



Digi International Inc

XB3C1

FCC 15.207:2017

FCC 15.247:2017

Report # DGII0257.1



NVLAP Lab Code: 200881-0



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CERTIFICATE OF TEST

Last Date of Test: December 12, 2017
Digi International Inc
Model: XB3C1

Radio Equipment Testing

Standards

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

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
6.5, 6.6, 11.12.1, 11.13.2,	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	Pass	
11.8.2	Occupied Bandwidth	Yes	Pass	
11.9.1.1	Output Power	Yes	Pass	
11.10.2	Power Spectral Density	Yes	Pass	
11.11	Band Edge Compliance	Yes	Pass	
11.11	Spurious Conducted Emissions	Yes	Pass	

Deviations From Test Standards

None

Approved By:

Matt Nuernberg, Operations Manager

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

REVISION HISTORY



Revision Number		Description	Date	Page Number
00		None		

ACCREDITATIONS AND AUTHORIZATIONS



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:

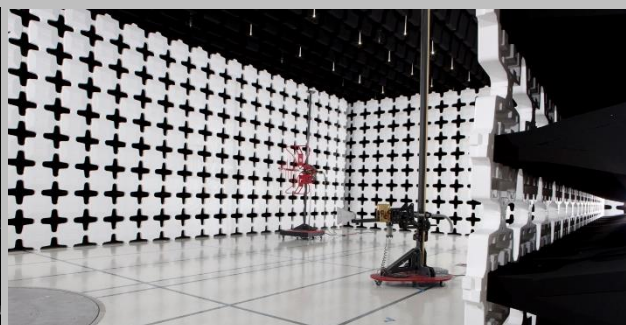
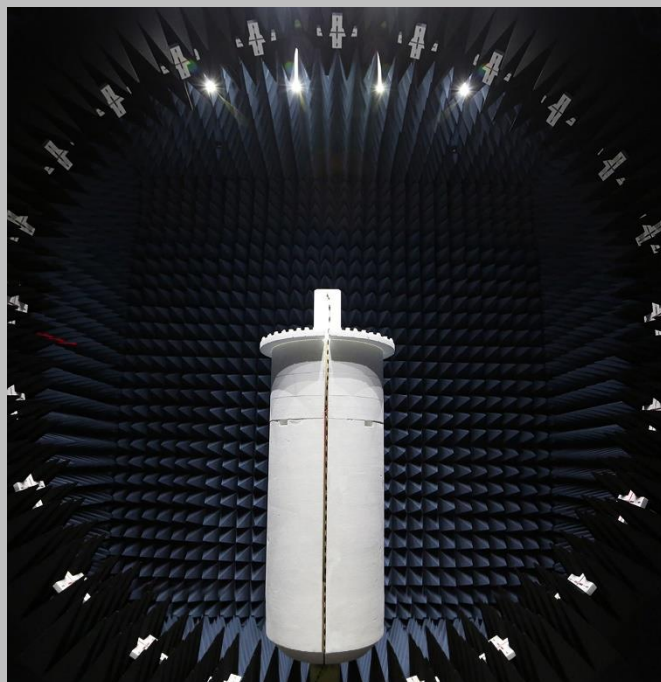
<http://portlandcustomer.element.com/ts/scope/scope.htm>

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

FACILITIES



California Labs OC01-17 41 Tesla Irvine, CA 92618 (949) 861-8918	Minnesota Labs MN01-10 9349 W Broadway Ave. Brooklyn Park, MN 55445 (612)-638-5136	New York Labs NY01-04 4939 Jordan Rd. Elbridge, NY 13060 (315) 554-8214	Oregon Labs EV01-12 6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	Texas Labs TX01-09 3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	Washington Labs NC01-05 19201 120 th Ave NE Bothell, WA 98011 (425)984-6600
NVLAP					
NVLAP Lab Code: 200676-0	NVLAP Lab Code: 200881-0	NVLAP Lab Code: 200761-0	NVLAP Lab Code: 200630-0	NVLAP Lab Code:201049-0	NVLAP Lab Code: 200629-0
Innovation, Science and Economic Development Canada					
2834B-1, 2834B-3	2834E-1, 2834E-3	N/A	2834D-1, 2834D-2	2834G-1	2834F-1
BSMI					
SL2-IN-E-1154R	SL2-IN-E-1152R	N/A	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI					
A-0029	A-0109	N/A	A-0108	A-0201	A-0110
Recognized Phase I CAB for ACMA, BSMI, IDA, KCC/RRR, MIC, MOC, NCC, OFCA					
US0158	US0175	N/A	US0017	US0191	US0157



MEASUREMENT UNCERTAINTY



Measurement Uncertainty

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

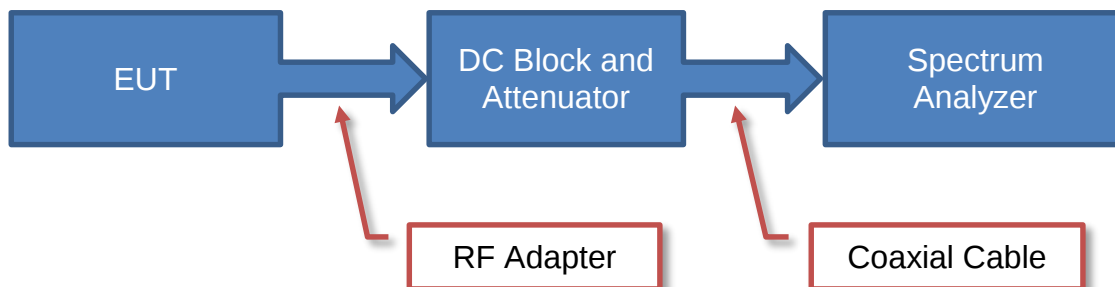
A measurement uncertainty estimation has been performed for each test per our internal quality document QM205.4.6. The estimation is used to compare the measured result with its "true" or theoretically correct value. The expanded measurement uncertainty (K=2) can be found included as part of the applicable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

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

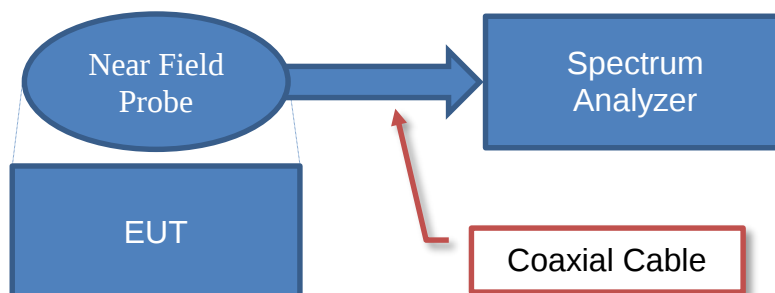
Test	+ MU	- MU
Frequency Accuracy (Hz)	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	0.3 dB	-0.3 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%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

Test Setup Block Diagrams

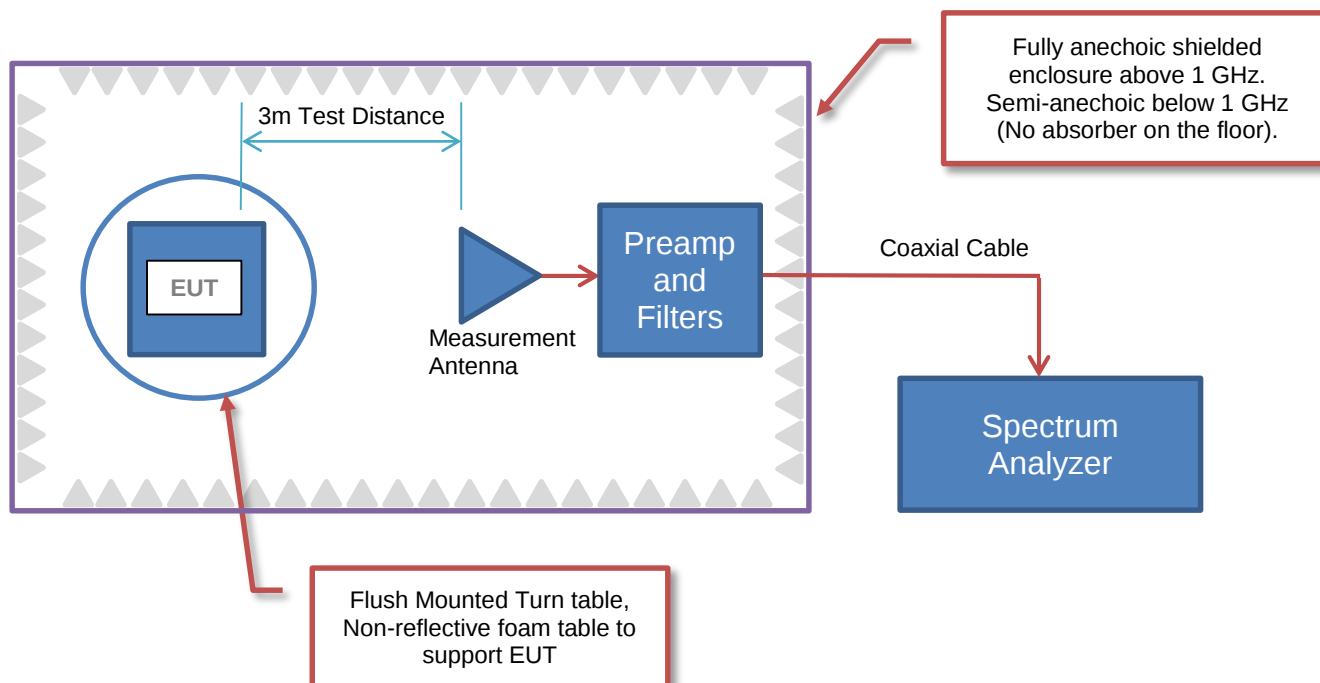
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions





PRODUCT DESCRIPTION

Client and Equipment Under Test (EUT) Information

Company Name:	Digi International Inc
Address:	11001 Bren Road East
City, State, Zip:	Minnetonka, MN 55343
Test Requested By:	Paul Millett
Model:	XB3C1
First Date of Test:	November 30, 2017
Last Date of Test:	December 12, 2017
Receipt Date of Samples:	November 30, 2017
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

Uses Serial UART and USB to communicate to module. Module transmits by BLE and/or Cellular antenna(s).

Testing Objective:

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

CONFIGURATIONS



Configuration DGII0257- 1

Software/Firmware Running during test	
Description	Version
XCTU	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
2.4GHz Wireless Module	Digi International Inc	XB3C1	P3

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Laptop	Lenovo	ThinkPad X201	R9-B306D 11/01
Development Board	Digi International Inc	XBIB-R-DEV Rev C	5028600049
Cellular PCB Antenna	Pulse	W3554 V05	None
2.4GHz PCB Antenna	Taoglas	FXP74	None
USB to Serial Adapter	Unknown	None	None
DC Power Supply	Agilent	U8002A	TPZ
Power Supply (Development Board)	Cincon Electronics Co., Ltd.	TR10R120	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	1.65m	No	DC Power Supply	Development Board
U.FL Cable (Cellular PCB Antenna)	No	0.15m	No	Cellular PCB Antenna	2.4GHz Wireless Module
U.FL Cable (2.4GHz PCB Antenna)	No	0.1m	No	2.4GHz PCB Antenna	2.4GHz Wireless Module
Serial Cable	No	1.8m	Yes	Development Board	USB to Serial Adapter
USB Cable (USB to Serial Adapter)	No	0.6m	No	Laptop	USB to Serial Adapter
USB Cable (Development Board)	No	1.9m	Yes	Laptop	Development Board
AC Cable (DC Power Supply)	No	1.8m	No	AC Mains	DC Power Supply
DC Cable (Development Board)	No	1.2m	No	Power Supply (Development Board)	Development Board

CONFIGURATIONS



Configuration DGII0257- 3

Software/Firmware Running during test	
Description	Version
XCTU	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
2.4GHz Wireless Module	Digi International Inc	XB3C1	P3
2.4GHz PCB Antenna	Taoglas	FXP74	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Development Board	Digi International Inc	XBIB-R-DEV Rev C	5028600049
Cellular PCB Antenna	Pulse	W3554 V05	None
Power Supply (Laptop)	Lenovo	92P1160	11S92P1160Z1ZBGH9338XW
USB to Serial Adapter	Unknown	None	None
DC Power Supply	EZ	GP-2303D	TQK
Power Supply (Development Board)	Cincon Electronics Co., Ltd.	TR10R120	None
Laptop	Lenovo	ThinkPad T400	7417TPU

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	1.65m	No	DC Power Supply	Development Board
U.FL Cable (Cellular PCB Antenna)	No	0.15m	No	Cellular PCB Antenna	2.4GHz Wireless Module
U.FL Cable (2.4GHz PCB Antenna)	No	0.1m	No	2.4GHz PCB Antenna	2.4GHz Wireless Module
AC Cable (Laptop)	No	1.0m	No	AC Mains	Power Supply (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop
Serial Cable	No	1.8m	Yes	Development Board	USB to Serial Adapter
USB Cable (USB to Serial Adapter)	No	0.6m	No	Laptop	USB to Serial Adapter
AC Cable (DC Power Supply)	No	1.8m	No	AC Mains	DC Power Supply
DC Cable (Development Board)	No	1.2m	No	Power Supply (Development Board)	Development Board

CONFIGURATIONS



Configuration DGII0257- 4

Software/Firmware Running during test	
Description	Version
XCTU	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
2.4GHz Wireless Module	Digi International Inc	XB3C1	P3
2.4GHz Dipole Antenna	Unknown	None	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Development Board	Digi International Inc	XBIB-R-DEV Rev C	5028600049
Cellular PCB Antenna	Pulse	W3554 V05	None
Power Supply (Laptop)	Lenovo	92P1160	11S92P1160Z1ZBGH9338XW
USB to Serial Adapter	Unknown	None	None
DC Power Supply	EZ	GP-2303D	TQK
Power Supply (Development Board)	Cincon Electronics Co., Ltd.	TR10R120	None
Laptop	Lenovo	ThinkPad T400	7417TPU

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	1.65m	No	DC Power Supply	Development Board
U.FL Cable (Cellular PCB Antenna)	No	0.15m	No	Cellular PCB Antenna	2.4GHz Wireless Module
U.FL Cable (2.4GHz Dipole Antenna)	No	0.1m	No	2.4GHz Dipole Antenna	2.4GHz Wireless Module
AC Cable (Laptop)	No	1.0m	No	AC Mains	Power Supply (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop
Serial Cable	No	1.8m	Yes	Development Board	USB to Serial Adapter
USB Cable (USB to Serial Adapter)	No	0.6m	No	Laptop	USB to Serial Adapter
AC Cable (DC Power Supply)	No	1.8m	No	AC Mains	DC Power Supply
DC Cable (Development Board)	No	1.2m	No	Power Supply (Development Board)	Development Board

CONFIGURATIONS



Configuration DGII0257- 5

Software/Firmware Running during test	
Description	Version
XCTU	

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
2.4GHz Wireless Module	Digi International Inc	XB3C1	P3

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
Development Board	Digi International Inc	XBIB-R-DEV Rev C	5028600049
Cellular PCB Antenna	Pulse	W3554 V05	None
2.4GHz Dipole Antenna	Unknown	None	None
Power Supply (Laptop)	Lenovo	92P1160	11S92P1160Z1ZBGH9338XW
USB to Serial Adapter	Unknown	None	None
DC Power Supply	EZ	GP-2303D	TQK
Power Supply (Development Board)	Cincon Electronics Co., Ltd.	TR10R120	None
Laptop	Lenovo	ThinkPad T400	7417TPU
XB3C1 Embedded Antenna	Digi International	XB3C1	P3

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
DC Leads	No	1.65m	No	DC Power Supply	Development Board
U.FL Cable (Cellular PCB Antenna)	No	0.15m	No	Cellular PCB Antenna	2.4GHz Wireless Module
U.FL Cable (2.4GHz Dipole Antenna)	No	0.1m	No	2.4GHz Dipole Antenna	2.4GHz Wireless Module
AC Cable (Laptop)	No	1.0m	No	AC Mains	Power Supply (Laptop)
DC Cable (Laptop)	No	1.8m	Yes	Power Supply (Laptop)	Laptop
Serial Cable	No	1.8m	Yes	Development Board	USB to Serial Adapter
USB Cable (USB to Serial Adapter)	No	0.6m	No	Laptop	USB to Serial Adapter
AC Cable (DC Power Supply)	No	1.8m	No	AC Mains	DC Power Supply
DC Cable (Development Board)	No	1.2m	No	Power Supply (Development Board)	Development Board

MODIFICATIONS



Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	11/30/2017	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	12/1/2017	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	12/12/2017	Occupied Bandwidth	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
4	12/12/2017	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.
5	12/12/2017	Power Spectral Density	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	12/12/2017	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.
7	12/12/2017	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



WTD.2017.07.11.1

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	Rohde & Schwarz	ESR7	ARI	6/4/2017	6/4/2018
Cable - Conducted Cable Assembly	Element	MNC, HGN, TYK	MNCA	1/27/2017	1/27/2018
LISN	Solar Electronics	9252-50-R-24-BNC	LIY	3/20/2017	3/20/2018

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

DGII0257-1

MODES INVESTIGATED

Transmitting BLE, 2440 MHz, 2 MHz BW

POWERLINE CONDUCTED EMISSIONS



EUT:	XB3C1	Work Order:	DGII0257
Serial Number:	None	Date:	11/30/2017
Customer:	Digi International Inc	Temperature:	22.9°C
Attendees:	None	Relative Humidity:	22.9%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0257-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	5	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

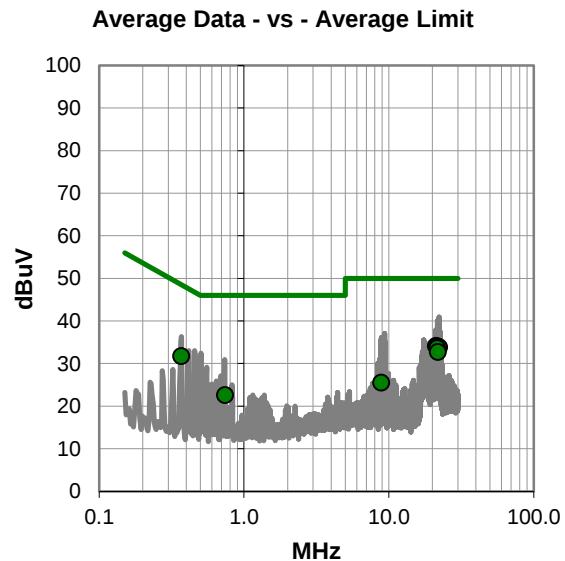
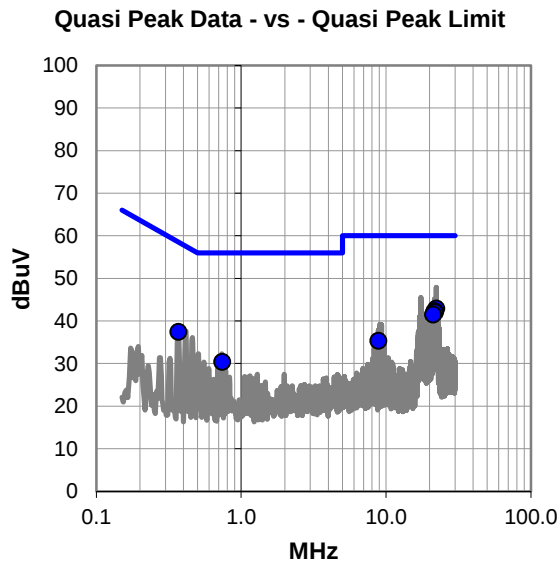
Testing on AC side of a DC power supply to the EUT (3.3VDC)

EUT OPERATING MODES

Transmitting BLE, 2440 MHz, 2 MHz BW

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #5

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.230	21.0	21.9	42.9	60.0	-17.1
21.642	20.4	21.8	42.2	60.0	-17.8
21.758	20.4	21.8	42.2	60.0	-17.8
21.871	20.2	21.8	42.0	60.0	-18.0
21.156	19.7	21.8	41.5	60.0	-18.5
0.369	17.2	20.2	37.4	58.5	-21.1
8.859	14.6	20.7	35.3	60.0	-24.7
0.739	10.1	20.3	30.4	56.0	-25.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
21.156	12.3	21.8	34.1	50.0	-15.9
21.758	12.2	21.8	34.0	50.0	-16.0
22.230	11.9	21.9	33.8	50.0	-16.2
21.642	11.8	21.8	33.6	50.0	-16.4
0.369	11.5	20.2	31.7	48.5	-16.8
21.871	10.9	21.8	32.7	50.0	-17.3
0.739	2.3	20.3	22.6	46.0	-23.4
8.859	4.8	20.7	25.5	50.0	-24.5

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	XB3C1	Work Order:	DGII0257
Serial Number:	None	Date:	11/30/2017
Customer:	Digi International Inc	Temperature:	22.9°C
Attendees:	None	Relative Humidity:	22.9%
Customer Project:	None	Bar. Pressure:	1021 mb
Tested By:	Dustin Sparks	Job Site:	MN03
Power:	110VAC/60Hz	Configuration:	DGII0257-1

