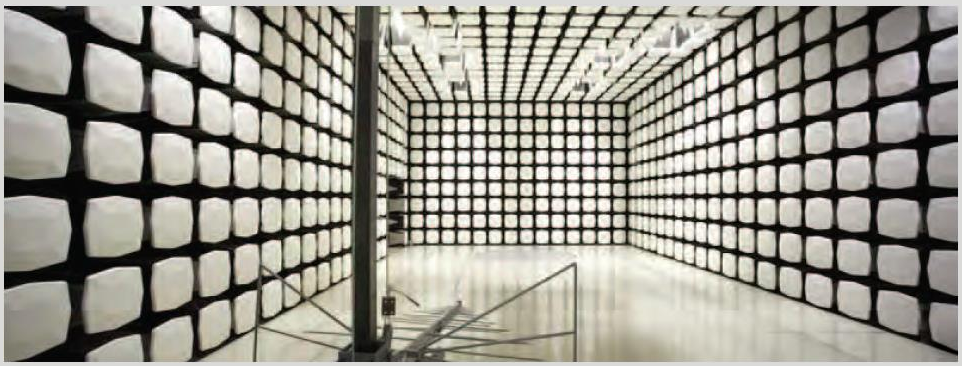
IrriGreen, Inc.

Controller 3, Model 705101

FCC 15.247:2024

Bluetooth Radio

Report: IRRI0024.1 Rev. 1, Issue Date: September 17, 2024



CERT #3310.02

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element
2023.04.17

Section	Page Number

CERTIFICATE OF TEST

Last Date of Test: September 13, 2024
IrriGreen, Inc.
EUT: Controller 3 , Model 705101

Radio Equipment Testing

Standards

Specification	Method
FCC 15.247:2024	ANSI C63.10:2013

Guidance

FCC KDB 558074 v05r02:2019

Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions	Pass	15.207	6.2	
Duty Cycle	Pass	KDB 558074 -6.0	11.6	
DTS Bandwidth (6 dB)	Pass	15.247(a)(2), KDB 558074 -8.2	11.8.2	
Occupied Bandwidth (99%)	Pass	KDB 558074 -2.1	6.9.3	
Output Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	11.9.1.1	
Equivalent Isotropic Radiated Power	Pass	15.247(b)(3), KDB 558074 -8.3.1	11.9.1.1	
Power Spectral Density	Pass	15.247(e), KDB 558074 -8.4	11.10.2	
Band Edge Compliance	Pass	15.247(d), KDB 558074 -8.5	11.11	
Spurious Conducted Emissions	Pass	15.247(d), KDB 558074 -8.5	11.11	
Spurious Radiated Emissions	Pass	15.247(d), KDB 558074 - 8.6, 8.7	11.12.1, 11.13.2, 6.5, 6.6	

Deviations From Test Standards

None

Approved By:

Chuck Heller, Operations Manager
Signed for and on behalf of Element

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		
01	Added IRRI0024-10 configuration	2024-09-17	16
	Updated Powerline Conducted Emissions data		18 - 22
	Added Spurious Emissions spot check data		69 - 72
	Updated product description		11
	Updated last date of test		3, 11
	Updated Modifications log		16

ACCREDITATIONS AND AUTHORIZATIONS

element
2021.09.01

United States

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

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

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

United Kingdom

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

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:

California Minnesota Oregon Texas Washington

FACILITIES

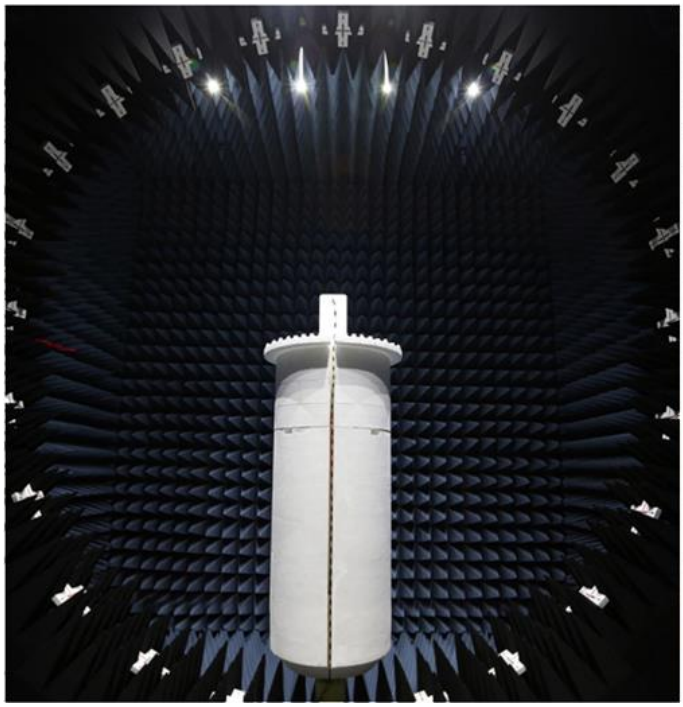
element
2024.07.18

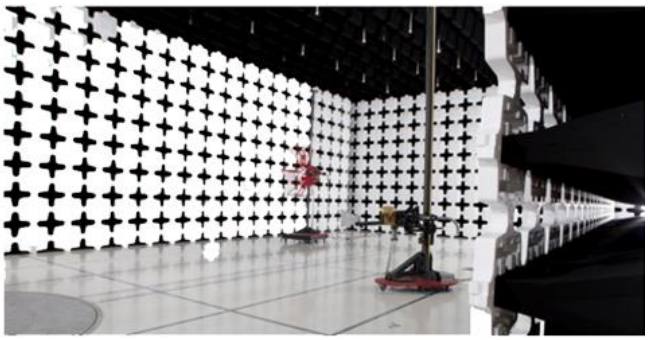
Testing was performed at the following location(s)

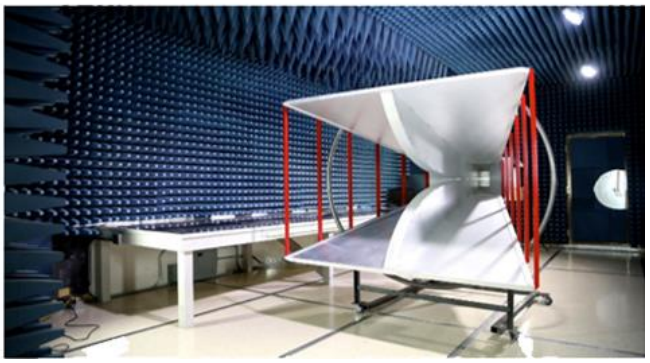
	Location	Labs (1)	Address	A2LA (2)	ISED (3)	BSMI (4)	VCCI (5)	CAB (6)	FDA (7)
☐	California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
☐	Minnesota	MN01-11	9349 W Broadway Ave. Brooklyn Park, MN 55445 (612) 638-5136	3310.05	2834E	SL2-IN-E-1152R	A-0109	US0175	TL-57
☒	Oregon	EV01-12	6775 NE Evergreen Pkwy #400 Hillsboro, OR 97124 (503) 844-4066	3310.02	2834D	SL2-IN-E-1017	A-0108	US0017	TL-56
☐	Plano Texas	PT01-15	1701 E Plano Pkwy, Ste 150 Plano, TX 75074 (972) 509-2566	214.19	32637	SL2-IN-E-057R	N/A	US0054	N/A
☐	Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	N/A	US0191	TL-54
☐	Washington	NC01-05	19201 120th Ave NE Bothell, WA 98011 (425) 984-6600	3310.06	2834F	SL2-IN-E-1153R	A-0110	US0157	TL-67
☐	Offsite	N/A	See Product Description	N/A	N/A	N/A	N/A	N/A	N/A

See data sheets for specific labs

(1) The lab designations denote individual rooms within each location. (OC01, OC02, OC03, etc.)
(2) A2LA Certificate No.
(3) ISED Company No.
(4) BSMI No.
(5) VCCI Site Filing No.
(6) CAB Identifier. Recognized Phase I CAB for ISED, ACMA, BSMI, IDA, KCC/RRA, MIC, MOC, NCC, OFCA
(7) FDA ASCA No.







MEASUREMENT UNCERTAINTY

element
MU 2023-09-21

Measurement Uncertainty

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

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

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

Various Measurements

Test	All Labs (+/-)
Frequency Accuracy (%)	0.0007
Amplitude Accuracy (dB)	1.2
Conducted Power (dB)	1.2
Radiated Power via Substitution (dB)	0.7
Temperature (degrees C)	0.7
Humidity (% RH)	2.5
Voltage (AC) (%)	1
Voltage (DC) (%)	0.7
Field Strength (dB)	5.2

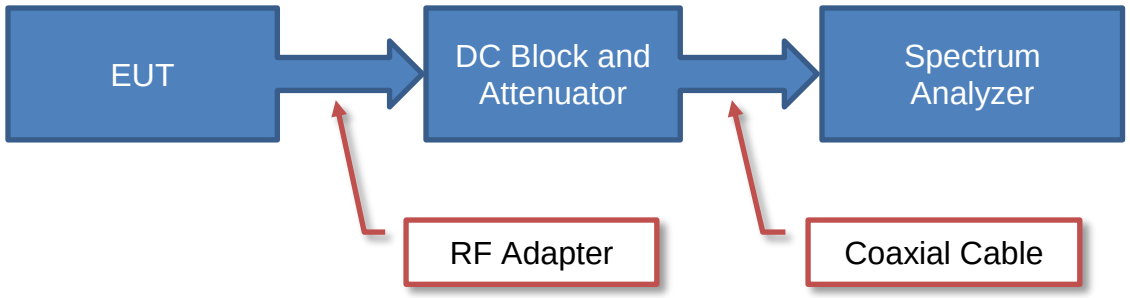
TEST SETUP BLOCK DIAGRAMS

Measurement Bandwidths

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

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

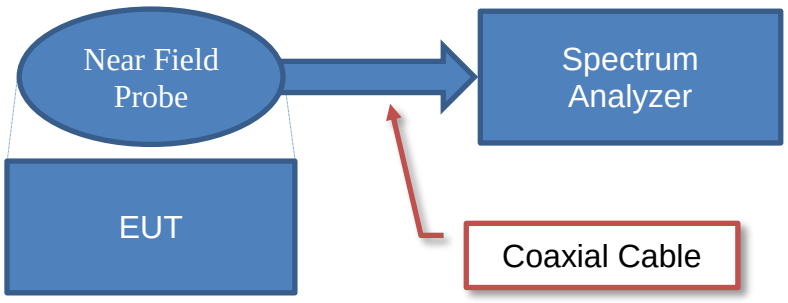
Antenna Port Conducted Measurements



Sample Calculation (logarithmic units)

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

Near Field Test Fixture Measurements

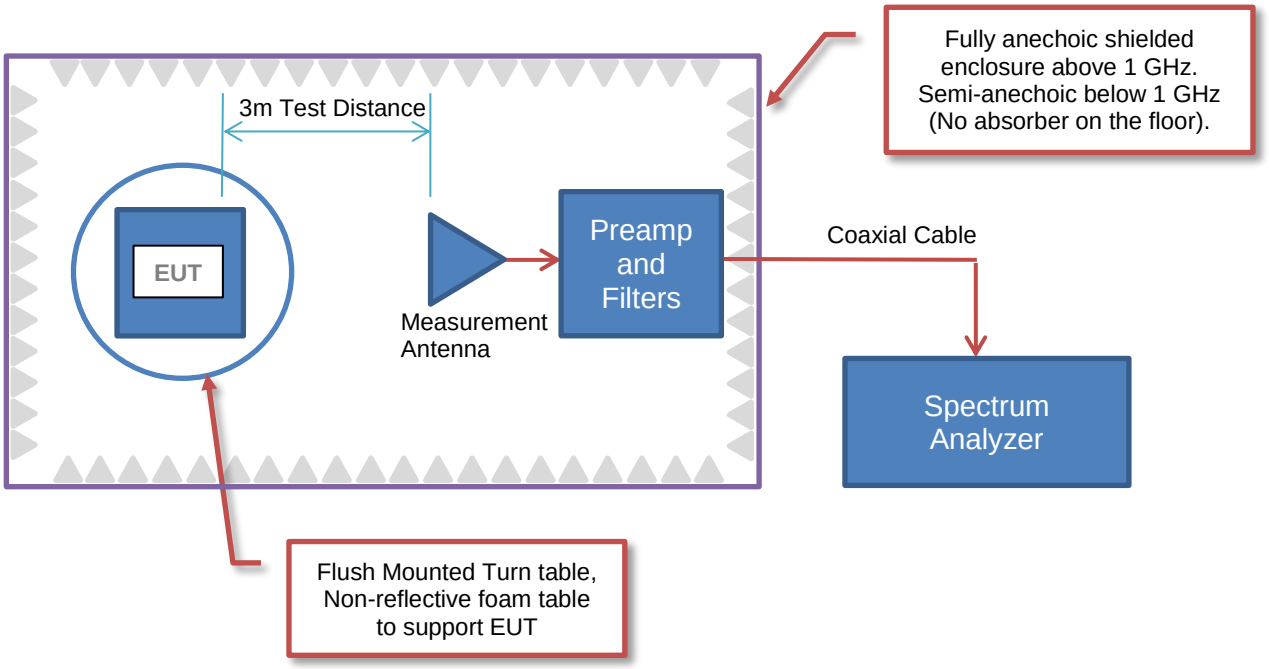


Sample Calculation (logarithmic units)

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

TEST SETUP BLOCK DIAGRAMS

Emissions Measurements



Sample Calculation (logarithmic units)

Radiated Emissions:

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

Conducted Emissions:

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

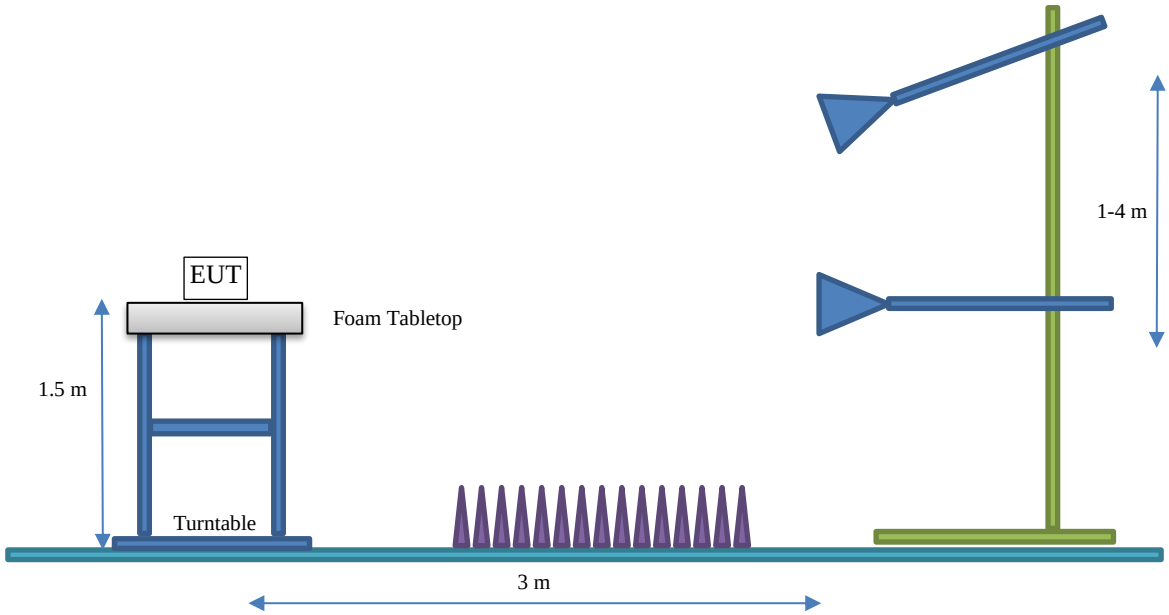
Radiated Power (ERP/EIRP) – Substitution Method:

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

TEST SETUP BLOCK DIAGRAMS

Bore Sighting (>1GHz)

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



PRODUCT DESCRIPTION

Client and Equipment under Test (EUT) Information

Company Name:	IrriGreen, Inc.
Address:	5250 West 73rd Street
City, State, Zip:	Edina, MN 55439
Test Requested By:	Gary Klinefelter
EUT:	Controller 3, Model 705101
First Date of Test:	July 24, 2024
Last Date of Test:	September 13, 2024
Receipt Date of Samples:	July 24, 2024
Equipment Design Stage:	Prototype
Equipment Condition:	No Damage
Purchase Authorization:	Verified

Information Provided by the Party Requesting the Test

Functional Description of the EUT:

The controller is labeled as a "Controller 3" with an Irrigreen sprinkler model 705101.

The controller contains three radio types:

- BLE
- 2.4 GHz Wi-Fi
- 5 GHz Wi-Fi. The 5 GHz Wi-Fi supports UNII-1 and UNII-3 bands.

The BLE radio uses a PCB Trace antenna.

Wi-Fi has a software-controlled diversity switch that changes the path to two identical antennas placed in two different orientations. The antennas are Shenzhen Keesun Technology Co. ltd., EM60 PCB antennas. Only one antenna can actively transmit at a time.

Testing Objective:

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

POWER SETTINGS AND ANTENNAS

The power settings, antenna gain value(s) and cable loss (if applicable) used for the testing contained in this report were provided by the customer and will affect the validity of the results. Element assumes no responsibility for the accuracy of this information. The power settings below reflect the maximum power that the EUT is allowed to transmit at during normal operation.

ANTENNA GAIN (dBi)

Type	Provided by:	Frequency Range (MHz)	Gain (dBi)
PCB Trace	IrriGreen, Inc.	2400 - 2486	5.9

The EUT was tested using the power settings provided by the manufacturer which were based upon:

☒ Test software settings Software / firmware used for testing: SmartRF Studio 7 v2.31.0
☐ Rated power settings

SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types / Data Rates	Type	Channel	Frequency (MHz)	Power Setting (dBm)
BLE GFSK, 125 kbps, 500 kbps, 1 Mbps, 2 Mbps	DTS	37	2402	5
		17	2440	
		39	2480	

CONFIGURATIONS

Configuration IRRI0024-2

Software/Firmware Running During Test	
Description	**Version**
SmartRF Studio 7	2.31.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sprinkler Controller	Irrigreen Inc	Controller 3, Model 705101	1C:63:49:9D:0B:20

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Vostro 15 3530	7PC3424
AC Adapter	Dell	LA65NS2-01	None
Developer Kit	Ti	CC-2652-R7	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	4.5	No	Sprinkler Controller	AC mains
AC Power	No	0.9	No	AC Mains	AC Adapter
Ribbon Cable	No	0.1	No	Sprinkler Controller	Developer Kit
Micro USB	Yes	0.9	No	Developer Kit	USB Extension
DC Power	No	1.8	Yes	AC Adapter	Laptop
USB Extension	Yes	2.9	No	Micro USB	Laptop

CONFIGURATIONS

Configuration IRRI0024-4

Software/Firmware Running During Test	
Description	**Version**
SmartRF Studio 7	2.31.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sprinkler Controller	Irrigreen Inc	Controller 3, Model 705101	1C:63:49:9D:0B:20

Remote Equipment Outside of Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Vostro 15 3530	7PC3424
Developer Kit	Ti	CC-2652-R7	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	4.5	No	Sprinkler Controller	AC mains
Ribbon Cable	No	0.1	No	Sprinkler Controller	Developer Kit
Micro USB	Yes	0.9	No	Developer Kit	Laptop

CONFIGURATIONS

Configuration IRRI0024-6

Software/Firmware Running During Test	
Description	**Version**
SmartRF Studio 7	2.31.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sprinkler Controller	Irrigreen Inc	Controller 3, Model 705101	1C:63:49:9D:33:FF

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Vostro 15 3530	7PC3424
AC Adapter	Dell	LA65NS2-01	None
Developer Kit	Ti	CC-2652-R7	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	4.5	No	Sprinkler Controller	AC mains
AC Power	No	0.9	No	AC Mains	AC Adapter
Ribbon Cable	No	0.1	No	Sprinkler Controller	Developer Kit
Micro USB	Yes	0.9	No	Developer Kit	Laptop
DC Power	No	1.8	Yes	AC Adapter	Laptop

CONFIGURATIONS

Configuration IRRI0024-10

Software/Firmware Running During Test	
Description	**Version**
SmartRF Studio 7	2.31.0

EUT			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Sprinkler Controller	Irrigreen Inc	Controller 3, Model 705101	1C:63:49:9D:0B:20

Peripherals in Test Setup Boundary			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
Laptop	Dell	Vostro 15 3530	7PC3424
Developer Kit	Ti	CC-2652-R7	None
Sprinkler Head	Irrigreen Inc	400104	None

Cables					
Cable Type	**Shield**	**Length (m)**	**Ferrite**	**Connection 1**	**Connection 2**
AC Power	No	4.5	No	Sprinkler Controller	AC mains
Ribbon Cable	No	0.1	No	Sprinkler Controller	Developer Kit
Micro USB	Yes	0.9	No	Developer Kit	Laptop
I/O Cable	No	15.2	No	Sprinkler Controller	Sprinkler

MODIFICATIONS

Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2024-07-24	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.
2	2024-07-24	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
3	2024-07-24	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.
4	2024-07-24	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	2024-07-24	DTS Bandwidth (6 dB)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
6	2024-07-24	Occupied Bandwidth (99%)	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	EUT remained at Element following the test.
7	2024-09-13	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.
8	2024-09-13	Powerline Conducted Emissions	Tested as delivered to Test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.

