



## Audio Precision

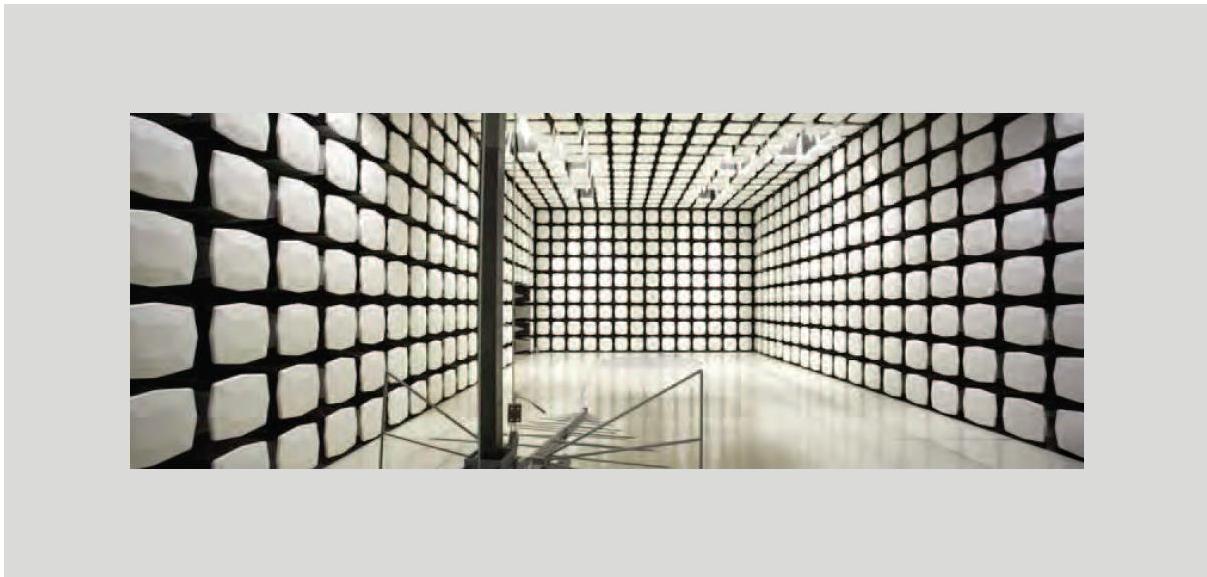
APx 525D2

FCC 15.207:2017

FCC 15.247:2017

Bluetooth Radio

Report # AUDI0246.2



NVLAP Lab Code: 200630-0



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# CERTIFICATE OF TEST



Last Date of Test: July 13, 2017  
Audio Precision  
Model: APx 525D2

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.207:2017	
FCC 15.247:2017	ANSI C63.10:2013, KDB 558074

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
7.5	Duty Cycle	Yes	Pass	
7.8.2	Carrier Frequency Separation	Yes	Pass	
7.8.3	Number of Hopping Frequencies	Yes	Pass	
7.8.4	Dwell Time	Yes	Pass	
7.8.5	Output Power	Yes	Pass	
7.8.6	Band Edge Compliance	Yes	Pass	
7.8.6	Band Edge Compliance - Hopping Mode	Yes	Pass	
7.8.7	Occupied Bandwidth	Yes	Pass	
7.8.8	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



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

## 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:

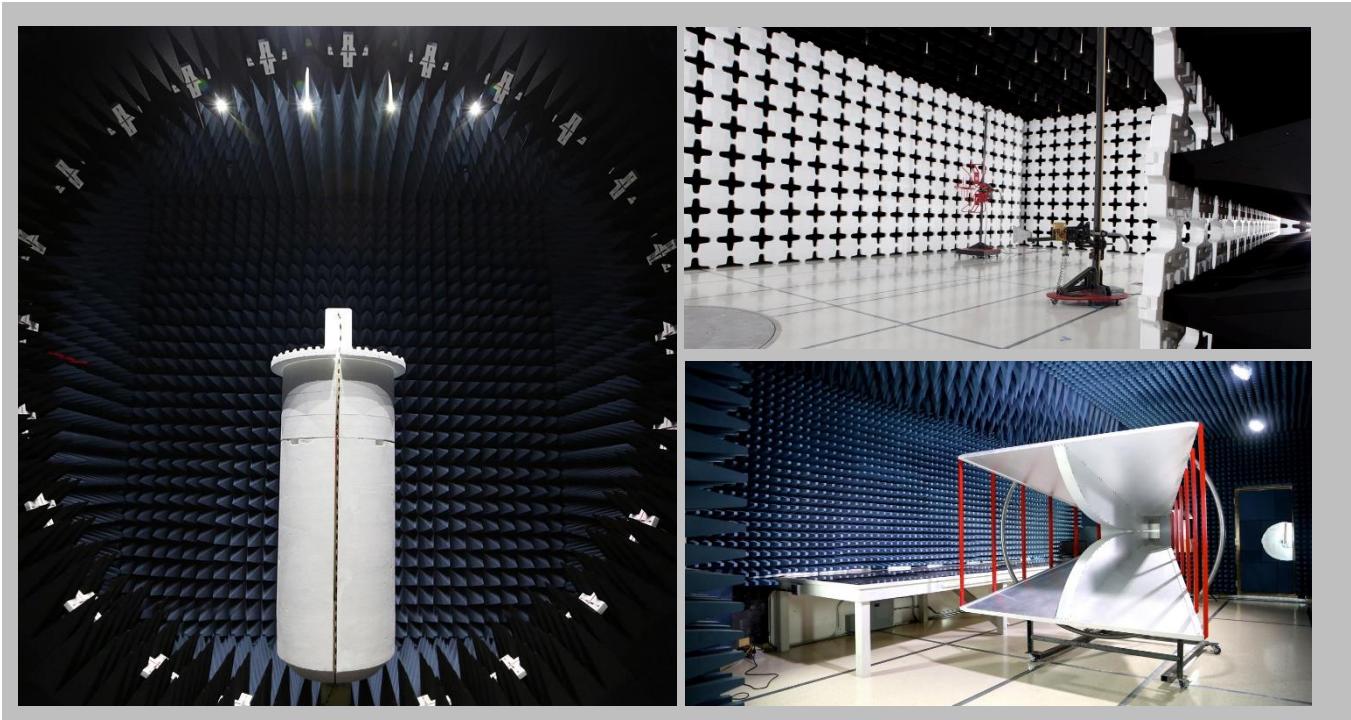
<http://portlandcustomer.element.com/ts/scope/scope.htm>

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

# FACILITIES



<b>California</b> Labs OC01-13 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/RRA, 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.

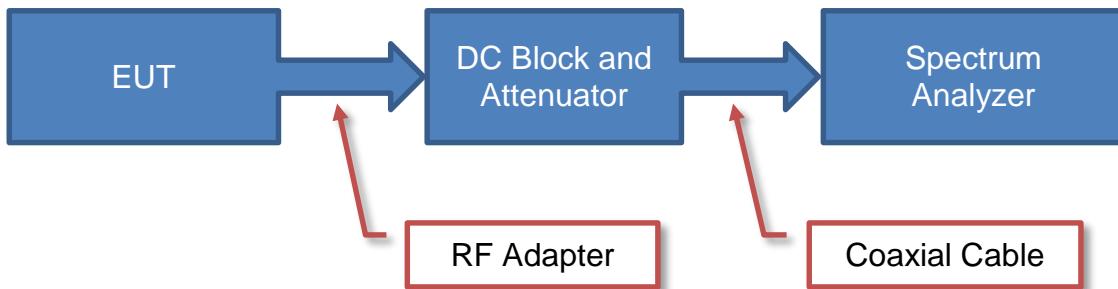
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable 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.

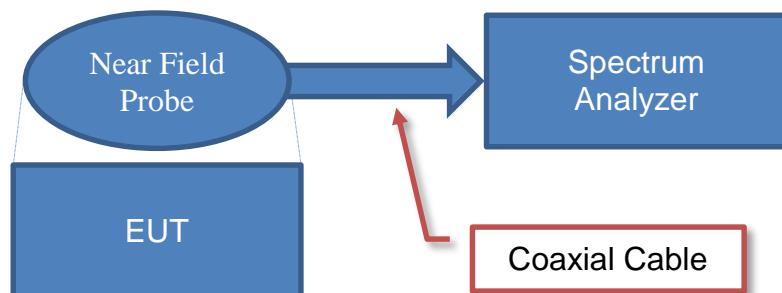
<u>Test</u>	<u>+ MU</u>	<u>- MU</u>
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (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

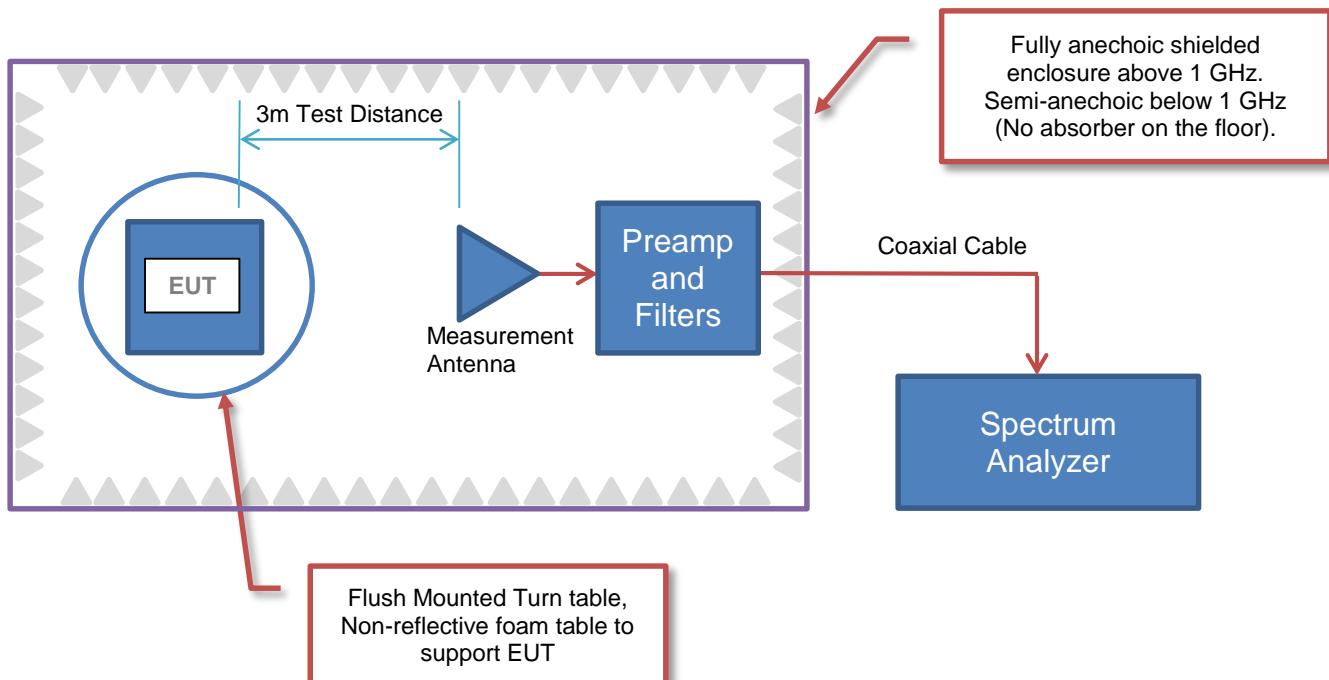
## Antenna Port Conducted Measurements



## Near Field Test Fixture Measurements



## Spurious Radiated Emissions



# PRODUCT DESCRIPTION



## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Audio Precision
<b>Address:</b>	5750 SW Arctic Drive
<b>City, State, Zip:</b>	Beaverton, OR 97005
<b>Test Requested By:</b>	Bill Bunnell
<b>Model:</b>	APx 525D2
<b>First Date of Test:</b>	July 5, 2017
<b>Last Date of Test:</b>	July 13, 2017
<b>Receipt Date of Samples:</b>	June 27, 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 APx Platform consists of a common chassis, rear panel, front panel bezel, upper and lower covers, internal vertical and horizontal metal partitions, backplane assembly and power supply that can be configured by the installation of individual modules into the 8 available front panel locations. By choosing the combination of modules the APx can accommodate 2 to 16 Audio Input channels and 2 to 8 Audio Generator channels, 2 channels of digital audio I/O and Bluetooth I/O for connection to the EUT. The internal modules and the power supply of the APx are filtered, decoupled, separated, partitioned and shielded to prevent interference between the modules. The specific model numbers of the APx series are based on the number of Output and Input channels. The APx modules are not functional on a standalone basis or in equipment other than the APx. In order to be functional the modules must be installed in the APx chassis using APx control Software.

Model Numbers	Audio Output Channels	Audio Input Channels
APx 525	2	2
APx 526	2	4
APx 582	2	8
APx585	8	8
APx586	8	16
APx 555	2 (High Performance)	2 (High Performance)

The Azul 2 Bluetooth module consists of a single 3 x 8 inch multilayer Pcb with 2 isolated layers of 360 degree RF shielding. The first layer of RF shielding covers the RX/TX active circuitry, the output filter, and the I/O ports. The second layer of RF shielding covers the first layer of shielding and the complete PCB assembly. Connections to and from the Antenna ports are made with double shielded coaxial cable with SMA bulkhead and cable terminations.

### Testing Objective:

To demonstrate compliance of the Bluetooth radio to FCC 15.247 requirements.

# CONFIGURATIONS



## Configuration AUDI0246- 1

Software/Firmware Running during test	
Description	Version
APx500	4.5.0.289.118768 Beta
BlueTest3	2.6.6
BlueSuit	2.6.6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Audio analyzer containing a Bluetooth BR/EDR radio module	Audio Precision	APx 525D2	APX2-28804

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
SPI to Ethernet Adapter #1	CSR	M1616V2	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB to SPI Converter	CSR	1324 USB-SPI Converter	373641
USB Mouse	Dell	MS1110L	None
AC Adapter	Dell	DA45NM140	None
Remote Laptop	Dell	Inspiron 15	20911042190

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	Audio Analyzer
Cat5e flat cable	No	2.1m	No	SPI to Ethernet Adapter #1	USB to SPI Converter
USB	Yes	2.0m	No	USB to SPI Converter	Remote Laptop
USB (Mouse)	Yes	1.8m	No	USB Mouse	Remote Laptop
USB	Yes	1.8m	Yes	Audio Analyzer	Remote Laptop
DC Power	No	1.8m	Yes	Remote Laptop	AC Adapter
AC Power	No	1.8m	No	AC Mains	AC Adapter

# CONFIGURATIONS



## Configuration AUDI0246- 2

Software/Firmware Running during test	
Description	Version
APx500	4.5.0.289.118768 Beta
BlueTest3	2.6.6
BlueSuit	2.6.6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Audio analyzer containing a Bluetooth BR/EDR radio module	Audio Precision	APx 525D2	APX2-28804

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
SPI to Ethernet Adapter #1	CSR	M1616V2	None

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB to SPI Converter	CSR	1324 USB-SPI Converter	373641
USB Mouse	Dell	MS1110L	None
AC Adapter	Dell	DA45NM140	None
Remote Laptop	Dell	Inspiron 15	20911042190

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	Audio Analyzer
Cat5e flat cable	No	2.1m	No	SPI to Ethernet Adapter #1	USB to SPI Converter
USB	Yes	2.0m	No	USB to SPI Converter	Remote Laptop
USB (Mouse)	Yes	1.8m	No	USB Mouse	Remote Laptop
USB	Yes	1.8m	Yes	Audio Analyzer	Remote Laptop
DC Power	No	1.8m	Yes	Remote Laptop	AC Adapter
AC Power	No	1.8m	No	AC Mains	AC Adapter
XLR x6	Yes	1.0m	Yes	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated

# CONFIGURATIONS



## Configuration AUDI0246- 5

Software/Firmware Running during test	
Description	Version
APx500	4.5.0.289.118768 Beta
BlueTest3	2.6.6
BlueSuit	2.6.6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Audio analyzer containing a Bluetooth BR/EDR radio module	Audio Precision	APx 525D2	APX2-28804

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
SPI to Ethernet Adapter #1	CSR	M1616V2	None
USB to SPI Converter	CSR	1324 USB-SPI Converter	373641
USB Mouse	Dell	MS1110L	None
AC Adapter	Dell	DA45NM140	None
Remote Laptop	Dell	Inspiron 15	20911042190

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	Audio Analyzer
Cat5e flat cable	No	2.1m	No	SPI to Ethernet Adapter #1	USB to SPI Converter
USB (Mouse)	Yes	1.8m	No	USB Mouse	Remote Laptop
USB	Yes	1.8m	Yes	Audio Analyzer	Remote Laptop
DC Power	No	1.8m	Yes	Remote Laptop	AC Adapter
AC Power	No	1.8m	No	AC Mains	AC Adapter
XLR x6	Yes	1.0m	Yes	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated

# CONFIGURATIONS



## Configuration AUDI0246- 6

Software/Firmware Running during test	
Description	Version
APx500	4.5.0.289.118768 Beta
BlueTest3	2.6.6
BlueSuit	2.6.6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Audio analyzer containing a Bluetooth BR/EDR radio module	Audio Precision	APx 525D2	APX2-28804

