



# element

**Digi International Inc**

**XBee 3 LTE Cat 1**

**FCC 15.247:2023**

**Bluetooth LE (DTS) Radio**

**Report: DGII0455.3 Rev, 2, Issue Date: January 24, 2023**



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# CERTIFICATE OF TEST



Last Date of Test: January 16, 2023  
Digi International Inc  
EUT: XB3C2

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2023	ANSI C63.10:2013, KDB 558074

### Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.9.3	Occupied Bandwidth (99%)	Yes	Pass	
11.6	Duty Cycle	Yes	N/A	EUT operates at 100%.
11.8.2	DTS Bandwidth (6 db)	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.9.1.1	Equivalent Isotropic Radiated Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	

### Deviations From Test Standards

None

### Approved By:

James Morris, 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. As indicated in the Statement of Work sent with the quotation, Element's standard process is to always use the latest published version of the test methods even when earlier versions are cited in the test specification. Issuance of a purchase order was de facto acceptance of this approach. Otherwise, the client would have advised Element in writing of the specific version of the test methods they wanted applied to the subject testing.*

# REVISION HISTORY



<b>Revision Number</b>	<b>Description</b>	<b>Date</b> (yyyy-mm-dd)	<b>Page Number</b>
01	Correct gain value for internal PCB antenna	2022-11-11	11
02	Added new Band Edge compliance data.	2023-01-24	51-54
	Added new Spurious Conducted Emissions data.	2023-01-24	66-76
	Added configuration DGII0474-1.	2023-01-24	14
	Updated test dates.	2023-01-24	2, 10, 15
	Updated power settings table.	2023-02-01	11

# ACCREDITATIONS AND AUTHORIZATIONS



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## United States

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

**A2LA** - Each laboratory is accredited by A2LA to ISO / IEC 17025, and as a product certifier to ISO / IEC 17065 which allows Element to certify transmitters to FCC and IC specifications.

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## Canada

**ISED** - Recognized by Innovation, Science and Economic Development Canada as a Certification Body (CB) and as a CAB for the acceptance of test data.

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## European Union

**European Commission** – Recognized as an EU Notified Body validated for the EMCD and RED Directives.

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## United Kingdom

**BEIS** – Recognized by the UK as an Approved Body under the UK Radio Equipment and UK EMC Regulations.

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## Taiwan

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

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

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## SCOPE

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

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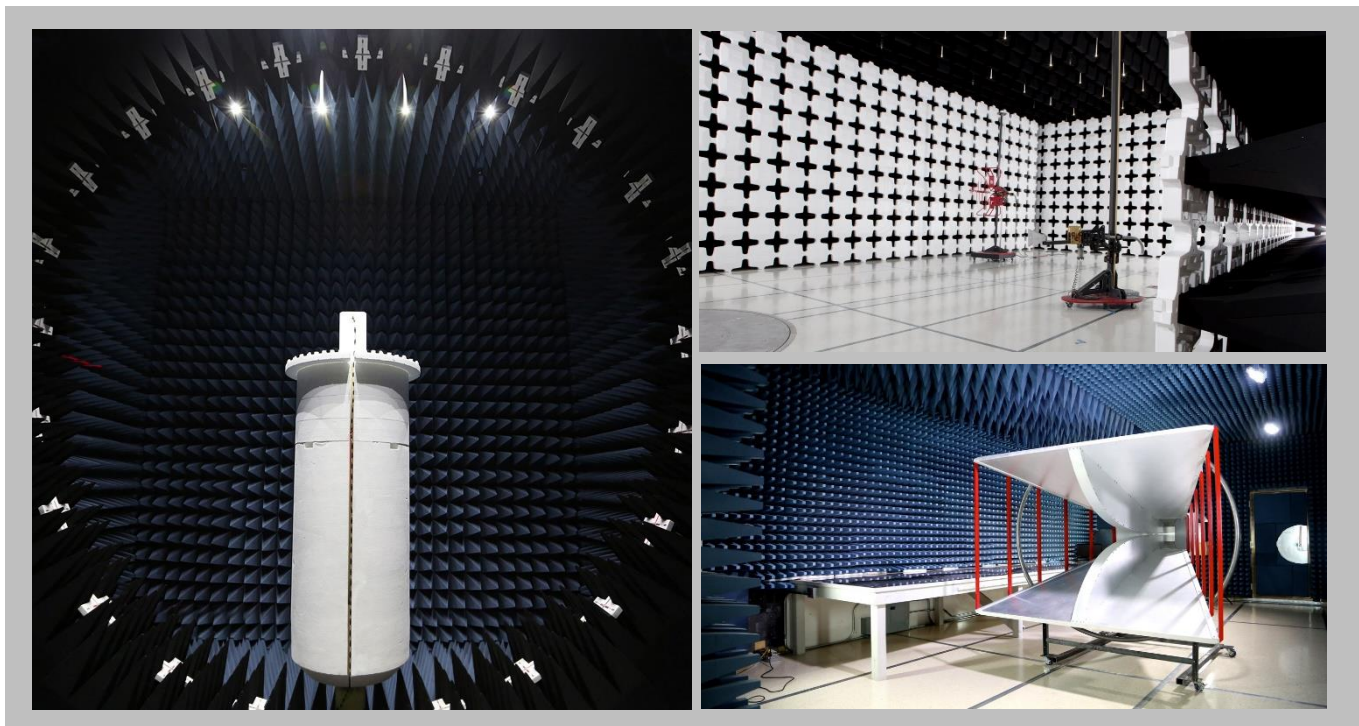
[Texas](#)

[Washington](#)

# FACILITIES



<b>California</b> Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	<b>Minnesota</b> Labs MN01-11 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	<b>Oregon</b> Labs EV01-12 6775 NE Evergreen Pkwy #400 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>A2LA</b>				
Lab Code: 3310.04	Lab Code: 3310.05	Lab Code: 3310.02	Lab Code: 3310.03	Lab Code: 3310.06
<b>Innovation, Science and Economic Development Canada</b>				
2834B-1, 2834B-3	2834E-1, 2834E-3	2834D-1	2834G-1	2834F-1
<b>BSMI</b>				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
<b>VCCI</b>				
A-0029	A-0109	A-0108	A-0201	A-0110
<b>Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA</b>				
US0158	US0175	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 in the table below. A lab specific value may also be found in the applicable test description section. 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.

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 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)	3.2 dB	-3.2 dB



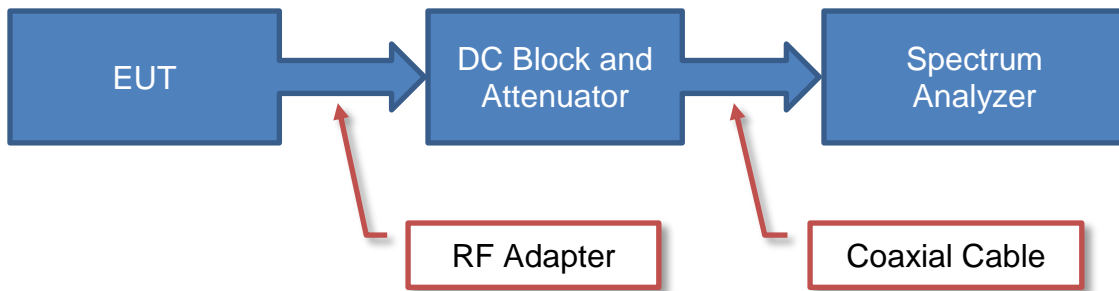
# TEST SETUP BLOCK DIAGRAMS

## Measurement Bandwidths

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

Unless otherwise stated, measurements were made using the bandwidths and detectors specified. No video filter was used.

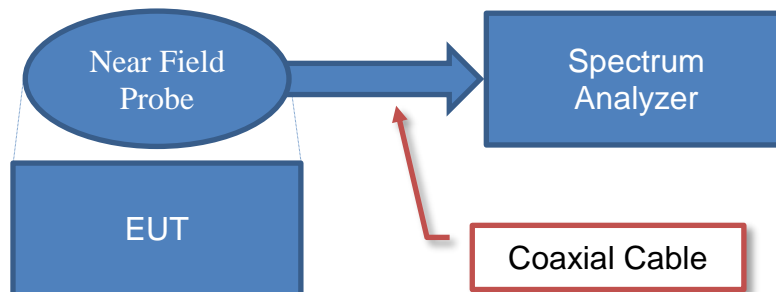
## Antenna Port Conducted Measurements



### Sample Calculation (logarithmic units)

Measured Value	=	Measured Level	+	Reference Level Offset
71.2		42.6		28.6

## Near Field Test Fixture Measurements

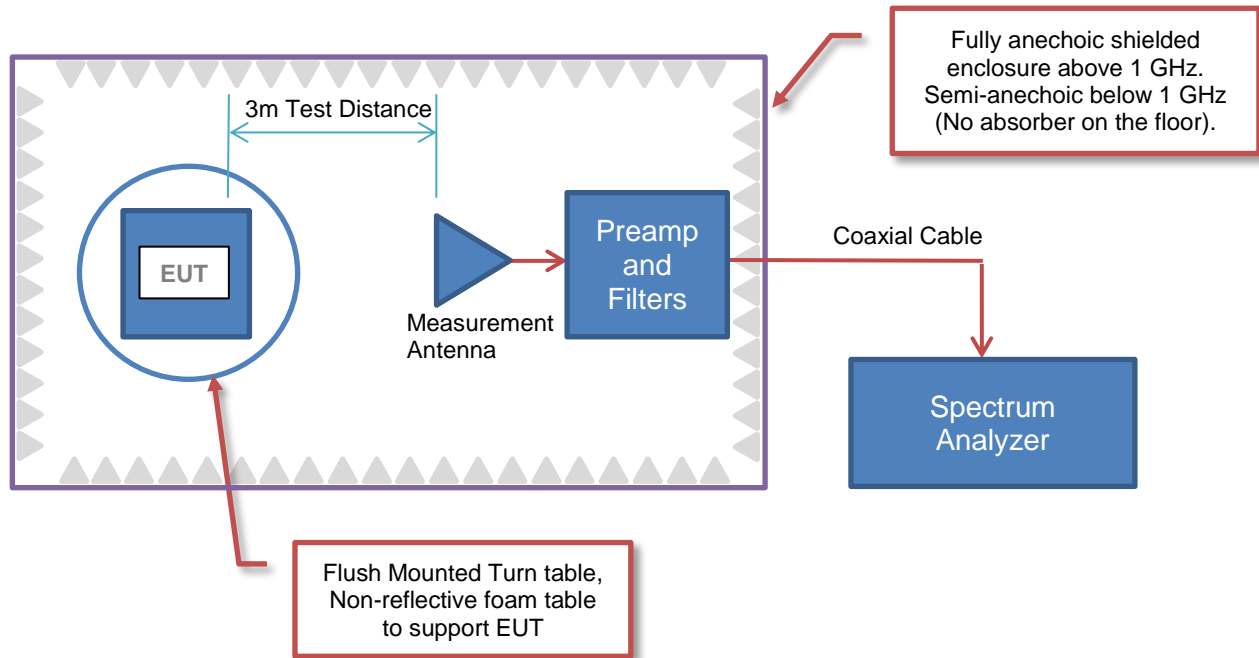


### Sample Calculation (logarithmic units)

Measured Value	=	Measured Level	+	Reference Level Offset
71.2		42.6		28.6

# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements



## Sample Calculation (logarithmic units)

### Radiated Emissions:

Measured Level (Amplitude)	Factor			Distance Adjustment Factor	External Attenuation	Field Strength
	Antenna Factor	Cable Factor	Amplifier Gain			
42.6	28.6	3.1	40.8	0.0	0.0	33.5

42.6 + 28.6 + 3.1 - 40.8 + 0.0 + 0.0 = 33.5

### Conducted Emissions:

Measured Level (Amplitude)	Factor		External Attenuation	Adjusted Level
	Transducer Factor	Cable Factor		
26.7	0.3	0.1	20.0	47.1

26.7 + 0.3 + 0.1 + 20.0 = 47.1

### Radiated Power (ERP/EIRP):

Measured Level into Substitution Antenna (Amplitude dBm)	Substitution Antenna Factor (dBi)	EIRP to ERP (if applicable)	Measured power (dBm ERP/EIRP)
10.0	6.0	2.15	13.9/16.0

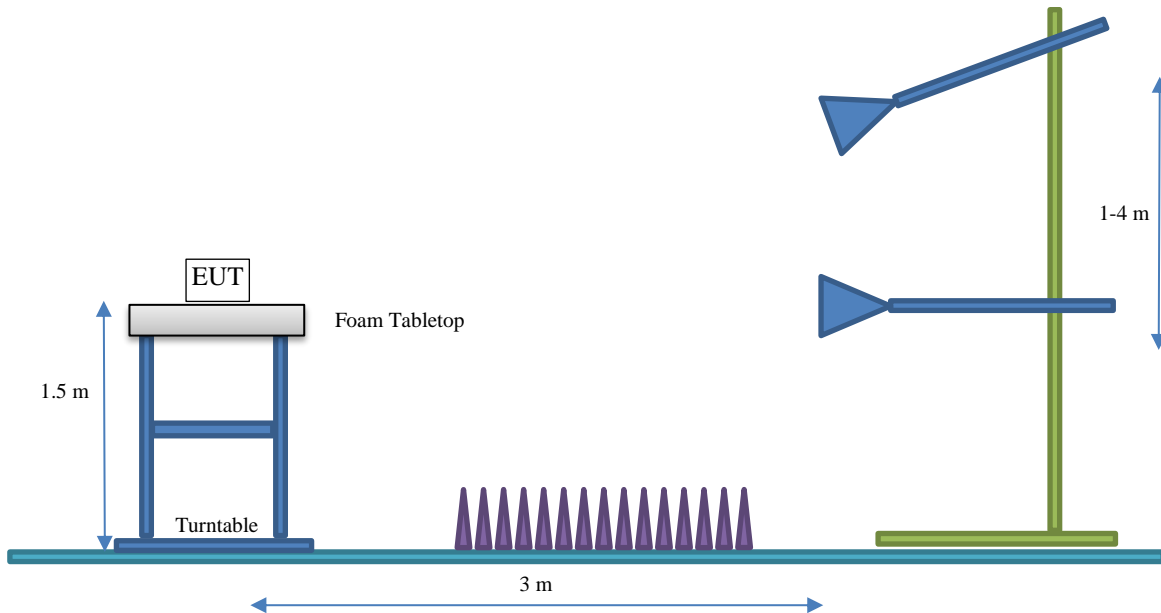
10.0 + 6.0 - 2.15 = 13.9/16.0



# TEST SETUP BLOCK DIAGRAMS

## Bore Sighting (>1GHz)

The diameter of the illumination area is the dimension of the line tangent to the EUT formed by 3 dB beamwidth of the measurement antenna at the measurement distance. At a 3 meter test distance, the diameter of the illumination area was 3.8 meters at 1 GHz and greater than 2.1 meters up to 6 GHz. Above 1 GHz, when required by the measurement standard, the antenna is pointed for both azimuth and elevation to maintain the receive antenna within the cone of radiation from the EUT. The specified measurement detectors were used for comparison of the emissions to the peak and average specification limits.