POWERLINE CONDUCTED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

TEST DESCRIPTION

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Receiver	Gauss Instruments	TDEMI 30M	ARN	2024-05-22	2025-05-22
Cable - Conducted Cable Assembly	Northwest EMC	EVG, HHD, RKT, VAB	EVGA	2024-04-19	2025-04-19
LISN	Solar Electronics	9252-50-R-24-BNC	LIR	2024-09-13	2025-09-13

CONFIGURATIONS INVESTIGATED

IRRI0024-10

MODES INVESTIGATED

Transmitting BLE, Mid Ch. 2440 MHz, 1 Mbps

POWERLINE CONDUCTED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-09-13
Customer:	IrriGreen, Inc.	Temperature:	21.9°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	IRRI0024-10

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2024	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

Unable to bundle I/O cable due to excessive length.

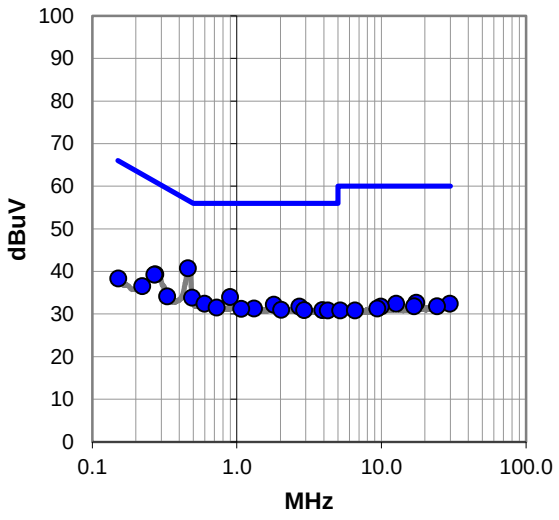
EUT OPERATING MODES

Transmitting BLE, Mid Ch. 2440 MHz, 1 Mbps

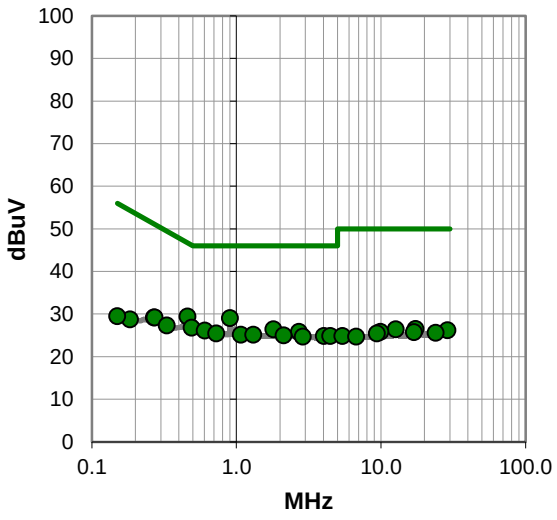
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #18

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.458	20.8	19.9	40.7	56.7	-16.0
0.274	19.4	19.9	39.3	61.0	-21.7
0.269	19.3	19.9	39.2	61.1	-21.9
0.901	14.1	19.9	34.0	56.0	-22.0
0.490	13.9	19.9	33.8	56.2	-22.4
0.597	12.5	19.9	32.4	56.0	-23.6
1.804	12.2	20.0	32.2	56.0	-23.8
2.704	11.6	20.1	31.7	56.0	-24.3
0.727	11.6	19.9	31.5	56.0	-24.5
1.317	11.3	20.0	31.3	56.0	-24.7
1.076	11.2	20.0	31.2	56.0	-24.8
2.031	11.0	20.0	31.0	56.0	-25.0
2.928	10.8	20.1	30.9	56.0	-25.1
3.911	10.6	20.3	30.9	56.0	-25.1
4.274	10.5	20.3	30.8	56.0	-25.2
0.330	14.2	19.9	34.1	59.5	-25.4
0.222	16.5	20.0	36.5	62.8	-26.3
17.456	11.4	21.2	32.6	60.0	-27.4
12.666	11.6	20.8	32.4	60.0	-27.6
29.777	10.1	22.3	32.4	60.0	-27.6
0.152	18.1	20.2	38.3	65.9	-27.6
16.871	10.6	21.2	31.8	60.0	-28.2
24.334	10.1	21.7	31.8	60.0	-28.2
9.912	11.2	20.5	31.7	60.0	-28.3
9.361	10.8	20.5	31.3	60.0	-28.7

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.902	9.0	20.0	29.0	46.0	-17.0
0.460	9.5	19.9	29.4	46.7	-17.3
0.490	6.9	19.9	26.8	46.2	-19.4
1.804	6.4	20.0	26.4	46.0	-19.6
0.605	6.2	19.9	26.1	46.0	-19.9
2.706	5.7	20.1	25.8	46.0	-20.2
0.727	5.5	19.9	25.4	46.0	-20.6
1.076	5.1	20.0	25.1	46.0	-20.9
1.313	5.1	20.0	25.1	46.0	-20.9
2.127	4.9	20.1	25.0	46.0	-21.0
4.033	4.5	20.3	24.8	46.0	-21.2
4.471	4.5	20.3	24.8	46.0	-21.2
2.881	4.6	20.1	24.7	46.0	-21.3
0.269	9.3	19.9	29.2	51.1	-21.9
0.272	9.3	19.9	29.2	51.1	-21.9
0.330	7.4	19.9	27.3	49.5	-22.2
17.344	5.3	21.2	26.5	50.0	-23.5
12.665	5.6	20.8	26.4	50.0	-23.6
28.931	3.9	22.3	26.2	50.0	-23.8
9.912	5.3	20.5	25.8	50.0	-24.2
16.937	4.5	21.2	25.7	50.0	-24.3
23.925	3.9	21.7	25.6	50.0	-24.4
9.360	4.9	20.5	25.4	50.0	-24.6
5.411	4.5	20.3	24.8	50.0	-25.2
6.735	4.4	20.3	24.7	50.0	-25.3

CONCLUSION

Pass

Tested By

POWERLINE CONDUCTED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-09-13
Customer:	IrriGreen, Inc.	Temperature:	21.9°C
Attendees:	None	Relative Humidity:	48%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mb
Tested By:	Jeff Alcoke	Job Site:	EV07
Power:	110VAC/60Hz	Configuration:	IRRI0024-10

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.207:2024	ANSI C63.10:2013

TEST PARAMETERS

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

COMMENTS

Unable to bundle I/O cable due to excessive length.

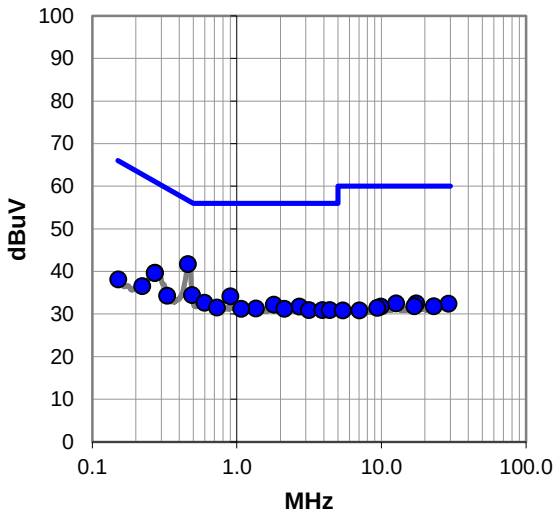
EUT OPERATING MODES

Transmitting BLE, Mid Ch. 2440 MHz, 1 Mbps

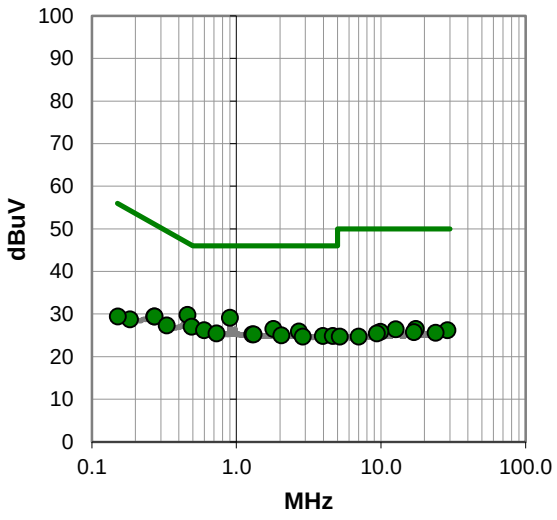
DEVIATIONS FROM TEST STANDARD

None

Quasi Peak Data - vs - Quasi Peak Limit



Average Data - vs - Average Limit



POWERLINE CONDUCTED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #19

Quasi Peak Data - vs - Quasi Peak Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.458	21.8	19.9	41.7	56.7	-15.0
0.272	19.8	19.9	39.7	61.1	-21.4
0.271	19.7	19.9	39.6	61.1	-21.5
0.490	14.5	19.9	34.4	56.2	-21.8
0.902	14.1	20.0	34.1	56.0	-21.9
0.597	12.7	19.9	32.6	56.0	-23.4
1.804	12.2	20.0	32.2	56.0	-23.8
2.706	11.6	20.1	31.7	56.0	-24.3
0.728	11.6	19.9	31.5	56.0	-24.5
1.357	11.3	20.0	31.3	56.0	-24.7
1.076	11.2	20.0	31.2	56.0	-24.8
2.129	11.1	20.1	31.2	56.0	-24.8
3.162	10.8	20.1	30.9	56.0	-25.1
3.920	10.6	20.3	30.9	56.0	-25.1
4.393	10.6	20.3	30.9	56.0	-25.1
0.330	14.4	19.9	34.3	59.5	-25.2
0.222	16.5	20.0	36.5	62.8	-26.3
12.666	11.7	20.8	32.5	60.0	-27.5
17.424	11.3	21.2	32.5	60.0	-27.5
29.185	10.1	22.3	32.4	60.0	-27.6
0.152	17.9	20.2	38.1	65.9	-27.8
16.928	10.6	21.2	31.8	60.0	-28.2
23.115	10.2	21.6	31.8	60.0	-28.2
9.912	11.2	20.5	31.7	60.0	-28.3
9.363	10.9	20.5	31.4	60.0	-28.6

Average Data - vs - Average Limit

Freq (MHz)	Amp. (dBuV)	Factor (dB)	Adjusted (dBuV)	Spec. Limit (dBuV)	Margin (dB)
0.902	9.1	20.0	29.1	46.0	-16.9
0.458	9.9	19.9	29.8	46.7	-16.9
0.490	7.1	19.9	27.0	46.2	-19.2
1.804	6.5	20.0	26.5	46.0	-19.5
0.597	6.3	19.9	26.2	46.0	-19.8
2.706	5.8	20.1	25.9	46.0	-20.1
0.728	5.5	19.9	25.4	46.0	-20.6
1.290	5.2	20.0	25.2	46.0	-20.8
1.319	5.2	20.0	25.2	46.0	-20.8
2.051	5.0	20.0	25.0	46.0	-21.0
3.969	4.5	20.3	24.8	46.0	-21.2
4.653	4.5	20.3	24.8	46.0	-21.2
2.881	4.6	20.1	24.7	46.0	-21.3
0.271	9.5	19.9	29.4	51.1	-21.7
0.272	9.5	19.9	29.4	51.1	-21.7
0.330	7.4	19.9	27.3	49.5	-22.2
17.416	5.3	21.2	26.5	50.0	-23.5
12.665	5.6	20.8	26.4	50.0	-23.6
28.931	3.9	22.3	26.2	50.0	-23.8
9.911	5.3	20.5	25.8	50.0	-24.2
16.960	4.5	21.2	25.7	50.0	-24.3
23.971	3.9	21.7	25.6	50.0	-24.4
9.361	4.9	20.5	25.4	50.0	-24.6
5.208	4.4	20.3	24.7	50.0	-25.3
7.022	4.3	20.4	24.7	50.0	-25.3

CONCLUSION

Pass

Tested By

DUTY CYCLE

element
2023/09/26

TEST DESCRIPTION

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 test software provided for operation in a fixed, single channel mode allows the EUT to operate continuously at 100% Duty Cycle.

DTS BANDWIDTH (6 dB)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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

The EUT was set to the channels and modes listed in the datasheet.

The 6dB DTS bandwidth was measured using 100 kHz resolution bandwidth and 300 kHz video bandwidth. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

DTS BANDWIDTH (6 dB)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.5°C
Attendees:	Seth Hammond	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

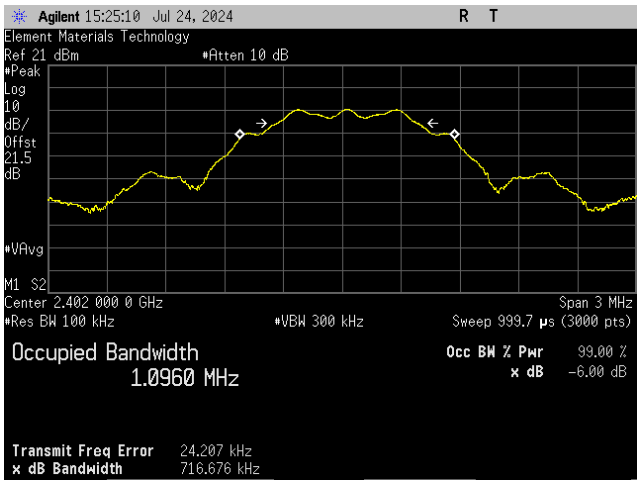
Tested By

TEST RESULTS

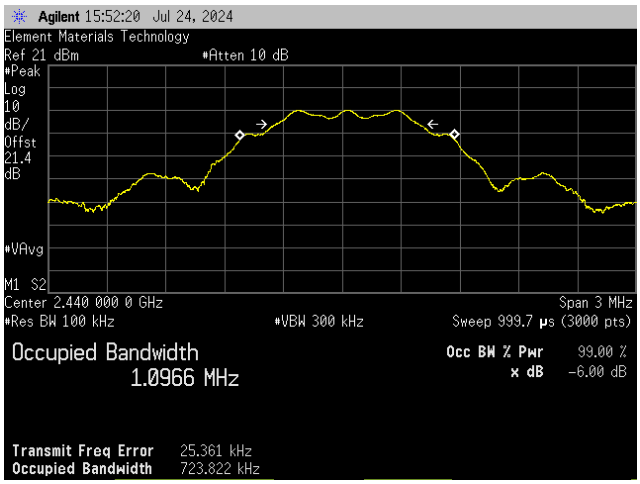
	Value	Limit (≥)	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	716.676 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	723.822 kHz	500 kHz	Pass
High Channel, 2480 MHz	690.32 kHz	500 kHz	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	698.35 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	692.569 kHz	500 kHz	Pass
High Channel, 2480 MHz	711.629 kHz	500 kHz	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	728.528 kHz	500 kHz	Pass
Mid Channel, 2440 MHz	741.501 kHz	500 kHz	Pass
High Channel, 2480 MHz	686.278 kHz	500 kHz	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	1.373 MHz	500 kHz	Pass
Mid Channel, 2440 MHz	1.419 MHz	500 kHz	Pass
High Channel, 2480 MHz	1.438 MHz	500 kHz	Pass

DTS BANDWIDTH (6 dB)

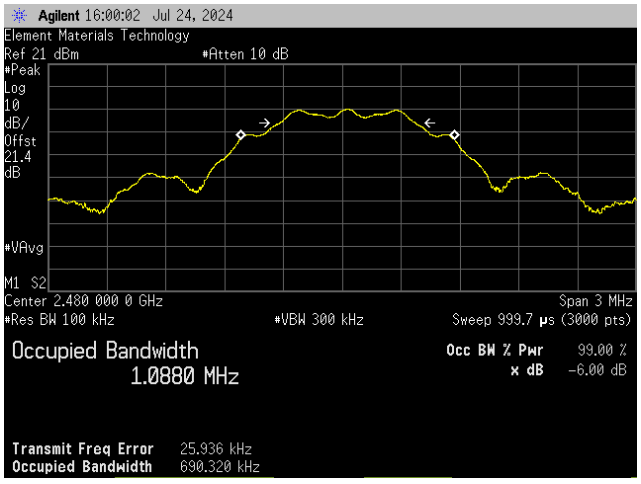
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



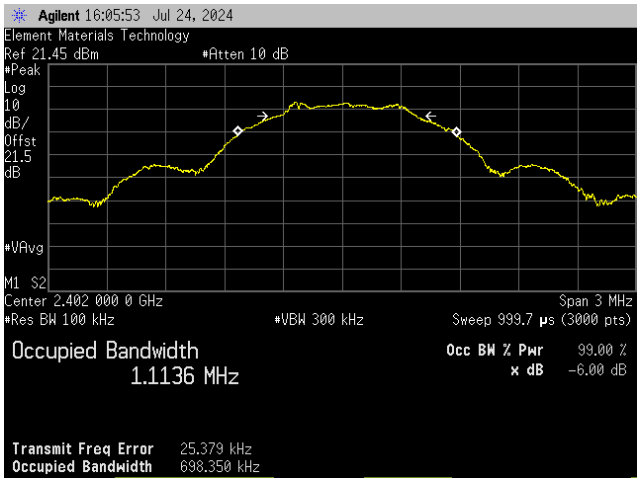
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



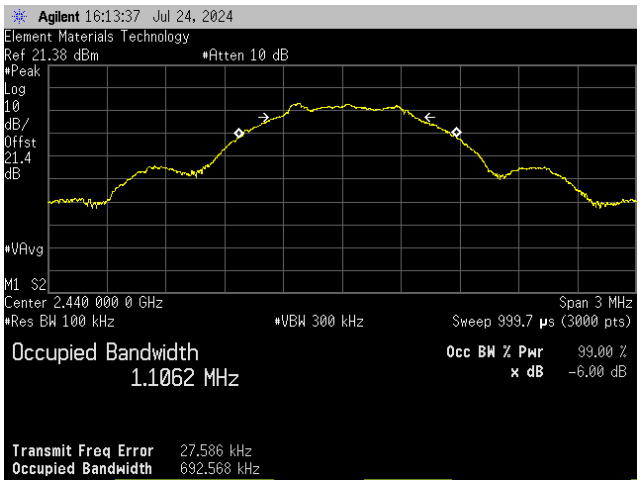
BLE/GFSK 125 kbps
High Channel, 2480 MHz



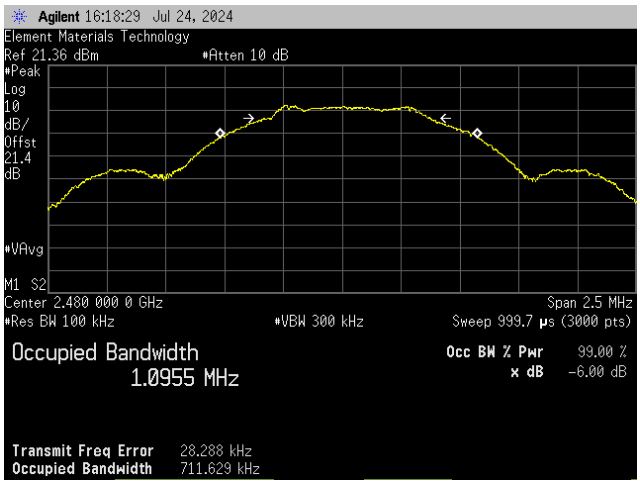
BLE/GFSK 500 kbps
Low Channel, 2402 MHz

DTS BANDWIDTH (6 dB)

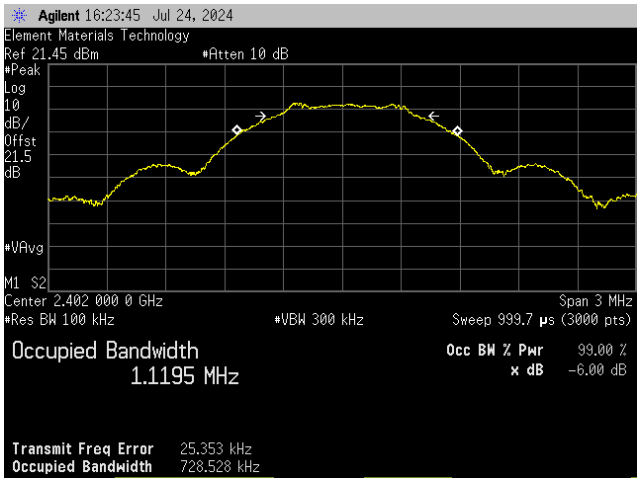
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