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB Mouse	Dell	MS1110L	None
AC Adapter	Dell	DA45NM140	None
Remote Laptop	Dell	Inspiron 15	21398130830
Wireless Adapter	Taotronics	TT-BA09	OGTKDVWH

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	Audio Analyzer
USB (Mouse)	Yes	1.8m	No	USB Mouse	Remote Laptop
USB	Yes	1.8m	Yes	Audio Analyzer	Remote Laptop
DC Power	No	1.8m	Yes	Remote Laptop	AC Adapter
AC Power	No	1.8m	No	AC Mains	AC Adapter
XLR x6	Yes	1.0m	Yes	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated
USB (for power)	Yes	1.8m	No	Laptop	Wireless Adapter
Audio RCA Pair	No	2.0m	No	Wireless Adapter	Audio Analyzer

# CONFIGURATIONS



## Configuration AUDI0246- 7

Software/Firmware Running during test	
Description	Version
APx500	4.5.0.289.118768 Beta
BlueTest3	2.6.6
BlueSuit	2.6.6

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Audio analyzer containing a Bluetooth BR/EDR radio module	Audio Precision	APx 525D2	APX2-28804

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
USB to SPI Converter	CSR	1324 USB-SPI Converter	373641
USB Mouse	Dell	MS1110L	None
AC Adapter	Dell	DA45NM140	None
Remote Laptop	Dell	Inspiron 15	21398130830

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	No	1.8m	No	AC Mains	Audio Analyzer
Cat5e flat cable	No	2.1m	No	SPI to Ethernet Adapter #1	USB to SPI Converter
USB	Yes	2.0m	No	USB to SPI Converter	Remote Laptop
USB (Mouse)	Yes	1.8m	No	USB Mouse	Remote Laptop
USB	Yes	1.8m	Yes	Audio Analyzer	Remote Laptop
DC Power	No	1.8m	Yes	Remote Laptop	AC Adapter
AC Power	No	1.8m	No	AC Mains	AC Adapter
XLR x6	Yes	1.0m	Yes	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated
DB9	Yes	1.8m	No	Audio Analyzer	Unterminated

# MODIFICATIONS



2017-1-25

## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	7/5/2017	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.
2	7/5/2017	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.
3	7/5/2017	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.
4	7/5/2017	Carrier Frequency Separation	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	7/5/2017	Number of Hopping Frequencies	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	7/5/2017	Dwell Time	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	7/5/2017	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.
8	7/5/2017	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.
9	7/5/2017	Band Edge Compliance - Hopping Mode	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
10	7/5/2017	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.
11	7/13/2017	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

# POWERLINE CONDUCTED EMISSIONS



## 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
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	10/4/2016	10/4/2018
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKA	EVGA	4/13/2017	4/13/2018
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

AUDI0246-7

## MODES INVESTIGATED

Mid Channel 2440MHz, DH5 (GFSK).

# POWERLINE CONDUCTED EMISSIONS



EUT:	APx 525D2	Work Order:	AUDIO246
Serial Number:	APX2-28804	Date:	07/13/2017
Customer:	Audio Precision	Temperature:	24°C
Attendees:	None	Relative Humidity:	43.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Duane Niesen and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	AUDIO246-7

## TEST SPECIFICATIONS

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

## TEST PARAMETERS

Run #:	11	Line:	High Line	Add. Ext. Attenuation (dB):	0
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## COMMENTS

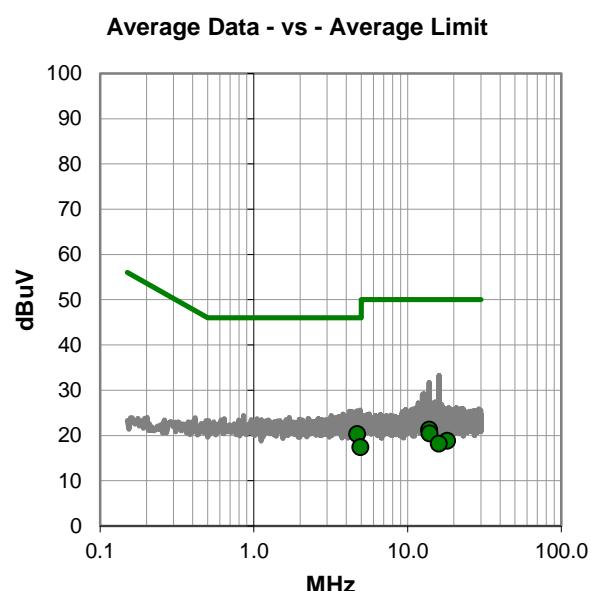
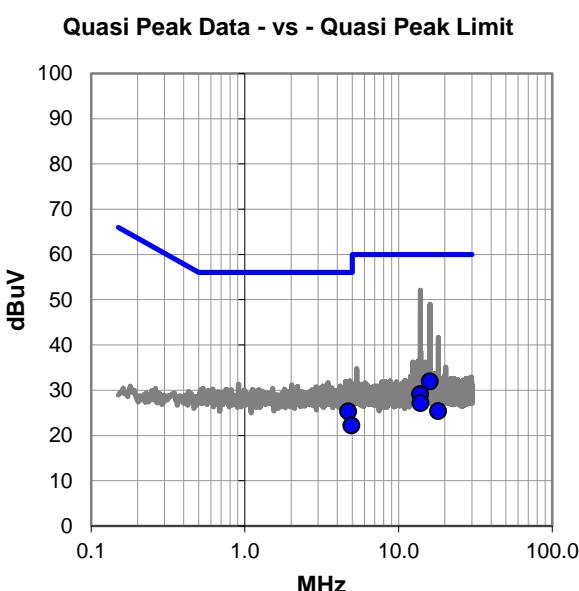
BR and EDR Power settings [(Ext),(Int)]= [255,63]

## EUT OPERATING MODES

Mid Channel 2440MHz, DH5 (GFSK).

## DEVIATIONS FROM TEST STANDARD

None





# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #11

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
16.002	11.5	20.4	31.9	60.0	-28.1
4.713	5.5	19.8	25.3	56.0	-30.7
13.836	8.9	20.2	29.1	60.0	-30.9
13.908	6.9	20.2	27.1	60.0	-32.9
4.938	2.4	19.8	22.2	56.0	-33.8
18.131	5.0	20.4	25.4	60.0	-34.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
4.713	0.5	19.8	20.3	46.0	-25.7
4.938	-2.4	19.8	17.4	46.0	-28.6
13.836	1.1	20.2	21.3	50.0	-28.7
13.908	0.2	20.2	20.4	50.0	-29.6
18.131	-1.6	20.4	18.8	50.0	-31.2
16.002	-2.2	20.4	18.2	50.0	-31.8

## CONCLUSION

Pass

Tested By

# POWERLINE CONDUCTED EMISSIONS



EUT:	APx 525D2	Work Order:	AUDIO246
Serial Number:	APX2-28804	Date:	07/13/2017
Customer:	Audio Precision	Temperature:	24°C
Attendees:	None	Relative Humidity:	43.6%
Customer Project:	None	Bar. Pressure:	1022 mb
Tested By:	Duane Niesen and Rod Peloquin	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	AUDIO246-6

## TEST SPECIFICATIONS

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

## TEST PARAMETERS

Run #:	12	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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## COMMENTS

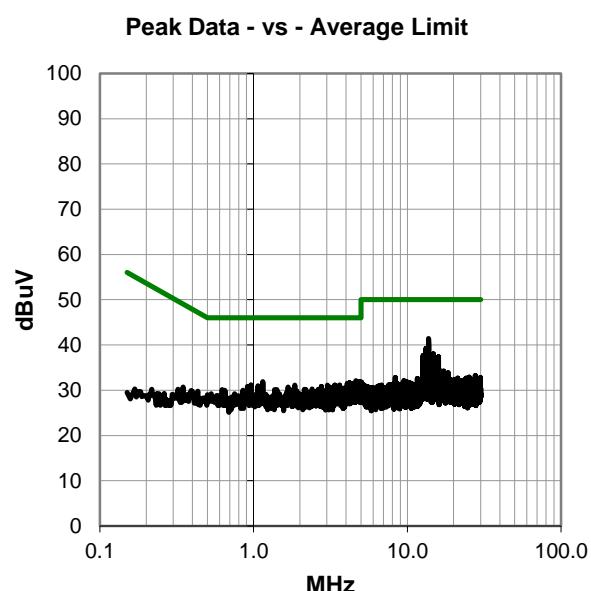
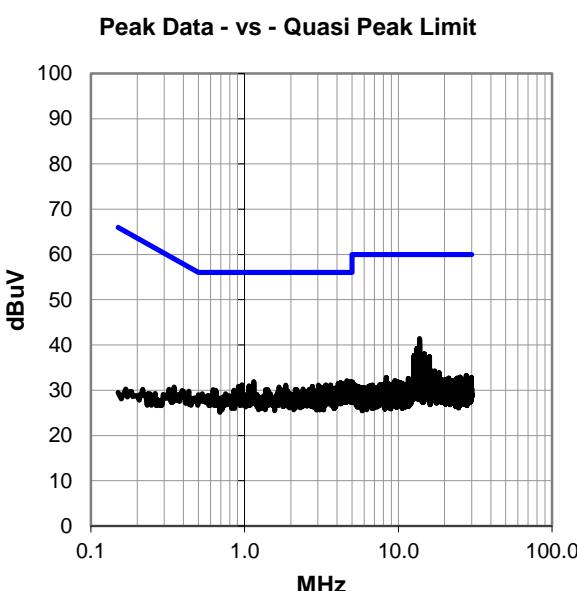
BR and EDR Power settings [(Ext),(Int)]= [255,63]

## EUT OPERATING MODES

Mid Channel 2440MHz, DH5 (GFSK).

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS



## RESULTS - Run #12

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.779	21.2	20.2	41.4	60.0	-18.6
13.238	19.0	20.2	39.2	60.0	-20.8
14.771	17.6	20.4	38.0	60.0	-22.0
12.652	17.5	20.2	37.7	60.0	-22.3
15.976	17.0	20.4	37.4	60.0	-22.6
12.588	16.9	20.2	37.1	60.0	-22.9
14.402	16.7	20.2	36.9	60.0	-23.1
4.642	12.3	19.8	32.1	56.0	-23.9
1.150	12.4	19.5	31.9	56.0	-24.1
4.903	12.1	19.8	31.9	56.0	-24.1
13.148	15.7	20.2	35.9	60.0	-24.1
4.209	11.9	19.8	31.7	56.0	-24.3
4.071	11.7	19.8	31.5	56.0	-24.5
4.396	11.7	19.8	31.5	56.0	-24.5
12.671	15.3	20.2	35.5	60.0	-24.5
4.571	11.6	19.8	31.4	56.0	-24.6
4.149	11.5	19.8	31.3	56.0	-24.7
13.066	15.0	20.2	35.2	60.0	-24.8
0.963	11.7	19.5	31.2	56.0	-24.8
4.541	11.4	19.8	31.2	56.0	-24.8
1.851	11.5	19.6	31.1	56.0	-24.9
3.026	11.3	19.8	31.1	56.0	-24.9
3.377	11.3	19.8	31.1	56.0	-24.9
3.627	11.3	19.8	31.1	56.0	-24.9
4.802	11.3	19.8	31.1	56.0	-24.9
13.286	14.9	20.2	35.1	60.0	-24.9

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
13.779	21.2	20.2	41.4	50.0	-8.6
13.238	19.0	20.2	39.2	50.0	-10.8
14.771	17.6	20.4	38.0	50.0	-12.0
12.652	17.5	20.2	37.7	50.0	-12.3
15.976	17.0	20.4	37.4	50.0	-12.6
12.588	16.9	20.2	37.1	50.0	-12.9
14.402	16.7	20.2	36.9	50.0	-13.1
4.642	12.3	19.8	32.1	46.0	-13.9
1.150	12.4	19.5	31.9	46.0	-14.1
4.903	12.1	19.8	31.9	46.0	-14.1
13.148	15.7	20.2	35.9	50.0	-14.1
4.209	11.9	19.8	31.7	46.0	-14.3
4.071	11.7	19.8	31.5	46.0	-14.5
4.396	11.7	19.8	31.5	46.0	-14.5
12.671	15.3	20.2	35.5	50.0	-14.5
4.571	11.6	19.8	31.4	46.0	-14.6
4.149	11.5	19.8	31.3	46.0	-14.7
13.066	15.0	20.2	35.2	50.0	-14.8
0.963	11.7	19.5	31.2	46.0	-14.8
4.541	11.4	19.8	31.2	46.0	-14.8
1.851	11.5	19.6	31.1	46.0	-14.9
3.026	11.3	19.8	31.1	46.0	-14.9
3.377	11.3	19.8	31.1	46.0	-14.9
3.627	11.3	19.8	31.1	46.0	-14.9
4.802	11.3	19.8	31.1	46.0	-14.9
13.286	14.9	20.2	35.1	50.0	-14.9

## 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

Bluetooth continuous Tx

## POWER SETTINGS INVESTIGATED

110VAC/60Hz

## CONFIGURATIONS INVESTIGATED

AUDI0246 - 2

AUDI0246 - 5

## FREQUENCY RANGE INVESTIGATED

Start Frequency | 30 MHz | Stop Frequency | 26.5 GHz

## 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
Cable	ESM Cable Corp.	KMKG-72	EVY	10/17/2016	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	10/17/2016	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2/6/2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 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	HPM50111	HFO	2/6/2017	12 mo
Attenuator	Coaxicom	3910-20	AXZ	4/19/2017	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
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
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFN	4/13/2017	12 mo

# SPURIOUS RADIATED EMISSIONS



## 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.

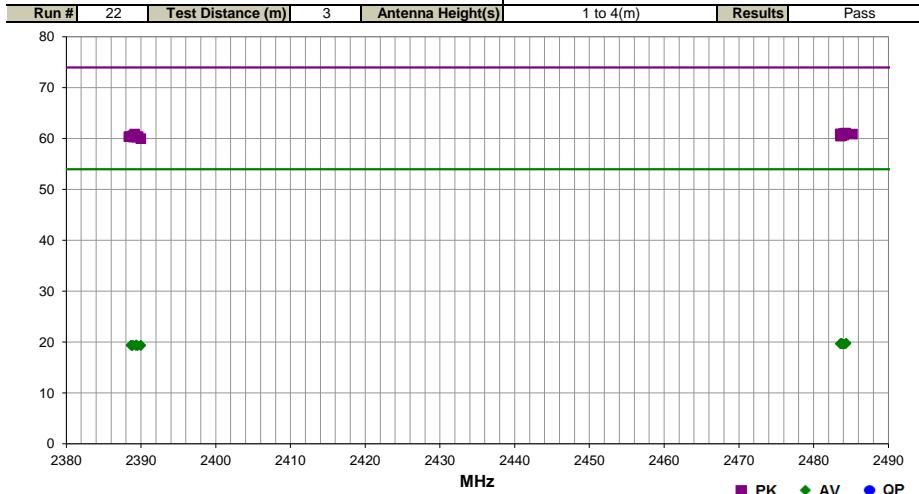
During the testing the EUT was operating with a 77.9% Duty cycle. The test software provided would not allow continuous operation. Per ANSI C63.10 methods, the RMS data was corrected with a carrier duty cycle correction factor (DCCF) of 1.1dB:  $DCCF \text{ (dB)} = 10 \cdot \log(\text{duty cycle})$ . In addition, a Frequency Hopping Spread Spectrum (FHSS) duty cycle correction factor (DCCF) was applied against the average measurements based on the hopping dwell time in a 100 ms period as allowed by FCC 15.35:  $DCCF \text{ (dB)} = 20 \cdot \log(\text{duty cycle})$

# SPURIOUS RADIATED EMISSIONS



Work Order:	AUDI0246	Date:	07/05/17	EmB5 2017.01.25	PSA-ESCI 2017.01.26
Project:	None	Temperature:	23.6 °C		
Job Site:	EV01	Humidity:	46.3% RH		
Serial Number:	APX2-28804	Barometric Pres.:	1016 mbar		
EUT:	APx 525D2				
Configuration:	2				
Customer:	Audio Precision				
Attendees:	Bill Bunnell				
EUT Power:	110VAC/60Hz				
Operating Mode:	Bluetooth continuous Tx				
Deviations:	I/O ports populated per customer direction				
Comments:	BR and EDR Power settings [(Ext),(Int)]=[255,63]. See comments below for Channel, Frequency, Modulation, Antenna Port and Antenna Orientation.				

