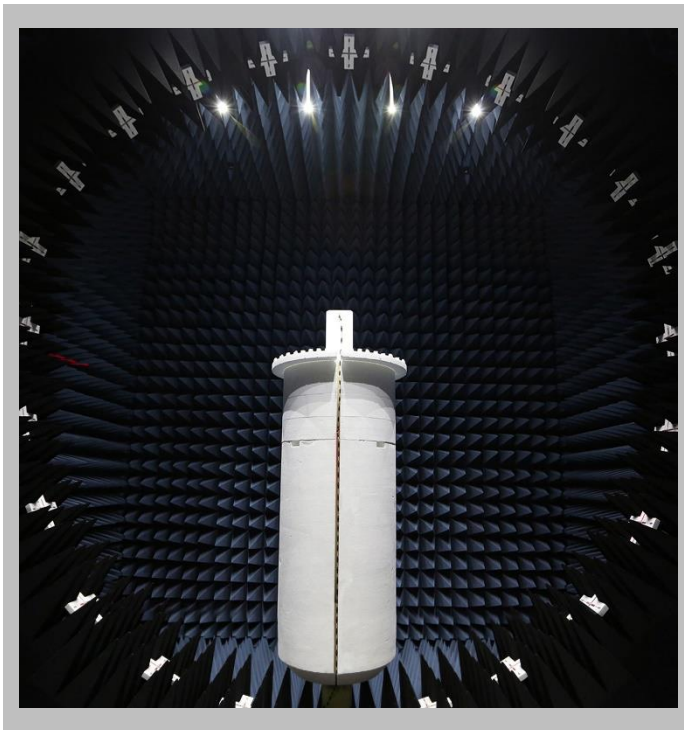
SCOPE

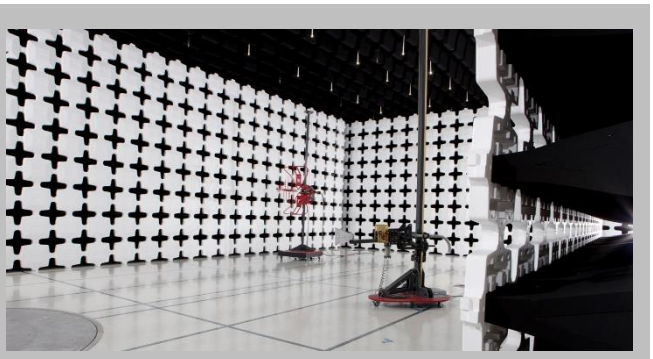
For details on the Scopes of our Accreditations, please visit:
http://portlandcustomer.element.com/ts/scope/scope.htm
http://gsi.nist.gov/global/docs/cabs/designations.html

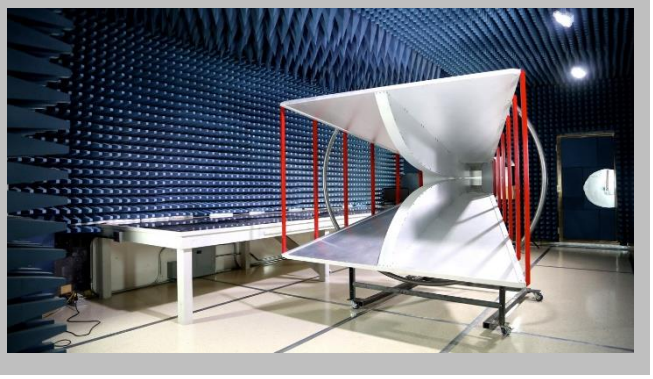
FACILITIES

2017.3.2

California	Minnesota	New York	Oregon	Texas	Washington
Labs OC01-13 41 Tesla Irvine, CA 92618 (949) 861-8918	Labs MN01-08, MN10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Labs EV01-12 22975 NW Evergreen Pkwy Hillsboro, OR 97124 (503) 844-4066	Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Labs NC01-05 19201 120th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
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
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1	N/A	2834D-1, 2834D-*2*	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157







MEASUREMENT UNCERTAINTY

TMU.2015.07.10

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.

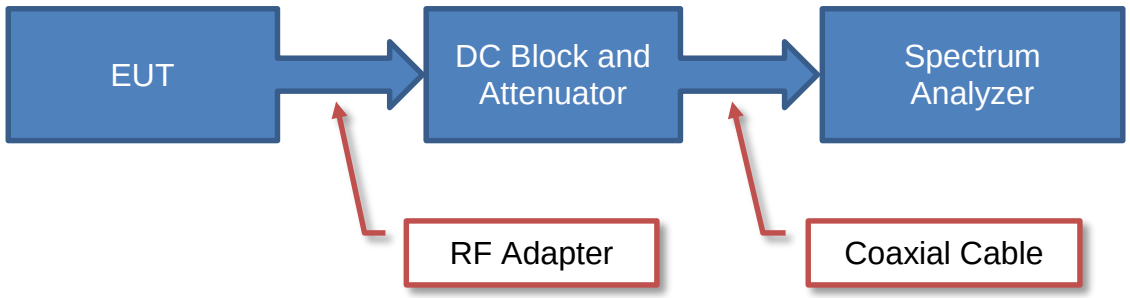
The following table represents the Measurement Uncertainty (MU) budgets for each of the tests that may be contained in this report.

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

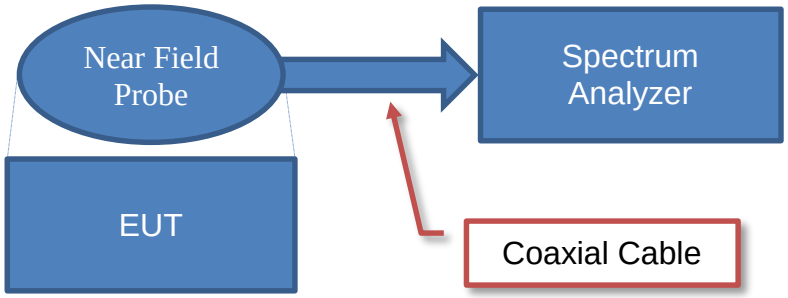
Test Setup Block Diagrams

2017.1.25

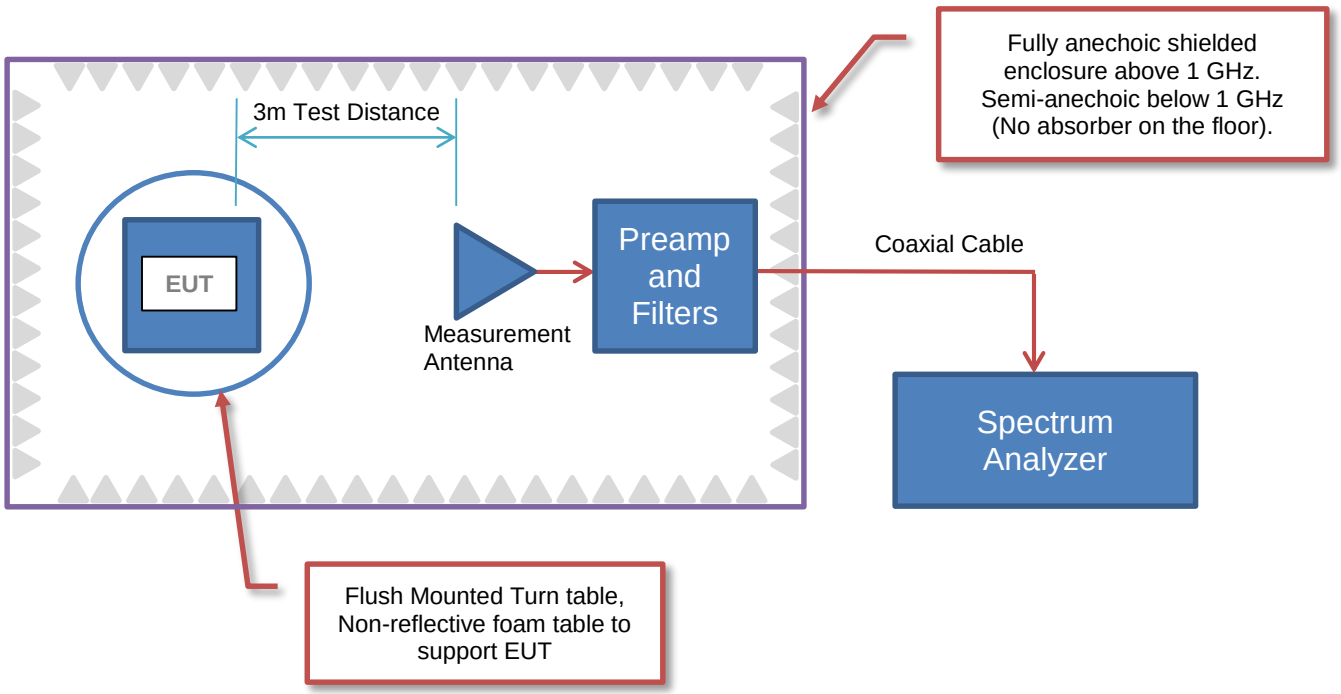
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION

2017-1-25

Client and Equipment Under Test (EUT) Information

Company Name:	APANA Inc
Address:	4290 Pacific HWY, Ste A
City, State, Zip:	Bellingham, WA 98226
Test Requested By:	Canyon Peckham of Peckham Technology Inc
Model:	XB1301
First Date of Test:	April 19, 2017
Last Date of Test:	May 11, 2017
Receipt Date of Samples:	April 19, 2017
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
The APANA XB1301 plugs into a XBEE form factor socket, communicating using UART and/or USB to the host board. The radios on the APANA XB1301 are configured to receive multiple uplink channels in the 902 - 928 MHz range from remotely-located sensors (an "End Device" or "End Node"). Once the APANA XB1301 receives a wireless transmission from an end node, it responds on a downlink channel, which is also in the 902 to 928 MHz range. The APANA XB1301 would be considered a LoRaWAN concentrator, in addition to a concentrator for other proprietary-LoRa specs.

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

CONFIGURATIONS

Configuration PECK0002- 1

Software/Firmware Running during test	
Description	**Version**
RealTerm	3.0.0.30

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	17

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop (Dell)	Dell	None	HQHP162
Test Board	APANA Inc	XB1301-MULE	1
AC/DC Adapter	Triad	WS2U050-2000	None
AC/DC Adapter (Dell)	Dell	LA45NM140	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Yes	1.5m	No	AC/DC Adapter	Test Board
USB Cable	Yes	2.2m	No	Test Board	Laptop
DC Power Cable (Dell)	Unknown	2.1m	Yes	AC/DC Adapter	Laptop
AC Power Cable (Dell)	No	1.2m	No	AC Mains	AC/DC Adapter

Configuration PECK0002- 3

Software/Firmware Running during test	
Description	**Version**
Picocom	V1.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	17
Antenna (Yagi) 12dBi	DMS Wireless	YA90012	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
DC Power Supply	TOPWARD Electronics	TPS 2000	TPD

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	No	1.1m	No	DC Power Supply	Transmitter Module
Antenna Cable	No	10.0m	No	Antenna	Transmitter Module
U.FL cable (bulkhead)	No	.1m	No	Antenna	Transmitter Module
AC Power Cable	No	2.1m	No	DC Power Supply	AC mains

CONFIGURATIONS

Configuration PECK0002- 5

Software/Firmware Running during test	
Description	**Version**
Picocom	V1.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	16
Antenna (Yagi) 12dBi	DMS Wireless	YA90012	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Board	APANA Inc	XB1301-MULE	1
AC/DC Adapter	Triad	WS2U050-2000	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Yes	1.5m	No	AC/DC Adapter	Test Board
Antenna Cable	No	10.0m	No	Antenna	Transmitter Module
U.FL cable (bulkhead)	No	.1m	No	Antenna	Transmitter Module

Configuration PECK0002- 6

Software/Firmware Running during test	
Description	**Version**
Picocom	V1.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	16
Antenna (Dipole) 3.5 dBi	Taoglas	OMB.915.B03F21	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Board	APANA Inc	XB1301-MULE	1
AC/DC Adapter	Triad	WS2U050-2000	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Yes	1.5m	No	AC/DC Adapter	Test Board
Antenna Cable	No	10.0m	No	Antenna	Transmitter Module
U.FL cable (bulkhead)	No	.1m	No	Antenna	Transmitter Module

CONFIGURATIONS

Configuration PECK0002- 7

Software/Firmware Running during test	
Description	**Version**
Picocom	V1.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	16
Antenna (Yagi) 12dBi	DMS Wireless	YA90012	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Board	APANA Inc	XB1301-MULE	1
AC/DC Adapter	Triad	WS2U050-2000	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Yes	1.5m	No	AC/DC Adapter	Test Board
U.FL cable (bulkhead)	No	.1m	No	Antenna	Transmitter Module

Configuration PECK0002- 8

Software/Firmware Running during test	
Description	**Version**
Picocom	V1.7

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Radio Transmitter	APANA Inc	SX1301 SX1257	16
Antenna (Dipole) 3.5 dBi	Taoglas	OMB.915.B03F21	None

Peripherals in test setup boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Test Board	APANA	XB1301-MULE	1
AC/DC Adapter	Triad	WS2U050-2000	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
DC Power Cable	Yes	1.5m	No	AC/DC Adapter	Test Board
U.FL cable (bulkhead)	No	.1m	No	Antenna	Transmitter Module

MODIFICATIONS

2017-1-25

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	4/19/2017	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	4/26/2017	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT was taken home by the client before the next scheduled test.
3	4/26/2017	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.
4	4/26/2017	Power Spectral Density	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	4/26/2017	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.
6	4/26/2017	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	4/29/2017	Powerline 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.
8	5/11/2017	Equivalent Isotropic Radiated Power (EIRP)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
9	5/11/2017	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

WTD.2017.03.21

TEST DESCRIPTION

Using the mode of operation and configuration noted within this report, conducted emissions tests were performed. The frequency range investigated (scanned), is also noted in this report. Conducted power line measurements are made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz to determine the line-to-ground radio-noise voltage that is conducted from the EUT power-input terminals that are directly (or indirectly via separate transformer or power supplies) connected to a public power network. Per the standard, an insulating material was also added to ground plane between the EUT's power and remote I/O cables. Equipment is tested with power cords that are normally used or that have electrical or shielding characteristics that are the same as those cords normally used. Typically those measurements are made using a LISN (Line Impedance Stabilization Network), the 50ohm measuring port is terminated by a 50ohm EMI meter or a 50ohm resistive load. All 50ohm measuring ports of the LISN are terminated by 50ohm. The test data represents the configuration / operating mode/ model that produced the highest emission levels as compared to the specification limit.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Cable - Conducted Cable Assembly	Element	EVG, HHD, RKA	EVGA	4/13/2017	4/13/2018
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	10/4/2016	10/4/2018
Receiver	Rohde & Schwarz	ESCI	ARH	3/27/2017	3/27/2018

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

PECK0002-3

MODES INVESTIGATED

Tx, 914.2 MHz DTS, Yagi antenna

POWERLINE CONDUCTED EMISSIONS

WTD.2017.03.21

EUT:	XB1301	Work Order:	PECK0002
Serial Number:	17	Date:	04/29/2017
Customer:	APANA Inc	Temperature:	22.1°C
Attendees:	None	Relative Humidity:	39.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	5 VDC Nominal via 110VAC/60Hz	Configuration:	PECK0002-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2017	ANSI C63.10:2013

TEST PARAMETERS

Run #:	18	Line:	High Line	Add. Ext. Attenuation (dB):	0

COMMENTS

The Yagi antenna was used to populate the antenna port.