# PRODUCT DESCRIPTION

## Client and Equipment Under Test (EUT) Information

<b>Company Name:</b>	Digi International Inc
<b>Address:</b>	9350 Excelsior Blvd #700
<b>City, State, Zip:</b>	Hopkins, MN 55343
<b>Test Requested By:</b>	Bradley Ferguson
<b>EUT:</b>	BLE Radio Module
<b>First Date of Test:</b>	March 22, 2022
<b>Last Date of Test:</b>	January 16, 2023
<b>Receipt Date of Samples:</b>	March 22, 2022
<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:

Modular approval for a Bluetooth Low Energy radio with 10 dBm peak output. This product contains one of two possible modems: Thales PLS63-W (world-wide, 2G, 3G, and LTE Cat 1), FCC ID: QIPPLS63-W or Thales PLS63-G (US-only, 3G and LTE Cat 1), FCC ID: QIPPLS63-X

### Testing Objective:

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

### Client Justification:

Similar by comparison to model 55002112-02 (XBee 3 North America LTE Cat 1) as well. The difference being the cell modem, which in either case would be operating in a RX-only mode and the difference not having an appreciable effect on the measurements due to the similarity of construction—the baseband processor is identical in both modems.

# POWER SETTINGS AND ANTENNAS



The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information.

## ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
Articulated Dipole Antenna	Digi International	2400-2500	2.1
Internal PCB Antenna (ATDV1)	Digi International	2400-2500	-0.67
Flat Patch Antenna	Taoglas	2400-2500	4.0

## POWER SETTINGS

Radio	Modulation	Frequency Range (MHz)	Power Setting (dBm)
BLE (Data and Advertising)	1Mbps	2402-2480	+8, or -2 if noted in comments
BLE (Data only)	2 Mbps	2404-2478	+8, or -2 if noted in comments

# CONFIGURATIONS



## Configuration DGII0474- 1

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BLE Module	Digi International Inc	XB3C2	IMEI 354846620001279

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig	Digi International Inc	None	22090002
Laptop	HP	ZBook	01297

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB Cable	Yes	1.0 m	No	Laptop	Test Jig

## Configuration DGII0455- 3

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
XBee 3 Global LTE Cat 1	Digi International Inc	55002112-03	350588280003609
BLE Articulated Dipole Antenna	Unknown	Digi PN: A24-HASM-450	None

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig 1	Digi International Inc	None	220900001
Laptop	HP	ZBook 15u G3	5CG6223R3W
Laptop Power Supply	HP	753559-004	None
GNSS Antenna (incl. patch cable)	Molex	206560	None
Cell Antenna (incl. 15cm patch cable)	Pulse	W3554 V05	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8 m	No	Laptop Power Supply	AC Mains
DC Cable	No	1.7 m	No	Laptop Power Supply	Laptop
USB Cable 2	No	1.3 m	No	Test Jig	Laptop

# CONFIGURATIONS



## Configuration DGII0455- 4

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
XBee 3 Global LTE Cat 1	Digi International Inc	55002112-03	350588280003609
BLE Flat Patch Antenna (incl. 20cm patch cable)	Yageo	Digi PN: 29000812	None

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig 1	Digi International Inc	None	220900001
Laptop	HP	ZBook 15u G3	5CG6223R3W
Laptop Power Supply	HP	753559-004	None
GNSS Antenna (incl. patch cable)	Molex	206560	None
Cell Antenna (incl. 15cm patch cable)	Pulse	W3554 V05	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8 m	No	Laptop Power Supply	AC Mains
DC Cable	No	1.7 m	No	Laptop Power Supply	Laptop
USB Cable 2	No	1.3 m	No	Test Jig	Laptop

## Configuration DGII0455- 5

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
XBee 3 Global LTE Cat 1	Digi International Inc	55002112-03	350588280003609

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig 1	Digi International Inc	None	220900001
Laptop	HP	ZBook 15u G3	5CG6223R3W
Laptop Power Supply	HP	753559-004	None
GNSS Antenna (incl. patch cable)	Molex	206560	None
Cell Antenna (incl. 15cm patch cable)	Pulse	W3554 V05	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8 m	No	Laptop Power Supply	AC Mains
DC Cable	No	1.7 m	No	Laptop Power Supply	Laptop
USB Cable 2	No	1.3 m	No	Test Jig	Laptop

# CONFIGURATIONS



## Configuration DGII0455- 9

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
XBee 3 Global LTE Cat 1	Digi International Inc	55002112-03	350588280003609

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig 1	Digi International Inc	None	220900001
Laptop	HP	ZBook 15u G3	5CG6223R3W
Laptop Power Supply	HP	753559-004	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8 m	No	Laptop Power Supply	AC Mains
DC Cable	No	1.7 m	No	Laptop Power Supply	Laptop
USB Cable 2	No	1.3 m	No	Test Jig	Laptop

## Configuration DGII0455- 11

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
XBee 3 Global LTE Cat 1	Digi International Inc	55002112-03	350588280003609

Peripherals in Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Test Jig 1	Digi International Inc	None	220900001
Laptop	HP	ZBook 15u G3	5CG6223R3W
Laptop Power Supply	HP	753559-004	None
DC Power Supply	Agilent	U8002A	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Cable	No	1.8 m	No	Laptop Power Supply	AC Mains
DC Cable	No	1.7 m	No	Laptop Power Supply	Laptop
USB Cable 2	No	1.3 m	No	Test Jig	Laptop
AC Cable power supply	No	1.8 m	No	DC Power Supply	AC Mains
Banana cables (x2)	No	1.0 m	No	DC Power Supply	Test Jig

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2022-04-05	DTS Bandwidth (6 dB)	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	2022-04-05	Occupied Bandwidth (99%)	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	2022-04-05	Output Power	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	2022-04-05	Equivalent Isotropic Radiated 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.
5	2022-04-05	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.
6	2022-04-08	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.
7	2022-06-15	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	2023-01-16	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	2023-01-16	Spurious 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
Receiver	Gauss Instruments	TDEMI 30M	ARS	2022-04-20	2023-04-20
Cable - Conducted Cable Assembly	Northwest EMC	MNC, HGN, TYK	MNCA	2022-03-07	2023-03-07
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	2022-04-04	2023-04-04
LISN	Solar Electronics	9252-50-R-24-BNC	LIQ	2022-04-04	2023-04-04

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	3.2 dB	-3.2 dB

## CONFIGURATIONS INVESTIGATED

DGII0455-11

## MODES INVESTIGATED

Transmitting BLE Mid Ch (2442 MHz), 1 Mbps

# POWERLINE CONDUCTED EMISSIONS



EUT:	XB3C2	Work Order:	DGII0455
Serial Number:	350588280003609	Date:	2022-06-15
Customer:	Digi International Inc	Temperature:	22°C
Attendees:	None	Relative Humidity:	52.7%
Customer Project:	None	Bar. Pressure (PMSL):	1012 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0455-11

## TEST SPECIFICATIONS

Specification: Equipment Class B FCC 15.247:2022	Method: ANSI C63.10:2013
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## TEST PARAMETERS

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

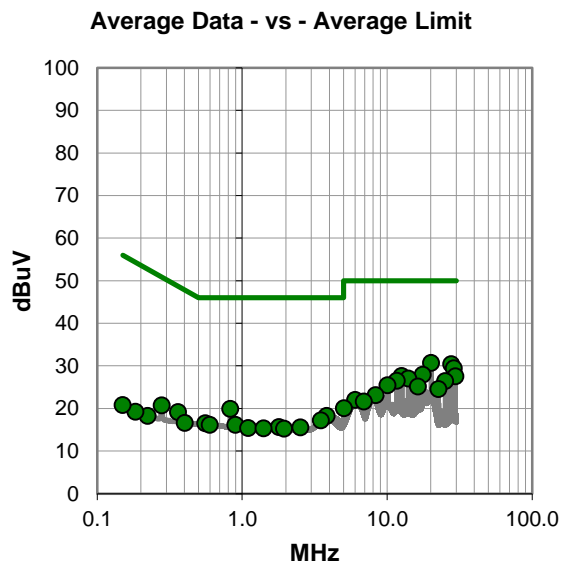
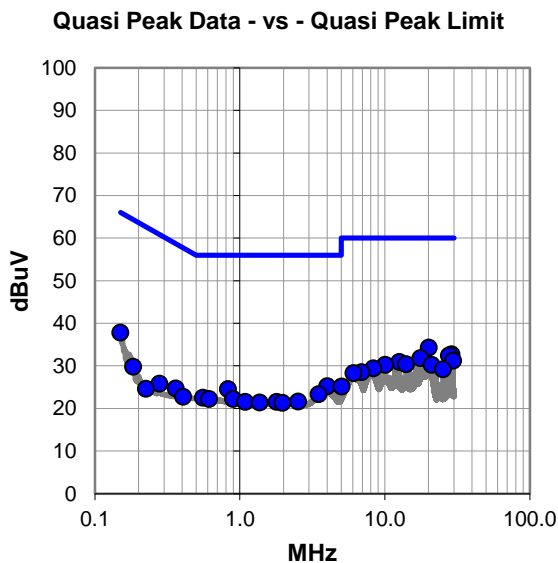
Testing on AC side of the DC power supply to the EUT (5VDC)

## EUT OPERATING MODES

Transmitting BLE Mid Ch (2442 MHz), 1 Mbps

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
20.176	12.6	21.7	34.3	60.0	-25.7
28.829	10.3	22.4	32.7	60.0	-27.3
27.743	10.0	22.4	32.4	60.0	-27.6
17.654	10.2	21.6	31.8	60.0	-28.2
0.150	17.1	20.7	37.8	66.0	-28.2
29.609	8.7	22.5	31.2	60.0	-28.8
12.610	9.5	21.4	30.9	60.0	-29.1
14.024	9.0	21.4	30.4	60.0	-29.6
10.088	9.1	21.1	30.2	60.0	-29.8
21.040	8.4	21.8	30.2	60.0	-29.8
8.347	8.5	20.9	29.4	60.0	-30.6
25.221	7.1	22.1	29.2	60.0	-30.8
4.012	4.7	20.5	25.2	56.0	-30.8
0.829	4.3	20.2	24.5	56.0	-31.5
6.905	7.8	20.7	28.5	60.0	-31.5
6.081	7.6	20.7	28.3	60.0	-31.7
3.499	2.8	20.5	23.3	56.0	-32.7
0.556	2.2	20.3	22.5	56.0	-33.5
0.612	1.9	20.3	22.2	56.0	-33.8
0.898	2.0	20.2	22.2	56.0	-33.8
0.361	4.4	20.3	24.7	58.7	-34.0
2.521	1.2	20.4	21.6	56.0	-34.4
0.184	9.3	20.5	29.8	64.3	-34.5
1.091	1.3	20.2	21.5	56.0	-34.5
1.795	1.2	20.3	21.5	56.0	-34.5

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
20.176	9.0	21.7	30.7	50.0	-19.3
27.743	8.0	22.4	30.4	50.0	-19.6
28.831	7.0	22.4	29.4	50.0	-20.6
17.654	6.3	21.6	27.9	50.0	-22.1
12.610	6.2	21.4	27.6	50.0	-22.4
29.610	5.0	22.5	27.5	50.0	-22.5
14.026	5.6	21.4	27.0	50.0	-23.0
11.688	5.1	21.4	26.5	50.0	-23.5
25.221	4.3	22.1	26.4	50.0	-23.6
10.088	4.3	21.1	25.4	50.0	-24.6
16.363	3.5	21.6	25.1	50.0	-24.9
22.596	2.6	21.9	24.5	50.0	-25.5
0.831	-0.3	20.2	19.9	46.0	-26.1
8.356	2.2	20.9	23.1	50.0	-26.9
3.833	-2.3	20.5	18.2	46.0	-27.8
6.021	1.4	20.6	22.0	50.0	-28.0
6.905	0.9	20.7	21.6	50.0	-28.4
3.499	-3.3	20.5	17.2	46.0	-28.8
0.556	-3.8	20.3	16.5	46.0	-29.5
0.361	-1.2	20.3	19.1	48.7	-29.6
0.597	-4.2	20.3	16.1	46.0	-29.9
0.898	-4.1	20.2	16.1	46.0	-29.9
5.043	-0.6	20.6	20.0	50.0	-30.0
0.278	0.4	20.3	20.7	50.9	-30.2
1.796	-4.7	20.3	15.6	46.0	-30.4

## CONCLUSION

Pass



Tested By

# POWERLINE CONDUCTED EMISSIONS



EUT:	XB3C2	Work Order:	DGII0455
Serial Number:	350588280003609	Date:	2022-06-15
Customer:	Digi International Inc	Temperature:	22°C
Attendees:	None	Relative Humidity:	52.7%
Customer Project:	None	Bar. Pressure (PMSL):	1012 mb
Tested By:	Marcelo Aguayo	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0455-11

## TEST SPECIFICATIONS

Specification: Equipment Class B FCC 15.247:2022	Method: ANSI C63.10:2013
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## TEST PARAMETERS

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

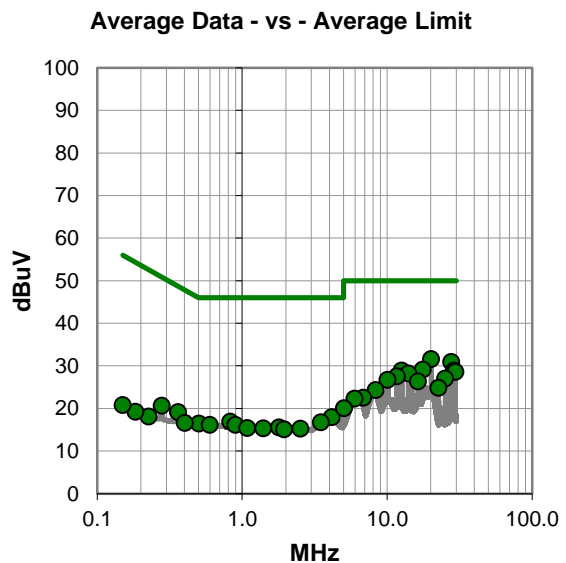
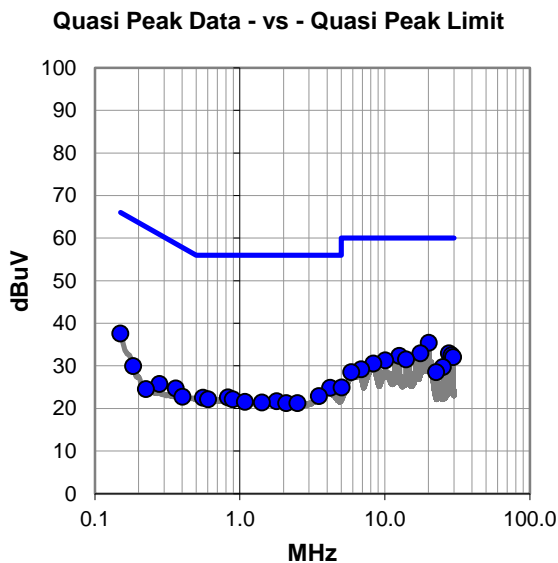
Testing on AC side of the DC power supply to the EUT (5VDC)

