



element

Apricity Code

JL Module

FCC 15.247:2019

Bluetooth Low Energy (DTS) Radio

Report # APRI0003



NVLAP LAB CODE: 200630-0



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CERTIFICATE OF TEST



Last Date of Test: December 31, 2019

Apricity Code

EUT: JL Module

Radio Equipment Testing

Standards

Specification	Method
FCC 15.207:2019	ANSI C63.10:2013, KDB 558074
FCC 15.247:2019	

Results

Method Clause	Test Description	Applied	Results	Comments
6.2	Powerline Conducted Emissions	Yes	Pass	
11.12.1, 11.13.2, 6.5, 6.6	Spurious Radiated Emissions	Yes	Pass	
11.6	Duty Cycle	Yes	N/A	
11.8.2	Occupied Bandwidth	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	

Deviations From Test Standards

None

Approved By:

Kyle Holgate, Operations Manager

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



Revision Number	Description	Date (yyyy-mm-dd)	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) and as a CAB for the acceptance of test data.

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

MSIT / 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:

<https://www.nwemc.com/emc-testing-accreditations>

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	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: 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	2834D-1	2834G-1	2834F-1
BSMI				
SL2-IN-E-1154R	SL2-IN-E-1152R	SL2-IN-E-1017	SL2-IN-E-1158R	SL2-IN-E-1153R
VCCI				
A-0029	A-0109	A-0108	A-0201	A-0110
Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA				
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 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	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)	2.4 dB	-2.4 dB

Test Setup Block Diagrams

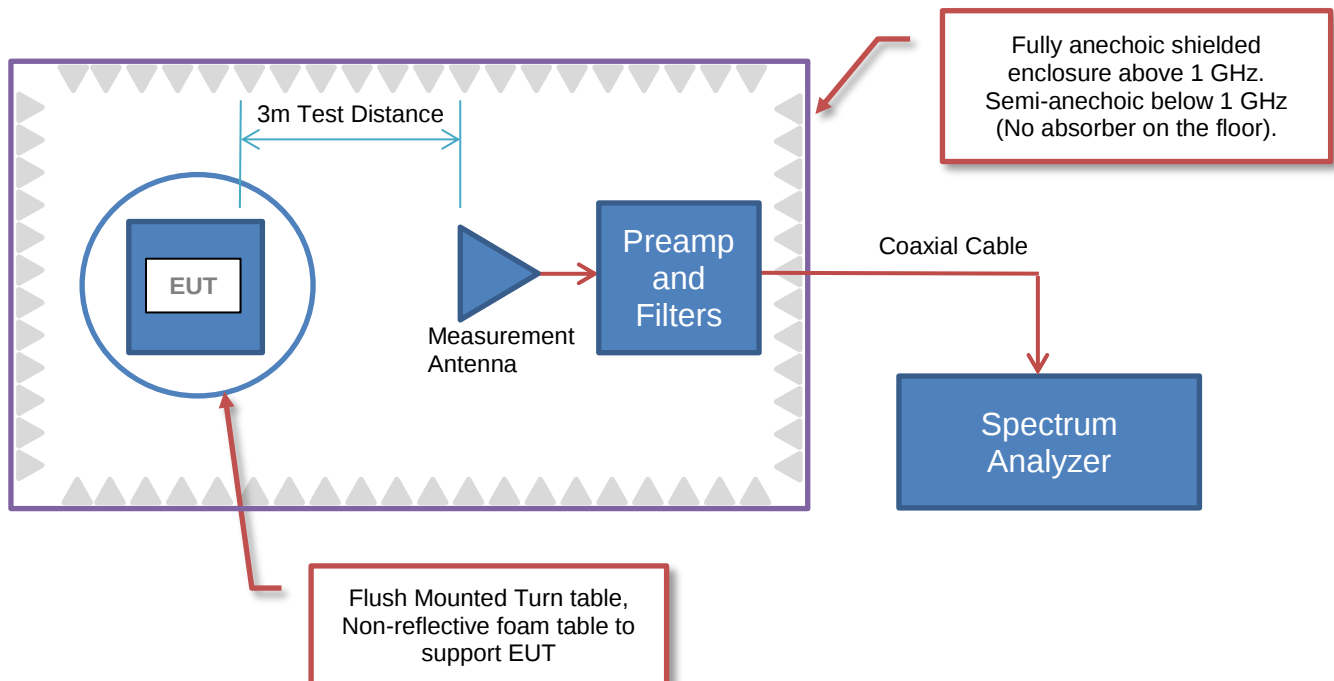
Antenna Port Conducted Measurements



Near Field Test Fixture Measurements



Spurious Radiated Emissions



PRODUCT DESCRIPTION



Client and Equipment Under Test (EUT) Information

Company Name:	Apricity Code
Address:	2783 NW Lolo Dr., Suite 130
City, State, Zip:	Bend, OR 97702
Test Requested By:	Justin Olexy
EUT:	JL Module
First Date of Test:	December 19, 2019
Last Date of Test:	December 31, 2019
Receipt Date of Samples:	December 19, 2019
Equipment Design Stage:	Production
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:
BLE Class 2 device, with a U.FL connector to connect an external antenna
Testing Objective:
To demonstrate compliance of the Bluetooth Low Energy (DTS) radio to FCC 15.247 requirements.

CONFIGURATIONS



Configuration APRI0003- 1

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC/DC Adapter	Dell	LA45NM140	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains

CONFIGURATIONS



Configuration APRI0003- 2

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
Patch Antenna	Yageo	ANTX100P112B24553	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC/DC Adapter	Dell	LA45NM140	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna

CONFIGURATIONS



Configuration APRI0003- 3

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
Trace Antenna	Yageo	ANTX100P001B24003	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC/DC Adapter	Dell	LA45NM140	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna

CONFIGURATIONS



Configuration APRI0003- 4

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
PCB Antenna	Yageo	ANTX100P011B24003	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2

Remote Equipment Outside of Test Setup Boundary			
Description	Manufacturer	Model/Part Number	Serial Number
AC/DC Adapter	Dell	LA45NM140	None

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna

CONFIGURATIONS

Configuration APRI0003- 6

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
Patch Antenna	Yageo	ANTX100P112B24553	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2
AC/DC Adapter	Dell	LA45NM140	None
DC Power Supply	Topward Electric Instruments	TPS-2000	946425

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna
DC Power cable	No	1.5m	No	USB Cable	Power Supply
AC Mains	Yes	1.8m	No	DC Power Supply	AC Mains

CONFIGURATIONS



Configuration APRI0003- 7

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
Trace Antenna	Yageo	ANTX100P001B24003	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2
AC/DC Adapter	Dell	LA45NM140	None
DC Power Supply	Topward Electric Instruments	TPS-2000	946425

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna
DC Power cable	No	1.5m	No	USB Cable	Power Supply
AC Mains	Yes	1.8m	No	DC Power Supply	AC Mains

CONFIGURATIONS



Configuration APRI0003- 8

Software/Firmware Running during test	
Description	Version
BlueTest3	3.2.2

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
BT Radio Module	Apricity Code	JL Module	4
PCB Antenna	Yageo	ANTX100P011B24003	None

Peripherals in test setup boundary			
Description	Manufacturer	Model/Part Number	Serial Number
BTM Demonstrator	Apricity Code	6003-001	None
Laptop	Dell	Inspiron 3583	4W5ZZX2
AC/DC Adapter	Dell	LA45NM140	None
DC Power Supply	Topward Electric Instruments	TPS-2000	946425

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
USB	Yes	1.3 m	No	Laptop	BTM Demonstrator
DC Power	No	1.8 m	Yes	Laptop	AC/DC Adapter
AC Mains	No	0.9 m	No	AC/DC Adapter	AC Mains
Coax	Yes	0.1 m	No	BT Radio Module	Antenna
DC Power cable	No	1.5m	No	USB Cable	Power Supply
AC Mains	Yes	1.8m	No	DC Power Supply	AC Mains

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2019-12-19	Duty Cycle	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
2	2019-12-19	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.
3	2019-12-19	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	2019-12-19	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	2019-12-19	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	2019-12-19	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	2019-12-19	Spurious Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
8	2019-12-20	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.
9	2019-12-31	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWER SETTINGS



No adjustable power settings were provided. The EUT was tested using power settings pre-defined by the manufacturer.

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	Rohde & Schwarz	ESCI	ARH	2019-05-02	2020-05-02
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT	EVGA	2019-01-07	2020-01-07
LISN	Solar Electronics	9252-50-R-24-BNC	LIP	2019-08-28	2020-08-28
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	2019-08-28	2020-08-28
Terminator	S.M. Electronics	ST3B	TMB	2019-04-09	2020-04-09

MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	2.4 dB	-2.4 dB

CONFIGURATIONS INVESTIGATED

APRI0003-6
APRI0003-7
APRI0003-8

MODES INVESTIGATED

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	4	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

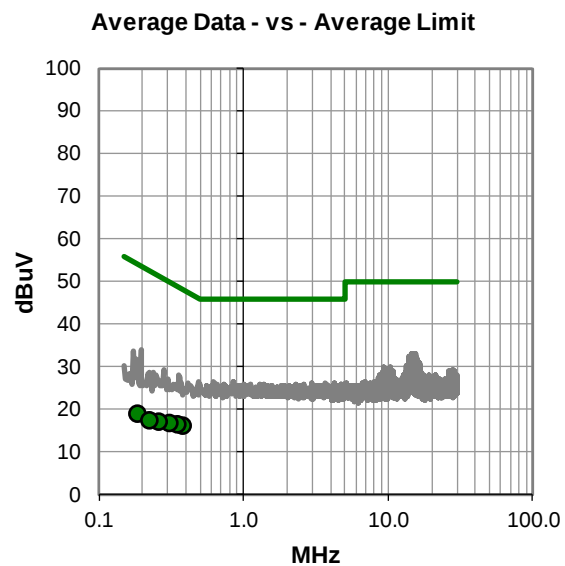
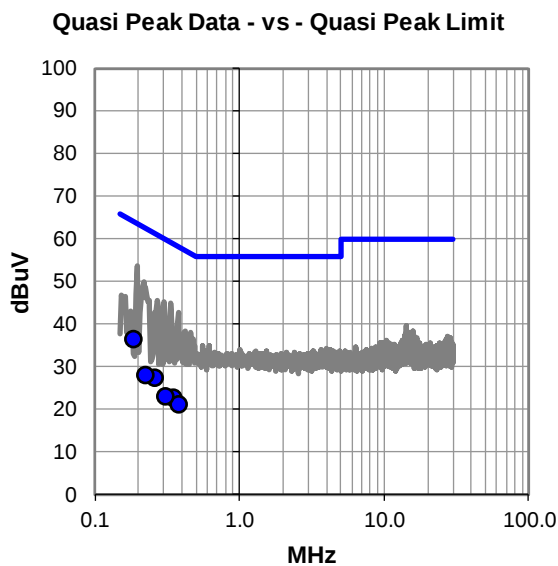
Measuring AC mains of Linear DC power supply. Patch Antenna.

EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #4

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.2	16.500	20.0	36.5	64.2	-27.7
0.3	7.300	20.0	27.3	61.4	-34.1
0.2	8.000	20.0	28.0	62.6	-34.6
0.3	2.700	20.0	22.7	59.1	-36.4
0.4	1.300	19.9	21.2	58.2	-37.0
0.3	2.900	20.0	22.9	60.1	-37.2

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.4	-3.600	19.9	16.3	48.2	-31.9
0.3	-3.500	20.0	16.5	49.1	-32.6
0.3	-3.300	20.0	16.7	50.1	-33.4
0.3	-3.000	20.0	17.0	51.4	-34.4
0.2	-1.000	20.0	19.0	54.2	-35.2
0.2	-2.600	20.0	17.4	52.6	-35.2

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

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

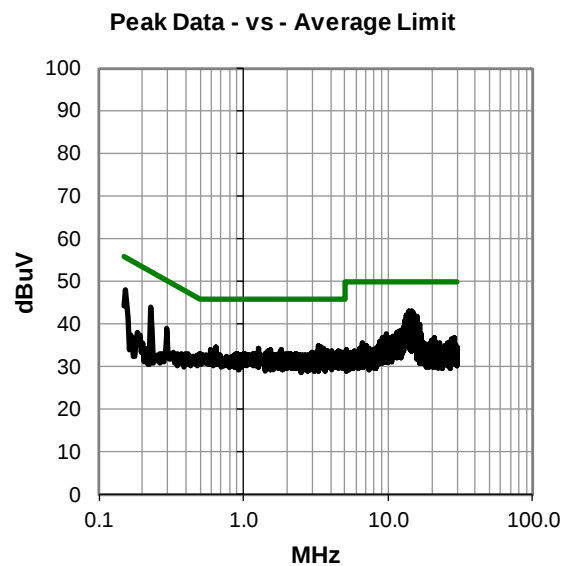
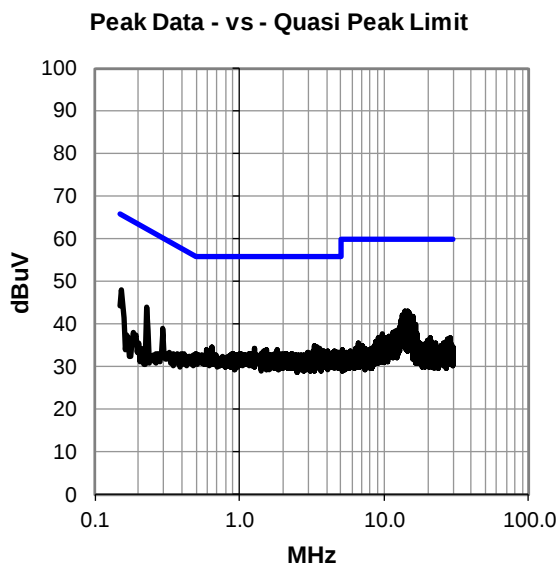
Measuring AC mains of Linear DC power supply. Patch Antenna.

EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #5

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
14.0	22.600	20.4	43.0	60.0	-17.0
14.4	22.600	20.4	43.0	60.0	-17.0
14.8	22.400	20.4	42.8	60.0	-17.2
0.2	28.000	20.1	48.1	65.8	-17.7
13.6	21.800	20.4	42.2	60.0	-17.8
15.0	21.600	20.5	42.1	60.0	-17.9
13.4	21.600	20.4	42.0	60.0	-18.0
14.2	21.500	20.4	41.9	60.0	-18.1
13.7	21.400	20.4	41.8	60.0	-18.2
14.9	21.200	20.5	41.7	60.0	-18.3
15.7	21.200	20.5	41.7	60.0	-18.3
13.9	21.200	20.4	41.6	60.0	-18.4
0.2	23.900	20.0	43.9	62.5	-18.6
15.1	20.700	20.5	41.2	60.0	-18.8
14.1	20.700	20.4	41.1	60.0	-18.9
14.9	20.600	20.5	41.1	60.0	-18.9
13.1	20.600	20.4	41.0	60.0	-19.0
15.2	20.500	20.5	41.0	60.0	-19.0
15.4	20.500	20.5	41.0	60.0	-19.0
14.0	20.400	20.4	40.8	60.0	-19.2
13.6	20.300	20.4	40.7	60.0	-19.3
13.8	20.300	20.4	40.7	60.0	-19.3
15.1	20.200	20.5	40.7	60.0	-19.3
13.5	20.200	20.4	40.6	60.0	-19.4
13.7	20.200	20.4	40.6	60.0	-19.4

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
14.0	22.600	20.4	43.0	50.0	-7.0
14.4	22.600	20.4	43.0	50.0	-7.0
14.8	22.400	20.4	42.8	50.0	-7.2
0.2	28.000	20.1	48.1	55.8	-7.7
13.6	21.800	20.4	42.2	50.0	-7.8
15.0	21.600	20.5	42.1	50.0	-7.9
13.4	21.600	20.4	42.0	50.0	-8.0
14.2	21.500	20.4	41.9	50.0	-8.1
13.7	21.400	20.4	41.8	50.0	-8.2
14.9	21.200	20.5	41.7	50.0	-8.3
15.7	21.200	20.5	41.7	50.0	-8.3
13.9	21.200	20.4	41.6	50.0	-8.4
0.2	23.900	20.0	43.9	52.5	-8.6
15.1	20.700	20.5	41.2	50.0	-8.8
14.1	20.700	20.4	41.1	50.0	-8.9
14.9	20.600	20.5	41.1	50.0	-8.9
13.1	20.600	20.4	41.0	50.0	-9.0
15.2	20.500	20.5	41.0	50.0	-9.0
15.4	20.500	20.5	41.0	50.0	-9.0
14.0	20.400	20.4	40.8	50.0	-9.2
13.6	20.300	20.4	40.7	50.0	-9.3
13.8	20.300	20.4	40.7	50.0	-9.3
15.1	20.200	20.5	40.7	50.0	-9.3
13.5	20.200	20.4	40.6	50.0	-9.4
13.7	20.200	20.4	40.6	50.0	-9.4

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

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

Measuring AC mains of Linear DC power supply. Trace Antenna.