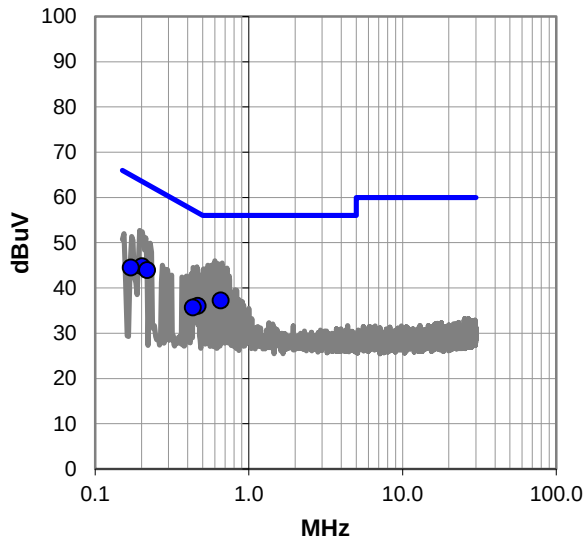
EUT OPERATING MODES

Tx, 914.2 MHz DTS, Yagi antenna

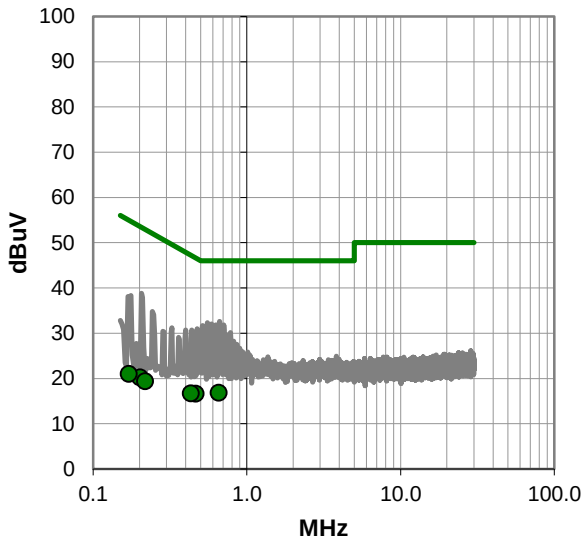
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

WTD.2017.03.21

RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.202	25.2	19.6	44.8	63.5	-18.7
0.658	17.7	19.5	37.2	56.0	-18.8
0.218	24.3	19.6	43.9	62.9	-19.0
0.171	25.0	19.5	44.5	64.9	-20.4
0.465	16.5	19.5	36.0	56.6	-20.6
0.432	16.2	19.5	35.7	57.2	-21.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.658	-2.7	19.5	16.8	46.0	-29.2
0.465	-2.9	19.5	16.6	46.6	-30.0
0.432	-2.8	19.5	16.7	47.2	-30.5
0.202	0.6	19.6	20.2	53.5	-33.3
0.218	-0.2	19.6	19.4	52.9	-33.5
0.171	1.5	19.5	21.0	54.9	-33.9

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

WTD.2017.03.21

EUT:	XB1301	Work Order:	PECK0002
Serial Number:	17	Date:	04/29/2017
Customer:	APANA Inc	Temperature:	22.1°C
Attendees:	None	Relative Humidity:	39.5%
Customer Project:	None	Bar. Pressure:	1024 mb
Tested By:	Brandon Hobbs	Job Site:	EV07
Power:	5 VDC Nominal via 110VAC/60Hz	Configuration:	PECK0002-3

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2017	ANSI C63.10:2013

TEST PARAMETERS

Run #:	19	Line:	Neutral	Add. Ext. Attenuation (dB):	0

COMMENTS

The Yagi antenna was used to populate the antenna port.

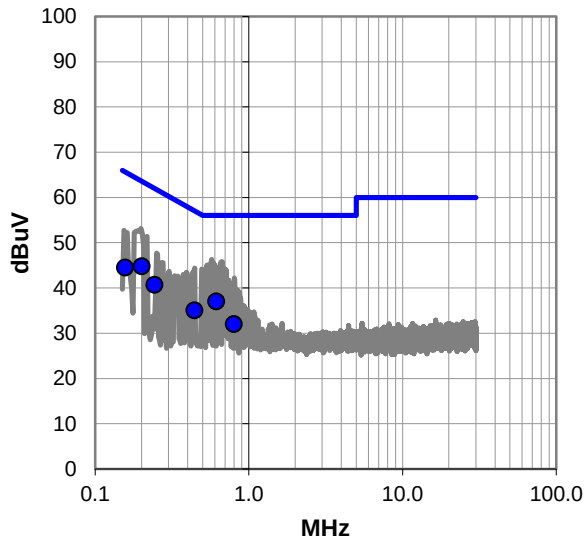
EUT OPERATING MODES

Tx, 914.2 MHz DTS, Yagi antenna

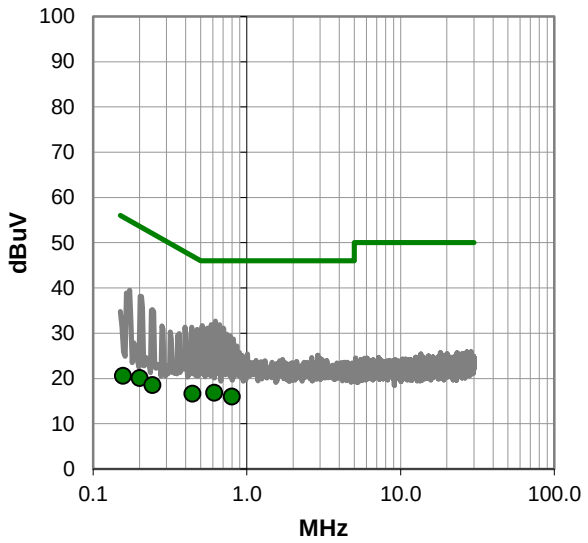
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

WTD.2017.03.21

RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.201	25.2	19.6	44.8	63.6	-18.8
0.615	17.5	19.5	37.0	56.0	-19.0
0.157	24.9	19.6	44.5	65.6	-21.1
0.243	21.1	19.6	40.7	62.0	-21.3
0.442	15.5	19.5	35.0	57.0	-22.0
0.800	12.5	19.5	32.0	56.0	-24.0

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.615	-2.7	19.5	16.8	46.0	-29.2
0.800	-3.5	19.5	16.0	46.0	-30.0
0.442	-2.9	19.5	16.6	47.0	-30.4
0.201	0.5	19.6	20.1	53.6	-33.5
0.243	-1.1	19.6	18.5	52.0	-33.5
0.157	1.0	19.6	20.6	55.6	-35.0

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

PSA-ESCI 2017.01.26

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

Tx Continuous, DTS

CHANNELS OF OPERATION

Low Ch. 903 MHz
Mid Ch. 914.2 MHz
High Ch. 927.5 MHz

ANTENNAS USED

Yagi Antenna, Final Power Setting, DAC: 4000, MXG: 8 (May be Lowered further for Conducted Testing)
Dipole Antenna, Final Power Setting, DAC: 4000, MXG: 15 (May be Lowered further for Conducted Testing)

CONFIGURATIONS INVESTIGATED

PECK0002 - 8
PECK0002 - 7
PECK0002 - 6
PECK0002 - 5

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	12400 MHz

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
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	4/13/2017	12 mo
Cable	None	Standard Gain Horns Cable	EVF	2/6/2017	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2/7/2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Filter - High Pass	Micro-Tronics	HPM50108	HFV	2/6/2017	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	2/6/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2/6/2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2/3/2016	24 mo
Filter - Band Pass/Notch	K&L Microwave	3TNF-500/1000-N/N	HFT	1/4/2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50003	LFB	4/19/2017	12 mo
Attenuator	Coaxicom	3910-20	AXZ	4/19/2017	12 mo
Cable	N/A	Bilog Cables	EVA	2/6/2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2/6/2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	6/30/2016	24 mo

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.

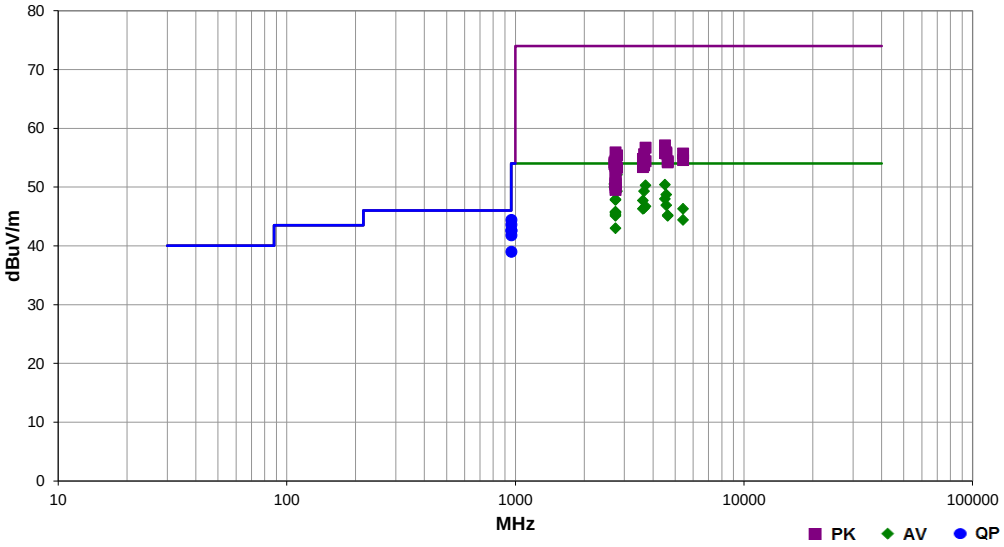
SPURIOUS RADIATED EMISSIONS

EmiR5 2017.01.25 PSA-ESCI 2017.01.26

Work Order:	PECK0002	**Date:**	04/19/17		
Project:	None	**Temperature:**	22.2 °C		
Job Site:	EV01	**Humidity:**	39.4% RH		
Serial Number:	16	**Barometric Pres.:**	1020 mbar	**Tested by:**	Brandon Hobbs
EUT:	XB1301				
Configuration:	5,7				
Customer:	APANA Inc				
Attendees:	None				
EUT Power:	5 VDC Nominal via 110VAC/60Hz				
Operating Mode:	On Tx Continuous DTS Please reference the data comments for further EUT operating modes.				
Deviations:	None				
Comments:	Dipole Antenna. The radio was tested with both the longest and shorts RF path on the worst case harmonic.				

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

Run #	53	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2742.595	51.0	1.6	1.0	91.0	3.0	0.0	Horz	AV	0.0	52.6	54.0	-1.4	Mid Ch.914.2 MHz, Port A, EUT Vert
2782.495	50.3	1.8	1.0	93.0	3.0	0.0	Horz	AV	0.0	52.1	54.0	-1.9	High Ch.927.5 MHz ,Port A, EUT Vert
2742.580	49.2	1.6	1.2	231.0	3.0	0.0	Vert	AV	0.0	50.8	54.0	-3.2	Mid Ch.914.2 MHz ,Port A, EUT Horz
2709.025	48.9	1.6	1.0	85.0	3.0	0.0	Horz	AV	0.0	50.5	54.0	-3.5	Low Ch.903 MHz ,Port A, EUT Vert
4514.935	40.2	10.2	1.0	14.0	3.0	0.0	Horz	AV	0.0	50.4	54.0	-3.6	Low Ch.903 MHz ,Port A, EUT Vert
3709.915	42.9	7.4	2.3	327.0	3.0	0.0	Horz	AV	0.0	50.3	54.0	-3.7	High Ch.927.5 MHz ,Port A, EUT Vert
2742.675	48.7	1.6	1.0	260.0	3.0	0.0	Horz	AV	0.0	50.3	54.0	-3.7	Mid Ch.914.2 MHz, Port A, EUT On Side with 10m cable
2742.505	48.5	1.6	1.2	21.0	3.0	0.0	Horz	AV	0.0	50.1	54.0	-3.9	Mid Ch.914.2 MHz ,Port A, EUT On Side
2708.985	48.4	1.6	4.0	188.0	3.0	0.0	Vert	AV	0.0	50.0	54.0	-4.0	Low Ch.903 MHz ,Port A, EUT Horz
2742.595	48.3	1.6	1.0	28.0	3.0	0.0	Vert	AV	0.0	49.9	54.0	-4.1	Mid Ch.914.2 MHz ,Port A, EUT Vert
2742.465	48.1	1.6	1.0	343.0	3.0	0.0	Horz	AV	0.0	49.7	54.0	-4.3	Mid Ch.914.2 MHz ,Port A, EUT Horz
3656.770	42.2	7.1	1.0	342.0	3.0	0.0	Horz	AV	0.0	49.3	54.0	-4.7	Mid Ch.914.2 MHz ,Port A, EUT Vert
2782.430	47.5	1.8	1.0	324.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	High Ch.927.5 MHz ,Port A, EUT Horz
4570.840	38.5	10.2	1.0	6.0	3.0	0.0	Horz	AV	0.0	48.7	54.0	-5.3	Mid Ch.914.2 MHz ,Port A, EUT Vert
4515.050	37.8	10.2	1.0	313.0	3.0	0.0	Vert	AV	0.0	48.0	54.0	-6.0	Low Ch.903 MHz ,Port A, EUT Horz
2742.690	46.3	1.6	1.2	18.0	3.0	0.0	Vert	AV	0.0	47.9	54.0	-6.1	Mid Ch.914.2 MHz ,Port A, EUT On Side
2742.650	46.2	1.6	1.0	290.0	3.0	0.0	Vert	AV	0.0	47.8	54.0	-6.2	Mid Ch.914.2 MHz, Port A, EUT On Side with 10m cable
3611.965	40.8	6.9	4.0	303.0	3.0	0.0	Vert	AV	0.0	47.7	54.0	-6.3	Low Ch.903 MHz ,Port A, EUT Horz
4570.840	36.7	10.2	1.0	311.0	3.0	0.0	Vert	AV	0.0	46.9	54.0	-7.1	Mid Ch.914.2 MHz ,Port A, EUT Horz
3710.010	39.3	7.4	1.0	283.0	3.0	0.0	Vert	AV	0.0	46.7	54.0	-7.3	High Ch.927.5 MHz ,Port A, EUT Horz
3656.775	39.3	7.1	1.0	287.0	3.0	0.0	Vert	AV	0.0	46.4	54.0	-7.6	Mid Ch.914.2 MHz ,Port A, EUT Horz
3612.100	39.4	6.9	1.0	327.0	3.0	0.0	Horz	AV	0.0	46.3	54.0	-7.7	Low Ch.903 MHz ,Port A, EUT Vert
5418.090	34.4	11.9	1.0	0.0	3.0	0.0	Horz	AV	0.0	46.3	54.0	-7.7	Low Ch.903 MHz ,Port A, EUT Vert
2742.605	44.2	1.6	1.0	60.0	3.0	0.0	Horz	AV	0.0	45.8	54.0	-8.2	Mid Ch.914.2 MHz, Port A, EUT Vert with 10m cable
2742.565	44.1	1.6	1.0	227.0	3.0	0.0	Vert	AV	0.0	45.7	54.0	-8.3	Mid Ch.914.2 MHz, Port A, EUT Vert with 10m cable
2742.635	44.0	1.6	1.0	94.0	3.0	0.0	Horz	AV	0.0	45.6	54.0	-8.4	Mid Ch.914.2 MHz ,Port B, EUT Vert
2742.640	43.7	1.6	1.0	68.0	3.0	0.0	Horz	AV	0.0	45.3	54.0	-8.7	Mid Ch.914.2 MHz, Port A, EUT Horz with 10m cable
4637.390	34.8	10.4	2.5	184.0	3.0	0.0	Vert	AV	0.0	45.2	54.0	-8.8	High Ch.927.5 MHz ,Port A, EUT Horz
4637.625	34.7	10.4	1.0	8.0	3.0	0.0	Horz	AV	0.0	45.1	54.0	-8.9	High Ch.927.5 MHz ,Port A, EUT Vert
2742.655	43.5	1.6	1.0	238.0	3.0	0.0	Vert	AV	0.0	45.1	54.0	-8.9	Mid Ch.914.2 MHz, Port A, EUT Horz with 10m cable
5417.950	32.5	11.9	1.0	24.0	3.0	0.0	Vert	AV	0.0	44.4	54.0	-9.6	Low Ch.903 MHz ,Port A, EUT Horz
960.008	24.0	10.4	1.5	157.0	3.0	10.0	Horz	QP	0.0	44.4	54.0	-9.6	High Ch. 927.5 MHz, Port A, EUT On Side
960.006	23.2	10.4	1.0	270.0	3.0	10.0	Vert	QP	0.0	43.6	54.0	-10.4	High Ch. 927.5 MHz, Port A, EUT Vert
2742.655	41.4	1.6	1.0	30.0	3.0	0.0	Vert	AV	0.0	43.0	54.0	-11.0	Mid Ch.914.2 MHz ,Port B, EUT Horz
960.009	22.2	10.4	1.0	24.0	3.0	10.0	Vert	QP	0.0	42.6	54.0	-11.4	High Ch. 927.5 MHz, Port A, EUT On Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
960.014	22.2	10.4	1.5	315.0	3.0	10.0	Horz	QP	0.0	42.6	54.0	-11.4	High Ch. 927.5 MHz, Port A, EUT Horz
960.009	21.4	10.4	1.0	135.0	3.0	10.0	Horz	QP	0.0	41.8	54.0	-12.2	High Ch. 927.5 MHz, Port A, EUT Vert
960.003	18.6	10.4	1.0	270.0	3.0	10.0	Vert	QP	0.0	39.0	54.0	-15.0	High Ch. 927.5 MHz, Port A, EUT Horz
4514.460	46.9	10.2	1.0	14.0	3.0	0.0	Horz	PK	0.0	57.1	74.0	-16.9	Low Ch.903 MHz ,Port A, EUT Vert
3710.055	49.3	7.4	2.3	327.0	3.0	0.0	Horz	PK	0.0	56.7	74.0	-17.3	High Ch.927.5 MHz ,Port A, EUT Vert
2742.625	54.3	1.6	1.0	91.0	3.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	Mid Ch.914.2 MHz ,Port A, EUT Vert
4571.215	45.7	10.2	1.0	6.0	3.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	Mid Ch.914.2 MHz ,Port A, EUT Vert
4514.430	45.6	10.2	1.0	313.0	3.0	0.0	Vert	PK	0.0	55.8	74.0	-18.2	Low Ch.903 MHz ,Port A, EUT Horz
4570.990	45.5	10.2	1.0	311.0	3.0	0.0	Vert	PK	0.0	55.7	74.0	-18.3	Mid Ch.914.2 MHz ,Port A, EUT Horz
5418.360	43.8	11.9	1.0	0.0	3.0	0.0	Horz	PK	0.0	55.7	74.0	-18.3	Low Ch.903 MHz ,Port A, EUT Vert
3656.515	48.5	7.1	1.0	342.0	3.0	0.0	Horz	PK	0.0	55.6	74.0	-18.4	Mid Ch.914.2 MHz ,Port A, EUT Vert
2782.515	53.6	1.8	1.0	93.0	3.0	0.0	Horz	PK	0.0	55.4	74.0	-18.6	High Ch.927.5 MHz ,Port A, EUT Vert
3611.750	47.9	6.9	4.0	303.0	3.0	0.0	Vert	PK	0.0	54.8	74.0	-19.2	Low Ch.903 MHz ,Port A, EUT Horz
5417.530	42.7	11.9	1.0	24.0	3.0	0.0	Vert	PK	0.0	54.6	74.0	-19.4	Low Ch.903 MHz ,Port A, EUT Horz
2742.490	52.9	1.6	1.2	231.0	3.0	0.0	Vert	PK	0.0	54.5	74.0	-19.5	Mid Ch.914.2 MHz ,Port A, EUT Horz
4638.065	44.0	10.4	1.0	8.0	3.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	High Ch.927.5 MHz ,Port A, EUT Vert
3709.995	47.0	7.4	1.0	283.0	3.0	0.0	Vert	PK	0.0	54.4	74.0	-19.6	High Ch.927.5 MHz ,Port A, EUT Horz
2709.080	52.6	1.6	1.0	85.0	3.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	Low Ch.903 MHz ,Port A, EUT Vert
4637.695	43.8	10.4	2.5	184.0	3.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	High Ch.927.5 MHz ,Port A, EUT Horz
2742.425	52.3	1.6	1.0	343.0	3.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	Mid Ch.914.2 MHz ,Port A, EUT Horz
2708.835	52.3	1.6	4.0	188.0	3.0	0.0	Vert	PK	0.0	53.9	74.0	-20.1	Low Ch.903 MHz ,Port A, EUT Horz
2743.190	52.2	1.6	1.0	260.0	3.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	Mid Ch.914.2 MHz, Port A, EUT On Side with 10m cable
2742.310	52.1	1.6	1.2	21.0	3.0	0.0	Horz	PK	0.0	53.7	74.0	-20.3	Mid Ch.914.2 MHz ,Port A, EUT On Side
3656.715	46.6	7.1	1.0	287.0	3.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	Mid Ch.914.2 MHz ,Port A, EUT Horz
2742.775	52.0	1.6	1.0	28.0	3.0	0.0	Vert	PK	0.0	53.6	74.0	-20.4	Mid Ch.914.2 MHz ,Port A, EUT Vert
3611.995	46.5	6.9	1.0	327.0	3.0	0.0	Horz	PK	0.0	53.4	74.0	-20.6	Low Ch.903 MHz ,Port A, EUT Vert
2782.280	51.5	1.8	1.0	324.0	3.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	High Ch.927.5 MHz ,Port A, EUT Horz
2742.830	50.8	1.6	1.2	18.0	3.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	Mid Ch.914.2 MHz ,Port A, EUT On Side
2742.775	50.4	1.6	1.0	290.0	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	Mid Ch.914.2 MHz, Port A, EUT On Side with 10m cable
2742.055	49.1	1.6	1.0	60.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	Mid Ch.914.2 MHz, Port A, EUT Vert with 10m cable
2742.690	48.9	1.6	1.0	94.0	3.0	0.0	Horz	PK	0.0	50.5	74.0	-23.5	Mid Ch.914.2 MHz ,Port B, EUT Vert
2742.050	48.9	1.6	1.0	227.0	3.0	0.0	Vert	PK	0.0	50.5	74.0	-23.5	Mid Ch.914.2 MHz, Port A, EUT Vert with 10m cable
2742.980	48.7	1.6	1.0	68.0	3.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	Mid Ch.914.2 MHz, Port A, EUT Horz with 10m cable
2742.815	48.3	1.6	1.0	238.0	3.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	Mid Ch.914.2 MHz, Port A, EUT Horz with 10m cable
2742.390	47.9	1.6	1.0	30.0	3.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	Mid Ch.914.2 MHz ,Port B, EUT Horz