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



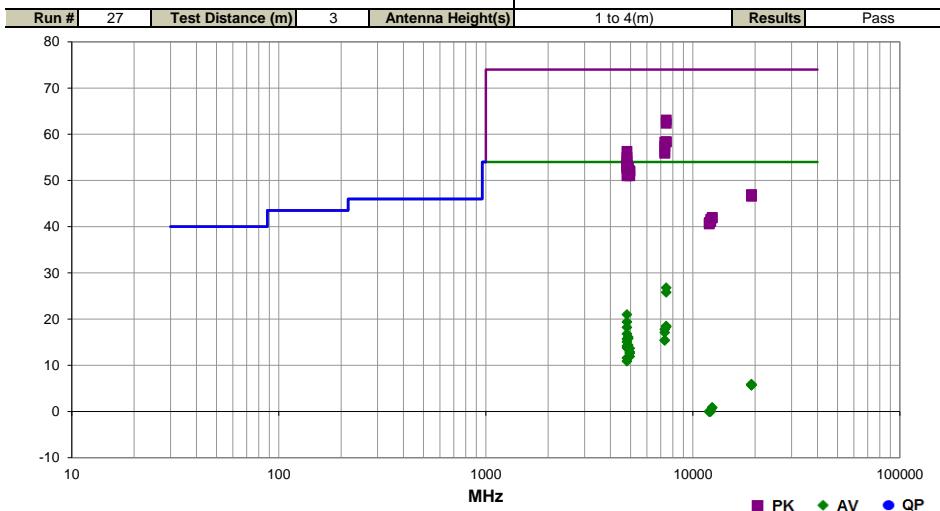
Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Carrier Duty Cycle (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2484.293	40.8	0.3	1.0	344.0	0.0	20.0	Vert	PK	0.0	61.1	74.0	-12.9	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2484.007	40.7	0.3	2.7	187.0	0.0	20.0	Vert	PK	0.0	61.0	74.0	-13.0	High Ch. 2480 MHz, 3DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2484.080	40.6	0.3	2.0	357.0	0.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2485.203	40.6	0.3	1.2	357.0	0.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2483.590	40.6	0.3	1.0	114.0	0.0	20.0	Vert	PK	0.0	60.9	74.0	-13.1	High Ch. 2480 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2483.560	40.6	0.3	2.7	206.0	0.0	20.0	Vert	PK	0.0	60.9	74.0	-13.1	High Ch. 2480 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Vert.
2389.133	41.0	-0.1	1.0	116.0	0.0	20.0	Horz	PK	0.0	60.9	74.0	-13.1	Low Ch. 2402 MHz, 3DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2484.003	40.4	0.3	2.7	206.0	0.0	20.0	Vert	PK	0.0	60.7	74.0	-13.3	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
2388.893	40.7	-0.1	1.0	50.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2483.750	40.3	0.3	1.0	266.0	0.0	20.0	Vert	PK	0.0	60.6	74.0	-13.4	High Ch. 2480 MHz, 3DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2483.593	40.2	0.3	1.0	13.0	0.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	High Ch. 2480 MHz, 2DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2388.367	40.5	-0.1	1.0	100.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2388.507	40.5	-0.1	1.0	249.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	Low Ch. 2402 MHz, 3DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2389.633	40.5	-0.1	1.0	116.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
2389.413	40.5	-0.1	1.0	116.0	0.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2389.427	40.4	-0.1	1.0	31.0	0.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2389.013	40.4	-0.1	1.0	150.0	0.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2389.970	40.1	-0.1	1.6	55.0	0.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2483.713	29.1	0.3	1.0	344.0	-30.7	20.0	Vert	AV	1.1	19.8	54.0	-34.2	High Ch. 2480 MHz, DHS (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2484.367	29.1	0.3	1.0	266.0	-30.7	20.0	Vert	AV	1.1	19.8	54.0	-34.2	High Ch. 2480 MHz, 3DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2483.617	29.0	0.3	2.0	357.0	-30.7	20.0	Horz	AV	1.1	19.7	54.0	-34.3	High Ch. 2480 MHz, DHS (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2484.320	29.0	0.3	1.0	114.0	-30.7	20.0	Vert	AV	1.1	19.7	54.0	-34.3	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2483.830	29.0	0.3	1.0	13.0	-30.7	20.0	Vert	AV	1.1	19.7	54.0	-34.3	High Ch. 2480 MHz, 2DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2483.567	29.0	0.3	2.7	187.0	-30.7	20.0	Vert	AV	1.1	19.7	54.0	-34.3	High Ch. 2480 MHz, 3DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2483.693	29.0	0.3	2.7	206.0	-30.7	20.0	Vert	AV	1.1	19.7	54.0	-34.3	High Ch. 2480 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2483.933	28.9	0.3	1.2	357.0	-30.7	20.0	Horz	AV	1.1	19.6	54.0	-34.4	High Ch. 2480 MHz, DHS (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2484.120	28.9	0.3	2.7	206.0	-30.7	20.0	Vert	AV	1.1	19.6	54.0	-34.4	High Ch. 2480 MHz, DHS (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
2389.357	29.2	-0.1	1.0	249.0	-30.7	20.0	Horz	AV	1.1	19.5	54.0	-34.5	Low Ch. 2402 MHz, 3DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2388.940	29.1	-0.1	1.0	31.0	-30.7	20.0	Horz	AV	1.1	19.4	54.0	-34.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
2389.967	29.1	-0.1	1.0	116.0	-30.7	20.0	Horz	AV	1.1	19.4	54.0	-34.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
2388.657	29.1	-0.1	1.0	116.0	-30.7	20.0	Horz	AV	1.1	19.4	54.0	-34.6	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
2388.847	29.0	-0.1	1.6	55.0	-30.7	20.0	Vert	AV	1.1	19.3	54.0	-34.7	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2389.573	29.0	-0.1	1.0	100.0	-30.7	20.0	Horz	AV	1.1	19.3	54.0	-34.7	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2389.970	29.0	-0.1	1.0	50.0	-30.7	20.0	Vert	AV	1.1	19.3	54.0	-34.7	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
2388.710	29.0	-0.1	1.0	150.0	-30.7	20.0	Horz	AV	1.1	19.3	54.0	-34.7	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
2389.327	29.0	-0.1	1.0	116.0	-30.7	20.0	Horz	AV	1.1	19.3	54.0	-34.7	Low Ch. 2402 MHz, 3DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.

# SPURIOUS RADIATED EMISSIONS



Work Order:	AUDIO246	Date:	07/05/17	EmRS 2017.01.25	PSA-ESCI 2017.01.26
Project:	None	Temperature:	23.3 °C		
Job Site:	EV01	Humidity:	40.9% RH		
Serial Number:	APX2-28804	Barometric Pres.:	1021 mbar		
EUT:	APx 525D2	Tested by:	Jeff Alcock and Rod Peloquin		
Configuration:	2 and 5				
Customer:	Audio Precision				
Attendees:	None				
EUT Power:	110VAC/60Hz				
Operating Mode:	Bluetooth continuous Tx				
Deviations:	I/O ports populated per customer direction				
Comments:	BR and EDR Power settings [(Ext),(Int)]=[255,63]. See comments below for Channel, Frequency, Modulation, Antenna Port and Antenna Orientation.				

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



Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	FHSS Duty Cycle (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Carrier Duty Cycle (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.535	43.7	19.4	1.9	360.0	0.0	0.0	Horz	PK	0.0	63.1	74.0	-10.9	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
7440.533	43.0	19.4	1.0	67.0	0.0	0.0	Vert	PK	0.0	62.4	74.0	-11.6	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
7439.603	39.0	19.4	2.9	45.0	0.0	0.0	Horz	PK	0.0	58.4	74.0	-15.6	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
7439.475	38.9	19.4	1.0	307.0	0.0	0.0	Vert	PK	0.0	58.3	74.0	-15.7	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
7320.783	39.5	18.8	2.1	59.0	0.0	0.0	Vert	PK	0.0	58.3	74.0	-15.7	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
7320.267	38.6	18.8	3.8	11.0	0.0	0.0	Horz	PK	0.0	57.4	74.0	-16.6	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
4803.675	45.7	10.6	2.0	25.0	0.0	0.0	Horz	PK	0.0	56.3	74.0	-17.7	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
7317.842	37.3	18.8	1.5	60.0	0.0	0.0	Vert	PK	0.0	56.1	74.0	-17.9	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
7320.320	37.1	18.8	1.0	282.0	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4804.100	44.5	10.6	2.1	25.0	0.0	0.0	Horz	PK	0.0	55.1	74.0	-18.9	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4803.875	43.6	10.6	2.1	14.0	0.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Source Ant, Antenna Horz.
4804.167	43.6	10.6	1.0	328.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
4804.358	42.8	10.6	1.0	25.0	0.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4804.180	42.7	10.6	2.1	28.0	0.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Source Ant, Antenna Horz.
4804.388	42.5	10.6	2.5	53.0	0.0	0.0	Horz	PK	0.0	53.1	74.0	-20.9	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Sink Ant, Antenna Horz.
4879.905	42.1	10.8	2.1	360.0	0.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4804.492	42.2	10.6	2.5	53.0	0.0	0.0	Horz	PK	0.0	52.8	74.0	-21.2	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Sink Ant, Antenna Horz.
4880.291	41.8	10.8	2.1	0.0	0.0	0.0	Horz	PK	0.0	52.6	74.0	-21.4	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenn Horz.
4803.703	41.9	10.6	2.0	27.0	0.0	0.0	Horz	PK	0.0	52.5	74.0	-21.5	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4880.008	41.4	10.8	1.9	332.0	0.0	0.0	Vert	PK	0.0	52.2	74.0	-21.8	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
4960.075	41.1	11.0	2.3	34.0	0.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
4960.258	41.0	11.0	1.8	359.0	0.0	0.0	Horz	PK	0.0	52.0	74.0	-22.0	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4960.000	40.9	11.0	1.0	328.0	0.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
4879.675	40.9	10.8	1.0	21.0	0.0	0.0	Vert	PK	0.0	51.7	74.0	-22.3	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4804.425	40.4	10.6	2.3	319.0	0.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4960.167	40.0	11.0	1.0	0.0	0.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
19217.350	45.9	1.0	1.8	328.0	0.0	0.0	Vert	PK	0.0	46.9	74.0	-27.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
19214.760	45.9	1.0	1.8	147.0	0.0	0.0	Horz	PK	0.0	46.9	74.0	-27.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
19214.250	45.7	1.0	1.8	0.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
19214.600	45.6	1.0	1.8	61.0	0.0	0.0	Vert	PK	0.0	46.6	74.0	-27.4	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
7439.767	37.0	19.4	1.9	360.0	-30.7	0.0	Horz	AV	1.1	26.8	54.0	-27.2	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
7439.758	36.0	19.4	1.0	67.0	-30.7	0.0	Vert	AV	1.1	25.8	54.0	-28.2	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
12398.760	38.1	3.9	1.2	64.0	0.0	0.0	Vert	PK	0.0	42.0	74.0	-32.0	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
12398.750	38.0	3.9	1.0	43.0	0.0	0.0	Horz	PK	0.0	41.9	74.0	-32.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12199.410	38.3	3.3	1.1	284.0	0.0	0.0	Horz	PK	0.0	41.6	74.0	-32.4	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12199.130	37.8	3.3	1.0	218.0	0.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
12007.680	37.7	3.2	1.0	170.0	0.0	0.0	Horz	PK	0.0	40.9	74.0	-33.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12009.710	37.4	3.2	1.0	232.0	0.0	0.0	Vert	PK	0.0	40.6	74.0	-33.4	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4804.000	40.0	10.6	2.0	25.0	-30.7	0.0	Horz	AV	1.1	21.0	54.0	-33.0	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
4804.000	38.4	10.6	2.1	25.0	-30.7	0.0	Horz	AV	1.1	19.4	54.0	-34.6	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
7439.675	28.7	19.4	1.0	307.0	-30.7	0.0	Vert	AV	1.1	18.5	54.0	-35.5	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
7439.725	28.5	19.4	2.9	45.0	-30.7	0.0	Horz	AV	1.1	18.3	54.0	-35.7	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4803.983	37.2	10.6	1.0	328.0	-30.7	0.0	Vert	AV	1.1	18.2	54.0	-35.8	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
7319.733	28.6	18.8	2.1	59.0	-30.7	0.0	Vert	AV	1.1	17.8	54.0	-36.2	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
7319.825	27.9	18.8	3.8	11.0	-30.7	0.0	Horz	AV	1.1	17.1	54.0	-36.9	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
4803.992	35.8	10.6	1.0	25.0	-30.7	0.0	Vert	AV	1.1	16.8	54.0	-37.2	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4880.020	34.9	10.8	2.1	360.0	-30.7	0.0	Horz	AV	1.1	16.1	54.0	-37.9	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4879.908	34.6	10.8	2.1	0.0	-30.7	0.0	Horz	AV	1.1	15.8	54.0	-38.2	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	FHSS Duty Cycle (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Carrier Duty Cycle (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4804.067	34.7	10.6	2.1	14.0	-30.7	0.0	Horz	AV	1.1	15.7	54.0	-38.3	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Source Ant, Antenna Horz.
7319.835	26.2	18.8	1.0	282.0	-30.7	0.0	Horz	AV	1.1	15.4	54.0	-38.6	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
7320.067	26.2	18.8	1.5	60.0	-30.7	0.0	Vert	AV	1.1	15.4	54.0	-38.6	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4803.995	34.1	10.6	2.1	28.0	-30.7	0.0	Horz	AV	1.1	15.1	54.0	-38.9	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Source Ant, Antenna Horz.
4879.900	33.2	10.8	1.9	332.0	-30.7	0.0	Vert	AV	1.1	14.4	54.0	-39.6	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
4804.125	33.2	10.6	2.5	53.0	-30.7	0.0	Horz	AV	1.1	14.2	54.0	-39.8	Low Ch. 2402 MHz, 2DH5 (pi/4-DQPSK), EUT Horizontal, Sink Ant, Antenna Horz.
4804.008	32.8	10.6	2.5	53.0	-30.7	0.0	Horz	AV	1.1	13.8	54.0	-40.2	Low Ch. 2402 MHz, 2DH5 (8DPSK), EUT Horizontal, Sink Ant, Antenna Horz.
4960.033	32.3	11.0	2.3	34.0	-30.7	0.0	Horz	AV	1.1	13.7	54.0	-40.3	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
4880.025	32.4	10.8	1.0	21.0	-30.7	0.0	Vert	AV	1.1	13.6	54.0	-40.4	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4959.992	31.5	11.0	1.0	328.0	-30.7	0.0	Vert	AV	1.1	12.9	54.0	-41.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
4959.992	31.2	11.0	1.8	359.0	-30.7	0.0	Horz	AV	1.1	12.6	54.0	-41.4	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4959.917	30.5	11.0	1.0	0.0	-30.7	0.0	Vert	AV	1.1	11.9	54.0	-42.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
4804.042	30.6	10.6	2.3	319.0	-30.7	0.0	Vert	AV	1.1	11.6	54.0	-42.4	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
4803.933	29.9	10.6	2.0	27.0	-30.7	0.0	Horz	AV	1.1	10.9	54.0	-43.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
19215.330	34.5	1.0	1.8	61.0	-30.7	0.0	Vert	AV	1.1	5.9	54.0	-48.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
19214.740	34.5	1.0	1.8	328.0	-30.7	0.0	Vert	AV	1.1	5.9	54.0	-48.1	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Vert.
19214.120	34.3	1.0	1.8	0.0	-30.7	0.0	Horz	AV	1.1	5.7	54.0	-48.3	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
19215.830	34.3	1.0	1.8	147.0	-30.7	0.0	Horz	AV	1.1	5.7	54.0	-48.3	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Sink Ant, Antenna Horz.
12399.110	26.6	3.9	1.2	64.0	-30.7	0.0	Vert	AV	1.1	0.9	54.0	-53.1	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Vert.
12399.380	26.5	3.9	1.0	43.0	-30.7	0.0	Horz	AV	1.1	0.8	54.0	-53.2	High Ch. 2480 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12199.090	26.4	3.3	1.1	284.0	-30.7	0.0	Horz	AV	1.1	0.1	54.0	-53.9	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12009.510	26.4	3.2	1.0	170.0	-30.7	0.0	Horz	AV	1.1	0.0	54.0	-54.0	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12009.610	26.4	3.2	1.0	232.0	-30.7	0.0	Vert	AV	1.1	0.0	54.0	-54.0	Low Ch. 2402 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.
12198.220	26.3	3.3	1.0	218.0	-30.7	0.0	Vert	AV	1.1	0.0	54.0	-54.0	Mid Ch. 2440 MHz, DH5 (GFSK), EUT Horizontal, Source Ant, Antenna Horz.

# DUTY CYCLE



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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
Block - DC	Fairview Microwave	SD3379	AMW	6/5/2017	6/5/2018
Attenuator	S.M. Electronics	SA26B-20	AUY	5/30/2017	5/30/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	5/30/2017	5/30/2018
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.