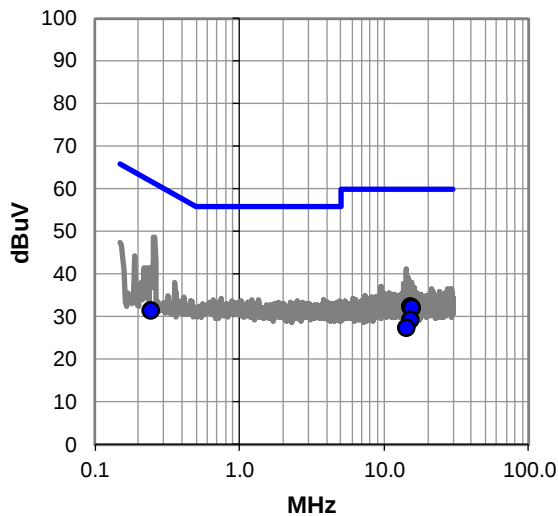
EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

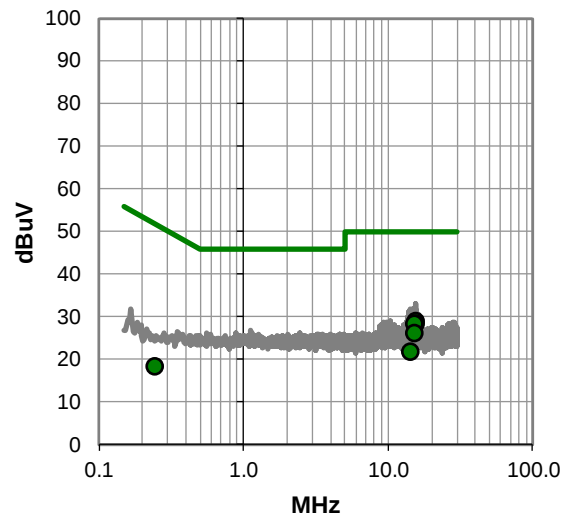
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #6

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
15.1	11.800	20.5	32.3	60.0	-27.7
15.6	11.600	20.5	32.1	60.0	-27.9
15.6	11.500	20.5	32.0	60.0	-28.0
0.2	11.500	20.0	31.5	61.9	-30.4
15.0	8.900	20.5	29.4	60.0	-30.6
14.1	6.900	20.4	27.3	60.0	-32.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
15.6	8.400	20.5	28.9	50.0	-21.1
15.6	7.900	20.5	28.4	50.0	-21.6
15.1	7.800	20.5	28.3	50.0	-21.7
15.0	5.700	20.5	26.2	50.0	-23.8
14.1	1.500	20.4	21.9	50.0	-28.1
0.2	-1.500	20.0	18.5	51.9	-33.4

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-7

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	7	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

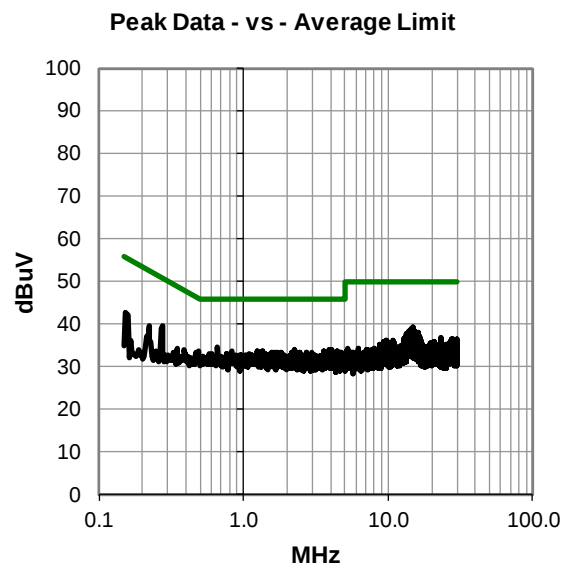
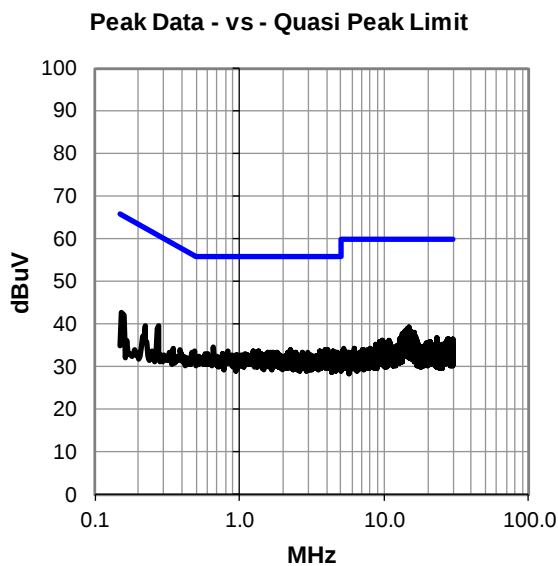
Measuring AC mains of Linear DC power supply. Trace Antenna.

EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #7

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
14.9	18.800	20.5	39.3	60.0	-20.7
14.4	18.500	20.4	38.9	60.0	-21.1
0.3	19.700	20.0	39.7	61.0	-21.3
0.7	14.700	19.9	34.6	56.0	-21.4
14.1	18.200	20.4	38.6	60.0	-21.4
15.0	18.000	20.5	38.5	60.0	-21.5
14.4	17.800	20.4	38.2	60.0	-21.8
13.9	17.700	20.4	38.1	60.0	-21.9
14.6	17.700	20.4	38.1	60.0	-21.9
16.3	17.500	20.6	38.1	60.0	-21.9
2.3	14.000	20.0	34.0	56.0	-22.0
3.9	13.800	20.2	34.0	56.0	-22.0
4.1	13.800	20.2	34.0	56.0	-22.0
14.7	17.500	20.4	37.9	60.0	-22.1
15.0	17.400	20.5	37.9	60.0	-22.1
15.4	17.400	20.5	37.9	60.0	-22.1
13.3	17.400	20.4	37.8	60.0	-22.2
14.0	17.400	20.4	37.8	60.0	-22.2
14.5	17.400	20.4	37.8	60.0	-22.2
15.6	17.300	20.5	37.8	60.0	-22.2
15.6	17.300	20.5	37.8	60.0	-22.2
1.2	13.800	19.9	33.7	56.0	-22.3
1.4	13.800	19.9	33.7	56.0	-22.3
3.6	13.600	20.1	33.7	56.0	-22.3
4.4	13.500	20.2	33.7	56.0	-22.3

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
14.9	18.800	20.5	39.3	50.0	-10.7
14.4	18.500	20.4	38.9	50.0	-11.1
0.3	19.700	20.0	39.7	51.0	-11.3
0.7	14.700	19.9	34.6	46.0	-11.4
14.1	18.200	20.4	38.6	50.0	-11.4
15.0	18.000	20.5	38.5	50.0	-11.5
14.4	17.800	20.4	38.2	50.0	-11.8
13.9	17.700	20.4	38.1	50.0	-11.9
14.6	17.700	20.4	38.1	50.0	-11.9
16.3	17.500	20.6	38.1	50.0	-11.9
2.3	14.000	20.0	34.0	46.0	-12.0
3.9	13.800	20.2	34.0	46.0	-12.0
4.1	13.800	20.2	34.0	46.0	-12.0
14.7	17.500	20.4	37.9	50.0	-12.1
15.0	17.400	20.5	37.9	50.0	-12.1
15.4	17.400	20.5	37.9	50.0	-12.1
13.3	17.400	20.4	37.8	50.0	-12.2
14.0	17.400	20.4	37.8	50.0	-12.2
14.5	17.400	20.4	37.8	50.0	-12.2
15.6	17.300	20.5	37.8	50.0	-12.2
15.6	17.300	20.5	37.8	50.0	-12.2
1.2	13.800	19.9	33.7	46.0	-12.3
1.4	13.800	19.9	33.7	46.0	-12.3
3.6	13.600	20.1	33.7	46.0	-12.3
4.4	13.500	20.2	33.7	46.0	-12.3

CONCLUSION

Pass



Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-8

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	8	Line:	High Line	Add. Ext. Attenuation (dB):	0
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COMMENTS

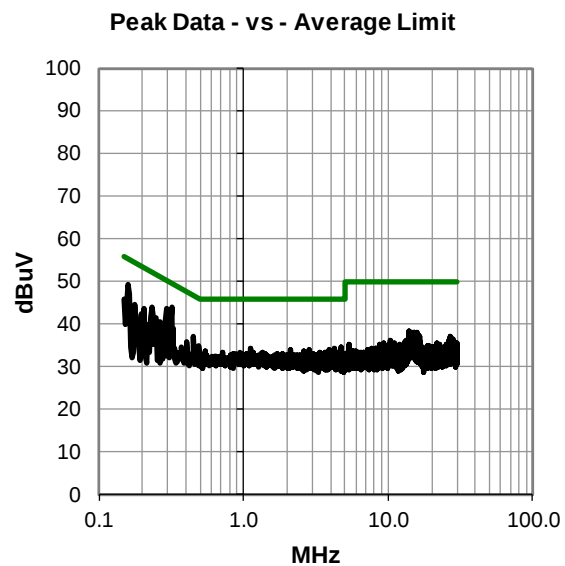
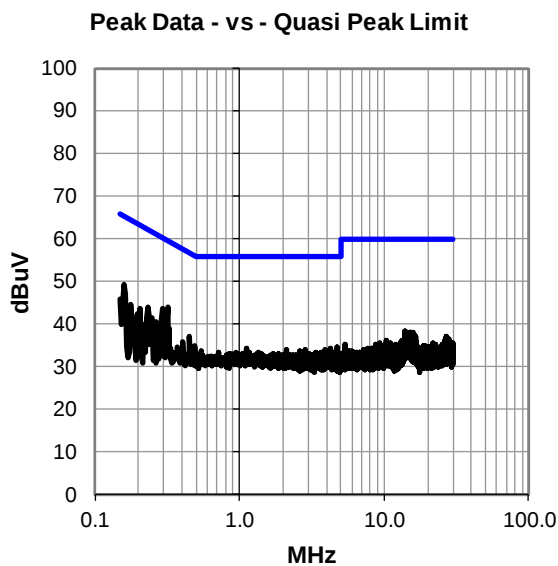
Measuring AC mains of Linear DC power supply. PCB Antenna.

EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS



RESULTS - Run #8

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.3	24.100	20.0	44.1	59.8	-15.7
0.2	29.100	20.1	49.2	65.6	-16.4
0.3	23.600	20.0	43.6	60.5	-16.9
0.2	24.000	20.0	44.0	62.4	-18.4
0.5	17.400	19.8	37.2	56.8	-19.6
0.2	23.700	20.0	43.7	63.4	-19.7
0.2	24.600	20.0	44.6	64.7	-20.1
0.2	25.700	20.1	45.8	66.0	-20.2
0.2	21.400	20.0	41.4	61.9	-20.5
0.3	20.600	20.0	40.6	61.3	-20.7
0.3	18.900	20.0	38.9	59.6	-20.7
0.5	15.200	19.8	35.0	56.1	-21.1
0.2	22.400	20.0	42.4	63.8	-21.4
4.7	14.300	20.2	34.5	56.0	-21.5
14.0	18.000	20.4	38.4	60.0	-21.6
4.2	14.100	20.2	34.3	56.0	-21.7
1.1	14.300	19.9	34.2	56.0	-21.8
14.7	17.800	20.4	38.2	60.0	-21.8
2.1	14.100	20.0	34.1	56.0	-21.9
15.0	17.600	20.5	38.1	60.0	-21.9
15.1	17.600	20.5	38.1	60.0	-21.9
0.4	16.000	19.8	35.8	57.7	-21.9
3.9	13.800	20.2	34.0	56.0	-22.0
2.8	13.900	20.0	33.9	56.0	-22.1
15.7	17.400	20.5	37.9	60.0	-22.1

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.3	24.100	20.0	44.1	49.8	-5.7
0.2	29.100	20.1	49.2	55.6	-6.4
0.3	23.600	20.0	43.6	50.5	-6.9
0.2	24.000	20.0	44.0	52.4	-8.4
0.5	17.400	19.8	37.2	46.8	-9.6
0.2	23.700	20.0	43.7	53.4	-9.7
0.2	24.600	20.0	44.6	54.7	-10.1
0.2	25.700	20.1	45.8	56.0	-10.2
0.2	21.400	20.0	41.4	51.9	-10.5
0.3	20.600	20.0	40.6	51.3	-10.7
0.3	18.900	20.0	38.9	49.6	-10.7
0.5	15.200	19.8	35.0	46.1	-11.1
0.2	22.400	20.0	42.4	53.8	-11.4
4.7	14.300	20.2	34.5	46.0	-11.5
14.0	18.000	20.4	38.4	50.0	-11.6
4.2	14.100	20.2	34.3	46.0	-11.7
1.1	14.300	19.9	34.2	46.0	-11.8
14.7	17.800	20.4	38.2	50.0	-11.8
2.1	14.100	20.0	34.1	46.0	-11.9
15.0	17.600	20.5	38.1	50.0	-11.9
15.1	17.600	20.5	38.1	50.0	-11.9
0.4	16.000	19.8	35.8	47.7	-11.9
3.9	13.800	20.2	34.0	46.0	-12.0
2.8	13.900	20.0	33.9	46.0	-12.1
15.7	17.400	20.5	37.9	50.0	-12.1

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS



EUT:	JL Module	Work Order:	APRI0003
Serial Number:	4	Date:	2019-12-31
Customer:	Apricity Code	Temperature:	19.9°C
Attendees:	None	Relative Humidity:	38.8%
Customer Project:	None	Bar. Pressure:	1023 mb
Tested By:	Jay Whitworth	Job Site:	EV07
Power:	5VDC from 110VAC/60Hz	Configuration:	APRI0003-8

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2019	ANSI C63.10:2013

TEST PARAMETERS

Run #:	9	Line:	Neutral	Add. Ext. Attenuation (dB):	0
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COMMENTS

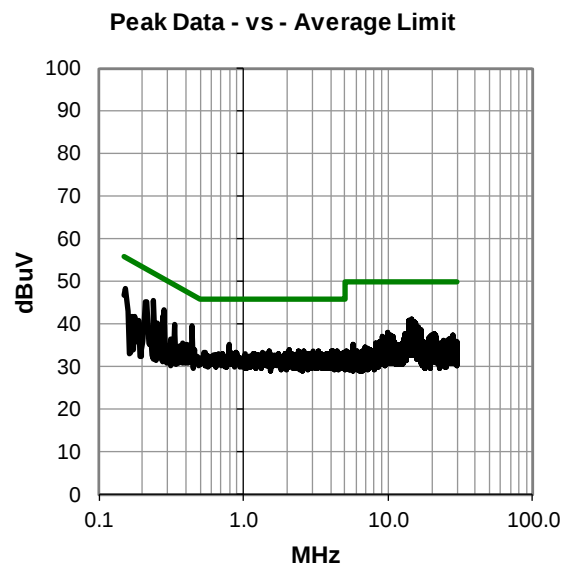
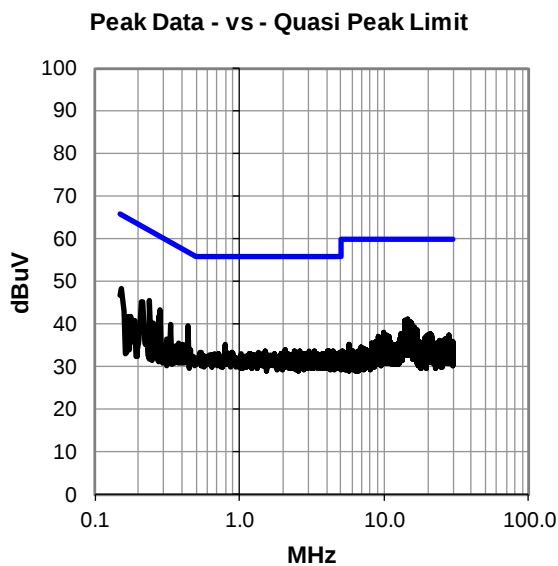
Measuring AC mains of Linear DC power supply. PCB Antenna.

EUT OPERATING MODES

BTLE Tx, GFSK, Mid Ch = 2442 MHz, Duty Cycle = 85.4%

DEVIATIONS FROM TEST STANDARD

None



POWERLINE CONDUCTED EMISSIONS

RESULTS - Run #9

Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.2	25.700	20.0	45.7	62.1	-16.4
0.3	23.500	20.0	43.5	60.7	-17.2
0.4	19.900	19.8	39.7	57.0	-17.3
0.2	28.200	20.1	48.3	65.8	-17.5
0.2	25.300	20.0	45.3	63.2	-17.9
14.6	20.900	20.4	41.3	60.0	-18.7
14.0	20.600	20.4	41.0	60.0	-19.0
14.1	20.400	20.4	40.8	60.0	-19.2
0.3	20.000	20.0	40.0	59.4	-19.4
13.9	20.200	20.4	40.6	60.0	-19.4
15.1	20.100	20.5	40.6	60.0	-19.4
15.5	19.800	20.5	40.3	60.0	-19.7
15.0	19.700	20.5	40.2	60.0	-19.8
14.1	19.600	20.4	40.0	60.0	-20.0
14.4	19.600	20.4	40.0	60.0	-20.0
15.0	19.400	20.5	39.9	60.0	-20.1
14.9	19.300	20.5	39.8	60.0	-20.2
15.1	19.300	20.5	39.8	60.0	-20.2
15.2	19.300	20.5	39.8	60.0	-20.2
14.8	19.200	20.4	39.6	60.0	-20.4
15.0	18.900	20.5	39.4	60.0	-20.6
15.6	18.900	20.5	39.4	60.0	-20.6
14.6	18.900	20.4	39.3	60.0	-20.7
16.2	18.800	20.5	39.3	60.0	-20.7
0.8	15.300	19.9	35.2	56.0	-20.8

Peak Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.2	25.700	20.0	45.7	52.1	-6.4
0.3	23.500	20.0	43.5	50.7	-7.2
0.4	19.900	19.8	39.7	47.0	-7.3
0.2	28.200	20.1	48.3	55.8	-7.5
0.2	25.300	20.0	45.3	53.2	-7.9
14.6	20.900	20.4	41.3	50.0	-8.7
14.0	20.600	20.4	41.0	50.0	-9.0
14.1	20.400	20.4	40.8	50.0	-9.2
0.3	20.000	20.0	40.0	49.4	-9.4
13.9	20.200	20.4	40.6	50.0	-9.4
15.1	20.100	20.5	40.6	50.0	-9.4
15.5	19.800	20.5	40.3	50.0	-9.7
15.0	19.700	20.5	40.2	50.0	-9.8
14.1	19.600	20.4	40.0	50.0	-10.0
14.4	19.600	20.4	40.0	50.0	-10.0
15.0	19.400	20.5	39.9	50.0	-10.1
14.9	19.300	20.5	39.8	50.0	-10.2
15.1	19.300	20.5	39.8	50.0	-10.2
15.2	19.300	20.5	39.8	50.0	-10.2
14.8	19.200	20.4	39.6	50.0	-10.4
15.0	18.900	20.5	39.4	50.0	-10.6
15.6	18.900	20.5	39.4	50.0	-10.6
14.6	18.900	20.4	39.3	50.0	-10.7
16.2	18.800	20.5	39.3	50.0	-10.7
0.8	15.300	19.9	35.2	46.0	-10.8

CONCLUSION

Pass



Tested By

SPURIOUS RADIATED EMISSIONS



PSA-ESCI 2019.05.10

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

BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%

POWER SETTINGS INVESTIGATED

USB

CONFIGURATIONS INVESTIGATED

APRI0003 - 4

APRI0003 - 3

APRI0003 - 2

FREQUENCY RANGE INVESTIGATED

Start Frequency	30 MHz	Stop Frequency	26.5 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
Filter - High Pass	Micro-Tronics	HPM50111	HFO	18-Nov-2019	12 mo
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	15-Feb-2019	12 mo
Attenuator	Coaxicom	3910-20	AXZ	15-Feb-2019	12 mo
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	EVY	31-Jul-2019	12 mo
Cable	None	Standard Gain Horns Cable	EVF	19-Nov-2019	12 mo
Cable	N/A	Double Ridge Horn Cables	EVB	18-Nov-2019	12 mo
Cable	N/A	Bilog Cables	EVA	18-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	31-Jul-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	19-Nov-2019	12 mo
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	19-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	18-Nov-2019	12 mo
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	18-Nov-2019	12 mo
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	0 mo
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	0 mo
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	7-Feb-2018	24 mo
Antenna - Biconilog	Teseq	CBL 6141B	AXR	2-Oct-2018	24 mo
Analyzer - Spectrum Analyzer	Agilent	E4446A	AAQ	24-Mar-2019	12 mo

TEST DESCRIPTION

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

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

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

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

QP = Quasi-Peak Detector

PK = Peak Detector

AV = RMS Detector

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

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

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

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of $10 \cdot \text{LOG}(\text{dc})$.