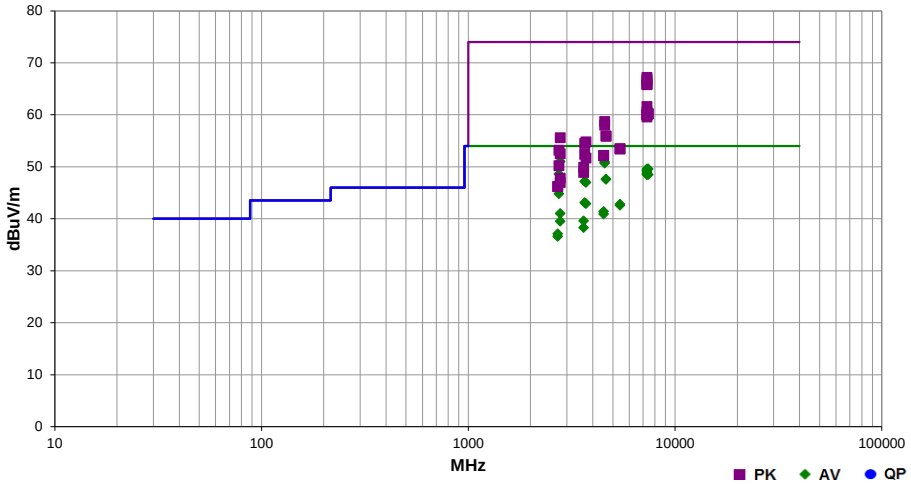
SPURIOUS RADIATED EMISSIONS

EmiRS 2017.01.25 PSA-ESCI 2017.01.26

Work Order:	PECK0002	**Date:**	04/19/17		
Project:	None	**Temperature:**	22.8 °C		
Job Site:	EV01	**Humidity:**	38.8% RH		
Serial Number:	16	**Barometric Pres.:**	1007 mbar	**Tested by:**	Brandon Hobbs
EUT:	XB1301				
Configuration:	6,8				
Customer:	APANA Inc				
Attendees:	None				
EUT Power:	5 VDC Nominal via 110VAC/60Hz				
Operating Mode:	On Tx Continuous DTS Please reference the data comments for further EUT operating modes.				
Deviations:	None				
Comments:	Yagi antenna. The radio was tested with both the longest and shorts RF path on the worst case harmonic.				

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

Run #	72	**Test Distance (m)**	3	**Antenna Height(s)**	1 to 4(m)	**Results**	Pass



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2782.480	49.2	1.8	1.0	37.0	3.0	0.0	Horz	AV	0.0	51.0	54.0	-3.0	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
4570.985	40.7	10.2	1.0	151.0	3.0	0.0	Horz	AV	0.0	50.9	54.0	-3.1	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
4571.010	40.5	10.2	1.0	118.0	3.0	0.0	Vert	AV	0.0	50.7	54.0	-3.3	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
7312.415	30.9	18.7	1.7	141.0	3.0	0.0	Vert	AV	0.0	49.6	54.0	-4.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
7420.000	30.3	19.3	1.6	175.0	3.0	0.0	Horz	AV	0.0	49.6	54.0	-4.4	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
7314.880	30.5	18.8	1.3	201.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
7313.655	30.4	18.8	2.8	198.0	3.0	0.0	Vert	AV	0.0	49.2	54.0	-4.8	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Horz
7313.540	30.0	18.8	1.0	227.0	3.0	0.0	Horz	AV	0.0	48.8	54.0	-5.2	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
7312.280	29.9	18.7	1.0	104.0	3.0	0.0	Horz	AV	0.0	48.6	54.0	-5.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
2742.625	47.0	1.6	1.0	169.0	3.0	0.0	Horz	AV	0.0	48.6	54.0	-5.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
7313.625	29.7	18.8	1.1	188.0	3.0	0.0	Horz	AV	0.0	48.5	54.0	-5.5	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Horz
7421.020	29.2	19.3	1.6	100.0	3.0	0.0	Vert	AV	0.0	48.5	54.0	-5.5	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
4637.610	37.2	10.4	1.0	149.0	3.0	0.0	Horz	AV	0.0	47.6	54.0	-6.4	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
4637.540	37.2	10.4	1.0	106.0	3.0	0.0	Vert	AV	0.0	47.6	54.0	-6.4	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
2782.585	45.5	1.8	1.0	88.0	3.0	0.0	Vert	AV	0.0	47.3	54.0	-6.7	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
7313.750	48.4	18.8	2.9	193.0	3.0	0.0	Vert	PK	0.0	67.2	74.0	-6.8	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT Horz
3656.820	40.1	7.1	1.0	37.0	3.0	0.0	Horz	AV	0.0	47.2	54.0	-6.8	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
3710.050	39.6	7.4	1.0	39.0	3.0	0.0	Horz	AV	0.0	47.0	54.0	-7.0	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
7313.830	48.0	18.8	1.7	141.0	3.0	0.0	Vert	PK	0.0	66.8	74.0	-7.2	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT Vert
7313.385	47.6	18.8	1.0	202.0	3.0	0.0	Vert	PK	0.0	66.4	74.0	-7.6	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT On Side
7313.535	47.1	18.8	1.0	157.0	3.0	0.0	Horz	PK	0.0	65.9	74.0	-8.1	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT On Side
7313.800	47.1	18.8	1.0	129.0	3.0	0.0	Horz	PK	0.0	65.9	74.0	-8.1	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT Vert
7313.625	47.0	18.8	2.0	191.0	3.0	0.0	Horz	PK	0.0	65.8	74.0	-8.2	Mid Ch. 914.2 MHz, Port A, DAC 2300, MG 10, EUT Horz
2742.625	43.2	1.6	1.0	282.0	3.0	0.0	Vert	AV	0.0	44.8	54.0	-9.2	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
3656.805	36.0	7.1	1.0	123.0	3.0	0.0	Vert	AV	0.0	43.1	54.0	-10.9	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
3709.965	35.5	7.4	1.0	103.0	3.0	0.0	Vert	AV	0.0	42.9	54.0	-11.1	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
5417.825	30.9	11.9	1.5	114.0	3.0	0.0	Horz	AV	0.0	42.8	54.0	-11.2	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
5417.933	30.7	11.9	1.0	94.0	3.0	0.0	Vert	AV	0.0	42.6	54.0	-11.4	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
7314.575	42.8	18.8	1.7	141.0	3.0	0.0	Vert	PK	0.0	61.6	74.0	-12.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
4515.040	31.2	10.2	1.0	99.0	3.0	0.0	Vert	AV	0.0	41.4	54.0	-12.6	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
2782.450	39.2	1.8	1.0	0.0	3.0	0.0	Horz	AV	0.0	41.0	54.0	-13.0	High Ch. 927.5 MHz, Port A, DAC 4000, MG 8, EUT On Side with RF cable attached
4515.145	30.7	10.2	1.0	125.0	3.0	0.0	Horz	AV	0.0	40.9	54.0	-13.1	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
7313.970	41.8	18.8	1.3	201.0	3.0	0.0	Vert	PK	0.0	60.6	74.0	-13.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
7419.965	40.9	19.3	1.6	175.0	3.0	0.0	Horz	PK	0.0	60.2	74.0	-13.8	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
7421.165	40.9	19.3	1.6	100.0	3.0	0.0	Vert	PK	0.0	60.2	74.0	-13.8	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
7314.070	41.2	18.8	1.0	227.0	3.0	0.0	Horz	PK	0.0	60.0	74.0	-14.0	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
7313.955	41.2	18.8	1.1	188.0	3.0	0.0	Horz	PK	0.0	60.0	74.0	-14.0	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Horz
7313.675	41.2	18.8	2.8	198.0	3.0	0.0	Vert	PK	0.0	60.0	74.0	-14.0	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Horz
7313.775	40.8	18.8	1.0	104.0	3.0	0.0	Horz	PK	0.0	59.6	74.0	-14.4	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
3611.940	32.7	6.9	1.0	151.0	3.0	0.0	Horz	AV	0.0	39.6	54.0	-14.4	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
2782.495	37.7	1.8	1.0	28.0	3.0	0.0	Horz	AV	0.0	39.5	54.0	-14.5	High Ch. 927.5 MHz, Port B, DAC 4000, MG 8, EUT On Side
4571.120	48.5	10.2	1.0	151.0	3.0	0.0	Horz	PK	0.0	58.7	74.0	-15.3	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
3612.030	31.4	6.9	1.0	53.0	3.0	0.0	Vert	AV	0.0	38.3	54.0	-15.7	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
4571.050	47.8	10.2	1.0	118.0	3.0	0.0	Vert	PK	0.0	58.0	74.0	-16.0	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
2709.005	35.5	1.6	1.0	83.0	3.0	0.0	Vert	AV	0.0	37.1	54.0	-16.9	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
2709.045	35.0	1.6	1.0	249.0	3.0	0.0	Horz	AV	0.0	36.6	54.0	-17.4	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
4637.565	45.5	10.4	1.0	149.0	3.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
4637.510	45.5	10.4	1.0	106.0	3.0	0.0	Vert	PK	0.0	55.9	74.0	-18.1	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2782.415	53.8	1.8	1.0	37.0	3.0	0.0	Horz	PK	0.0	55.6	74.0	-18.4	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
3710.040	47.4	7.4	1.0	39.0	3.0	0.0	Horz	PK	0.0	54.8	74.0	-19.2	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT On Side
3656.740	47.4	7.1	1.0	37.0	3.0	0.0	Horz	PK	0.0	54.5	74.0	-19.5	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
5417.895	41.6	11.9	1.5	114.0	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
5417.758	41.5	11.9	1.0	94.0	3.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
2742.800	51.6	1.6	1.0	169.0	3.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT On Side
2782.500	50.7	1.8	1.0	88.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
3656.595	45.3	7.1	1.0	123.0	3.0	0.0	Vert	PK	0.0	52.4	74.0	-21.6	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
4514.195	42.0	10.2	1.0	99.0	3.0	0.0	Vert	PK	0.0	52.2	74.0	-21.8	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
4515.545	41.9	10.2	1.0	125.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
3710.145	44.3	7.4	1.0	103.0	3.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	High Ch. 927.5 MHz, Port A, DAC 0, MG 10, EUT Vert
2742.655	48.6	1.6	1.0	282.0	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	Mid Ch. 914.2 MHz, Port A, DAC 0, MG 10, EUT Vert
3612.515	43.0	6.9	1.0	151.0	3.0	0.0	Horz	PK	0.0	49.9	74.0	-24.1	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side
3611.785	42.0	6.9	1.0	53.0	3.0	0.0	Vert	PK	0.0	48.9	74.0	-25.1	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
2782.715	46.0	1.8	1.0	0.0	3.0	0.0	Horz	PK	0.0	47.8	74.0	-26.2	High Ch. 927.5 MHz, Port A, DAC 4000, MG 8, EUT On Side with RF cable attached
2782.275	45.2	1.8	1.0	28.0	3.0	0.0	Horz	PK	0.0	47.0	74.0	-27.0	High Ch. 927.5 MHz, Port B, DAC 4000, MG 8, EUT On Side
2708.815	44.6	1.6	1.0	83.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT Vert
2709.090	44.6	1.6	1.0	249.0	3.0	0.0	Horz	PK	0.0	46.2	74.0	-27.8	Low Ch. 903 MHz, Port A, DAC 4000, MG 8, EUT On Side

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	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	1/21/2015	1/21/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AUY	6/27/2016	6/27/2017
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017

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.

In accordance with power settings stated herein, the power applied to each antenna is different. The approximate output power for each antenna is listed below.