TEST SPECIFICATIONS

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

TEST PARAMETERS

Run #:	6	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

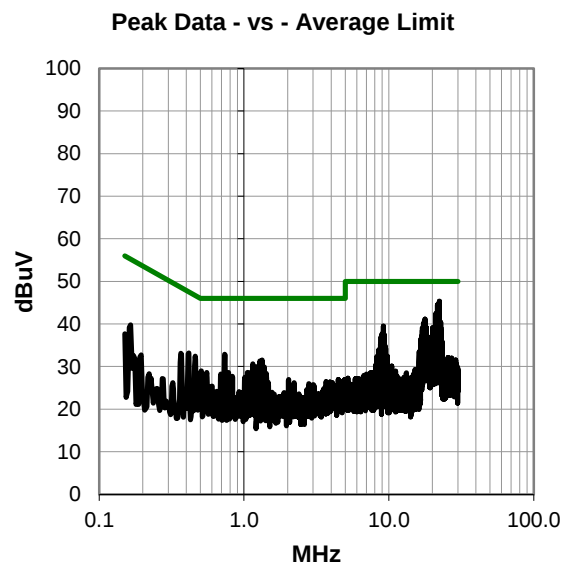
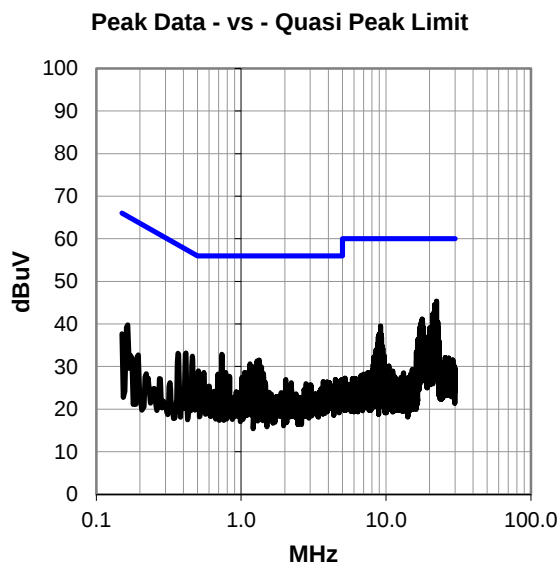
Testing on AC side of a DC power supply to the EUT (3.3VDC)

EUT OPERATING MODES

Transmitting BLE, 2440 MHz, 2 MHz BW

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #6

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.348	23.3	22.0	45.3	60.0	-14.7
21.639	22.7	21.8	44.5	60.0	-15.5
21.766	21.6	21.8	43.4	60.0	-16.6
22.262	21.2	22.0	43.2	60.0	-16.8
22.233	20.9	22.0	42.9	60.0	-17.1
21.729	21.0	21.8	42.8	60.0	-17.2
21.158	20.6	21.8	42.4	60.0	-17.6
21.266	20.6	21.8	42.4	60.0	-17.6
21.658	19.9	21.8	41.7	60.0	-18.3
21.863	19.8	21.8	41.6	60.0	-18.4
21.874	19.6	21.8	41.4	60.0	-18.6
17.770	19.6	21.5	41.1	60.0	-18.9
17.595	19.3	21.4	40.7	60.0	-19.3
17.901	19.2	21.5	40.7	60.0	-19.3
22.288	18.7	22.0	40.7	60.0	-19.3
22.844	18.4	22.0	40.4	60.0	-19.6
22.106	18.4	21.8	40.2	60.0	-19.8
17.394	18.7	21.4	40.1	60.0	-19.9
17.513	18.7	21.4	40.1	60.0	-19.9
21.893	18.2	21.8	40.0	60.0	-20.0
17.550	18.5	21.4	39.9	60.0	-20.1
17.856	18.4	21.5	39.9	60.0	-20.1
21.841	17.8	21.8	39.6	60.0	-20.4
9.182	18.8	20.7	39.5	60.0	-20.5
21.210	17.6	21.8	39.4	60.0	-20.6
21.233	17.6	21.8	39.4	60.0	-20.6

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
22.348	23.3	22.0	45.3	50.0	-4.7
21.639	22.7	21.8	44.5	50.0	-5.5
21.766	21.6	21.8	43.4	50.0	-6.6
22.262	21.2	22.0	43.2	50.0	-6.8
22.233	20.9	22.0	42.9	50.0	-7.1
21.729	21.0	21.8	42.8	50.0	-7.2
21.158	20.6	21.8	42.4	50.0	-7.6
21.266	20.6	21.8	42.4	50.0	-7.6
21.658	19.9	21.8	41.7	50.0	-8.3
21.863	19.8	21.8	41.6	50.0	-8.4
21.874	19.6	21.8	41.4	50.0	-8.6
17.770	19.6	21.5	41.1	50.0	-8.9
17.595	19.3	21.4	40.7	50.0	-9.3
17.901	19.2	21.5	40.7	50.0	-9.3
22.288	18.7	22.0	40.7	50.0	-9.3
22.844	18.4	22.0	40.4	50.0	-9.6
22.106	18.4	21.8	40.2	50.0	-9.8
17.394	18.7	21.4	40.1	50.0	-9.9
17.513	18.7	21.4	40.1	50.0	-9.9
21.893	18.2	21.8	40.0	50.0	-10.0
17.550	18.5	21.4	39.9	50.0	-10.1
17.856	18.4	21.5	39.9	50.0	-10.1
21.841	17.8	21.8	39.6	50.0	-10.4
9.182	18.8	20.7	39.5	50.0	-10.5
21.210	17.6	21.8	39.4	50.0	-10.6
21.233	17.6	21.8	39.4	50.0	-10.6

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. A direct connection was made between the RF output of the EUT and a spectrum analyzer. Attenuation and a DC block were used

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.

OCCUPIED BANDWIDTH



XMIT 2017.09.21

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
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR
Attenuator	S.M. Electronics	SA26B-20	RFW	14-Feb-17	14-Feb-18
Block - DC	Fairview Microwave	SD3379	AMI	12-Sep-17	12-Sep-18
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-17	12-Sep-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	19-Jun-17	19-Jun-18

TEST DESCRIPTION

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

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

OCCUPIED BANDWIDTH



THxTx 2017.10.04 XMt 2017.09.21

EUT: XB3C1		Work Order: DGII0257	
Serial Number: P3		Date: 12-Dec-17	
Customer: Digi International Inc		Temperature: 22.6 °C	
Attendees: None		Humidity: 19.4% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Kyle McMullan		Power: 3.3VDC	
TEST SPECIFICATIONS		Job Site: MN09	
FCC 15.247:2017		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Kyle McMullan</i>	

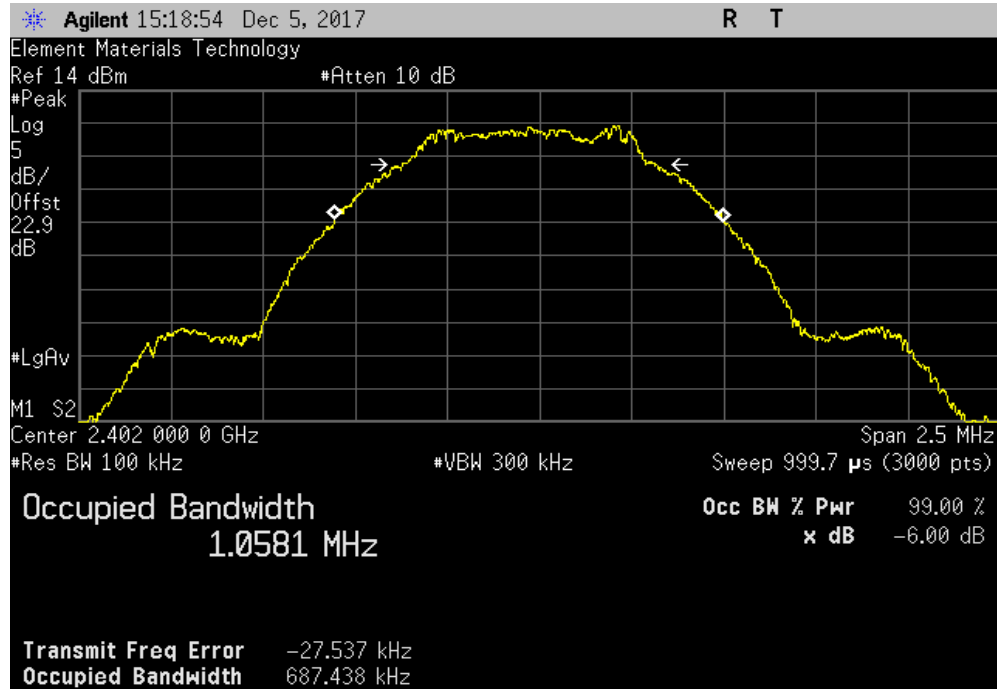
	Value	Limit (±)	Result
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW	687.438 kHz	500 kHz	Pass
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW	689.692 kHz	500 kHz	Pass
BLE/GFSK High Channel (2480 MHz), 1 MHz BW	689.838 kHz	500 kHz	Pass
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW	1.392 MHz	500 kHz	Pass
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW	1.406 MHz	500 kHz	Pass
BLE/GFSK High Channel (2478 MHz), 2 MHz BW	1.389 MHz	500 kHz	Pass

OCCUPIED BANDWIDTH

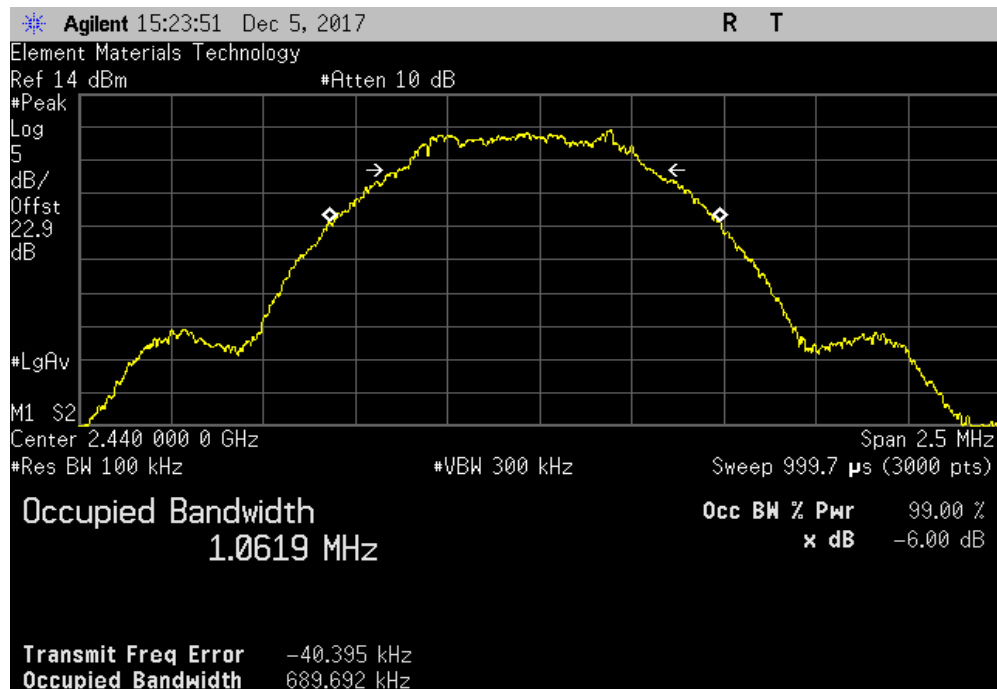


TMTx 2017.10.04 XMM 2017.09.21

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



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

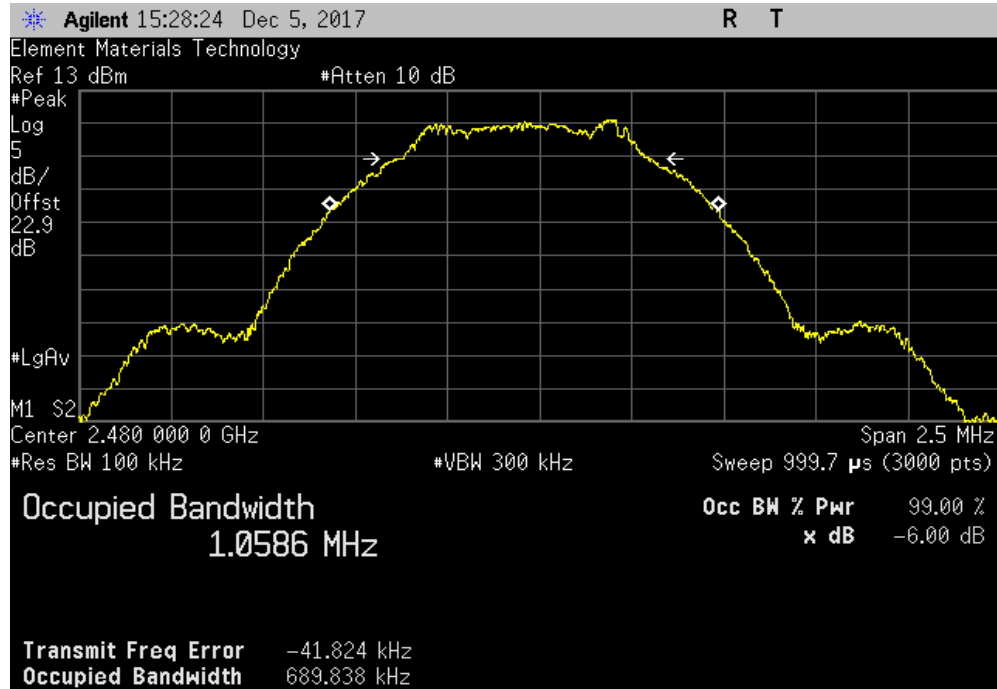


OCCUPIED BANDWIDTH

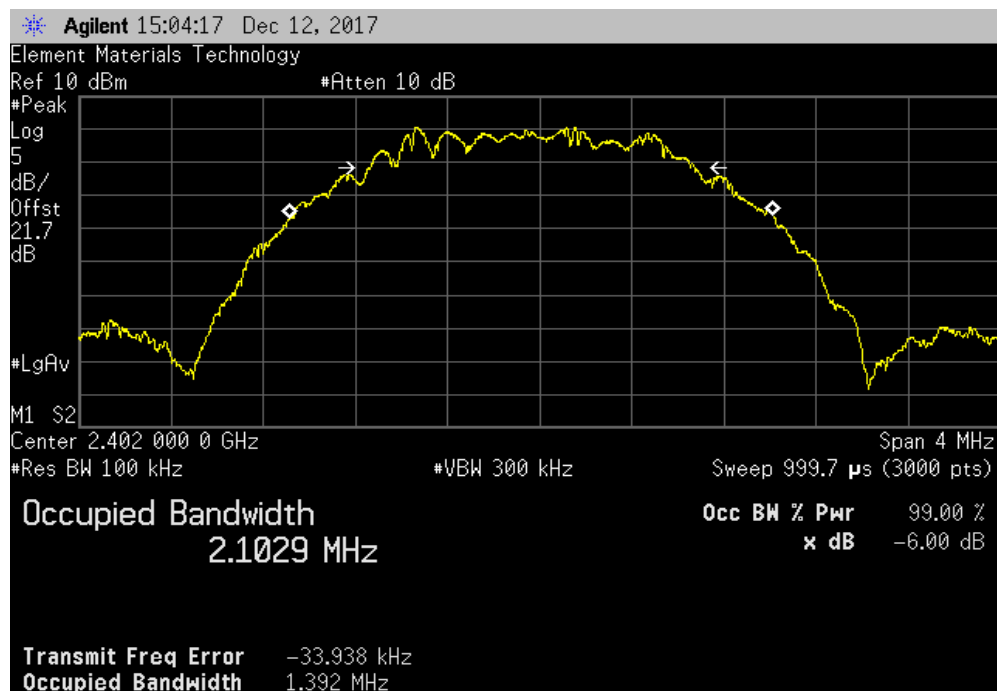


TMTx 2017.10.04 XMM 2017.09.21

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



BLE/GFSK Low Channel (2402 MHz), 2 MHz BW						
				Value	Limit (≥)	Result
				1.392 MHz	500 kHz	Pass

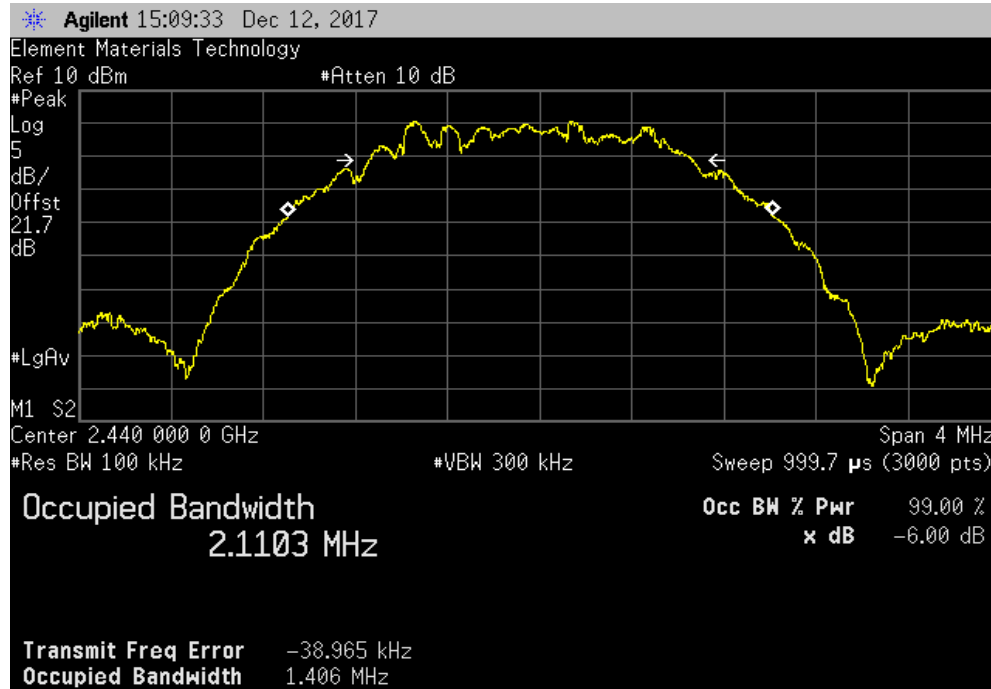


OCCUPIED BANDWIDTH

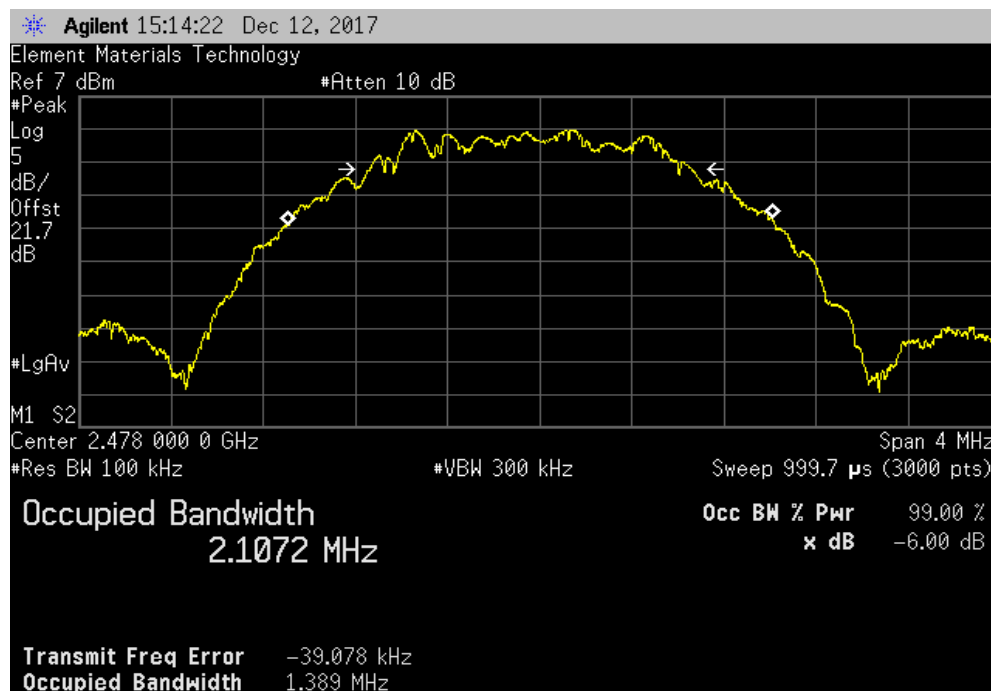


TMTx 2017.10.04 XMM 2017.09.21

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



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



OUTPUT POWER



XMI 2017.09.21

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
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR
Generator - Signal	Agilent	N5183A	TIK	29-Sep-17	29-Sep-20
Attenuator	S.M. Electronics	SA26B-20	RFW	14-Feb-17	14-Feb-18
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-17	12-Sep-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	19-Jun-17	19-Jun-18