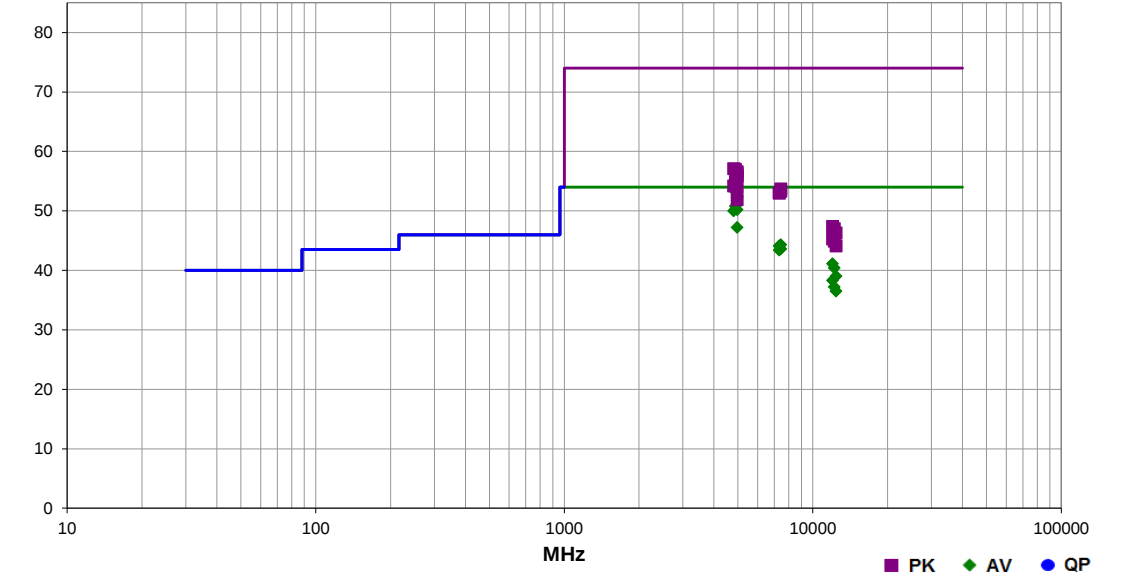


SPURIOUS RADIATED EMISSIONS

Work Order:	APRI0003	Date:	20-Dec-2019	
Project:	None	Temperature:	21.6 °C	
Job Site:	EV01	Humidity:	45.8% RH	
Serial Number:	4	Barometric Pres.:	1012 mbar	
EUT:	JL Module			
Configuration:	2			
Customer:	Apricity Code			
Attendees:	None			
EUT Power:	USB			
Operating Mode:	BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:	None			
Comments:	See comments below for Channel, EUT and Antenna orientation. The RMS Average Measurements were upwardly corrected by a factor of $10 * \log(1/\text{Duty Cycle}) = 10 * \log(1/0.854) = 0.7 \text{ dB}$.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

Run #	12	Test Distance (m)	3	Antenna Height(s)	1 to 4(m)	Results	Pass
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Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4884.108	46.7	6.4	2.3	140.0	0.7	0.0	Horz	AV	0.0	53.8	54.0	-0.2	Mid Ch, EUT and Patch Antenna Vert
4960.167	46.3	6.5	2.4	66.0	0.7	0.0	Vert	AV	0.0	53.5	54.0	-0.5	High Ch, EUT and Patch Antenna Vert
4804.092	47.4	5.4	2.4	116.0	0.7	0.0	Horz	AV	0.0	53.5	54.0	-0.5	Low Ch, EUT and Patch Antenna Vert
4960.042	46.0	6.5	2.8	146.0	0.7	0.0	Horz	AV	0.0	53.2	54.0	-0.8	High Ch, EUT and Patch Antenna Vert
4960.100	45.2	6.5	2.5	188.0	0.7	0.0	Vert	AV	0.0	52.4	54.0	-1.6	High Ch, EUT and Patch Antenna Horz
4960.150	45.1	6.5	3.5	141.0	0.7	0.0	Horz	AV	0.0	52.3	54.0	-1.7	High Ch, EUT and Patch Antenna on Side
4884.000	43.7	6.4	2.4	68.0	0.7	0.0	Vert	AV	0.0	50.8	54.0	-3.2	Mid Ch, EUT and Patch Antenna Vert
4960.175	43.0	6.5	2.4	207.0	0.7	0.0	Horz	AV	0.0	50.2	54.0	-3.8	High Ch, EUT and Patch Antenna Horz
4804.150	43.9	5.4	2.4	57.0	0.7	0.0	Vert	AV	0.0	50.0	54.0	-4.0	Low Ch, EUT and Patch Antenna Vert
4960.108	40.0	6.5	2.4	88.0	0.7	0.0	Vert	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and Patch Antenna on Side
7440.450	29.0	14.6	2.3	80.0	0.7	0.0	Vert	AV	0.0	44.3	54.0	-9.7	High Ch, EUT and Patch Antenna Vert
7325.533	29.2	14.2	2.5	44.0	0.7	0.0	Horz	AV	0.0	44.1	54.0	-9.9	Mid Ch, EUT and Patch Antenna Vert
7441.033	28.3	14.6	3.9	225.0	0.7	0.0	Horz	AV	0.0	43.6	54.0	-10.4	High Ch, EUT and Patch Antenna Vert
7325.067	28.5	14.2	1.5	222.0	0.7	0.0	Vert	AV	0.0	43.4	54.0	-10.6	Mid Ch, EUT and Patch Antenna Vert
12011.370	39.4	1.0	1.9	83.0	0.7	0.0	Vert	AV	0.0	41.1	54.0	-12.9	Low Ch, EUT and Patch Antenna Vert
12211.400	38.9	0.8	1.9	91.0	0.7	0.0	Vert	AV	0.0	40.4	54.0	-13.6	Mid Ch, EUT and Patch Antenna Vert
12399.210	37.2	1.1	1.8	71.0	0.7	0.0	Vert	AV	0.0	39.0	54.0	-15.0	High Ch, EUT and Patch Antenna Vert
12011.470	36.6	1.0	2.4	112.0	0.7	0.0	Horz	AV	0.0	38.3	54.0	-15.7	Low Ch, EUT and Patch Antenna Vert
12209.040	35.7	0.8	2.0	87.0	0.7	0.0	Horz	AV	0.0	37.2	54.0	-16.8	Mid Ch, EUT and Patch Antenna Vert
4803.675	51.7	5.4	2.5	139.0	0.0	0.0	Horz	PK	0.0	57.1	74.0	-16.9	Low Ch, EUT and Patch Antenna Vert
4884.633	50.6	6.4	2.3	141.0	0.0	0.0	Horz	PK	0.0	57.0	74.0	-17.0	Mid Ch, EUT and Patch Antenna Vert
4959.692	50.1	6.5	2.8	146.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	High Ch, EUT and Patch Antenna Vert
12399.130	34.7	1.1	2.0	83.0	0.7	0.0	Horz	AV	0.0	36.5	54.0	-17.5	High Ch, EUT and Patch Antenna Vert
4960.700	49.8	6.5	2.4	66.0	0.0	0.0	Vert	PK	0.0	56.3	74.0	-17.7	High Ch, EUT and Patch Antenna Vert
4959.542	49.4	6.5	2.5	188.0	0.0	0.0	Vert	PK	0.0	55.9	74.0	-18.1	High Ch, EUT and Patch Antenna Horz
4960.675	49.4	6.5	3.5	141.0	0.0	0.0	Horz	PK	0.0	55.9	74.0	-18.1	High Ch, EUT and Patch Antenna on Side
4884.600	48.5	6.4	2.4	68.0	0.0	0.0	Vert	PK	0.0	54.9	74.0	-19.1	Mid Ch, EUT and Patch Antenna Vert

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4803.850	48.8	5.4	2.4	57.0	0.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	Low Ch, EUT and Patch Antenna Vert
4959.550	47.5	6.5	2.4	207.0	0.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	High Ch, EUT and Patch Antenna Horz
7441.283	39.1	14.6	2.3	80.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	High Ch, EUT and Patch Antenna Vert
7442.208	38.7	14.6	3.9	225.0	0.0	0.0	Horz	PK	0.0	53.3	74.0	-20.7	High Ch, EUT and Patch Antenna Vert
7325.000	38.9	14.1	2.5	44.0	0.0	0.0	Horz	PK	0.0	53.0	74.0	-21.0	Mid Ch, EUT and Patch Antenna Vert
7325.333	38.8	14.2	1.5	222.0	0.0	0.0	Vert	PK	0.0	53.0	74.0	-21.0	Mid Ch, EUT and Patch Antenna Vert
4959.450	45.4	6.5	2.4	88.0	0.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	High Ch, EUT and Patch Antenna on Side
12009.110	46.4	1.0	1.9	83.0	0.0	0.0	Vert	PK	0.0	47.4	74.0	-26.6	Low Ch, EUT and Patch Antenna Vert
12211.410	46.2	0.8	1.9	91.0	0.0	0.0	Vert	PK	0.0	47.0	74.0	-27.0	Mid Ch, EUT and Patch Antenna Vert
12400.530	45.2	1.1	1.8	71.0	0.0	0.0	Vert	PK	0.0	46.3	74.0	-27.7	High Ch, EUT and Patch Antenna Vert
12009.030	44.3	1.0	2.4	112.0	0.0	0.0	Horz	PK	0.0	45.3	74.0	-28.7	Low Ch, EUT and Patch Antenna Vert
12211.350	44.1	0.8	2.0	87.0	0.0	0.0	Horz	PK	0.0	44.9	74.0	-29.1	Mid Ch, EUT and Patch Antenna Vert
12401.350	43.0	1.1	2.0	83.0	0.0	0.0	Horz	PK	0.0	44.1	74.0	-29.9	High Ch, EUT and Patch Antenna Vert

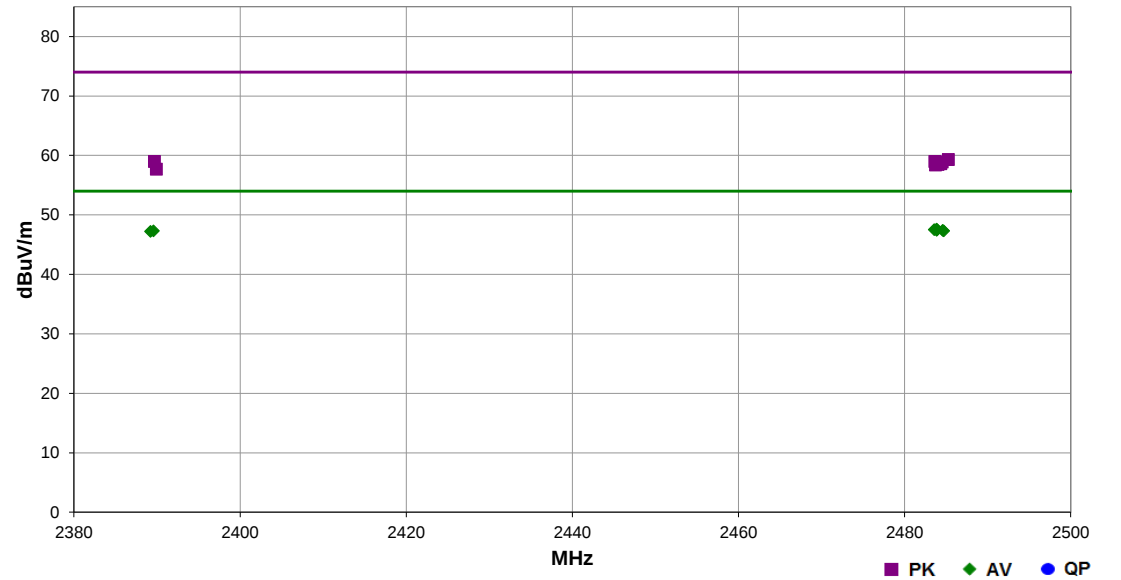


SPURIOUS RADIATED EMISSIONS

Work Order:		APRI0003	Date:	20-Dec-2019	
Project:		None	Temperature:	21.6 °C	
Job Site:		EV01	Humidity:	45.8% RH	
Serial Number:		4	Barometric Pres.:	1012 mbar	
EUT:		JL Module			
Configuration:		2			
Customer:		Apricity Code			
Attendees:		None			
EUT Power:		USB			
Operating Mode:		BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:		None			
Comments:		See comments below for Channel, EUT and Antenna orientation. Measurements were noise floor, no DCCF applied.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

Run #	14	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
2483.863	31.4	-3.8	1.5	356.0	3.0	20.0	Horz	AV	0.0	47.6	54.0	-6.4	High Ch, EUT and Patch Antenna Vert
2483.570	31.3	-3.8	1.5	346.0	3.0	20.0	Vert	AV	0.0	47.5	54.0	-6.5	High Ch, EUT and Patch Antenna Vert
2483.947	31.3	-3.8	1.5	324.0	3.0	20.0	Vert	AV	0.0	47.5	54.0	-6.5	High Ch, EUT and Patch Antenna on Side
2483.877	31.2	-3.8	1.5	38.0	3.0	20.0	Horz	AV	0.0	47.4	54.0	-6.6	High Ch, EUT and Patch Antenna Horz
2484.603	31.1	-3.7	4.0	246.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High Ch, EUT and Patch Antenna Horz
2484.733	31.0	-3.7	3.43	94.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High Ch, EUT and Patch Antenna on Side
2389.583	31.3	-4.0	1.5	282.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	Low Ch, EUT and Patch Antenna Vert
2389.223	31.2	-4.0	3.0	252.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	Low Ch, EUT and Patch Antenna Vert
2485.283	43.0	-3.7	1.5	346.0	3.0	20.0	Vert	PK	0.0	59.3	74.0	-14.7	High Ch, EUT and Patch Antenna Vert
2483.640	42.8	-3.8	1.5	38.0	3.0	20.0	Horz	PK	0.0	59.0	74.0	-15.0	High Ch, EUT and Patch Antenna Horz
2389.680	43.0	-4.0	3.0	252.0	3.0	20.0	Vert	PK	0.0	59.0	74.0	-15.0	Low Ch, EUT and Patch Antenna Vert
2484.527	42.6	-3.7	1.5	356.0	3.0	20.0	Horz	PK	0.0	58.9	74.0	-15.1	High Ch, EUT and Patch Antenna Vert
2484.357	42.3	-3.7	1.5	324.0	3.0	20.0	Vert	PK	0.0	58.6	74.0	-15.4	High Ch, EUT and Patch Antenna on Side
2484.023	42.3	-3.8	4.0	246.0	3.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Ch, EUT and Patch Antenna Horz
2483.717	42.2	-3.8	3.43	94.0	3.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	High Ch, EUT and Patch Antenna on Side
2389.923	41.7	-4.0	1.5	282.0	3.0	20.0	Horz	PK	0.0	57.7	74.0	-16.3	Low Ch, EUT and Patch Antenna Vert

SPURIOUS RADIATED EMISSIONS

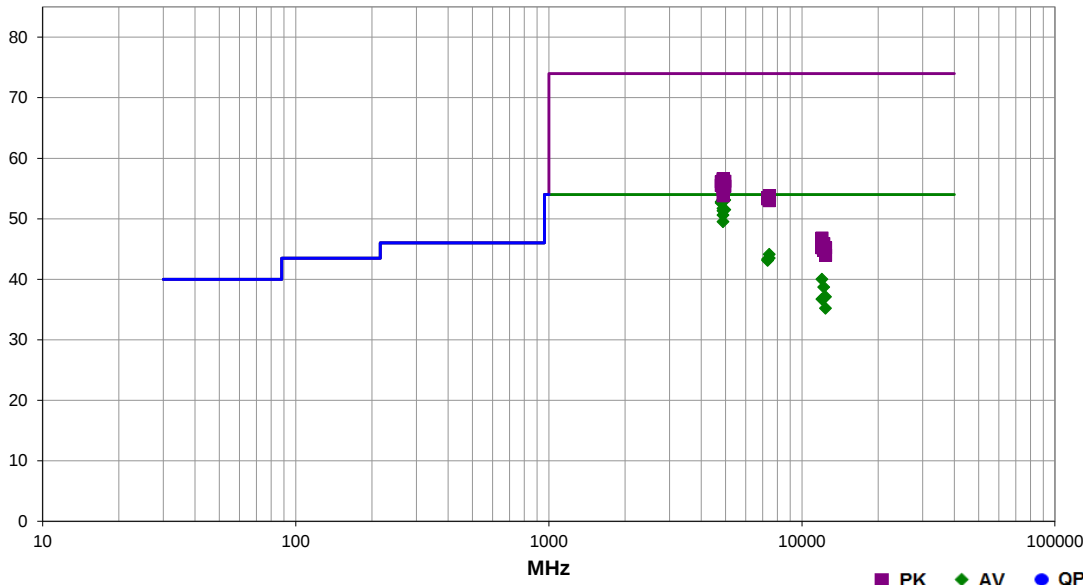


EmiRS 2019.08.15.1 PSA-ESCI 2019.05.10

Work Order:	APRI0003	Date:	20-Dec-2019	
Project:	None	Temperature:	21.8 °C	
Job Site:	EV01	Humidity:	46.5% RH	
Serial Number:	4	Barometric Pres.:	1013 mbar	
EUT:		JL Module		
Configuration:	3			
Customer:	Apricity Code			
Attendees:	None			
EUT Power:	USB			
Operating Mode:	BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:	None			
Comments:	See comments below for Channel, EUT and Antenna orientation. The RMS Average Measurements were upwardly corrected by a factor of $10 * \log(1/\text{Duty Cycle}) = 10 * \log(1/0.854) = 0.7 \text{ dB}$.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