## EUT OPERATING MODES

Transmitting BLE Mid Ch (2442 MHz), 1 Mbps

## DEVIATIONS FROM TEST STANDARD

None



# POWERLINE CONDUCTED EMISSIONS

## RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
20.178	13.7	21.7	35.4	60.0	-24.6
17.656	11.3	21.6	32.9	60.0	-27.1
27.744	10.5	22.4	32.9	60.0	-27.1
28.829	10.1	22.4	32.5	60.0	-27.5
12.611	10.9	21.4	32.3	60.0	-27.7
29.610	9.5	22.5	32.0	60.0	-28.0
0.150	16.9	20.7	37.6	66.0	-28.4
14.026	10.1	21.4	31.5	60.0	-28.5
10.088	10.2	21.1	31.3	60.0	-28.7
8.363	9.6	20.9	30.5	60.0	-29.5
25.221	7.6	22.1	29.7	60.0	-30.3
6.889	8.5	20.7	29.2	60.0	-30.8
4.207	4.3	20.5	24.8	56.0	-31.2
22.599	6.6	21.9	28.5	60.0	-31.5
5.887	7.9	20.6	28.5	60.0	-31.5
3.507	2.4	20.5	22.9	56.0	-33.1
0.829	2.4	20.2	22.6	56.0	-33.4
0.556	2.2	20.3	22.5	56.0	-33.5
0.605	1.8	20.3	22.1	56.0	-33.9
0.896	1.9	20.2	22.1	56.0	-33.9
0.362	4.4	20.3	24.7	58.7	-34.0
1.796	1.4	20.3	21.7	56.0	-34.3
0.184	9.4	20.5	29.9	64.3	-34.4
1.082	1.3	20.2	21.5	56.0	-34.5
1.418	1.1	20.3	21.4	56.0	-34.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
20.176	9.9	21.7	31.6	50.0	-18.4
27.744	8.5	22.4	30.9	50.0	-19.1
17.654	7.5	21.6	29.1	50.0	-20.9
12.611	7.5	21.4	28.9	50.0	-21.1
28.829	6.5	22.4	28.9	50.0	-21.1
29.610	6.1	22.5	28.6	50.0	-21.4
14.026	6.8	21.4	28.2	50.0	-21.8
11.688	6.1	21.4	27.5	50.0	-22.5
25.222	4.9	22.1	27.0	50.0	-23.0
10.089	5.6	21.1	26.7	50.0	-23.3
16.363	4.7	21.6	26.3	50.0	-23.7
22.598	2.9	21.9	24.8	50.0	-25.2
8.359	3.4	20.9	24.3	50.0	-25.7
6.848	1.8	20.7	22.5	50.0	-27.5
5.951	1.7	20.6	22.3	50.0	-27.7
4.166	-2.6	20.5	17.9	46.0	-28.1
0.831	-3.3	20.2	16.9	46.0	-29.1
3.501	-3.8	20.5	16.7	46.0	-29.3
0.362	-1.2	20.3	19.1	48.7	-29.6
0.504	-3.9	20.3	16.4	46.0	-29.6
0.597	-4.2	20.3	16.1	46.0	-29.9
0.898	-4.1	20.2	16.1	46.0	-29.9
5.043	-0.6	20.6	20.0	50.0	-30.0
0.278	0.3	20.3	20.6	50.9	-30.3
1.795	-4.8	20.3	15.5	46.0	-30.5

## CONCLUSION

Pass



Tested By

# DUTY CYCLE



## TEST DESCRIPTION

---

The Duty Cycle (x) were measured for each of the EUT operating modes. 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.

The EUT operates at 100% Duty Cycle.

# DTS BANDWIDTH



element

XMIT 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## 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 DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.



# DTS BANDWIDTH



TelTx 2021.12.14.1 XMI: 2022.02.07.0

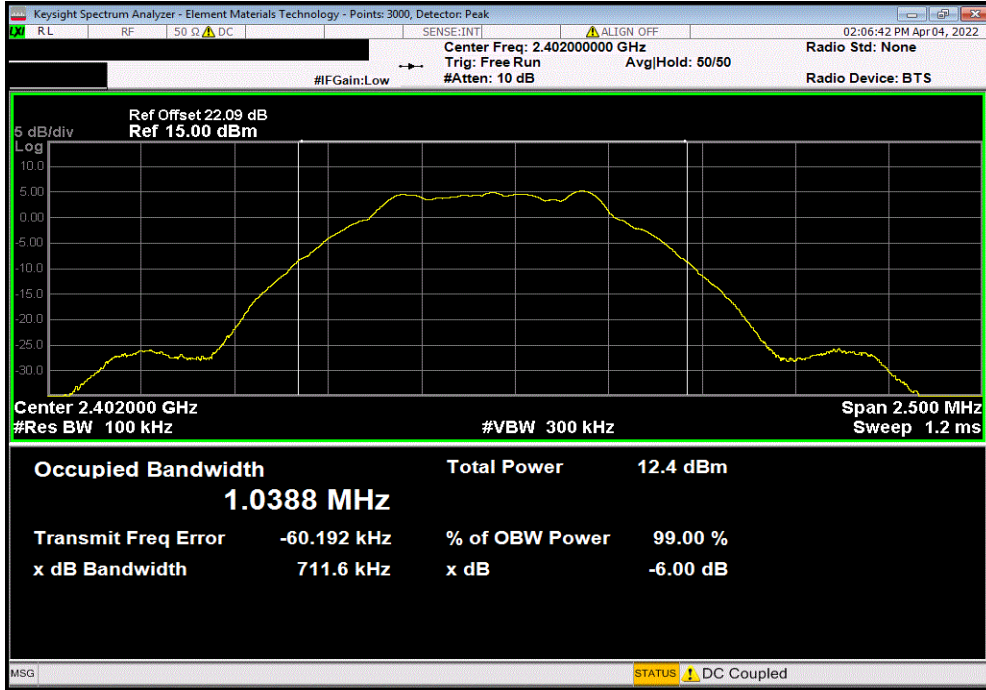
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28.1% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Value	Limit (±) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	711.593 kHz	500 kHz Pass
	Mid Channel, 2440 MHz	711.406 kHz	500 kHz Pass
	High Channel, 2480 MHz	709.482 kHz	500 kHz Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	1.362 MHz	500 kHz Pass
	Mid Channel, 2440 MHz	1.366 MHz	500 kHz Pass
	High Channel, 2478 MHz	1.366 MHz	500 kHz Pass

# DTS BANDWIDTH

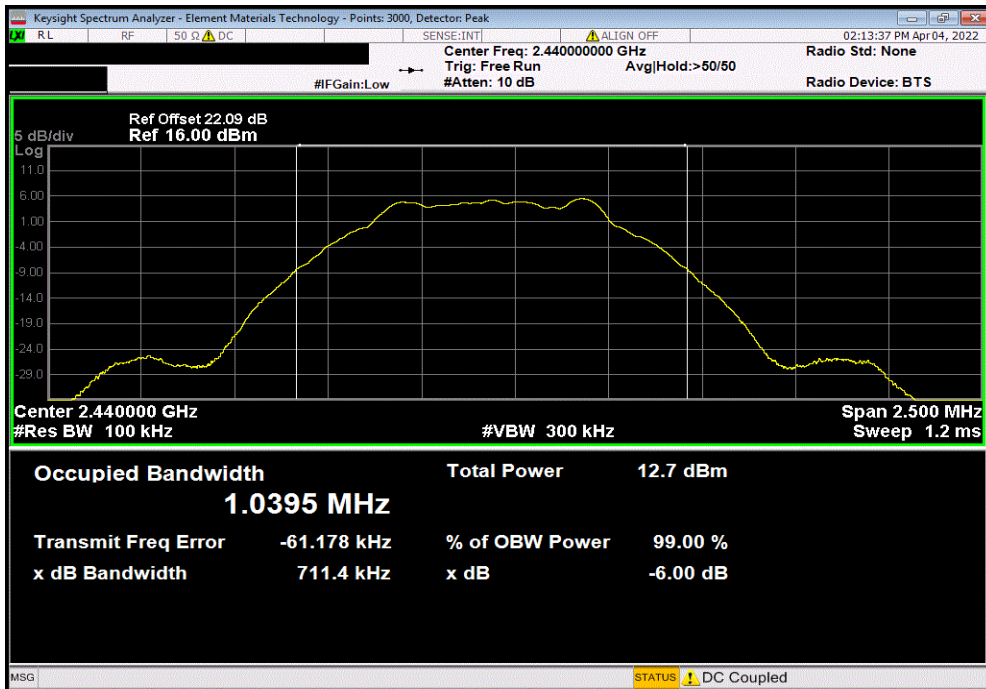


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value	Limit	Result
					(≥)	
				711.593 kHz	500 kHz	Pass



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
				Value	Limit	Result
					(≥)	
				711.406 kHz	500 kHz	Pass

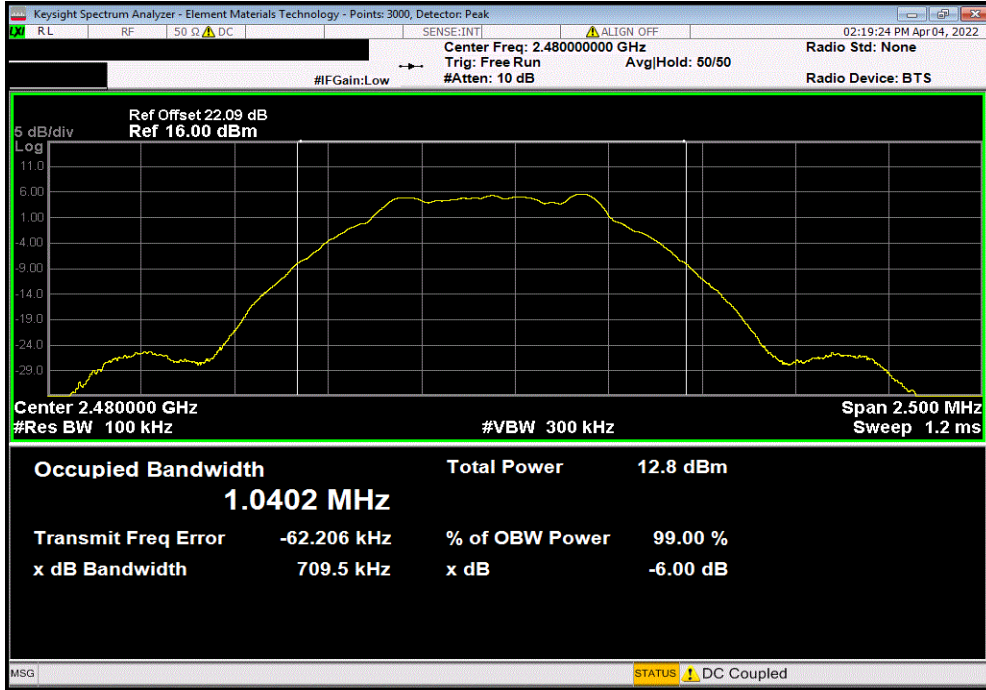


# DTS BANDWIDTH

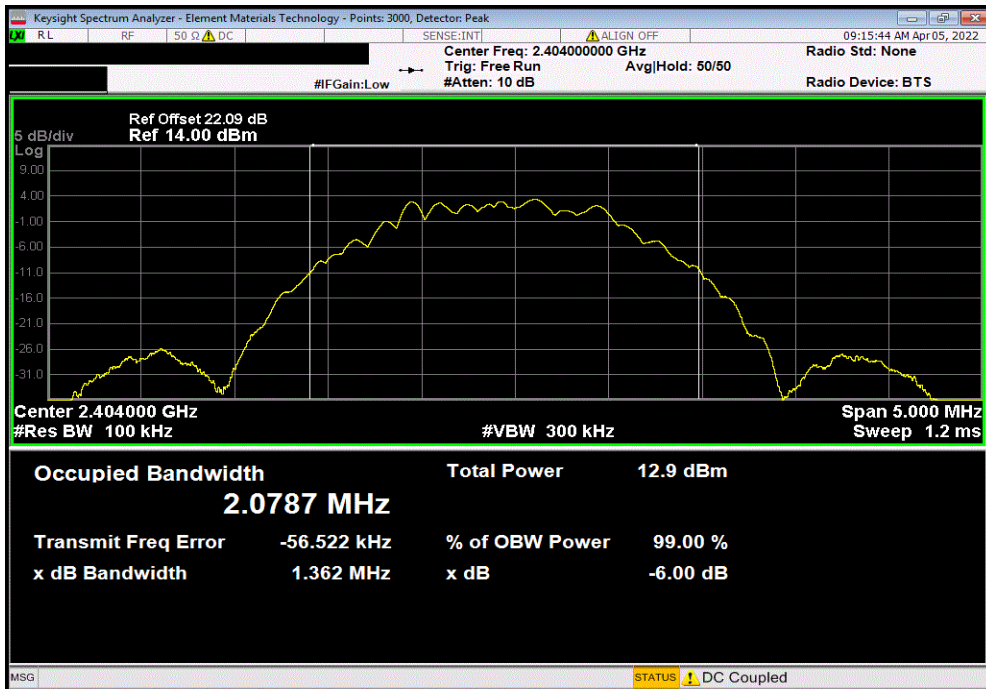


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value	Limit	Result
					(≥)	
				709.482 kHz	500 kHz	Pass



BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
				Value	Limit	Result
					(≥)	
				1.362 MHz	500 kHz	Pass

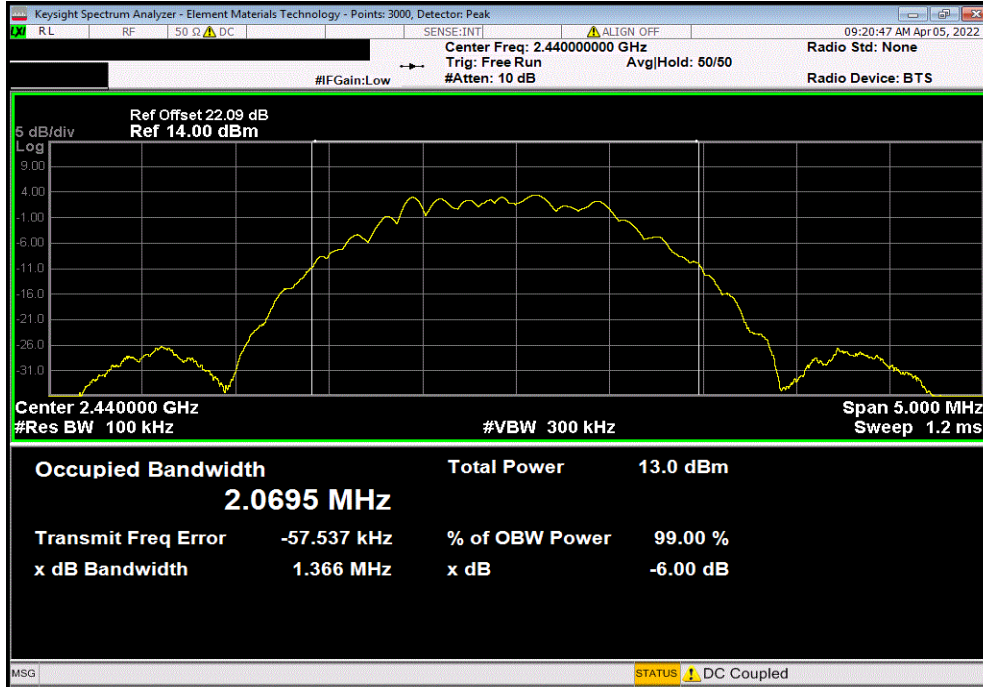


# DTS BANDWIDTH

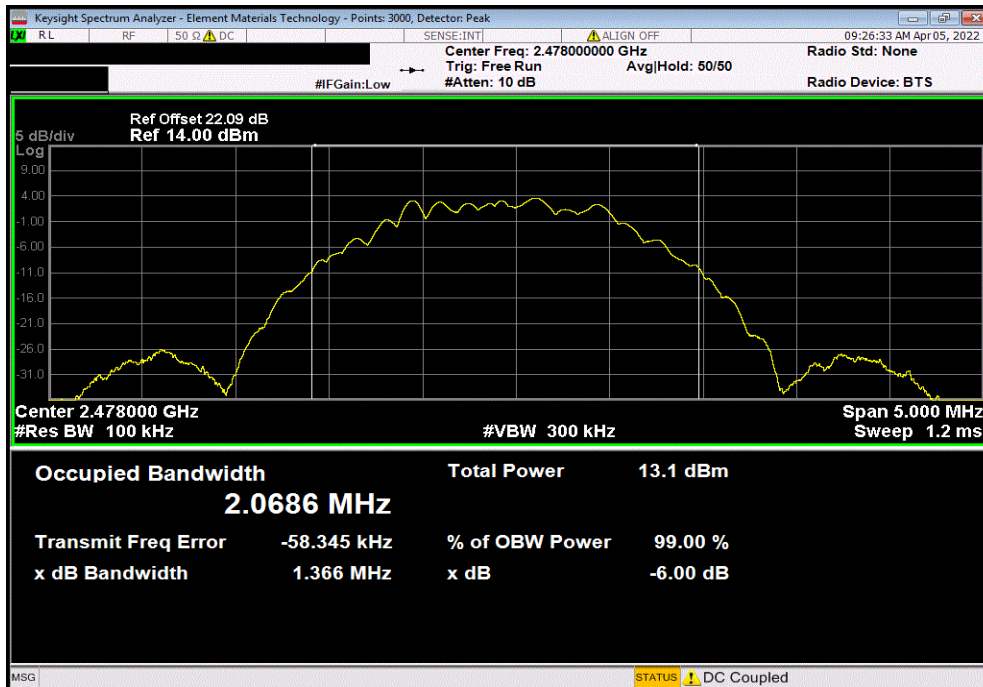


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
				Value	Limit (≥)	Result
				1.366 MHz	500 kHz	Pass



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
				Value	Limit (≥)	Result
				1.366 MHz	500 kHz	Pass



# OCCUPIED BANDWIDTH



XMH 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The 99% occupied bandwidth was measured with the EUT configured for continuous modulated operation.