# DUTY CYCLE



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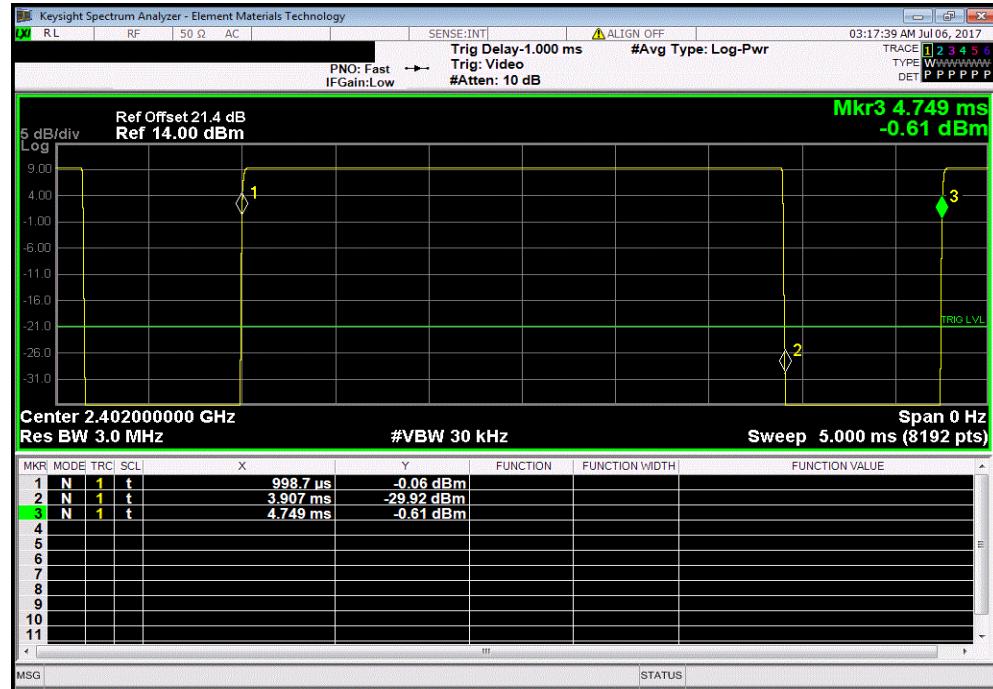
EUT:	APx 525D2	Work Order:	AUDI0246				
Serial Number:	APX2-28804	Date:	07/05/17				
Customer:	Audio Precision	Temperature:	23.2 °C				
Attendees:	None	Humidity:	44.9% RH				
Project:	None	Barometric Pres.:	1017 mbar				
Tested by:	Jeff Alcock and Rod Peloquin	Power:	110VAC/60Hz				
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013				
FCC 15.247:2017							
COMMENTS	BR and EDR Power settings [(Ext),(Int)]=[255,63]. Measurements were taken on the Source only. Source was shown to have highest output power.						
DEVIATIONS FROM TEST STANDARD							
None							
Configuration #	1	Signature					
Source		Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
DH5, GFSK							
Low Channel, 2402 MHz		2.909 ms	3.75 ms	1	77.6	N/A	N/A
Low Channel, 2402 MHz		N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz		2.908 ms	3.75 ms	1	77.5	N/A	N/A
Mid Channel, 2440 MHz		N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz		2.908 ms	3.75 ms	1	77.6	N/A	N/A
High Channel, 2480 MHz		N/A	N/A	5	N/A	N/A	N/A
2DH5, pi/4-DQPSK							
Low Channel, 2402 MHz		2.919 ms	3.75 ms	1	77.8	N/A	N/A
Low Channel, 2402 MHz		N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz		2.919 ms	3.75 ms	1	77.8	N/A	N/A
Mid Channel, 2440 MHz		N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz		2.918 ms	3.75 ms	1	77.8	N/A	N/A
High Channel, 2480 MHz		N/A	N/A	5	N/A	N/A	N/A
3DH5, 8-DPSK							
Low Channel, 2402 MHz		2.92 ms	3.75 ms	1	77.9	N/A	N/A
Low Channel, 2402 MHz		N/A	N/A	5	N/A	N/A	N/A
Mid Channel, 2440 MHz		2.92 ms	3.75 ms	1	77.9	N/A	N/A
Mid Channel, 2440 MHz		N/A	N/A	5	N/A	N/A	N/A
High Channel, 2480 MHz		2.92 ms	3.75 ms	1	77.9	N/A	N/A
High Channel, 2480 MHz		N/A	N/A	5	N/A	N/A	N/A

# DUTY CYCLE

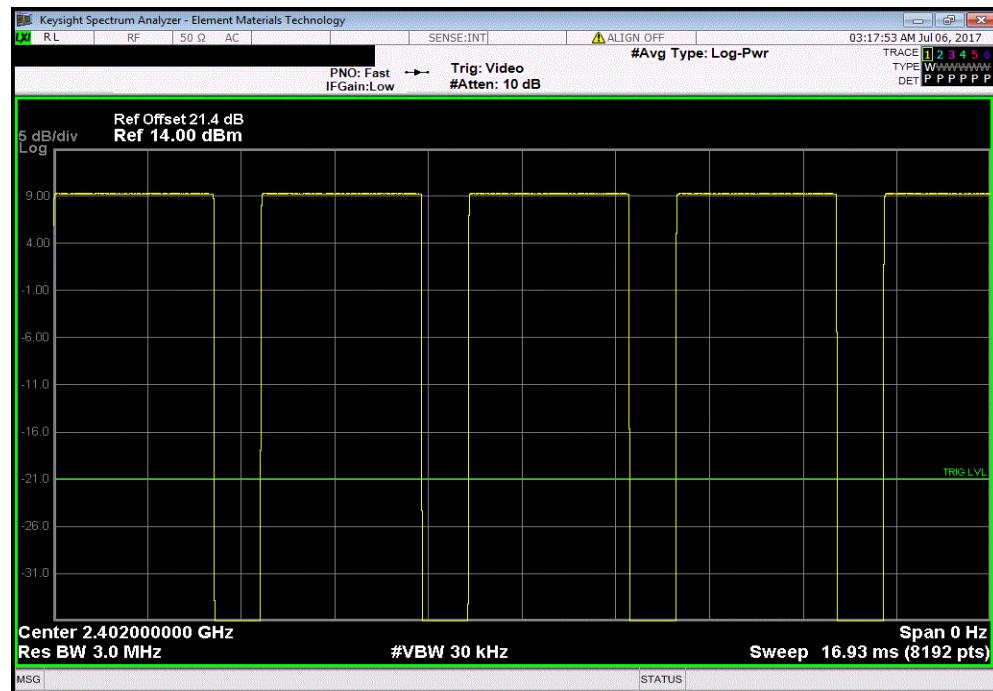


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Source, DH5, GFSK, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.909 ms	3.75 ms	1	77.6	N/A	N/A



Source, DH5, GFSK, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

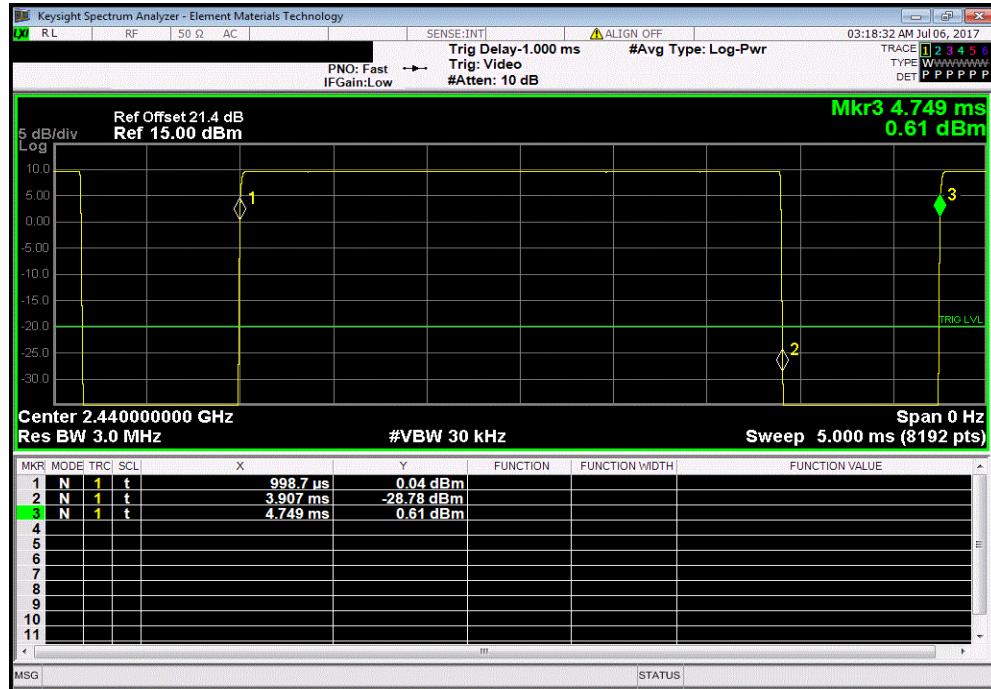


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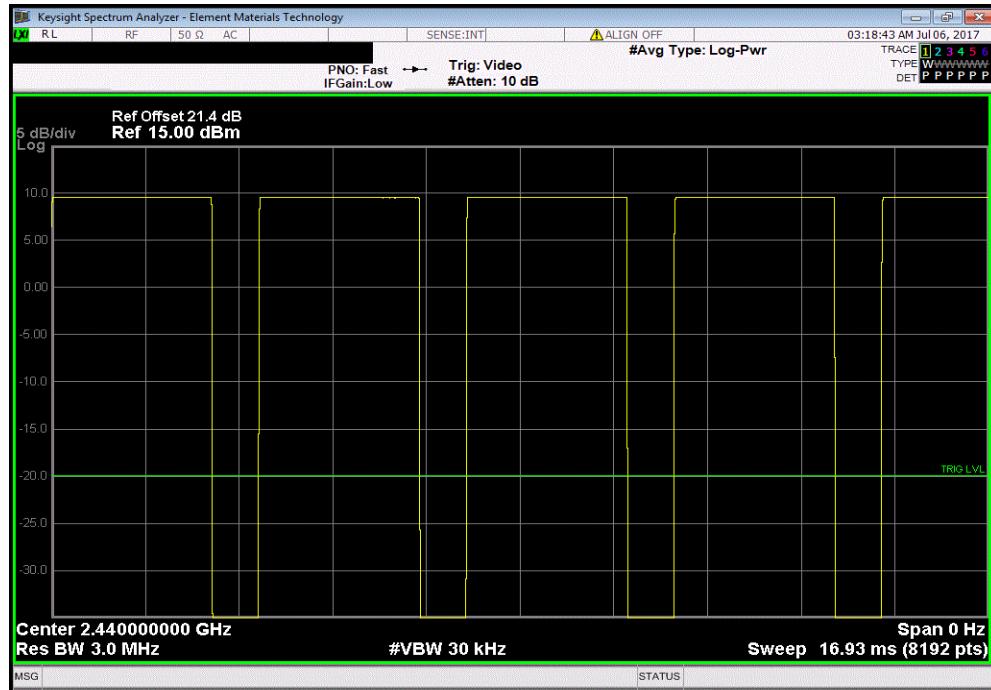


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Source, DH5, GFSK, Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.908 ms	3.75 ms	1	77.5	N/A	N/A



Source, DH5, GFSK, Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

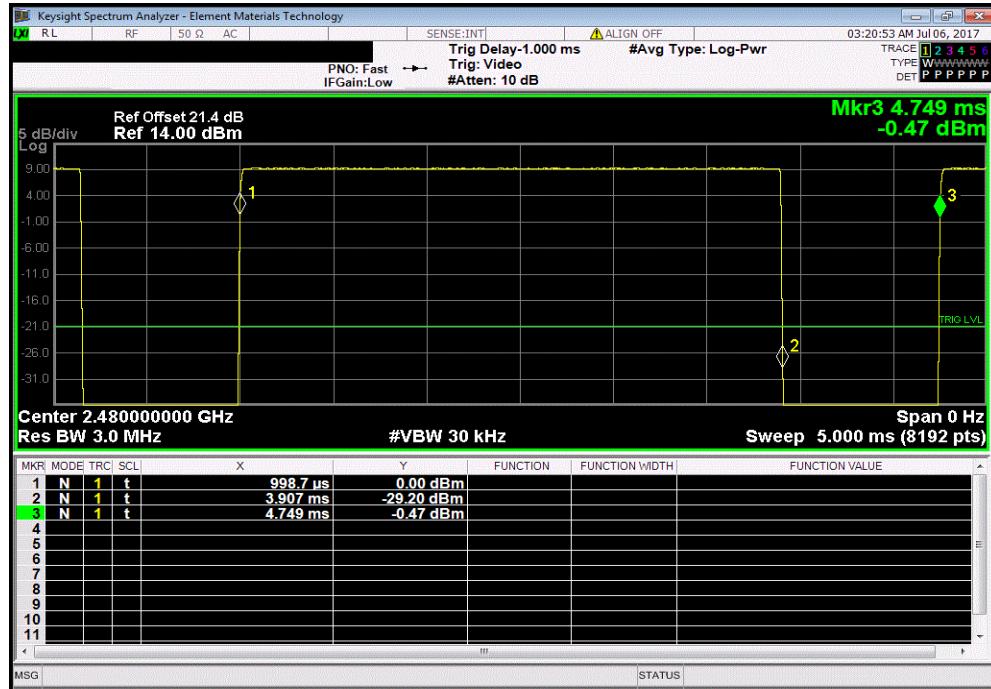


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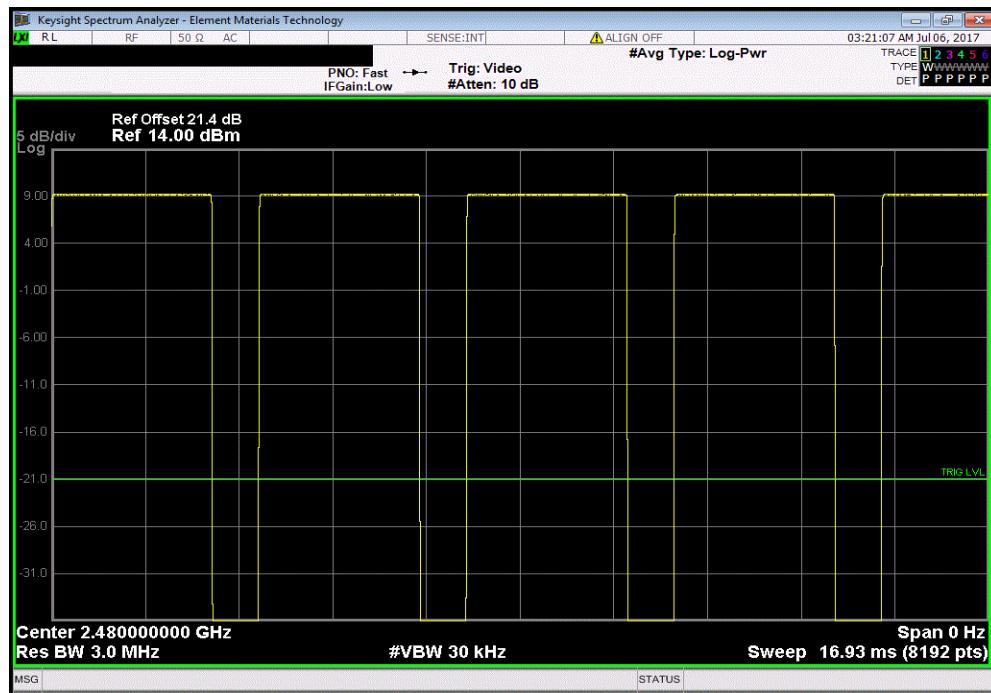


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Source, DH5, GFSK, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.908 ms	3.75 ms	1	77.6	N/A	N/A



Source, DH5, GFSK, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



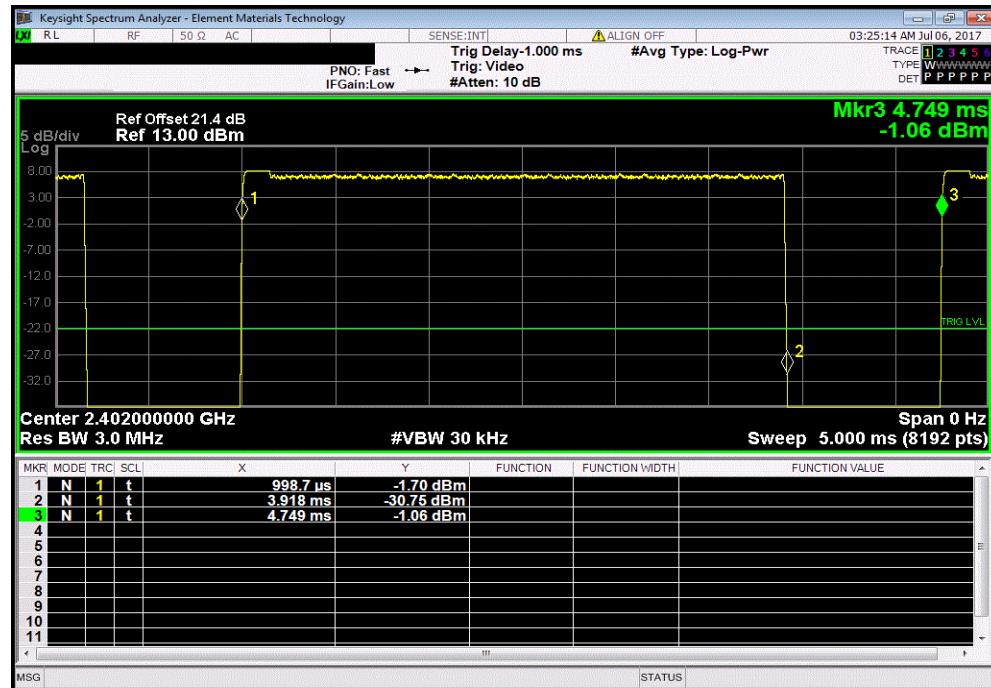
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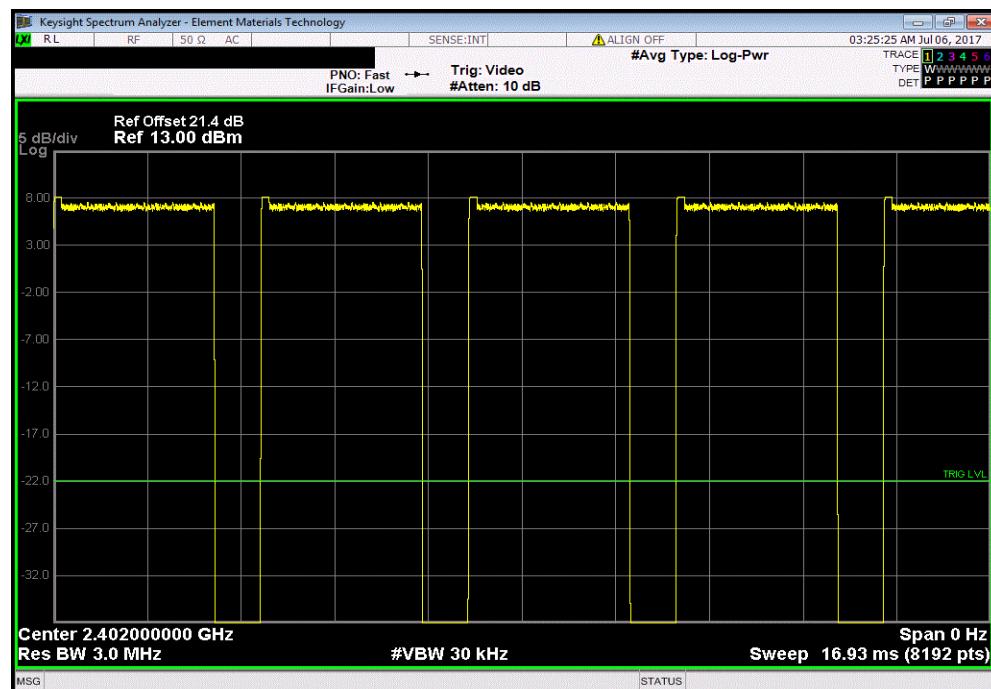
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Source, 2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.919 ms	3.75 ms	1	77.8	N/A	N/A	