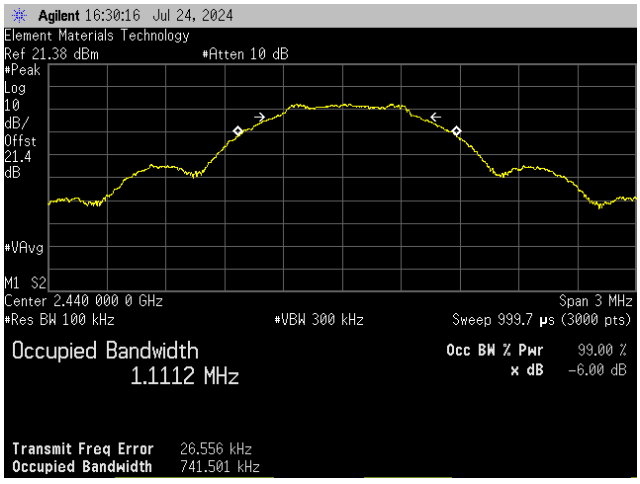
BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



BLE/GFSK 500 kbps
High Channel, 2480 MHz



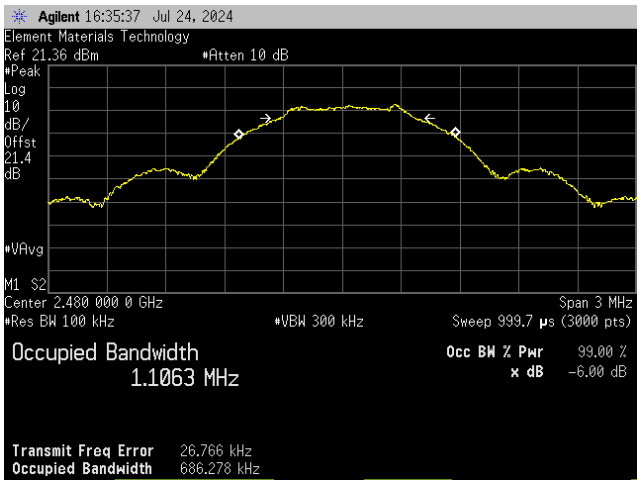
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

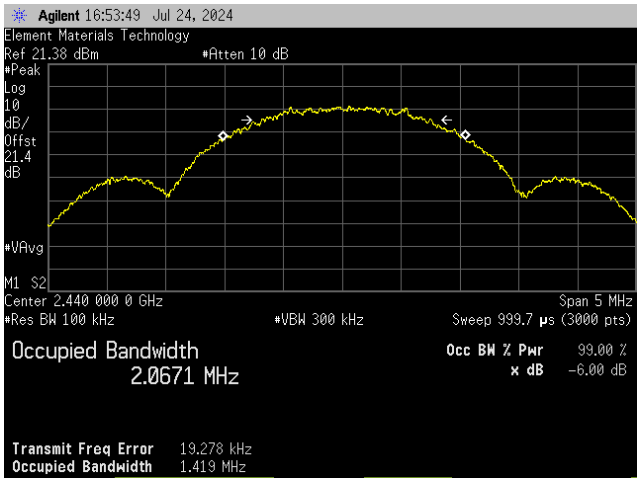
DTS BANDWIDTH (6 dB)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

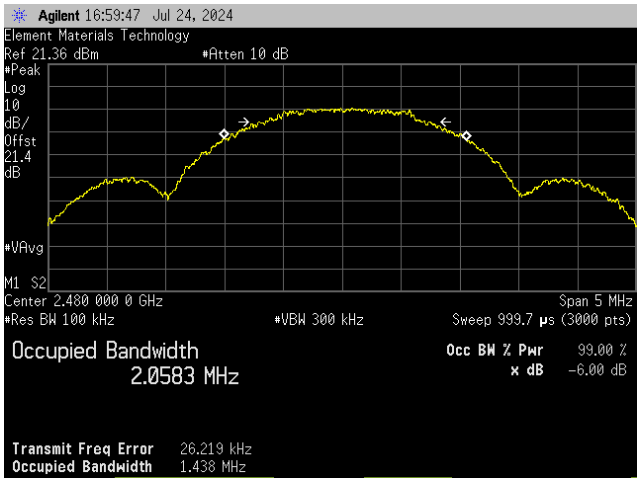


BLE/GFSK 1 Mbps
High Channel, 2480 MHz

BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

OCCUPIED BANDWIDTH (99%)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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

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

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

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

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

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

OCCUPIED BANDWIDTH (99%)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.7°C
Attendees:	Seth Hammond	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

N/A

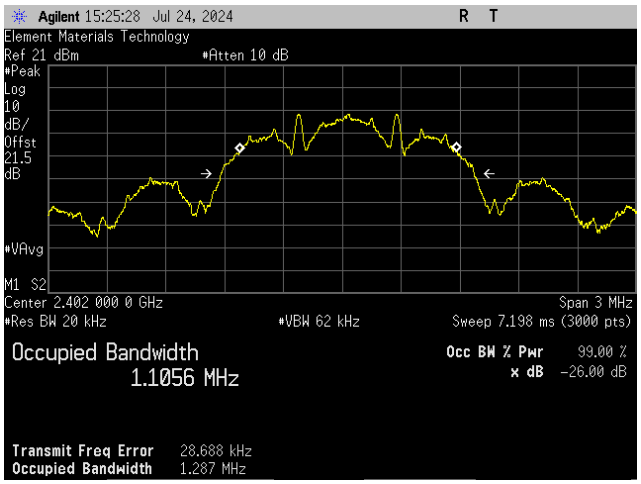
Tested By

TEST RESULTS

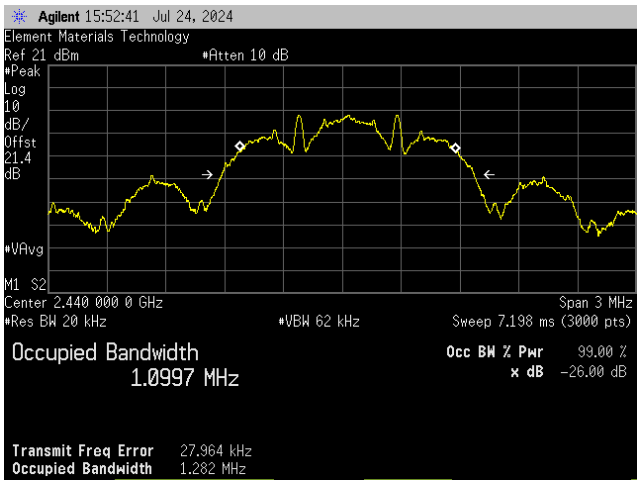
	Value	Limit	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	1.106 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.1 MHz	N/A	N/A
High Channel, 2480 MHz	1.093 MHz	N/A	N/A
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	1.088 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.09 MHz	N/A	N/A
High Channel, 2480 MHz	1.069 MHz	N/A	N/A
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	1.094 MHz	N/A	N/A
Mid Channel, 2440 MHz	1.096 MHz	N/A	N/A
High Channel, 2480 MHz	1.081 MHz	N/A	N/A
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	2.073 MHz	N/A	N/A
Mid Channel, 2440 MHz	2.047 MHz	N/A	N/A
High Channel, 2480 MHz	2.071 MHz	N/A	N/A

OCCUPIED BANDWIDTH (99%)

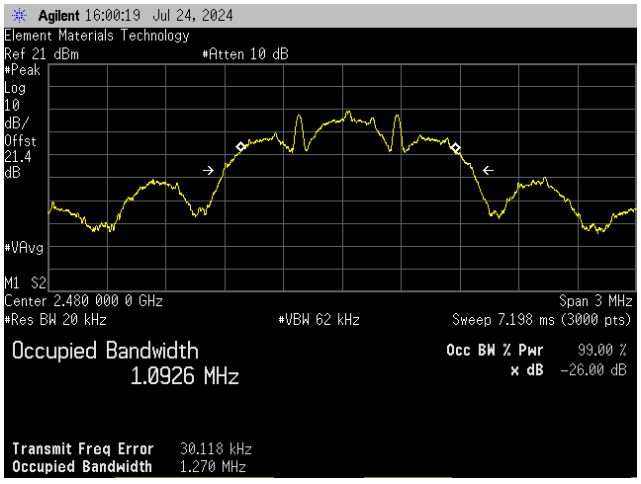
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



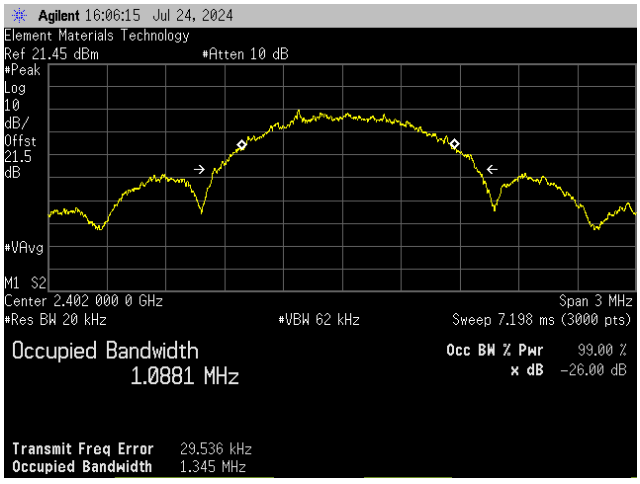
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



BLE/GFSK 125 kbps
High Channel, 2480 MHz



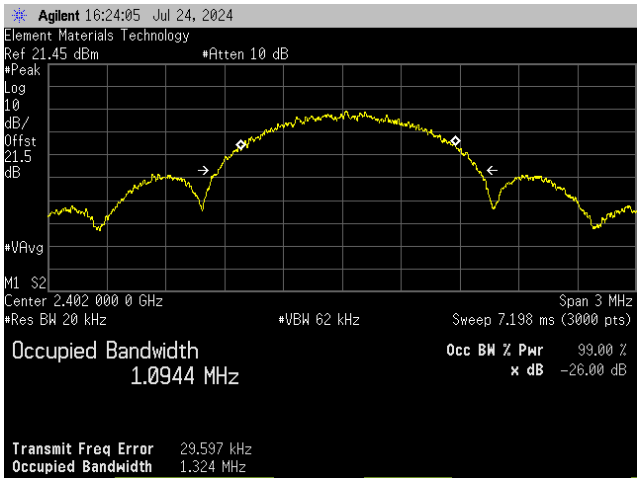
BLE/GFSK 500 kbps
Low Channel, 2402 MHz

OCCUPIED BANDWIDTH (99%)

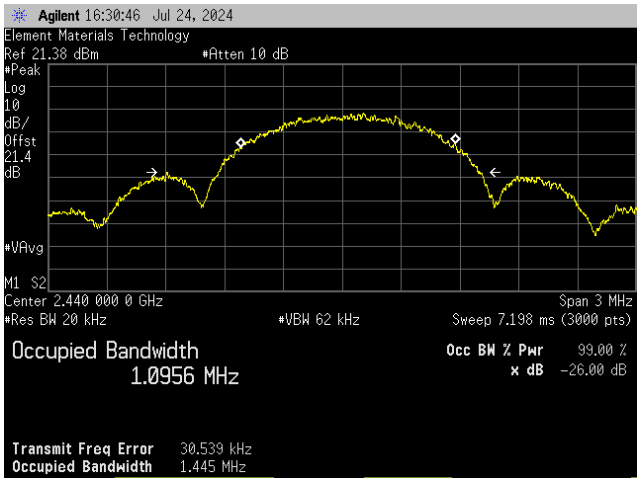
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

BLE/GFSK 500 kbps
Mid Channel, 2440 MHz

BLE/GFSK 500 kbps
High Channel, 2480 MHz



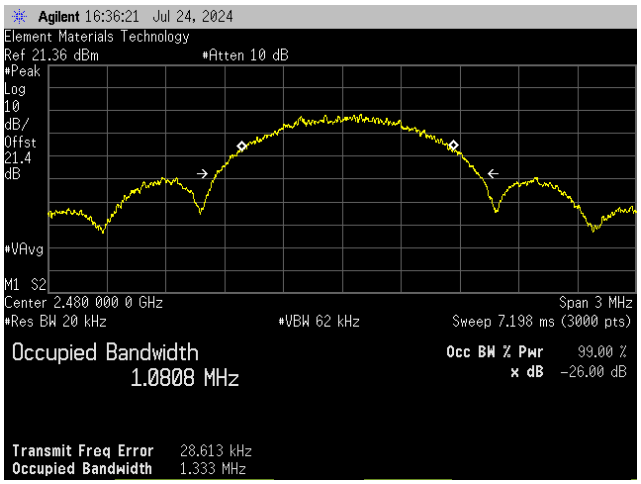
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



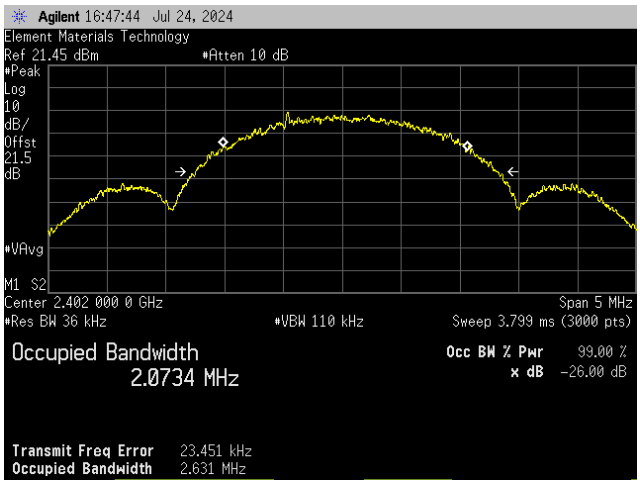
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

OCCUPIED BANDWIDTH (99%)

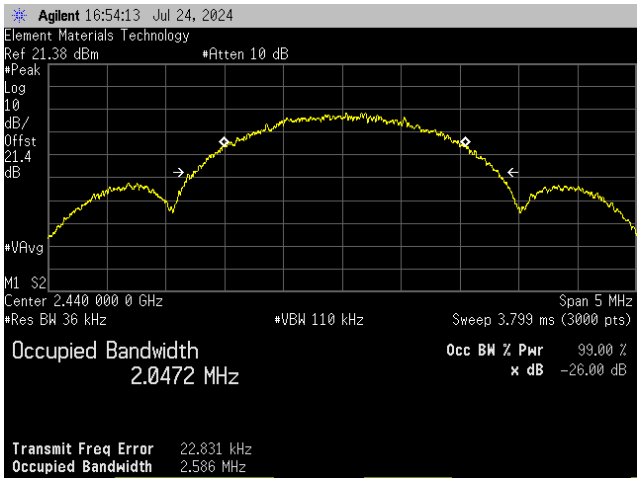
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz

BLE/GFSK 2 Mbps
High Channel, 2480 MHz

OUTPUT POWER

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

OUTPUT POWER

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.6°C
Attendees:	Seth Hammond	Relative Humidity:	44.3%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

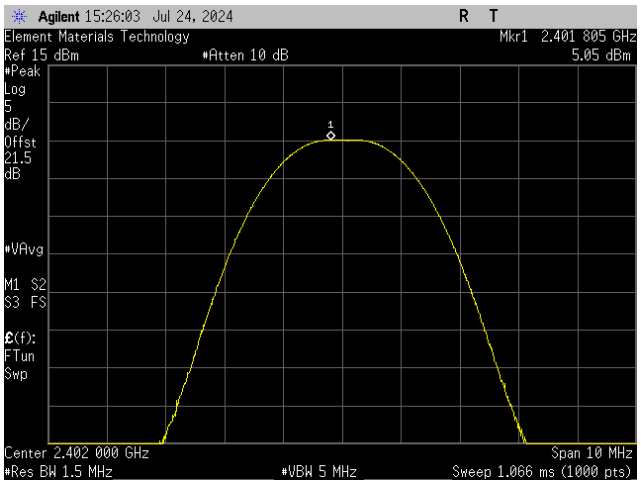
Pass

Tested By

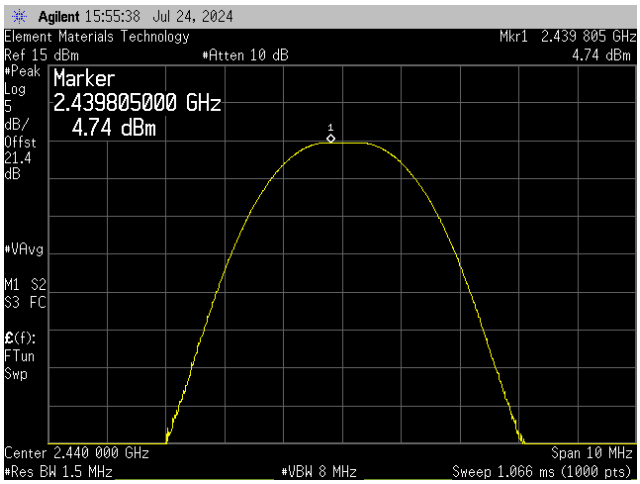
TEST RESULTS

	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	5.052	30	Pass
Mid Channel, 2440 MHz	4.736	30	Pass
High Channel, 2480 MHz	4.368	30	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	5.012	30	Pass
Mid Channel, 2440 MHz	4.736	30	Pass
High Channel, 2480 MHz	4.358	30	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	5	30	Pass
Mid Channel, 2440 MHz	4.743	30	Pass
High Channel, 2480 MHz	4.355	30	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	5.054	30	Pass
Mid Channel, 2440 MHz	4.789	30	Pass
High Channel, 2480 MHz	4.407	30	Pass

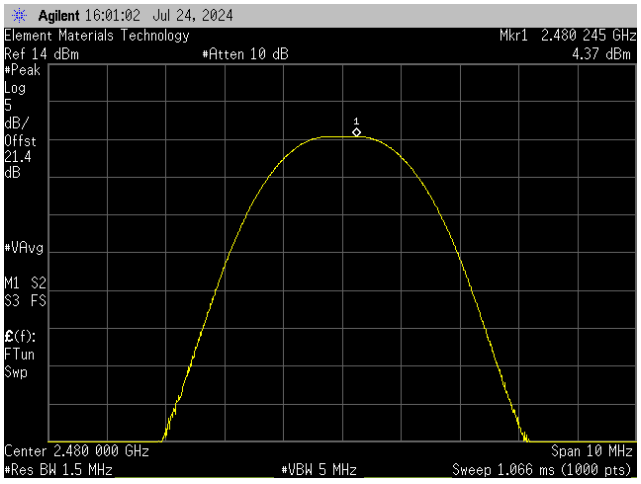
OUTPUT POWER



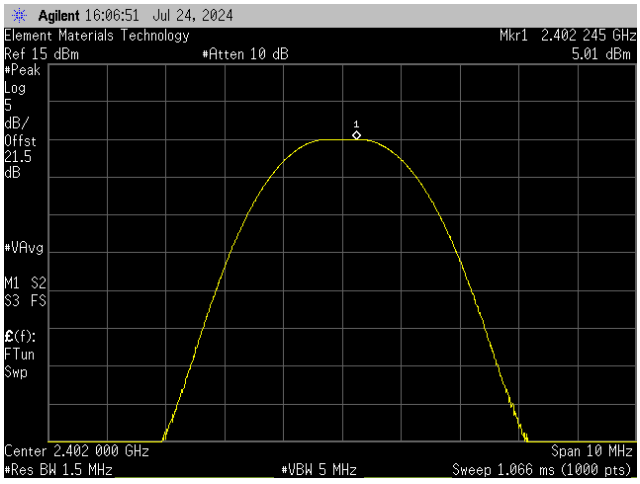
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



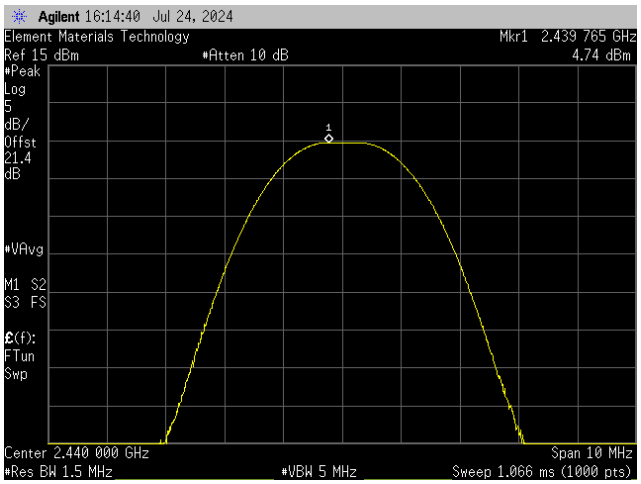
BLE/GFSK 125 kbps
High Channel, 2480 MHz