Per ANSI C63.10:2013, 6.9.3, the spectrum analyzer was configured as follows:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

The resolution bandwidth (RBW) of the spectrum analyzer was set to the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) bandwidth was set to at least 3 times the resolution bandwidth. The analyzer sweep time was set to auto to prevent video filtering or averaging. A sample detector was used unless the device was not able to be operated in a continuous transmit mode, in which case a peak detector was used.

The spectrum analyzer occupied bandwidth measurement function was used to sum the power of the transmission in linear terms to obtain the 99% bandwidth.

# OCCUPIED BANDWIDTH



TelTx 2021.12.14.1 XMt 2022.02.07.0

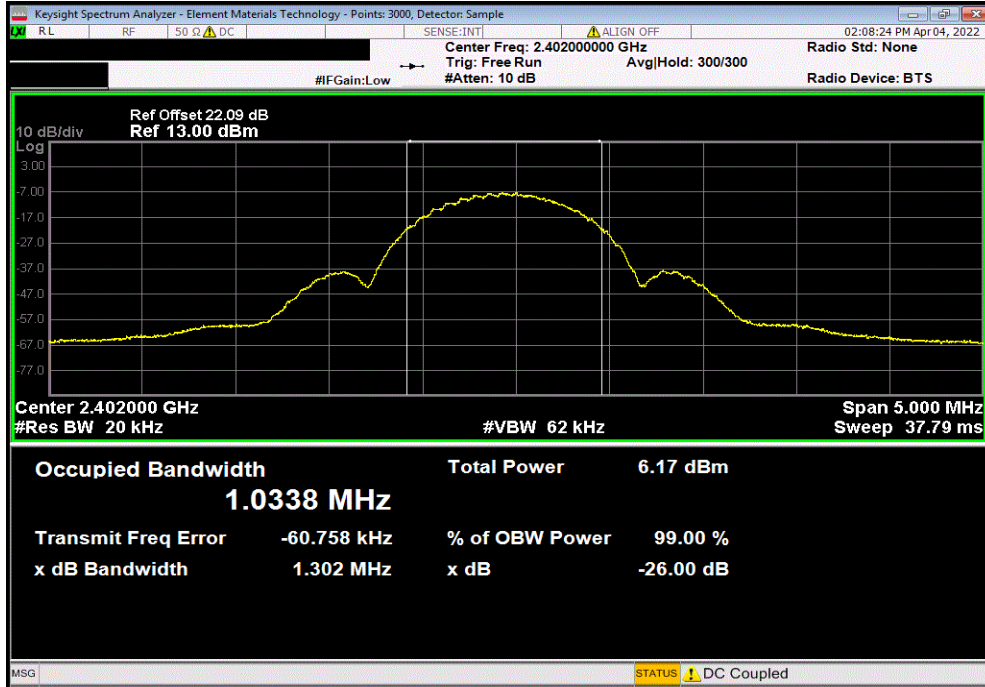
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28.1% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Value	Limit
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	1.034 MHz	N/A
	Mid Channel, 2440 MHz	1.034 MHz	N/A
	High Channel, 2480 MHz	1.033 MHz	N/A
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	2.087 MHz	N/A
	Mid Channel, 2440 MHz	2.076 MHz	N/A
	High Channel, 2478 MHz	2.076 MHz	N/A

# OCCUPIED BANDWIDTH

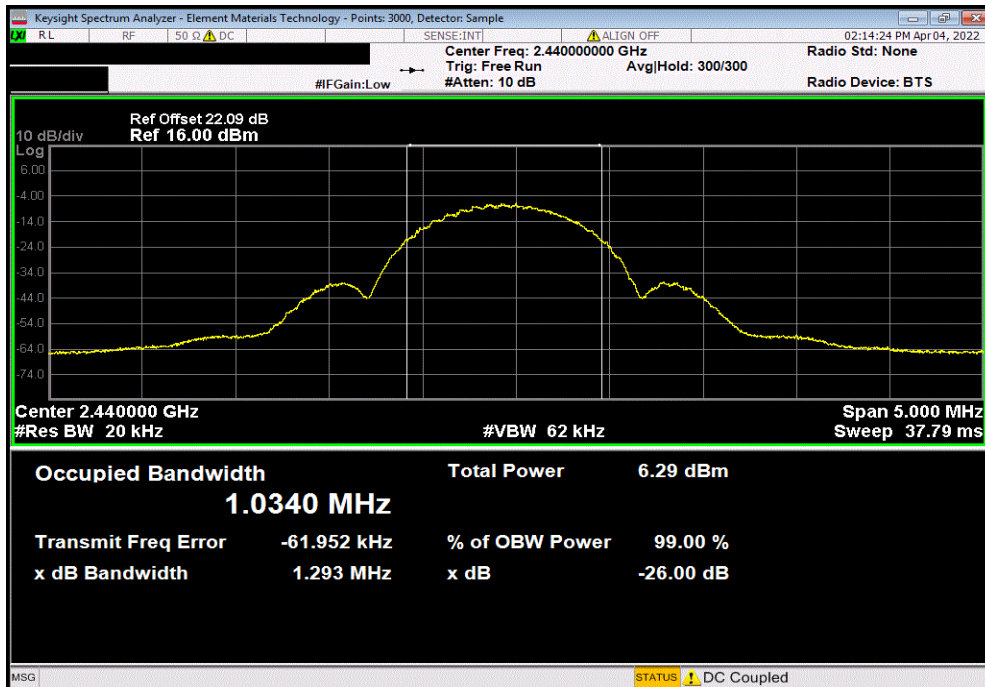


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
			Value	Limit	Result	
			1.034 MHz	N/A	N/A	



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
			Value	Limit	Result	
			1.034 MHz	N/A	N/A	



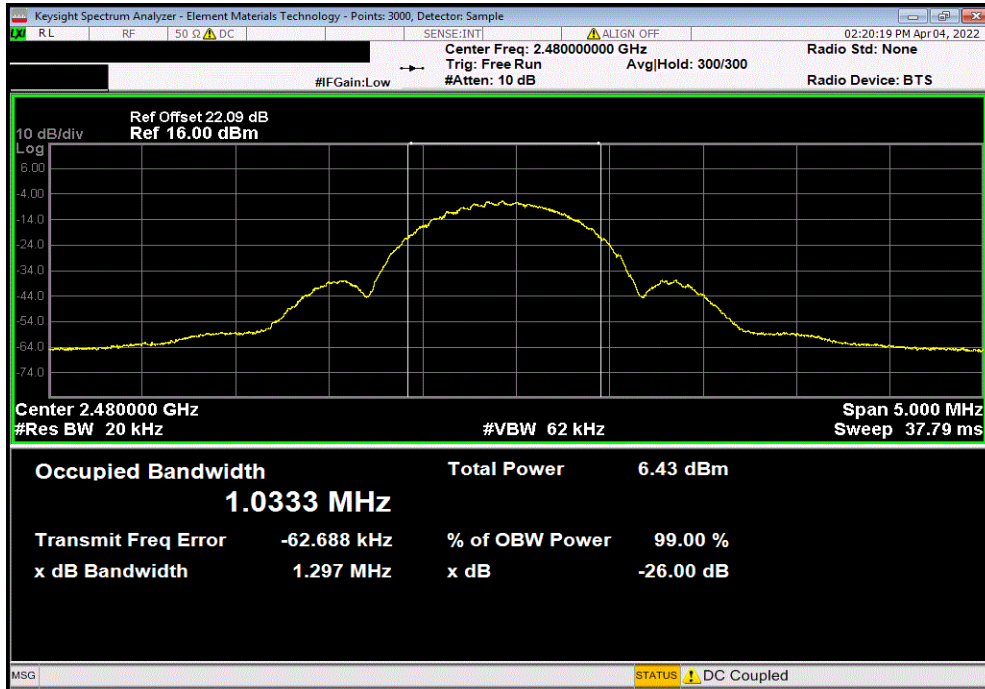


# OCCUPIED BANDWIDTH

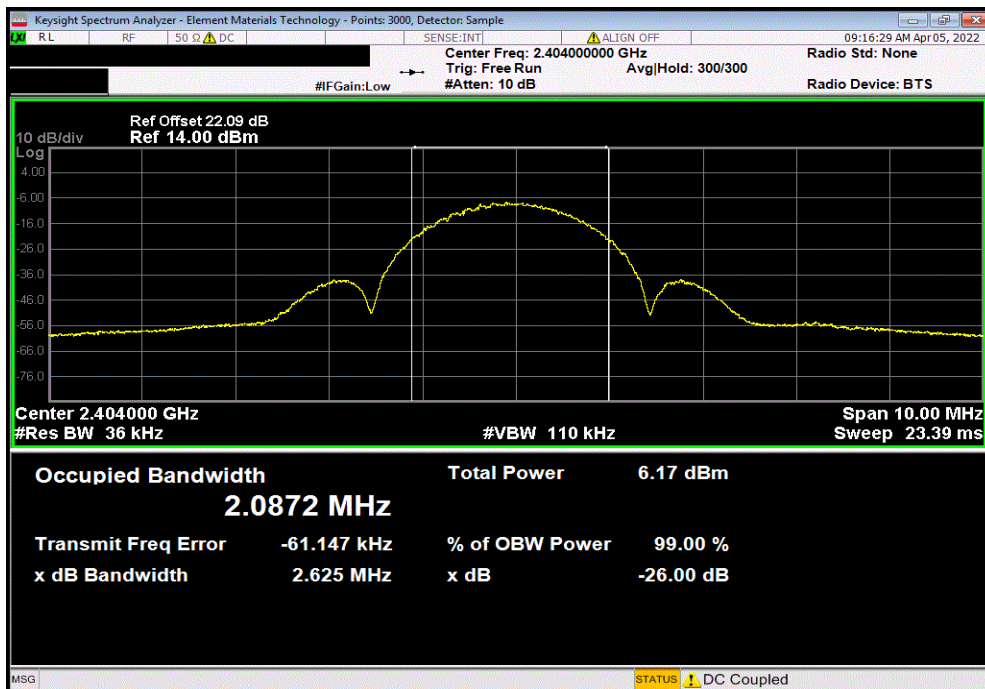


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value	Limit	Result
				1.033 MHz	N/A	N/A



BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
				Value	Limit	Result
				2.087 MHz	N/A	N/A

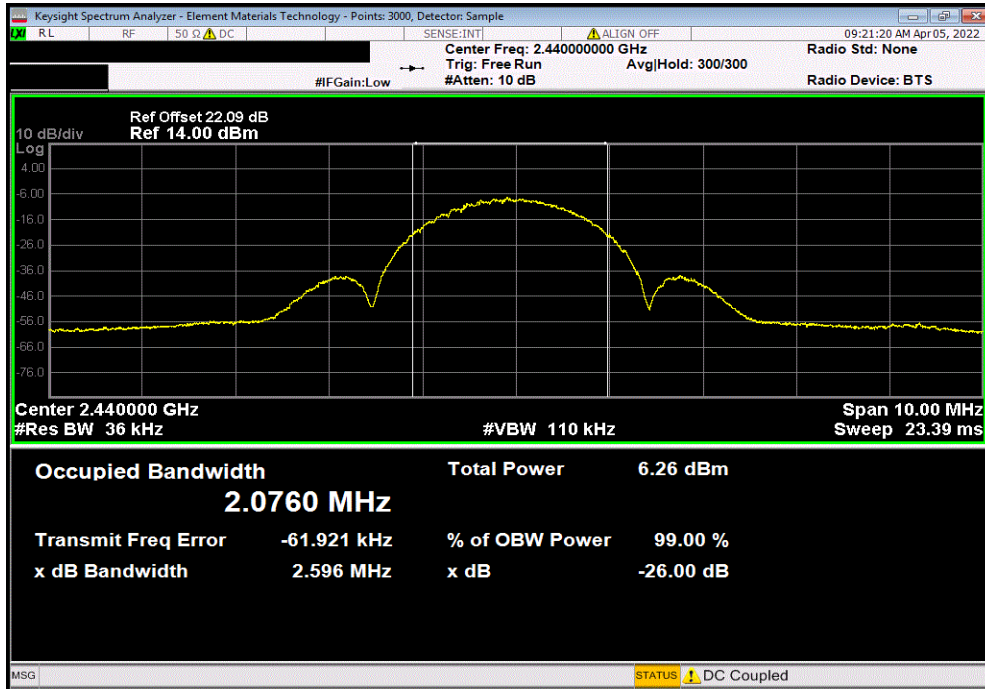


# OCCUPIED BANDWIDTH

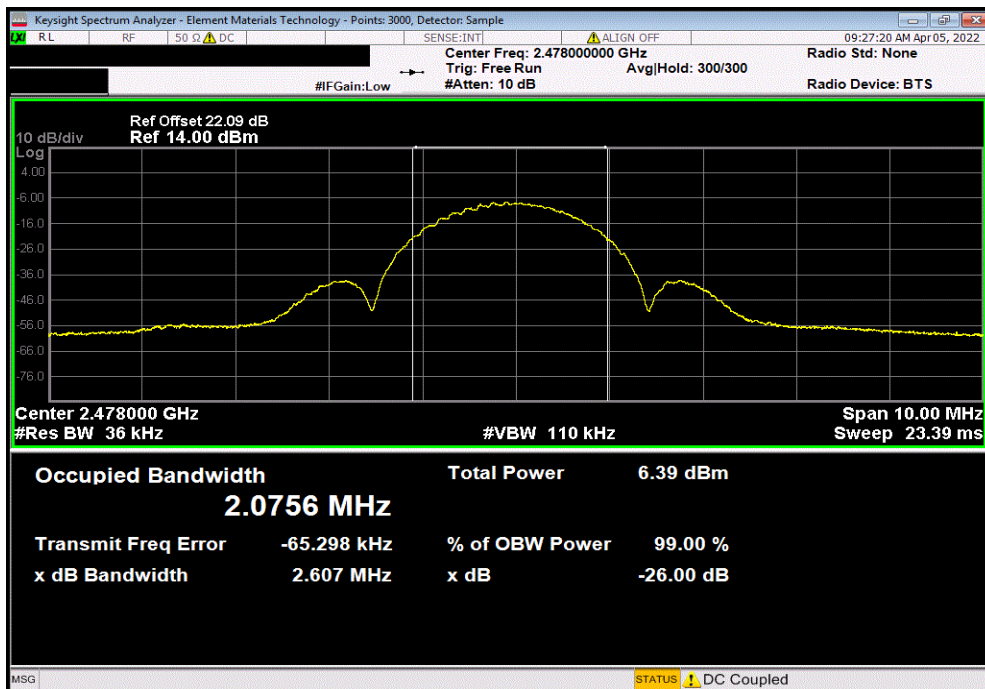


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
				Value	Limit	Result
				2.076 MHz	N/A	N/A