TEST DESCRIPTION

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

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

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

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

OUTPUT POWER



THtTx 2017.10.04 XMtM 2017.09.21

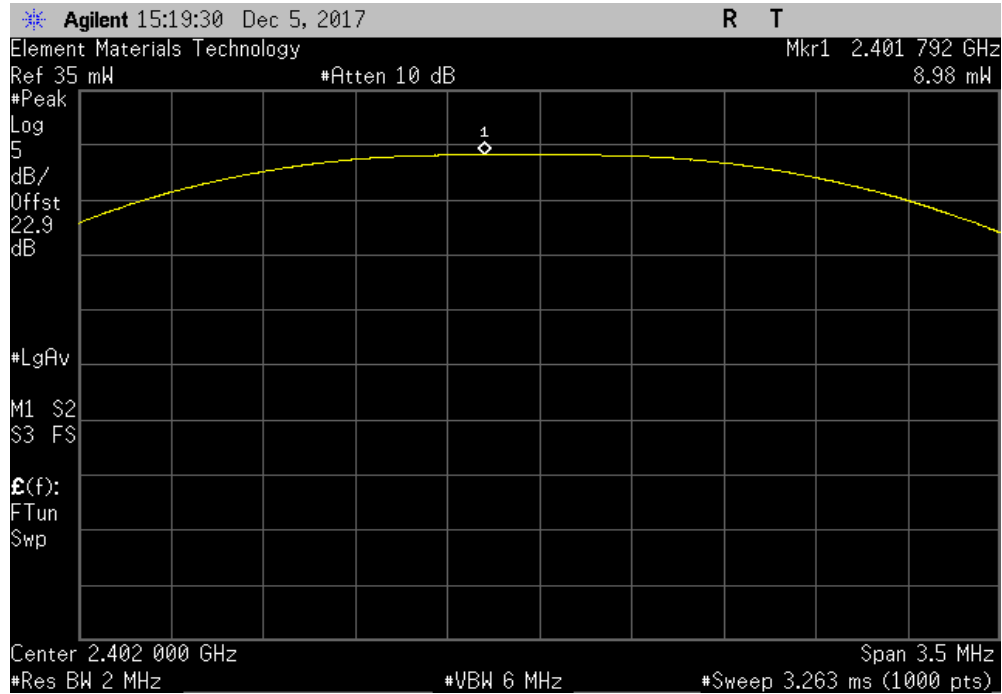
EUT: XB3C1		Work Order: DGII0257	
Serial Number: P3		Date: 12-Dec-17	
Customer: Digi International Inc		Temperature: 22.6 °C	
Attendees: None		Humidity: 19.5% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Kyle McMullan		Power: 3.3VDC	
		Job Site: MN09	
TEST SPECIFICATIONS			
FCC 15.247:2017		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Kyle McMullan</i>	
		Value	Limit (<) Result
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		8.98 mW	1 W Pass
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW		8.644 mW	1 W Pass
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		8.682 mW	1 W Pass
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		7.156 mW	1 W Pass
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW		7.143 mW	1 W Pass
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		3.262 mW	1 W Pass

OUTPUT POWER

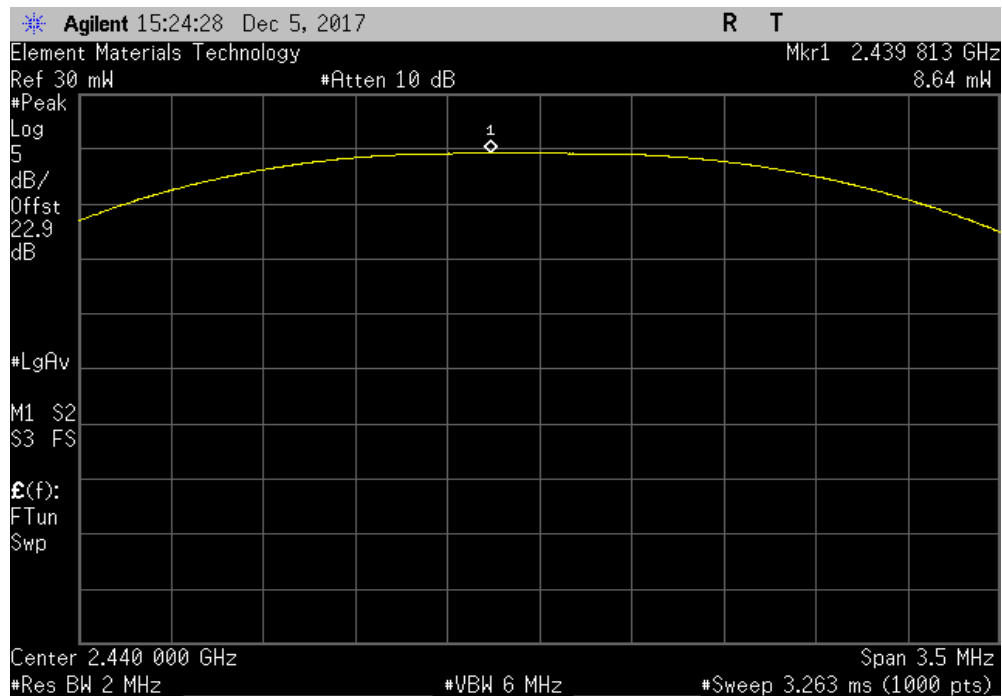


TMTx 2017.10.04 XMM 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 1 MHz BW						
				Value	Limit (<)	Result
				8.98 mW	1 W	Pass



BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW						
				Value	Limit (<)	Result
				8.644 mW	1 W	Pass

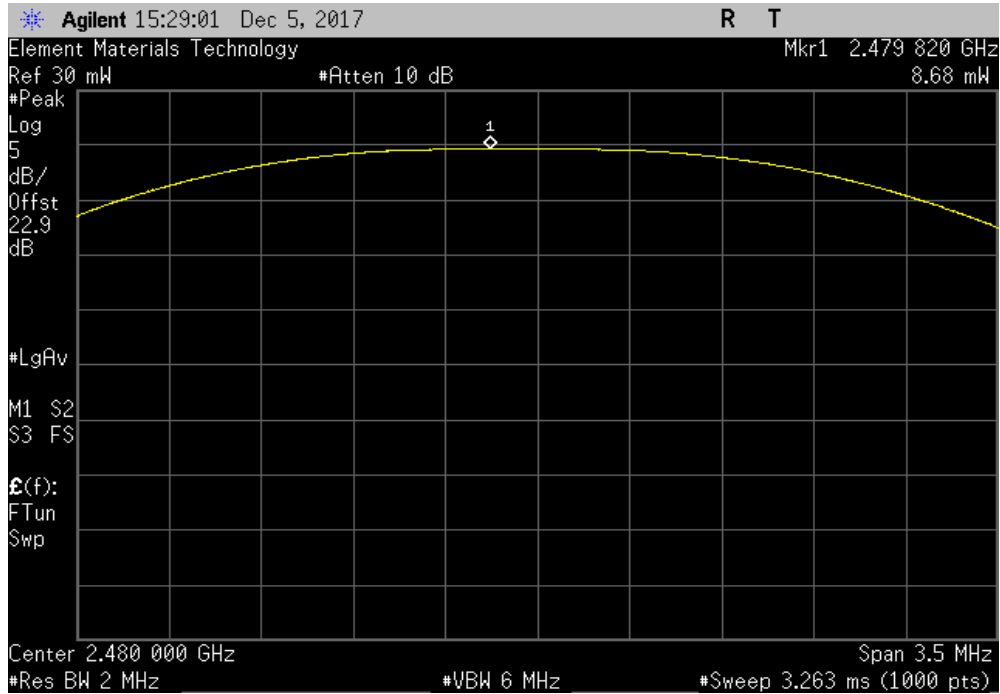


OUTPUT POWER

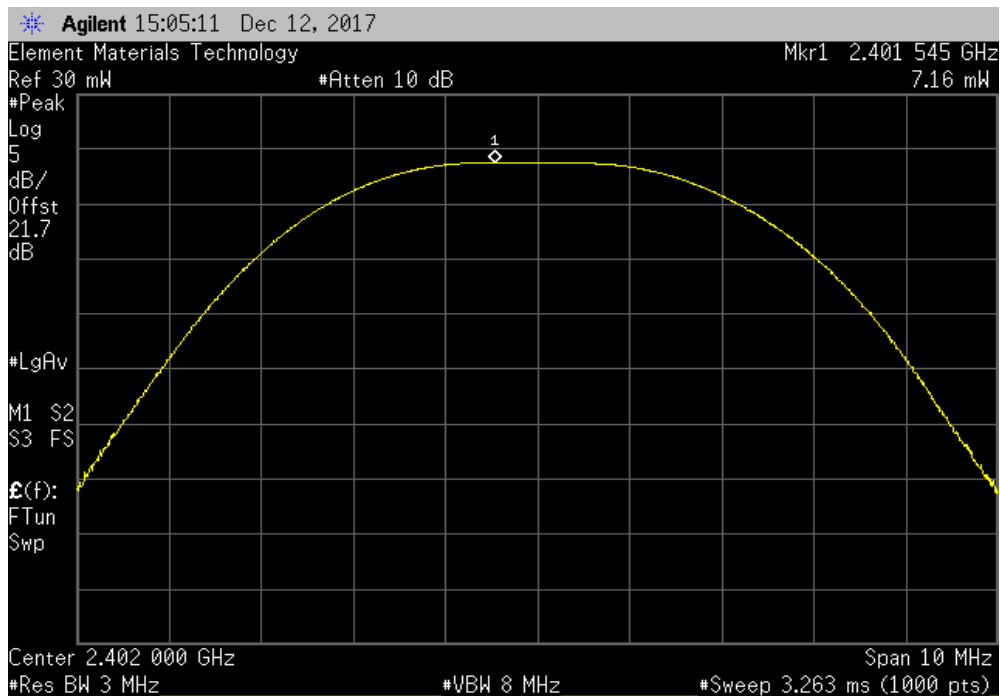


TMTx 2017.10.04 XMM 2017.09.21

BLE/GFSK High Channel (2480 MHz), 1 MHz BW						
				Value	Limit (<)	Result
				8.682 mW	1 W	Pass



BLE/GFSK Low Channel (2402 MHz), 2 MHz BW						
				Value	Limit (<)	Result
				7.156 mW	1 W	Pass

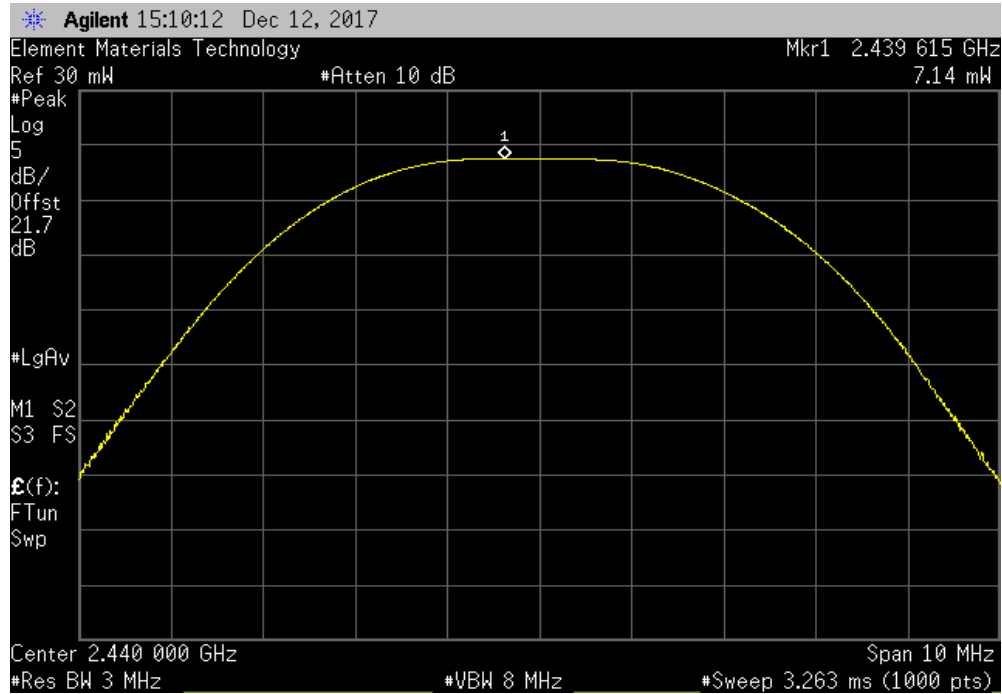


OUTPUT POWER

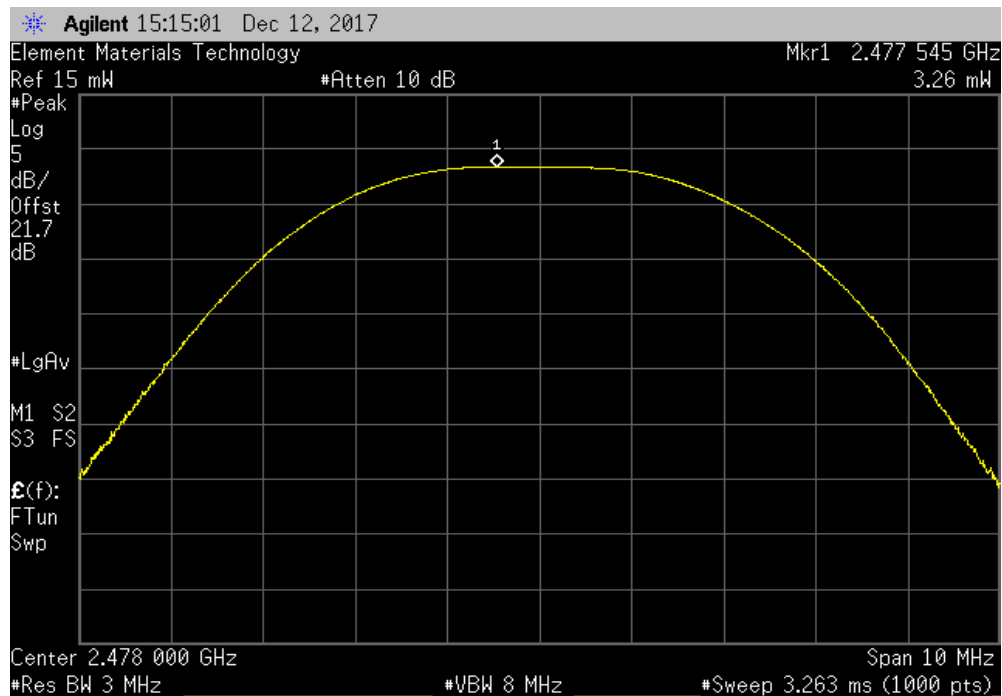


TMTx 2017.10.04 XMM 2017.09.21

BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW						
				Value	Limit (<)	Result
				7.143 mW	1 W	Pass



BLE/GFSK High Channel (2478 MHz), 2 MHz BW						
				Value	Limit (<)	Result
				3.262 mW	1 W	Pass



POWER SPECTRAL DENSITY



XMIT 2017.09.21

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
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR
Generator - Signal	Agilent	N5183A	TIK	29-Sep-17	29-Sep-20
Attenuator	S.M. Electronics	SA26B-20	RFW	14-Feb-17	14-Feb-18
Block - DC	Fairview Microwave	SD3379	AMI	12-Sep-17	12-Sep-18
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-17	12-Sep-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	19-Jun-17	19-Jun-18

TEST DESCRIPTION

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



THtTx 2017.10.04 XMtM 2017.09.21

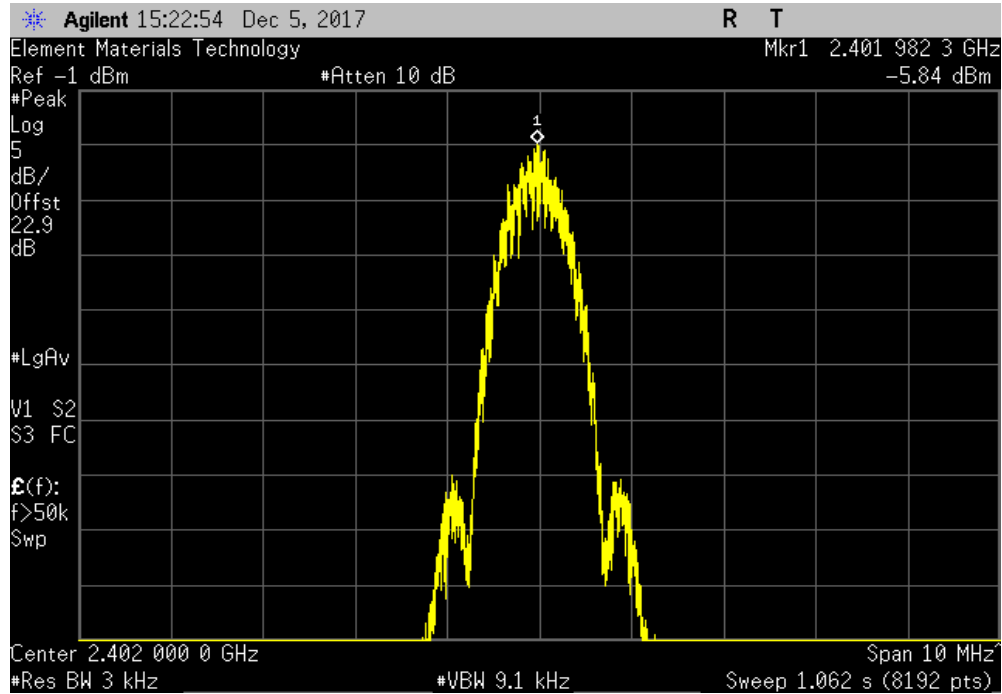
EUT: XB3C1		Work Order: DGII0257	
Serial Number: P3		Date: 12-Dec-17	
Customer: Digi International Inc		Temperature: 22.5 °C	
Attendees: None		Humidity: 19.3% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Kyle McMullan		Power: 3.3VDC	
Job Site: MN09			
TEST SPECIFICATIONS			
FCC 15.247:2017		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Kyle McMullan</i>	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		-5.841	8
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW		-6.047	8
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		-5.957	8
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		-13.769	8
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW		-13.778	8
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		-17.122	8
			Results
			Pass
			Pass
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

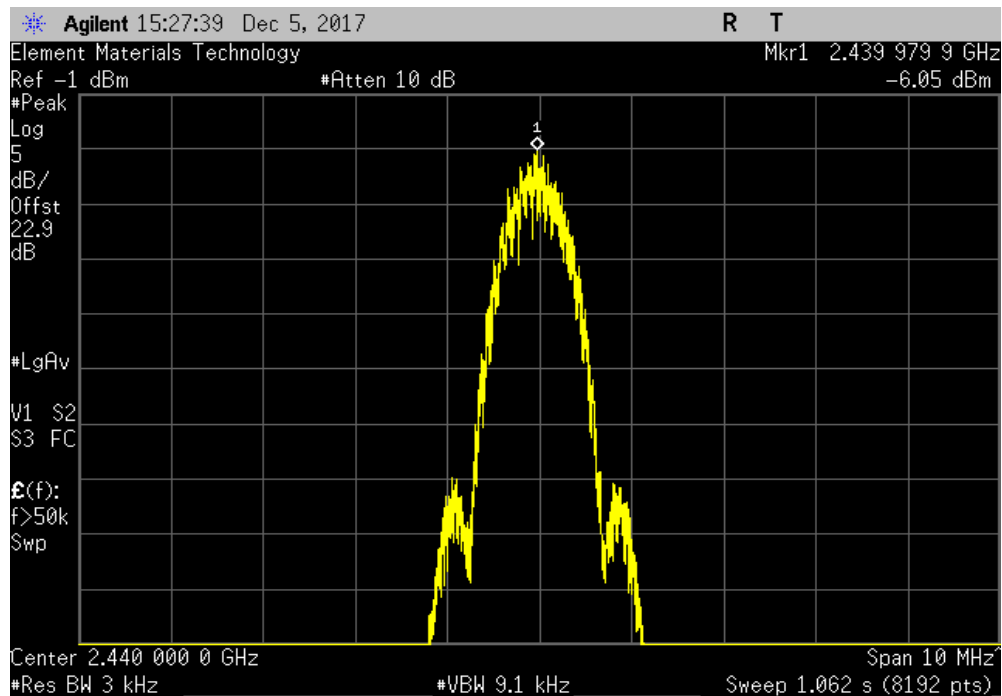


TMTX 2017.10.04 XMM 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 1 MHz BW						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-5.841	8	Pass			



BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-6.047	8	Pass			

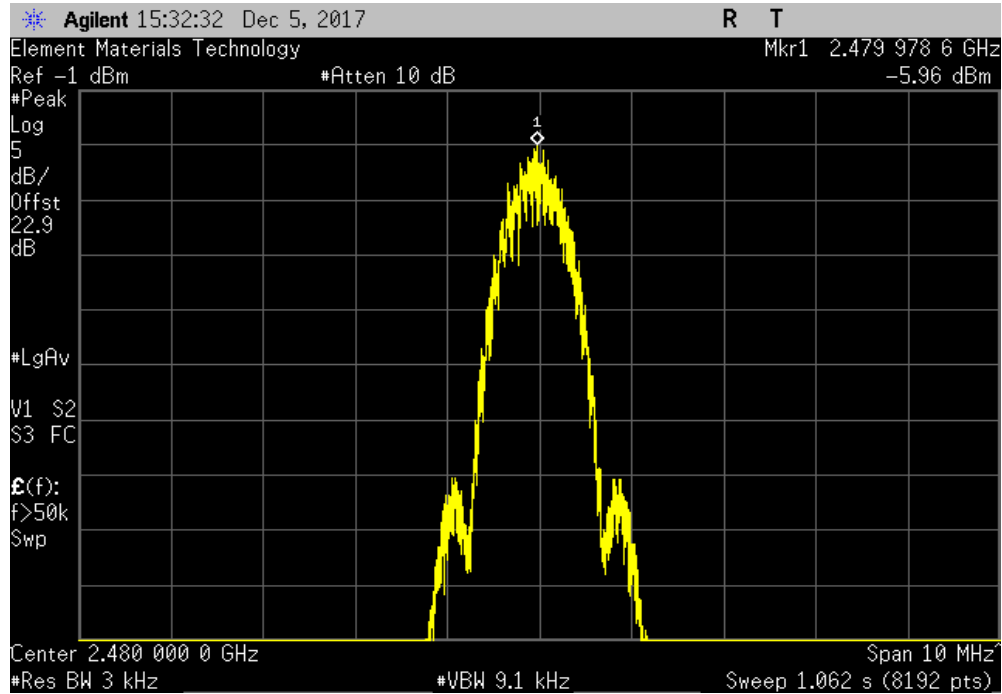


POWER SPECTRAL DENSITY

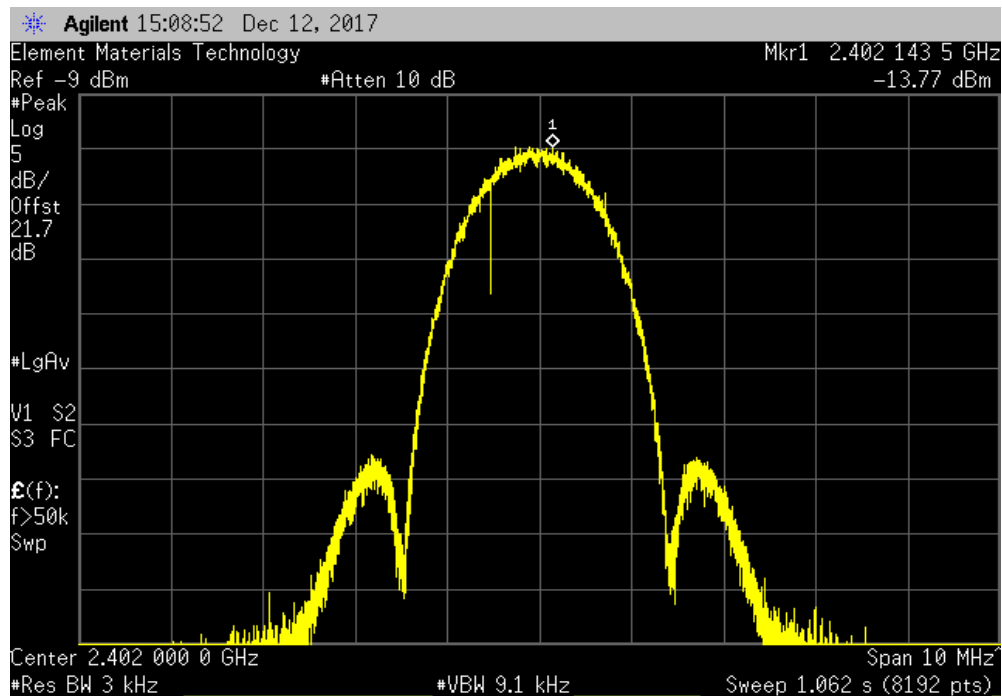


TMTx 2017.10.04 XMM 2017.09.21

BLE/GFSK High Channel (2480 MHz), 1 MHz BW						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-5.957	8	Pass



BLE/GFSK Low Channel (2402 MHz), 2 MHz BW						
				Value dBm/3kHz	Limit < dBm/3kHz	Results
				-13.769	8	Pass

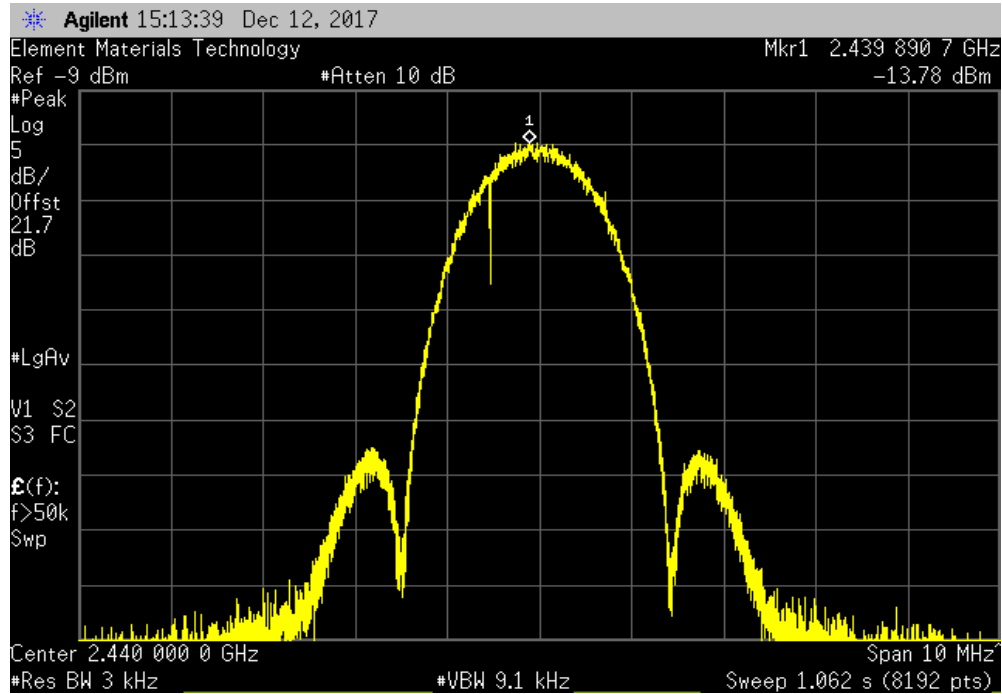


POWER SPECTRAL DENSITY

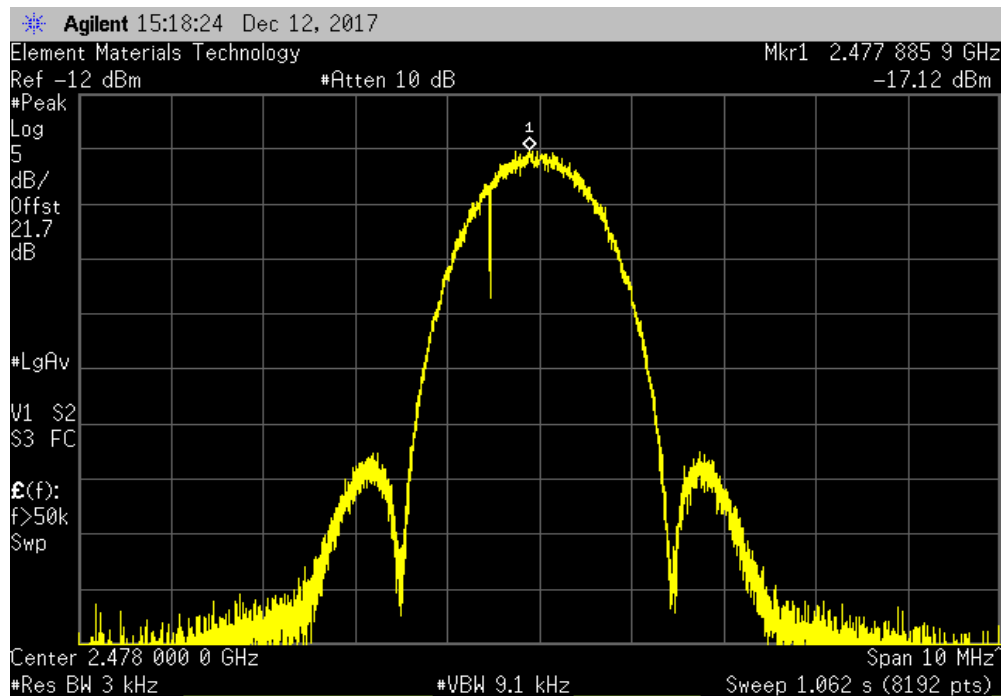


TMTx 2017.10.04 XMM 2017.09.21

BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-13.778	8	Pass



BLE/GFSK High Channel (2478 MHz), 2 MHz BW				Value	Limit	Results
				dBm/3kHz	< dBm/3kHz	
				-17.122	8	Pass



BAND EDGE COMPLIANCE



XMIT 2017.09.21

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
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR
Generator - Signal	Agilent	N5183A	TIK	29-Sep-17	29-Sep-20
Block - DC	Fairview Microwave	SD3379	AMI	12-Sep-17	12-Sep-18
Attenuator	S.M. Electronics	SA26B-20	RFW	14-Feb-17	14-Feb-18
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-17	12-Sep-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	19-Jun-17	19-Jun-18

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



THtTx 2017.10.04 XMtM 2017.09.21

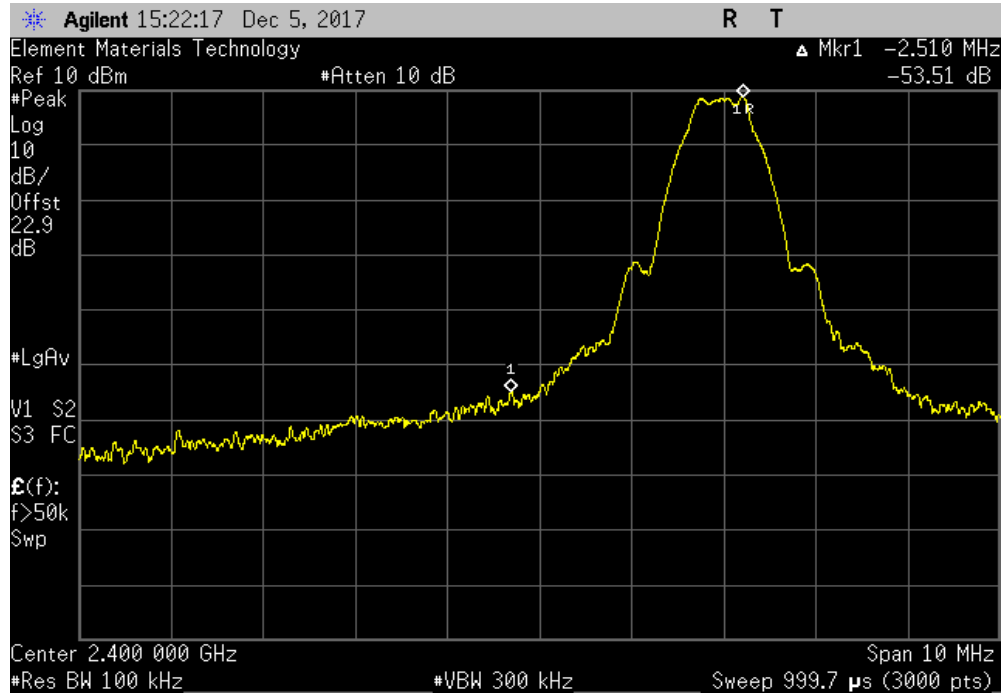
EUT: XB3C1		Work Order: DGII0257	
Serial Number: P3		Date: 12-Dec-17	
Customer: Digi International Inc		Temperature: 22.6 °C	
Attendees: None		Humidity: 19.3% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Kyle McMullan		Power: 3.3VDC	
		Job Site: MN09	
TEST SPECIFICATIONS			
FCC 15.247:2017		Test Method	
		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Kyle McMullan</i>	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		-53.51	-20 Pass
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		-57.58	-20 Pass
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		-31.31	-20 Pass
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		-48.33	-20 Pass

BAND EDGE COMPLIANCE

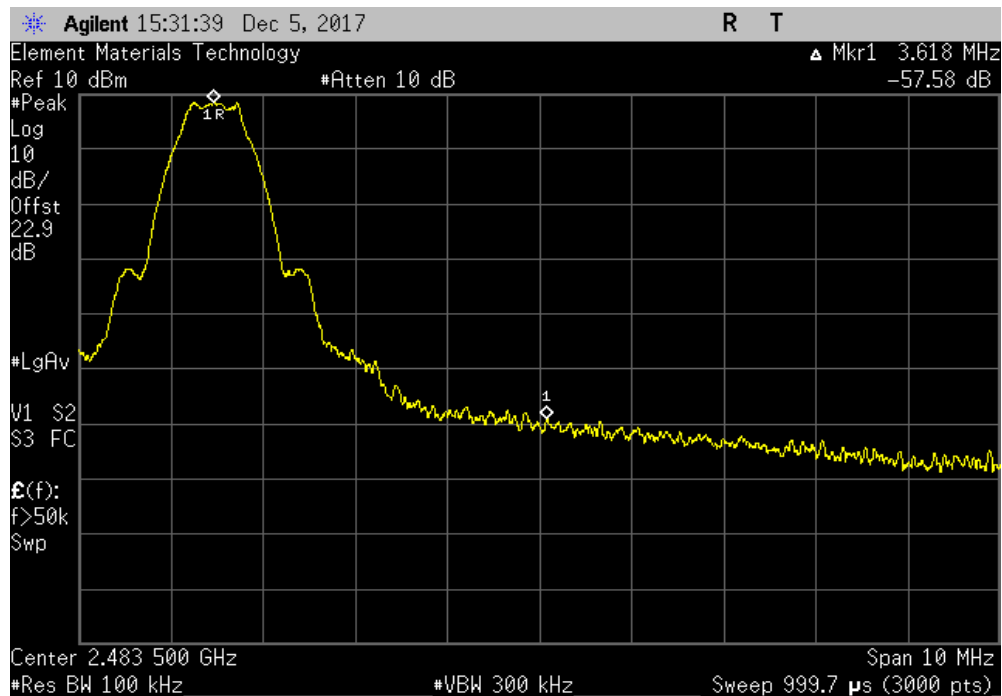


TMTX 2017.10.04 XMM 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 1 MHz BW						
				Value (dBc)	Limit ≤ (dBc)	Result
				-53.51	-20	Pass



BLE/GFSK High Channel (2480 MHz), 1 MHz BW						
				Value (dBc)	Limit ≤ (dBc)	Result
				-57.58	-20	Pass

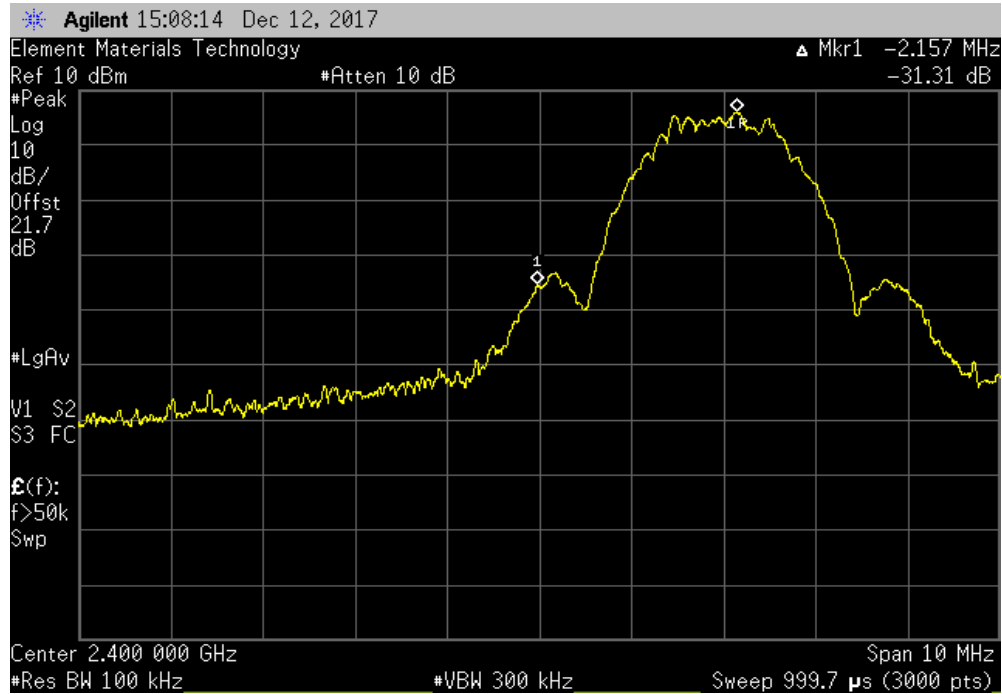


BAND EDGE COMPLIANCE

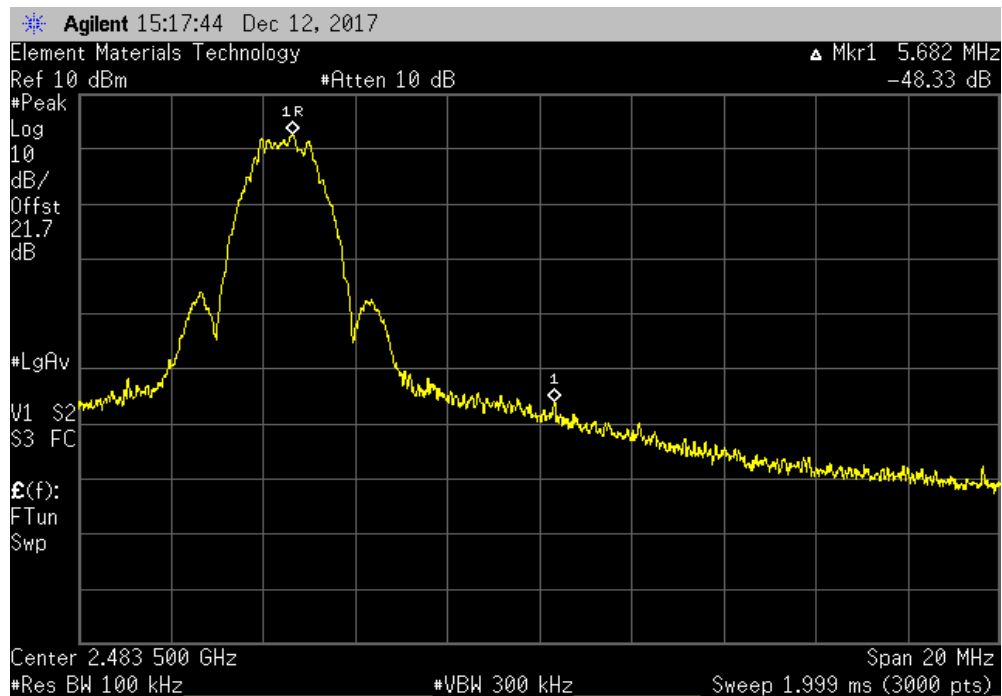


TMTX 2017.10.04 XMM 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 2 MHz BW						
				Value (dBc)	Limit ≤ (dBc)	Result
				-31.31	-20	Pass



BLE/GFSK High Channel (2478 MHz), 2 MHz BW						
				Value (dBc)	Limit ≤ (dBc)	Result
				-48.33	-20	Pass



SPURIOUS CONDUCTED EMISSIONS



XMit 2017.09.21

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
Power Supply - DC	EZ Digital Co., Ltd.	GP-4030D	TQK	NCR	NCR
Generator - Signal	Agilent	N5183A	TIK	29-Sep-17	29-Sep-20
Attenuator	S.M. Electronics	SA26B-20	RFW	14-Feb-17	14-Feb-18
Block - DC	Fairview Microwave	SD3379	AMI	12-Sep-17	12-Sep-18
Cable	ESM Cable Corp	TTBJ141 KMKM-72	MNP	12-Sep-17	12-Sep-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFG	19-Jun-17	19-Jun-18