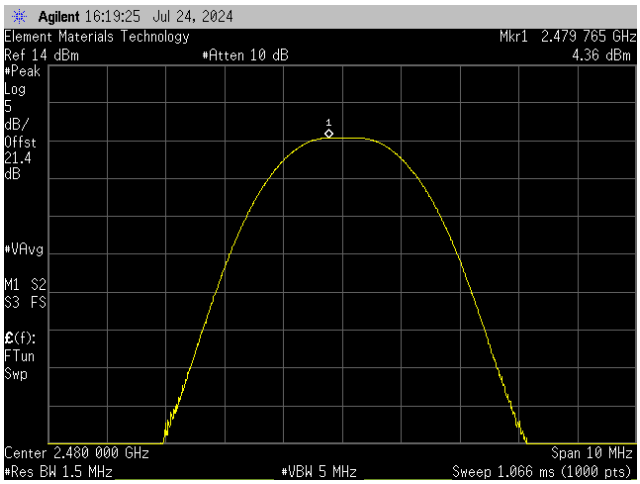
BLE/GFSK 500 kbps
Low Channel, 2402 MHz

OUTPUT POWER

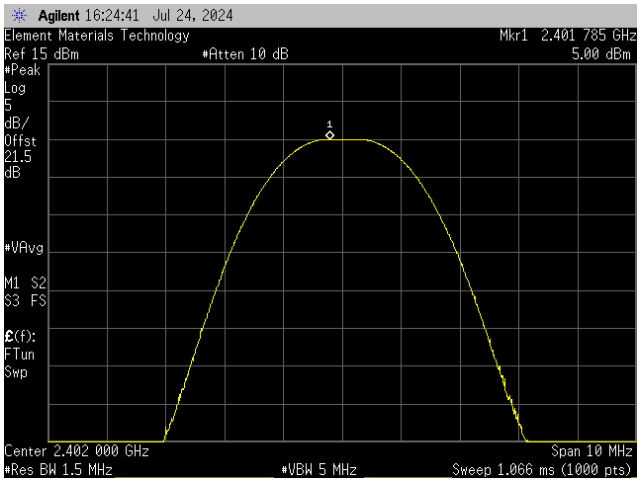
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



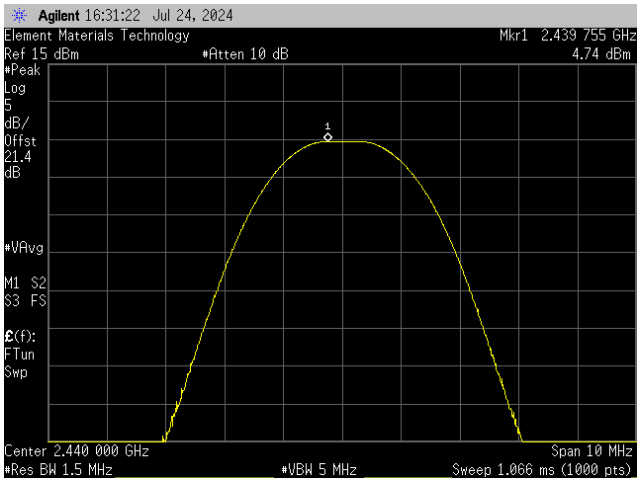
BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



BLE/GFSK 500 kbps
High Channel, 2480 MHz



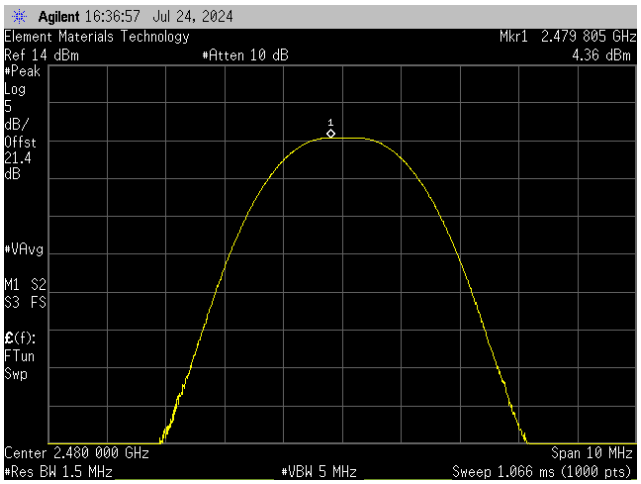
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



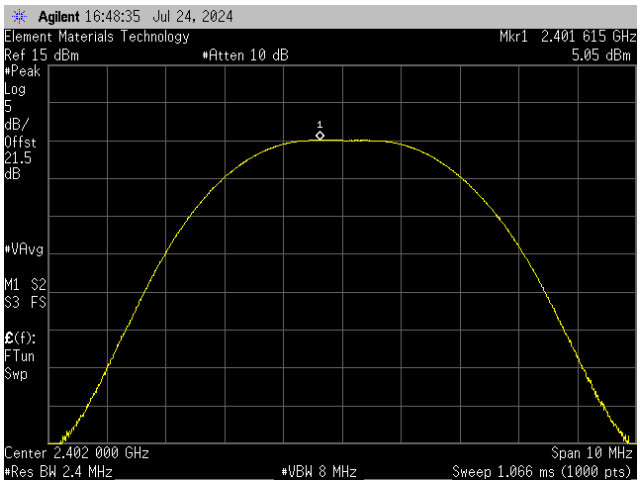
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

OUTPUT POWER

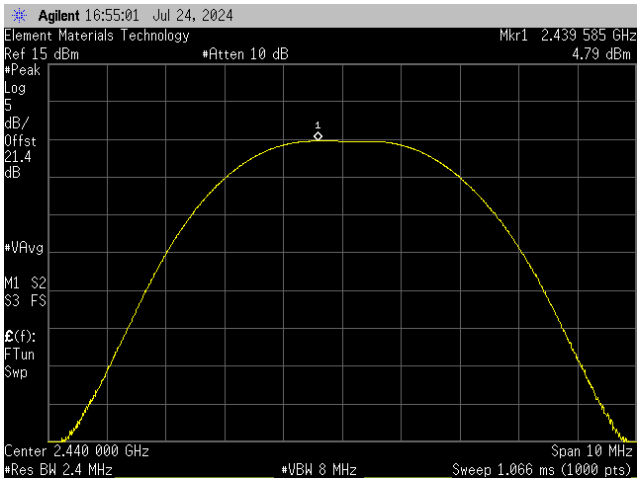
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



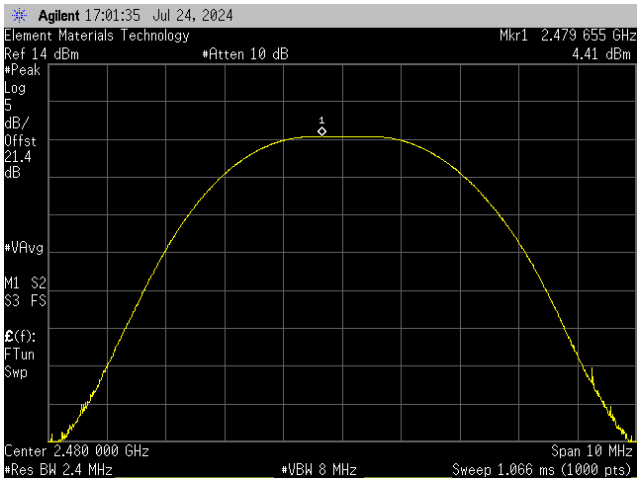
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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

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

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

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

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

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

EQUIVALENT ISOTROPIC RADIATED POWER (EIRP)

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.6°C
Attendees:	Seth Hammond	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Out Pwr (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)	Result
BLE/GFSK 125 kbps					
Low Channel, 2402 MHz	5.052	5.9	10.952	36	Pass
Mid Channel, 2440 MHz	4.736	5.9	10.636	36	Pass
High Channel, 2480 MHz	4.368	5.9	10.268	36	Pass
BLE/GFSK 500 kbps					
Low Channel, 2402 MHz	5.012	5.9	10.912	36	Pass
Mid Channel, 2440 MHz	4.736	5.9	10.636	36	Pass
High Channel, 2480 MHz	4.358	5.9	10.258	36	Pass
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	5	5.9	10.9	36	Pass
Mid Channel, 2440 MHz	4.743	5.9	10.643	36	Pass
High Channel, 2480 MHz	4.355	5.9	10.255	36	Pass
BLE/GFSK 2 Mbps					
Low Channel, 2402 MHz	5.054	5.9	10.954	36	Pass
Mid Channel, 2440 MHz	4.789	5.9	10.689	36	Pass
High Channel, 2480 MHz	4.407	5.9	10.307	36	Pass

POWER SPECTRAL DENSITY

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

POWER SPECTRAL DENSITY

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	21.9°C
Attendees:	Seth Hammond	Relative Humidity:	43.4%
Customer Project:	None	Bar. Pressure (PMSL):	1024 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

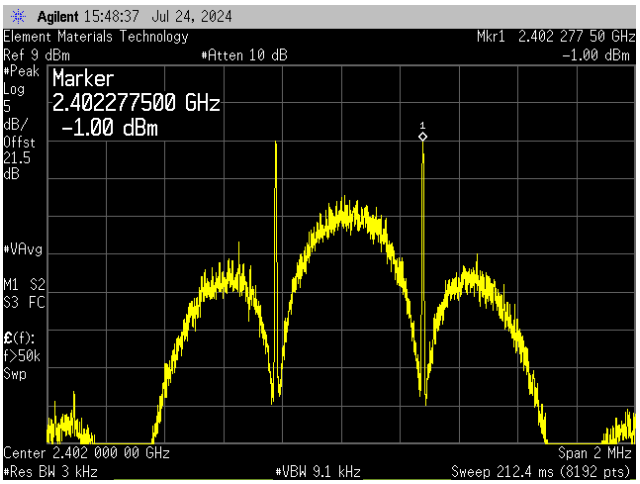
Tested By

TEST RESULTS

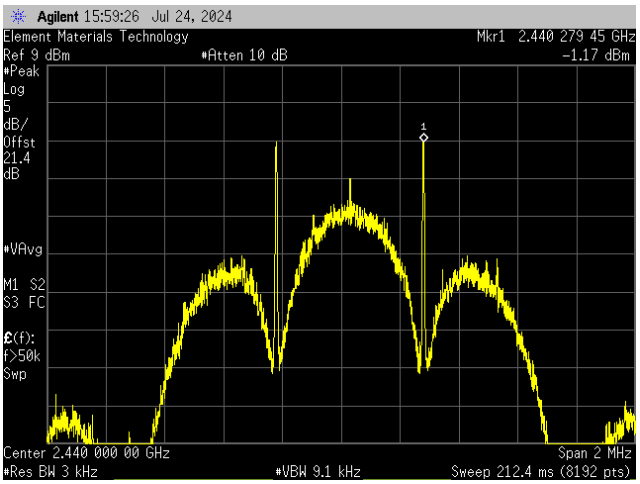
	Value dBm/3kHz	Limit ≤ (dBm/3kHz)	Results
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	-1.004	8	Pass
Mid Channel, 2440 MHz	-1.166	8	Pass
High Channel, 2480 MHz	-1.596	8	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	-7.074	8	Pass
Mid Channel, 2440 MHz	-6.92	8	Pass
High Channel, 2480 MHz	-8.182	8	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	-6.6	8	Pass
Mid Channel, 2440 MHz	-7.15	8	Pass
High Channel, 2480 MHz	-8.618	8	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	-9.336	8	Pass
Mid Channel, 2440 MHz	-8.96	8	Pass
High Channel, 2480 MHz	-8.882	8	Pass

POWER SPECTRAL DENSITY

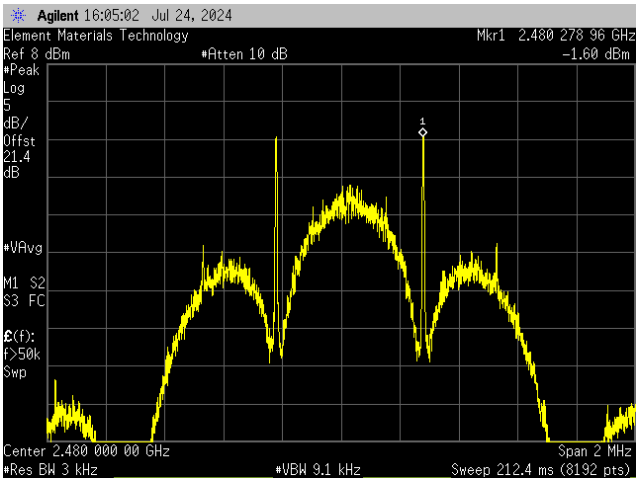
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



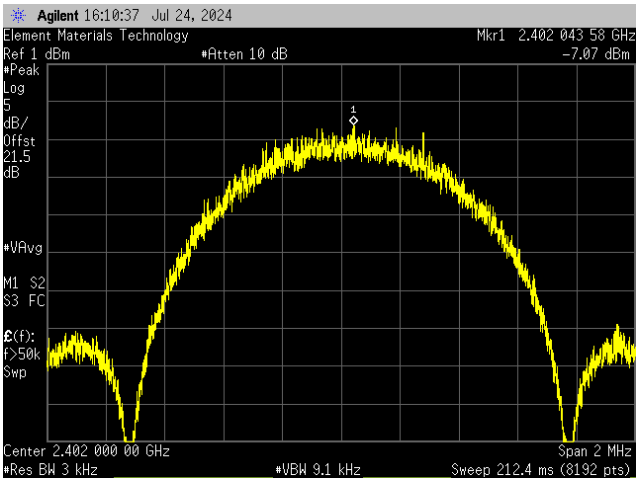
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



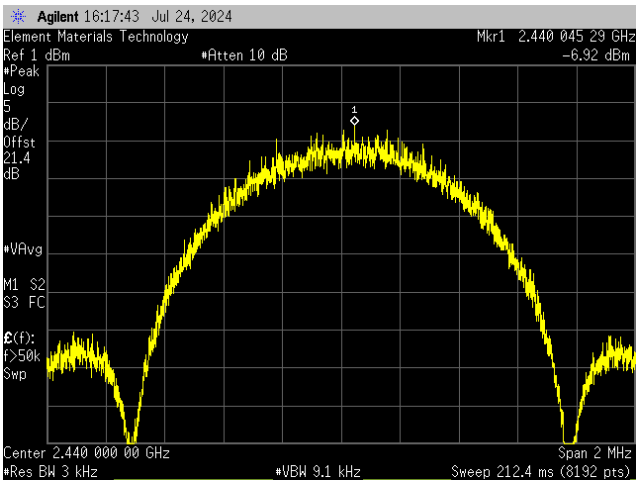
BLE/GFSK 125 kbps
High Channel, 2480 MHz



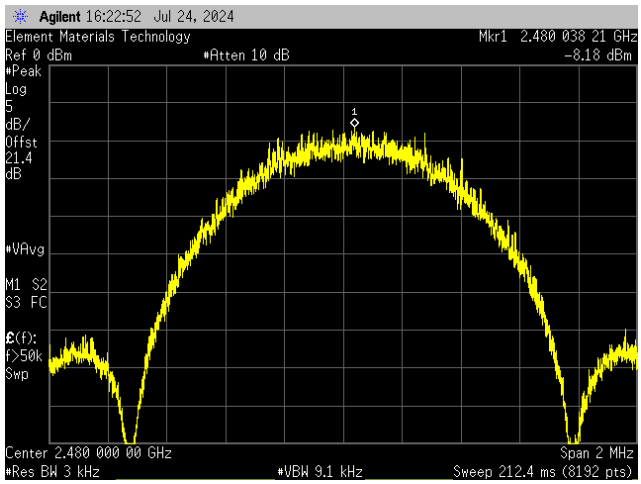
BLE/GFSK 500 kbps
Low Channel, 2402 MHz

POWER SPECTRAL DENSITY

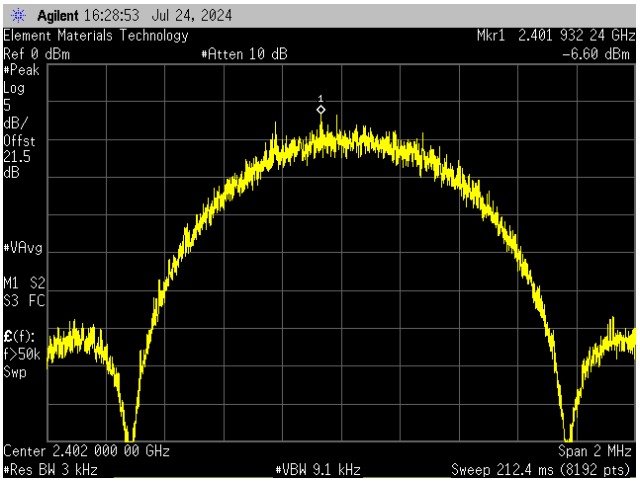
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



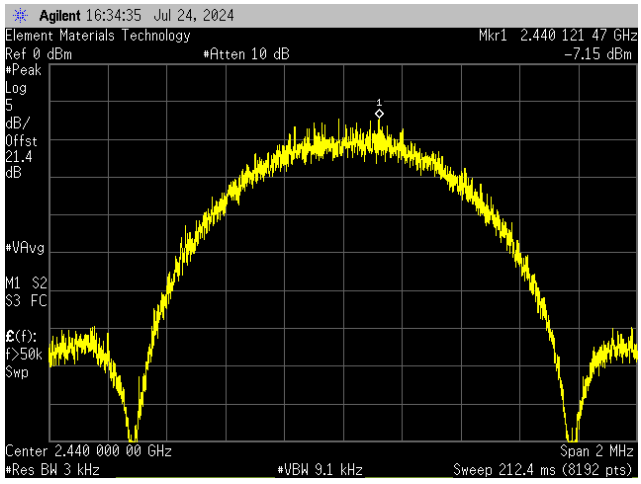
BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



BLE/GFSK 500 kbps
High Channel, 2480 MHz



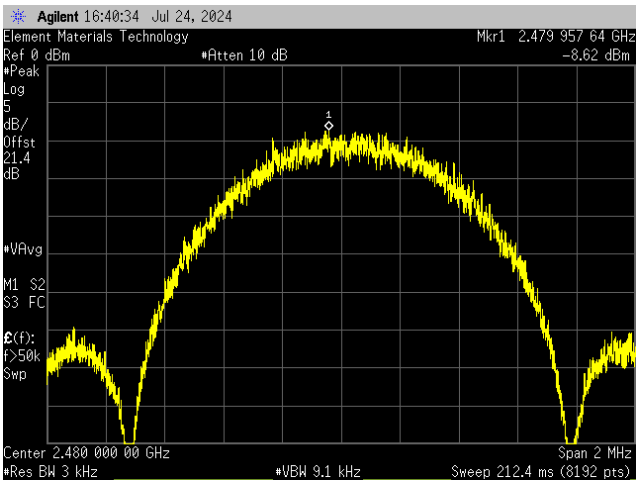
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



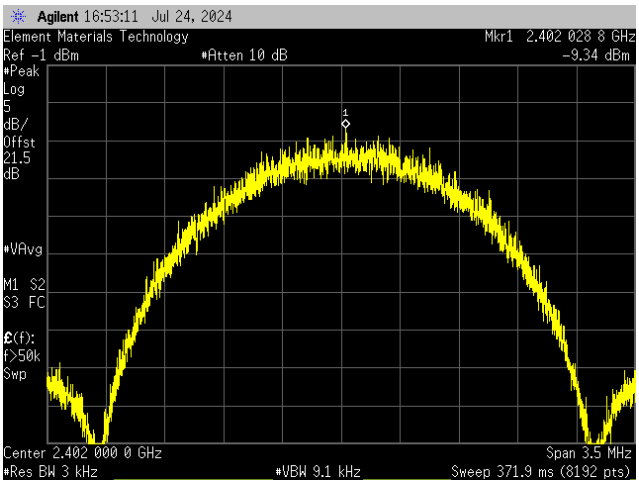
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

POWER SPECTRAL DENSITY

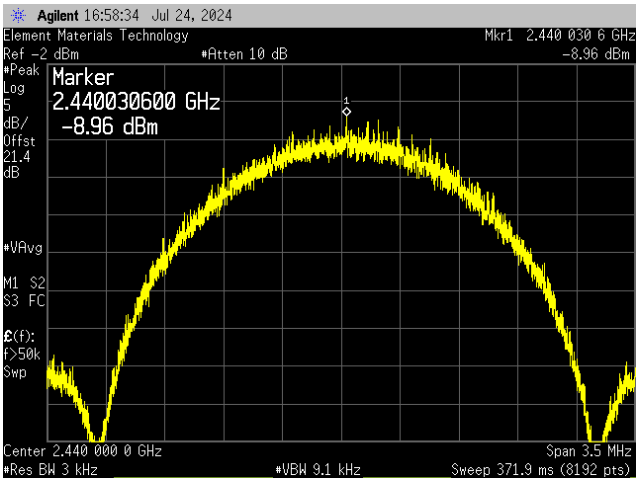
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



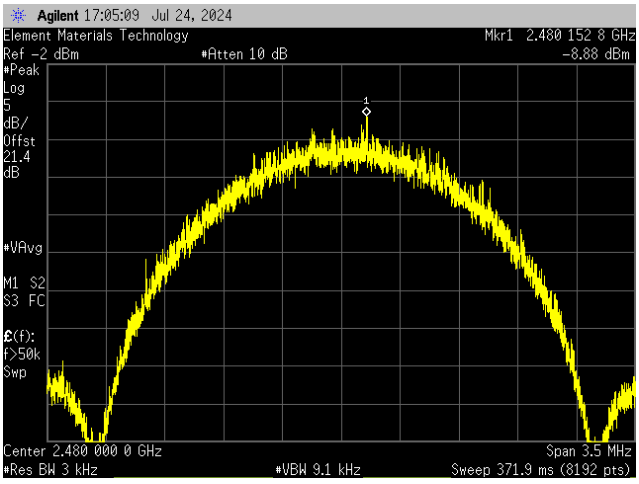
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