Run #	26	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)	Antenna Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4884.140	46.1	6.4	3.1	308.0	0.7	0.0	Horz	AV	0.0	53.2	54.0	-0.8	Mid Ch, EUT and Trace Antenna Vert
4884.133	46.0	6.4	2.7	232.0	0.7	0.0	Vert	AV	0.0	53.1	54.0	-0.9	Mid Ch, EUT and Trace Antenna Vert
4960.058	45.9	6.5	2.4	74.0	0.7	0.0	Vert	AV	0.0	53.1	54.0	-0.9	High Ch, EUT and Trace Antenna Vert
4804.133	46.7	5.4	1.4	157.0	0.7	0.0	Horz	AV	0.0	52.8	54.0	-1.2	Low Ch, EUT and Trace Antenna Vert
4804.242	46.4	5.5	2.3	84.0	0.7	0.0	Vert	AV	0.0	52.6	54.0	-1.4	Low Ch, EUT and Trace Antenna Vert
4884.117	44.6	6.4	3.9	164.0	0.7	0.0	Horz	AV	0.0	51.7	54.0	-2.3	Mid Ch, EUT ant Trace Antenna on Side
4960.077	44.3	6.5	1.5	169.0	0.7	0.0	Horz	AV	0.0	51.5	54.0	-2.5	High Ch, EUT and Trace Antenna Vert
4884.103	44.2	6.4	2.3	248.0	0.7	0.0	Horz	AV	0.0	51.3	54.0	-2.7	Mid Ch, EUT and Trace Antenna Horz
4884.130	43.5	6.4	1.5	216.0	0.7	0.0	Vert	AV	0.0	50.6	54.0	-3.4	Mid Ch, EUT and Trace Antenna Horz
4884.053	42.4	6.4	3.8	116.0	0.7	0.0	Vert	AV	0.0	49.5	54.0	-4.5	Mid Ch, EUT ant Trace Antenna on Side
7440.600	28.8	14.6	1.5	123.0	0.7	0.0	Vert	AV	0.0	44.1	54.0	-9.9	High Ch, EUT and Trace Antenna Vert
7440.742	28.2	14.6	3.1	8.0	0.7	0.0	Horz	AV	0.0	43.5	54.0	-10.5	High Ch, EUT and Trace Antenna Vert
7326.860	28.4	14.2	1.5	136.0	0.7	0.0	Vert	AV	0.0	43.3	54.0	-10.7	Mid Ch, EUT and Trace Antenna Vert
7326.677	28.2	14.2	1.5	245.0	0.7	0.0	Horz	AV	0.0	43.1	54.0	-10.9	Mid Ch, EUT and Trace Antenna Vert
12011.360	38.3	1.0	1.8	114.0	0.7	0.0	Vert	AV	0.0	40.0	54.0	-14.0	Low Ch, EUT and Trace Antenna Vert
12211.370	37.2	0.8	1.8	91.0	0.7	0.0	Vert	AV	0.0	38.7	54.0	-15.3	Mid Ch, EUT and Trace Antenna Vert
12399.150	35.3	1.1	1.9	94.0	0.7	0.0	Vert	AV	0.0	37.1	54.0	-16.9	High Ch, EUT and Trace Antenna Vert
12209.170	35.4	0.8	1.9	116.0	0.7	0.0	Horz	AV	0.0	36.9	54.0	-17.1	Mid Ch, EUT and Trace Antenna Vert
12009.110	35.0	1.0	1.2	25.0	0.7	0.0	Horz	AV	0.0	36.7	54.0	-17.3	Low Ch, EUT and Trace Antenna Vert
4884.670	50.2	6.4	3.1	308.0	0.0	0.0	Horz	PK	0.0	56.6	74.0	-17.4	Mid Ch, EUT and Trace Antenna Vert
4883.720	50.0	6.4	2.7	232.0	0.0	0.0	Vert	PK	0.0	56.4	74.0	-17.6	Mid Ch, EUT and Trace Antenna Vert
4960.592	49.7	6.5	2.4	74.0	0.0	0.0	Vert	PK	0.0	56.2	74.0	-17.8	High Ch, EUT and Trace Antenna Vert
4804.608	50.6	5.5	1.4	157.0	0.0	0.0	Horz	PK	0.0	56.1	74.0	-17.9	Low Ch, EUT and Trace Antenna Vert
4804.617	50.0	5.5	2.3	84.0	0.0	0.0	Vert	PK	0.0	55.5	74.0	-18.5	Low Ch, EUT and Trace Antenna Vert
4884.583	49.0	6.4	3.9	164.0	0.0	0.0	Horz	PK	0.0	55.4	74.0	-18.6	Mid Ch, EUT ant Trace Antenna on Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.483	48.9	6.5	1.5	169.0	0.0	0.0	Horz	PK	0.0	55.4	74.0	-18.6	High Ch, EUT and Trace Antenna Vert
4883.567	48.9	6.4	2.3	248.0	0.0	0.0	Horz	PK	0.0	55.3	74.0	-18.7	Mid Ch, EUT and Trace Antenna Horz
12399.090	33.4	1.1	1.0	21.0	0.7	0.0	Horz	AV	0.0	35.2	54.0	-18.8	High Ch, EUT and Trace Antenna Vert
4883.687	48.4	6.4	1.5	216.0	0.0	0.0	Vert	PK	0.0	54.8	74.0	-19.2	Mid Ch, EUT and Trace Antenna Horz
4883.580	47.4	6.4	3.8	116.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	Mid Ch, EUT ant Trace Antenna on Side
7441.042	39.2	14.6	1.5	123.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	High Ch, EUT and Trace Antenna Vert
7326.437	39.3	14.2	1.5	245.0	0.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Mid Ch, EUT and Trace Antenna Vert
7326.293	39.1	14.2	1.5	136.0	0.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	Mid Ch, EUT and Trace Antenna Vert
7437.542	38.4	14.6	3.1	8.0	0.0	0.0	Horz	PK	0.0	53.0	74.0	-21.0	High Ch, EUT and Trace Antenna Vert
12011.710	45.8	1.0	1.8	114.0	0.0	0.0	Vert	PK	0.0	46.8	74.0	-27.2	Low Ch, EUT and Trace Antenna Vert
12211.770	45.1	0.8	1.8	91.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Mid Ch, EUT and Trace Antenna Vert
12008.990	44.2	1.0	1.2	25.0	0.0	0.0	Horz	PK	0.0	45.2	74.0	-28.8	Low Ch, EUT and Trace Antenna Vert
12398.980	44.1	1.1	1.9	94.0	0.0	0.0	Vert	PK	0.0	45.2	74.0	-28.8	High Ch, EUT and Trace Antenna Vert
12211.260	44.0	0.8	1.9	116.0	0.0	0.0	Horz	PK	0.0	44.8	74.0	-29.2	Mid Ch, EUT and Trace Antenna Vert
12398.950	42.9	1.1	1.0	21.0	0.0	0.0	Horz	PK	0.0	44.0	74.0	-30.0	High Ch, EUT and Trace Antenna Vert

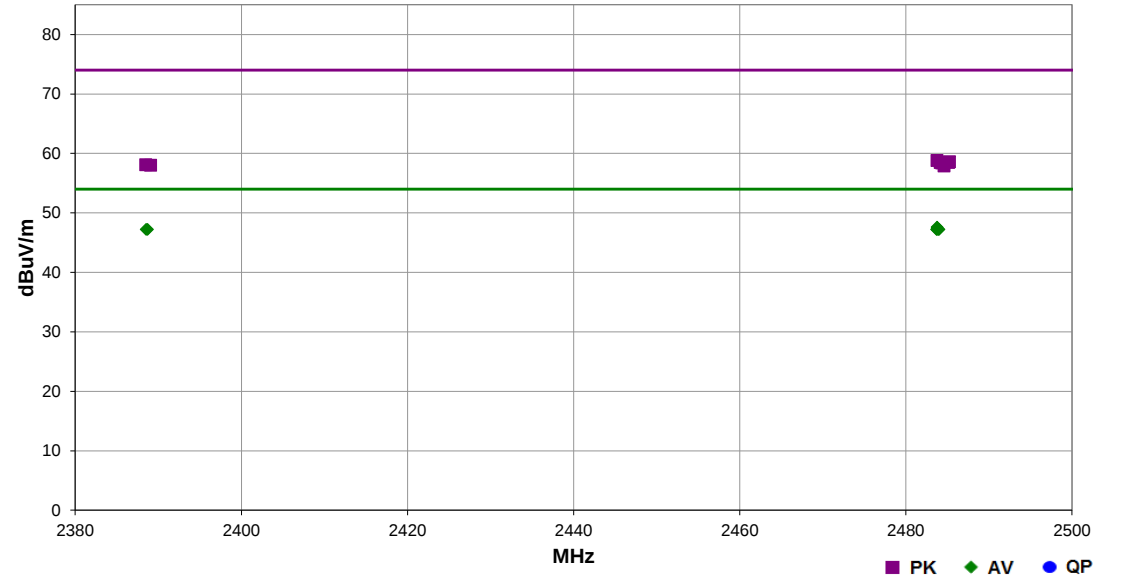


SPURIOUS RADIATED EMISSIONS

Work Order:		APRI0003	Date:	20-Dec-2019	
Project:		None	Temperature:	21.8 °C	
Job Site:		EV01	Humidity:	46.5% RH	
Serial Number:		4	Barometric Pres.:	1013 mbar	
EUT:		JL Module			
Configuration:		3			
Customer:		Apricity Code			
Attendees:		None			
EUT Power:		USB			
Operating Mode:		BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:		None			
Comments:		See comments below for Channel, EUT and Antenna orientation. Measurements were noise floor, no DCCF applied.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

Run #	28	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
2483.760	31.4	-3.8	1.5	15.0	3.0	20.0	Horz	AV	0.0	47.6	54.0	-6.4	High Ch, EUT and Trace Antenna Vert
2483.803	31.2	-3.8	1.5	39.0	3.0	20.0	Vert	AV	0.0	47.4	54.0	-6.6	High Ch, EUT and Trace Antenna Vert
2483.917	31.0	-3.8	1.54	326.0	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and Trace Antenna Horz
2484.000	31.0	-3.8	1.88	299.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and Trace Antenna Horz
2483.777	31.0	-3.8	1.5	17.0	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and Trace Antenna on Side
2483.703	31.0	-3.8	1.5	343.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and Trace Antenna on Side
2388.550	31.2	-4.0	3.38	191.0	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	Low Ch, EUT and Trace Antenna Vert
2388.703	31.2	-4.0	1.5	180.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	Low Ch, EUT and Trace Antenna Vert
2483.743	42.6	-3.8	1.5	15.0	3.0	20.0	Horz	PK	0.0	58.8	74.0	-15.2	High Ch, EUT and Trace Antenna Vert
2485.257	42.3	-3.7	1.5	17.0	3.0	20.0	Horz	PK	0.0	58.6	74.0	-15.4	High Ch, EUT and Trace Antenna on Side
2485.137	42.2	-3.7	1.54	326.0	3.0	20.0	Horz	PK	0.0	58.5	74.0	-15.5	High Ch, EUT and Trace Antenna Horz
2484.123	42.3	-3.8	1.5	343.0	3.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	High Ch, EUT and Trace Antenna on Side
2484.310	42.1	-3.7	1.5	39.0	3.0	20.0	Vert	PK	0.0	58.4	74.0	-15.6	High Ch, EUT and Trace Antenna Vert
2388.480	42.1	-4.0	1.5	180.0	3.0	20.0	Vert	PK	0.0	58.1	74.0	-15.9	Low Ch, EUT and Trace Antenna Vert
2389.073	42.0	-4.0	3.38	191.0	3.0	20.0	Horz	PK	0.0	58.0	74.0	-16.0	Low Ch, EUT and Trace Antenna Vert
2484.590	41.6	-3.7	1.88	299.0	3.0	20.0	Vert	PK	0.0	57.9	74.0	-16.1	High Ch, EUT and Trace Antenna Horz

SPURIOUS RADIATED EMISSIONS

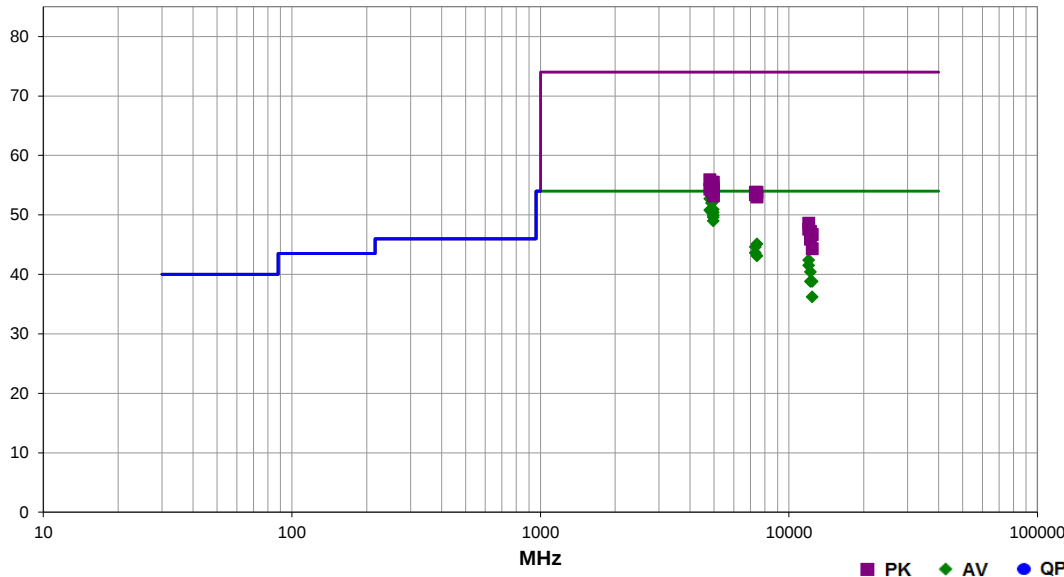


EmiR5 2019.08.15.1 PSA-ESCI 2019.05.10

Work Order:	APRI0003	Date:	20-Dec-2019	
Project:	None	Temperature:	21.8 °C	
Job Site:	EV01	Humidity:	46.5% RH	
Serial Number:	4	Barometric Pres.:	1013 mbar	
EUT:	JL Module			
Configuration:	4			
Customer:	Apricity Code			
Attendees:	None			
EUT Power:	USB			
Operating Mode:	BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:	None			
Comments:	See comments below for Channel, EUT and Antenna orientation. The RMS Average Measurements were upwardly corrected by a factor of $10 * \log(1/\text{Duty Cycle}) = 10 * \log(1/0.854) = 0.7 \text{ dB}$.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

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)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4804.183	46.5	5.5	2.7	217.0	0.7	0.0	Vert	AV	0.0	52.7	54.0	-1.3	Low Ch, EUT and PCB Antenna Vert
4960.175	45.1	6.5	2.4	207.0	0.7	0.0	Vert	AV	0.0	52.3	54.0	-1.7	High Ch, EUT and PCB Antenna Vert
4884.067	44.9	6.4	2.7	210.0	0.7	0.0	Vert	AV	0.0	52.0	54.0	-2.0	Mid Ch, EUT and PCB Antenna Vert
4960.092	43.7	6.5	3.3	292.0	0.7	0.0	Horz	AV	0.0	50.9	54.0	-3.1	High Ch, EUT and PCB Antenna on Side
4804.100	44.7	5.4	3.0	181.0	0.7	0.0	Horz	AV	0.0	50.8	54.0	-3.2	Low Ch, EUT and PCB Antenna on Side
4884.217	43.4	6.4	3.6	279.0	0.7	0.0	Horz	AV	0.0	50.5	54.0	-3.5	Mid Ch, EUT and PCB Antenna on Side
4960.133	43.2	6.5	1.5	333.0	0.7	0.0	Horz	AV	0.0	50.4	54.0	-3.6	High Ch, EUT and PCB Antenna Vert
4960.133	42.7	6.5	3.6	256.0	0.7	0.0	Vert	AV	0.0	49.9	54.0	-4.1	High Ch, EUT and PCB Antenna on Side
4960.142	42.4	6.5	2.3	227.0	0.7	0.0	Vert	AV	0.0	49.6	54.0	-4.4	High Ch, EUT and PCB Antenna Horz
4960.158	41.8	6.5	1.3	113.0	0.7	0.0	Horz	AV	0.0	49.0	54.0	-5.0	High Ch, EUT and PCB Antenna Horz
7440.725	29.8	14.6	3.2	216.0	0.7	0.0	Vert	AV	0.0	45.1	54.0	-8.9	High Ch, EUT and PCB Antenna Vert
7325.517	29.7	14.2	1.4	187.0	0.7	0.0	Horz	AV	0.0	44.6	54.0	-9.4	Mid Ch, EUT and PCB Antenna on Side
7326.492	28.7	14.2	2.7	169.0	0.7	0.0	Vert	AV	0.0	43.6	54.0	-10.4	Mid Ch, EUT and PCB Antenna Vert
7441.675	27.8	14.6	1.1	181.0	0.7	0.0	Vert	AV	0.0	43.1	54.0	-10.9	High Ch, EUT and PCB Antenna on Side
12009.140	40.7	1.0	2.0	245.0	0.7	0.0	Horz	AV	0.0	42.4	54.0	-11.6	Low Ch, EUT and PCB Antenna on Side
12011.360	39.8	1.0	1.9	246.0	0.7	0.0	Vert	AV	0.0	41.5	54.0	-12.5	Low Ch, EUT and PCB Antenna Vert
12211.380	38.9	0.8	2.0	243.0	0.7	0.0	Horz	AV	0.0	40.4	54.0	-13.6	Mid Ch, EUT and PCB Antenna on Side
12209.130	37.3	0.8	1.9	231.0	0.7	0.0	Vert	AV	0.0	38.8	54.0	-15.2	Mid Ch, EUT and PCB Antenna Vert
12399.220	37.0	1.1	2.0	240.0	0.7	0.0	Horz	AV	0.0	38.8	54.0	-15.2	High Ch, EUT and PCB Antenna on Side
12399.050	34.4	1.1	1.8	237.0	0.7	0.0	Vert	AV	0.0	36.2	54.0	-17.8	High Ch, EUT and PCB Antenna Vert
4803.583	50.5	5.4	2.7	217.0	0.0	0.0	Vert	PK	0.0	55.9	74.0	-18.1	Low Ch, EUT and PCB Antenna Vert
4959.642	49.0	6.5	2.4	207.0	0.0	0.0	Vert	PK	0.0	55.5	74.0	-18.5	High Ch, EUT and PCB Antenna Vert
4883.667	49.1	6.4	2.7	210.0	0.0	0.0	Vert	PK	0.0	55.5	74.0	-18.5	Mid Ch, EUT and PCB Antenna Vert
4960.642	48.2	6.5	3.3	292.0	0.0	0.0	Horz	PK	0.0	54.7	74.0	-19.3	High Ch, EUT and PCB Antenna on Side
4804.700	48.8	5.5	3.0	181.0	0.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	Low Ch, EUT and PCB Antenna on Side
4959.967	47.7	6.5	1.5	333.0	0.0	0.0	Horz	PK	0.0	54.2	74.0	-19.8	High Ch, EUT and PCB Antenna Vert
4884.583	47.7	6.4	3.6	279.0	0.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	Mid Ch, EUT and PCB Antenna on Side

Freq (MHz)	Amplitude (dBuV)	Factor (dB)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/ Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
4959.592	47.5	6.5	3.6	256.0	0.0	0.0	Vert	PK	0.0	54.0	74.0	-20.0	High Ch, EUT and PCB Antenna on Side
7440.317	39.2	14.6	3.2	216.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	High Ch, EUT and PCB Antenna Vert
7325.417	39.6	14.2	1.4	187.0	0.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	Mid Ch, EUT and PCB Antenna on Side
7326.208	39.2	14.2	2.7	169.0	0.0	0.0	Vert	PK	0.0	53.4	74.0	-20.6	Mid Ch, EUT and PCB Antenna Vert
4960.542	46.8	6.5	2.3	227.0	0.0	0.0	Vert	PK	0.0	53.3	74.0	-20.7	High Ch, EUT and PCB Antenna Horz
4960.767	46.7	6.5	1.3	113.0	0.0	0.0	Horz	PK	0.0	53.2	74.0	-20.8	High Ch, EUT and PCB Antenna Horz
7441.392	38.4	14.6	1.1	181.0	0.0	0.0	Vert	PK	0.0	53.0	74.0	-21.0	High Ch, EUT and PCB Antenna on Side
12009.070	47.6	1.0	2.0	245.0	0.0	0.0	Horz	PK	0.0	48.6	74.0	-25.4	Low Ch, EUT and PCB Antenna on Side
12011.440	46.6	1.0	1.9	246.0	0.0	0.0	Vert	PK	0.0	47.6	74.0	-26.4	Low Ch, EUT and PCB Antenna Vert
12211.670	46.4	0.8	2.0	243.0	0.0	0.0	Horz	PK	0.0	47.2	74.0	-26.8	Mid Ch, EUT and PCB Antenna on Side
12399.170	45.6	1.1	2.0	240.0	0.0	0.0	Horz	PK	0.0	46.7	74.0	-27.3	High Ch, EUT and PCB Antenna on Side
12208.830	45.1	0.8	1.9	231.0	0.0	0.0	Vert	PK	0.0	45.9	74.0	-28.1	Mid Ch, EUT and PCB Antenna Vert
12399.030	43.2	1.1	1.8	237.0	0.0	0.0	Vert	PK	0.0	44.3	74.0	-29.7	High Ch, EUT and PCB Antenna Vert