- Yagi antenna: ≈ 24 dBm
- Dipole antenna: ≈ 30 dBm

DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

EUT:	XB1301			**Work Order:**	PECK0002
Serial Number:	17			**Date:**	04/26/17
Customer:	APANA Inc			**Temperature:**	22.9 °C
Attendees:	None			**Humidity:**	41.6% RH
Project:	None			**Barometric Pres.:**	1016 mbar
Tested by:	Brandon Hobbs	**Power:**	5 VDC Nominal via 110VAC/60Hz	**Job Site:**	EV06

TEST SPECIFICATIONS	Test Method
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

The power level settings for the Yagi (12dBi) antenna data listed below are as follows: DAC = 4000, MXG = 8. The power level settings for the Dipole antenna data listed below are as follows: DAC = 4000, MXG = 12. All measurements were made at -20°C per client's request. Power limit for the Yagi antenna was lowered to accommodate for an antenna gain greater than 6dBi. A termination was placed on the unused antenna port while under test.

DEVIATIONS FROM TEST STANDARD

None

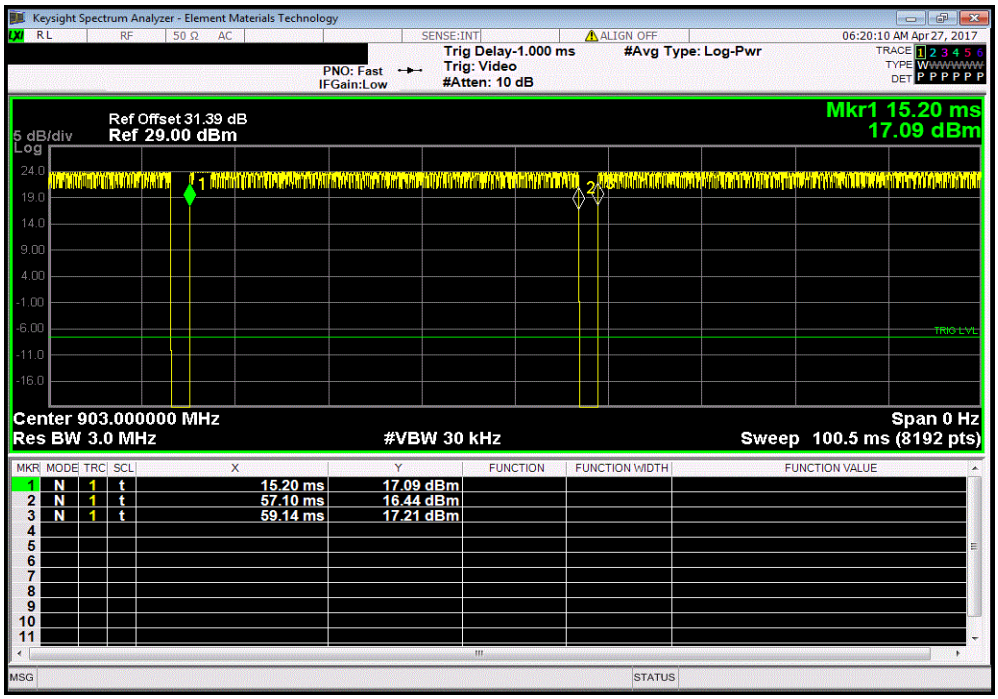
Configuration #	1	Signature

		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
Yagi Antenna							
Port A							
500 kHz Bandwidth							
Spreading Factor 7							
	Low Channel 903 MHz	41.903 ms	43.939 ms	1	95.4	N/A	N/A
	Low Channel 903 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 914.2 MHz	41.903 ms	43.939 ms	1	95.4	N/A	N/A
	Mid Channel 914.2 MHz	N/A	N/A	6	N/A	N/A	N/A
	High Channel 927.5 MHz	41.976 ms	44.049 ms	1	95.3	N/A	N/A
	High Channel 927.5 MHz	N/A	N/A	6	N/A	N/A	N/A
Port B							
500 kHz Bandwidth							
Spreading Factor 7							
	Low Channel 903 MHz	41.903 ms	43.939 ms	1	95.4	N/A	N/A
	Low Channel 903 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 914.2 MHz	41.878 ms	43.927 ms	1	95.3	N/A	N/A
	Mid Channel 914.2 MHz	N/A	N/A	5	N/A	N/A	N/A
	High Channel 927.5 MHz	41.903 ms	43.927 ms	1	95.4	N/A	N/A
	High Channel 927.5 MHz	N/A	N/A	6	N/A	N/A	N/A
Dipole Antenna							
Port A							
500 kHz Bandwidth							
Spreading Factor 7							
	Low Channel 903 MHz	42.025 ms	44.049 ms	1	95.4	N/A	N/A
	Low Channel 903 MHz	N/A	N/A	5	N/A	N/A	N/A
	Mid Channel 914.2 MHz	42.025 ms	44.049 ms	1	95.4	N/A	N/A
	Mid Channel 914.2 MHz	N/A	N/A	6	N/A	N/A	N/A
	High Channel 927.5 MHz	42.013 ms	44.049 ms	1	95.4	N/A	N/A
	High Channel 927.5 MHz	N/A	N/A	6	N/A	N/A	N/A
Port B							
500 kHz Bandwidth							
Spreading Factor 7							
	Low Channel 903 MHz	42.025 ms	44.049 ms	1	95.4	N/A	N/A
	Low Channel 903 MHz	N/A	N/A	6	N/A	N/A	N/A
	Mid Channel 914.2 MHz	42.025 ms	44.062 ms	1	95.4	N/A	N/A
	Mid Channel 914.2 MHz	N/A	N/A	6	N/A	N/A	N/A
	High Channel 927.5 MHz	42.013 ms	44.049 ms	1	95.4	N/A	N/A
	High Channel 927.5 MHz	N/A	N/A	5	N/A	N/A	N/A

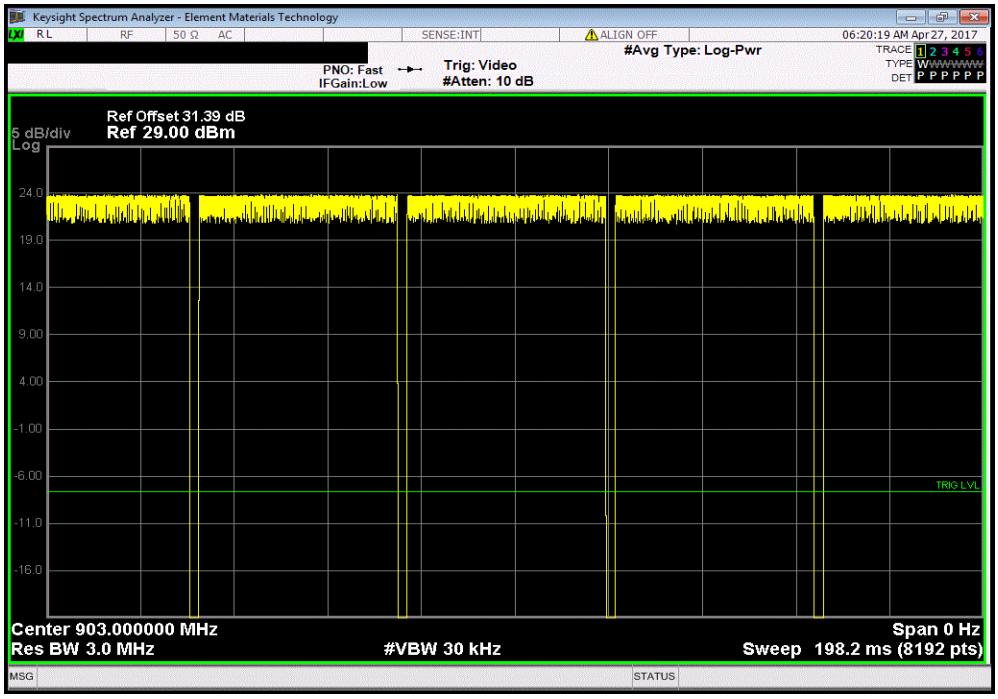
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.903 ms	43.939 ms	1	95.4	N/A	N/A



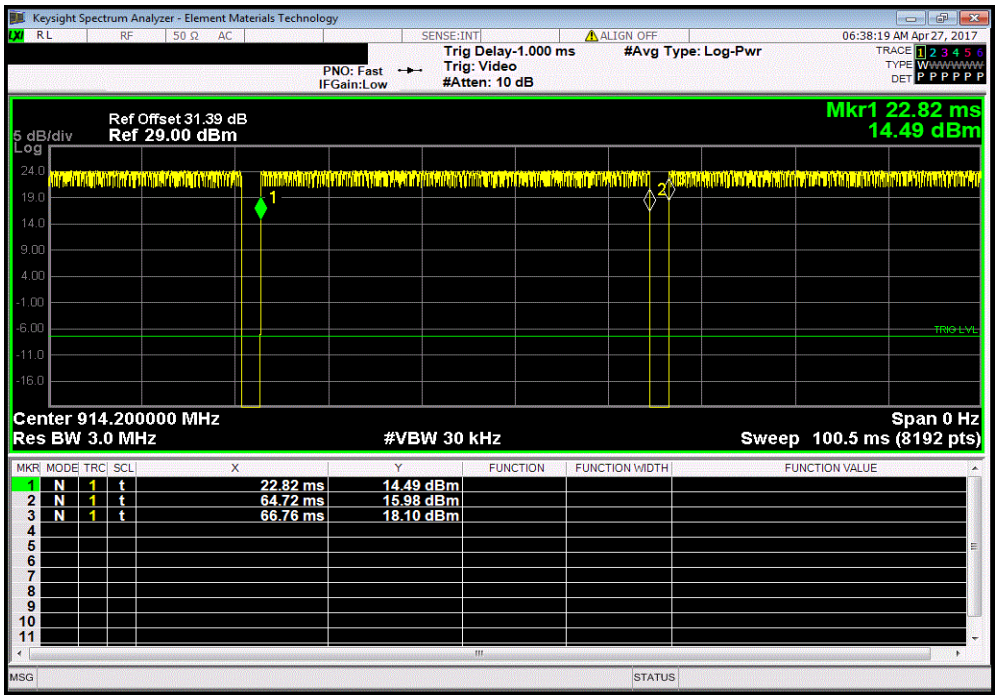
Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



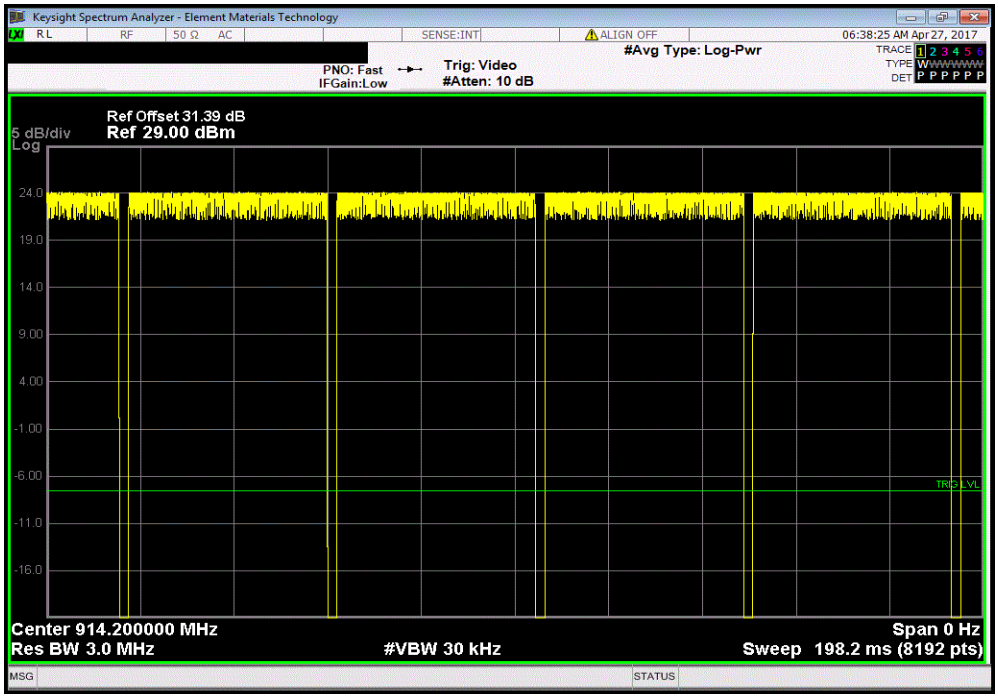
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.903 ms	43.939 ms	1	95.4	N/A	N/A

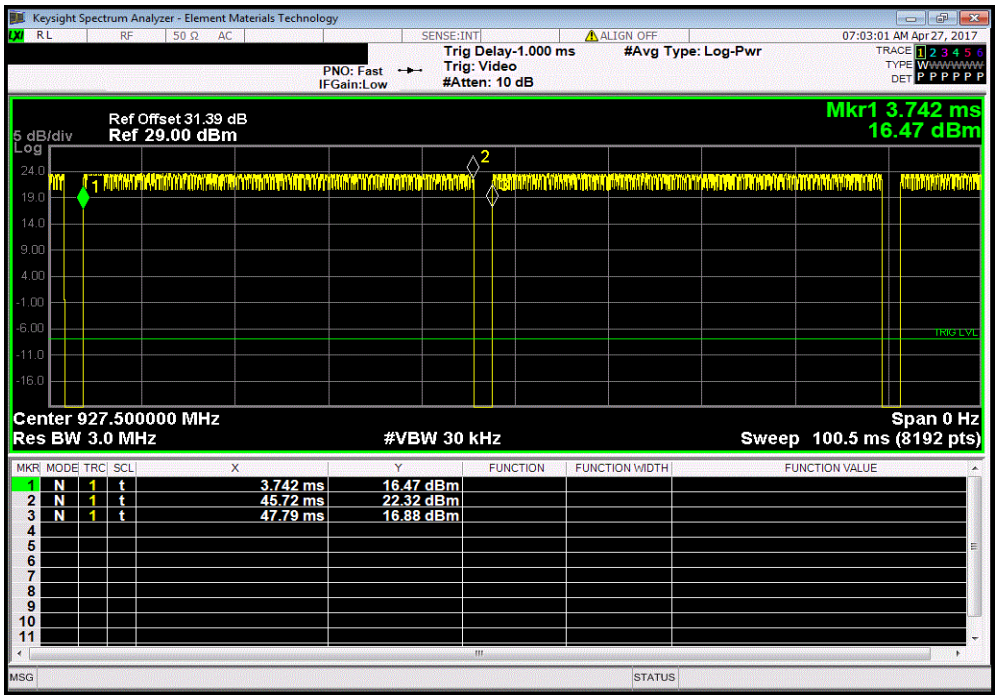


Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

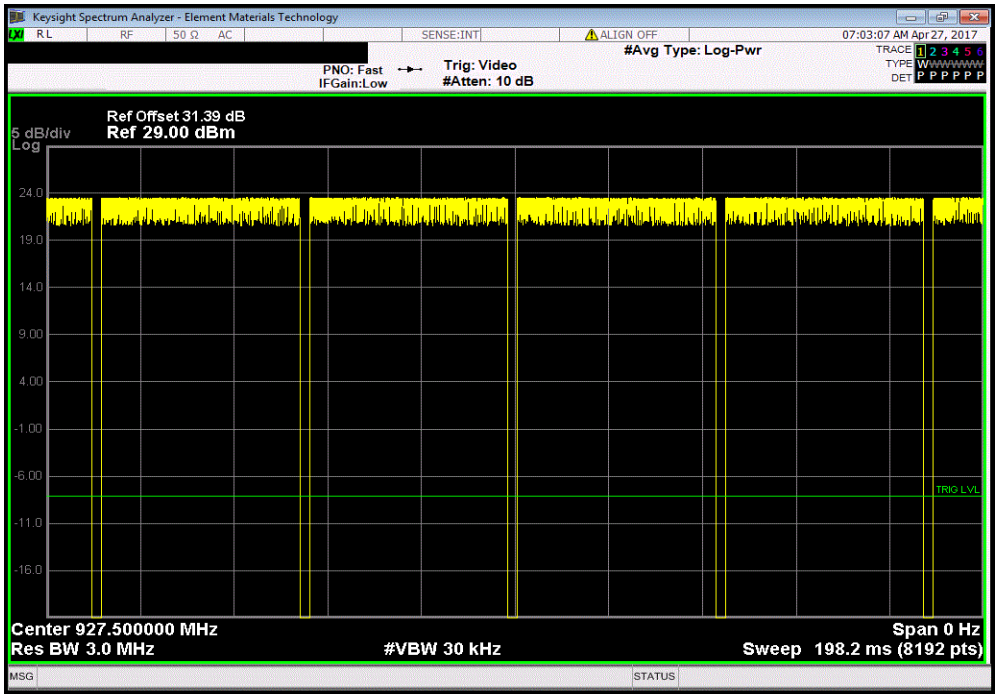


DUTY CYCLE

Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.976 ms	44.049 ms	1	95.3	N/A	N/A