BAND EDGE COMPLIANCE

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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 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. The analyzer screen captures for this test show an example of the emission mask for the test mode also used during the radiated spurious emissions at the restricted band edges test.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

BAND EDGE COMPLIANCE

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.6°C
Attendees:	Seth Hammond	Relative Humidity:	44.6%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

Reference level offset includes: DC Block, 20 dB attenuator and measurement cable

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

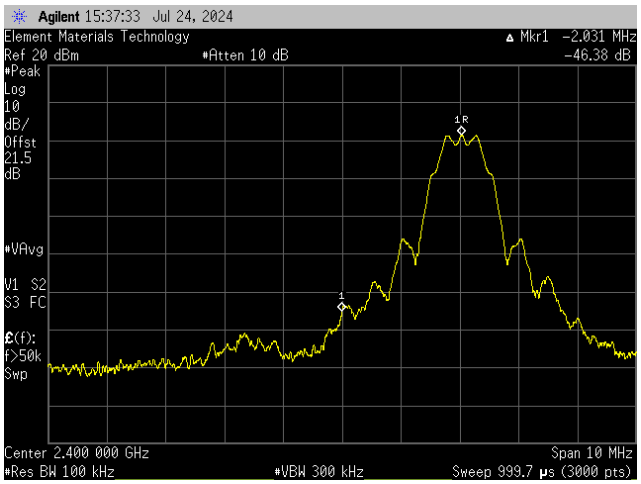
Tested By

TEST RESULTS

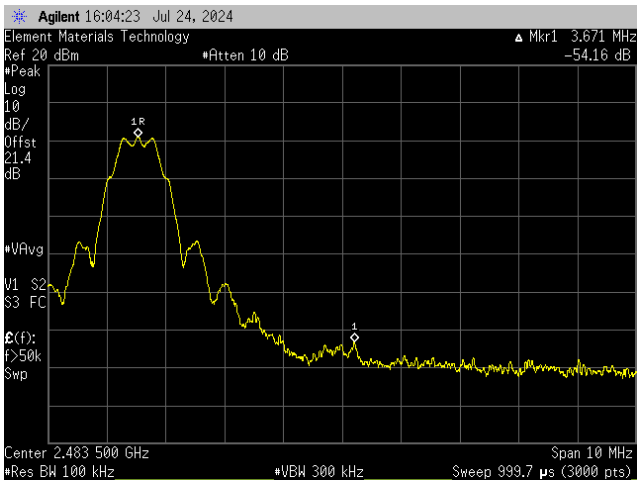
	Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 125 kbps			
Low Channel, 2402 MHz	-46.38	-20	Pass
High Channel, 2480 MHz	-54.16	-20	Pass
BLE/GFSK 500 kbps			
Low Channel, 2402 MHz	-47.88	-20	Pass
High Channel, 2480 MHz	-57.81	-20	Pass
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	-48.26	-20	Pass
High Channel, 2480 MHz	-57.75	-20	Pass
BLE/GFSK 2 Mbps			
Low Channel, 2402 MHz	-33.28	-20	Pass
High Channel, 2480 MHz	-53.61	-20	Pass

BAND EDGE COMPLIANCE

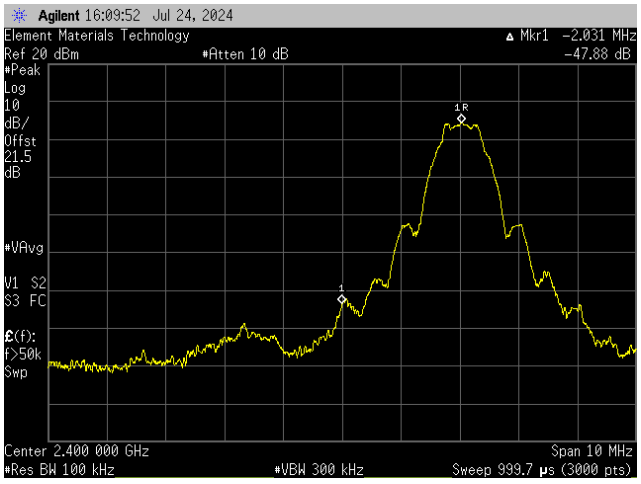
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



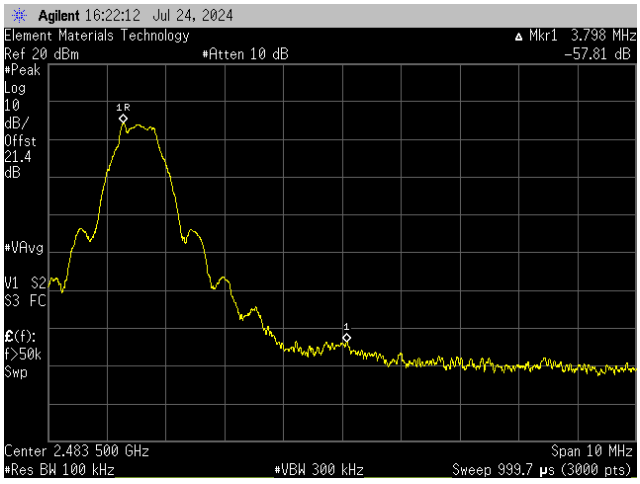
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
High Channel, 2480 MHz



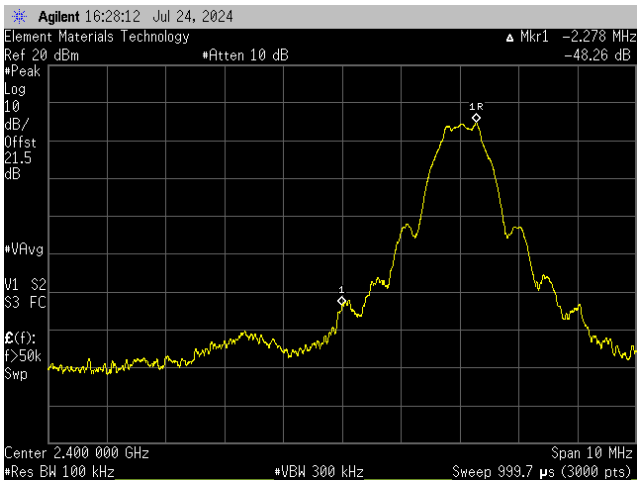
BLE/GFSK 500 kbps
Low Channel, 2402 MHz



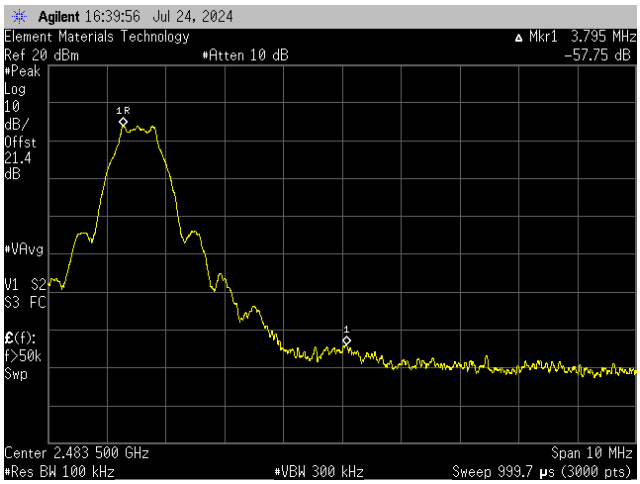
BLE/GFSK 500 kbps
High Channel, 2480 MHz

BAND EDGE COMPLIANCE

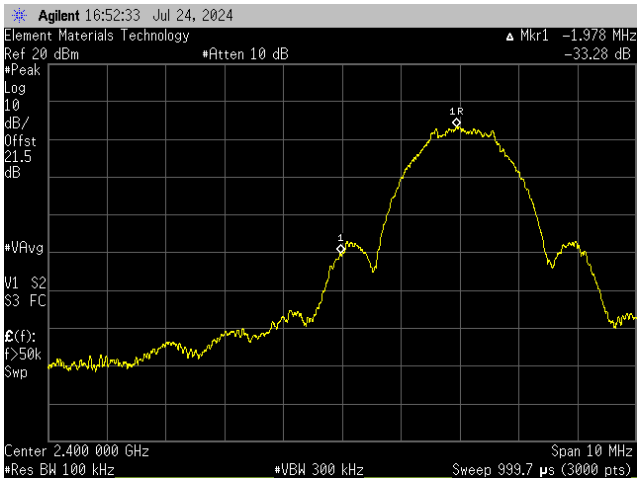
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



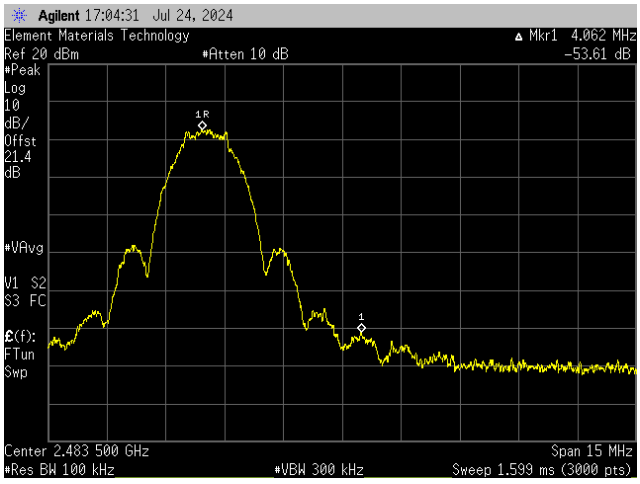
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

SPURIOUS CONDUCTED EMISSIONS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

TEST DESCRIPTION

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 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 fundamental was measured with a 100 kHz resolution bandwidth and the highest value was recorded. The rest of the spectrum was then measured with a 100 kHz resolution bandwidth and the highest value was found. The difference between the value found on the fundamental and the rest of the spectrum was compared against the limit to determine compliance.

The reference level offset for the fundamental screen capture was based on a measured value of the loss between the spectrum analyzer and the EUT which was verified at the time of test. The remaining screen capture(s) use an internal transducer factor on the analyzer to correct the displayed trace based on the cable loss over frequency. The reference level offset for the additional screen capture(s) is then based on the expected attenuator value and any other losses.

Fundamental Offset = Ref Lvl Offset showing measured composite factor of all losses

Remaining Screen capture(s) Offset = “Internal” cable loss factor not shown on screen capture + Ref Lvl Offset showing expected attenuator value and any other losses

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Generator - Signal	Keysight	N5182B	TEU	2024-04-18	2027-04-18
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAW	2024-02-14	2025-02-14
Block - DC	Fairview Microwave	SD3379	AMW	2024-03-13	2025-03-13
Attenuator	S.M. Electronics	SA26B-20	AUY	2024-03-13	2025-03-13
Cable	Micro-Coax	UFD150A-1-0720-200200	EVH	2024-03-14	2025-03-14

SPURIOUS CONDUCTED EMISSIONS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:33:FF	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22.7°C
Attendees:	Seth Hammond	Relative Humidity:	44.5%
Customer Project:	None	Bar. Pressure (PMSL):	1025 mbar
Tested By:	Jeff Alcoke	Job Site:	EV06
Power:	110VAC/60Hz	Configuration:	IRRI0024-6

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

COMMENTS

None

DEVIATIONS FROM TEST STANDARD

None

CONCLUSION

Pass

Tested By

TEST RESULTS

	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
BLE/GFSK 125 kbps					
Low Channel, 2402 MHz	Fundamental	2402.03	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7101.6	-53.1	-20	Pass
	12.5 GHz - 25 GHz	24691.7	-49.28	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2440.03	N/A	N/A	N/A
	30 MHz - 12.5 GHz	11935.2	-53.29	-20	Pass
	12.5 GHz - 25 GHz	24984.7	-49.22	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.03	N/A	N/A	N/A
	30 MHz - 12.5 GHz	12274.7	-52.67	-20	Pass
	12.5 GHz - 25 GHz	24366.7	-48.33	-20	Pass
BLE/GFSK 500 kbps					
Low Channel, 2402 MHz	Fundamental	2401.78	N/A	N/A	N/A
	30 MHz - 12.5 GHz	12318.8	-57.96	-20	Pass
	12.5 GHz - 25 GHz	24746.7	-52.18	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2439.78	N/A	N/A	N/A
	30 MHz - 12.5 GHz	8019.6	-56.51	-20	Pass
	12.5 GHz - 25 GHz	24398.7	-52.18	-20	Pass
High Channel, 2480 MHz	Fundamental	2479.78	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7043.7	-56.87	-20	Pass
	12.5 GHz - 25 GHz	24784.8	-52.3	-20	Pass
BLE/GFSK 1 Mbps					
Low Channel, 2402 MHz	Fundamental	2402.29	N/A	N/A	N/A
	30 MHz - 12.5 GHz	11445	-57.09	-20	Pass
	12.5 GHz - 25 GHz	24352.9	-52.74	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2439.78	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7552.2	-56.72	-20	Pass
	12.5 GHz - 25 GHz	24728.4	-52.07	-20	Pass

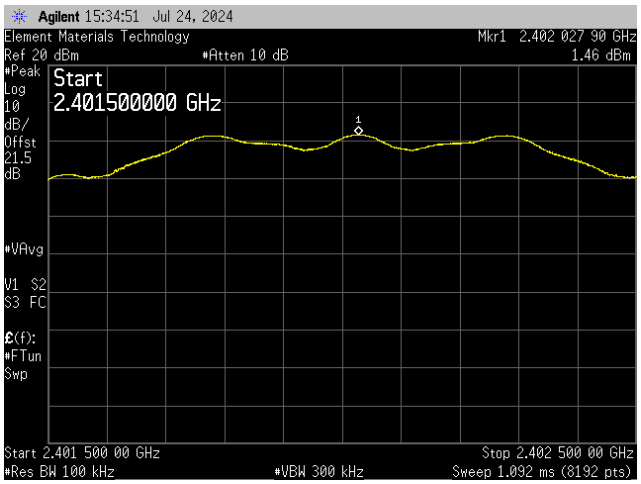
SPURIOUS CONDUCTED EMISSIONS

element
TbtTx 2024.05.24.1
WTD.2024.01.16.0

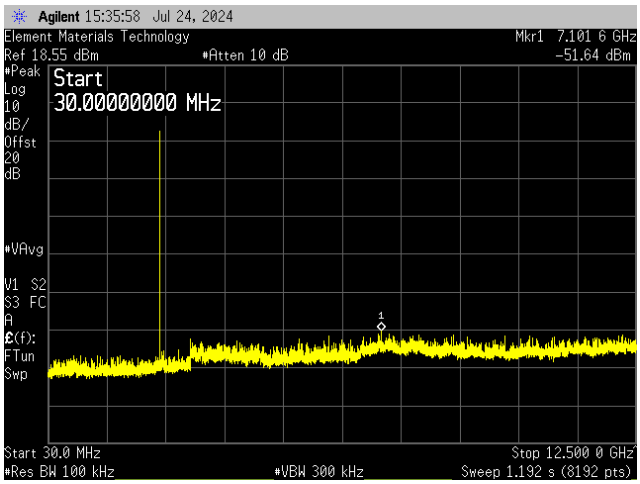
	Frequency Range	Measured Freq (MHz)	Max Value (dBc)	Limit ≤ (dBc)	Result
High Channel, 2480 MHz	Fundamental	2480.29	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7027	-56.95	-20	Pass
	12.5 GHz - 25 GHz	24545.2	-51.62	-20	Pass
BLE/GFSK 2 Mbps					
Low Channel, 2402 MHz	Fundamental	2402.04	N/A	N/A	N/A
	30 MHz - 12.5 GHz	2397.3	-56.27	-20	Pass
	12.5 GHz - 25 GHz	24400.3	-50.93	-20	Pass
Mid Channel, 2440 MHz	Fundamental	2440.52	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7098.5	-55.46	-20	Pass
	12.5 GHz - 25 GHz	24719.2	-51.07	-20	Pass
High Channel, 2480 MHz	Fundamental	2480.52	N/A	N/A	N/A
	30 MHz - 12.5 GHz	7261.4	-55.87	-20	Pass
	12.5 GHz - 25 GHz	24688.7	-50.11	-20	Pass

SPURIOUS CONDUCTED EMISSIONS

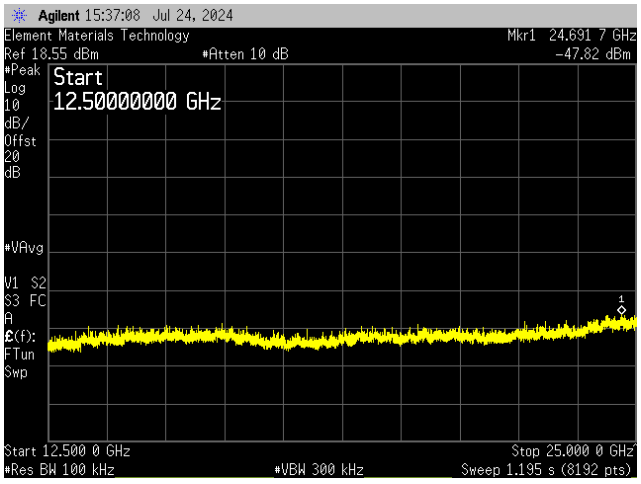
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



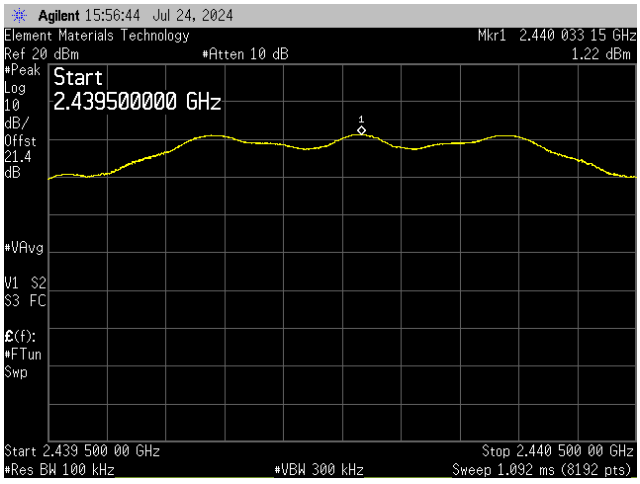
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



BLE/GFSK 125 kbps
Low Channel, 2402 MHz



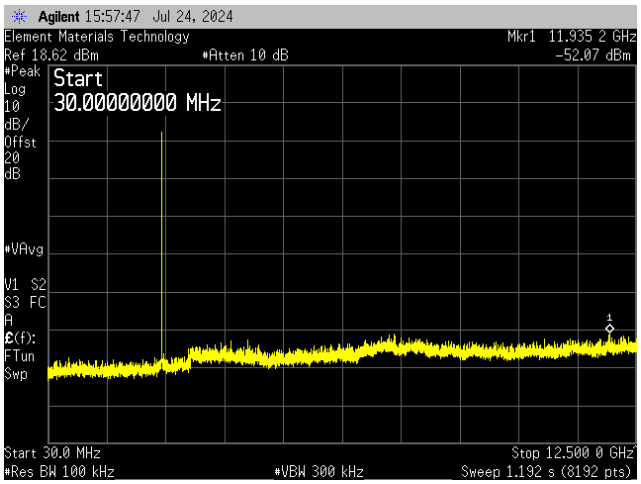
BLE/GFSK 125 kbps
Low Channel, 2402 MHz



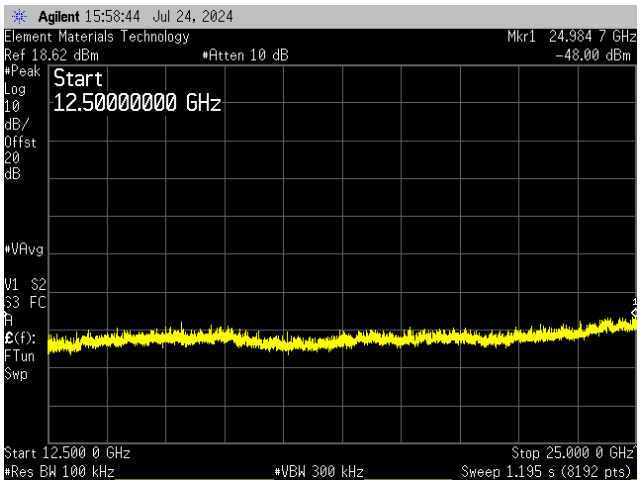
BLE/GFSK 125 kbps
Mid Channel, 2440 MHz

SPURIOUS CONDUCTED EMISSIONS

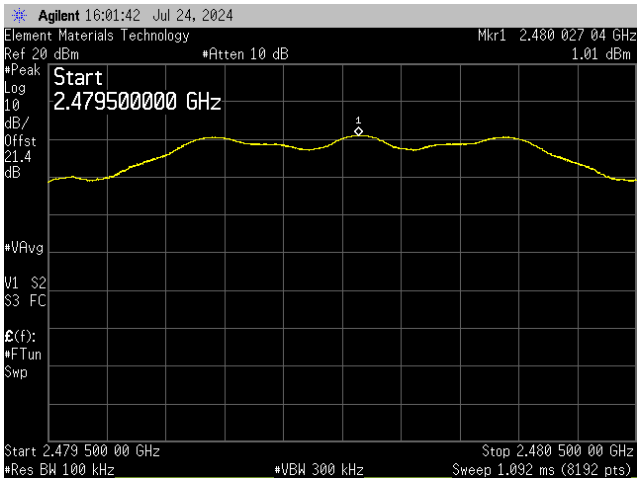
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