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
				Value	Limit	Result
				2.076 MHz	N/A	N/A



# OUTPUT POWER



element

XMI 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

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

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

# OUTPUT POWER



TelTx 2021.12.14.1 XMI: 2022.02.07.0

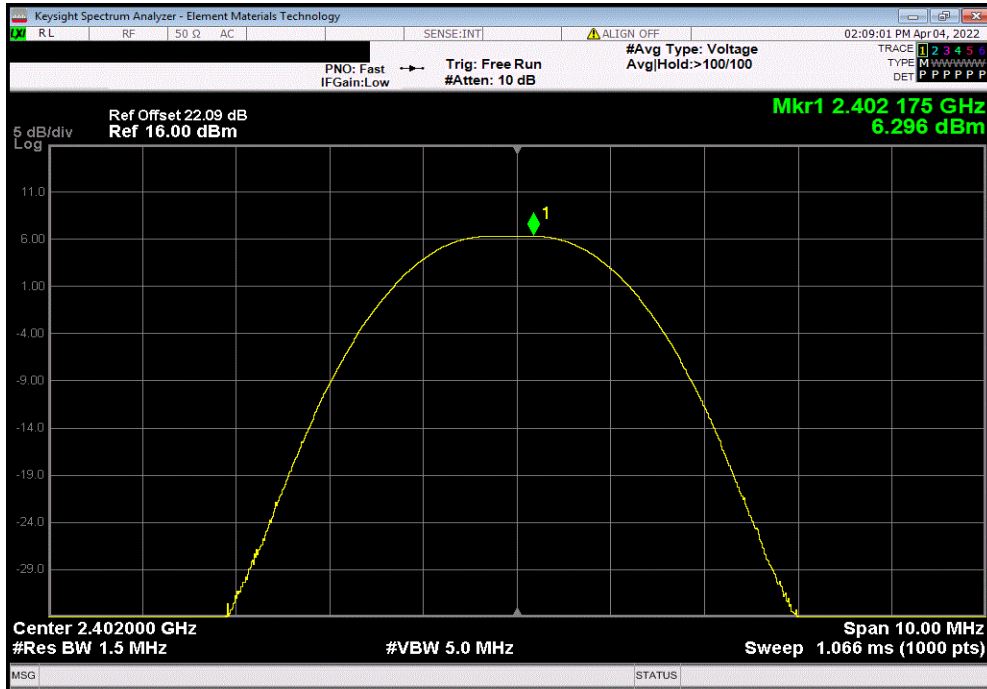
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
Job Site: MN08			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	6.296	30 Pass
	Mid Channel, 2440 MHz	6.414	30 Pass
	High Channel, 2480 MHz	6.533	30 Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	6.319	30 Pass
	Mid Channel, 2440 MHz	6.418	30 Pass
	High Channel, 2478 MHz	6.532	30 Pass

# OUTPUT POWER

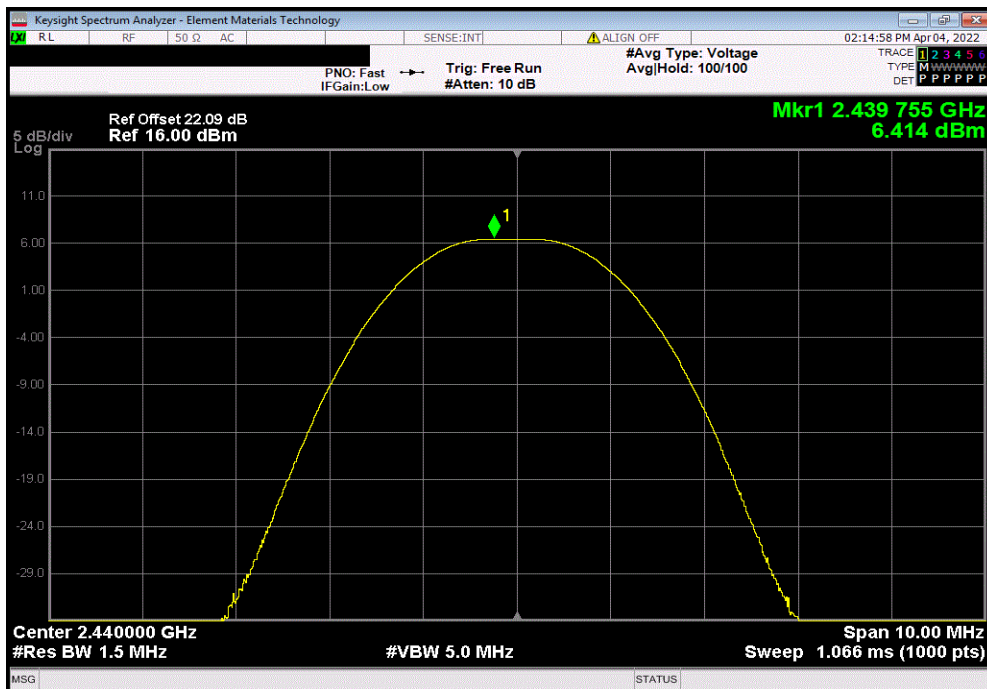


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.296	30	Pass



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.414	30	Pass

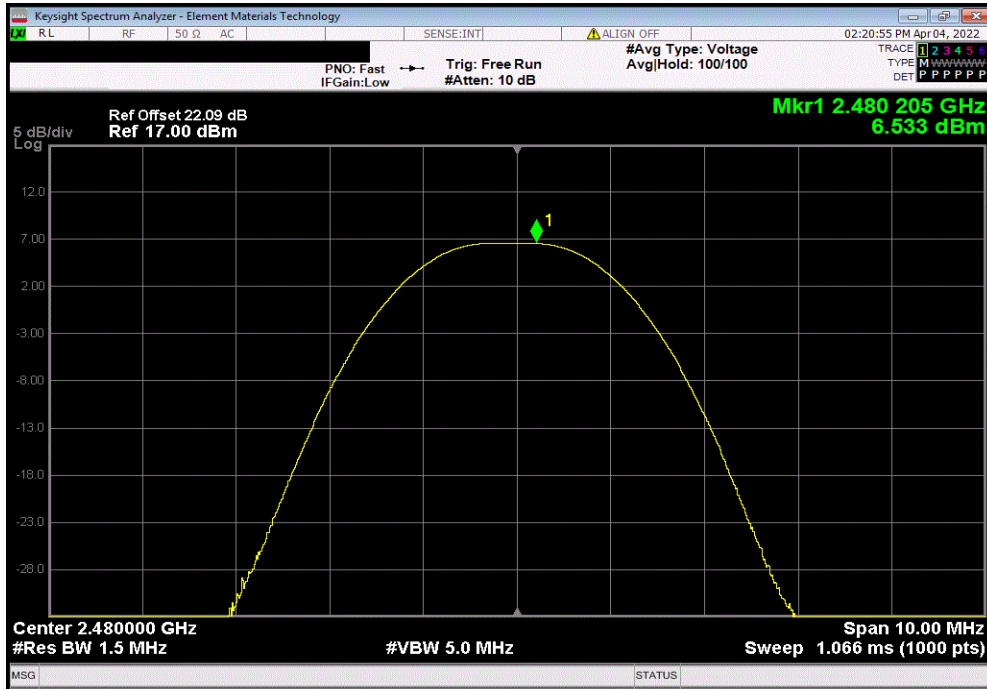


# OUTPUT POWER

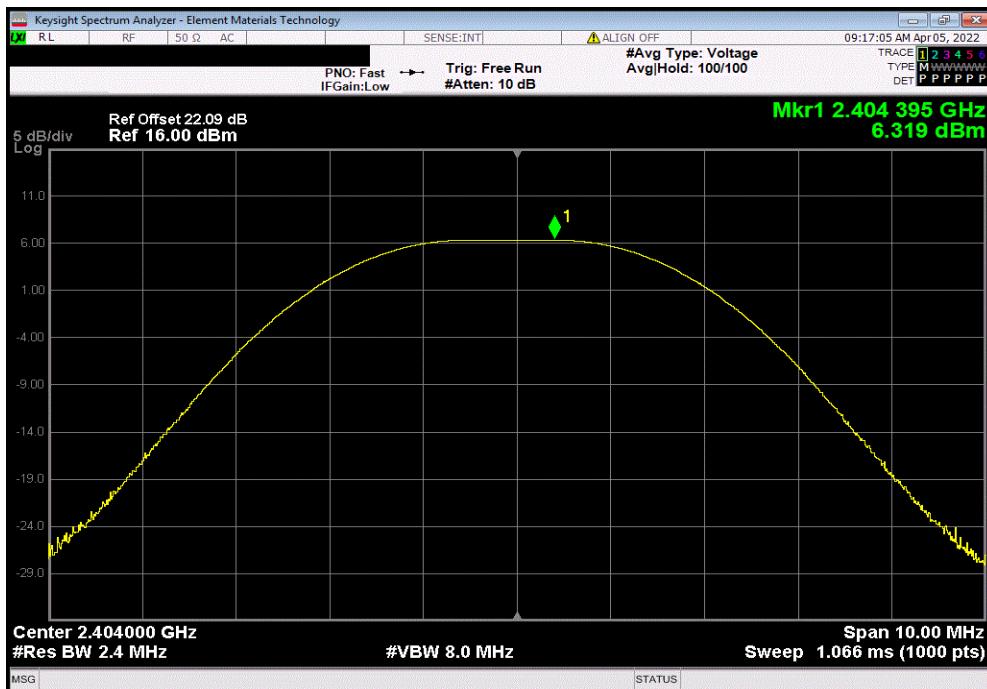


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.533	30	Pass



BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.319	30	Pass

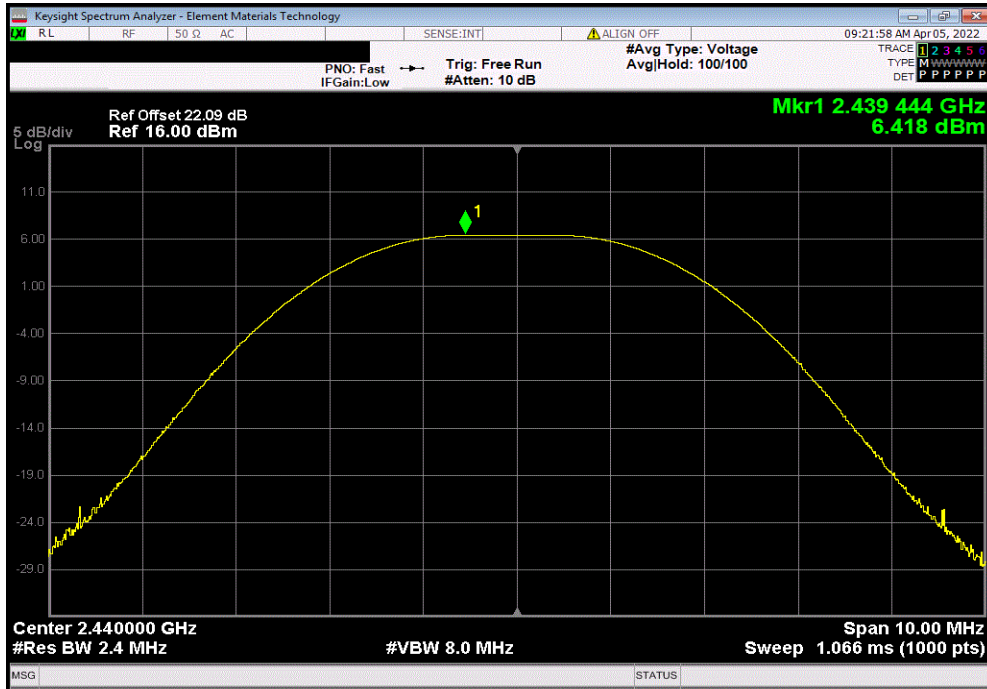


# OUTPUT POWER

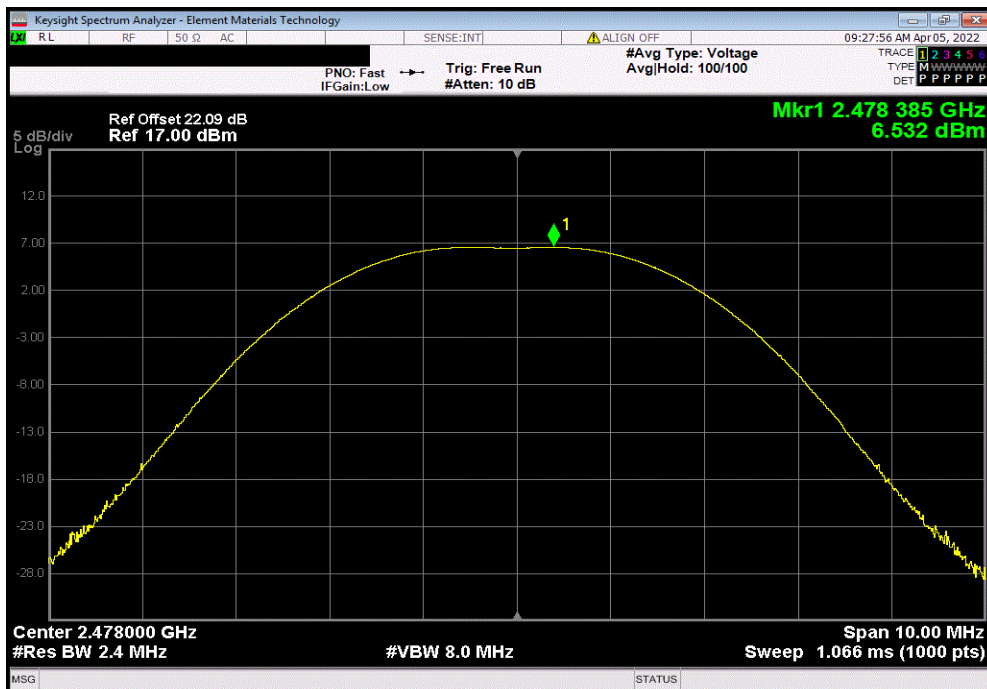


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.418	30	Pass



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				6.532	30	Pass





# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



XMH 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The transmit frequency was set to the required channels in each band. The transmit power was set to its default maximum.