Source, 2DH5, pi/4-DQPSK, Low Channel, 2402 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	N/A

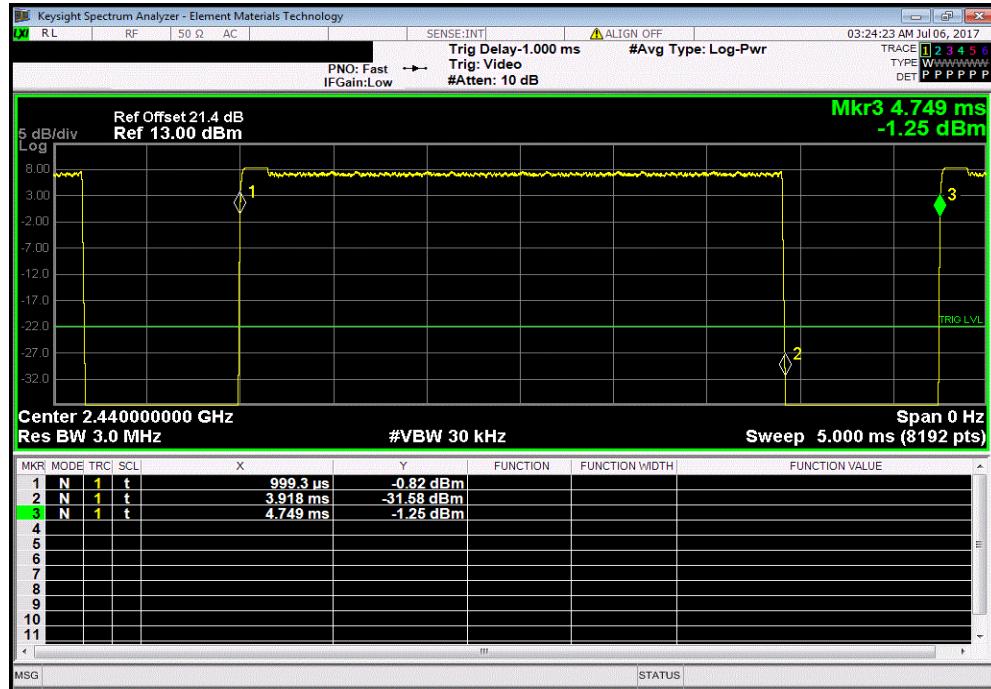


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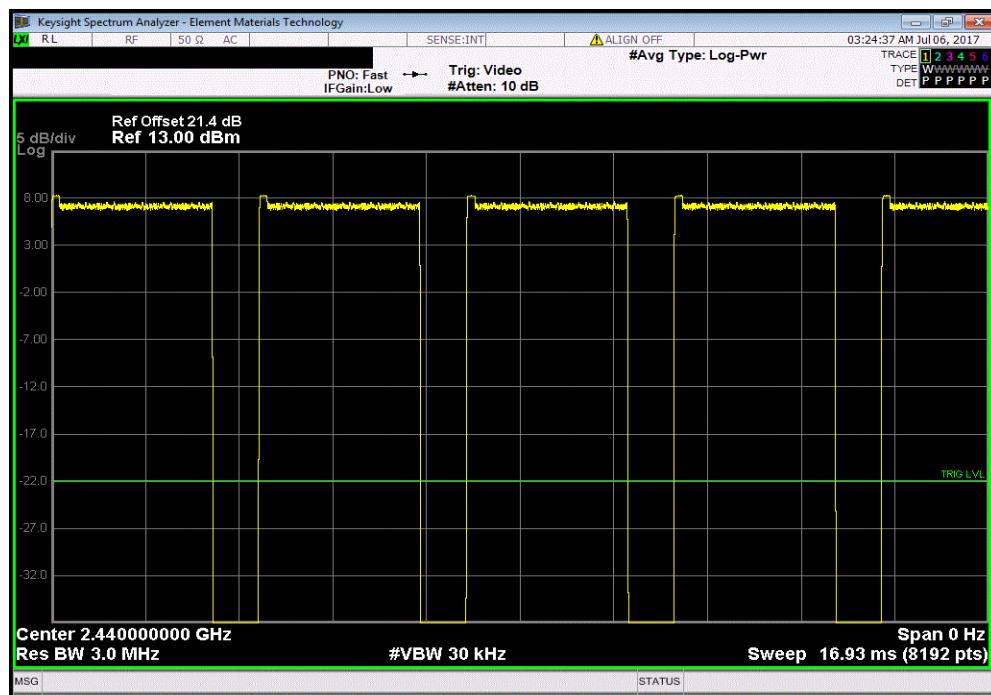


TbTx 2017.04.18 XM1 2017.02.08

Source, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.919 ms	3.75 ms	1	77.8	N/A	N/A



Source, 2DH5, pi/4-DQPSK, Mid Channel, 2440 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



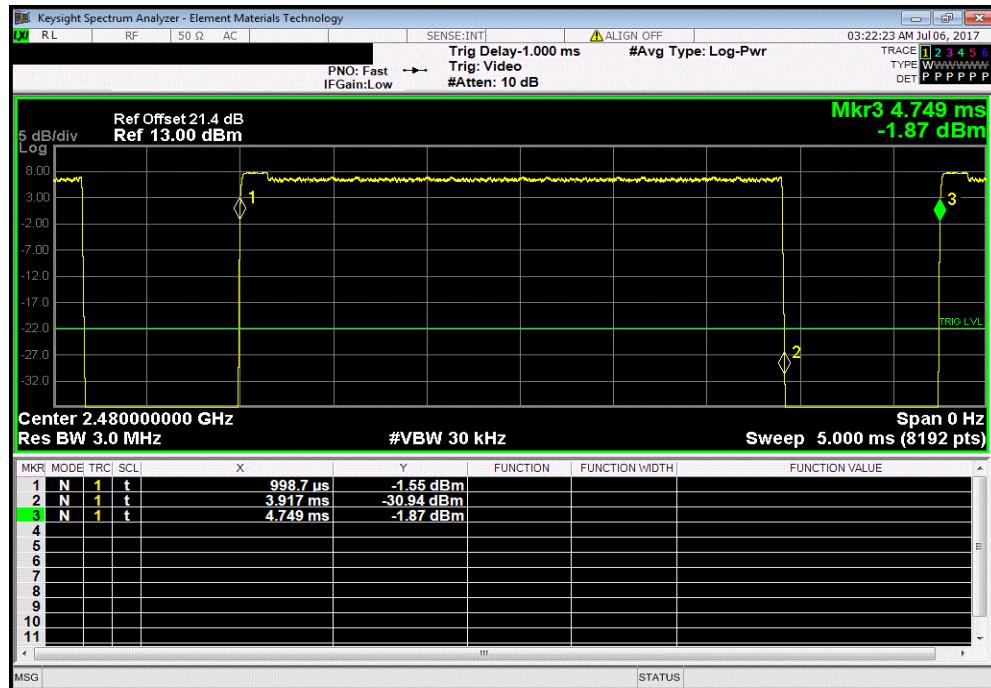
## DUTY CYCLE



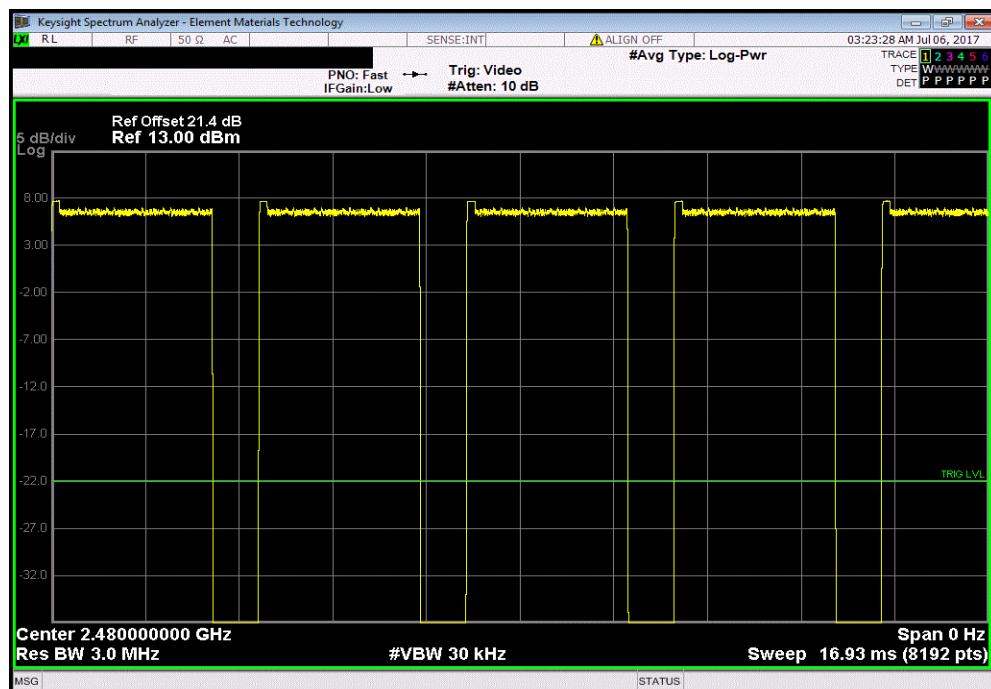
TbtTx 2017.04.18

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Source, 2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
2.918 ms	3.75 ms	1	77.8	N/A	N/A	



Source, 2DH5, pi/4-DQPSK, High Channel, 2480 MHz						
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results	
N/A	N/A	5	N/A	N/A	N/A	N/A

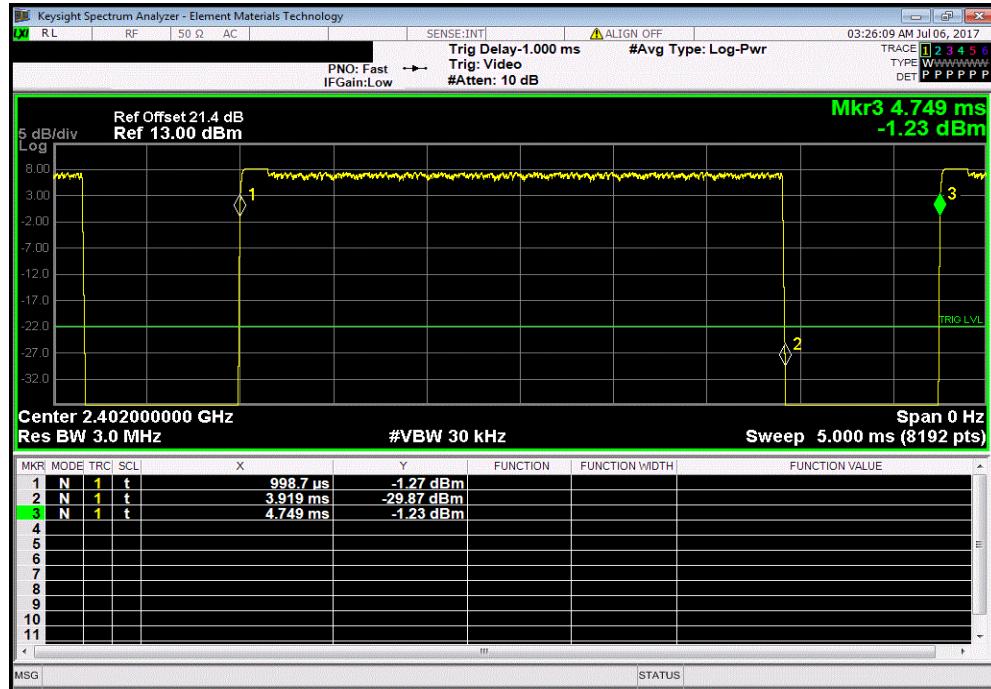


# DUTY CYCLE

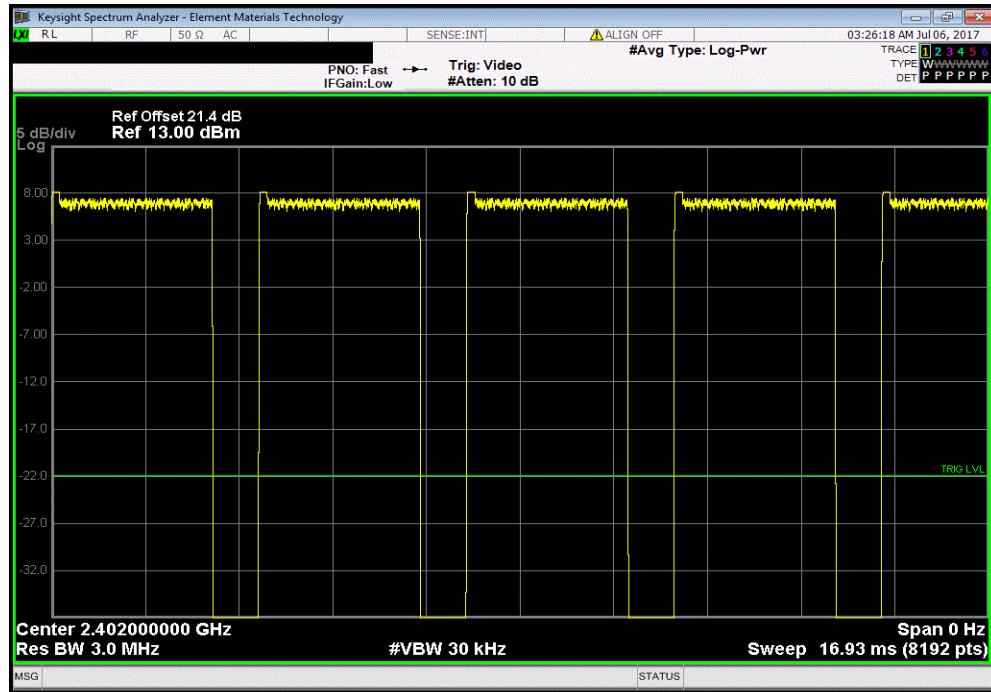


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Source, 3DH5, 8-DPSK, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.92 ms	3.75 ms	1	77.9	N/A	N/A



Source, 3DH5, 8-DPSK, Low Channel, 2402 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A