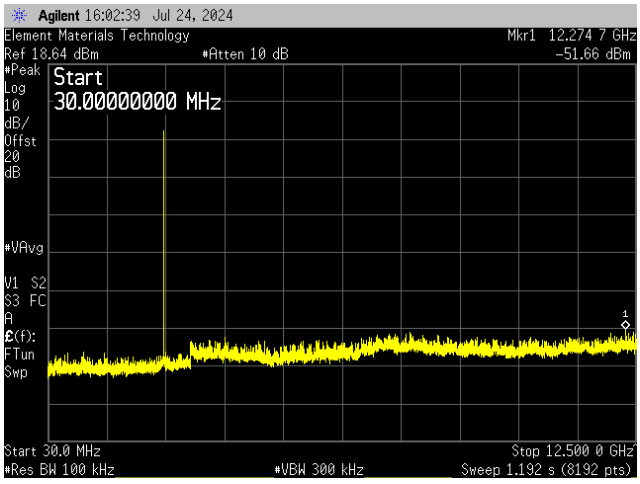
BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



BLE/GFSK 125 kbps
Mid Channel, 2440 MHz



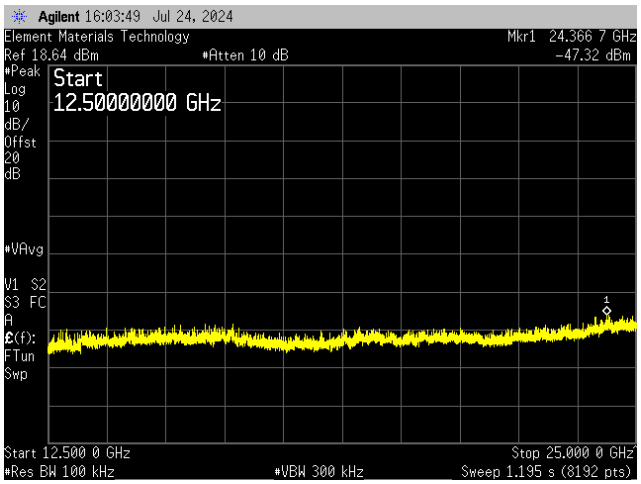
BLE/GFSK 125 kbps
High Channel, 2480 MHz



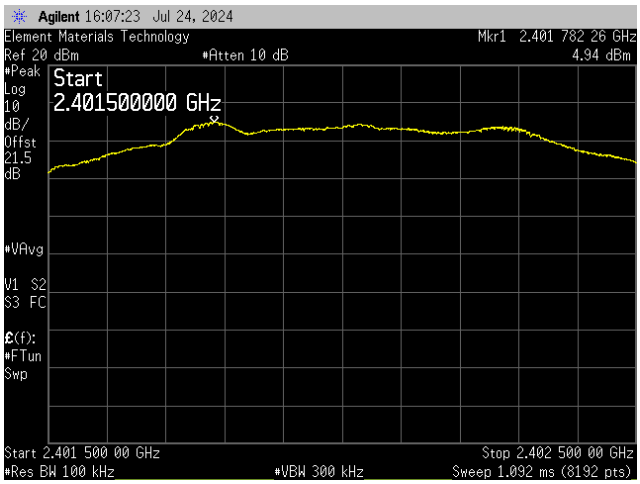
BLE/GFSK 125 kbps
High Channel, 2480 MHz

SPURIOUS CONDUCTED EMISSIONS

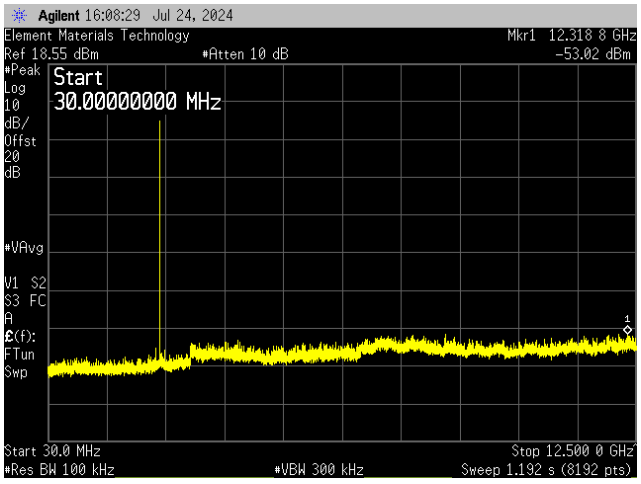
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



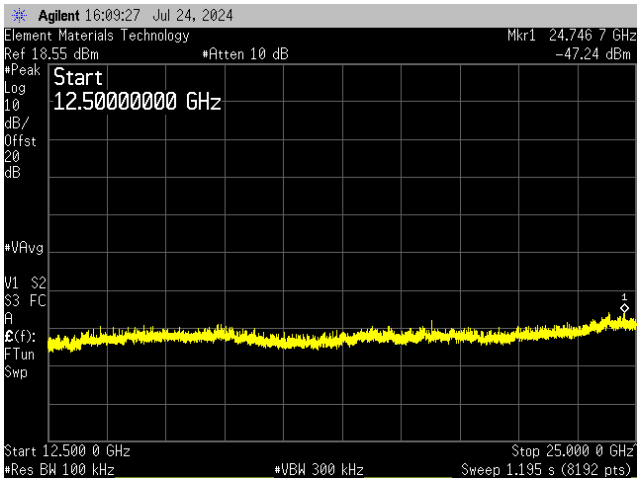
BLE/GFSK 125 kbps
High Channel, 2480 MHz



BLE/GFSK 500 kbps
Low Channel, 2402 MHz



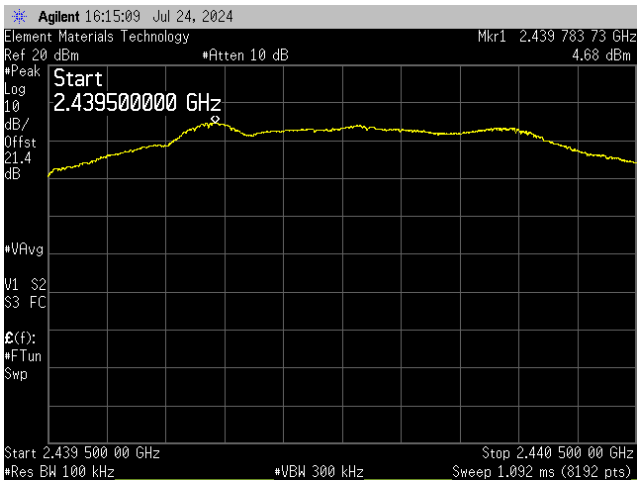
BLE/GFSK 500 kbps
Low Channel, 2402 MHz



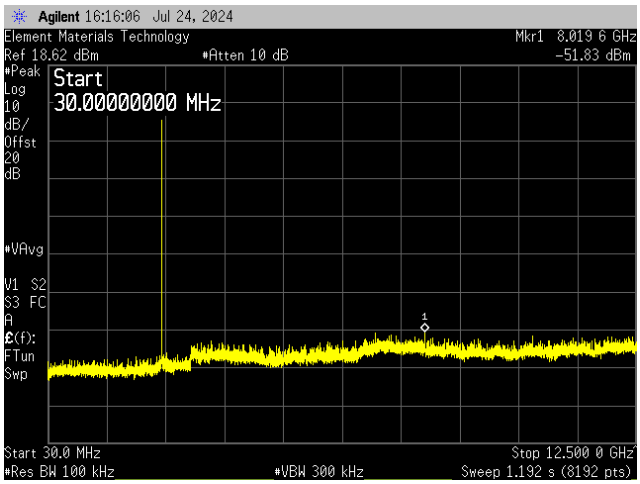
BLE/GFSK 500 kbps
Low Channel, 2402 MHz

SPURIOUS CONDUCTED EMISSIONS

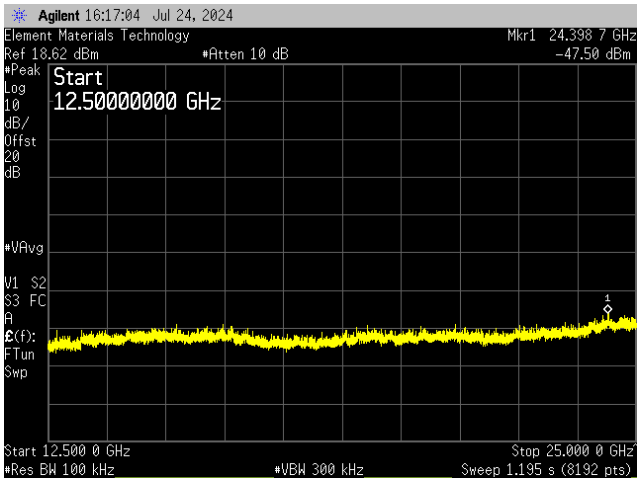
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



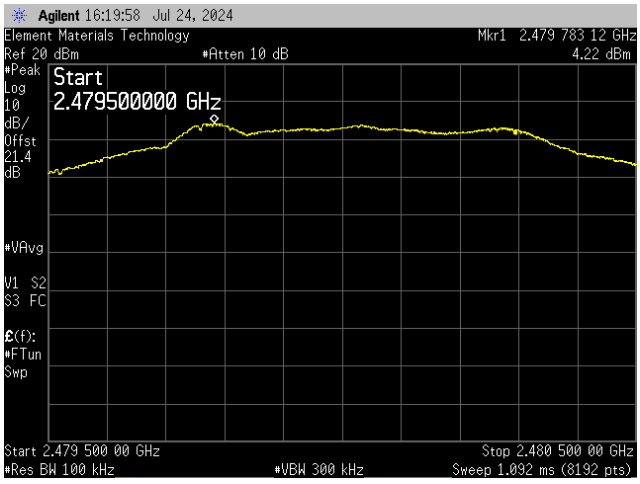
BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



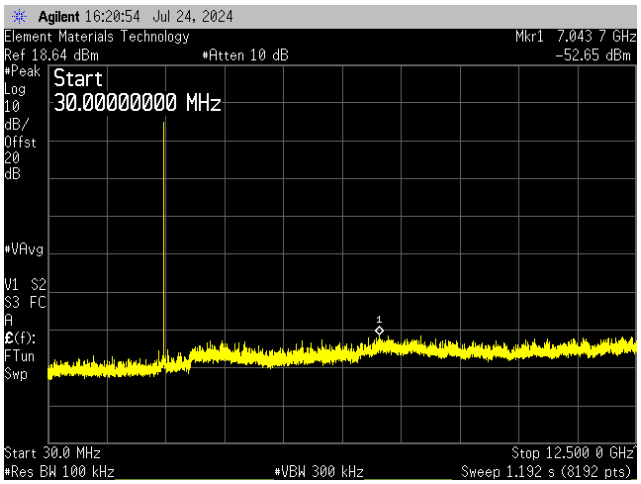
BLE/GFSK 500 kbps
Mid Channel, 2440 MHz



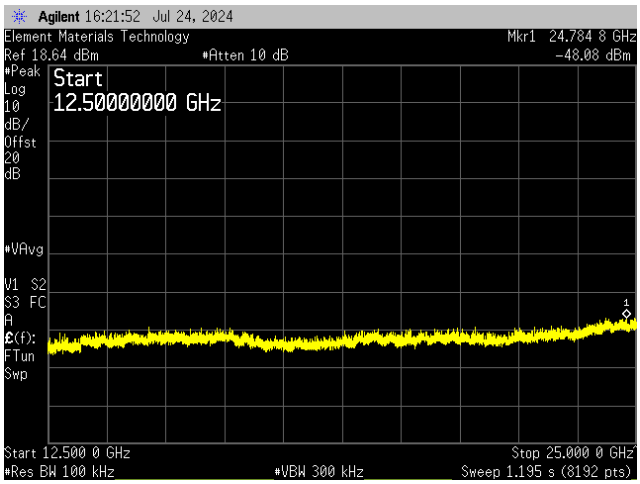
BLE/GFSK 500 kbps
High Channel, 2480 MHz

SPURIOUS CONDUCTED EMISSIONS

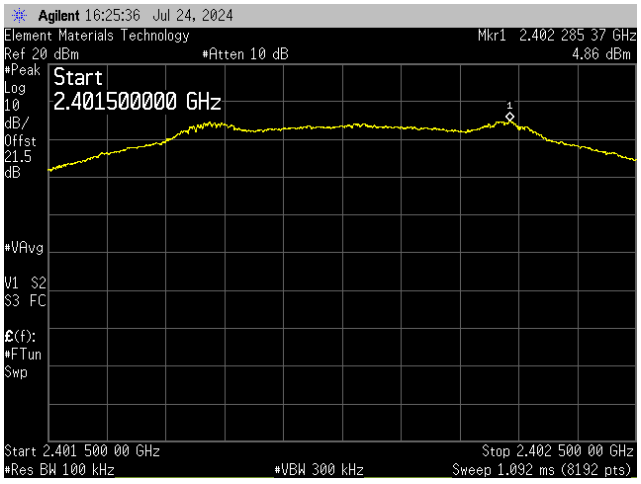
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



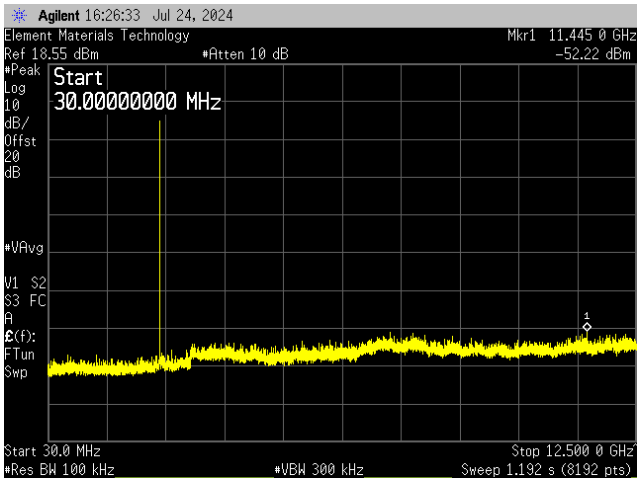
BLE/GFSK 500 kbps
High Channel, 2480 MHz



BLE/GFSK 500 kbps
High Channel, 2480 MHz



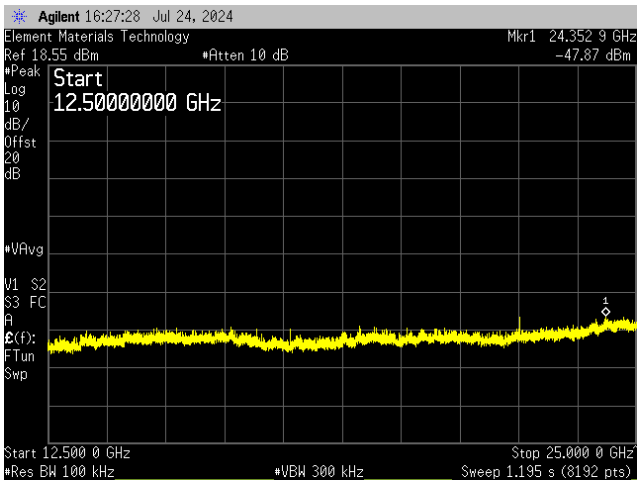
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



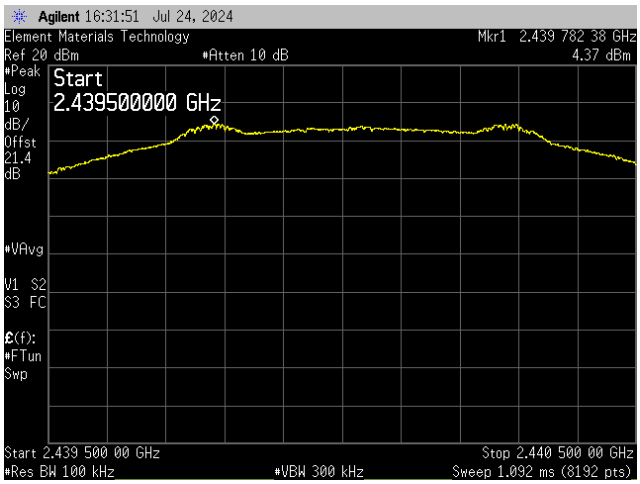
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz

SPURIOUS CONDUCTED EMISSIONS

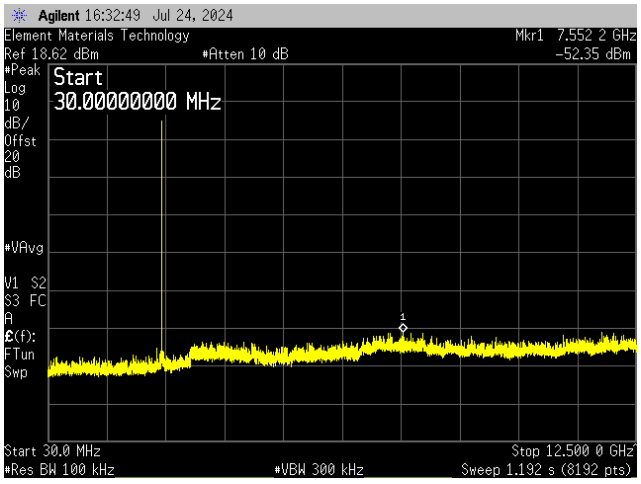
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



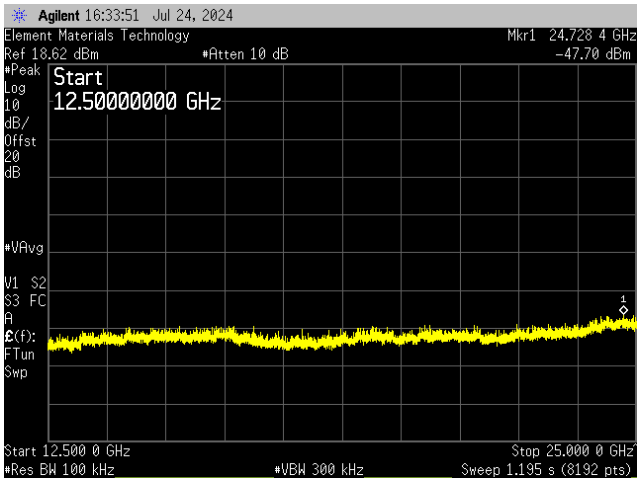
BLE/GFSK 1 Mbps
Low Channel, 2402 MHz



BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



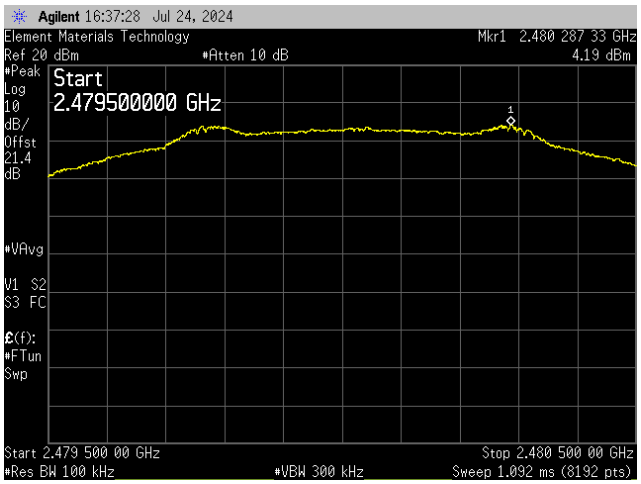
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz



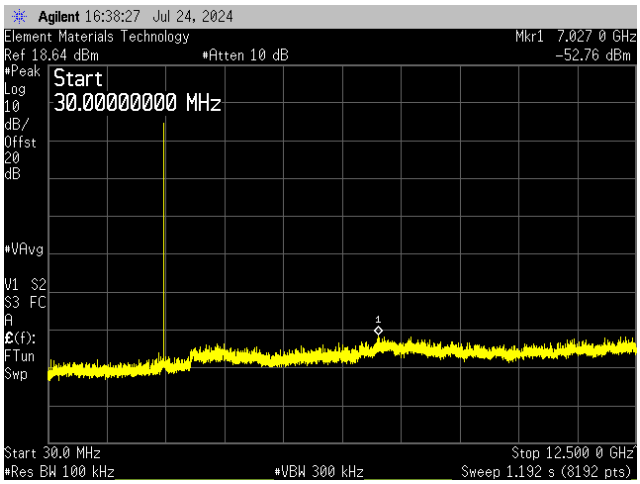
BLE/GFSK 1 Mbps
Mid Channel, 2440 MHz

SPURIOUS CONDUCTED EMISSIONS

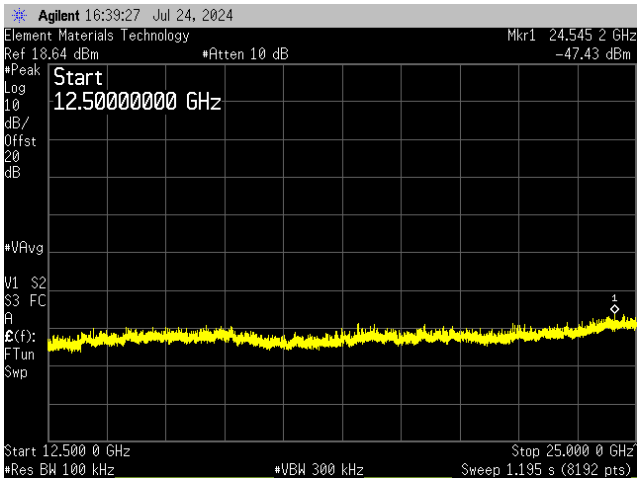
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