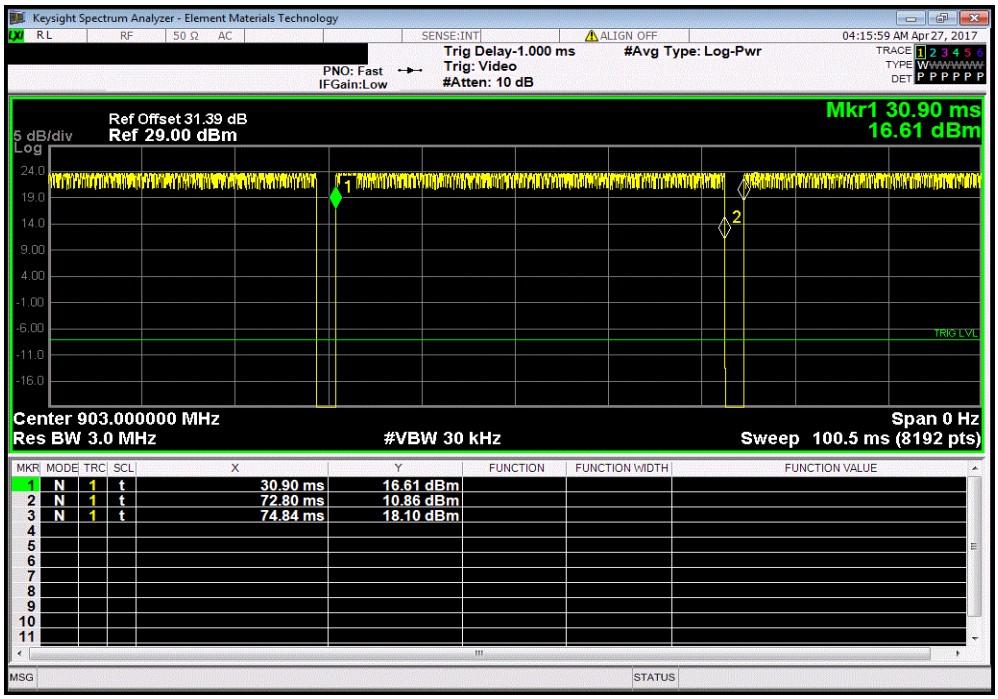
Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



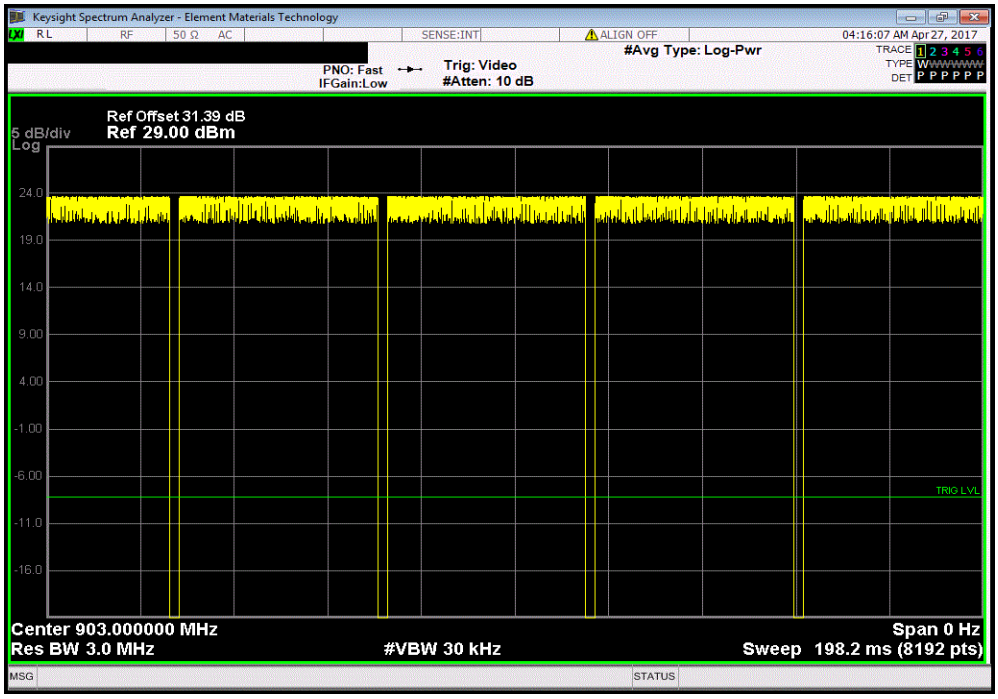
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.903 ms	43.939 ms	1	95.4	N/A	N/A



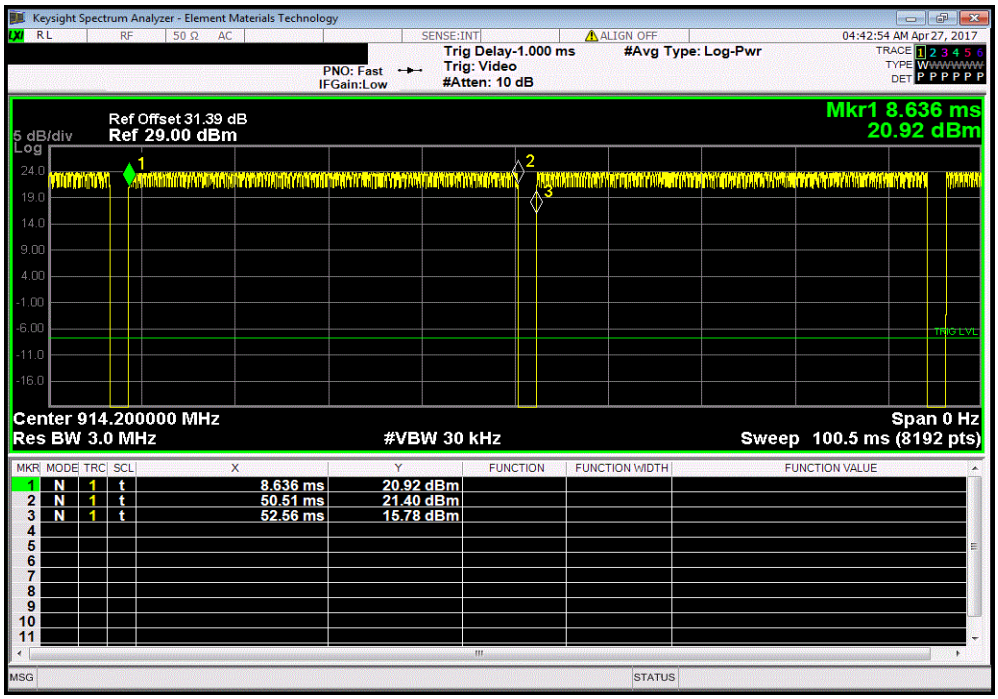
Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.878 ms	43.927 ms	1	95.3	N/A	N/A

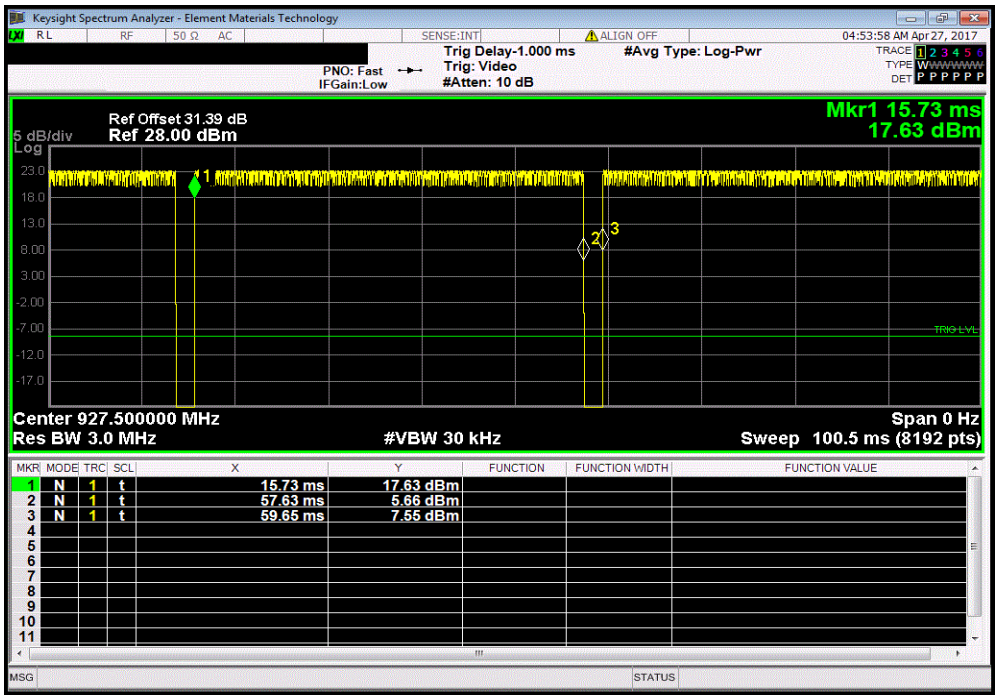


Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

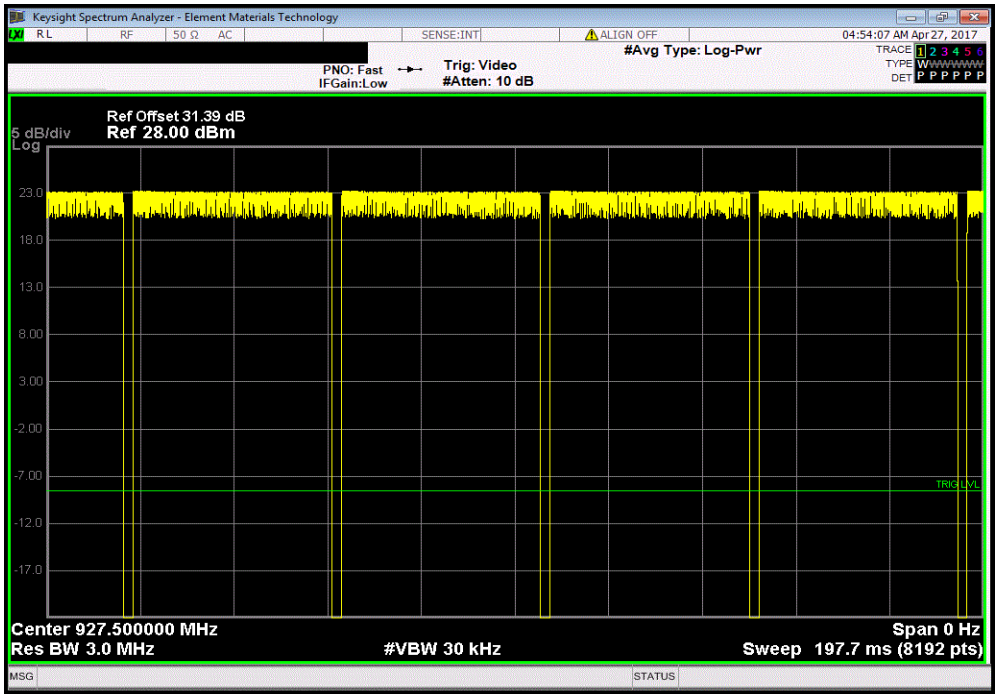
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	41.903 ms	43.927 ms	1	95.4	N/A	N/A



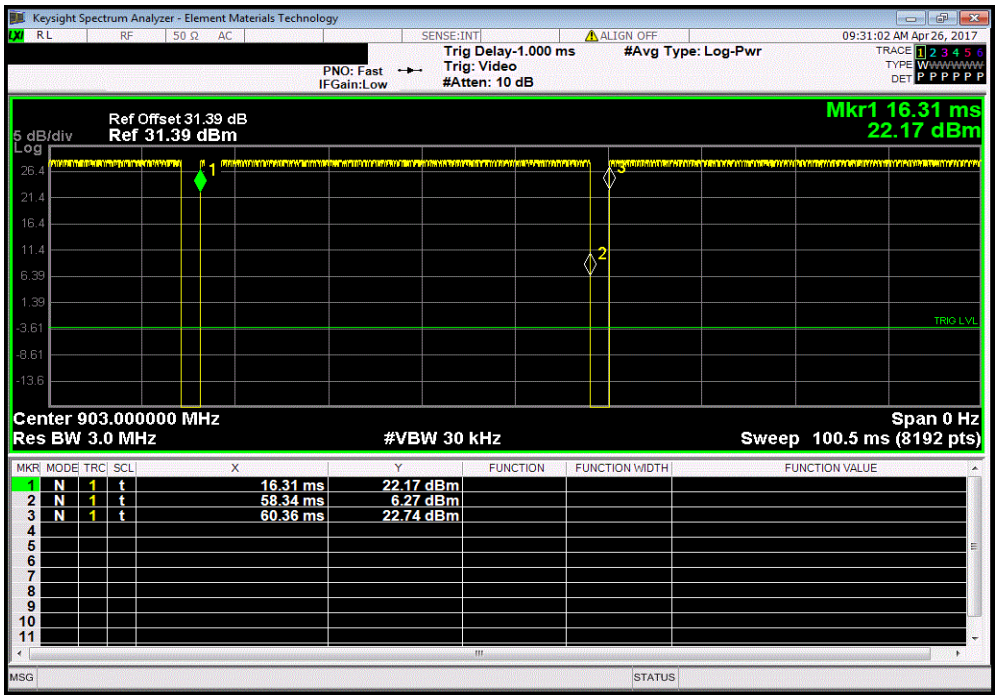
Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



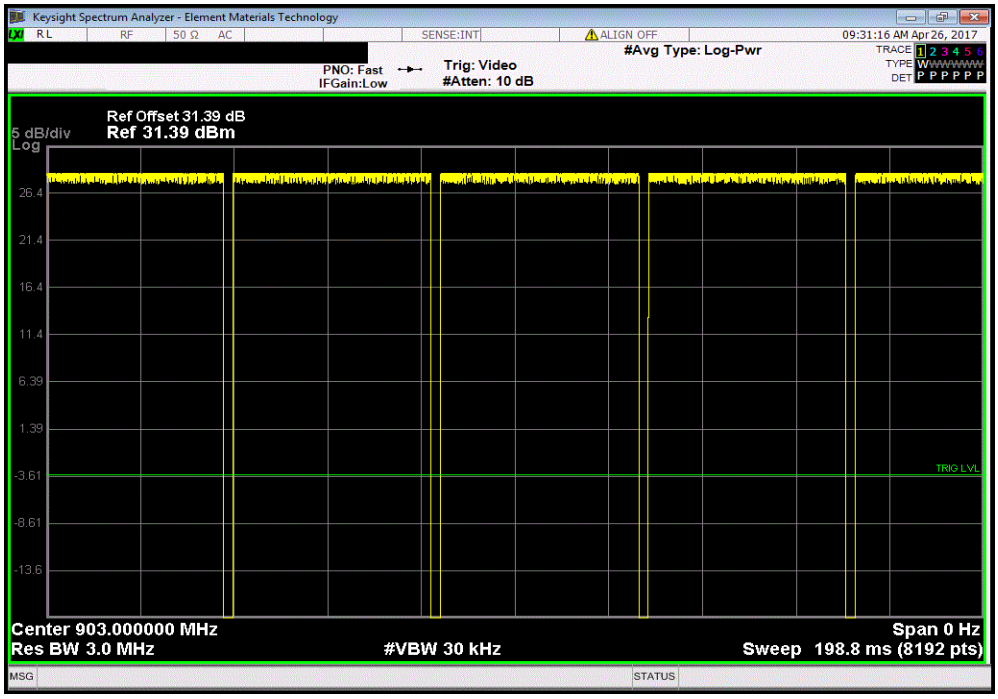
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.025 ms	44.049 ms	1	95.4	N/A	N/A