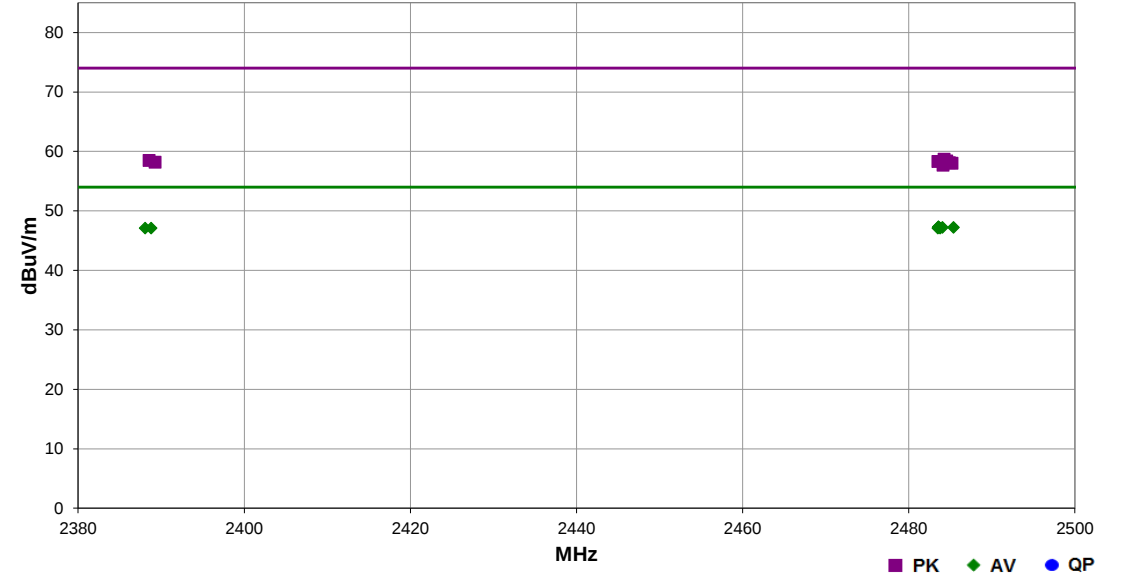


SPURIOUS RADIATED EMISSIONS

Work Order:	APRI0003	Date:	20-Dec-2019	
Project:	None	Temperature:	20.3 °C	
Job Site:	EV01	Humidity:	41.5% RH	
Serial Number:	4	Barometric Pres.:	1019 mbar	
EUT:	JL Module			Tested by: Jeff Alcock
Configuration:	4			
Customer:	Apricity Code			
Attendees:	None			
EUT Power:	USB			
Operating Mode:	BTLE Tx, GFSK, Low Ch = 2402 MHz, Mid Ch = 2442 MHz, High Ch = 2480 MHz, Duty Cycle = 85.4%			
Deviations:	None			
Comments:	See comments below for Channel, EUT and Antenna orientation. Measurements were noise floor, no DCCF applied.			

Test Specifications	Test Method
FCC 15.247:2019	ANSI C63.10:2013

Run #	42	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
2483.580	31.1	-3.8	1.5	224.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High Ch, EUT and PCB Antenna on Side
2483.597	31.1	-3.8	1.5	272.0	3.0	20.0	Horz	AV	0.0	47.3	54.0	-6.7	High Ch, EUT and PCB Antenna Horz
2485.393	30.9	-3.7	3.07	87.0	3.0	20.0	Horz	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and PCB Antenna Vert
2484.063	31.0	-3.8	1.5	191.0	3.0	20.0	Vert	AV	0.0	47.2	54.0	-6.8	High Ch, EUT and PCB Antenna Vert
2483.507	30.9	-3.8	3.98	50.0	3.0	20.0	Vert	AV	0.0	47.1	54.0	-6.9	High Ch, EUT and PCB Antenna on Side
2483.783	30.9	-3.8	3.18	103.0	3.0	20.0	Vert	AV	0.0	47.1	54.0	-6.9	High Ch, EUT and PCB Antenna Horz
2388.067	31.1	-4.0	1.5	5.0	3.0	20.0	Horz	AV	0.0	47.1	54.0	-6.9	Low Ch, EUT and PCB Antenna Vert
2388.787	31.1	-4.0	1.5	71.0	3.0	20.0	Vert	AV	0.0	47.1	54.0	-6.9	Low Ch, EUT and PCB Antenna Vert
2484.263	42.4	-3.7	1.5	224.0	3.0	20.0	Horz	PK	0.0	58.7	74.0	-15.3	High Ch, EUT and PCB Antenna on Side
2388.547	42.5	-4.0	1.5	71.0	3.0	20.0	Vert	PK	0.0	58.5	74.0	-15.5	Low Ch, EUT and PCB Antenna Vert
2484.570	42.1	-3.7	3.07	87.0	3.0	20.0	Horz	PK	0.0	58.4	74.0	-15.6	High Ch, EUT and PCB Antenna Vert
2483.507	42.1	-3.8	1.5	191.0	3.0	20.0	Vert	PK	0.0	58.3	74.0	-15.7	High Ch, EUT and PCB Antenna Vert
2389.253	42.2	-4.0	1.5	5.0	3.0	20.0	Horz	PK	0.0	58.2	74.0	-15.8	Low Ch, EUT and PCB Antenna Vert
2484.900	41.8	-3.7	1.5	272.0	3.0	20.0	Horz	PK	0.0	58.1	74.0	-15.9	High Ch, EUT and PCB Antenna Horz
2485.213	41.7	-3.7	3.98	50.0	3.0	20.0	Vert	PK	0.0	58.0	74.0	-16.0	High Ch, EUT and PCB Antenna on Side
2484.137	41.5	-3.8	3.18	103.0	3.0	20.0	Vert	PK	0.0	57.7	74.0	-16.3	High Ch, EUT and PCB Antenna Horz

DUTY CYCLE



XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

TEST DESCRIPTION

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

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

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

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

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

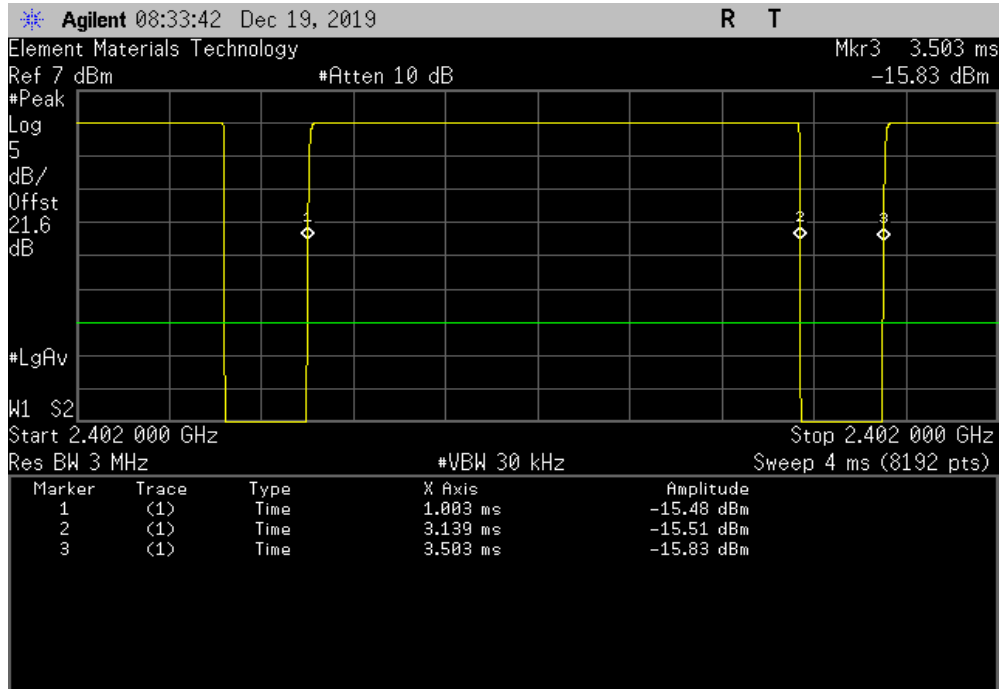
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DUTY CYCLE

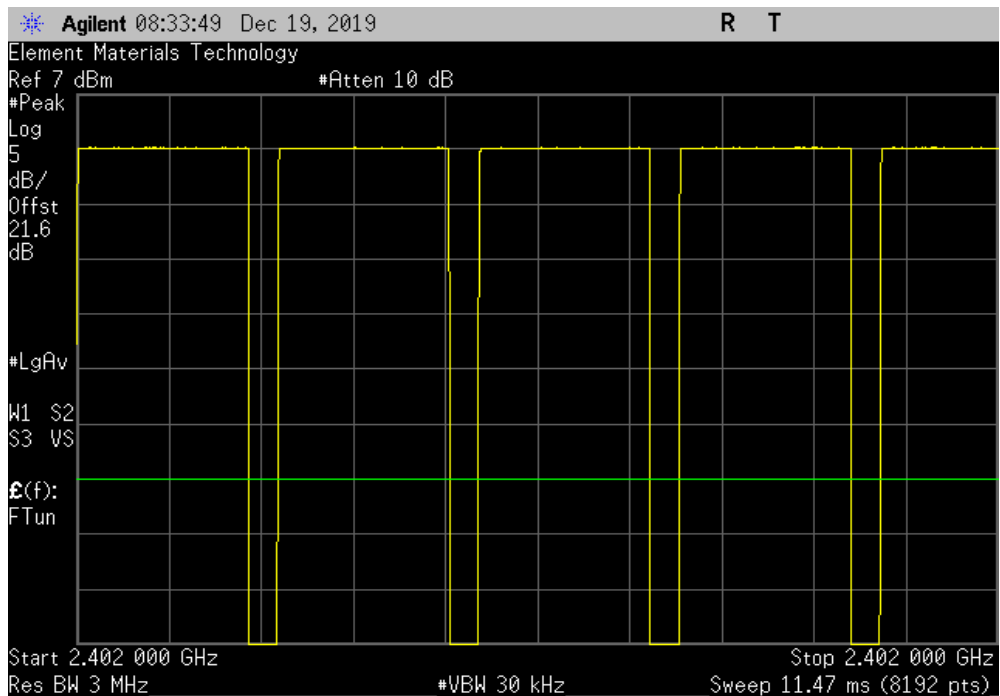


TUTTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Low Channel, 2402 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.136 ms	2.5 ms	1	85.4	N/A	N/A



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

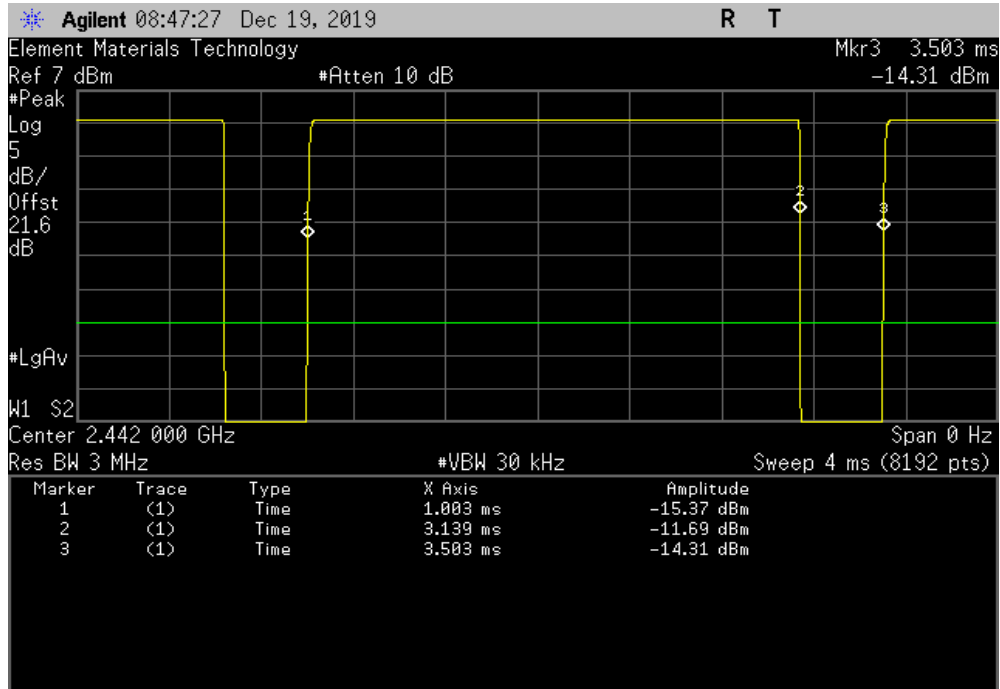


DUTY CYCLE

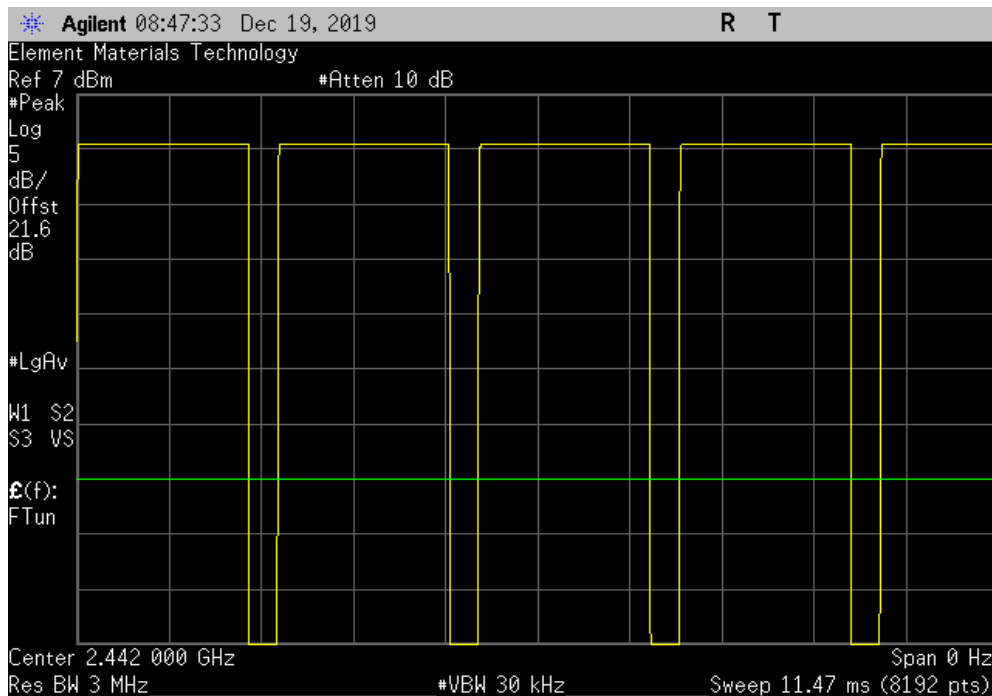


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.136 ms	2.5 ms	1	85.4	N/A	N/A



BLE/GFSK Mid Channel, 2442 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	N/A	N/A	5	N/A	N/A	N/A

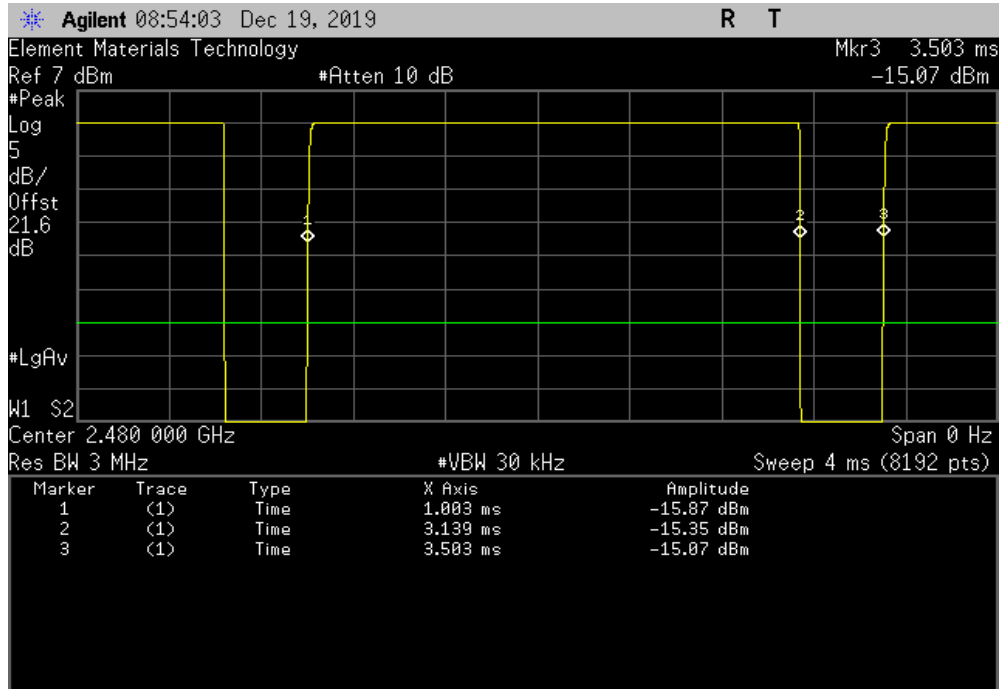


DUTY CYCLE

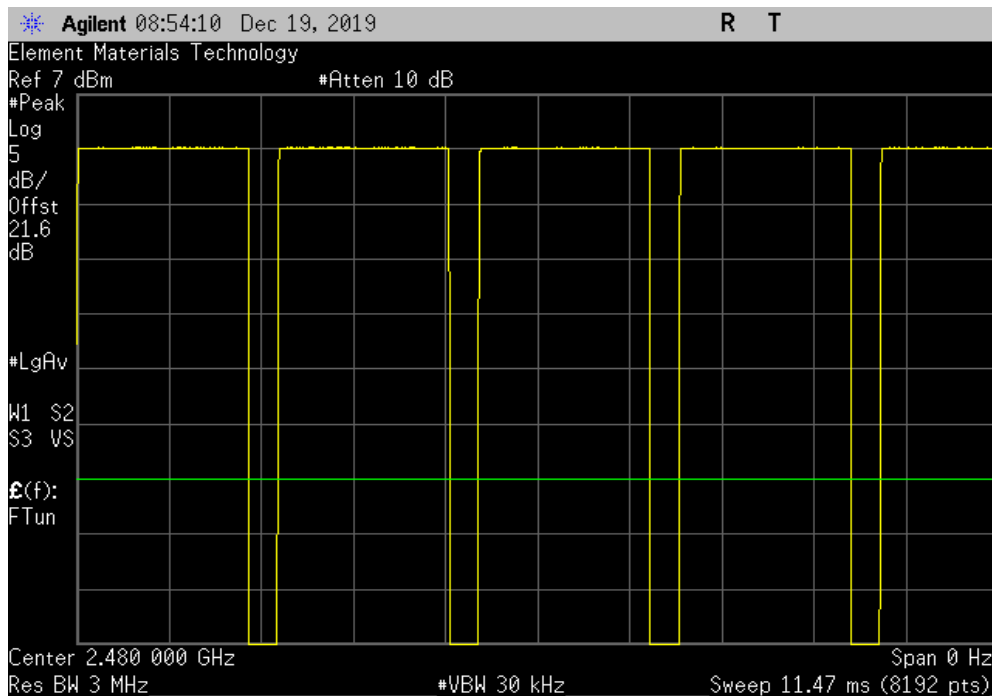


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz						
	Pulse Width	Period	Number of Pulses	Value (%)	Limit (%)	Results
	2.136 ms	2.5 ms	1	85.4	N/A	N/A