TEST DESCRIPTION

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

SPURIOUS CONDUCTED EMISSIONS



ThxTx 2017.10.04 XMt 2017.09.21

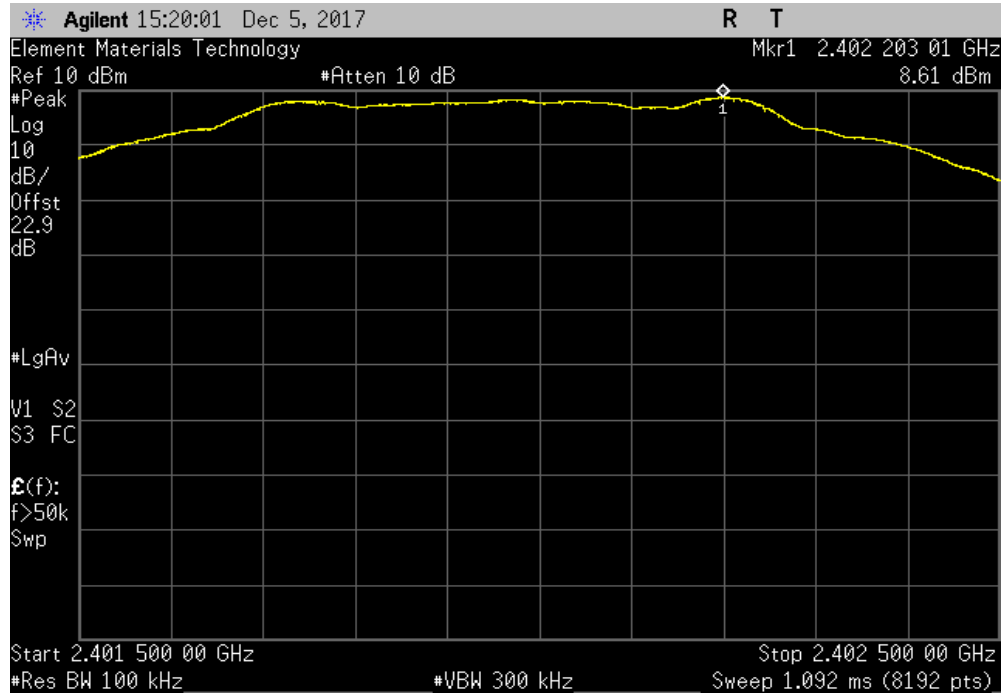
EUT: XB3C1		Work Order: DGII0257	
Serial Number: P3		Date: 12-Dec-17	
Customer: Digi International Inc		Temperature: 22.5 °C	
Attendees: None		Humidity: 19.6% RH	
Project: None		Barometric Pres.: 1018 mbar	
Tested by: Kyle McMullan		Power: 3.3VDC	
Job Site: MN09			
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2017		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	4	Signature <i>Kyle McMullan</i>	
		Frequency Range	Max Value (dBc)
		Limit ≤ (dBc)	Result
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		Fundamental	N/A
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		30 MHz - 12.5 GHz	-59.6
BLE/GFSK Low Channel (2402 MHz), 1 MHz BW		12.5 GHz - 25 GHz	-59.93
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW		Fundamental	N/A
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW		30 MHz - 12.5 GHz	-64.26
BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW		12.5 GHz - 25 GHz	-59.37
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		Fundamental	N/A
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		30 MHz - 12.5 GHz	-64.05
BLE/GFSK High Channel (2480 MHz), 1 MHz BW		12.5 GHz - 25 GHz	-59.85
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		Fundamental	N/A
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		30 MHz - 12.5 GHz	-50.44
BLE/GFSK Low Channel (2402 MHz), 2 MHz BW		12.5 GHz - 25 GHz	-53.61
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW		Fundamental	N/A
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW		30 MHz - 12.5 GHz	-60.98
BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW		12.5 GHz - 25 GHz	-55.31
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		Fundamental	N/A
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		30 MHz - 12.5 GHz	-57.57
BLE/GFSK High Channel (2478 MHz), 2 MHz BW		12.5 GHz - 25 GHz	-52.22

SPURIOUS CONDUCTED EMISSIONS

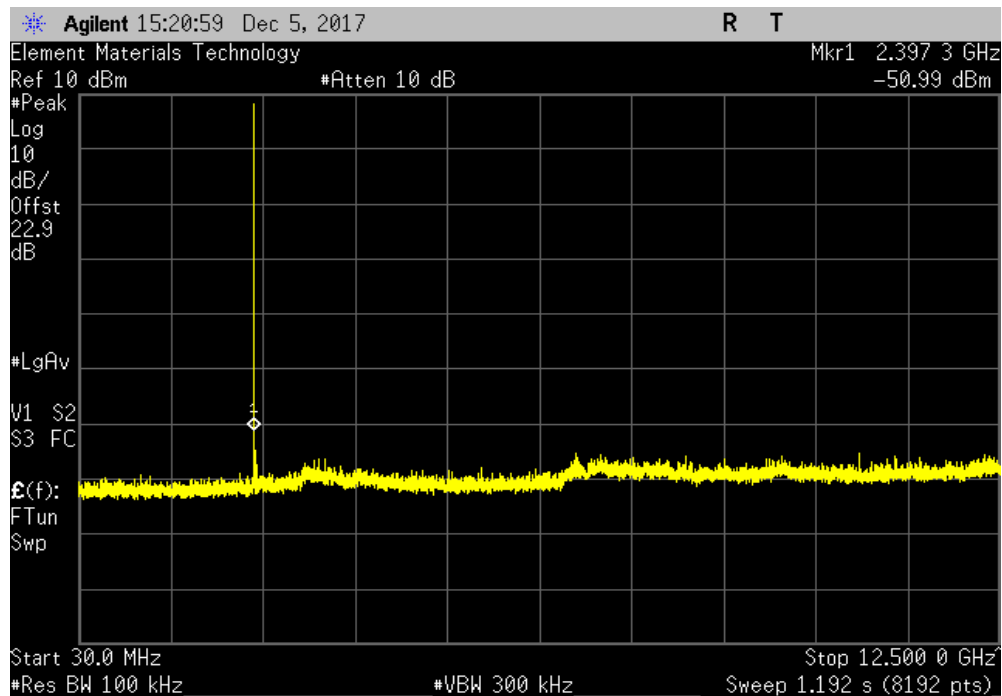


TMTx 2017.10.04 XMI 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 1 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



BLE/GFSK Low Channel (2402 MHz), 1 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-59.6		-20	Pass	

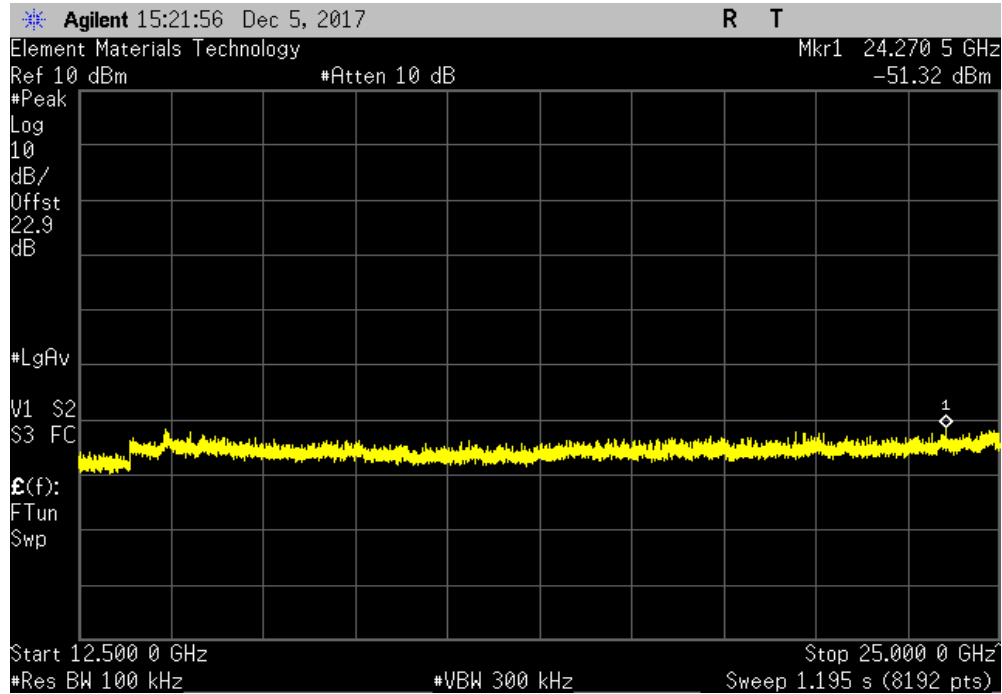


SPURIOUS CONDUCTED EMISSIONS

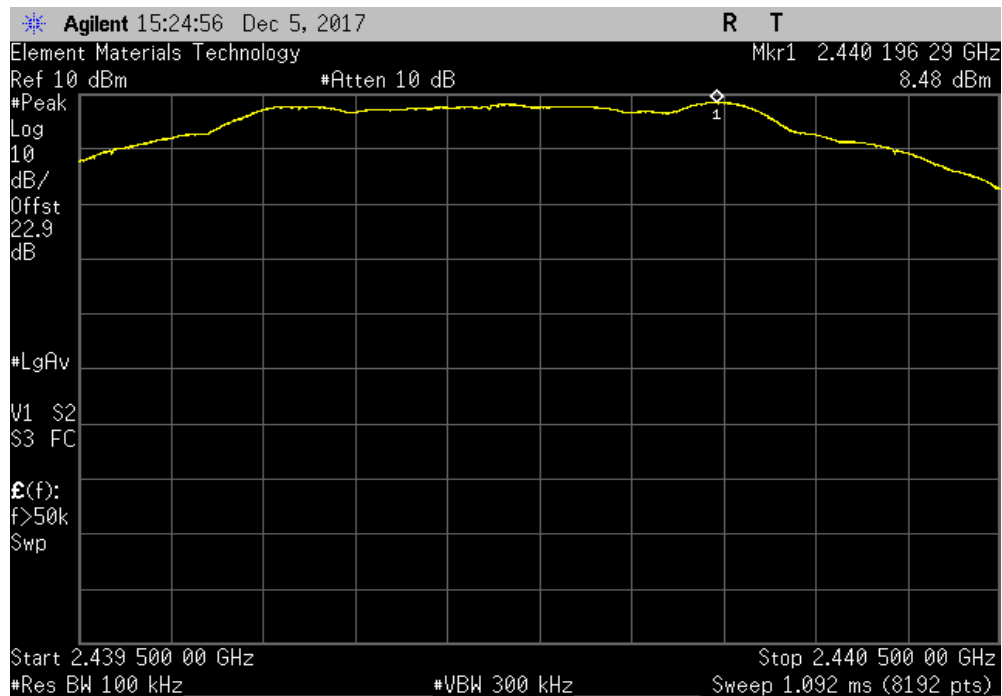


TMTX 2017.10.04 XMI 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 1 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-59.93	-20	Pass	



BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

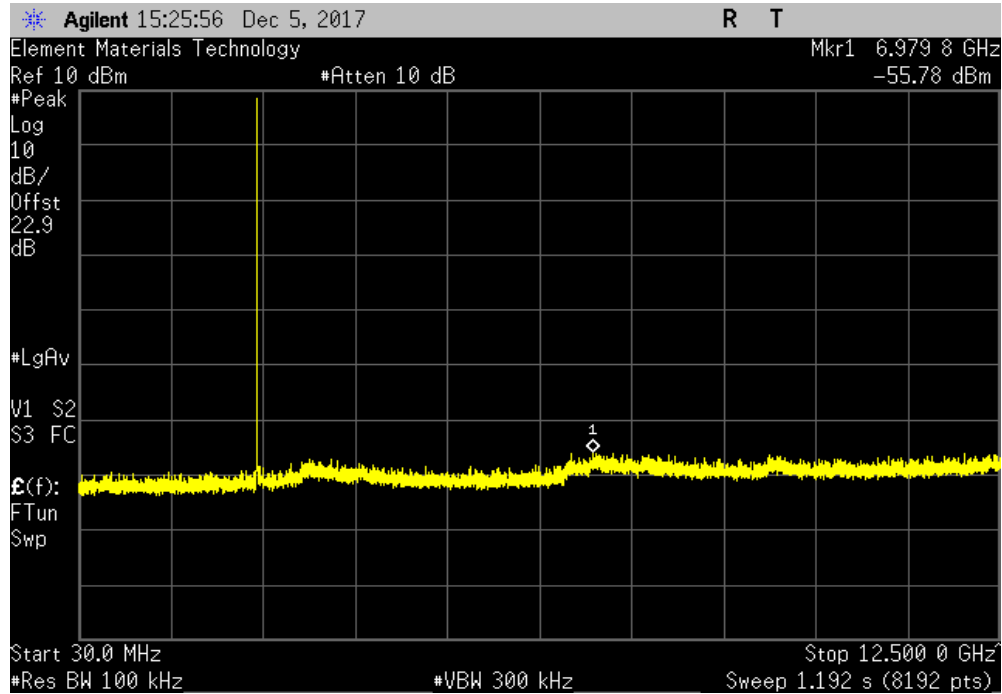


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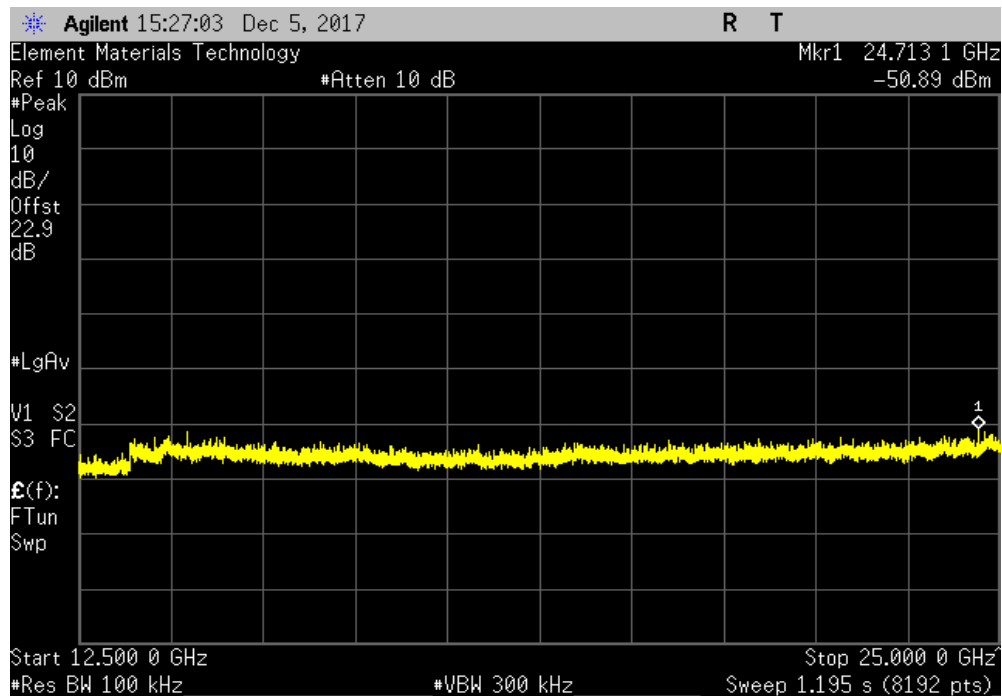


TMTX 2017.10.04 XMI 2017.09.21

BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-64.26	-20	Pass	



BLE/GFSK Mid Channel (2440 MHz), 1 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-59.37	-20	Pass	

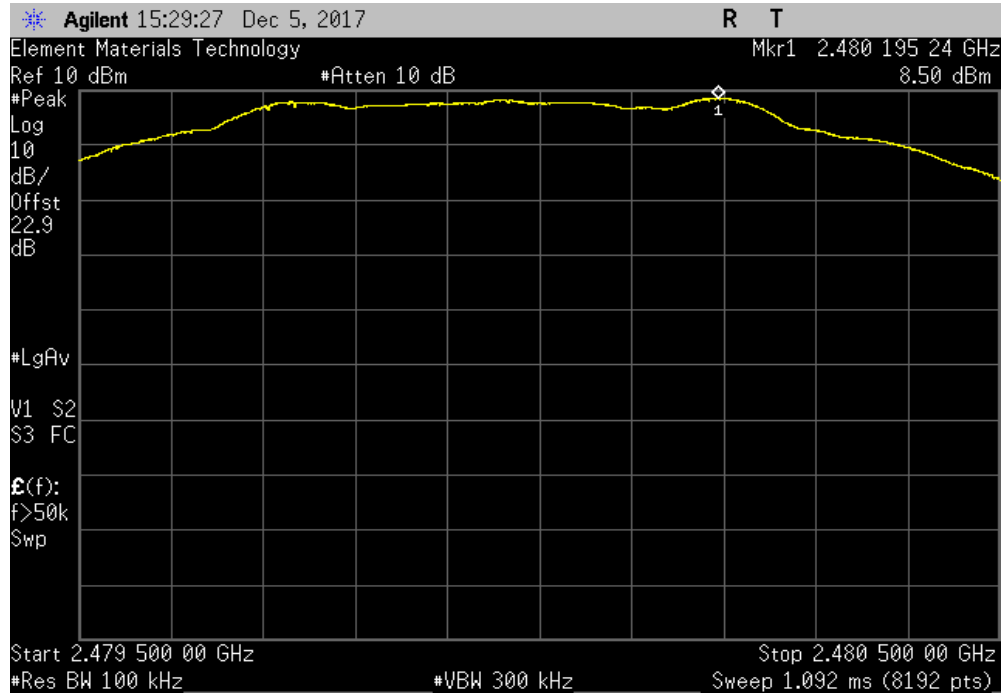


SPURIOUS CONDUCTED EMISSIONS

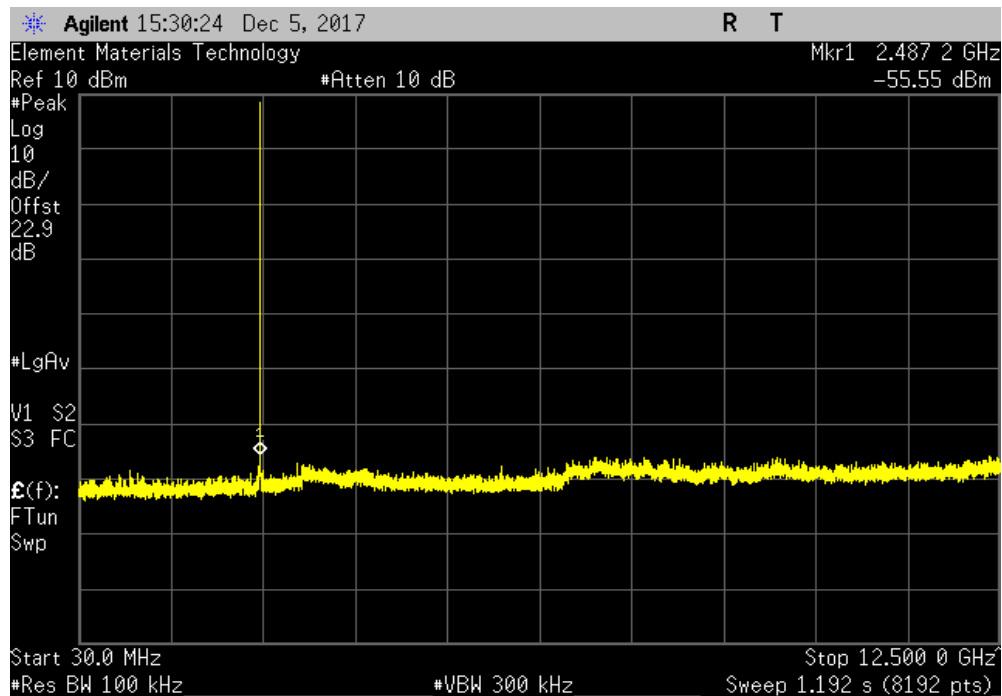


TMTX 2017.10.04 XMI 2017.09.21

BLE/GFSK High Channel (2480 MHz), 1 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



BLE/GFSK High Channel (2480 MHz), 1 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-64.05		-20	Pass	