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

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

Equivalent Isotropic Radiated Power (EIRP) = Max Measured Power + Antenna gain (dBi)



# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)



TelTx 2021.12.14.1 XMit 2022.02.07.0

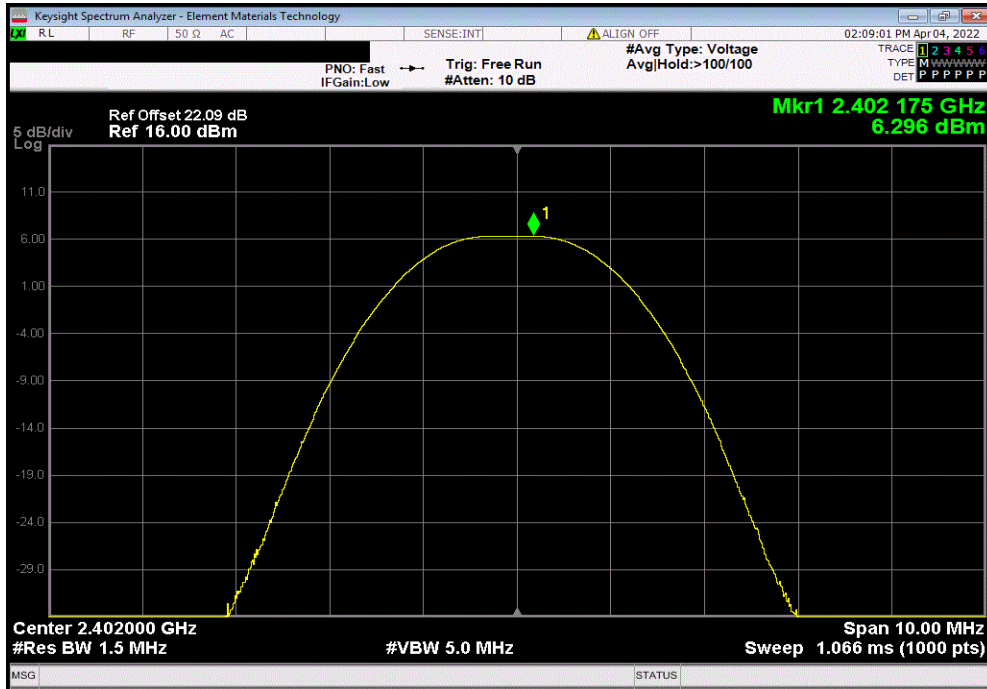
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Out Pwr (dBm)	Antenna Gain (dBi)
		EIRP (dBm)	EIRP Limit (dBm)
			Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	6.296	4.0
	Mid Channel, 2440 MHz	6.414	4.0
	High Channel, 2480 MHz	6.533	4.0
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	6.319	4.0
	Mid Channel, 2440 MHz	6.418	4.0
	High Channel, 2478 MHz	6.532	4.0

# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

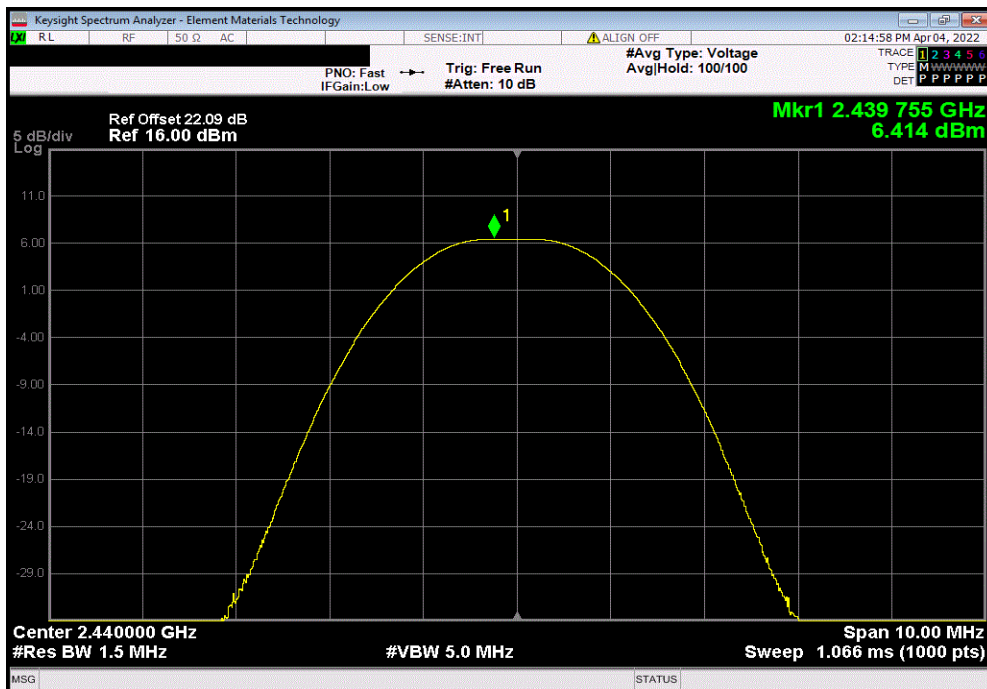


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.296	4.0	10.3	36	Pass		



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.414	4.0	10.4	36	Pass		

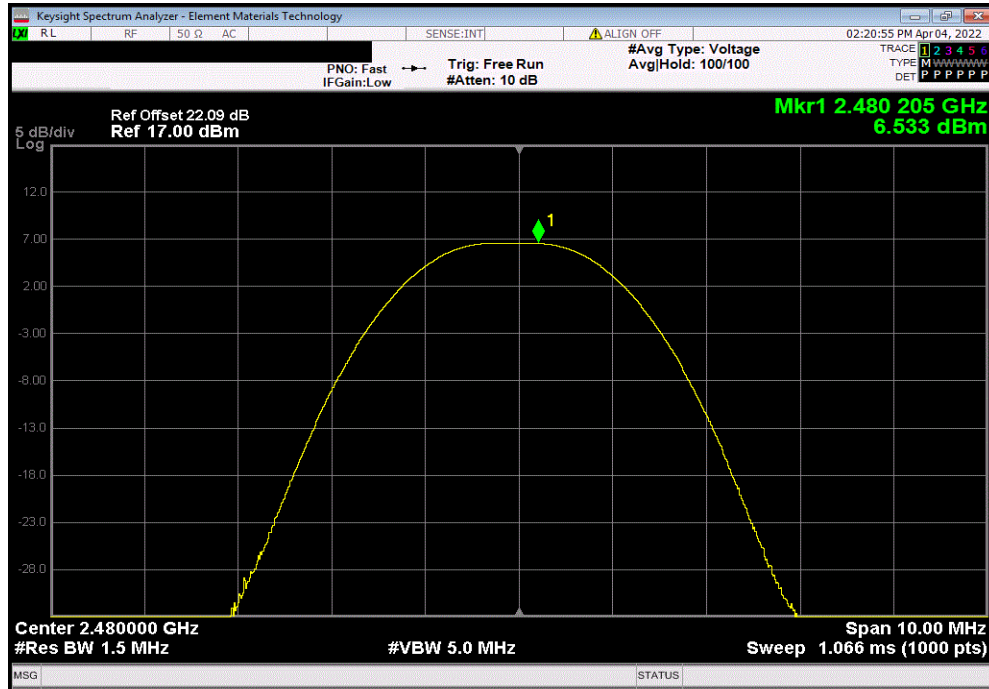


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

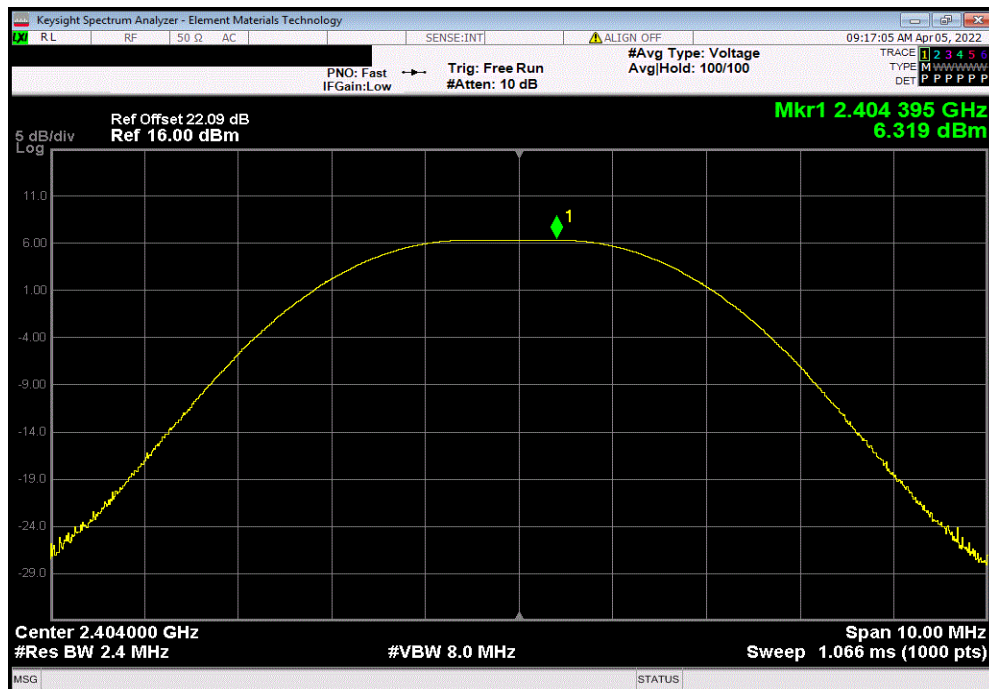


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.533	4.0	10.5	36	Pass		



BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.319	4.0	10.3	36	Pass		

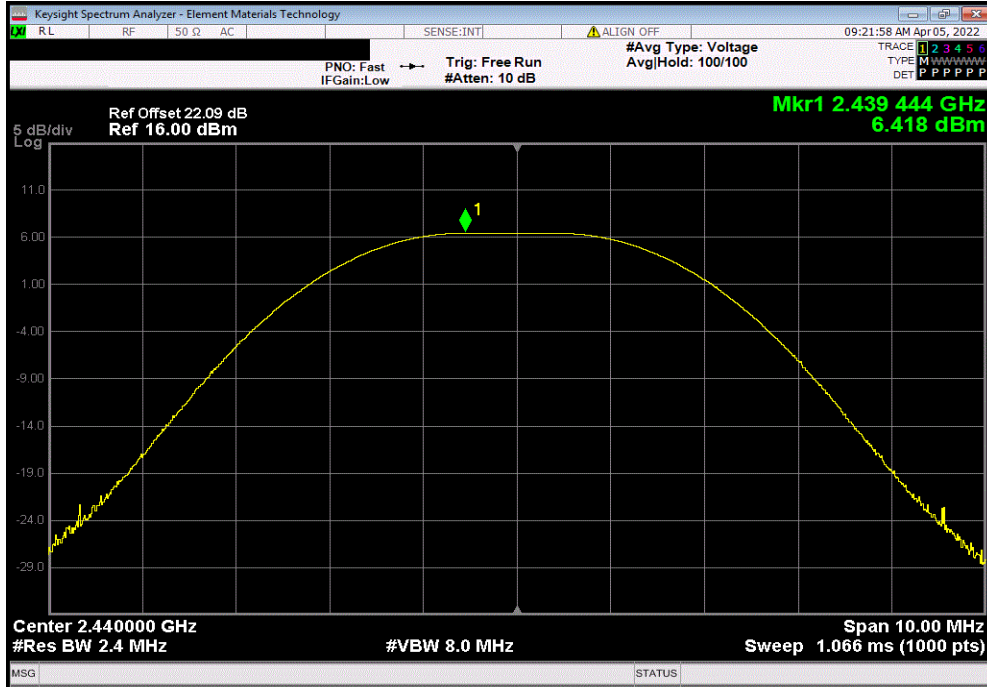


# EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

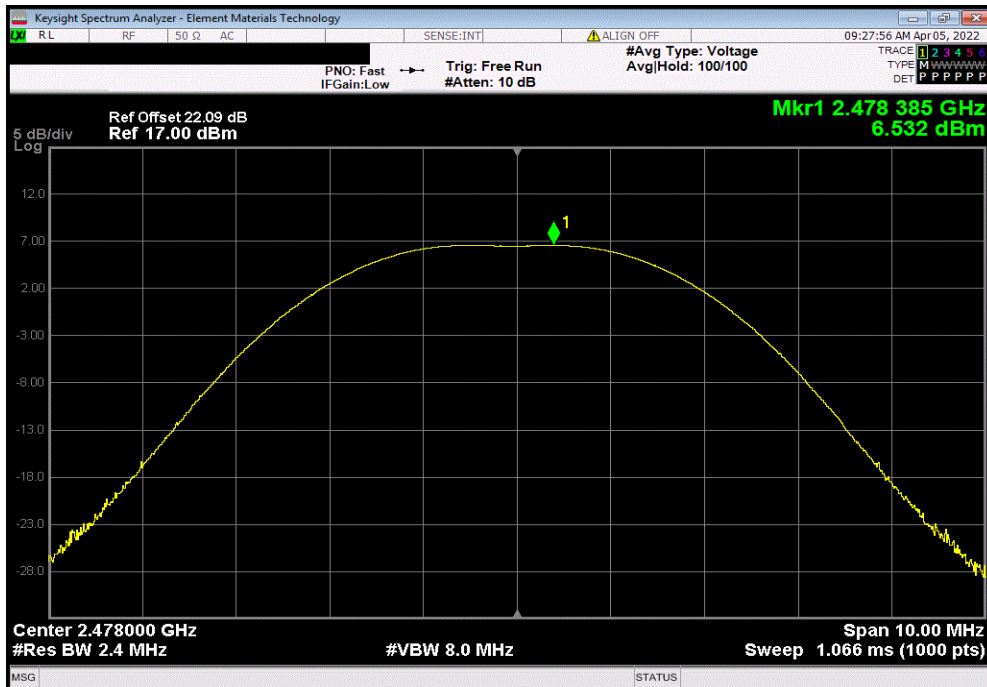


TuTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.418	4.0	10.4	36	Pass		



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result		
6.532	4.0	10.5	36	Pass		



# POWER SPECTRAL DENSITY



XMH 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The maximum power spectral density measurements was measured using the channels and modes as called out on the following data sheets.

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

# POWER SPECTRAL DENSITY



TelTx 2021.12.14.1 XMI: 2022.02.07.0

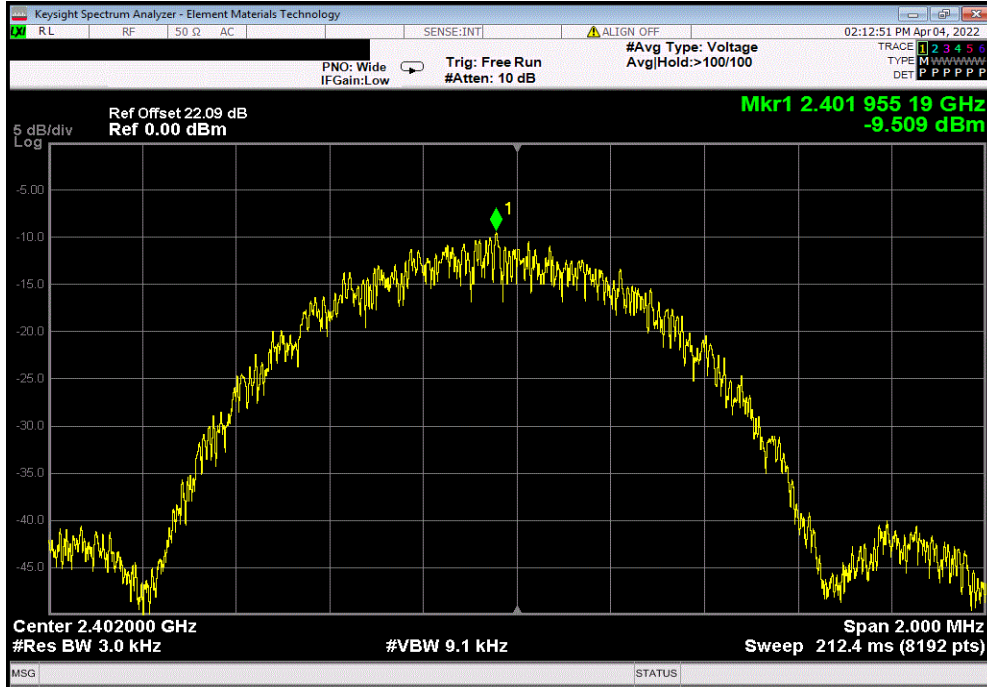
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-9.509	8
	Mid Channel, 2440 MHz	-9.389	8
	High Channel, 2480 MHz	-9.236	8
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	-13.398	8
	Mid Channel, 2440 MHz	-13.32	8
	High Channel, 2478 MHz	-13.185	8
		Results	Pass