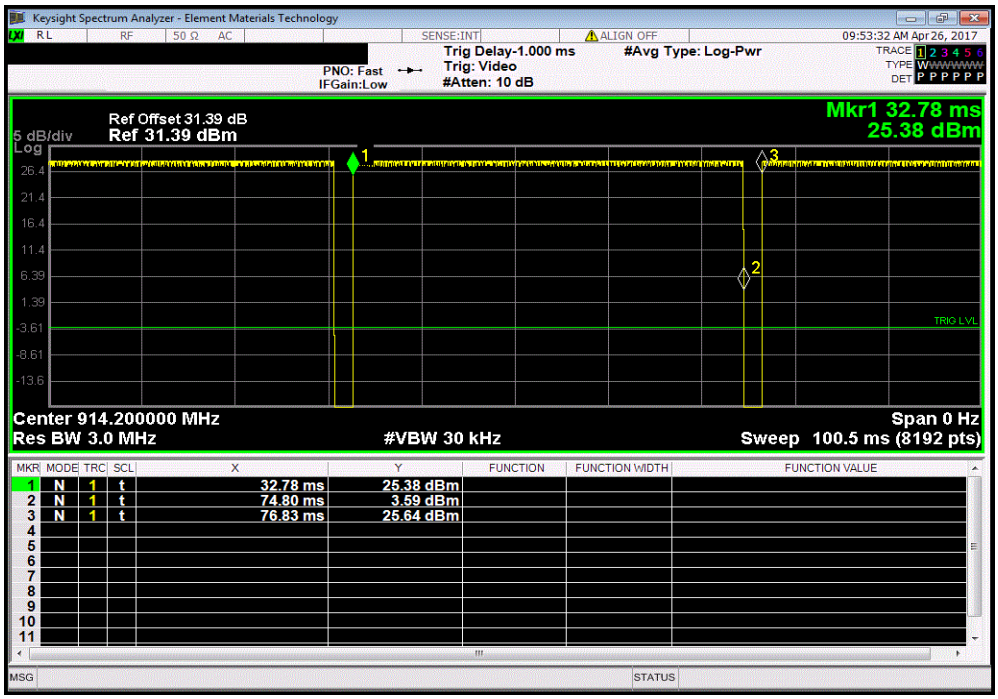
Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A



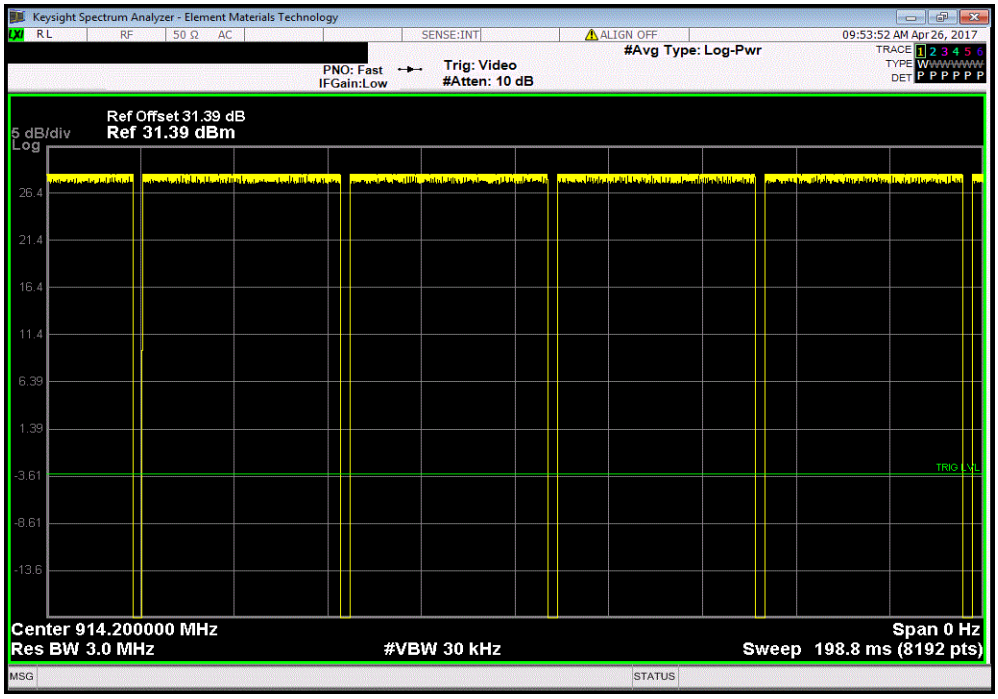
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.025 ms	44.049 ms	1	95.4	N/A	N/A

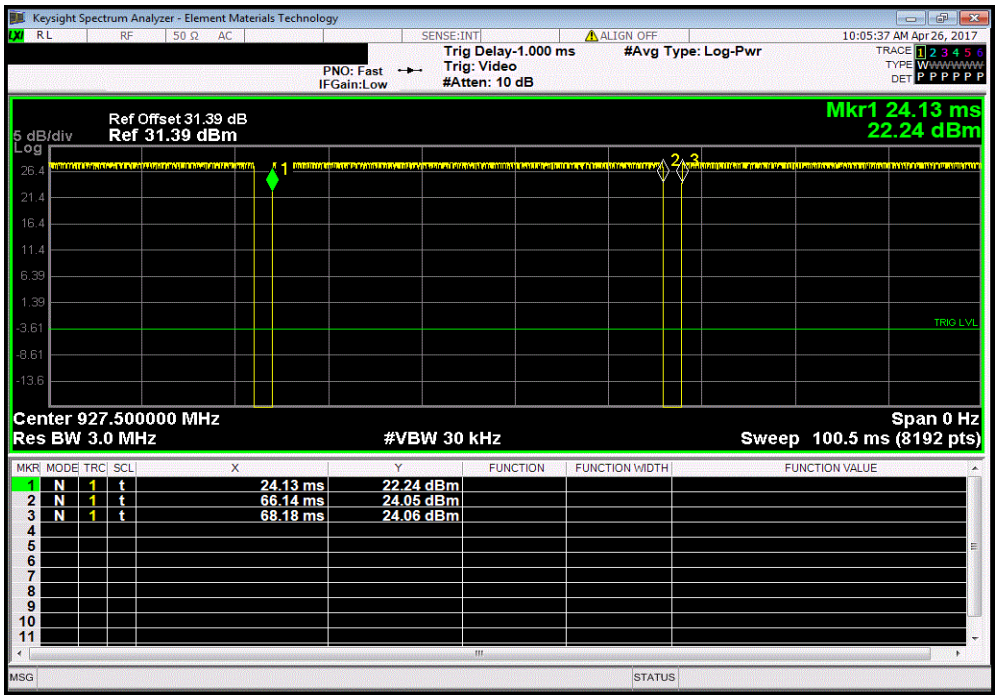


Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

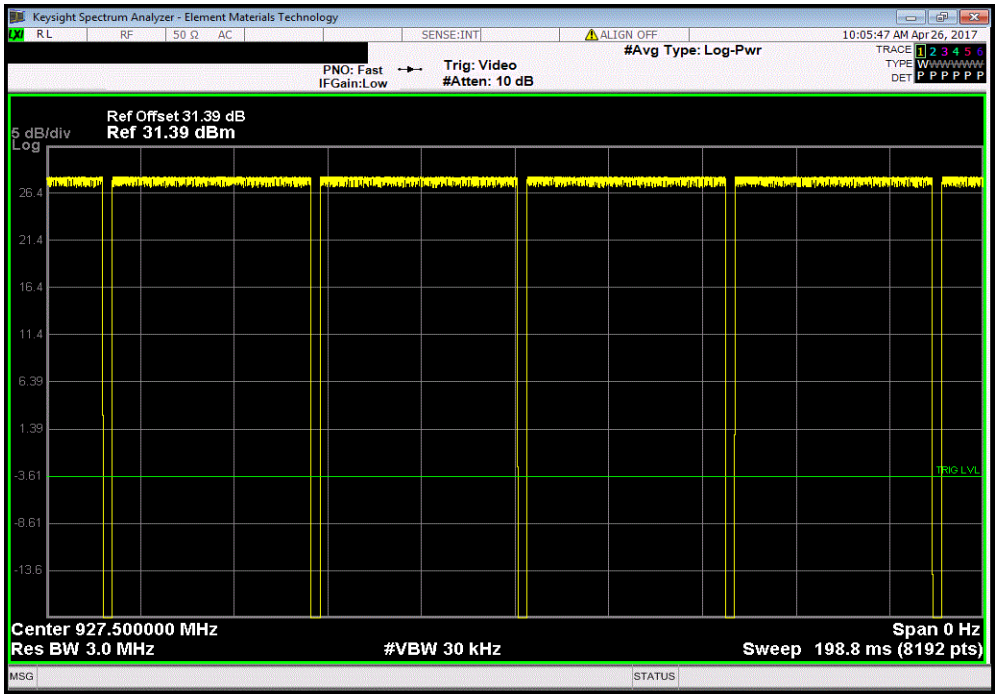


DUTY CYCLE

Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.013 ms	44.049 ms	1	95.4	N/A	N/A



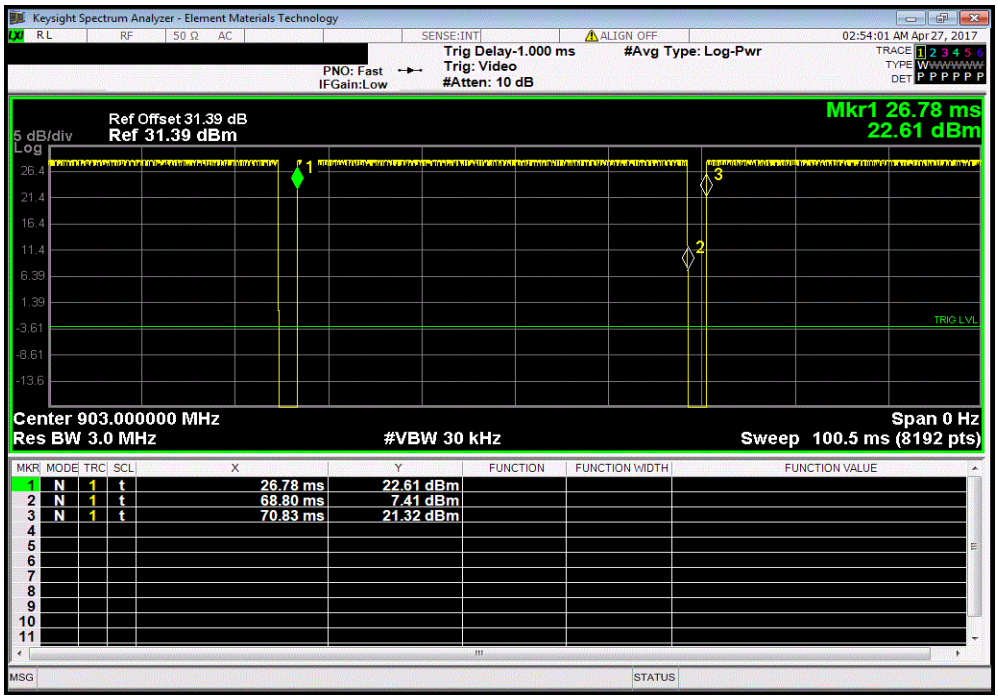
Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



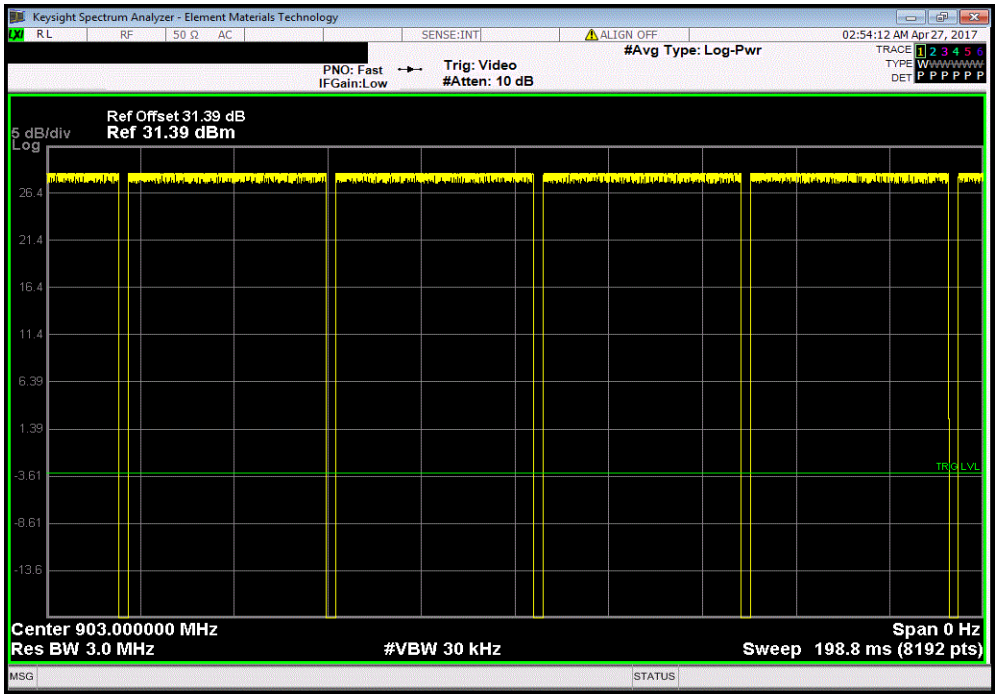
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.025 ms	44.049 ms	1	95.4	N/A	N/A

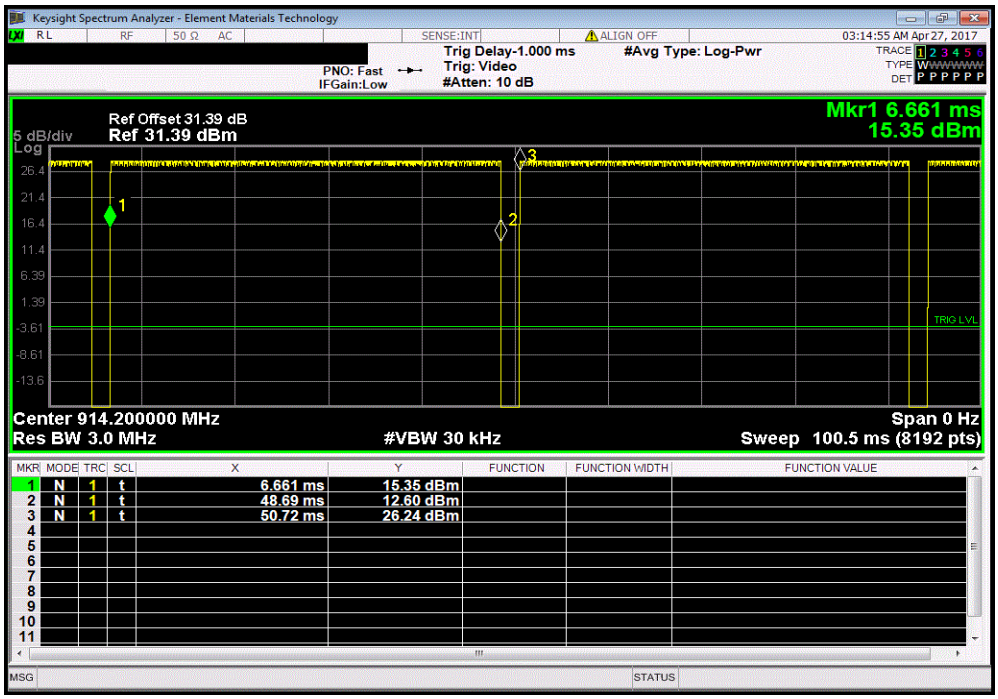


Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A

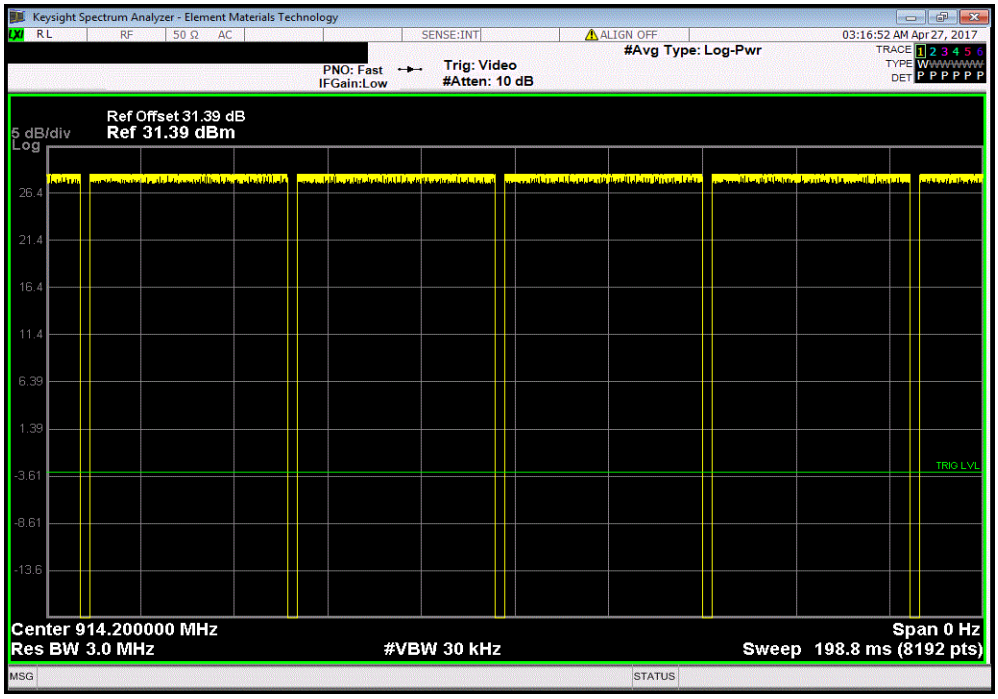


DUTY CYCLE

Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.025 ms	44.062 ms	1	95.4	N/A	N/A