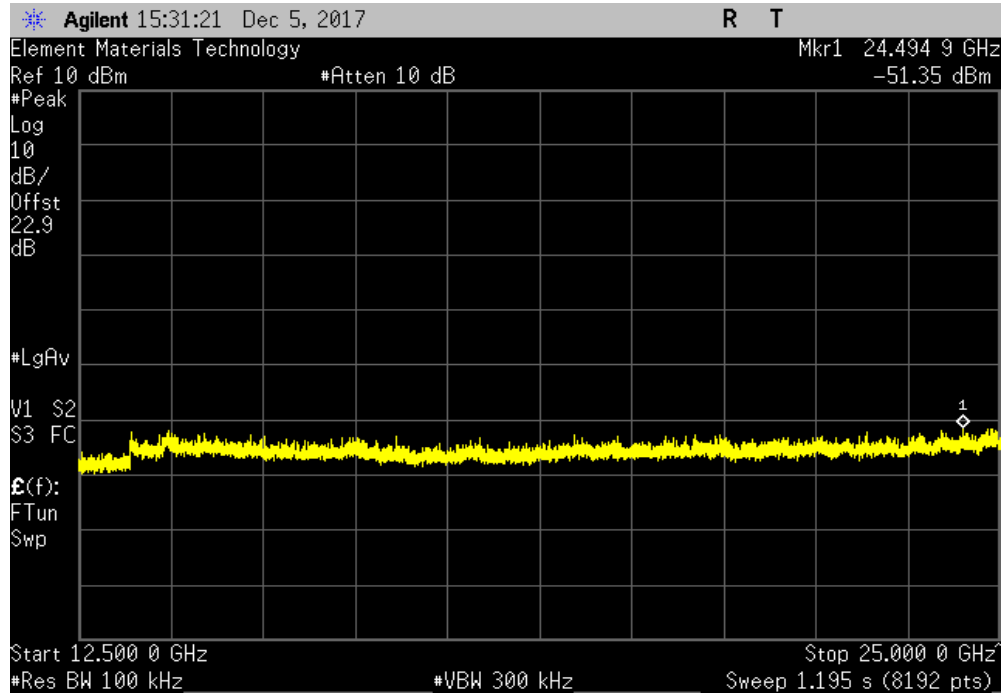


SPURIOUS CONDUCTED EMISSIONS

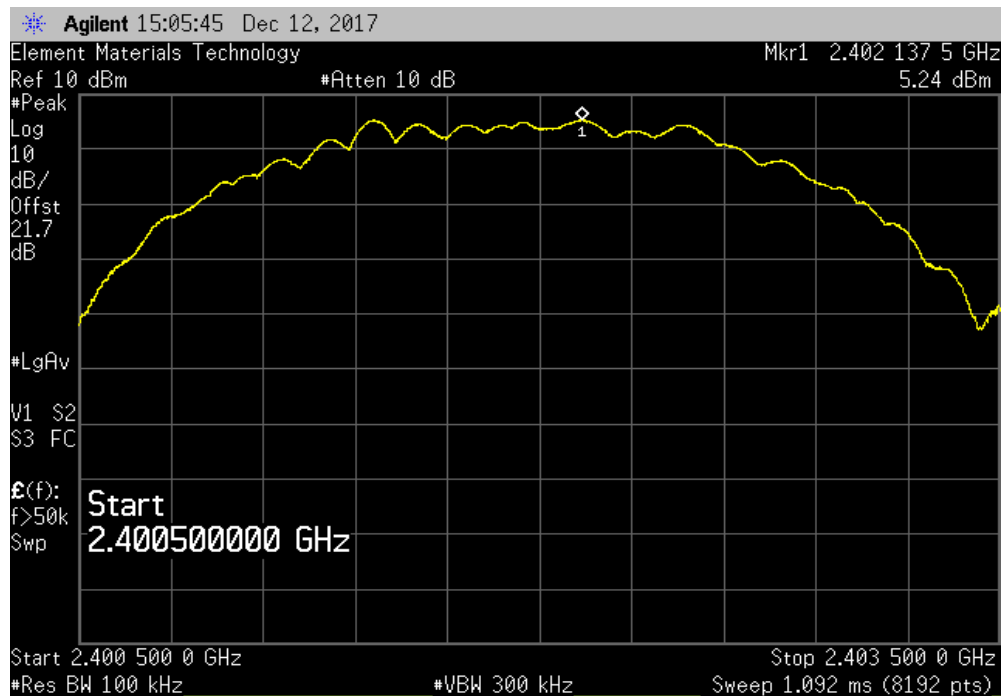


TMTx 2017.10.04 XMI 2017.09.21

BLE/GFSK High Channel (2480 MHz), 1 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-59.85	-20	Pass	



BLE/GFSK Low Channel (2402 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

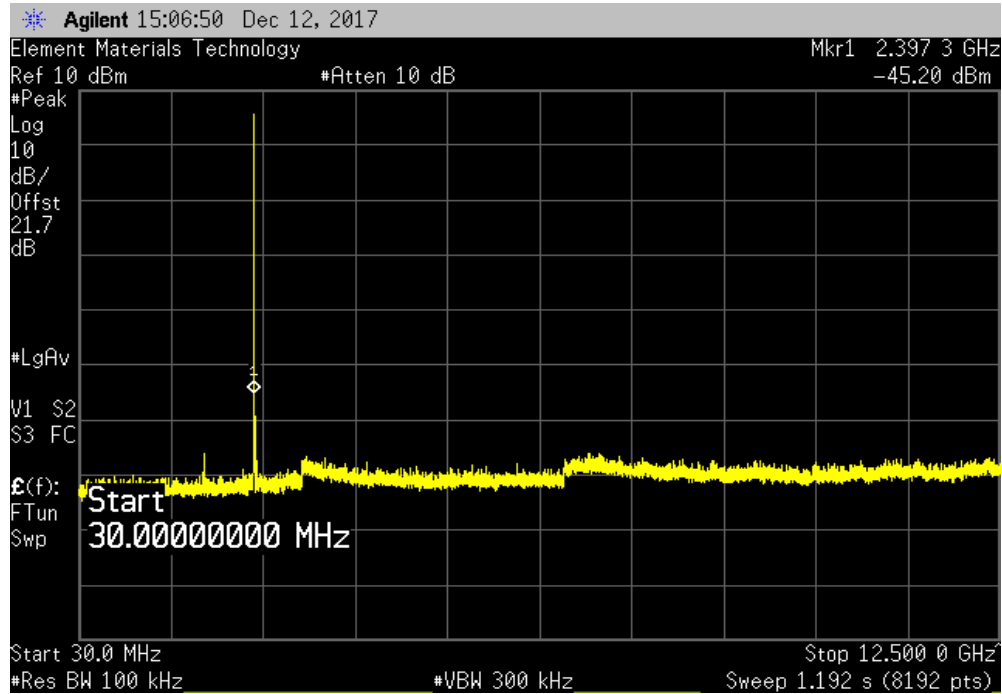


SPURIOUS CONDUCTED EMISSIONS

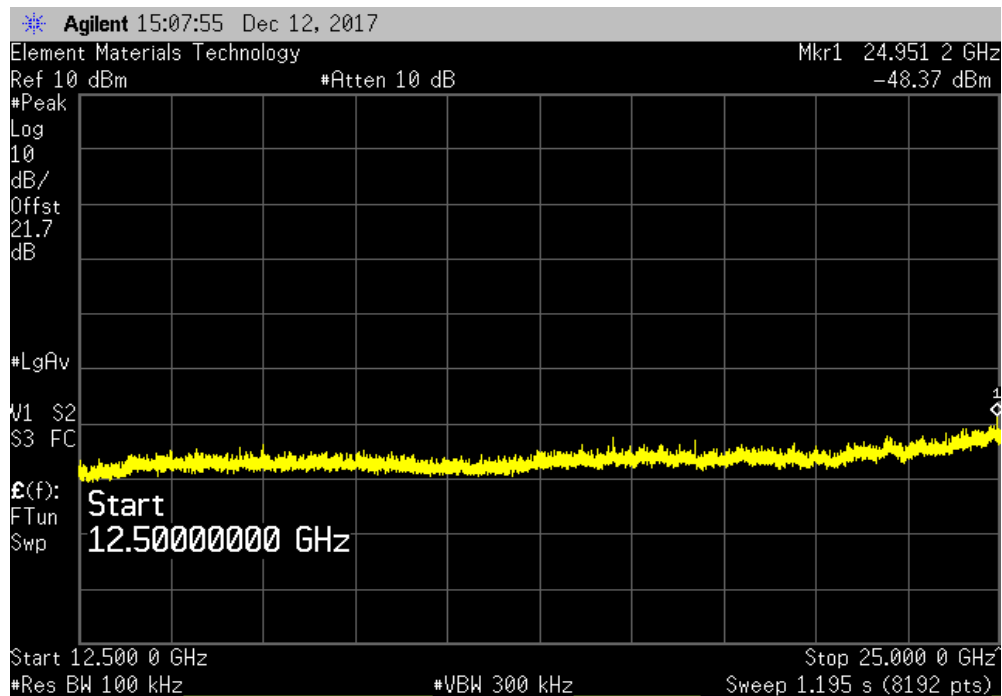


TMTx 2017.10.04 XMI 2017.09.21

BLE/GFSK Low Channel (2402 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-50.44	-20	Pass	



BLE/GFSK Low Channel (2402 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-53.61	-20	Pass	

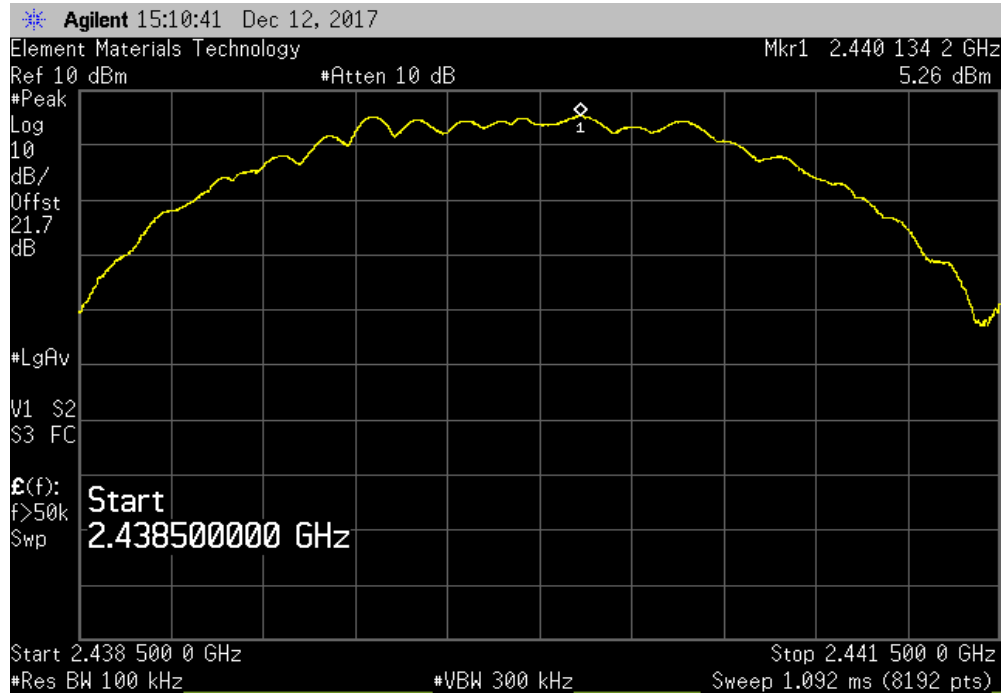


SPURIOUS CONDUCTED EMISSIONS

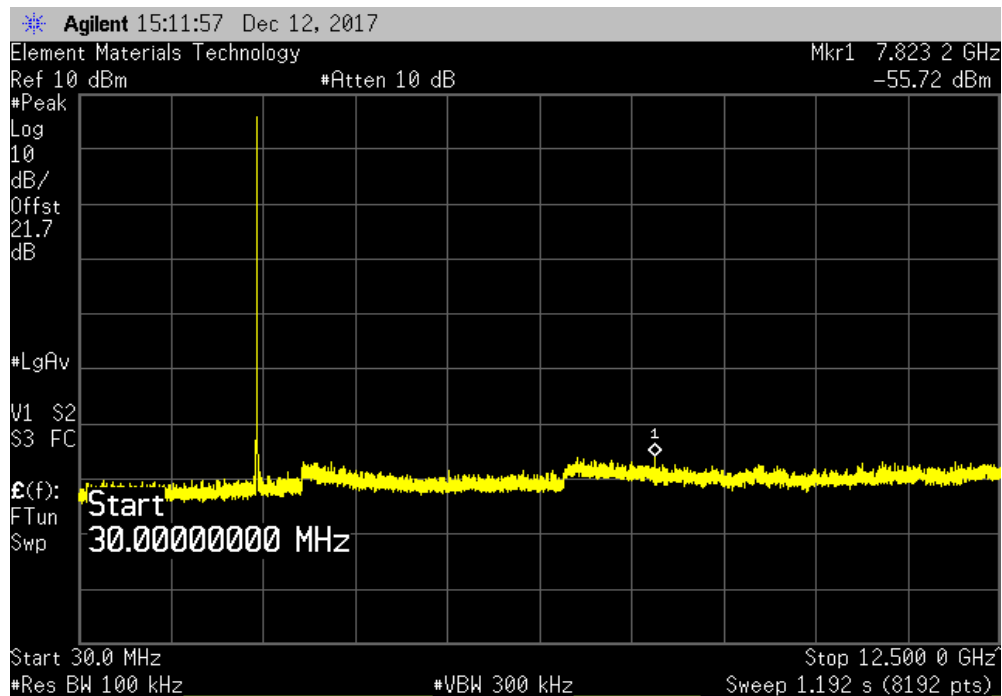


TMTX 2017.10.04 XMI 2017.09.21

BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
Fundamental		N/A		N/A	N/A	



BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW						
Frequency Range		Max Value (dBc)		Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz		-60.98		-20	Pass	

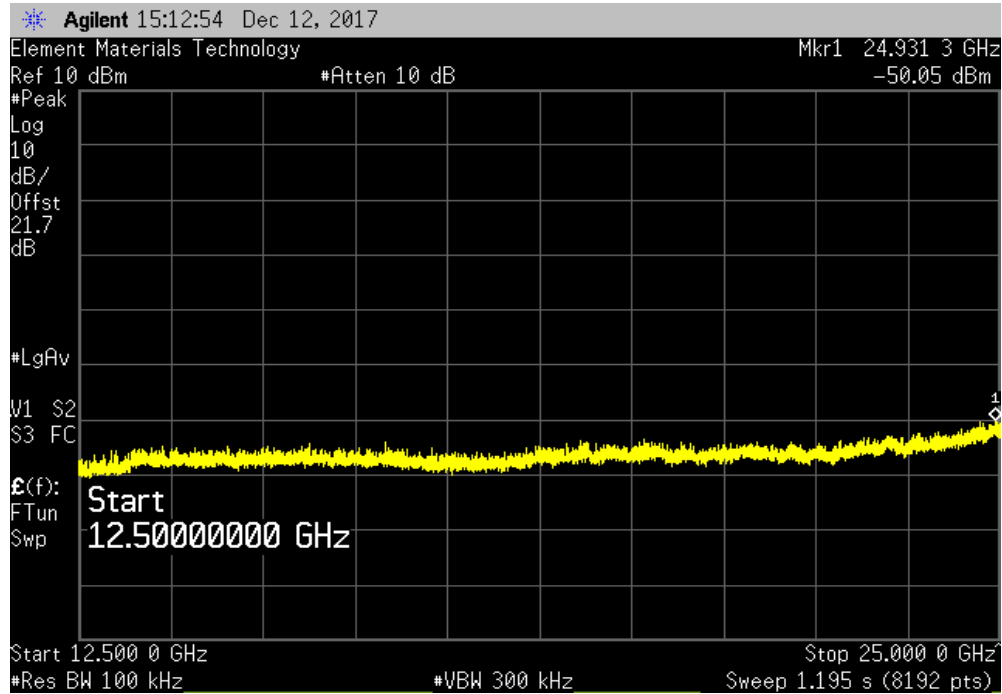


SPURIOUS CONDUCTED EMISSIONS

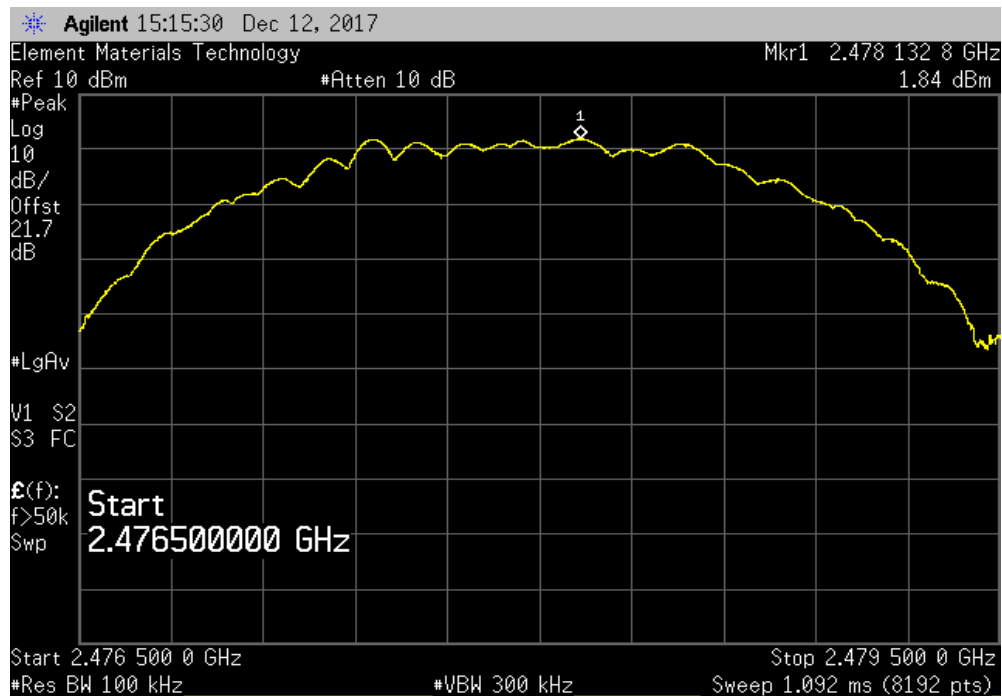


TMTx 2017.10.04 XMI 2017.09.21

BLE/GFSK Mid Channel (2440 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-55.31	-20	Pass	



BLE/GFSK High Channel (2478 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	N/A	N/A	N/A	

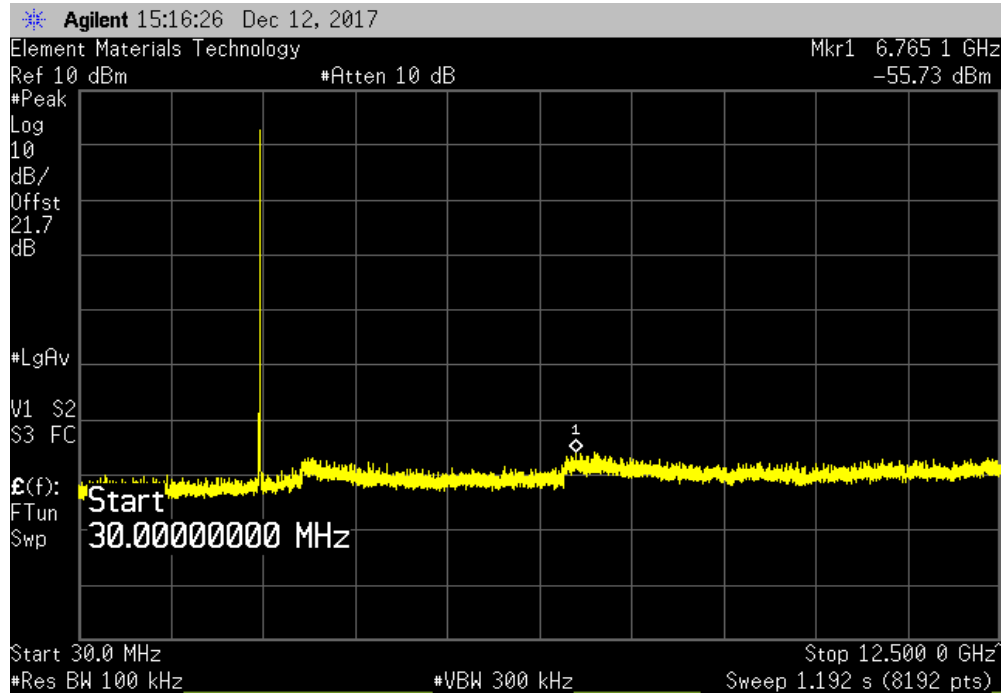


SPURIOUS CONDUCTED EMISSIONS

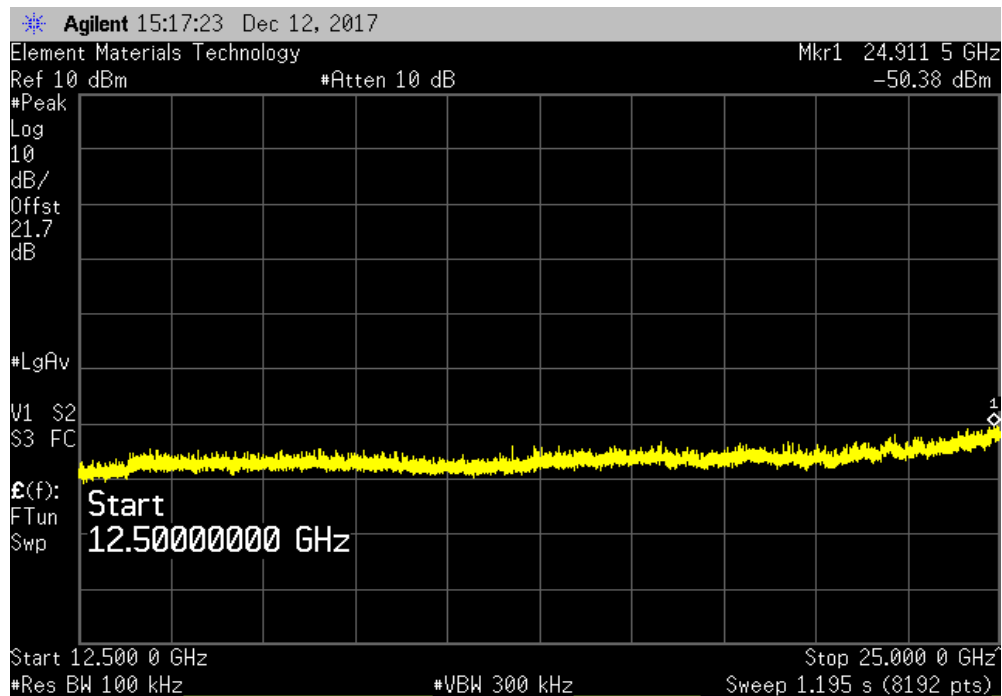


TMTX 2017.10.04 XMI 2017.09.21

BLE/GFSK High Channel (2478 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	-57.57	-20	Pass	



BLE/GFSK High Channel (2478 MHz), 2 MHz BW				
Frequency Range	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	-52.22	-20	Pass	



SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2017.09.18

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

MODES OF OPERATION

Transmitting BLE with 1 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2480 MHz), or Transmitting BLE with 2 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2478 MHz).