# POWER SPECTRAL DENSITY

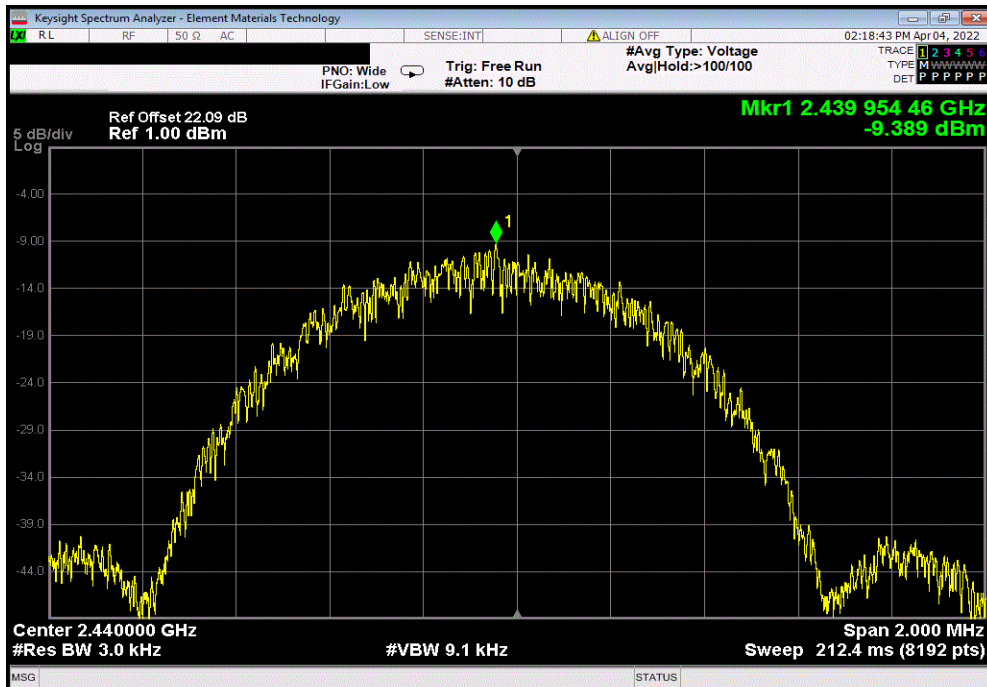


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-9.509	8	Pass



BLE/GFSK 1 Mbps, Mid Channel, 2440 MHz			
	Value	Limit	Results
	dBm/3kHz	< dBm/3kHz	
	-9.389	8	Pass



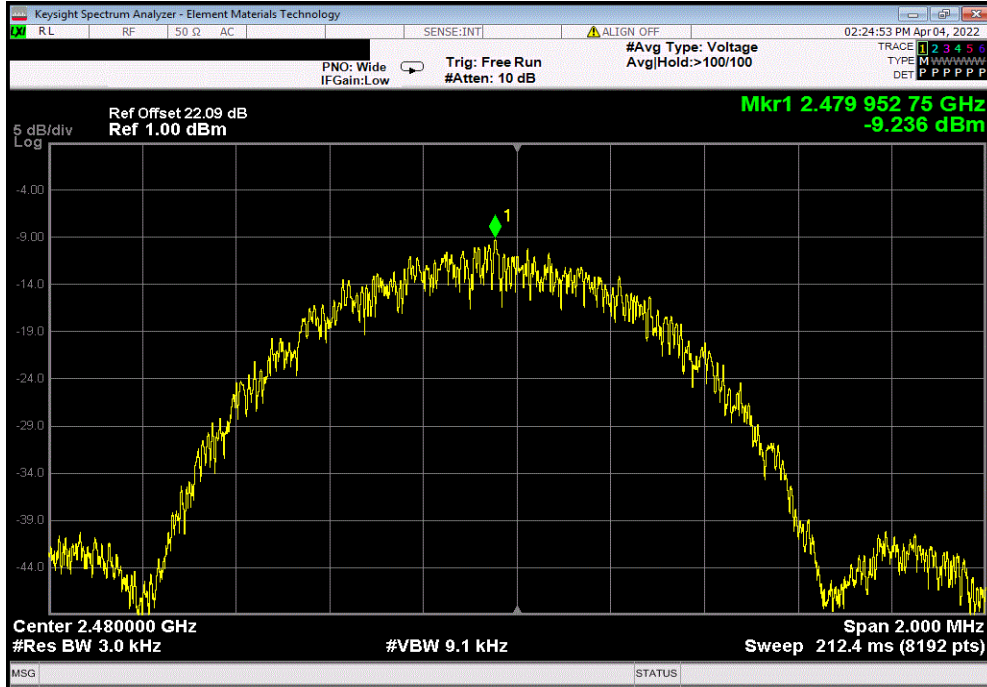


# POWER SPECTRAL DENSITY

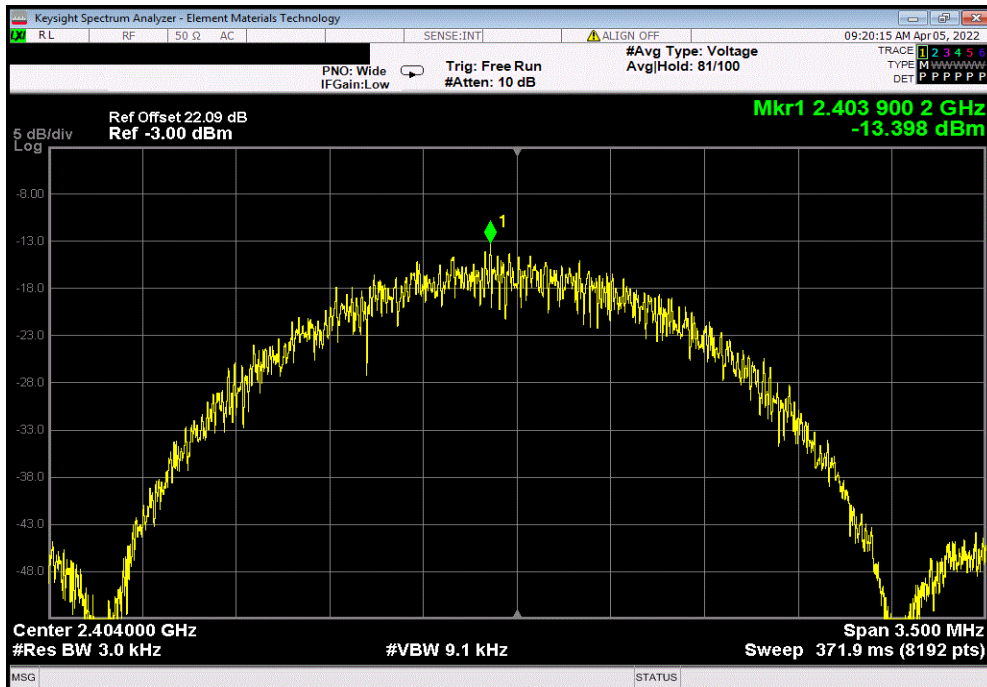


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-9.236	8	Pass			



BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.398	8	Pass			



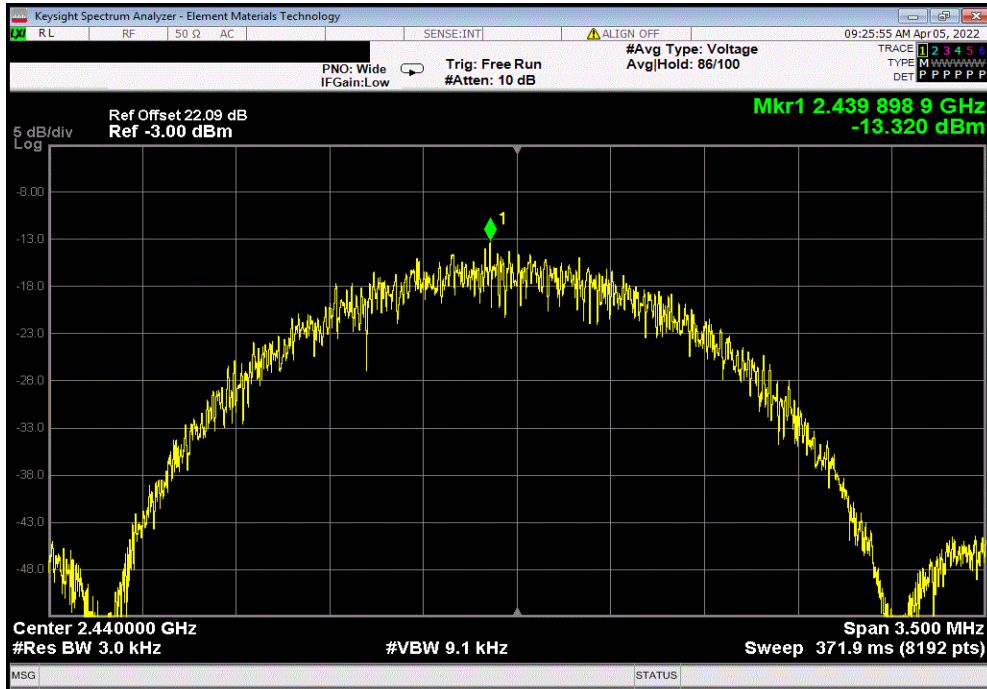


# POWER SPECTRAL DENSITY

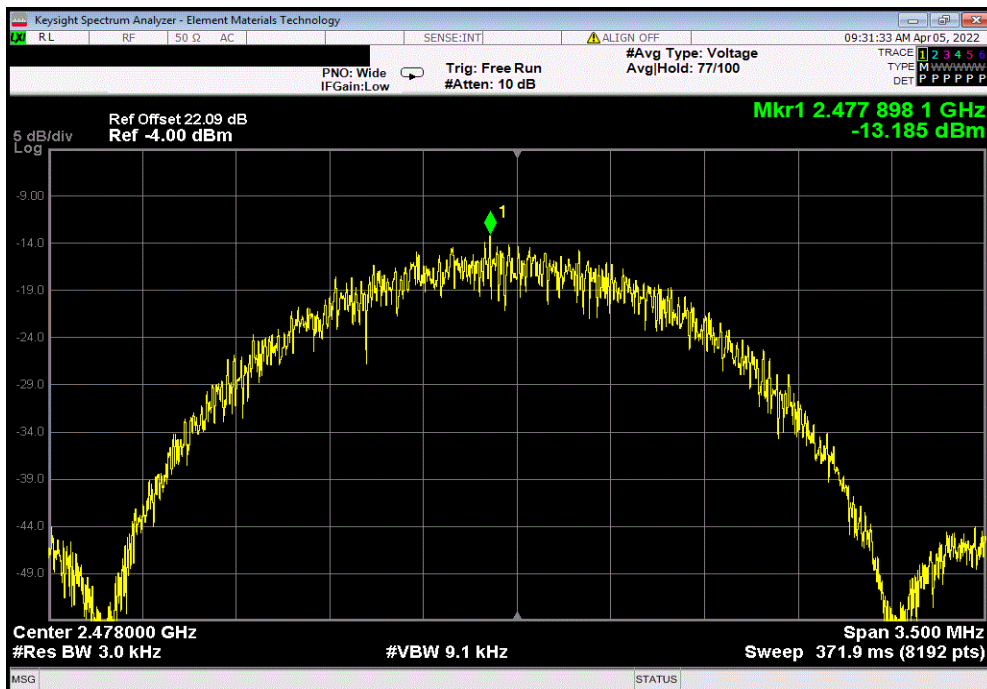


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Mid Channel, 2440 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.32	8	Pass			



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.185	8	Pass			



# BAND EDGE COMPLIANCE



XMH 2022.02.07.0

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

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Agilent	N5182A	TIF	2020-08-29	2023-08-29
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2021-04-16	2022-04-16
Block - DC	Fairview Microwave	SD3379	AMI	2021-08-13	2022-08-13
Attenuator	Fairview Microwave	SA18S5W-20	RFX	2021-06-02	2022-06-02
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2021-09-12	2022-09-12

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

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

# BAND EDGE COMPLIANCE



TelTx 2021.12.14.1 XMI: 2022.02.07.0

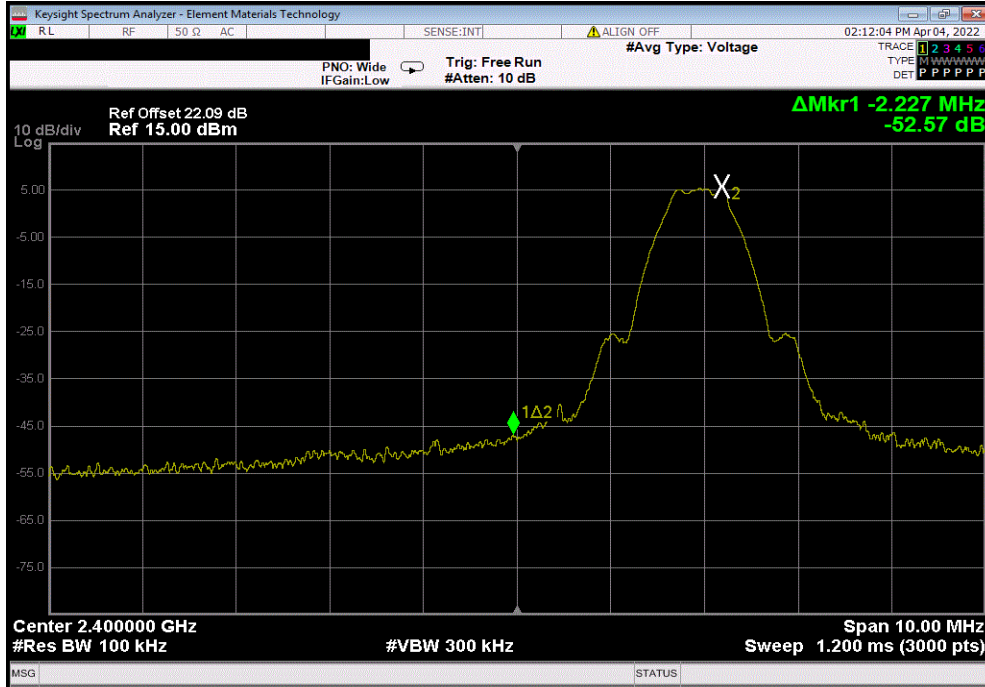
EUT: XB3C2		Work Order: DGII0455	
Serial Number: 350588280003609		Date: 5-Apr-22	
Customer: Digi International Inc		Temperature: 22.8 °C	
Attendees: None		Humidity: 28% RH	
Project: None		Barometric Pres.: 1004 mbar	
Tested by: Andrew Rogstad		Power: 5VDC	
		Job Site: MN08	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2022		ANSI C63.10:2013	
COMMENTS			
IMEI 350588280003609. Reference level offset accounts for measurement cable, attenuator, DC block, and patch cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	9	Signature <i>Andrew Rogstad</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK 1 Mbps			
	Low Channel, 2402 MHz	-52.57	-20 Pass
	High Channel, 2480 MHz	-55.77	-20 Pass
BLE/GFSK 2 Mbps			
	Low Channel, 2404 MHz	-47.53	-20 Pass
	High Channel, 2478 MHz	-49	-20 Pass