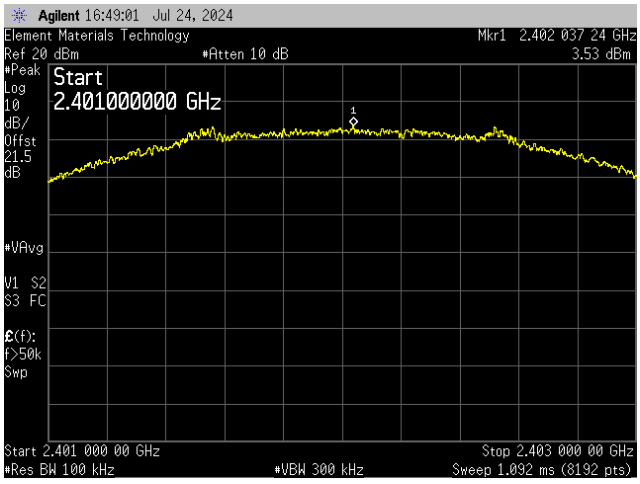
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



BLE/GFSK 1 Mbps
High Channel, 2480 MHz



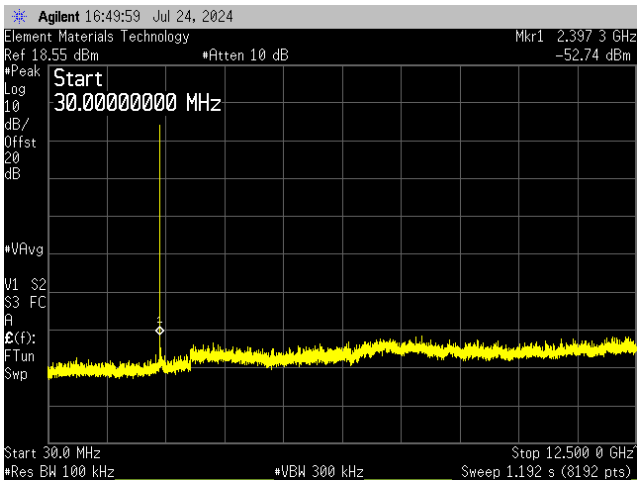
BLE/GFSK 1 Mbps
High Channel, 2480 MHz



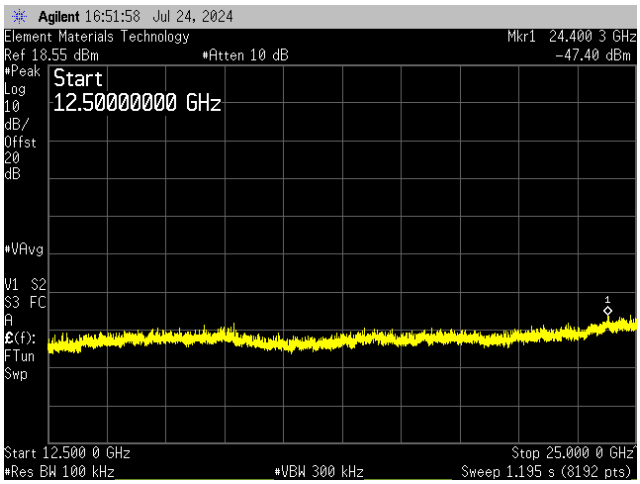
BLE/GFSK 2 Mbps
Low Channel, 2402 MHz

SPURIOUS CONDUCTED EMISSIONS

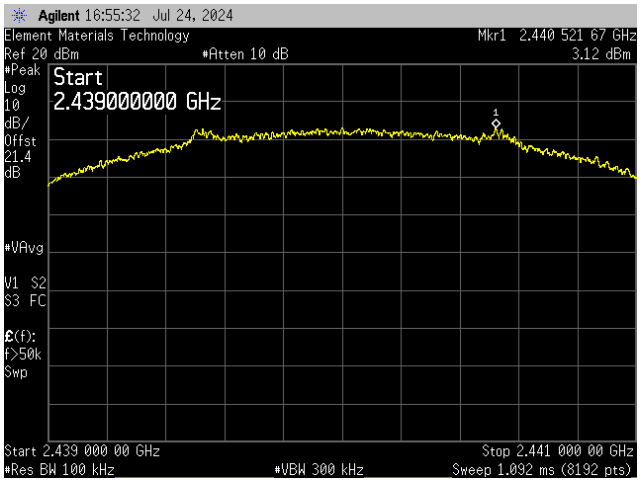
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



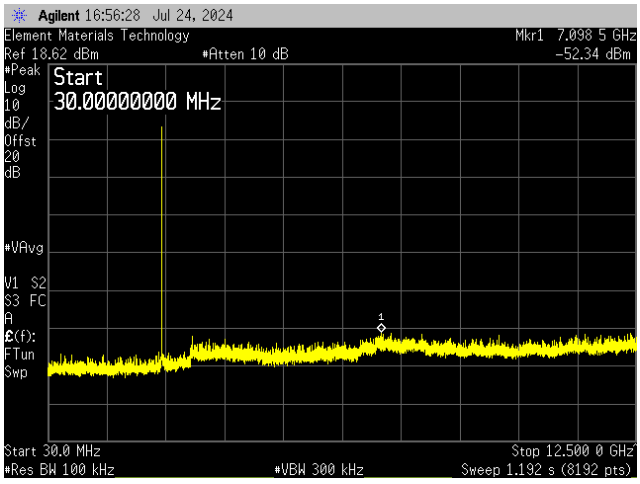
BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



BLE/GFSK 2 Mbps
Low Channel, 2402 MHz



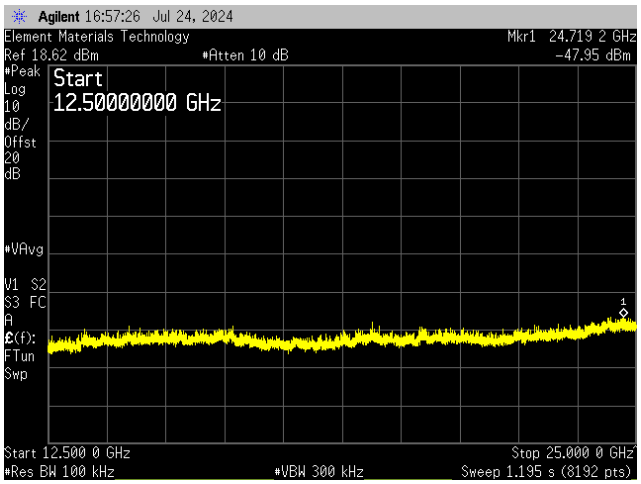
BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz



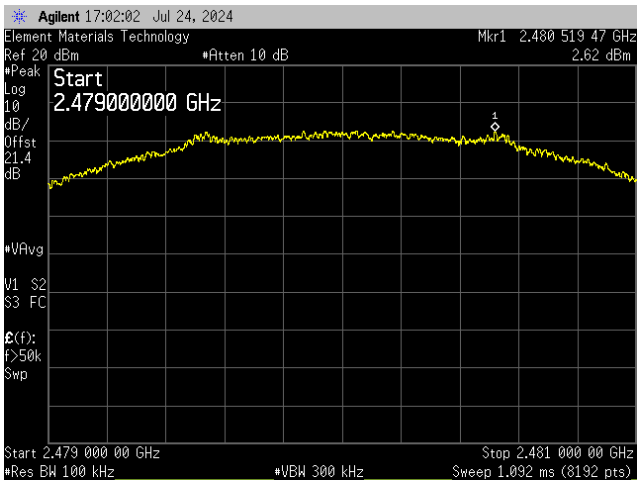
BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz

SPURIOUS CONDUCTED EMISSIONS

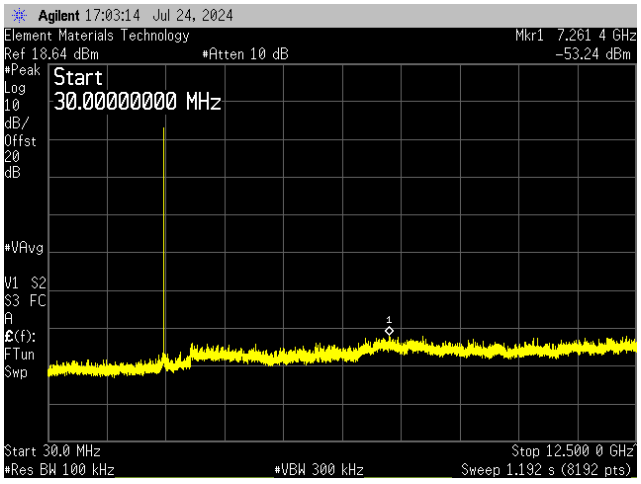
element
TbtTx 2024.05.24.1
WTD.2024.01.16.0



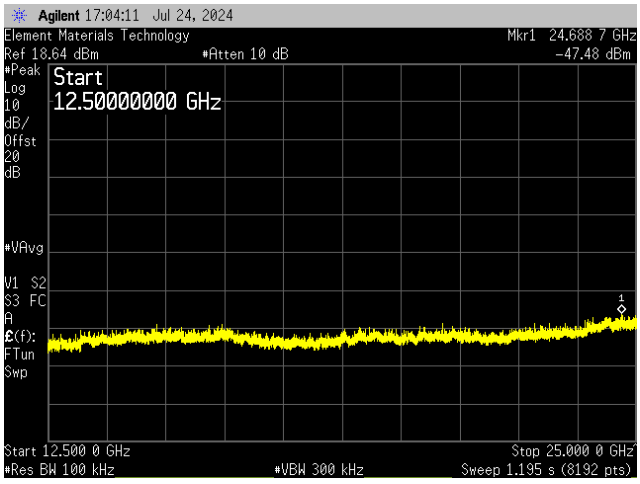
BLE/GFSK 2 Mbps
Mid Channel, 2440 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz



BLE/GFSK 2 Mbps
High Channel, 2480 MHz

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

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 shown 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 axes 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 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.

TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Loop	A.H. Systems, Inc.	SAS-563B	TNI	2022-06-07	2025-06-07
Antenna - Biconilog	EMCO	3142B	AXJ	2023-04-17	2025-04-17
Antenna - Double Ridge	ETS Lindgren	3115	AIZ	2024-03-08	2026-03-08
Antenna - Standard Gain	ETS Lindgren	3160-07	AHU	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-08	AHV	NCR	NCR
Antenna - Standard Gain	ETS Lindgren	3160-09	AIV	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AM-1616-1000	AOL	2023-11-05	2024-11-05
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	PAG	2024-03-14	2025-03-14
Amplifier - Pre-Amplifier	L-3 Narda-MITEQ	AMF-6F-08001200-30-10P	PAO	2023-10-31	2024-10-31
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AVD	2023-10-31	2024-10-31
Amplifier - Pre-Amplifier	Miteq	AMF-6F-18002650-25-10P	AVU	2024-07-09	2025-07-09
Cable	N/A	Bilog Cables	EVA	2023-11-05	2024-11-05
Cable	N/A	Double Ridge Horn Cables	EVB	2024-03-14	2025-03-14
Cable	None	Standard Gain Horn Cables	EVF	2023-10-31	2024-10-31
Cable	ESM Cable Corp.	TTBJ141-KMKM-72	EVY	2024-07-09	2025-07-09
Attenuator	Coaxicom	3910-10	AWX	2024-02-12	2025-02-12
Filter - Low Pass	Micro-Tronics	LPM50004	LFD	2024-02-12	2025-02-12
Filter - High Pass	Micro-Tronics	HPM50111	HFO	2023-11-06	2024-11-06
Analyzer - Spectrum Analyzer	Keysight	N9010A	AFO	2023-10-04	2024-10-04

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

FREQUENCY RANGE INVESTIGATED

9 kHz TO 26.4 GHz

POWER INVESTIGATED

110VAC/60Hz

CONFIGURATIONS INVESTIGATED

IRRI0024-2
IRRI0024-10

MODES INVESTIGATED

Transmitting BLE, Low Ch. 2402 MHz, Mid Ch. 2440 MHz, High Ch. 2480 MHz

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22°C
Attendees:	Seth Hammond	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	110VAC/60Hz	Configuration:	IRRI0024-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	71	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

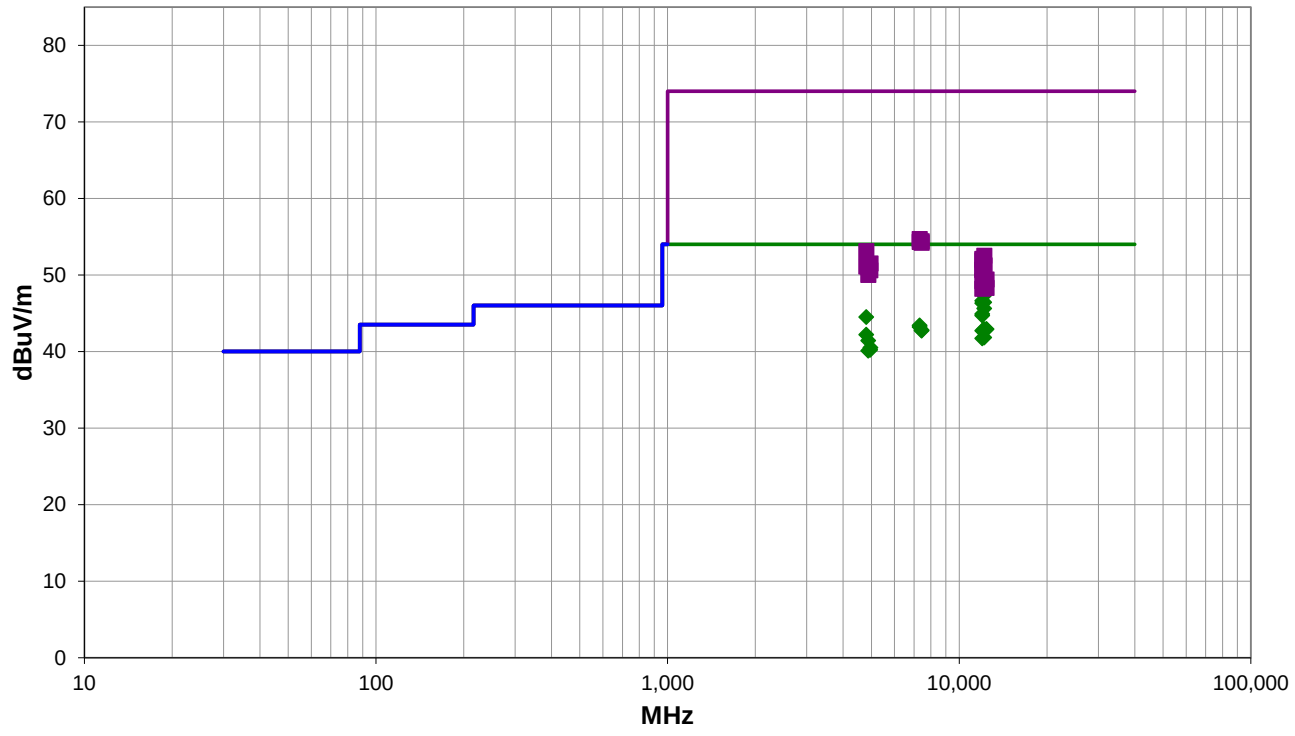
Please reference data comments below for channel, data rate, and EUT orientation.

EUT OPERATING MODES

Transmitting BLE, Low Ch. 2402 MHz, Mid Ch. 2440 MHz, High Ch. 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 71 PK AV QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #71

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
12201.150	46.5	0.8	1.0	189.0	3.0	0.0	Vert	AV	0.0	47.3	54.0	-6.7	Mid Ch, 1 Mbps, EUT on Side
12008.950	46.0	0.6	1.5	221.0	3.0	0.0	Horz	AV	0.0	46.6	54.0	-7.4	Low Ch, 1 Mbps, EUT Vert
12201.230	45.6	0.8	1.0	199.0	3.0	0.0	Vert	AV	0.0	46.4	54.0	-7.6	Mid Ch, 500 kbps, EUT on Side
12008.980	45.7	0.6	3.0	190.0	3.0	0.0	Vert	AV	0.0	46.3	54.0	-7.7	Low Ch, 1 Mbps, EUT on Side
12198.980	44.8	0.8	1.1	217.0	3.0	0.0	Horz	AV	0.0	45.6	54.0	-8.4	Mid Ch, 1 Mbps, EUT Vert
12009.030	44.3	0.6	2.5	244.0	3.0	0.0	Vert	AV	0.0	44.9	54.0	-9.1	Low Ch, 1 Mbps, EUT Horz
12009.000	44.1	0.6	1.2	151.0	3.0	0.0	Horz	AV	0.0	44.7	54.0	-9.3	Low Ch, 1 Mbps, EUT on Side
4803.933	35.0	9.5	3.1	157.0	3.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	Low Ch, 1 Mbps, EUT on Side
7320.725	27.8	15.6	1.0	283.0	3.0	0.0	Horz	AV	0.0	43.4	54.0	-10.6	Mid Ch, 1 Mbps, EUT Vert
7319.450	27.6	15.6	1.5	333.0	3.0	0.0	Vert	AV	0.0	43.2	54.0	-10.8	Mid Ch, 1 Mbps, EUT on Side
12398.930	41.6	1.3	3.1	191.0	3.0	0.0	Vert	AV	0.0	42.9	54.0	-11.1	High Ch. 1 Mbps, EUT on Side
12398.980	41.6	1.3	1.7	220.0	3.0	0.0	Horz	AV	0.0	42.9	54.0	-11.1	High Ch, 1 Mbps, EUT Vert
12201.300	42.1	0.8	1.0	199.0	3.0	0.0	Horz	AV	0.0	42.9	54.0	-11.1	Mid Ch, 125 kbps, EUT on Side
7438.067	27.2	15.6	1.5	54.0	3.0	0.0	Vert	AV	0.0	42.8	54.0	-11.2	High Ch, 1 Mbps, EUT on Side
12008.970	42.1	0.6	1.0	345.0	3.0	0.0	Horz	AV	0.0	42.7	54.0	-11.3	Low Ch, 1 Mbps, EUT Horz
7439.883	27.1	15.6	3.3	131.0	3.0	0.0	Horz	AV	0.0	42.7	54.0	-11.3	High Ch, 1 Mbps, EUT Vert
4803.950	32.7	9.5	1.5	170.0	3.0	0.0	Horz	AV	0.0	42.2	54.0	-11.8	Low Ch, 1 Mbps, EUT Vert
12202.430	41.0	0.8	1.0	199.0	3.0	0.0	Horz	AV	0.0	41.8	54.0	-12.2	Mid Ch, 2 Mbps, EUT on Side
12008.970	41.1	0.6	1.5	174.0	3.0	0.0	Vert	AV	0.0	41.7	54.0	-12.3	Low Ch, 1 Mbps, EUT Vert
4879.833	31.9	9.5	1.2	177.0	3.0	0.0	Vert	AV	0.0	41.4	54.0	-12.6	Mid Ch, 1 Mbps, EUT on Side
4960.167	30.8	9.7	3.7	199.0	3.0	0.0	Horz	AV	0.0	40.5	54.0	-13.5	High Ch, 1 Mbps, EUT Vert
4959.842	30.5	9.7	1.2	186.0	3.0	0.0	Vert	AV	0.0	40.2	54.0	-13.8	High Ch, 1 Mbps, EUT on Side
4880.258	30.6	9.5	1.6	205.0	3.0	0.0	Horz	AV	0.0	40.1	54.0	-13.9	Mid Ch, 1 Mbps, EUT Vert
7319.367	39.1	15.6	1.5	333.0	3.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3	Mid Ch, 1 Mbps, EUT on Side
7437.858	38.8	15.6	3.3	131.0	3.0	0.0	Horz	PK	0.0	54.4	74.0	-19.6	High Ch, 1 Mbps, EUT Vert
7320.833	38.7	15.6	1.0	283.0	3.0	0.0	Horz	PK	0.0	54.3	74.0	-19.7	Mid Ch, 1 Mbps, EUT Vert
7437.650	38.6	15.6	1.5	54.0	3.0	0.0	Vert	PK	0.0	54.2	74.0	-19.8	High Ch, 1 Mbps, EUT on Side
4803.692	43.6	9.5	3.1	157.0	3.0	0.0	Vert	PK	0.0	53.1	74.0	-20.9	Low Ch, 1 Mbps, EUT on Side
12198.900	51.7	0.8	1.0	189.0	3.0	0.0	Vert	PK	0.0	52.5	74.0	-21.5	Mid Ch, 1 Mbps, EUT on Side
12011.430	51.5	0.6	1.5	221.0	3.0	0.0	Horz	PK	0.0	52.1	74.0	-21.9	Low Ch, 1 Mbps, EUT Vert
12011.370	51.3	0.6	3.0	190.0	3.0	0.0	Vert	PK	0.0	51.9	74.0	-22.1	Low Ch, 1 Mbps, EUT on Side
4960.450	41.8	9.7	1.2	186.0	3.0	0.0	Vert	PK	0.0	51.5	74.0	-22.5	High Ch, 1 Mbps, EUT on Side
12198.770	50.5	0.8	1.0	199.0	3.0	0.0	Vert	PK	0.0	51.3	74.0	-22.7	Mid Ch, 500 kbps, EUT on Side
12198.980	50.4	0.8	1.1	217.0	3.0	0.0	Horz	PK	0.0	51.2	74.0	-22.8	Mid Ch, 1 Mbps, EUT Vert
4803.833	41.6	9.5	1.5	170.0	3.0	0.0	Horz	PK	0.0	51.1	74.0	-22.9	Low Ch, 1 Mbps, EUT Vert
4879.942	41.5	9.5	1.2	177.0	3.0	0.0	Vert	PK	0.0	51.0	74.0	-23.0	Mid Ch, 1 Mbps, EUT on Side
12009.040	50.1	0.6	1.2	151.0	3.0	0.0	Horz	PK	0.0	50.7	74.0	-23.3	Low Ch, 1 Mbps, EUT on Side
12008.930	50.0	0.6	2.5	244.0	3.0	0.0	Vert	PK	0.0	50.6	74.0	-23.4	Low Ch, 1 Mbps, EUT Horz
4959.550	40.9	9.7	3.7	199.0	3.0	0.0	Horz	PK	0.0	50.6	74.0	-23.4	High Ch, 1 Mbps, EUT Vert
4879.575	40.5	9.5	1.6	205.0	3.0	0.0	Horz	PK	0.0	50.0	74.0	-24.0	Mid Ch, 1 Mbps, EUT Vert