POWER SETTINGS INVESTIGATED

3.3VDC

CONFIGURATIONS INVESTIGATED

DGII0257 - 5

DGII0257 - 4

DGII0257 - 3

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	25 GHz
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SAMPLE CALCULATIONS

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Interval
Cable	ESM Cable Corp.	TTBJ141 KMKM-72	MNP	12-Sep-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	JSD4-18002600-26-8P	APU	12-Sep-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AHG	NCR	0 mo
Filter - High Pass	Micro-Tronics	HPM50111	LFN	20-Sep-2017	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFK	20-Sep-2017	12 mo
Attenuator	Fairview Microwave	SA18E-20	TWZ	20-Sep-2017	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVW	14-Feb-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AIQ	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AVV	14-Feb-2017	12 mo
Cable	ESM Cable Corp.	Standard Gain Horn Cables	MNJ	12-Jul-2017	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AXP	NCR	0 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVT	14-Feb-2017	12 mo
Cable	ESM Cable Corp.	Double Ridge Guide Horn Cables	MNI	21-Nov-2017	12 mo
Antenna - Double Ridge	ETS Lindgren	3115	AJA	23-Jun-2016	24 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AVO	9-Nov-2017	12 mo
Cable	ESM Cable Corp.	Bilog Cables	MNH	9-Nov-2017	12 mo
Antenna - Biconilog	Teseq	CBL 6141B	AYD	6-Jan-2016	24 mo
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	6-Jan-2017	12 mo

MEASUREMENT BANDWIDTHS

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

TEST DESCRIPTION

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

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

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

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

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

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

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

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



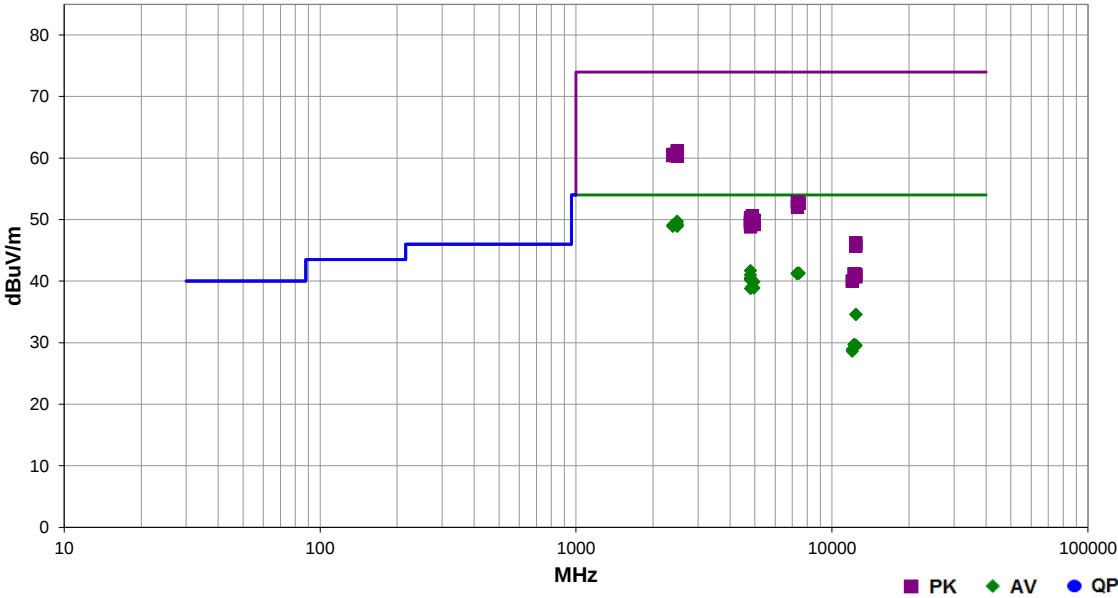
SPURIOUS RADIATED EMISSIONS

EmiRS 2017.07.11 PSA-ESCI 2017.09.18

Work Order:	DGII0257	Date:	1-Dec-2017	
Project:	None	Temperature:	22.3 °C	
Job Site:	MN05	Humidity:	24.6% RH	
Serial Number:	P3	Barometric Pres.:	1019 mbar	
Tested by:				Dustin Sparks
EUT:	XB3C1			
Configuration:	3			
Customer:	Digi International Inc			
Attendees:	None			
EUT Power:	3.3VDC			
Operating Mode:	Transmitting BLE with 1 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2480 MHz), or Transmitting BLE with 2 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2478 MHz).			
Deviations:	None			
Comments:	Taoglas antenna			

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

Run #	15	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.525	33.6	-3.9	1.0	42.0	3.0	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High ch, EUT on side, 1 MHz BW
2483.617	33.6	-3.9	1.0	54.0	3.0	20.0	Vert	AV	0.0	49.7	54.0	-4.3	High ch, EUT on side, 2 MHz BW
2483.742	33.2	-3.9	1.0	300.9	3.0	20.0	Horz	AV	0.0	49.3	54.0	-4.7	High ch, EUT vert, 1 MHz BW
2484.458	33.0	-3.9	1.0	69.1	3.0	20.0	Vert	AV	0.0	49.1	54.0	-4.9	High ch, EUT vert, 1 MHz BW
2484.042	33.0	-3.9	1.8	297.0	3.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	High ch, EUT horz, 1 MHz BW
2388.960	32.7	-3.6	1.9	18.0	3.0	20.0	Horz	AV	0.0	49.1	54.0	-4.9	High ch, EUT vert, 1 MHz BW
2483.683	32.9	-3.9	1.0	311.0	3.0	20.0	Vert	AV	0.0	49.0	54.0	-5.0	High ch, EUT horz, 1 MHz BW
2483.625	32.8	-3.9	1.0	99.0	3.0	20.0	Horz	AV	0.0	48.9	54.0	-5.1	High ch, EUT on side, 1 MHz BW
2388.075	32.5	-3.6	4.0	132.0	3.0	20.0	Vert	AV	0.0	48.9	54.0	-5.1	Low ch, EUT on side, 1 MHz BW
4803.933	36.5	5.2	1.0	95.1	3.0	0.0	Horz	AV	0.0	41.7	54.0	-12.3	Low ch, EUT on side, 1 MHz BW
7319.058	31.0	10.3	1.0	240.9	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	Mid ch, EUT on side, 1 MHz BW
7438.442	31.0	10.3	1.0	340.9	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	High ch, EUT on side, 1 MHz BW
7438.475	31.0	10.3	1.0	27.0	3.0	0.0	Vert	AV	0.0	41.3	54.0	-12.7	High ch, EUT on side, 1 MHz BW
7320.067	30.9	10.3	1.0	228.1	3.0	0.0	Vert	AV	0.0	41.2	54.0	-12.8	Mid ch, EUT on side, 1 MHz BW
2485.900	45.1	-3.9	1.8	297.0	3.0	20.0	Horz	PK	0.0	61.2	74.0	-12.8	High ch, EUT horz, 1 MHz BW
4803.742	35.8	5.2	1.0	229.0	3.0	0.0	Horz	AV	0.0	41.0	54.0	-13.0	Low ch, EUT horz, 1 MHz BW
2487.092	44.9	-3.9	1.0	311.0	3.0	20.0	Vert	PK	0.0	61.0	74.0	-13.0	High ch, EUT horz, 1 MHz BW
2483.617	44.7	-3.9	1.0	42.0	3.0	20.0	Vert	PK	0.0	60.8	74.0	-13.2	High ch, EUT on side, 1 MHz BW
2389.210	44.2	-3.6	1.9	18.0	3.0	20.0	Horz	PK	0.0	60.6	74.0	-13.4	High ch, EUT vert, 1 MHz BW
4803.867	35.3	5.2	1.0	176.0	3.0	0.0	Horz	AV	0.0	40.5	54.0	-13.5	Low ch, EUT vert, 1 MHz BW
2483.758	44.4	-3.9	1.0	69.1	3.0	20.0	Vert	PK	0.0	60.5	74.0	-13.5	High ch, EUT vert, 1 MHz BW
4803.925	35.2	5.2	1.0	34.1	3.0	0.0	Vert	AV	0.0	40.4	54.0	-13.6	Low ch, EUT on side, 1 MHz BW
2486.850	44.3	-3.9	1.0	99.0	3.0	20.0	Horz	PK	0.0	60.4	74.0	-13.6	High ch, EUT on side, 1 MHz BW

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2386.000	44.0	-3.6	4.0	132.0	3.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	Low ch, EUT on side, 1 MHz BW
2484.327	44.3	-3.9	1.0	54.0	3.0	20.0	Vert	PK	0.0	60.4	74.0	-13.6	High ch, EUT on side, 2 MHz BW
4804.008	35.1	5.2	1.0	283.9	3.0	0.0	Vert	AV	0.0	40.3	54.0	-13.7	Low ch, EUT horz, 1 MHz BW
2486.150	44.2	-3.9	1.0	300.9	3.0	20.0	Horz	PK	0.0	60.3	74.0	-13.7	High ch, EUT vert, 1 MHz BW
4803.983	35.0	5.2	1.0	184.1	3.0	0.0	Vert	AV	0.0	40.2	54.0	-13.8	Low ch, EUT vert, 1 MHz BW
4879.858	34.7	5.4	1.0	146.0	3.0	0.0	Vert	AV	0.0	40.1	54.0	-13.9	Mid ch, EUT on side, 1 MHz BW
4960.100	34.2	5.7	1.0	147.0	3.0	0.0	Vert	AV	0.0	39.9	54.0	-14.1	High ch, EUT on side, 1 MHz BW
4879.825	33.7	5.4	1.6	147.0	3.0	0.0	Horz	AV	0.0	39.1	54.0	-14.9	Mid ch, EUT on side, 1 MHz BW
4959.958	33.2	5.7	1.0	82.0	3.0	0.0	Horz	AV	0.0	38.9	54.0	-15.1	High ch, EUT on side, 1 MHz BW
4803.092	33.6	5.2	1.0	166.1	3.0	0.0	Horz	AV	0.0	38.8	54.0	-15.2	Low ch, EUT horz, 2 MHz BW
12402.030	29.2	5.4	1.0	220.1	3.0	0.0	Horz	AV	0.0	34.6	54.0	-19.4	High ch, EUT on side, 1 MHz BW
12401.830	29.2	5.4	2.6	10.0	3.0	0.0	Vert	AV	0.0	34.6	54.0	-19.4	High ch, EUT on side, 1 MHz BW
7320.933	42.6	10.3	1.0	240.9	3.0	0.0	Horz	PK	0.0	52.9	74.0	-21.1	Mid ch, EUT on side, 1 MHz BW
7438.308	42.4	10.3	1.0	340.9	3.0	0.0	Horz	PK	0.0	52.7	74.0	-21.3	High ch, EUT on side, 1 MHz BW
7438.458	42.4	10.3	1.0	27.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	High ch, EUT on side, 1 MHz BW
7322.058	41.8	10.2	1.0	228.1	3.0	0.0	Vert	PK	0.0	52.0	74.0	-22.0	Mid ch, EUT on side, 1 MHz BW
4879.525	45.2	5.4	1.0	146.0	3.0	0.0	Vert	PK	0.0	50.6	74.0	-23.4	Mid ch, EUT on side, 1 MHz BW
4803.092	45.1	5.2	1.0	95.1	3.0	0.0	Horz	PK	0.0	50.3	74.0	-23.7	Low ch, EUT on side, 1 MHz BW
4803.333	44.9	5.2	1.0	229.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	Low ch, EUT horz, 1 MHz BW
4960.217	44.2	5.7	1.0	147.0	3.0	0.0	Vert	PK	0.0	49.9	74.0	-24.1	High ch, EUT on side, 1 MHz BW
12198.130	30.1	-0.4	1.0	339.0	3.0	0.0	Horz	AV	0.0	29.7	54.0	-24.3	Mid ch, EUT on side, 1 MHz BW
12199.080	30.1	-0.4	1.0	135.0	3.0	0.0	Vert	AV	0.0	29.7	54.0	-24.3	Mid ch, EUT on side, 1 MHz BW
4803.950	44.4	5.2	1.0	176.0	3.0	0.0	Horz	PK	0.0	49.6	74.0	-24.4	Low ch, EUT vert, 1 MHz BW
12397.790	29.4	0.2	1.2	336.0	3.0	0.0	Vert	AV	0.0	29.6	54.0	-24.4	High ch, EUT on side, 1 MHz BW
4804.317	44.3	5.2	1.0	283.9	3.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	Low ch, EUT horz, 1 MHz BW
4880.300	44.0	5.5	1.6	147.0	3.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	Mid ch, EUT on side, 1 MHz BW
12399.500	29.3	0.2	1.0	192.1	3.0	0.0	Horz	AV	0.0	29.5	54.0	-24.5	High ch, EUT on side, 1 MHz BW
4803.683	44.2	5.2	1.0	34.1	3.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	Low ch, EUT on side, 1 MHz BW
4803.433	44.2	5.2	1.0	184.1	3.0	0.0	Vert	PK	0.0	49.4	74.0	-24.6	Low ch, EUT vert, 1 MHz BW
4958.933	43.5	5.7	1.0	82.0	3.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	High ch, EUT on side, 1 MHz BW
12011.560	30.0	-1.1	4.0	171.0	3.0	0.0	Horz	AV	0.0	28.9	54.0	-25.1	Low ch, EUT on side, 1 MHz BW
4804.817	43.6	5.2	1.0	166.1	3.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Low ch, EUT horz, 2 MHz BW
12011.680	29.7	-1.1	3.0	350.0	3.0	0.0	Vert	AV	0.0	28.6	54.0	-25.4	Low ch, EUT on side, 1 MHz BW
12401.770	40.8	5.4	2.6	10.0	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	High ch, EUT on side, 1 MHz BW
12401.620	40.3	5.4	1.0	220.1	3.0	0.0	Horz	PK	0.0	45.7	74.0	-28.3	High ch, EUT on side, 1 MHz BW
12200.790	41.6	-0.4	1.0	339.0	3.0	0.0	Horz	PK	0.0	41.2	74.0	-32.8	Mid ch, EUT on side, 1 MHz BW
12199.130	41.6	-0.4	1.0	135.0	3.0	0.0	Vert	PK	0.0	41.2	74.0	-32.8	Mid ch, EUT on side, 1 MHz BW
12399.310	40.9	0.2	1.2	336.0	3.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	High ch, EUT on side, 1 MHz BW
12398.920	40.5	0.2	1.0	192.1	3.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	High ch, EUT on side, 1 MHz BW
12010.220	41.1	-1.1	4.0	171.0	3.0	0.0	Horz	PK	0.0	40.0	74.0	-34.0	Low ch, EUT on side, 1 MHz BW
12010.140	41.1	-1.1	3.0	350.0	3.0	0.0	Vert	PK	0.0	40.0	74.0	-34.0	Low ch, EUT on side, 1 MHz BW

SPURIOUS RADIATED EMISSIONS

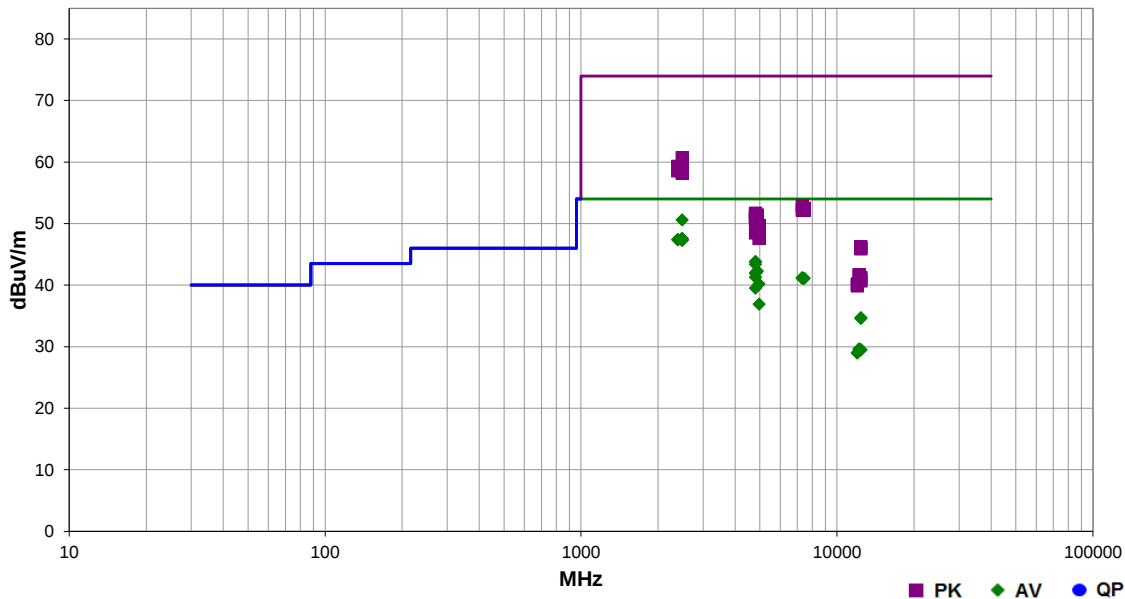


EmiRS 2017.07.11 PSA-ESCI 2017.09.18

Work Order:	DGII0257	Date:	1-Dec-2017	
Project:	None	Temperature:	22.7 °C	
Job Site:	MN05	Humidity:	28.8% RH	
Serial Number:	P3	Barometric Pres.:	999 mbar	
		Tested by: Dustin Sparks, Kyle McMullan		
EUT:	XB3C1			
Configuration:	4			
Customer:	Digi International Inc			
Attendees:	None			
EUT Power:	3.3VDC			
Operating Mode:	Transmitting BLE with 1 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2480 MHz), or Transmitting BLE with 2 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2478 MHz).			
Deviations:	None			
Comments:	Dipole antenna			

Test Specifications	FCC 15.247:2017	Test Method	ANSI C63.10:2013
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Run #	40	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.527	34.5	-3.9	1.0	325.1	3.0	20.0	Horz	AV	0.0	50.6	54.0	-3.4	High ch, EUT horz, 2 MHz BW
2483.643	31.5	-3.9	1.0	198.0	3.0	20.0	Horz	AV	0.0	47.6	54.0	-6.4	High ch, EUT horz, 1 MHz BW
2484.403	31.3	-3.9	1.0	98.1	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High ch, EUT horz, 1 MHz BW
2483.900	31.3	-3.9	1.0	88.1	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High ch, EUT on side, 1 MHz BW
2485.210	31.3	-3.9	3.2	172.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High ch, EUT vert, 1 MHz BW
2389.973	31.0	-3.6	1.0	168.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	Low ch, EUT horz, 1 MHz BW
2389.607	31.0	-3.6	2.9	74.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	Low ch, EUT horz, 1 MHz BW
2484.027	31.2	-3.9	1.0	282.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High ch, EUT on side, 1 MHz BW
2484.287	31.2	-3.9	1.0	175.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High ch, EUT vert, 1 MHz BW
4803.883	38.6	5.2	2.7	253.9	3.0	0.0	Horz	AV	0.0	43.8	54.0	-10.2	Low ch, EUT horz, 1 MHz BW
4803.875	38.6	5.2	1.0	246.9	3.0	0.0	Vert	AV	0.0	43.8	54.0	-10.2	Low ch, EUT horz, 1 MHz BW
4803.742	38.2	5.2	1.0	268.9	3.0	0.0	Vert	AV	0.0	43.4	54.0	-10.6	Low ch, EUT vert, 1 MHz BW
4879.942	36.9	5.4	1.0	293.0	3.0	0.0	Vert	AV	0.0	42.3	54.0	-11.7	Mid ch, EUT horz, 1 MHz BW
4879.942	36.8	5.4	2.3	227.1	3.0	0.0	Horz	AV	0.0	42.2	54.0	-11.8	Mid ch, EUT horz, 1 MHz BW
4803.792	36.8	5.2	2.1	68.0	3.0	0.0	Horz	AV	0.0	42.0	54.0	-12.0	Low ch, EUT on side, 1 MHz BW
4803.133	36.7	5.2	2.1	57.0	3.0	0.0	Horz	AV	0.0	41.9	54.0	-12.1	Low ch, EUT horz, 2 MHz BW
4803.992	36.1	5.2	1.0	211.0	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	Low ch, EUT vert, 1 MHz BW
7320.150	30.9	10.3	1.8	67.0	3.0	0.0	Horz	AV	0.0	41.2	54.0	-12.8	Mid ch, EUT horz, 1 MHz BW
7318.417	30.8	10.3	1.0	32.0	3.0	0.0	Vert	AV	0.0	41.1	54.0	-12.9	Mid ch, EUT horz, 1 MHz BW
7441.783	30.8	10.3	1.0	172.0	3.0	0.0	Horz	AV	0.0	41.1	54.0	-12.9	High ch, EUT horz, 1 MHz BW
7439.117	30.8	10.3	1.0	200.0	3.0	0.0	Vert	AV	0.0	41.1	54.0	-12.9	High ch, EUT horz, 1 MHz BW
2483.650	44.6	-3.9	1.0	325.1	3.0	20.0	Horz	PK	0.0	60.7	74.0	-13.3	High ch, EUT horz, 2 MHz BW
4960.133	34.5	5.7	1.0	64.0	3.0	0.0	Vert	AV	0.0	40.2	54.0	-13.8	High ch, EUT horz, 1 MHz BW