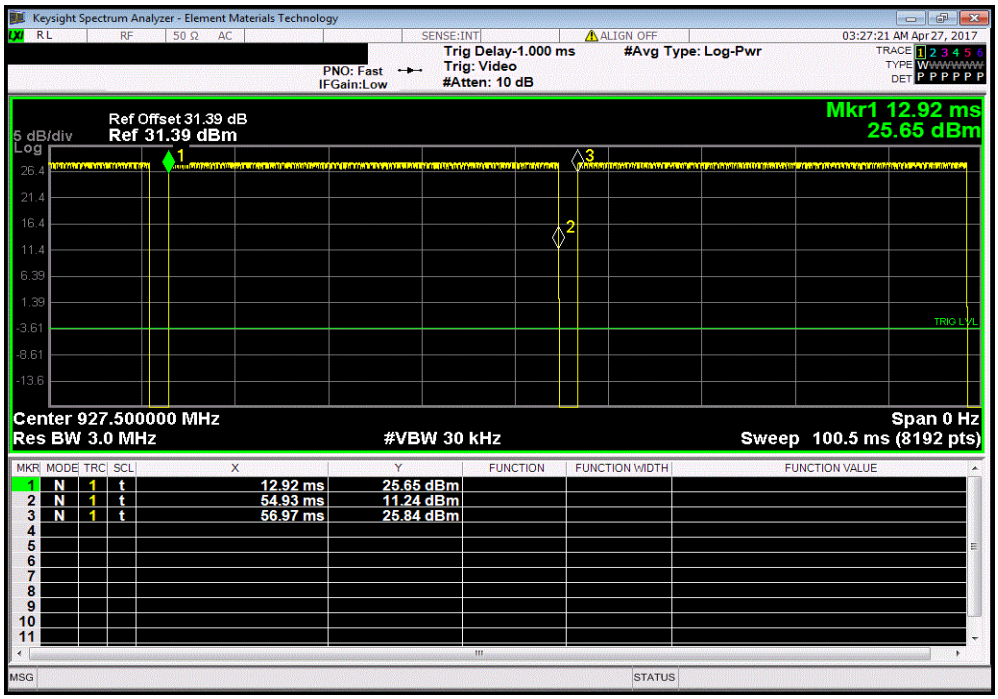
Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	6	N/A	N/A	N/A



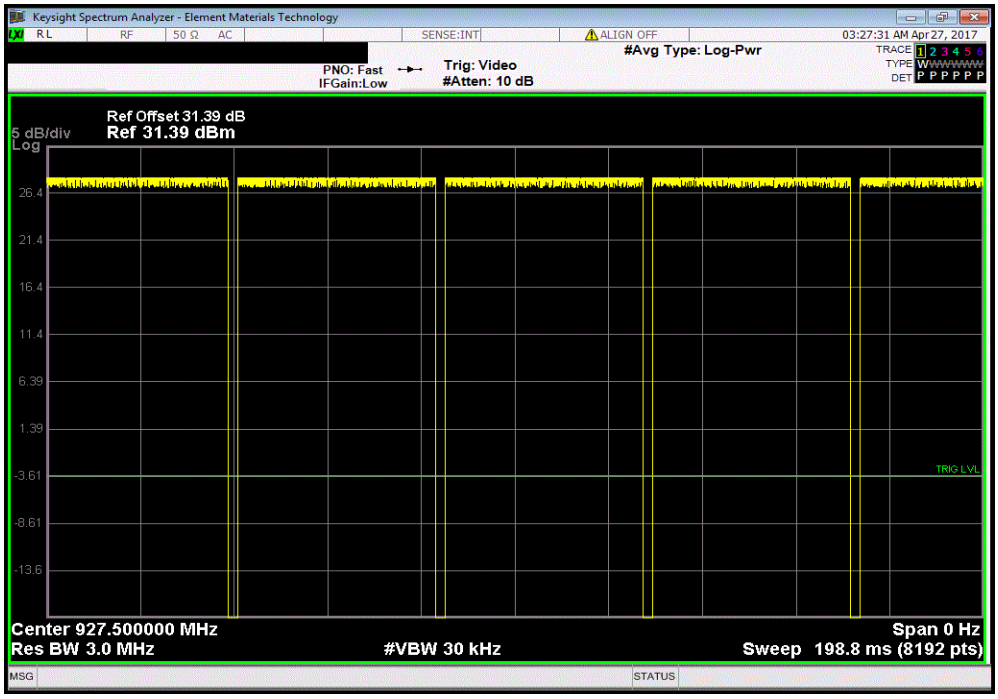
DUTY CYCLE

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	42.013 ms	44.049 ms	1	95.4	N/A	N/A



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 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	Keysight	N5182B	TFU	10/27/2015	10/27/2018
Chamber - Temperature/Humidity	Cincinnati Sub Zero (CSZ)	ZPH-8-2-SCT/AC	TBI	NCR	NCR
Thermometer	Omegaette	HH311	DTY	1/21/2015	1/21/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	6/7/2016	6/7/2017
Attenuator	S.M. Electronics	SA26B-20	AUY	6/27/2016	6/27/2017
Block - DC	Fairview Microwave	SD3379	AMQ	6/8/2016	6/8/2017
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFP	8/10/2016	8/10/2017

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.

In accordance with power settings stated herein, the power applied to each antenna is different. The approximate output power for each antenna is listed below.

- Yagi antenna: ≈ 24 dBm
- Dipole antenna: ≈ 30 dBm

OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

EUT:	**XB1301**			**Work Order:**	**PECK0002**
Serial Number:	**17**			**Date:**	**04/26/17**
Customer:	**APANA Inc**			**Temperature:**	**23.2 °C**
Attendees:	**None**			**Humidity:**	**41% RH**
Project:	**None**			**Barometric Pres.:**	**1016 mbar**
Tested by:	**Brandon Hobbs**	**Power:**	**5 VDC Nominal via 110VAC/60Hz**	**Job Site:**	**EV06**

TEST SPECIFICATIONS	**Test Method**
FCC 15.247:2017	ANSI C63.10:2013

COMMENTS

The power level settings for the Yagi (12dBi) antenna data listed below are as follows: DAC = 4000, MXG = 8. The power level settings for the Dipole antenna data listed below are as follows: DAC = 4000, MXG = 12. All measurements were made at -20°C per client's request. A termination was placed on the unused antenna port while under test.

DEVIATIONS FROM TEST STANDARD

None

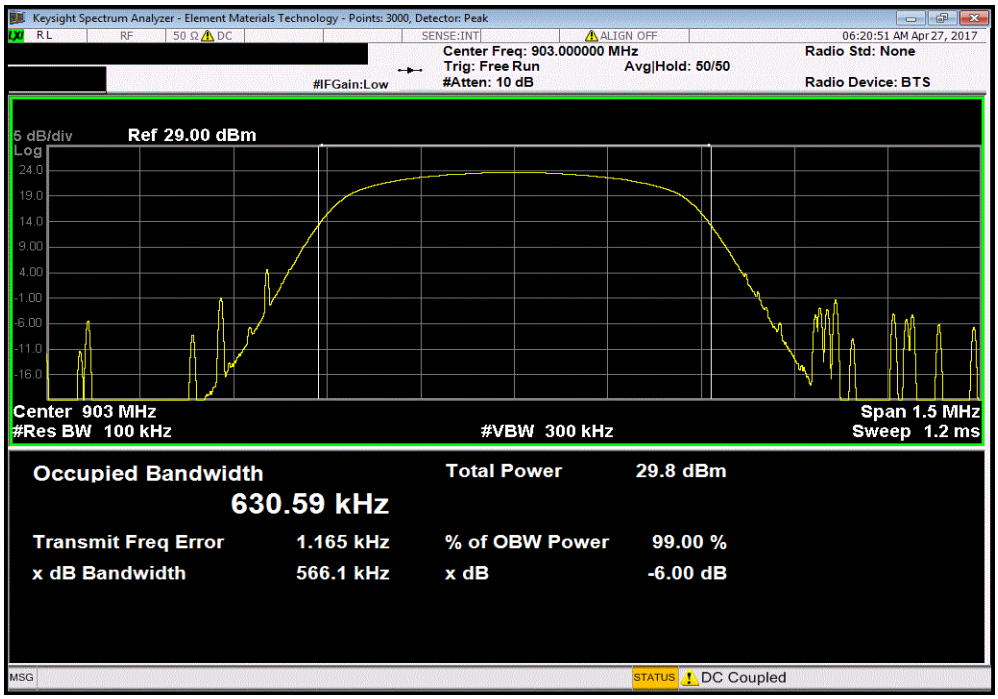
Configuration #	**1**	*Signature*

				Value	**Limit (≥)**	**Result**
Yagi Antenna						
	Port A					
		500 kHz Bandwidth				
			Spreading Factor 7			
			Low Channel 903 MHz	566.087 kHz	500 kHz	Pass
			Mid Channel 914.2 MHz	567.165 kHz	500 kHz	Pass
			High Channel 927.5 MHz	566.514 kHz	500 kHz	Pass
	Port B					
		500 kHz Bandwidth				
			Spreading Factor 7			
			Low Channel 903 MHz	570.219 kHz	500 kHz	Pass
			Mid Channel 914.2 MHz	570.27 kHz	500 kHz	Pass
			High Channel 927.5 MHz	570.235 kHz	500 kHz	Pass
Dipole Antenna						
	Port A					
		500 kHz Bandwidth				
			Spreading Factor 7			
			Low Channel 903 MHz	602.834 kHz	500 kHz	Pass
			Mid Channel 914.2 MHz	605.371 kHz	500 kHz	Pass
			High Channel 927.5 MHz	604.002 kHz	500 kHz	Pass
	Port B					
		500 kHz Bandwidth				
			Spreading Factor 7			
			Low Channel 903 MHz	604.294 kHz	500 kHz	Pass
			Mid Channel 914.2 MHz	607.383 kHz	500 kHz	Pass
			High Channel 927.5 MHz	605.16 kHz	500 kHz	Pass

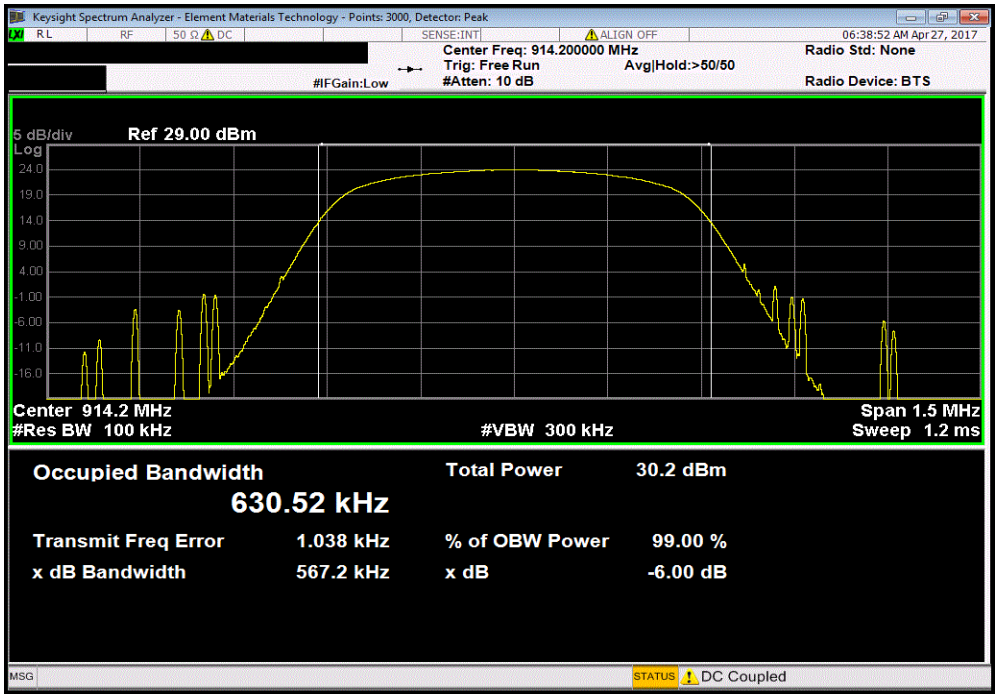
OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
				Value	Limit (≥)	Result
				566.087 kHz	500 kHz	Pass



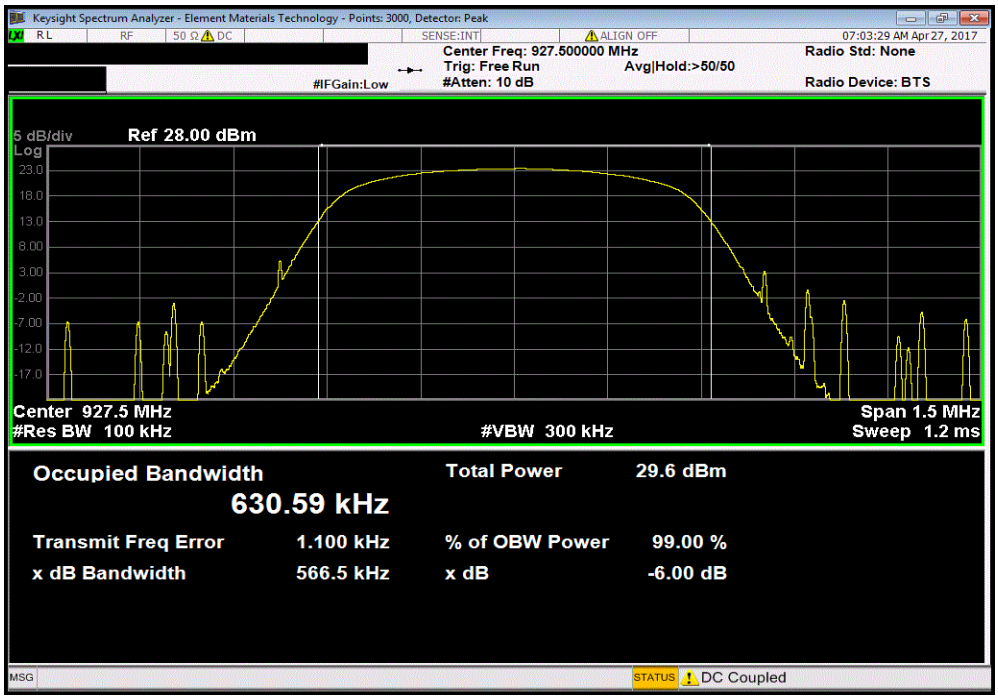
Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
				Value	Limit (≥)	Result
				567.165 kHz	500 kHz	Pass



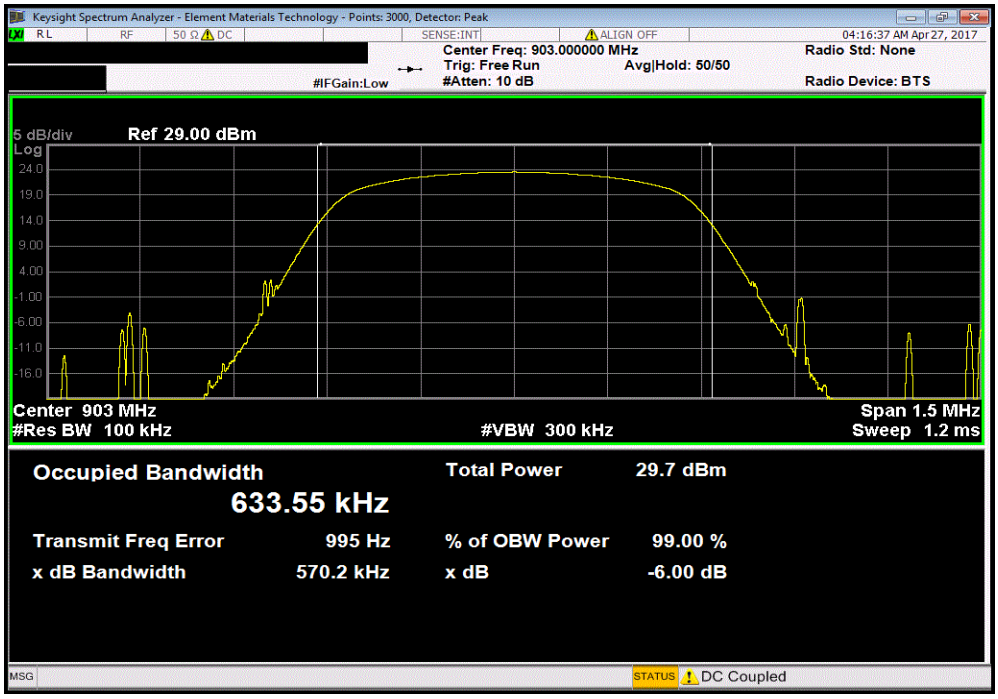
OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
				Value	Limit (≥)	Result
				566.514 kHz	500 kHz	Pass