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



OCCUPIED BANDWIDTH



XMIT 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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



TMTx 2019.08.30.0 XMI 2019.09.05

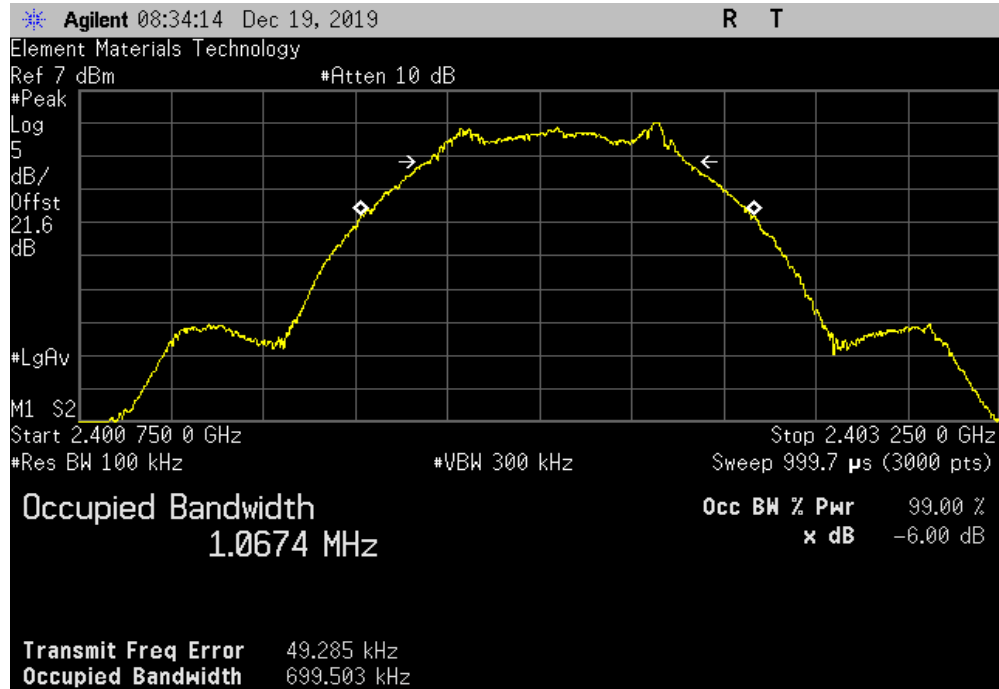
EUT: JL Module		Work Order: APRI0003	
Serial Number: 4		Date: 19-Dec-19	
Customer: Apricity Code		Temperature: 19.6 °C	
Attendees: None		Humidity: 40.8% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Jeff Alcock	Power: USB	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2019		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes: 20 dB attenuator, DC block, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value	Limit (±) Result
BLE/GFSK Low Channel, 2402 MHz		699.503 kHz	500 kHz Pass
BLE/GFSK Mid Channel, 2442 MHz		700.988 kHz	500 kHz Pass
BLE/GFSK High Channel, 2480 MHz		710.467 kHz	500 kHz Pass

OCCUPIED BANDWIDTH

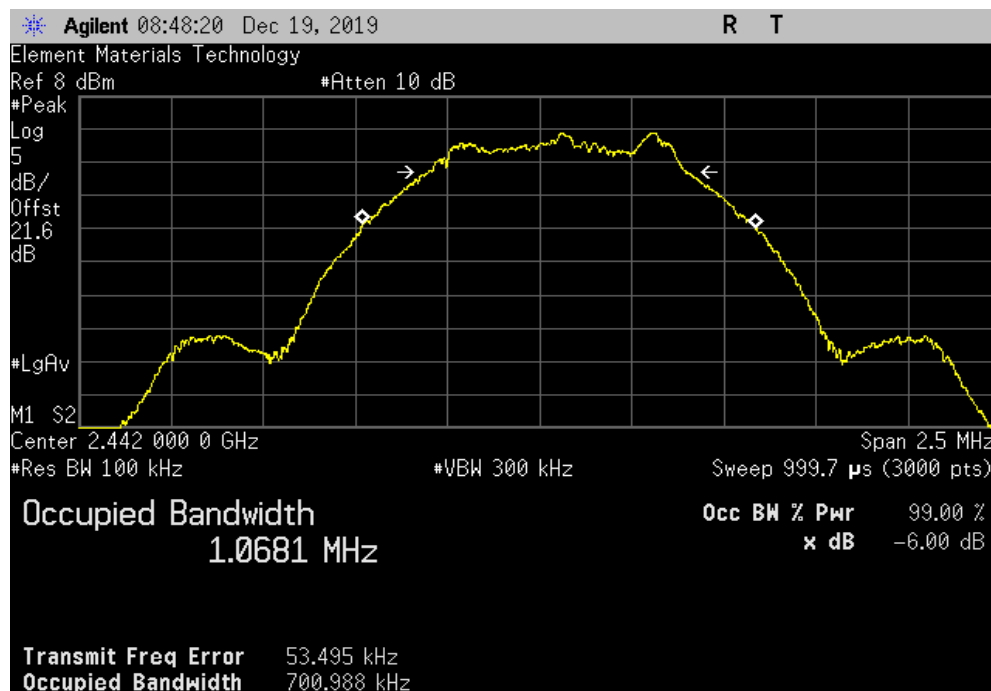


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BLE/GFSK Low Channel, 2402 MHz						
Value				Limit (≥)	Result	
699.503 kHz				500 kHz	Pass	



BLE/GFSK Mid Channel, 2442 MHz						
Value				Limit (≥)	Result	
700.988 kHz				500 kHz	Pass	

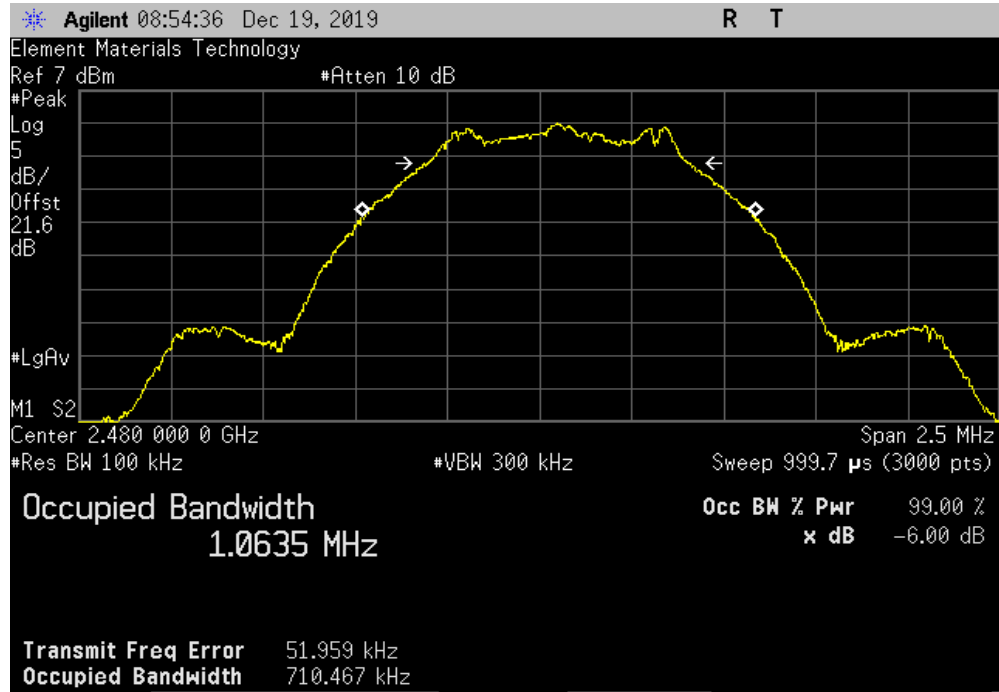


OCCUPIED BANDWIDTH



TbTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz						
Value				Limit	Result	
710.467 kHz				500 kHz	Pass	



OUTPUT POWER



XMIT 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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



TMTx 2019.08.30.0 XMt 2019.09.05

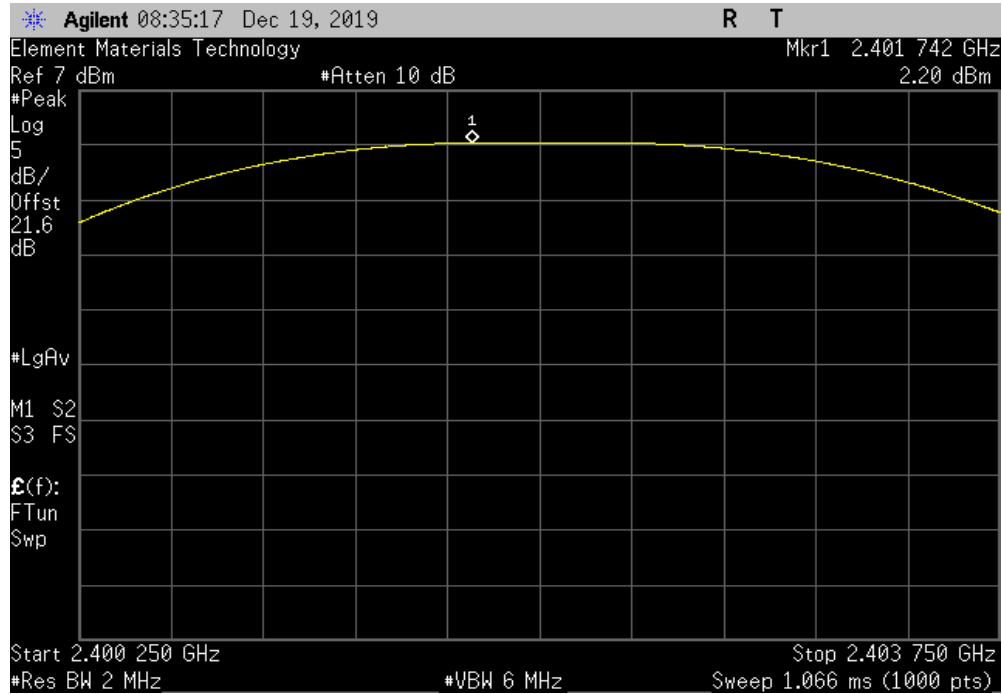
EUT: JL Module		Work Order: APRI0003	
Serial Number: 4		Date: 19-Dec-19	
Customer: Apricity Code		Temperature: 19.6 °C	
Attendees: None		Humidity: 40.6% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Jeff Alcock	Power: USB	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2019		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Out Pwr (dBm)	Limit (dBm) Result
BLE/GFSK Low Channel, 2402 MHz		2.196	30 Pass
BLE/GFSK Mid Channel, 2442 MHz		2.567	30 Pass
BLE/GFSK High Channel, 2480 MHz		2.335	30 Pass

OUTPUT POWER

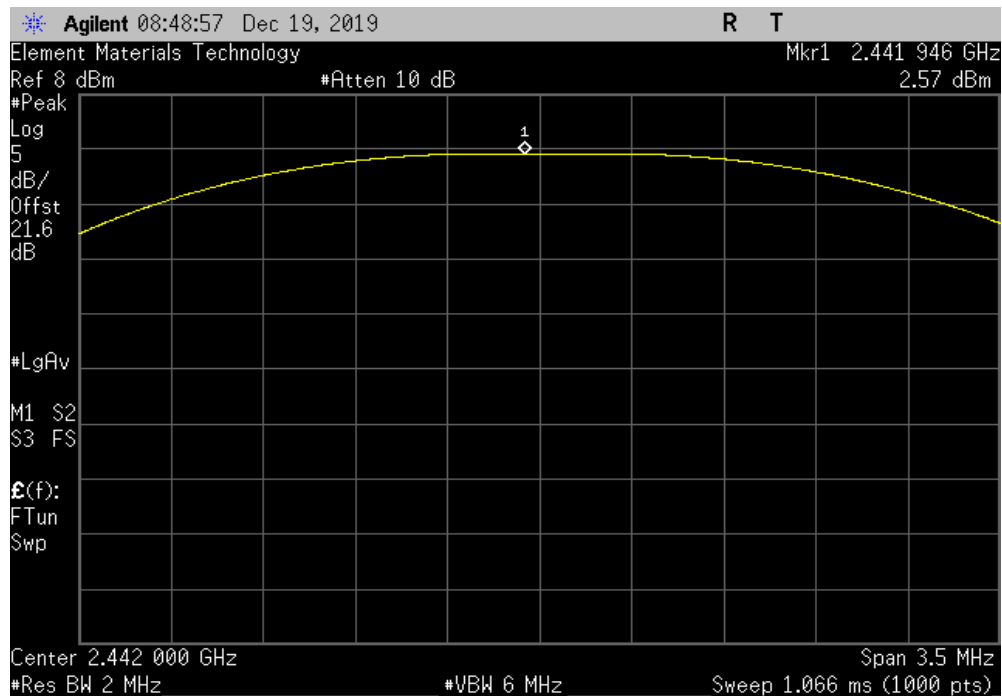


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Low Channel, 2402 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				2.196	30	Pass



BLE/GFSK Mid Channel, 2442 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				2.567	30	Pass

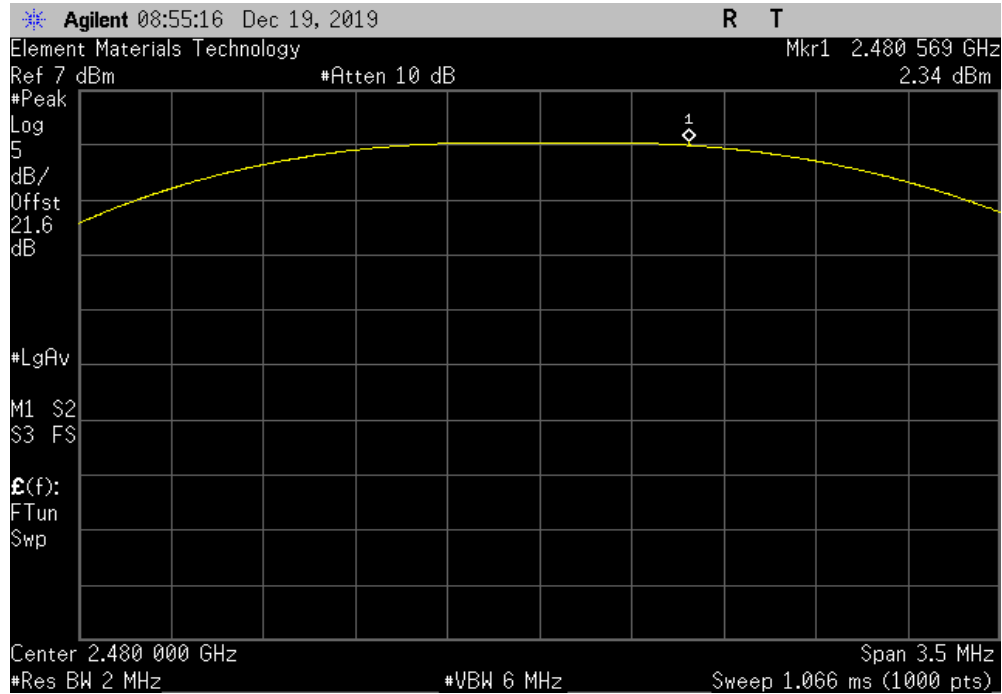


OUTPUT POWER



TbTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz						
				Out Pwr (dBm)	Limit (dBm)	Result
				2.335	30	Pass



EQUIVALENT ISOTROPIC RADIATED POWER



XMIT 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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.

The antenna gain of the EUT was then added to the conducted output power to derive the EIRP Values.

EQUIVALENT ISOTROPIC RADAITED POWER



TMTx 2019.08.30.0 XMI 2019.09.05

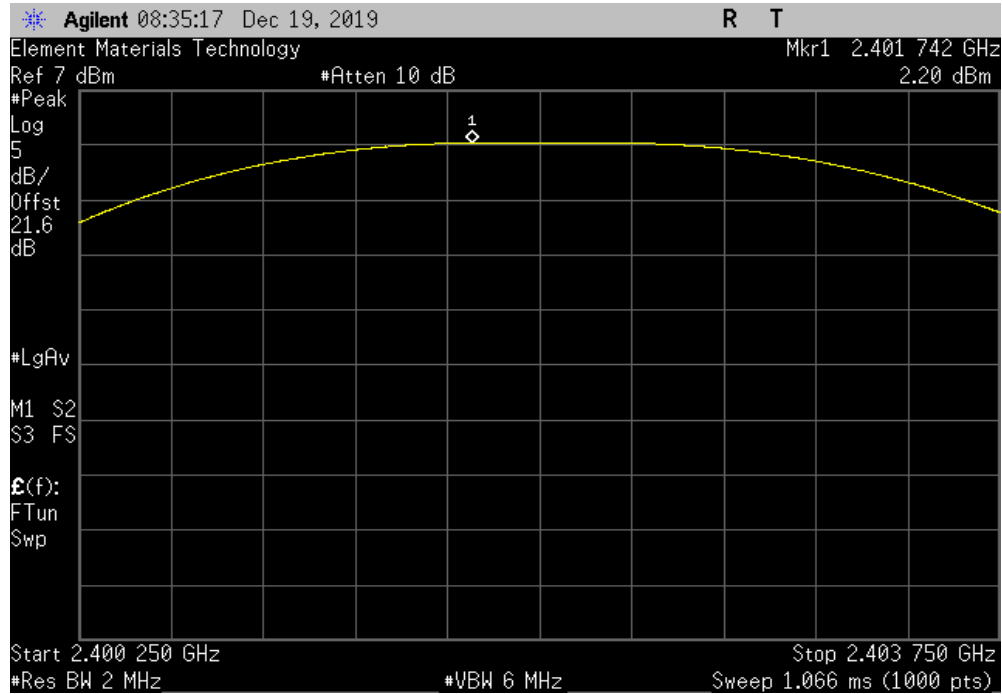
EUT: JL Module		Work Order: APRI0003	
Serial Number: 4		Date: 19-Dec-19	
Customer: Apricity Code		Temperature: 19.6 °C	
Attendees: None		Humidity: 40.6% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Jeff Alcock	Power: USB	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2019		ANSI C63.10:2013	
COMMENTS			
None			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Out Pwr (dBm)	Antenna Gain (dBi)
BLE/GFSK Low Channel, 2402 MHz		2.20	4.4
BLE/GFSK Mid Channel, 2442 MHz		2.57	4.4
BLE/GFSK High Channel, 2480 MHz		2.34	4.4
		EIRP (dBm)	Limit (dBm)
		6.6	≤ 36
		7.0	≤ 36
		6.7	≤ 36
			Result
			Pass
			Pass
			Pass