# BAND EDGE COMPLIANCE

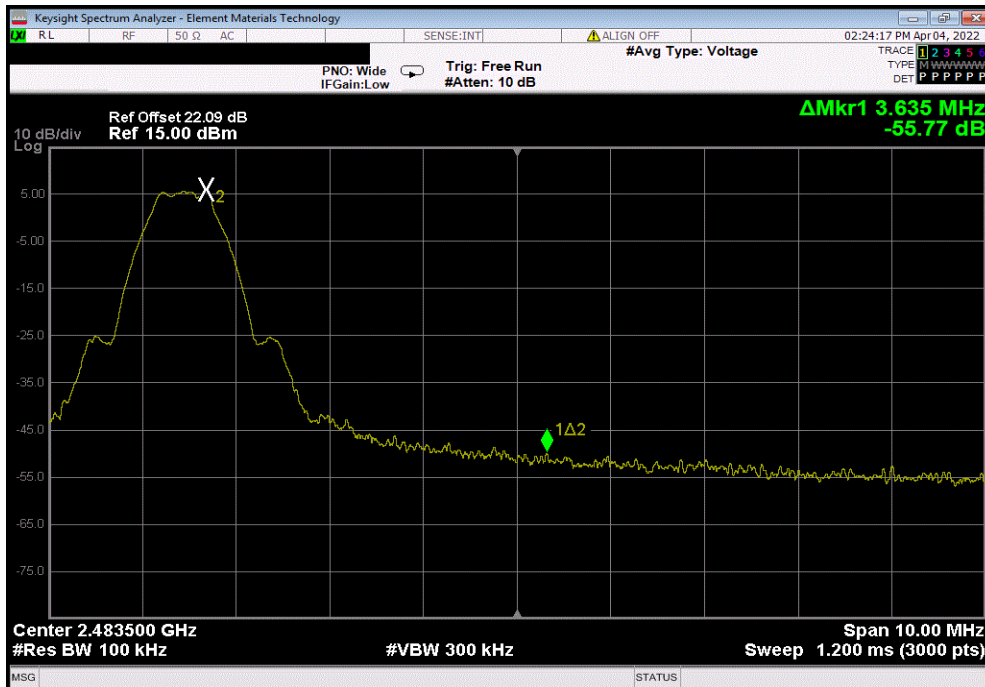


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 1 Mbps, Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.57	-20	Pass



BLE/GFSK 1 Mbps, High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-55.77	-20	Pass

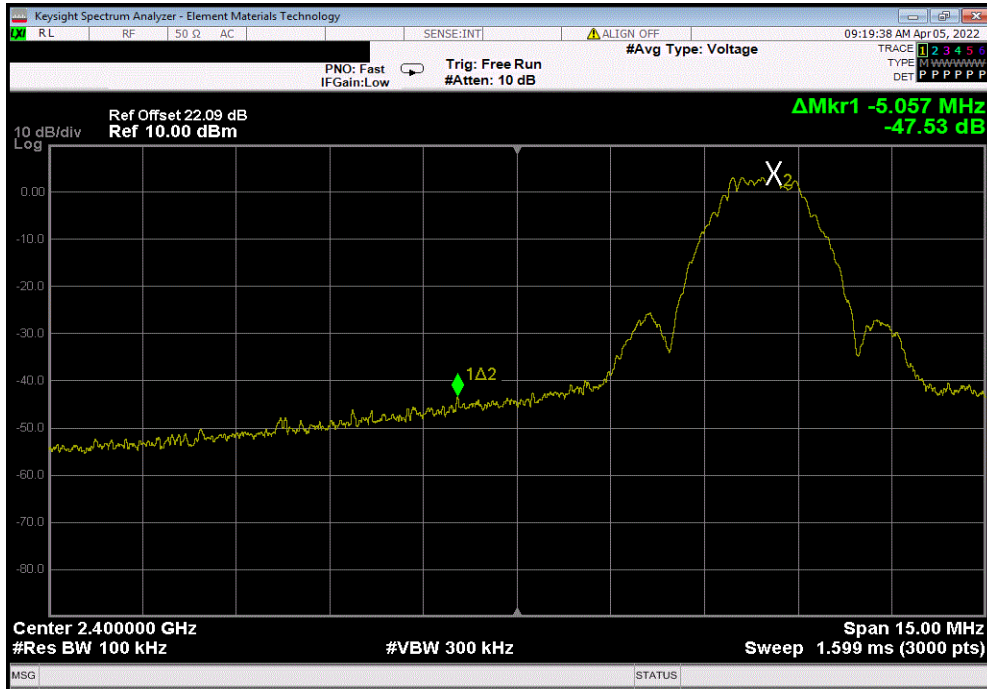


# BAND EDGE COMPLIANCE

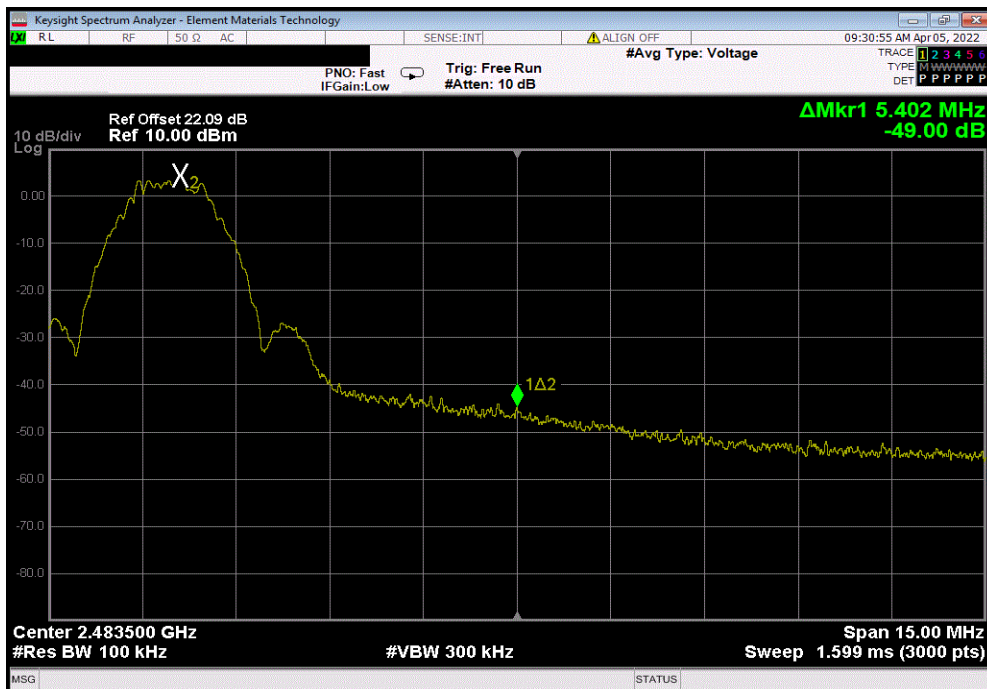


TbTx 2021.12.14.1 XMI 2022.02.07.0

BLE/GFSK 2 Mbps, Low Channel, 2404 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-47.53	-20	Pass



BLE/GFSK 2 Mbps, High Channel, 2478 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49	-20	Pass



# BAND EDGE COMPLIANCE



XMI 2022.02.07.0

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
Block - DC	Fairview Microwave	SD3379	AMZ	2022-11-06	2023-11-06
Attenuator	S.M. Electronics	SA26B-20	RFW	2022-02-08	2023-02-08
Cable	Micro-Coax	UFD150A-1-0720-200200	MNL	2022-09-10	2023-09-10
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFM	2022-04-25	2023-04-25
Generator - Signal	Agilent	N5183A	TIK	2022-01-24	2025-01-24

## TEST DESCRIPTION

The measurement was made using a direct connection between the RF output of the EUT and a spectrum analyzer.

The spurious RF conducted emissions at the edges of the authorized bands were measured with the EUT set to low and high transmit frequencies in each available band. The channels closest to the band edges were selected. The EUT was transmitting at the data rate(s) listed in the datasheet.

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

# BAND EDGE COMPLIANCE



TelTx 2022.06.03.0 XMI: 2022.02.07.0

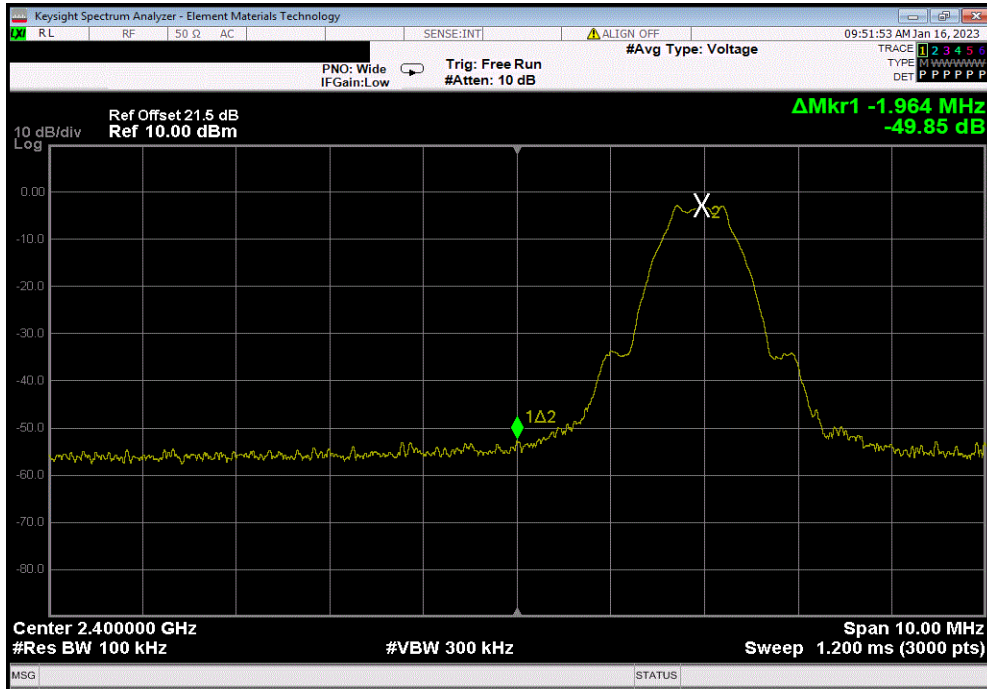
EUT: XB3C2		Work Order: DGII0474	
Serial Number: 354846620001279		Date: 16-Jan-23	
Customer: Digi International Inc		Temperature: 21.7 °C	
Attendees: Brad Ferguson		Humidity: 28.7% RH	
Project: None		Barometric Pres.: 1002 mbar	
Tested by: Christopher Heintzelman		Power: 5VDC via USB	
		Job Site: MN11	
TEST SPECIFICATIONS			
FCC 15.247:2023		ANSI C63.10:2013	
TEST METHOD			
COMMENTS			
Power set to -2dBm rated power.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature <i>Christopher Heintzelman</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK 1 Mbps Low Channel, 2402 MHz		-49.85	-20 Pass
BLE/GFSK 1 Mbps High Channel, 2480 MHz		-52.48	-20 Pass
BLE/GFSK 2 Mbps Low Channel, 2404 MHz		-48.43	-20 Pass
BLE/GFSK 2 Mbps High Channel, 2478 MHz		-50.23	-20 Pass

# BAND EDGE COMPLIANCE

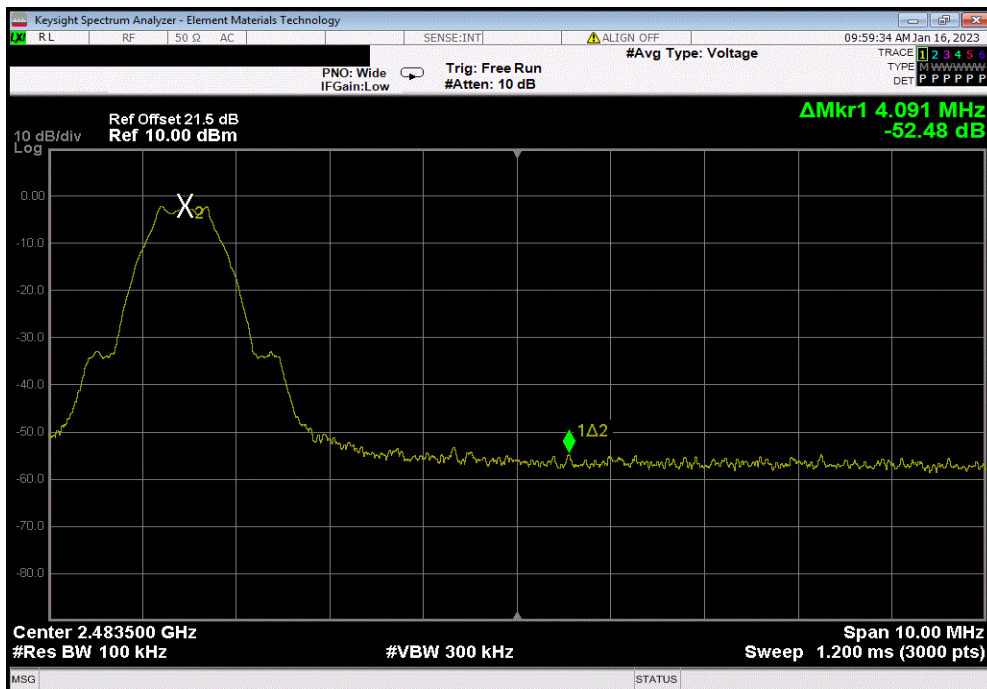


TbTx 2022.06.03.0 XMI 2022.02.07.0

BLE/GFSK 1 Mbps Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-49.85	-20	Pass



BLE/GFSK 1 Mbps High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-52.48	-20	Pass



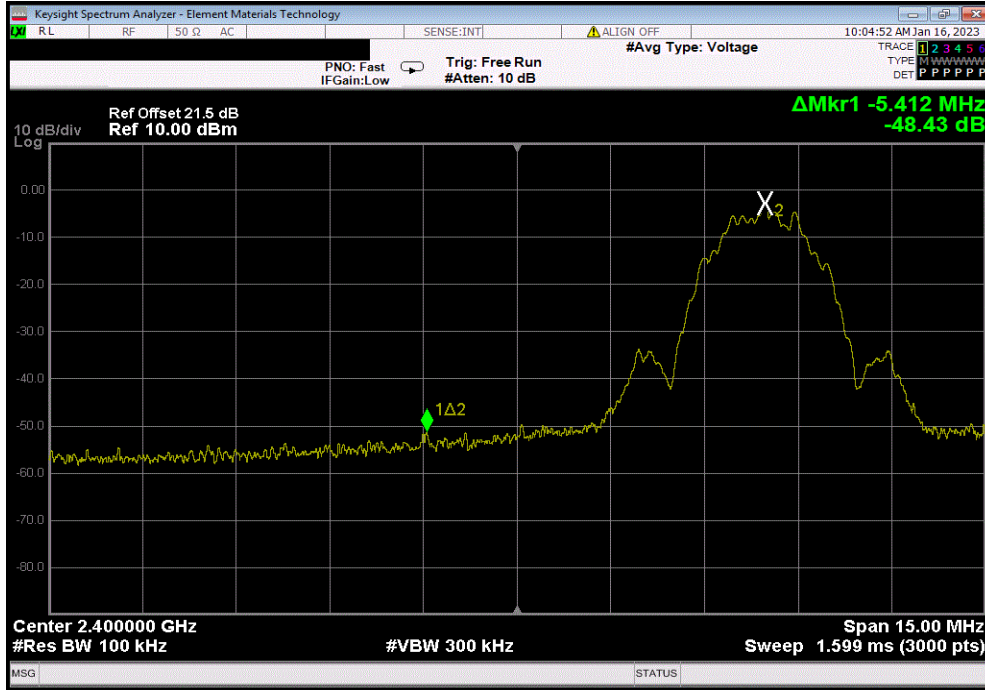


# BAND EDGE COMPLIANCE



TbTx 2022.06.03.0 XMI 2022.02.07.0

BLE/GFSK 2 Mbps Low Channel, 2404 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-48.43	-20	Pass



BLE/GFSK 2 Mbps High Channel, 2478 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-50.23	-20	Pass