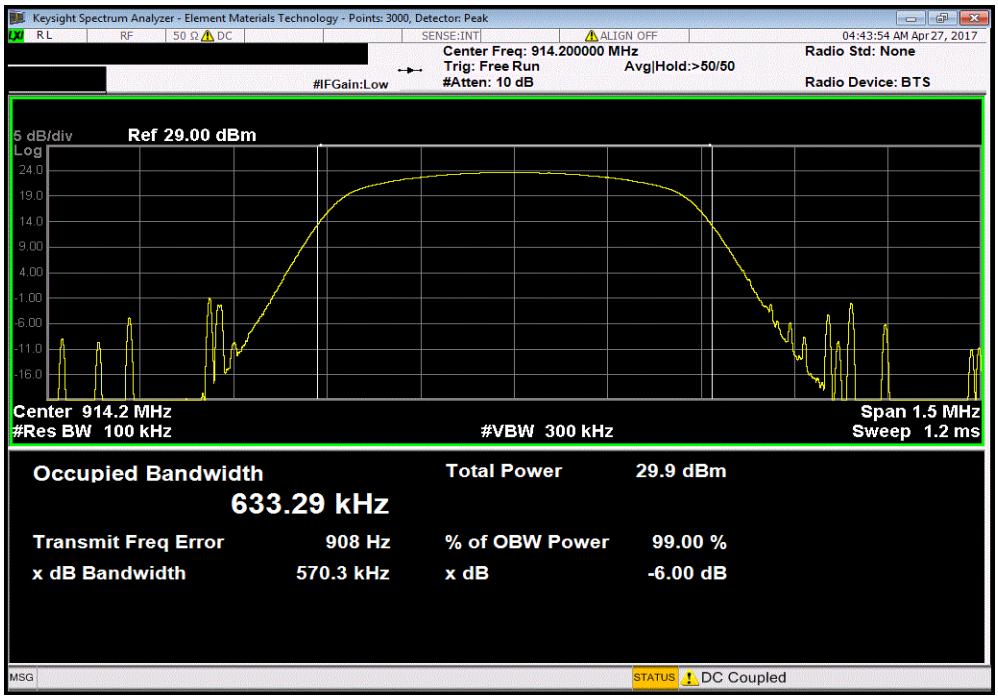
Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
				Value	Limit (≥)	Result
				570.219 kHz	500 kHz	Pass



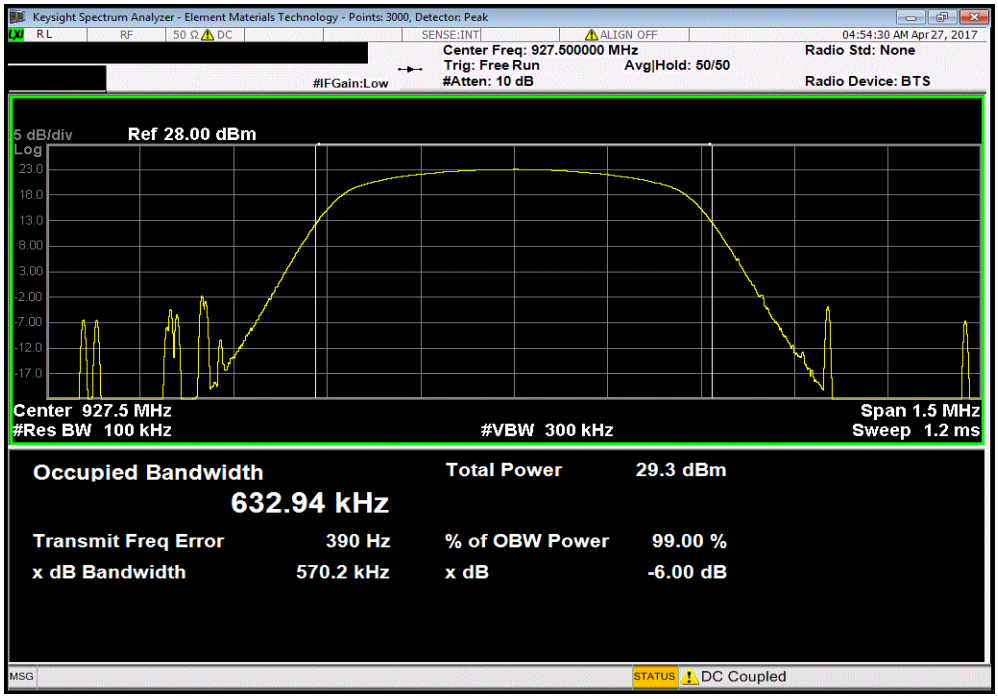
OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
				Value	Limit (≥)	Result
				570.27 kHz	500 kHz	Pass

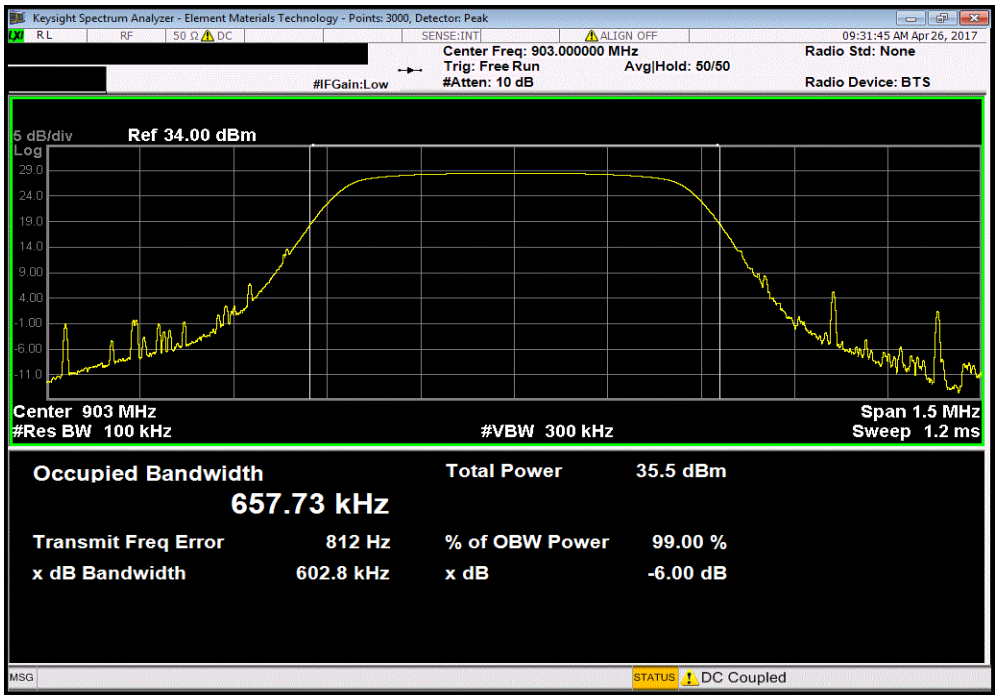


Yagi Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
				Value	Limit (≥)	Result
				570.235 kHz	500 kHz	Pass

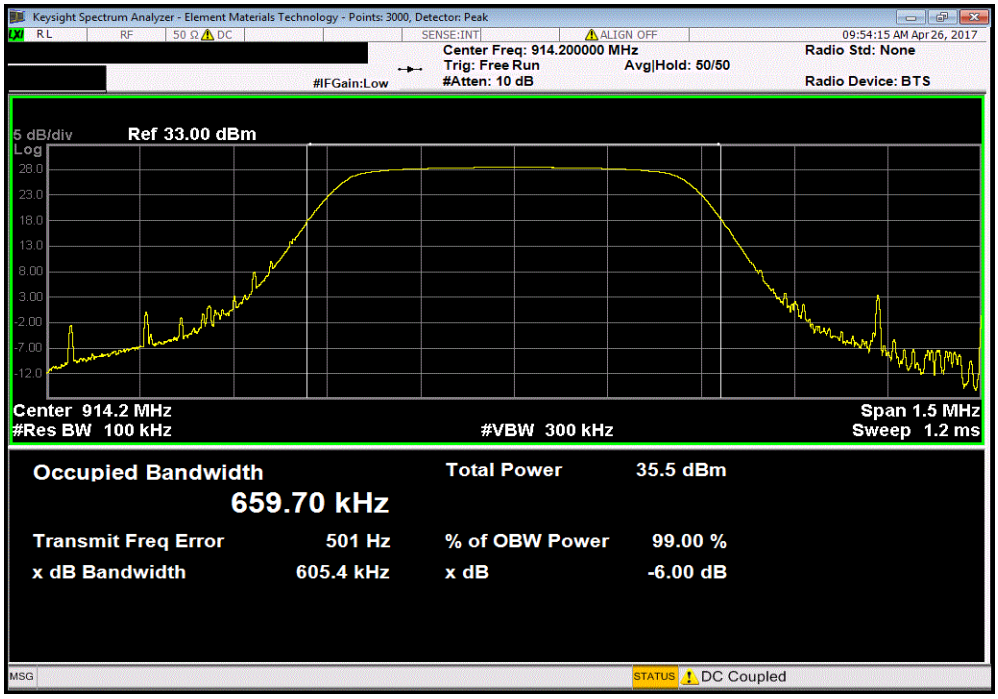


OCCUPIED BANDWIDTH

Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
				Value	Limit (≥)	Result
				602.834 kHz	500 kHz	Pass



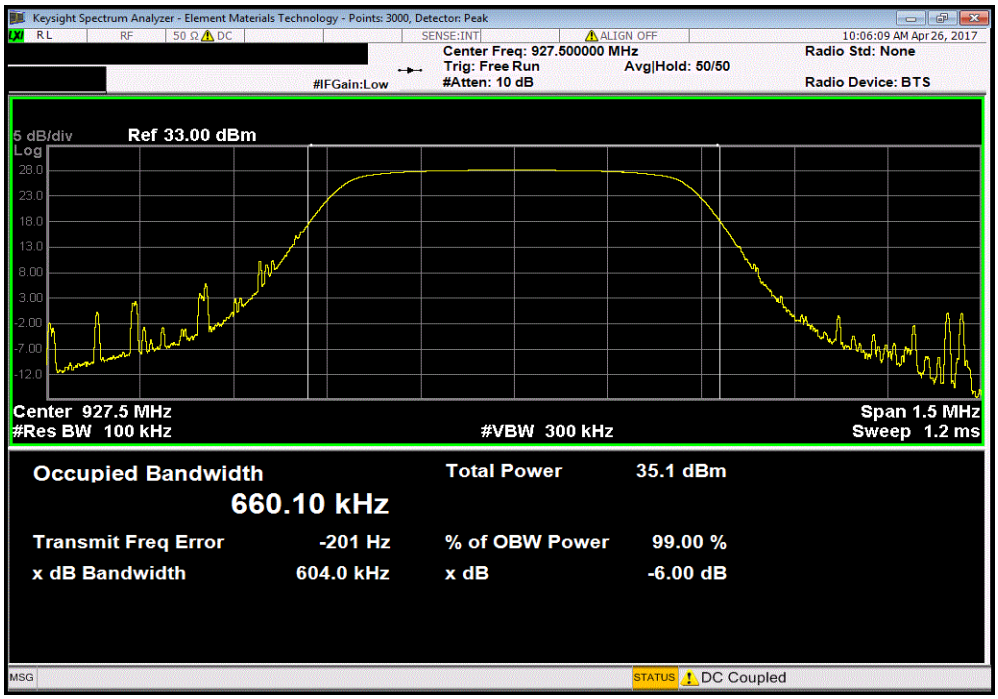
Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
				Value	Limit (≥)	Result
				605.371 kHz	500 kHz	Pass



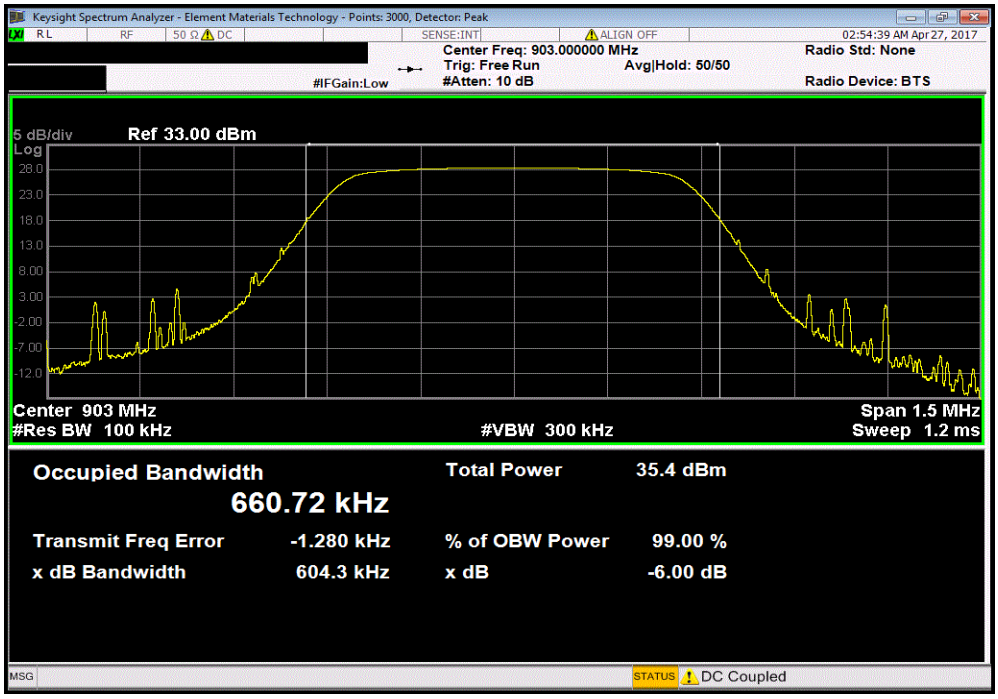
OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port A, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
				Value	Limit (≥)	Result
				604.002 kHz	500 kHz	Pass



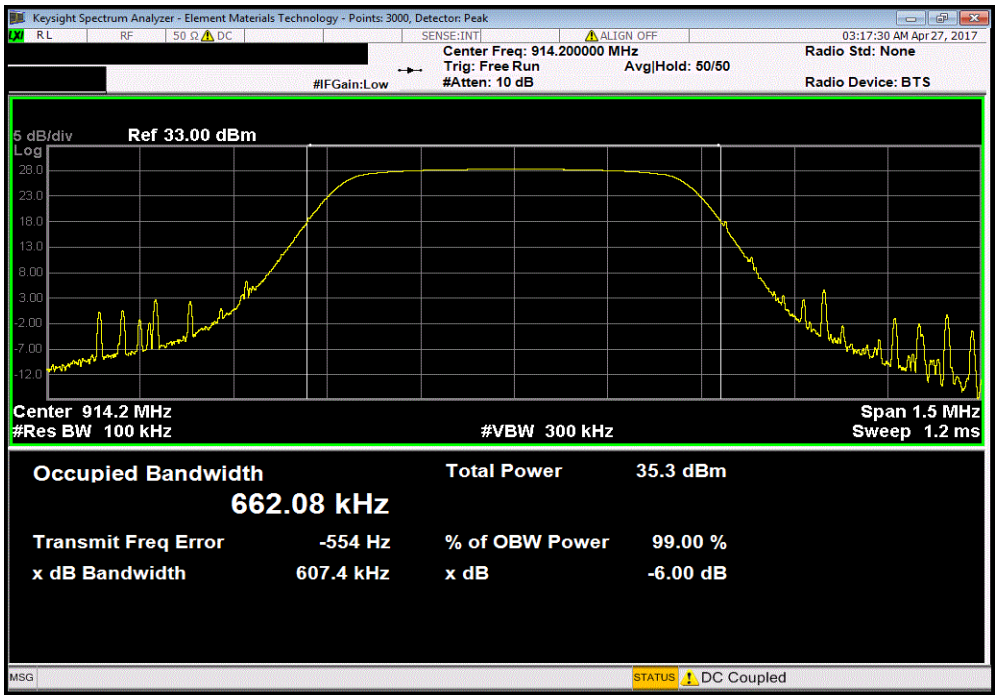
Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Low Channel 903 MHz						
				Value	Limit (≥)	Result
				604.294 kHz	500 kHz	Pass



OCCUPIED BANDWIDTH

TbtTx 2017.01.27 XMit 2017.02.08

Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, Mid Channel 914.2 MHz						
				Value	Limit (≥)	Result
				607.383 kHz	500 kHz	Pass



Dipole Antenna, Port B, 500 kHz Bandwidth, Spreading Factor 7, High Channel 927.5 MHz						
				Value	Limit (≥)	Result
				605.16 kHz	500 kHz	Pass