EQUIVALENT ISOTROPIC RADAITED POWER

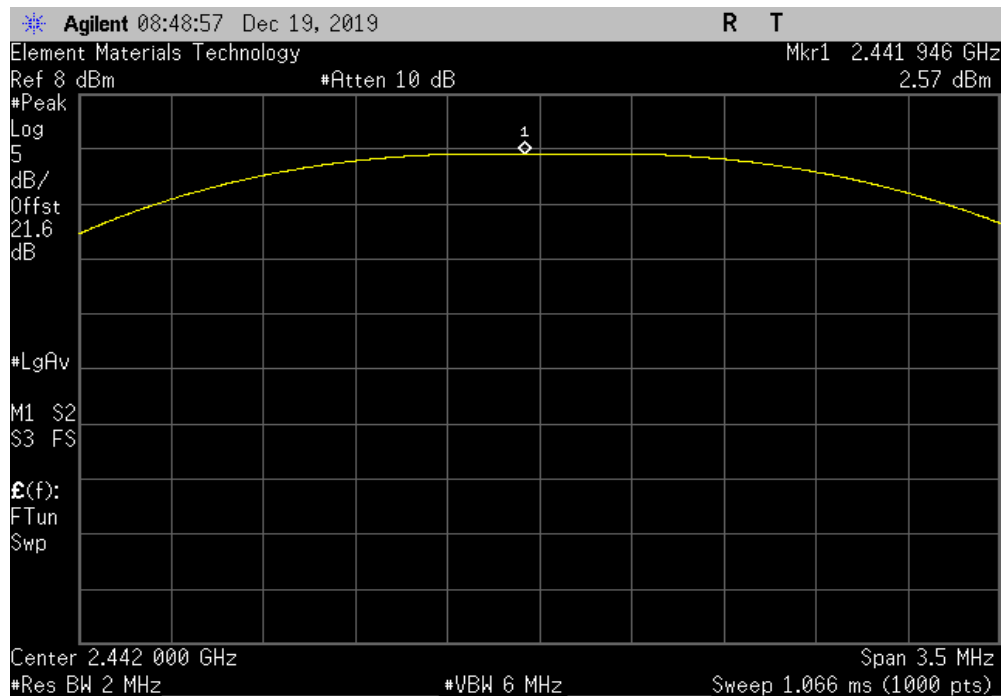


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Low Channel, 2402 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result	
	2.2	4.4	6.6	≤ 36	Pass	



BLE/GFSK Mid Channel, 2442 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result	
	2.57	4.4	6.97	≤ 36	Pass	

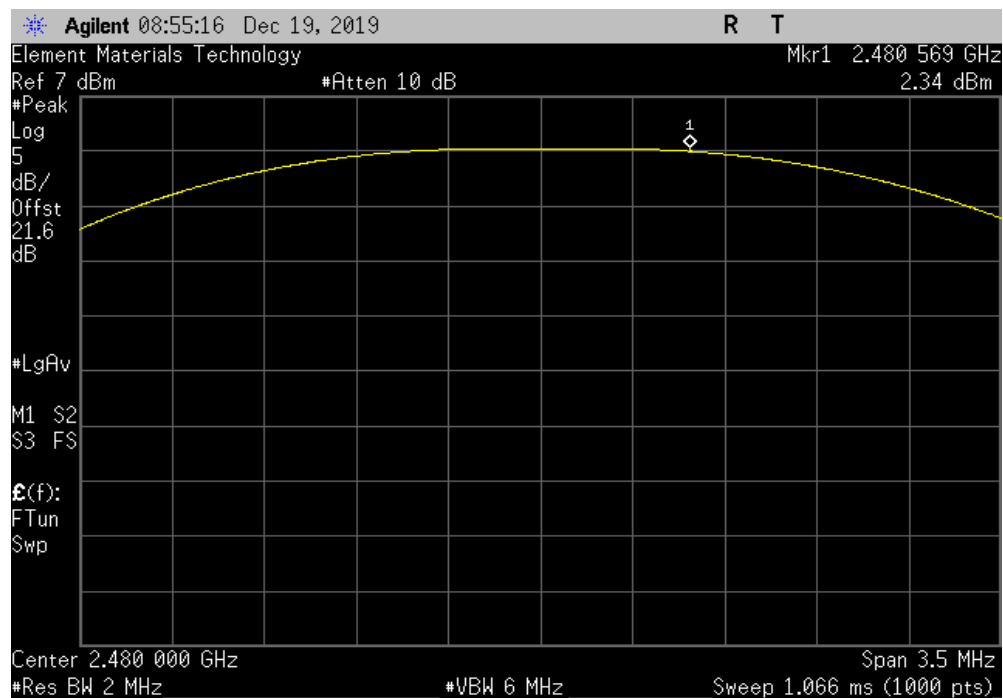


EQUIVALENT ISOTROPIC RADAITED POWER



TbTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz						
	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Result	
	2.34	4.4	6.74	≤ 36	Pass	



POWER SPECTRAL DENSITY



XMIT 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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



TMTx 2019.08.30.0 XMI 2019.09.05

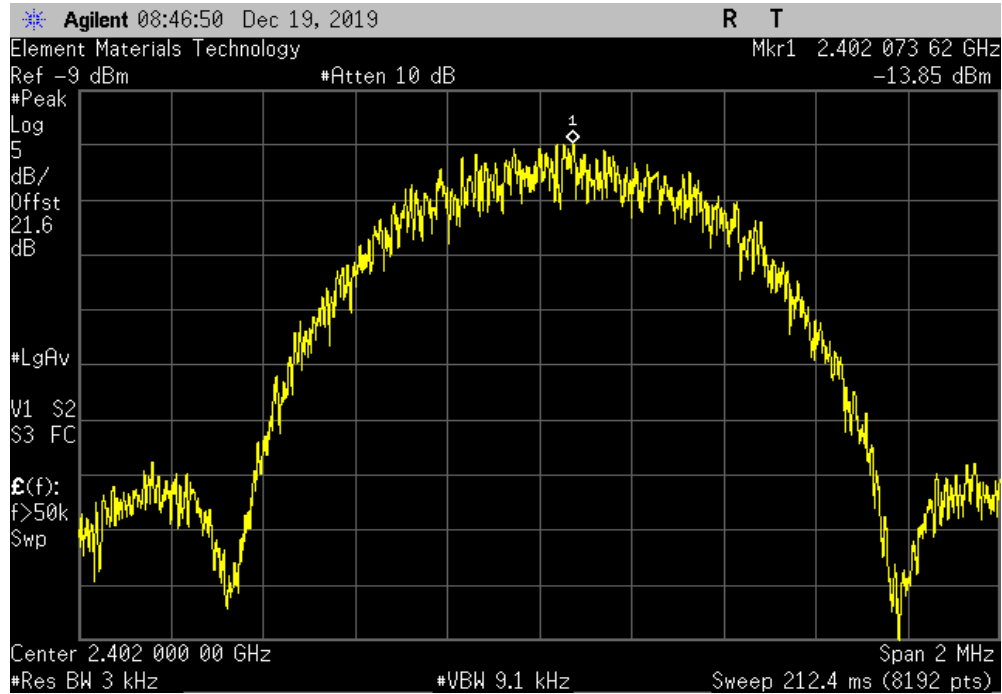
EUT: JL Module		Work Order: APRI0003	
Serial Number: 4		Date: 19-Dec-19	
Customer: Apricity Code		Temperature: 19.6 °C	
Attendees: None		Humidity: 40.8% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Jeff Alcock	Power: USB	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2019		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes: 20 dB attenuator, DC block, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value dBm/3kHz	Limit < dBm/3kHz
BLE/GFSK Low Channel, 2402 MHz		-13.845	8
BLE/GFSK Mid Channel, 2442 MHz		-13.169	8
BLE/GFSK High Channel, 2480 MHz		-13.54	8
			Results
			Pass
			Pass
			Pass

POWER SPECTRAL DENSITY

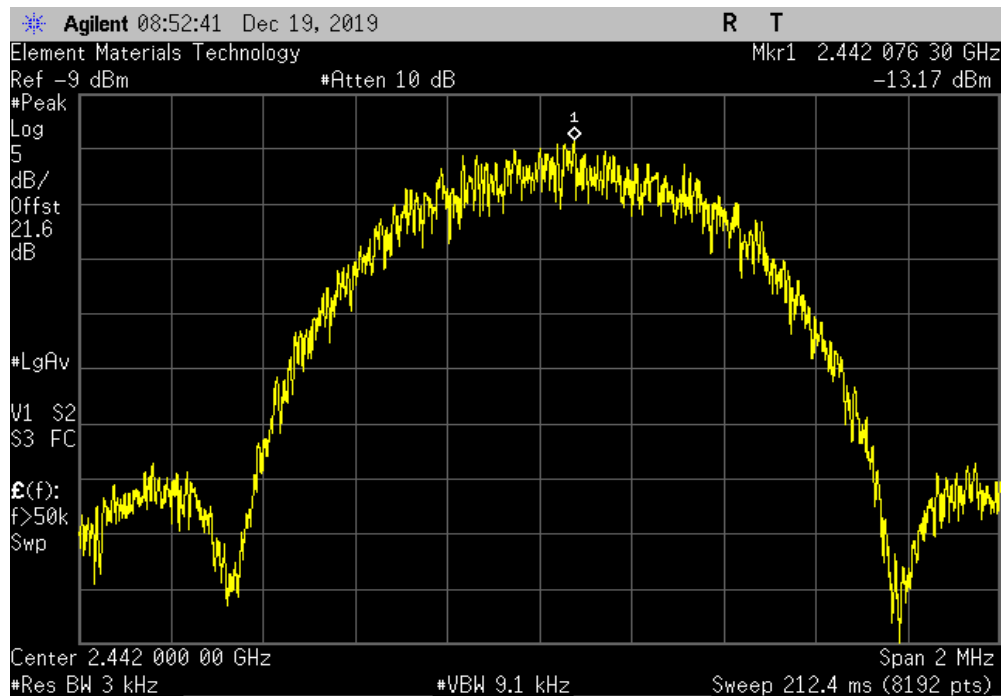


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BLE/GFSK Low Channel, 2402 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.845	8	Pass			



BLE/GFSK Mid Channel, 2442 MHz						
	Value	Limit	Results			
	dBm/3kHz	< dBm/3kHz				
	-13.169	8	Pass			

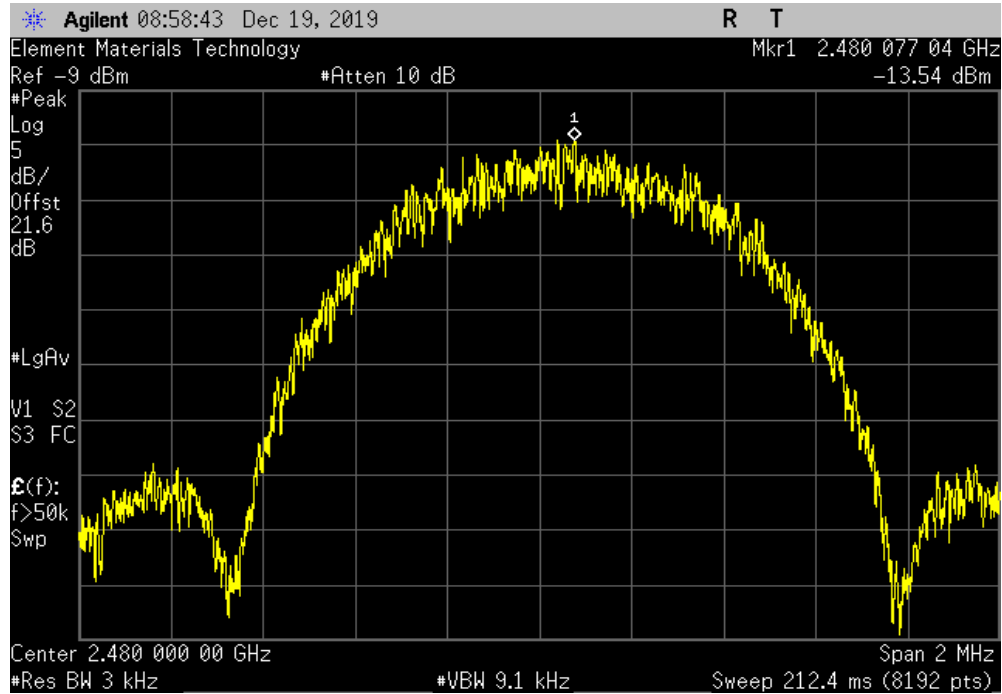


POWER SPECTRAL DENSITY



TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz						
	Value	Limit				
	dBm/3kHz	< dBm/3kHz	Results			
	-13.54	8	Pass			



BAND EDGE COMPLIANCE



XMit 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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



TMTx 2019.08.30.0 XMI 2019.09.05

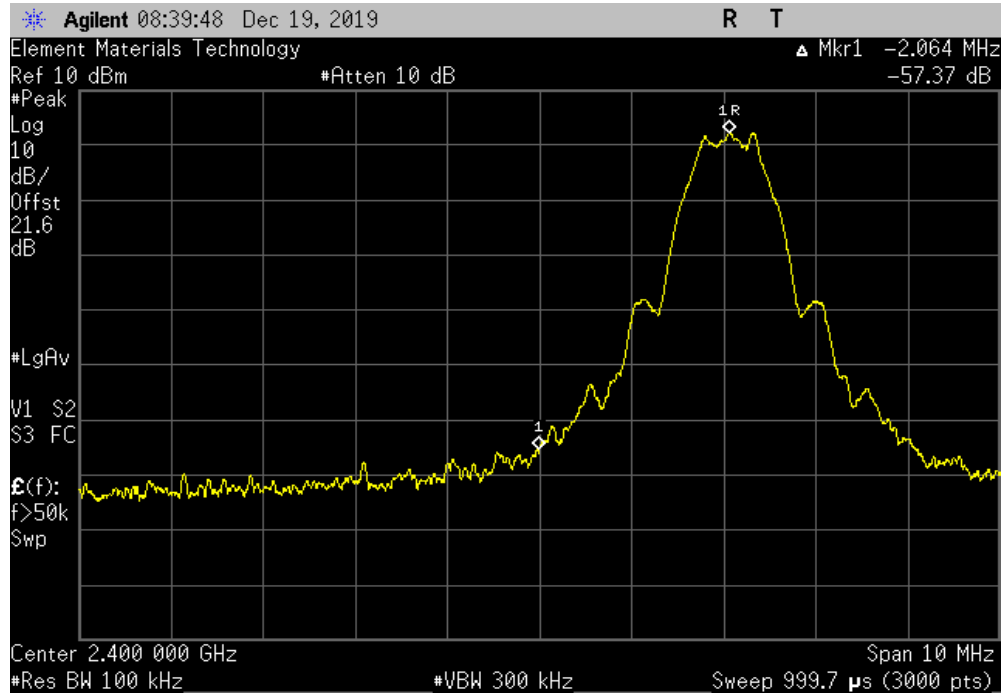
EUT: JL Module		Work Order: APRI0003	
Serial Number: 4		Date: 19-Dec-19	
Customer: Apricity Code		Temperature: 19.6 °C	
Attendees: None		Humidity: 40.8% RH	
Project: None		Barometric Pres.: 1014 mbar	
Tested by: Jeff Alcock	Power: USB	Job Site: EV06	
TEST SPECIFICATIONS		Test Method	
FCC 15.247:2019		ANSI C63.10:2013	
COMMENTS			
Reference level offset includes: 20 dB attenuator, DC Block, and measurement cable.			
DEVIATIONS FROM TEST STANDARD			
None			
Configuration #	1	Signature 	
		Value (dBc)	Limit ≤ (dBc) Result
BLE/GFSK Low Channel, 2402 MHz		-57.37	-20 Pass
BLE/GFSK High Channel, 2480 MHz		-59.24	-20 Pass

BAND EDGE COMPLIANCE

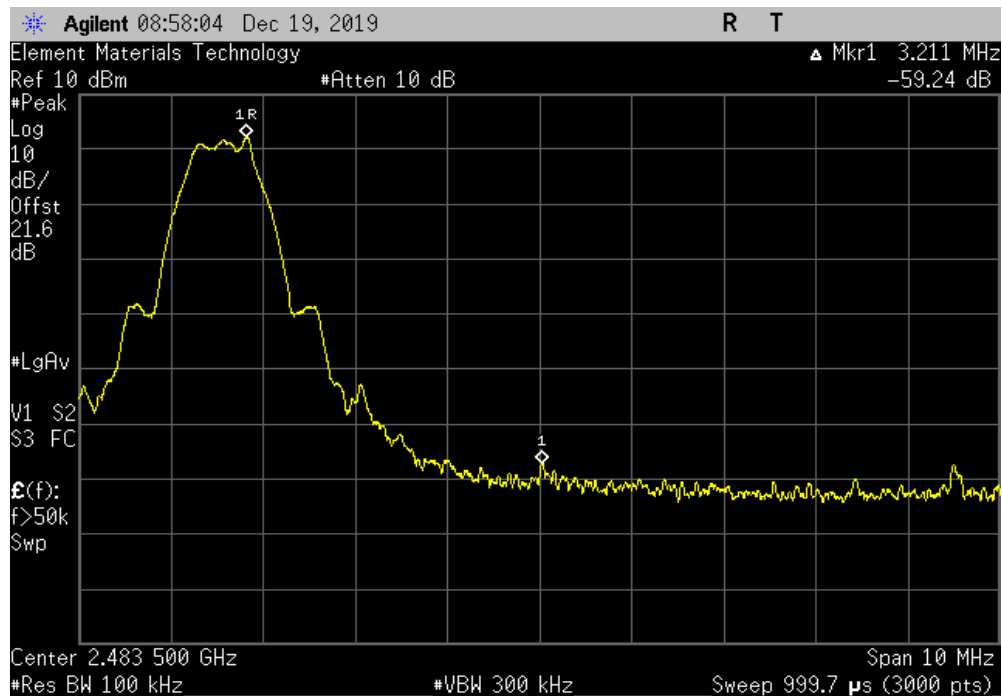


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Low Channel, 2402 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-57.37	-20	Pass



BLE/GFSK High Channel, 2480 MHz						
				Value (dBc)	Limit ≤ (dBc)	Result
				-59.24	-20	Pass



SPURIOUS CONDUCTED EMISSIONS



XMIT 2019.09.05

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TFU	5-Nov-18	5-Nov-21
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	28-Mar-19	28-Mar-20
Attenuator	S.M. Electronics	SA26B-20	AUY	28-Mar-19	28-Mar-20
Block - DC	Fairview Microwave	SD3379	AMW	28-Mar-19	28-Mar-20
Analyzer - Spectrum Analyzer	Agilent	E4440A	AFA	12-Feb-19	12-Feb-20