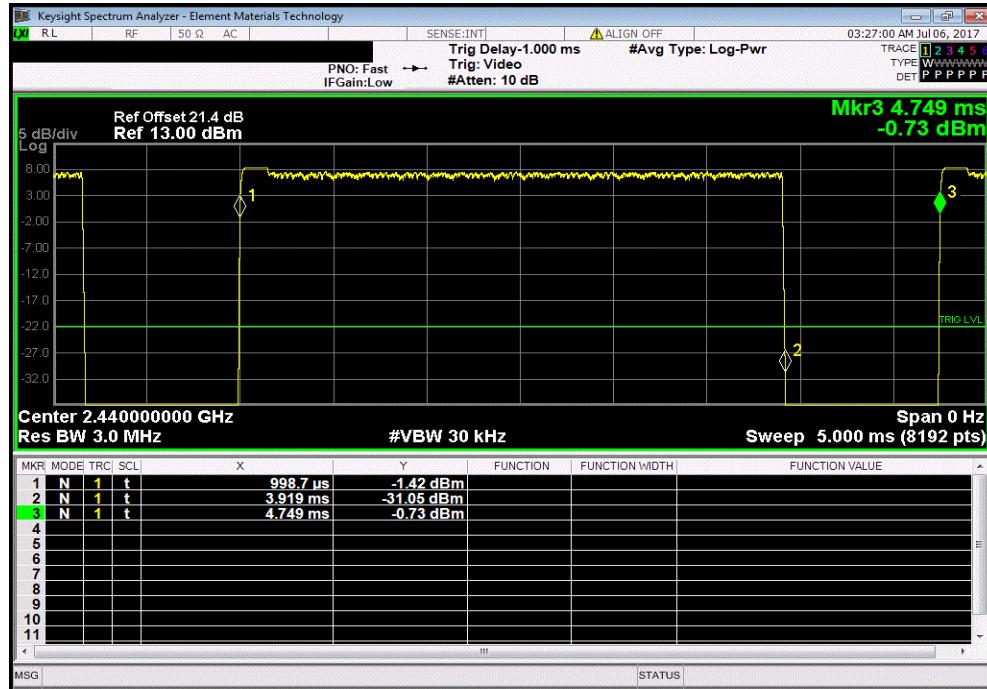


# DUTY CYCLE

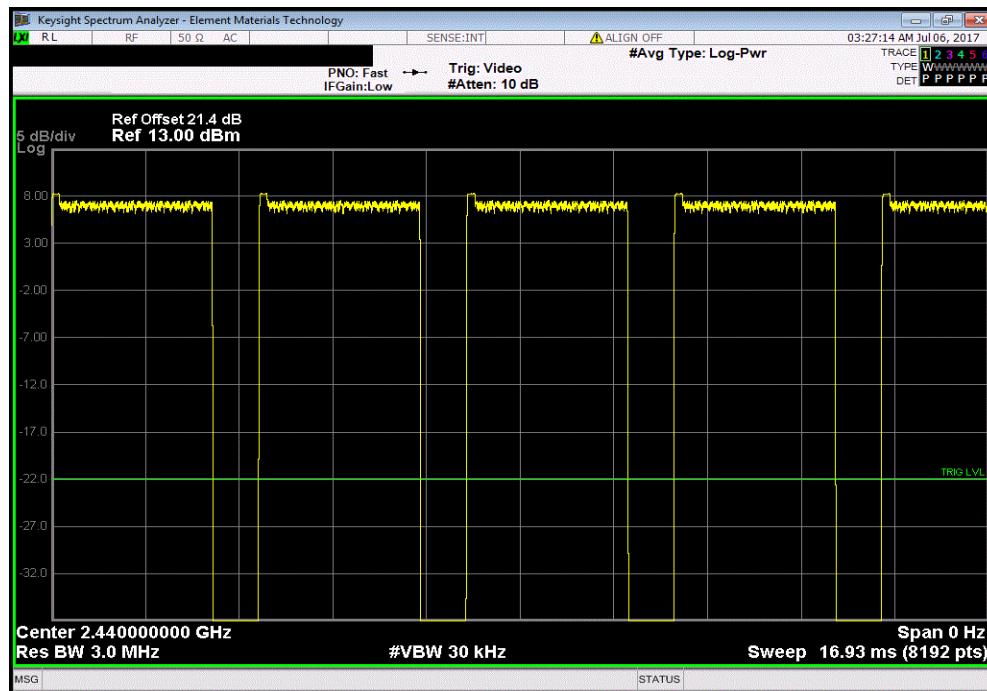


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Source, 3DH5, 8-DPSK, Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.92 ms	3.75 ms	1	77.9	N/A	N/A



Source, 3DH5, 8-DPSK, Mid Channel, 2440 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

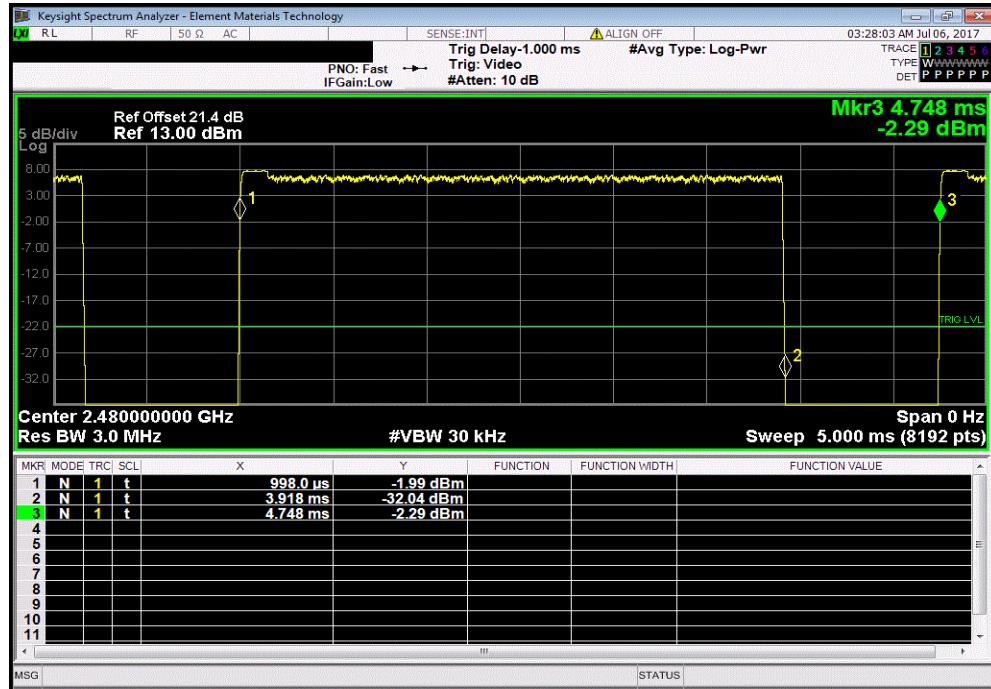


# DUTY CYCLE

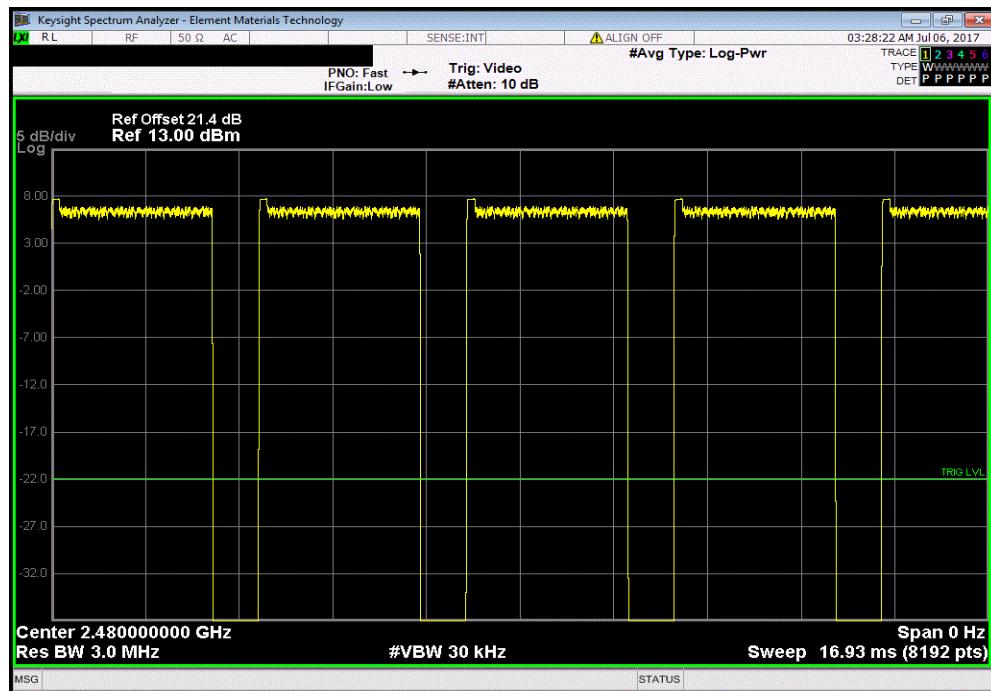


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Source, 3DH5, 8-DPSK, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
2.92 ms	3.75 ms	1	77.9	N/A	N/A



Source, 3DH5, 8-DPSK, High Channel, 2480 MHz					
Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
N/A	N/A	5	N/A	N/A	N/A



# CARRIER FREQUENCY SEPARATION



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
Block - DC	Fairview Microwave	SD3379	AMW	6/5/2017	6/5/2018
Attenuator	S.M. Electronics	SA26B-20	AUY	5/30/2017	5/30/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	5/30/2017	5/30/2018
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 channel carrier frequencies in the 2400-2483.5MHz band must be separated by 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Or, if the output power is less than 125 mW, the channel separation can be 25 kHz or 2/3 of the 20dB bandwidth. The EUT was operated in pseudorandom hopping mode. The spectrum was scanned across two adjacent peaks. The separation between the peaks of these channels was measured.

# CARRIER FREQUENCY SEPARATION



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XMI 2017.02.08

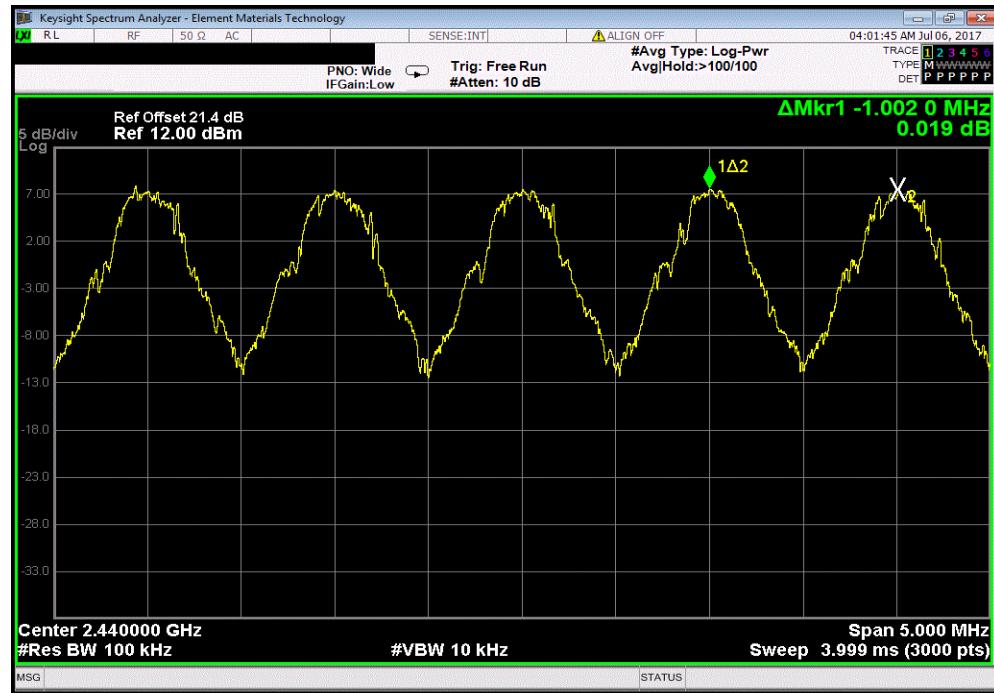
EUT:	APx 525D2	Work Order:	AUDI0246	
Serial Number:	APX2-28804	Date:	07/05/17	
Customer:	Audio Precision	Temperature:	23.3 °C	
Attendees:	None	Humidity:	45.2% RH	
Project:	None	Barometric Pres.:	1017 mbar	
Tested by:	Jeff Alcock and Rod Peloquin	Power:	110VAC/60Hz	
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013	
FCC 15.247:2017				
COMMENTS	BR and EDR Power settings [(Ext),(Int)]=[255,63]. Measurements were taken on the Source only. Source was shown to have highest output power.			
DEVIATIONS FROM TEST STANDARD				
None				
Configuration #	1	Signature		
Source	Hopping	Value	Limit (±)	Results
	DH5, GFSK	1.0 MHz	1 MHz	Pass
	Mid Channel			

# CARRIER FREQUENCY SEPARATION



TbTx 2017.04.18 XMII 2017.02.08

Source, Hopping, DH5, GFSK, Mid Channel			Value	Limit (≥)	Results
			1.0 MHz	1 MHz	Pass



# NUMBER OF HOPPING FREQUENCIES



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
Block - DC	Fairview Microwave	SD3379	AMW	6/5/2017	6/5/2018
Attenuator	S.M. Electronics	SA26B-20	AUY	5/30/2017	5/30/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	5/30/2017	5/30/2018
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 number of hopping frequencies was measured across the authorized band. The hopping function of the EUT was enabled.

# NUMBER OF HOPPING FREQUENCIES



TbTx 2017.04.18

XMI 2017.02.08

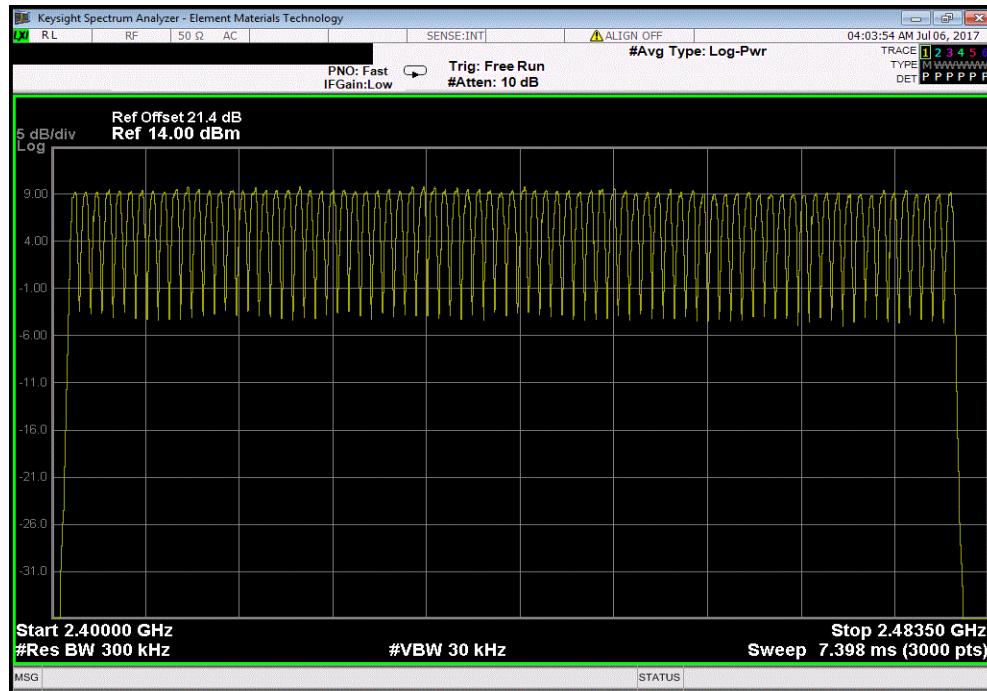
EUT:	APx 525D2	Work Order:	AUDI0246			
Serial Number:	APX2-28804	Date:	07/05/17			
Customer:	Audio Precision	Temperature:	23.4 °C			
Attendees:	None	Humidity:	45.3% RH			
Project:	None	Barometric Pres.:	1017 mbar			
Tested by:	Jeff Alcock and Rod Peloquin	Power:	110VAC/60Hz			
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013			
FCC 15.247:2017						
COMMENTS	BR and EDR Power settings [(Ext),(Int)]=[255,63]. Measurements were taken on the Source only. Source was shown to have highest output power.					
DEVIATIONS FROM TEST STANDARD						
None						
Configuration #	1	Signature				
Source	Hopping	Number of Channels	Limit (2)			
	DH5, GFSK	79	15			
	Mid Channel		Pass			

# NUMBER OF HOPPING FREQUENCIES



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Source, Hopping, DH5, GFSK, Mid Channel				Number of Channels	Limit (≥)	Results
				79	15	Pass



# DWELL TIME



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
Block - DC	Fairview Microwave	SD3379	AMW	6/5/2017	6/5/2018
Attenuator	S.M. Electronics	SA26B-20	AUY	5/30/2017	5/30/2018
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	5/30/2017	5/30/2018
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 average dwell time per hopping channel was measured at one hopping channel in the middle of the authorized band. The hopping function of the EUT was enabled.

The dwell time limit is based on the Number of Hopping Channels \* 400 mS. For Bluetooth this would be 79 Channels \* 400mS = 31.6 Sec.

On Time During 31.6 Sec = Pulse Width \* Average Number of Pulses \* Scale Factor

➤Average Number of Pulses is based on 4 samples.