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803.892	34.3	5.2	1.0	51.1	3.0	0.0	Vert	AV	0.0	39.5	54.0	-14.5	Low ch, EUT on side, 1 MHz BW
2389.773	42.9	-3.6	2.9	74.0	3.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	Low ch, EUT horz, 1 MHz BW
2485.207	42.6	-3.9	1.0	282.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High ch, EUT on side, 1 MHz BW
2484.070	42.6	-3.9	1.0	175.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High ch, EUT vert, 1 MHz BW
2484.710	42.5	-3.9	1.0	88.1	3.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	High ch, EUT on side, 1 MHz BW
2389.090	42.2	-3.6	1.0	168.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	Low ch, EUT horz, 1 MHz BW
2484.403	42.4	-3.9	1.0	198.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	High ch, EUT horz, 1 MHz BW
2485.010	42.3	-3.9	1.0	98.1	3.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	High ch, EUT horz, 1 MHz BW
2484.783	42.1	-3.9	3.2	172.0	3.0	20.0	Vert	PK	0.0	58.2	74.0	-15.8	High ch, EUT vert, 1 MHz BW
4962.333	31.2	5.7	1.0	147.0	3.0	0.0	Horz	AV	0.0	36.9	54.0	-17.1	High ch, EUT horz, 1 MHz BW
12401.310	29.3	5.4	1.0	94.1	3.0	0.0	Vert	AV	0.0	34.7	54.0	-19.3	High ch, EUT horz, 1 MHz BW
12400.250	29.2	5.4	1.0	275.0	3.0	0.0	Horz	AV	0.0	34.6	54.0	-19.4	High ch, EUT horz, 1 MHz BW
7319.583	42.6	10.3	1.0	32.0	3.0	0.0	Vert	PK	0.0	52.9	74.0	-21.1	Mid ch, EUT horz, 1 MHz BW
7438.025	42.2	10.3	1.0	200.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	High ch, EUT horz, 1 MHz BW
7317.875	41.9	10.3	1.8	67.0	3.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	Mid ch, EUT horz, 1 MHz BW
7440.017	41.9	10.3	1.0	172.0	3.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	High ch, EUT horz, 1 MHz BW
4803.383	46.5	5.2	2.7	253.9	3.0	0.0	Horz	PK	0.0	51.7	74.0	-22.3	Low ch, EUT horz, 1 MHz BW
4880.133	46.0	5.4	2.3	227.1	3.0	0.0	Horz	PK	0.0	51.4	74.0	-22.6	Mid ch, EUT horz, 1 MHz BW
4802.867	46.2	5.2	2.1	57.0	3.0	0.0	Horz	PK	0.0	51.4	74.0	-22.6	Low ch, EUT horz, 2 MHz BW
4803.667	46.1	5.2	1.0	246.9	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	Low ch, EUT horz, 1 MHz BW
4879.967	45.7	5.4	1.0	293.0	3.0	0.0	Vert	PK	0.0	51.1	74.0	-22.9	Mid ch, EUT horz, 1 MHz BW
4803.325	45.8	5.2	2.1	68.0	3.0	0.0	Horz	PK	0.0	51.0	74.0	-23.0	Low ch, EUT on side, 1 MHz BW
4804.083	45.5	5.2	1.0	211.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	Low ch, EUT vert, 1 MHz BW
4803.342	45.5	5.2	1.0	268.9	3.0	0.0	Vert	PK	0.0	50.7	74.0	-23.3	Low ch, EUT vert, 1 MHz BW
4959.850	44.0	5.7	1.0	64.0	3.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	High ch, EUT horz, 1 MHz BW
12198.960	30.0	-0.4	3.4	268.0	3.0	0.0	Horz	AV	0.0	29.6	54.0	-24.4	Mid ch, EUT horz, 1 MHz BW
12197.980	30.0	-0.4	1.0	325.9	3.0	0.0	Vert	AV	0.0	29.6	54.0	-24.4	Mid ch, EUT horz, 1 MHz BW
12398.550	29.3	0.2	1.0	87.1	3.0	0.0	Horz	AV	0.0	29.5	54.0	-24.5	High ch, EUT horz, 1 MHz BW
12397.800	29.3	0.2	1.0	119.1	3.0	0.0	Vert	AV	0.0	29.5	54.0	-24.5	High ch, EUT horz, 1 MHz BW
12009.230	30.1	-1.1	1.0	202.1	3.0	0.0	Horz	AV	0.0	29.0	54.0	-25.0	Mid ch, EUT horz, 1 MHz BW
12007.750	30.1	-1.1	1.0	210.1	3.0	0.0	Vert	AV	0.0	29.0	54.0	-25.0	Mid ch, EUT horz, 1 MHz BW
4803.225	43.3	5.2	1.0	51.1	3.0	0.0	Vert	PK	0.0	48.5	74.0	-25.5	Low ch, EUT on side, 1 MHz BW
4961.983	41.9	5.7	1.0	147.0	3.0	0.0	Horz	PK	0.0	47.6	74.0	-26.4	High ch, EUT horz, 1 MHz BW
12400.580	40.8	5.4	1.0	94.1	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	High ch, EUT horz, 1 MHz BW
12401.970	40.5	5.4	1.0	275.0	3.0	0.0	Horz	PK	0.0	45.9	74.0	-28.1	High ch, EUT horz, 1 MHz BW
12200.000	42.1	-0.4	1.0	325.9	3.0	0.0	Vert	PK	0.0	41.7	74.0	-32.3	Mid ch, EUT horz, 1 MHz BW
12200.740	41.9	-0.4	3.4	268.0	3.0	0.0	Horz	PK	0.0	41.5	74.0	-32.5	Mid ch, EUT horz, 1 MHz BW
12398.600	41.0	0.2	1.0	119.1	3.0	0.0	Vert	PK	0.0	41.2	74.0	-32.8	High ch, EUT horz, 1 MHz BW
12398.040	40.5	0.2	1.0	87.1	3.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	High ch, EUT horz, 1 MHz BW
12012.330	41.3	-1.1	1.0	202.1	3.0	0.0	Horz	PK	0.0	40.2	74.0	-33.8	Mid ch, EUT horz, 1 MHz BW
12007.930	41.0	-1.1	1.0	210.1	3.0	0.0	Vert	PK	0.0	39.9	74.0	-34.1	Mid ch, EUT horz, 1 MHz BW

SPURIOUS RADIATED EMISSIONS

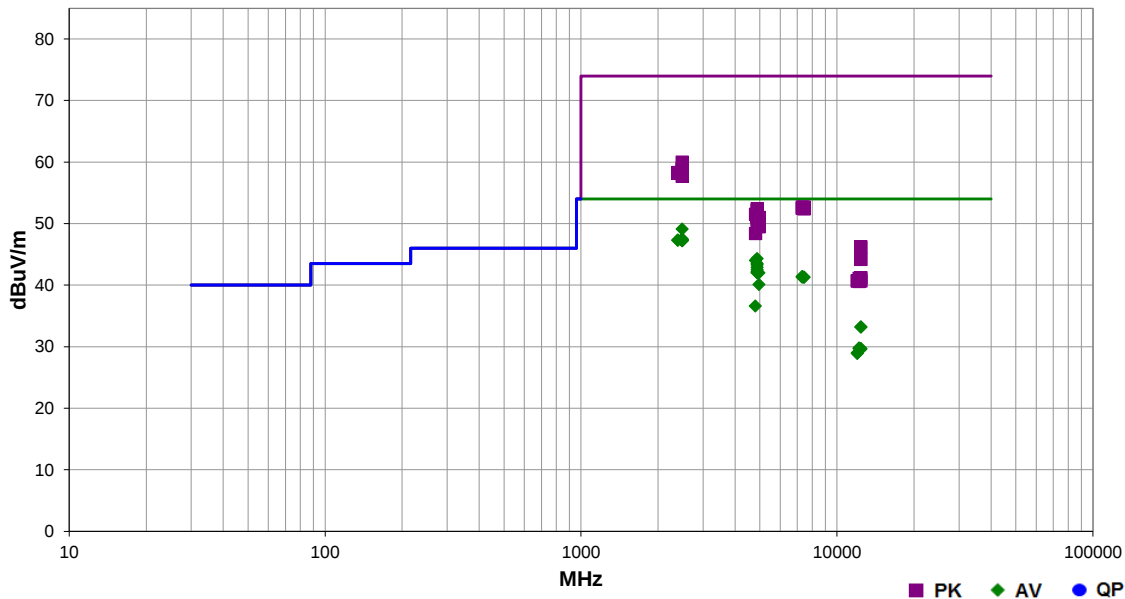


EmiRS 2017.07.11 PSA-ESCI 2017.09.18

Work Order:	DGII0257	Date:	1-Dec-2017	<i>Kyle McMullan</i>
Project:	None	Temperature:	22.7 °C	
Job Site:	MN05	Humidity:	28.8% RH	
Serial Number:	P3	Barometric Pres.:	999 mbar	
Tested by: Kyle McMullan				
EUT:	XB3C1			
Configuration:	5			
Customer:	Digi International Inc			
Attendees:	None			
EUT Power:	3.3VDC			
Operating Mode:	Transmitting BLE with 1 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2480 MHz), or Transmitting BLE with 2 MHz bandwidth on low, mid, or high channel (2402, 2440, or 2478 MHz).			
Deviations:	None			
Comments:	Embedded antenna			

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

Run #	67	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.523	33.0	-3.9	1.0	228.3	3.0	20.0	Vert	AV	0.0	49.1	54.0	-4.9	High ch, EUT on side, 2 MHz BW
2483.780	31.4	-3.9	1.0	296.0	3.0	20.0	Vert	AV	0.0	47.5	54.0	-6.5	High ch, EUT on side, 1 MHz BW
2484.230	31.3	-3.9	1.0	242.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	High ch, EUT horz, 1 MHz BW
2484.757	31.2	-3.9	1.0	151.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High ch, EUT on side, 1 MHz BW
2484.467	31.2	-3.9	1.0	281.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High ch, EUT vert, 1 MHz BW
2388.027	30.9	-3.6	1.3	315.9	3.0	20.0	Vert	AV	0.0	47.3	54.0	-6.7	Low ch, EUT on side, 1 MHz BW
2389.323	30.9	-3.6	1.0	321.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	Low ch, EUT horz, 1 MHz BW
2485.287	31.2	-3.9	1.0	167.1	3.0	20.0	Vert	AV	0.0	47.3	54.0	-6.7	High ch, EUT on side, 2 MHz BW
2484.723	31.1	-3.9	1.0	133.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	High ch, EUT horz, 1 MHz BW
2484.443	31.1	-3.9	1.0	240.9	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	High ch, EUT vert, 1 MHz BW
4879.925	38.9	5.4	2.1	54.0	3.0	0.0	Horz	AV	0.0	44.3	54.0	-9.7	Mid ch, EUT on side, 1 MHz BW
4803.925	38.8	5.2	1.0	124.1	3.0	0.0	Vert	AV	0.0	44.0	54.0	-10.0	Low ch, EUT horz, 1 MHz BW
4880.192	38.1	5.4	2.8	44.1	3.0	0.0	Horz	AV	0.0	43.5	54.0	-10.5	Mid ch, EUT on side, 2 MHz BW
4879.183	37.9	5.4	1.7	326.9	3.0	0.0	Horz	AV	0.0	43.3	54.0	-10.7	Mid ch, EUT on side, 2 MHz BW
4879.975	37.5	5.4	1.1	54.0	3.0	0.0	Horz	AV	0.0	42.9	54.0	-11.1	Mid ch, EUT horz, 1 MHz BW
4879.900	37.1	5.4	1.0	72.0	3.0	0.0	Vert	AV	0.0	42.5	54.0	-11.5	Mid ch, EUT horz, 1 MHz BW
4880.067	36.8	5.4	1.0	176.0	3.0	0.0	Horz	AV	0.0	42.2	54.0	-11.8	Mid ch, EUT vert, 1 MHz BW
4879.950	36.7	5.4	1.0	90.0	3.0	0.0	Vert	AV	0.0	42.1	54.0	-11.9	Mid ch, EUT vert, 1 MHz BW
4879.900	36.6	5.4	1.1	315.9	3.0	0.0	Vert	AV	0.0	42.0	54.0	-12.0	Mid ch, EUT on side, 1 MHz BW
4960.042	36.3	5.7	1.1	234.0	3.0	0.0	Vert	AV	0.0	42.0	54.0	-12.0	High ch, EUT horz, 1 MHz BW
7317.650	31.1	10.3	1.0	132.0	3.0	0.0	Vert	AV	0.0	41.4	54.0	-12.6	Mid ch, EUT horz, 1 MHz BW
7442.042	31.0	10.3	1.7	336.0	3.0	0.0	Vert	AV	0.0	41.3	54.0	-12.7	High ch, EUT horz, 1 MHz BW
7438.900	31.0	10.3	1.0	358.0	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	High ch, EUT on side, 1 MHz BW

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7320.458	31.0	10.3	1.0	0.0	3.0	0.0	Horz	AV	0.0	41.3	54.0	-12.7	Mid ch, EUT on side, 1 MHz BW
4959.842	34.4	5.7	1.0	62.1	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	High ch, EUT on side, 1 MHz BW
2483.827	43.9	-3.9	1.0	228.3	3.0	20.0	Vert	PK	0.0	60.0	74.0	-14.0	High ch, EUT on side, 2 MHz BW
2483.910	42.9	-3.9	1.0	296.0	3.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	High ch, EUT on side, 1 MHz BW
2485.040	42.7	-3.9	1.0	151.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High ch, EUT on side, 1 MHz BW
2483.690	42.3	-3.9	1.0	281.0	3.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	High ch, EUT vert, 1 MHz BW
2484.447	42.2	-3.9	1.0	240.9	3.0	20.0	Vert	PK	0.0	58.3	74.0	-15.7	High ch, EUT vert, 1 MHz BW
2389.800	41.9	-3.6	1.0	321.0	3.0	20.0	Horz	PK	0.0	58.3	74.0	-15.7	Low ch, EUT horz, 1 MHz BW
2483.540	42.1	-3.9	1.0	242.0	3.0	20.0	Horz	PK	0.0	58.2	74.0	-15.8	High ch, EUT horz, 1 MHz BW
2388.727	41.8	-3.6	1.3	315.9	3.0	20.0	Vert	PK	0.0	58.2	74.0	-15.8	Low ch, EUT on side, 1 MHz BW
2485.307	42.0	-3.9	1.0	167.1	3.0	20.0	Vert	PK	0.0	58.1	74.0	-15.9	High ch, EUT on side, 2 MHz BW
2484.607	41.6	-3.9	1.0	133.0	3.0	20.0	Vert	PK	0.0	57.7	74.0	-16.3	High ch, EUT horz, 1 MHz BW
4801.983	31.4	5.2	1.0	208.0	3.0	0.0	Horz	AV	0.0	36.6	54.0	-17.4	Low ch, EUT on side, 1 MHz BW
12402.040	27.8	5.4	1.0	315.9	3.0	0.0	Vert	AV	0.0	33.2	54.0	-20.8	High ch, EUT horz, 1 MHz BW
12401.740	27.8	5.4	1.0	337.9	3.0	0.0	Horz	AV	0.0	33.2	54.0	-20.8	High ch, EUT on side, 1 MHz BW
7440.100	42.4	10.3	1.7	336.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	High ch, EUT horz, 1 MHz BW
7318.333	42.4	10.3	1.0	0.0	3.0	0.0	Horz	PK	0.0	52.7	74.0	-21.3	Mid ch, EUT on side, 1 MHz BW
7318.258	42.2	10.3	1.0	132.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	Mid ch, EUT horz, 1 MHz BW
4880.467	46.9	5.5	2.1	54.0	3.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	Mid ch, EUT on side, 1 MHz BW
7438.650	42.1	10.3	1.0	358.0	3.0	0.0	Horz	PK	0.0	52.4	74.0	-21.6	High ch, EUT on side, 1 MHz BW
4880.808	46.7	5.5	1.7	326.9	3.0	0.0	Horz	PK	0.0	52.2	74.0	-21.8	Mid ch, EUT on side, 2 MHz BW
4803.542	46.3	5.2	1.0	124.1	3.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	Low ch, EUT horz, 1 MHz BW
4879.425	45.8	5.4	1.1	54.0	3.0	0.0	Horz	PK	0.0	51.2	74.0	-22.8	Mid ch, EUT horz, 1 MHz BW
4879.417	45.8	5.4	2.8	44.1	3.0	0.0	Horz	PK	0.0	51.2	74.0	-22.8	Mid ch, EUT on side, 2 MHz BW
4880.000	45.7	5.4	1.0	90.0	3.0	0.0	Vert	PK	0.0	51.1	74.0	-22.9	Mid ch, EUT vert, 1 MHz BW
4879.683	45.7	5.4	1.0	72.0	3.0	0.0	Vert	PK	0.0	51.1	74.0	-22.9	Mid ch, EUT horz, 1 MHz BW
4960.425	45.3	5.7	1.1	234.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	High ch, EUT horz, 1 MHz BW
4880.250	45.2	5.5	1.0	176.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	Mid ch, EUT vert, 1 MHz BW
4879.908	44.8	5.4	1.1	315.9	3.0	0.0	Vert	PK	0.0	50.2	74.0	-23.8	Mid ch, EUT on side, 1 MHz BW
12198.430	30.2	-0.4	2.2	63.0	3.0	0.0	Vert	AV	0.0	29.8	54.0	-24.2	Mid ch, EUT horz, 1 MHz BW
12197.920	30.1	-0.4	1.0	48.1	3.0	0.0	Horz	AV	0.0	29.7	54.0	-24.3	Mid ch, EUT on side, 1 MHz BW
12399.610	29.5	0.2	1.6	150.0	3.0	0.0	Vert	AV	0.0	29.7	54.0	-24.3	High ch, EUT horz, 1 MHz BW
12399.090	29.4	0.2	2.7	335.0	3.0	0.0	Horz	AV	0.0	29.6	54.0	-24.4	High ch, EUT on side, 1 MHz BW
4959.583	43.8	5.7	1.0	62.1	3.0	0.0	Horz	PK	0.0	49.5	74.0	-24.5	High ch, EUT on side, 1 MHz BW
12008.900	30.1	-1.1	1.0	172.0	3.0	0.0	Vert	AV	0.0	29.0	54.0	-25.0	Low ch, EUT horz, 1 MHz BW
12009.580	30.0	-1.1	1.0	47.1	3.0	0.0	Horz	AV	0.0	28.9	54.0	-25.1	Low ch, EUT on side, 1 MHz BW
4805.208	43.2	5.2	1.0	208.0	3.0	0.0	Horz	PK	0.0	48.4	74.0	-25.6	Low ch, EUT on side, 1 MHz BW
12401.340	40.8	5.4	1.0	315.9	3.0	0.0	Vert	PK	0.0	46.2	74.0	-27.8	High ch, EUT horz, 1 MHz BW
12401.670	38.8	5.4	1.0	337.9	3.0	0.0	Horz	PK	0.0	44.2	74.0	-29.8	High ch, EUT on side, 1 MHz BW
12399.850	41.0	0.2	1.6	150.0	3.0	0.0	Vert	PK	0.0	41.2	74.0	-32.8	High ch, EUT horz, 1 MHz BW
12197.580	41.5	-0.4	2.2	63.0	3.0	0.0	Vert	PK	0.0	41.1	74.0	-32.9	Mid ch, EUT horz, 1 MHz BW
12008.170	41.8	-1.1	1.0	47.1	3.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	Low ch, EUT on side, 1 MHz BW
12399.050	40.5	0.2	2.7	335.0	3.0	0.0	Horz	PK	0.0	40.7	74.0	-33.3	High ch, EUT on side, 1 MHz BW
12011.620	41.8	-1.1	1.0	172.0	3.0	0.0	Vert	PK	0.0	40.7	74.0	-33.3	Low ch, EUT horz, 1 MHz BW
12200.290	41.0	-0.4	1.0	48.1	3.0	0.0	Horz	PK	0.0	40.6	74.0	-33.4	Mid ch, EUT on side, 1 MHz BW