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



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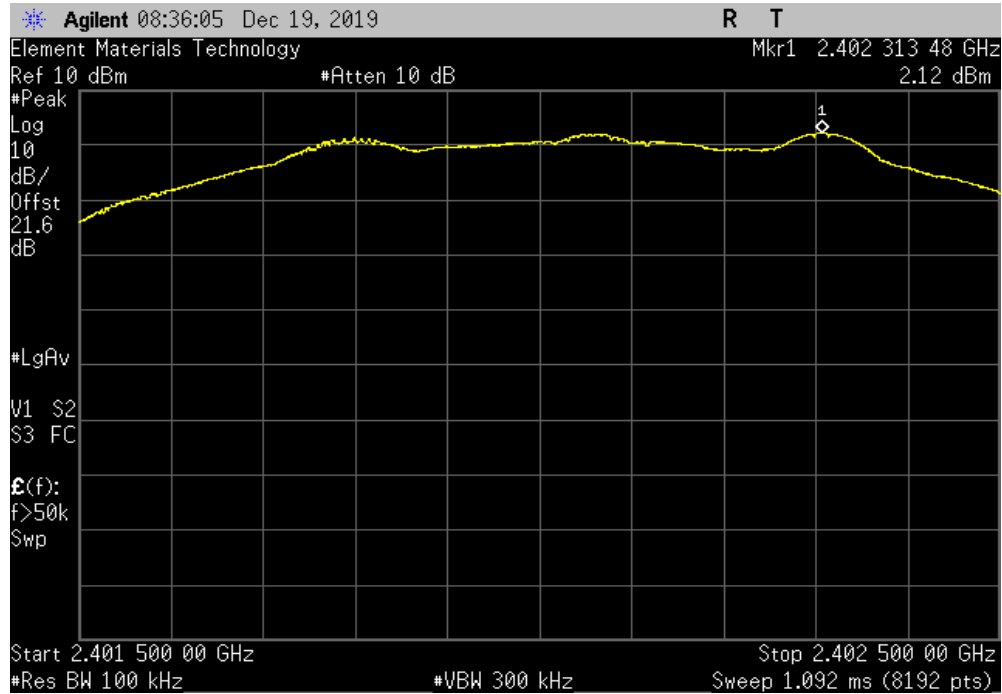
EUT: JL Module		Work Order: APRI0003			
Serial Number: 4		Date: 19-Dec-19			
Customer: Apricity Code		Temperature: 19.6 °C			
Attendees: None		Humidity: 40.8% RH			
Project: None		Barometric Pres.: 1014 mbar			
Tested by: Jeff Alcock	Power: USB	Job Site: EV06			
TEST SPECIFICATIONS		Test Method			
FCC 15.247:2019		ANSI C63.10:2013			
COMMENTS					
Reference level offset includes: 20 dB attenuator, DC block, and measurement cable.					
DEVIATIONS FROM TEST STANDARD					
None					
Configuration #	1	Signature 			
	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK Low Channel, 2402 MHz	Fundamental	2402.31	N/A	N/A	N/A
BLE/GFSK Low Channel, 2402 MHz	30 MHz - 12.5 GHz	2394.3	-57.06	-20	Pass
BLE/GFSK Low Channel, 2402 MHz	12.5 GHz - 25 GHz	24237	-56.1	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	Fundamental	2442.32	N/A	N/A	N/A
BLE/GFSK Mid Channel, 2442 MHz	30 MHz - 12.5 GHz	12484.8	-59.51	-20	Pass
BLE/GFSK Mid Channel, 2442 MHz	12.5 GHz - 25 GHz	24223.2	-56.01	-20	Pass
BLE/GFSK High Channel, 2480 MHz	Fundamental	2480.32	N/A	N/A	N/A
BLE/GFSK High Channel, 2480 MHz	30 MHz - 12.5 GHz	7272.1	-59.49	-20	Pass
BLE/GFSK High Channel, 2480 MHz	12.5 GHz - 25 GHz	23216	-56.68	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

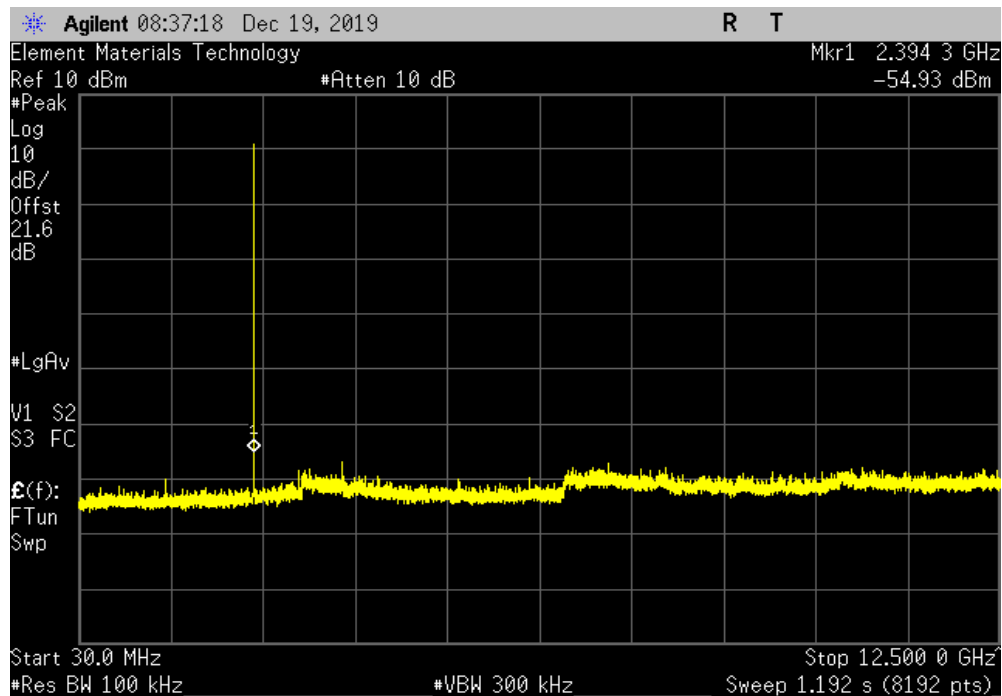


TMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2402.31	N/A	N/A	N/A	



BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	2394.3	-57.06	-20	Pass	

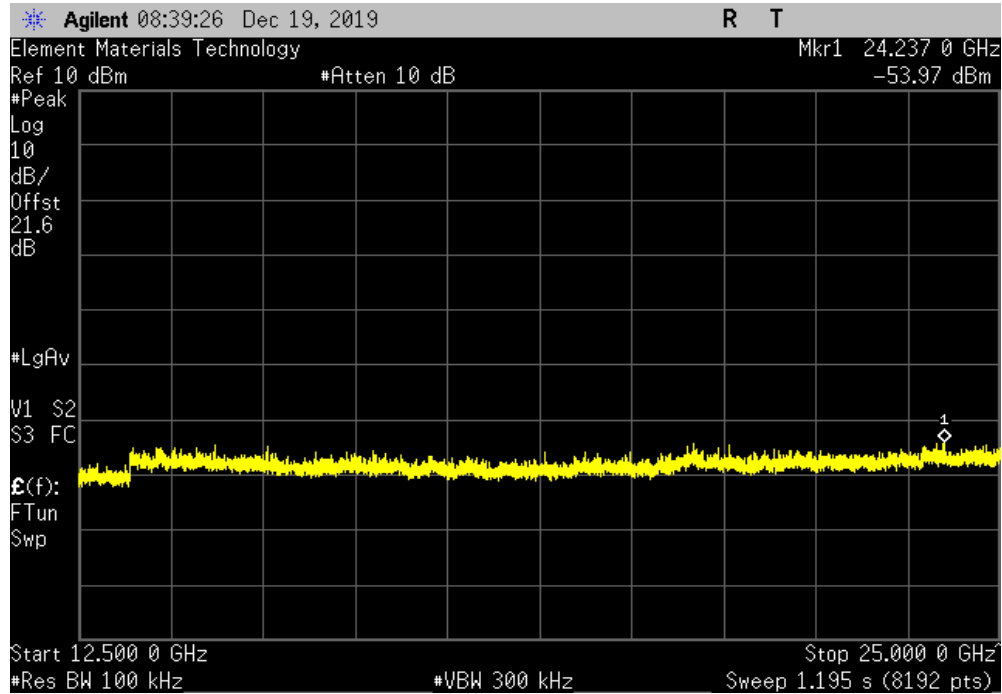


SPURIOUS CONDUCTED EMISSIONS

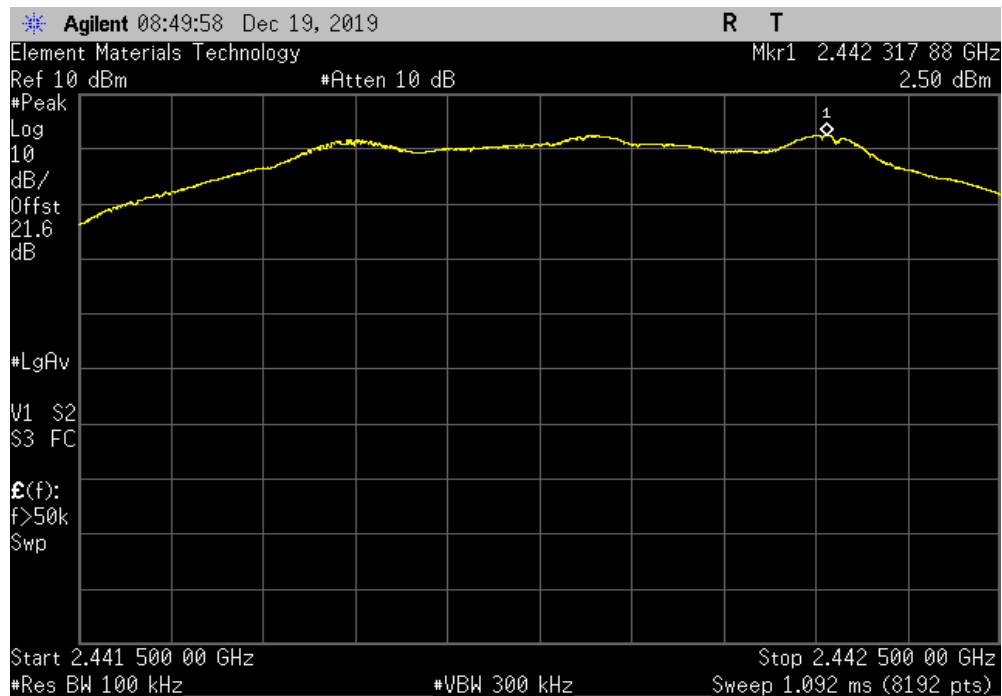


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BLE/GFSK Low Channel, 2402 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24237	-56.1	-20	Pass	



BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2442.32	N/A	N/A	N/A	

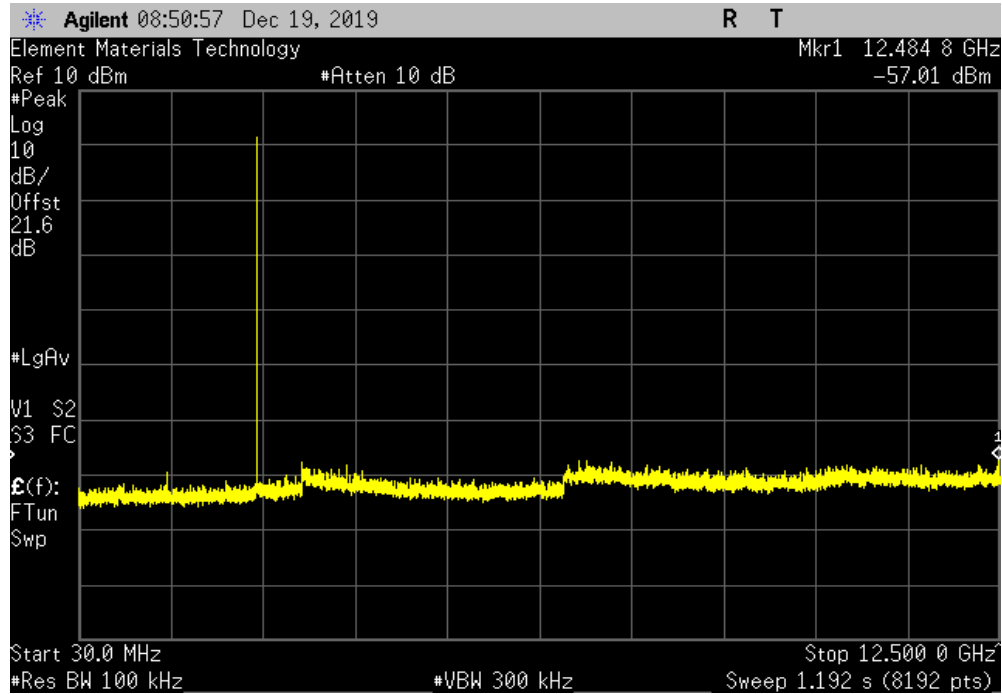


SPURIOUS CONDUCTED EMISSIONS

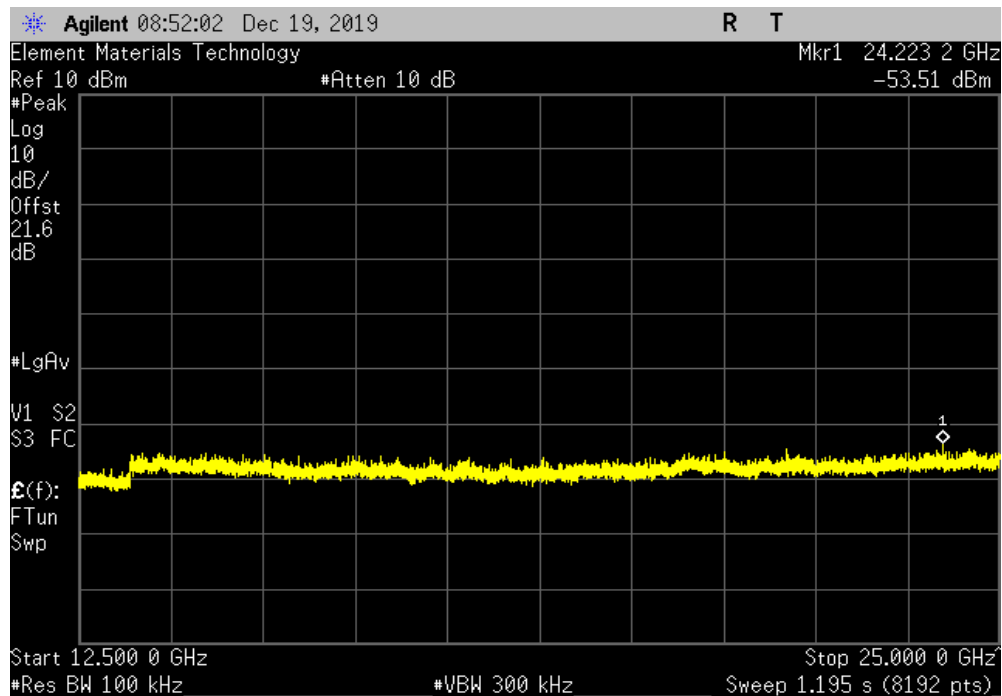


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BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	12484.8	-59.51	-20	Pass	



BLE/GFSK Mid Channel, 2442 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	24223.2	-56.01	-20	Pass	

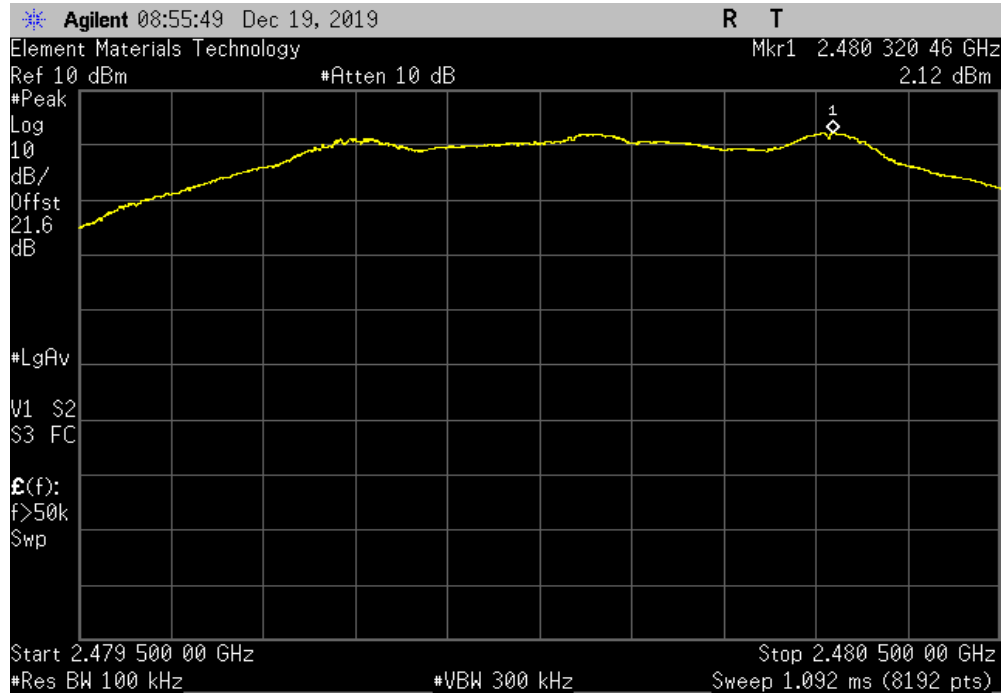


SPURIOUS CONDUCTED EMISSIONS

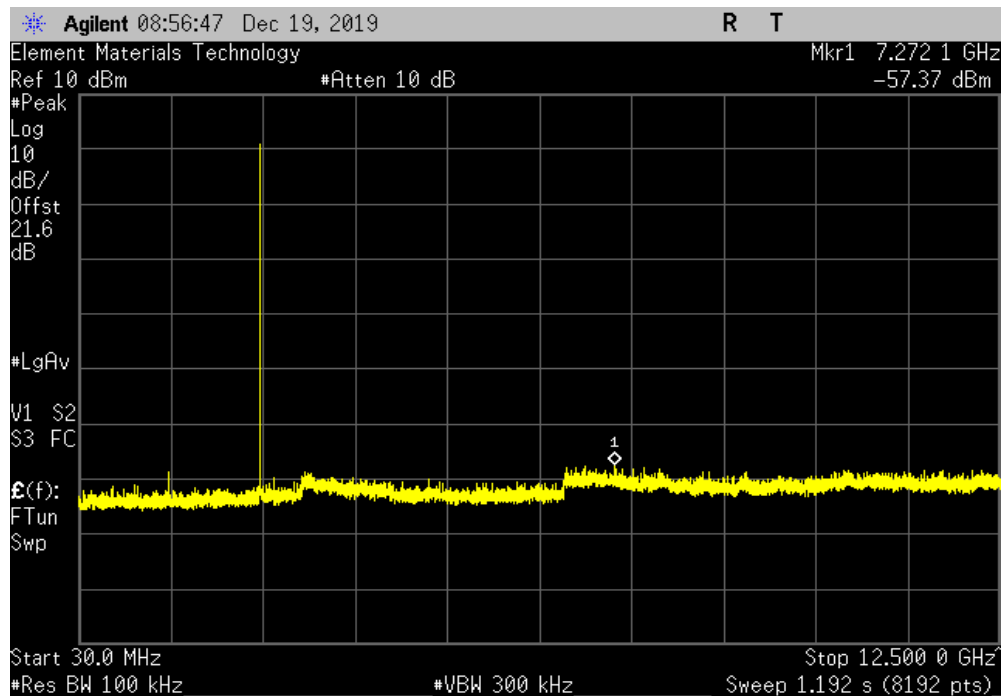


TIMTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
Fundamental	2480.32	N/A	N/A	N/A	



BLE/GFSK High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
30 MHz - 12.5 GHz	7272.1	-59.49	-20	Pass	



SPURIOUS CONDUCTED EMISSIONS



TUTx 2019.08.30.0 XMI 2019.09.05

BLE/GFSK High Channel, 2480 MHz					
Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result	
12.5 GHz - 25 GHz	23216	-56.68	-20	Pass	