➤Scale Factor = 31.6 Sec / Screen Capture Sweep Time = 31.6 Sec / 6.32 Sec = 5

# DWELL TIME



TbTx 2017.04.18

XMI 2017.02.08

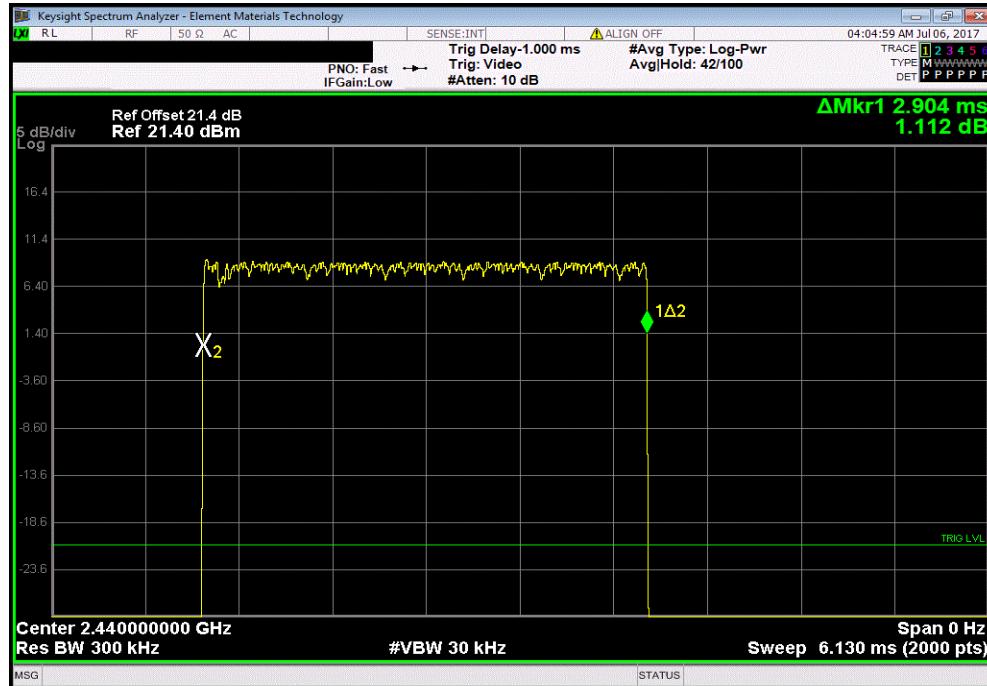
EUT:	APx 525D2	Work Order:	AUDI0246					
Serial Number:	APX2-28804	Date:	07/05/17					
Customer:	Audio Precision	Temperature:	23.3 °C					
Attendees:	None	Humidity:	45.3% RH					
Project:	None	Barometric Pres.:	1017 mbar					
Tested by:	Jeff Alcock and Rod Peloquin	Power:	110VAC/60Hz					
TEST SPECIFICATIONS		Test Method	ANSI C63.10:2013					
FCC 15.247:2017								
COMMENTS								
BR and EDR Power settings [(Ext),(Int)]=[255,63]. Measurements were taken on the Source only. Source was shown to have highest output power.								
DEVIATIONS FROM TEST STANDARD								
None								
Configuration #	1	Signature						
Source	Hopping	DH5, GFSK						
		Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
		Mid Channel	2.904	N/A	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	2.904	N/A	22	5	319.44	400
		2DH5, pi/4-DQPSK	2.913	N/A	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	2.913	N/A	22	5	320.43	400
		3DH5, 8-DPSK	2.913	N/A	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	N/A	22	N/A	N/A	N/A	N/A
		Mid Channel	2.913	N/A	22	5	320.43	400

# DWELL TIME

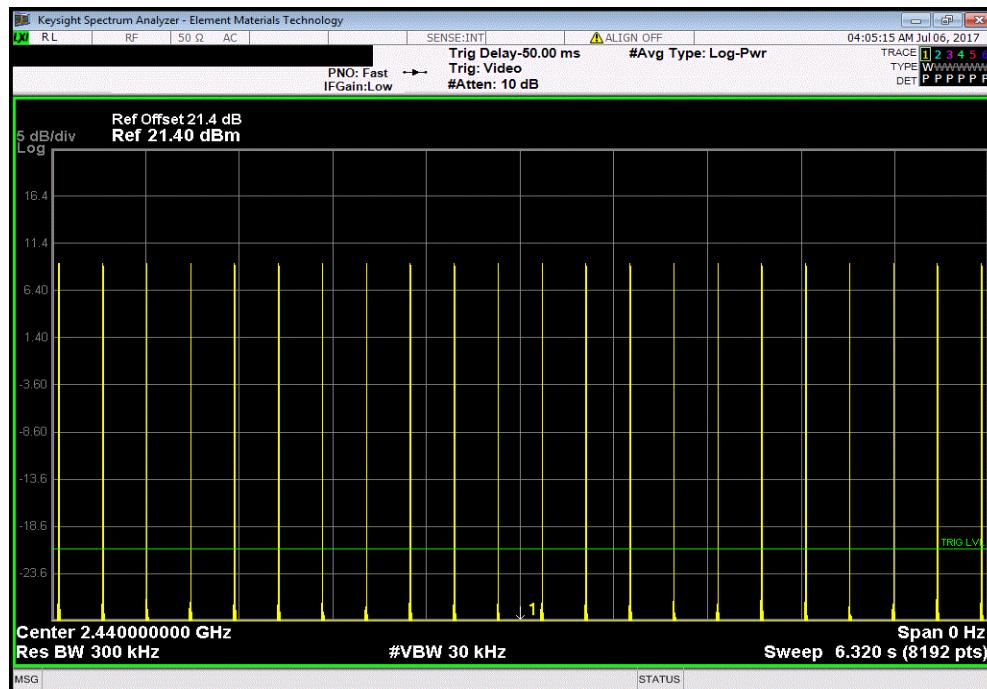


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Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.904	N/A	N/A	N/A	N/A	N/A	N/A



Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

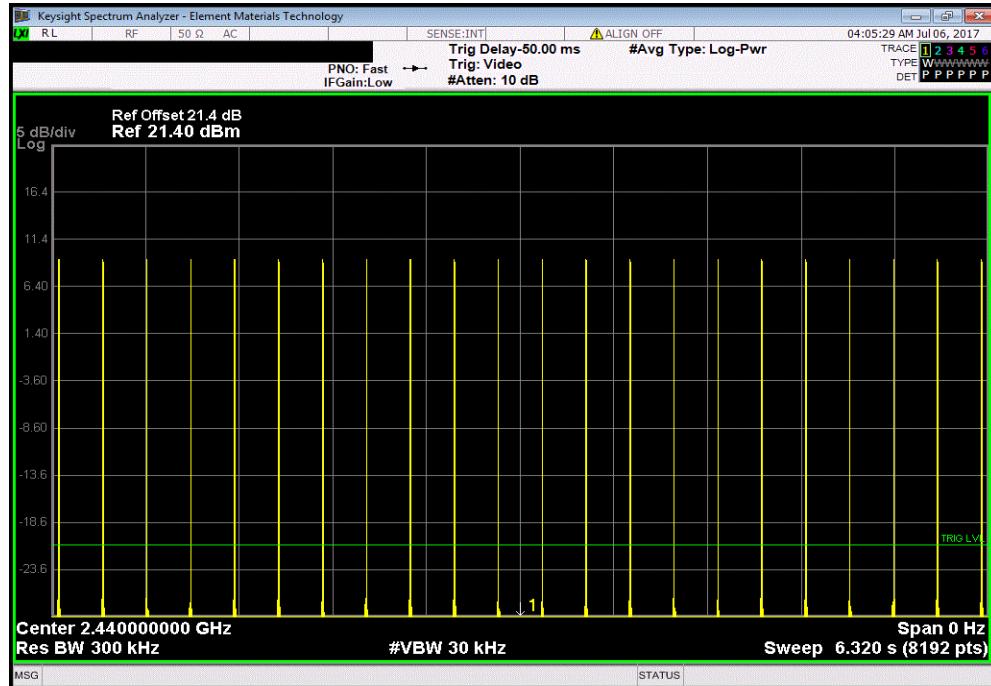


# DWELL TIME

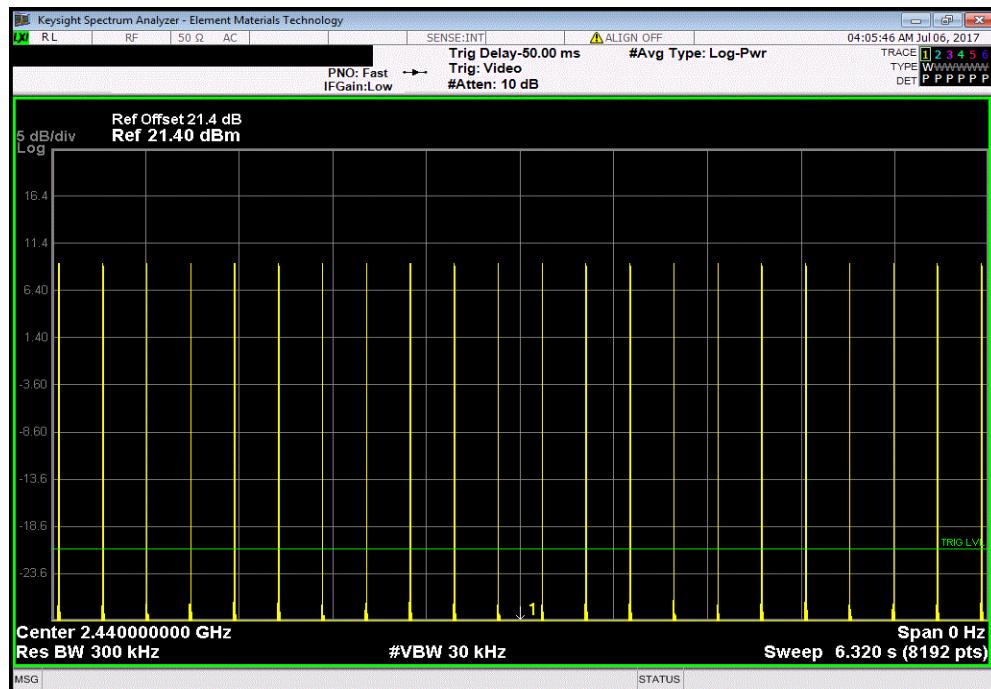


TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

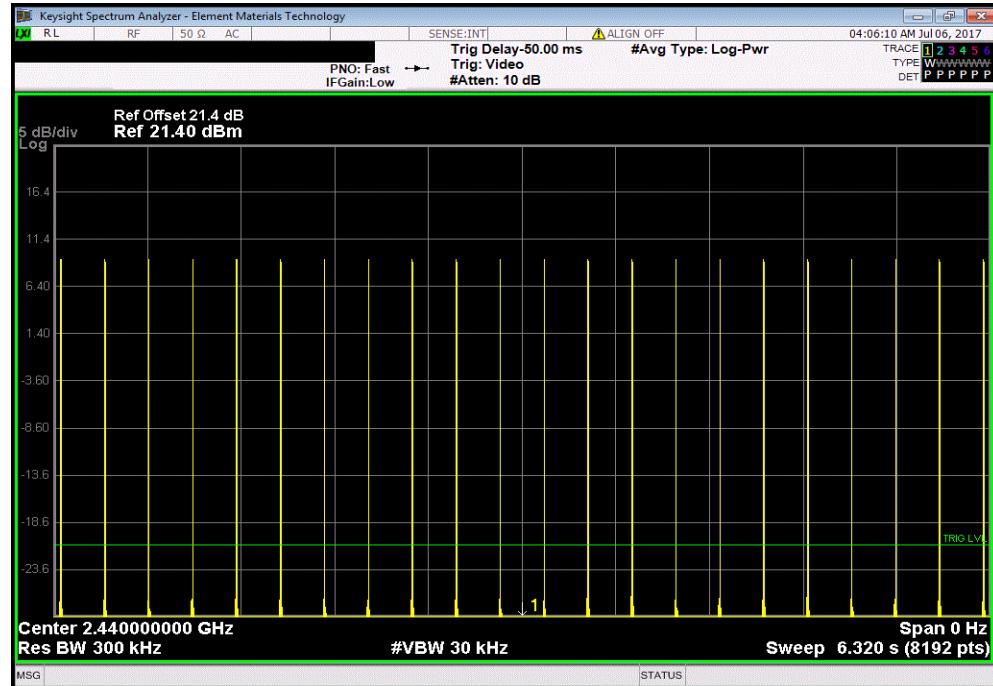


# DWELL TIME



TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, DH5, GFSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.904	N/A	22	5	319.44	400	Pass

Calculation Only

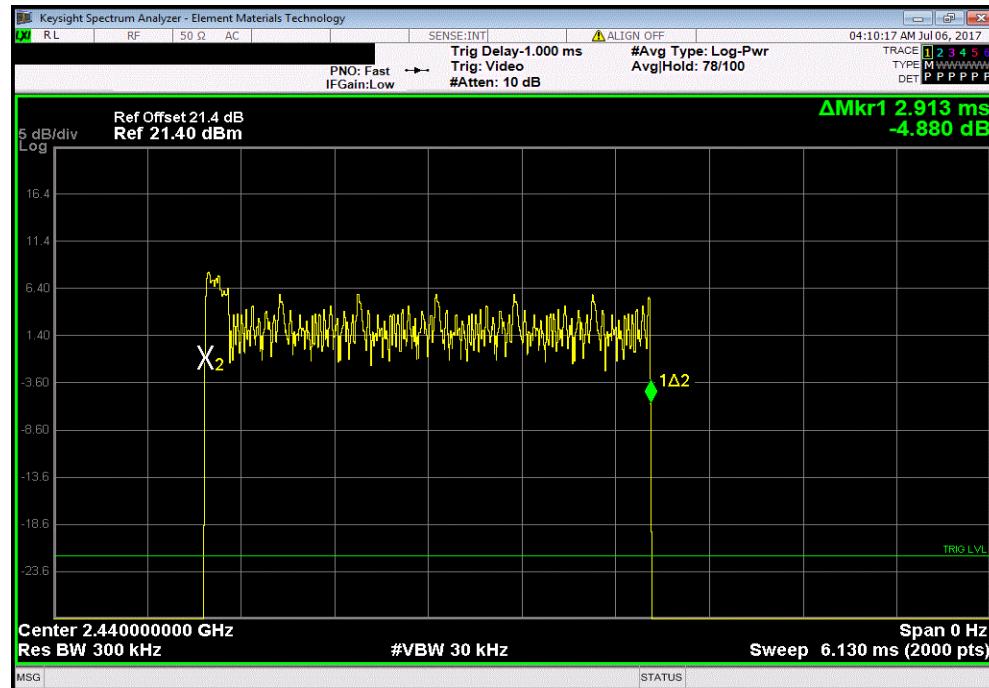
No Screen Capture Required

# DWELL TIME

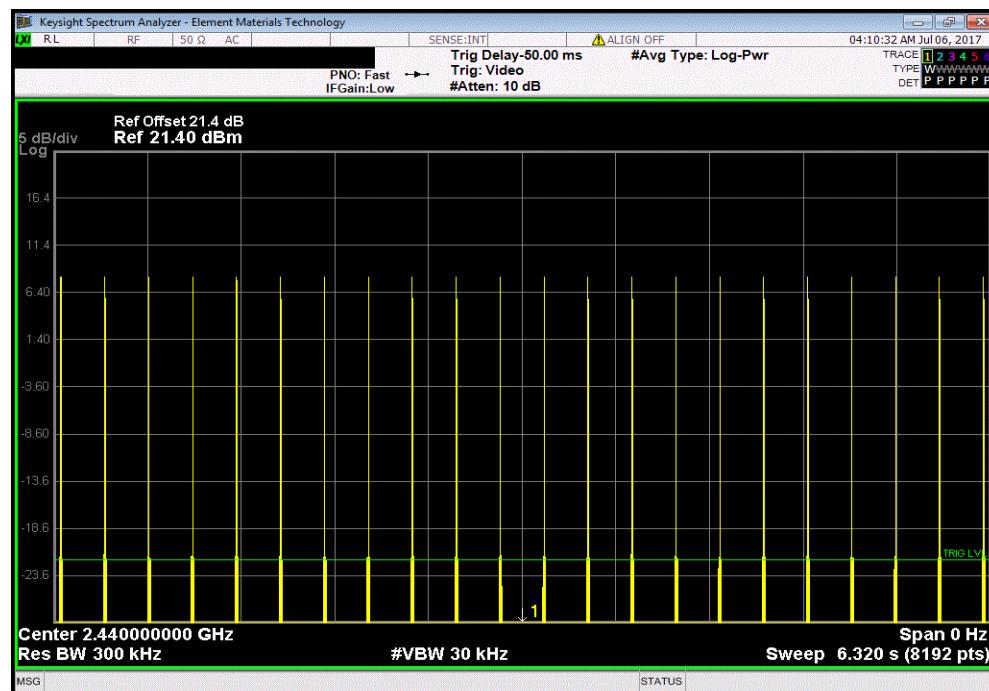


TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.913	N/A	N/A	N/A	N/A	N/A	N/A



Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

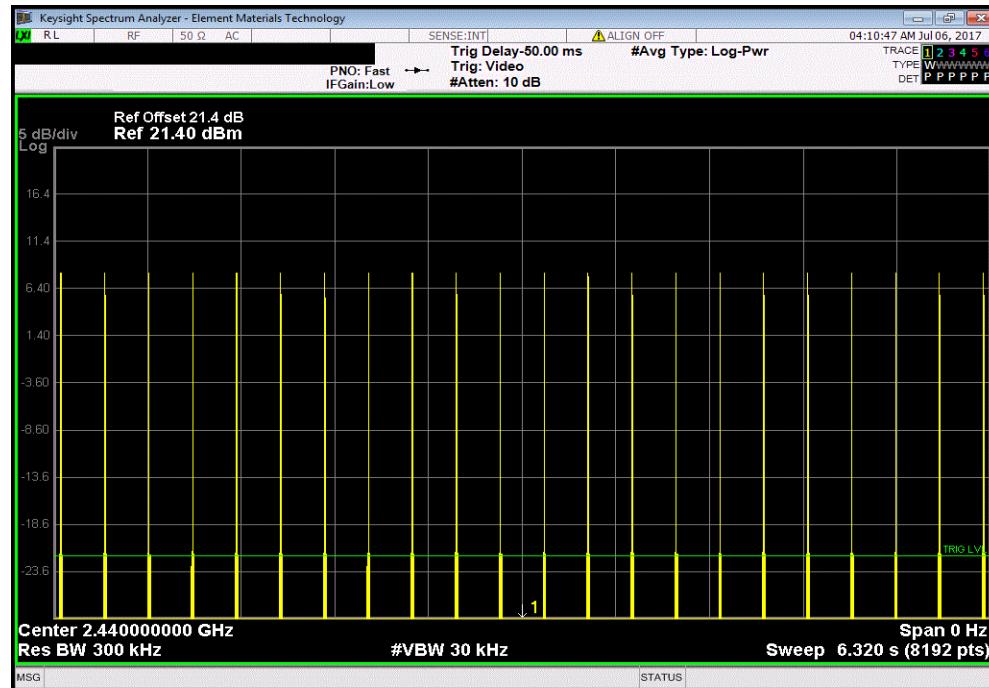


# DWELL TIME

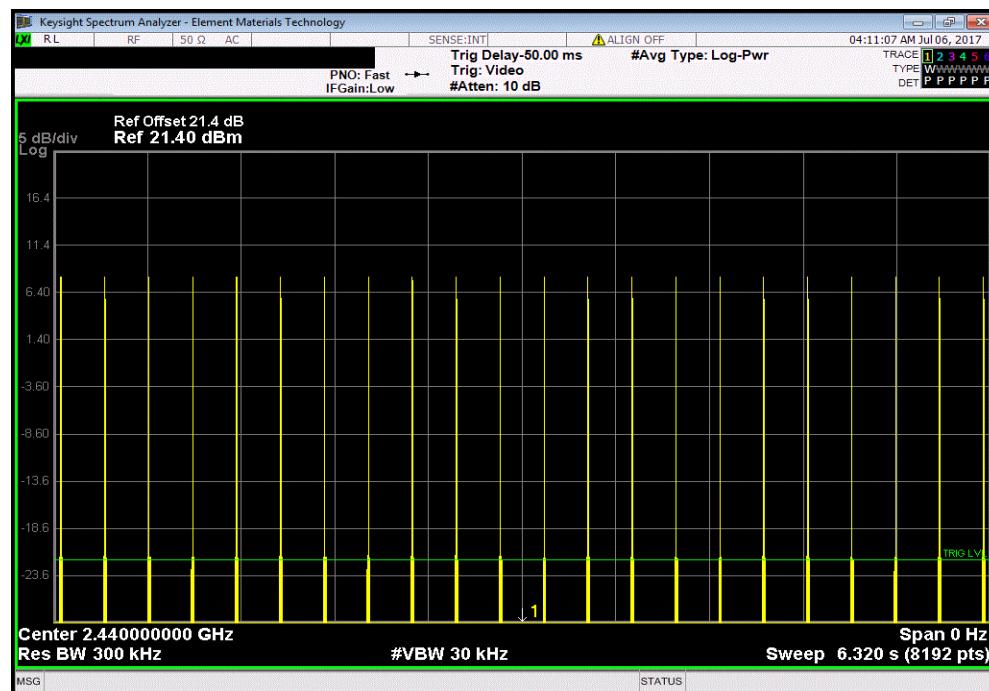


TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

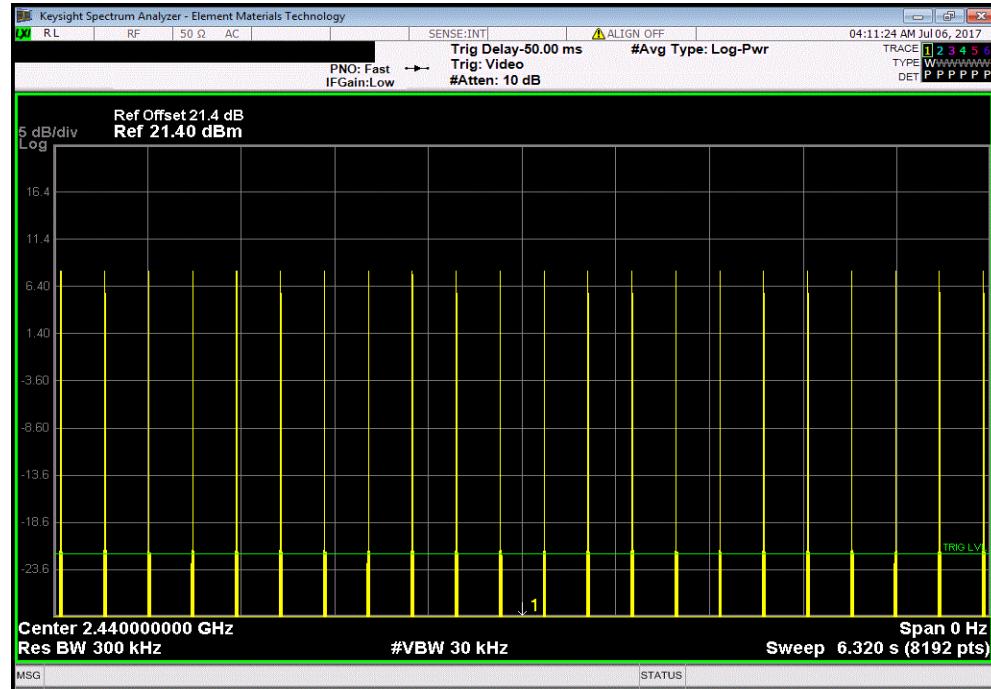


# DWELL TIME



TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, 2DH5, pi/4-DQPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.913	N/A	22	5	320.43	400	Pass

Calculation Only

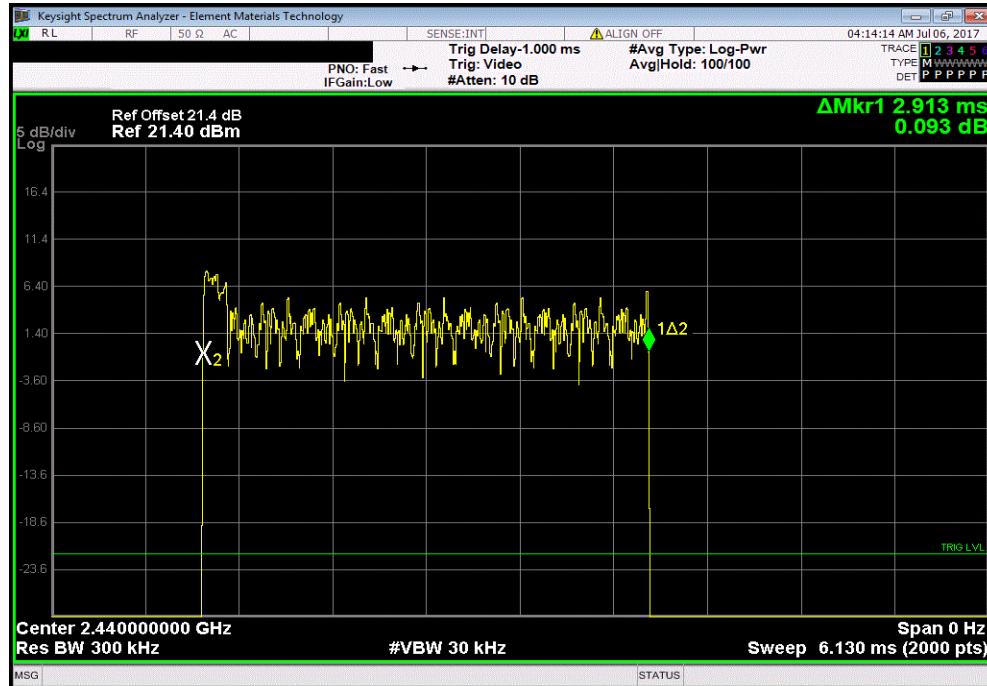
No Screen Capture Required

# DWELL TIME

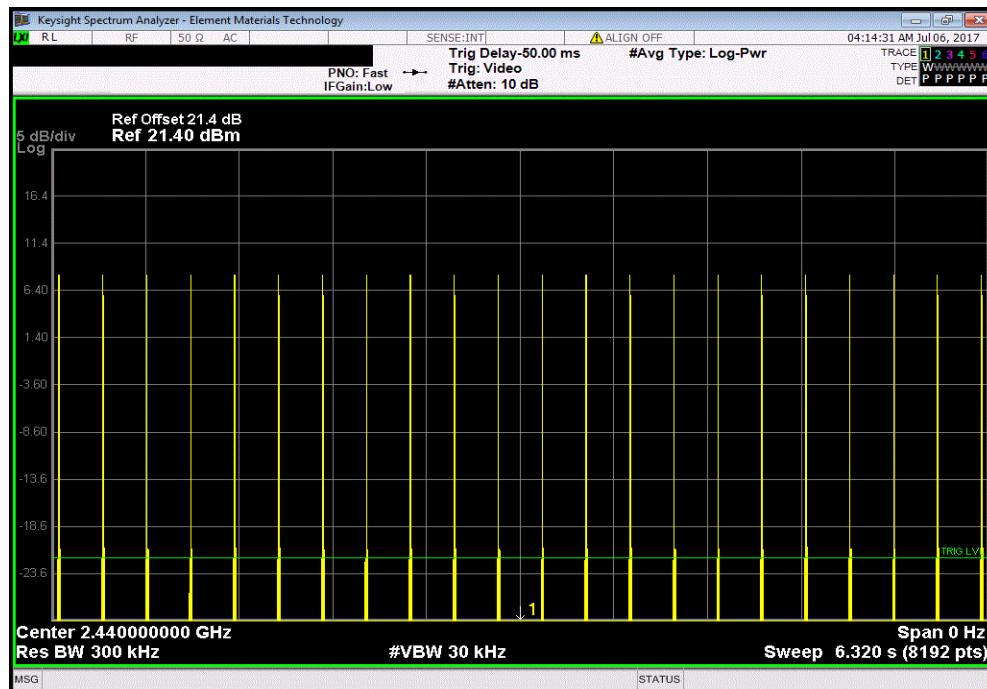


TbTx 2017.04.18 XMII 2017.02.08

Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.913	N/A	N/A	N/A	N/A	N/A	N/A



Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

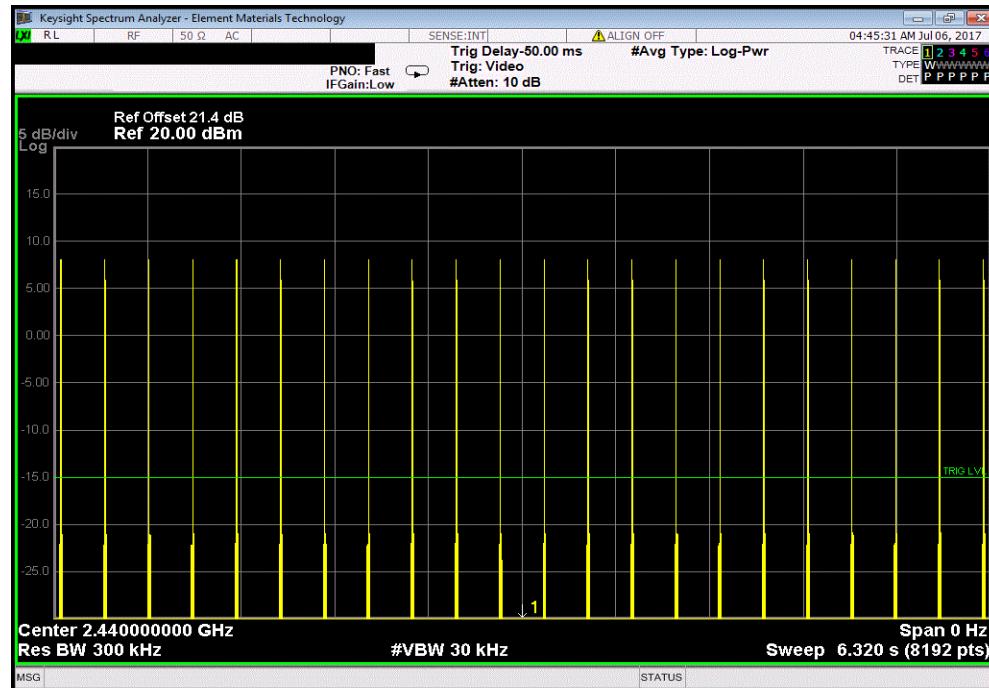


# DWELL TIME

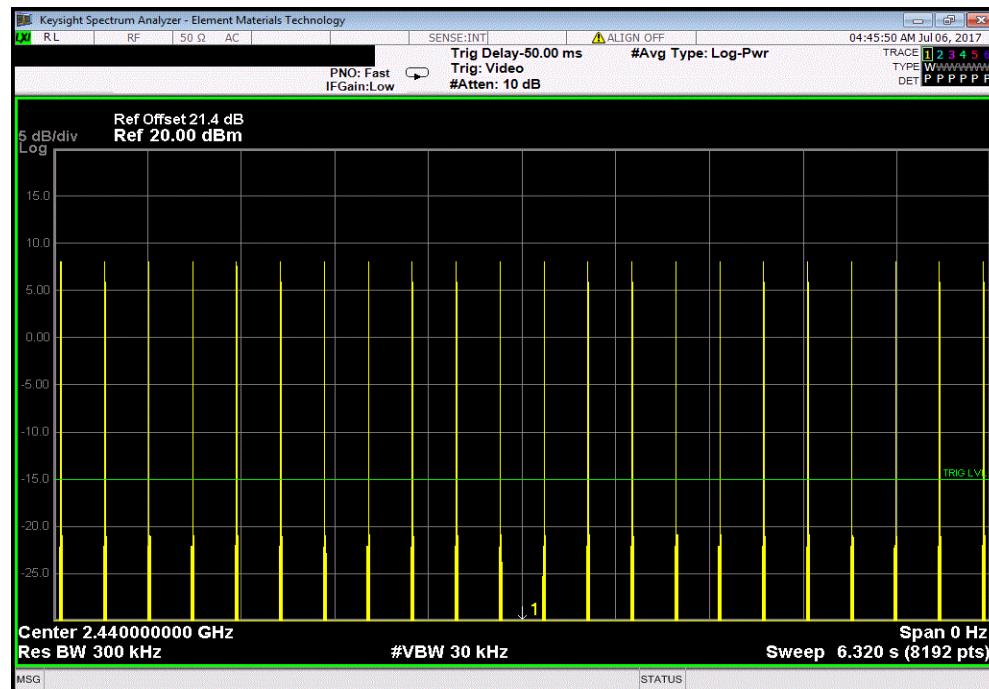


TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, 3DH5, 8-DPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, 3DH5, 8-DPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A

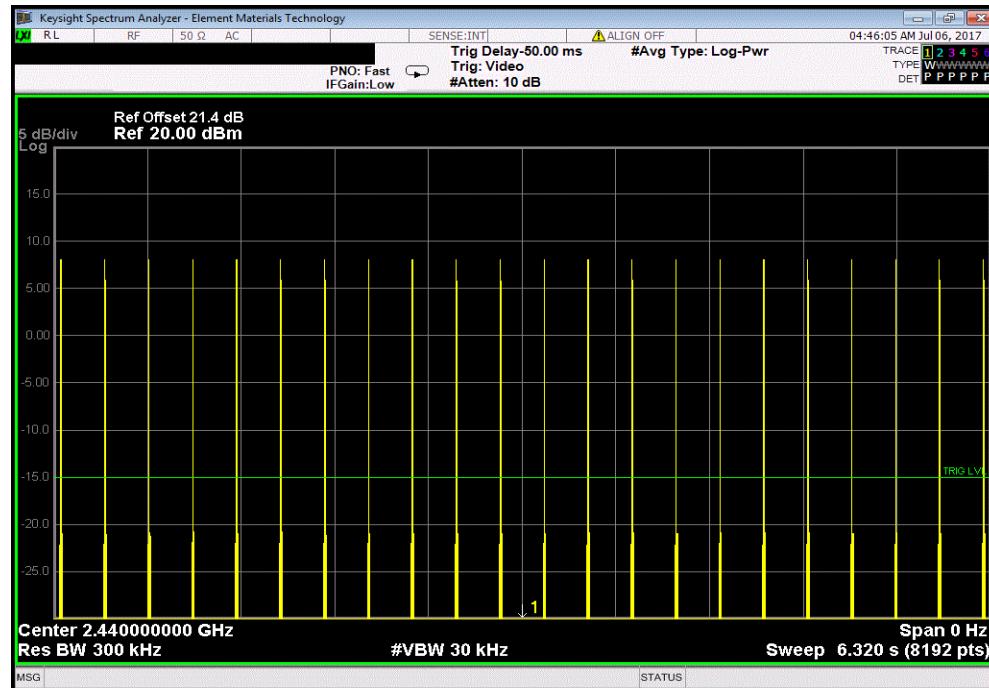


# DWELL TIME



TbTx 2017.04.18 XM1 2017.02.08

Source, Hopping, 3DH5, 8-DPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
N/A	22	N/A	N/A	N/A	N/A	N/A



Source, Hopping, 3DH5, 8-DPSK, Mid Channel						
Pulse Width (ms)	Number of Pulses	Average No. of Pulses	Scale Factor	On Time (ms) During 31.6 s	Limit (ms)	Results
2.913	N/A	22	5	320.43	400	Pass

Azul 2

Calculation Only

No Screen Capture Required