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
12401.200	48.1	1.3	1.7	220.0	3.0	0.0	Horz	PK	0.0	49.4	74.0	-24.6	High Ch, 1 Mbps, EUT Vert
12008.830	48.6	0.6	1.0	345.0	3.0	0.0	Horz	PK	0.0	49.2	74.0	-24.8	Low Ch, 1 Mbps, EUT Horz
12197.620	48.2	0.8	1.0	199.0	3.0	0.0	Horz	PK	0.0	49.0	74.0	-25.0	Mid Ch, 2 Mbps, EUT on Side
12201.350	47.9	0.8	1.0	199.0	3.0	0.0	Horz	PK	0.0	48.7	74.0	-25.3	Mid Ch, 125 kbps, EUT on Side
12401.330	47.0	1.3	3.1	191.0	3.0	0.0	Vert	PK	0.0	48.3	74.0	-25.7	High Ch. 1 Mbps, EUT on Side
12008.710	47.6	0.6	1.5	174.0	3.0	0.0	Vert	PK	0.0	48.2	74.0	-25.8	Low Ch, 1 Mbps, EUT Vert

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-07-24
Customer:	IrriGreen, Inc.	Temperature:	22°C
Attendees:	Seth Hammond	Relative Humidity:	44.4%
Customer Project:	None	Bar. Pressure (PMSL):	1019 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	110VAC/60Hz	Configuration:	IRRI0024-2

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	74	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

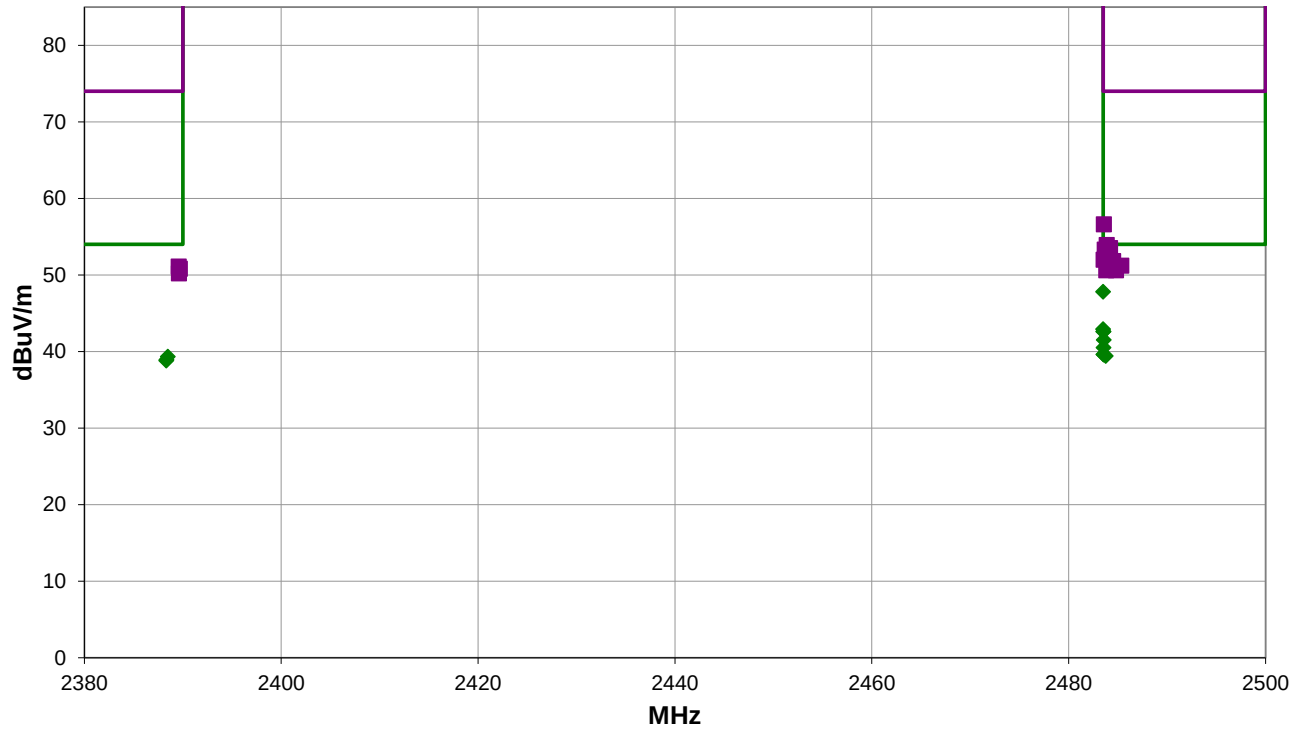
Please reference data comments below for channel, data rate, and EUT orientation.

EUT OPERATING MODES

Transmitting BLE, Low Ch. 2402 MHz, Mid Ch. 2440 MHz, High Ch. 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 74 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #74

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	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
2483.503	39.8	-2.0	1.0	25.0	3.0	10.0	Vert	AV	0.0	47.8	54.0	-6.2	High Ch, 2 Mbps, EUT on Side
2483.503	34.9	-2.0	1.0	25.0	3.0	10.0	Vert	AV	0.0	42.9	54.0	-11.1	High Ch, 500 kbps, EUT on Side
2483.540	34.6	-2.0	1.0	23.0	3.0	10.0	Vert	AV	0.0	42.6	54.0	-11.4	High Ch, 1 Mbps, EUT on Side
2483.553	34.6	-2.0	1.0	25.0	3.0	10.0	Vert	AV	0.0	42.6	54.0	-11.4	High Ch, 125 kbps, EUT on Side
2483.573	33.5	-2.0	1.0	13.0	3.0	10.0	Horz	AV	0.0	41.5	54.0	-12.5	High Ch, 1 Mbps, EUT Vert
2483.563	32.5	-2.0	1.0	219.0	3.0	10.0	Horz	AV	0.0	40.5	54.0	-13.5	High Ch, 1 Mbps, EUT Horz
2483.550	31.6	-2.0	1.5	112.0	3.0	10.0	Vert	AV	0.0	39.6	54.0	-14.4	High Ch, 1 Mbps, EUT Vert
2483.553	31.6	-2.0	1.32	128.0	3.0	10.0	Vert	AV	0.0	39.6	54.0	-14.4	High Ch, 1 Mbps, EUT Horz
2483.780	31.4	-2.0	1.5	167.0	3.0	10.0	Horz	AV	0.0	39.4	54.0	-14.6	High Ch, 1 Mbps, EUT on Side
2388.490	31.7	-2.4	1.0	25.0	3.0	10.0	Vert	AV	0.0	39.3	54.0	-14.7	Low Ch, 2 Mbps, EUT on Side
2388.357	31.3	-2.4	1.5	19.0	3.0	10.0	Vert	AV	0.0	38.9	54.0	-15.1	Low Ch, 1 Mbps, EUT on Side
2388.323	31.2	-2.4	1.5	11.0	3.0	10.0	Horz	AV	0.0	38.8	54.0	-15.2	Low Ch, 1 Mbps, EUT Vert
2483.587	48.6	-2.0	1.0	25.0	3.0	10.0	Vert	PK	0.0	56.6	74.0	-17.4	High Ch, 2 Mbps, EUT on Side
2483.860	45.9	-2.0	1.0	25.0	3.0	10.0	Vert	PK	0.0	53.9	74.0	-20.1	High Ch, 500 kbps, EUT on Side
2484.193	45.5	-2.0	1.0	23.0	3.0	10.0	Vert	PK	0.0	53.5	74.0	-20.5	High Ch, 1 Mbps, EUT on Side
2483.673	45.3	-2.0	1.0	25.0	3.0	10.0	Vert	PK	0.0	53.3	74.0	-20.7	High Ch, 125 kbps, EUT on Side
2483.560	44.0	-2.0	1.0	13.0	3.0	10.0	Horz	PK	0.0	52.0	74.0	-22.0	High Ch, 1 Mbps, EUT Vert
2484.507	43.8	-2.0	1.0	219.0	3.0	10.0	Horz	PK	0.0	51.8	74.0	-22.2	High Ch, 1 Mbps, EUT Horz
2485.337	43.2	-2.0	1.5	167.0	3.0	10.0	Horz	PK	0.0	51.2	74.0	-22.8	High Ch, 1 Mbps, EUT on Side
2389.580	43.5	-2.4	1.5	19.0	3.0	10.0	Vert	PK	0.0	51.1	74.0	-22.9	Low Ch, 1 Mbps, EUT on Side
2389.693	43.2	-2.4	1.0	25.0	3.0	10.0	Vert	PK	0.0	50.8	74.0	-23.2	Low Ch, 2 Mbps, EUT on Side
2484.810	42.6	-2.0	1.5	112.0	3.0	10.0	Vert	PK	0.0	50.6	74.0	-23.4	High Ch, 1 Mbps, EUT Vert
2483.817	42.6	-2.0	1.32	128.0	3.0	10.0	Vert	PK	0.0	50.6	74.0	-23.4	High Ch, 1 Mbps, EUT Horz
2389.613	42.6	-2.4	1.5	11.0	3.0	10.0	Horz	PK	0.0	50.2	74.0	-23.8	Low Ch, 1 Mbps, EUT Vert

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-09-13
Customer:	IrriGreen, Inc.	Temperature:	21.1°C
Attendees:	None	Relative Humidity:	47.7%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	110VAC/60Hz	Configuration:	IRRI0024-10

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	196	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

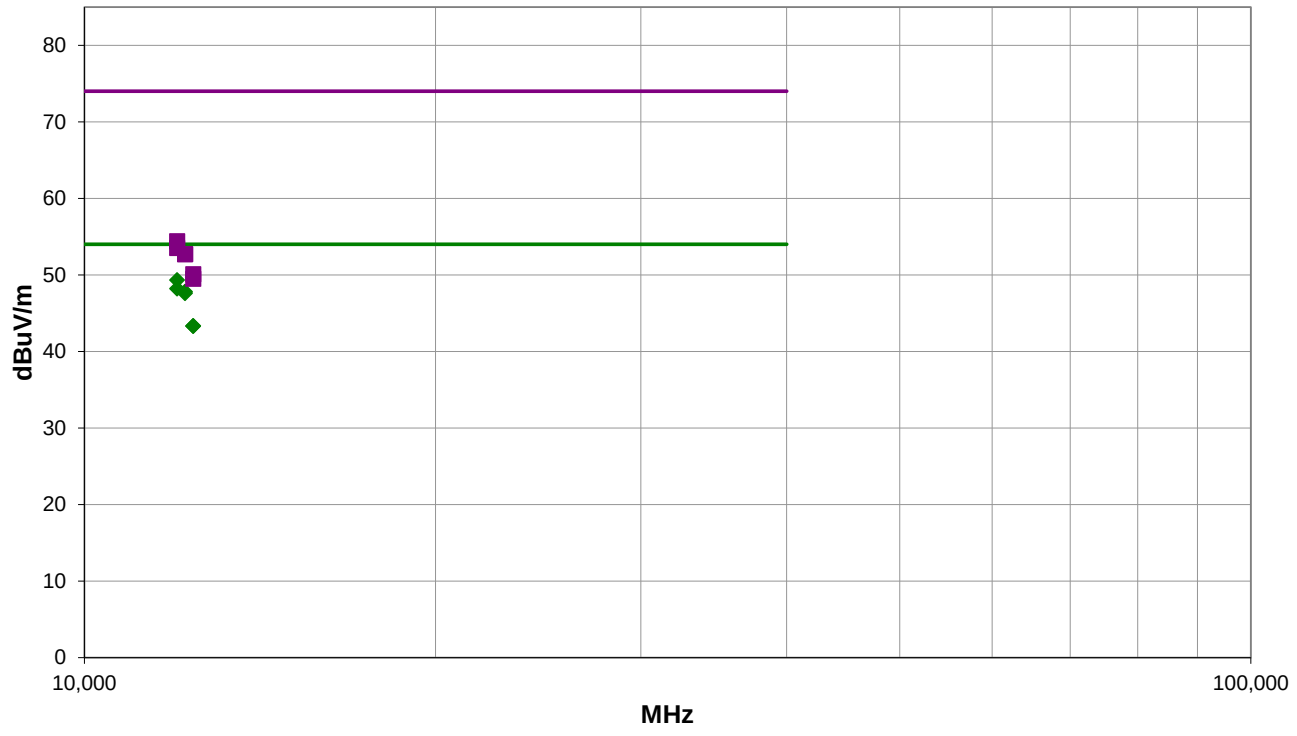
Spot-checking worst-case emission

EUT OPERATING MODES

Transmitting BLE, Low Ch. 2402 MHz, Mid Ch. 2440 MHz, High Ch. 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 196 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #196

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
12008.980	48.7	0.6	1.06	297.0	3.0	0.0	Vert	AV	0.0	49.3	54.0	-4.7	Low Ch, 1 Mbps, EUT on Side
12008.990	47.6	0.6	1.5	306.0	3.0	0.0	Horz	AV	0.0	48.2	54.0	-5.8	Low Ch, 1 Mbps, EUT Vert
12198.990	47.0	0.8	1.08	280.0	3.0	0.0	Vert	AV	0.0	47.8	54.0	-6.2	Mid Ch, 1 Mbps, EUT on Side
12198.990	46.8	0.8	1.47	309.0	3.0	0.0	Horz	AV	0.0	47.6	54.0	-6.4	Mid Ch, 1 Mbps, EUT Vert
12398.960	42.0	1.3	1.01	282.0	3.0	0.0	Vert	AV	0.0	43.3	54.0	-10.7	High Ch, 1 Mbps, EUT on Side
12399.000	42.0	1.3	1.5	312.0	3.0	0.0	Horz	AV	0.0	43.3	54.0	-10.7	High Ch, 1 Mbps, EUT Vert
12011.230	53.8	0.6	1.06	297.0	3.0	0.0	Vert	PK	0.0	54.4	74.0	-19.6	Low Ch, 1 Mbps, EUT on Side
12011.400	52.9	0.6	1.5	306.0	3.0	0.0	Horz	PK	0.0	53.5	74.0	-20.5	Low Ch, 1 Mbps, EUT Vert
12201.400	51.9	0.8	1.08	280.0	3.0	0.0	Vert	PK	0.0	52.7	74.0	-21.3	Mid Ch, 1 Mbps, EUT on Side
12201.530	51.9	0.8	1.47	309.0	3.0	0.0	Horz	PK	0.0	52.7	74.0	-21.3	Mid Ch, 1 Mbps, EUT Vert
12398.830	48.8	1.3	1.5	312.0	3.0	0.0	Horz	PK	0.0	50.1	74.0	-23.9	High Ch, 1 Mbps, EUT Vert
12398.800	48.2	1.3	1.01	282.0	3.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	High Ch, 1 Mbps, EUT on Side

CONCLUSION

Pass

Tested By

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

EUT:	Controller 3, Model 705101	Work Order:	IRRI0024
Serial Number:	1C:63:49:9D:0B:20	Date:	2024-09-13
Customer:	IrriGreen, Inc.	Temperature:	21.1°C
Attendees:	None	Relative Humidity:	47.7%
Customer Project:	None	Bar. Pressure (PMSL):	1016 mb
Tested By:	Jeff Alcoke	Job Site:	EV01
Power:	110VAC/60Hz	Configuration:	IRRI0024-10

TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013

TEST PARAMETERS

Run #:	197	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)

COMMENTS

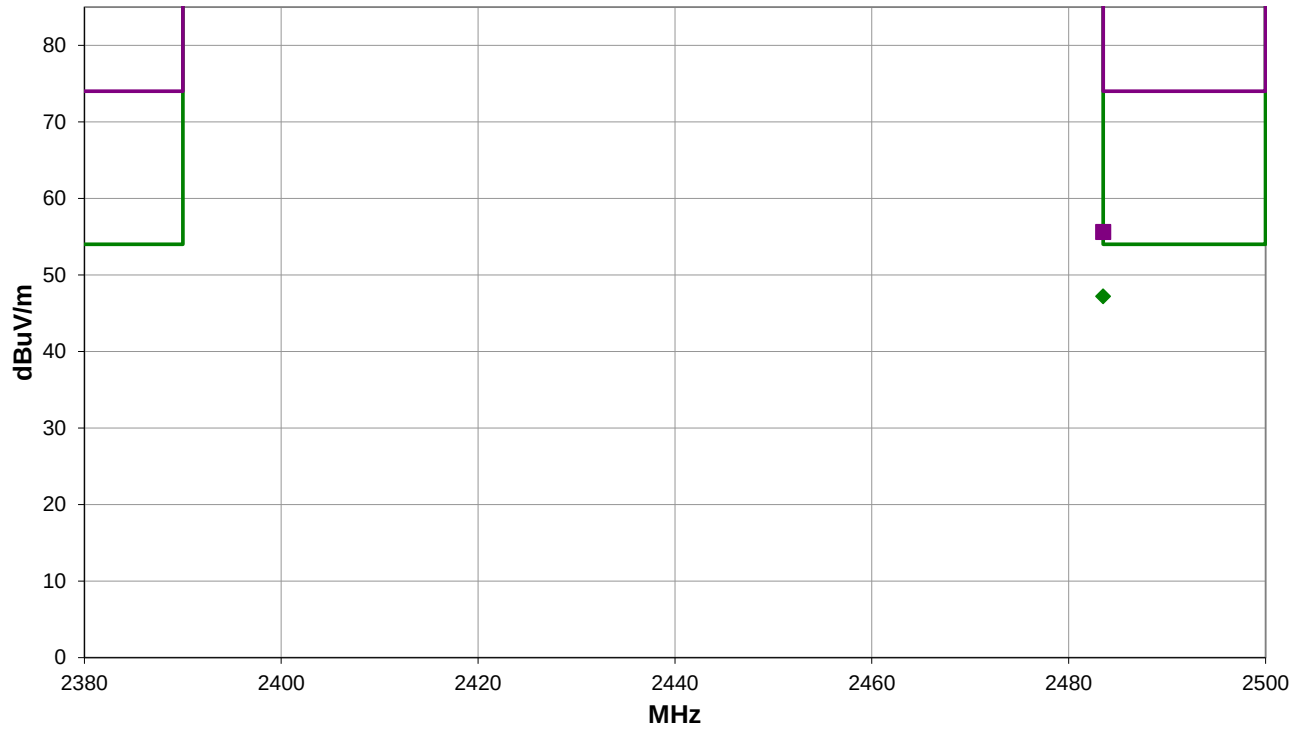
Spot-checking worst-case emission

EUT OPERATING MODES

Transmitting BLE, Low Ch. 2402 MHz, Mid Ch. 2440 MHz, High Ch. 2480 MHz

DEVIATIONS FROM TEST STANDARD

None



Run #: 197 ■ PK ◆ AV ● QP

SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

RESULTS - Run #197

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Test Distance (meters)	External Attenuation (dB)	Polarity/ Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.507	39.2	-2.0	1.5	79.0	3.0	10.0	Vert	AV	0.0	47.2	54.0	-6.8	High Ch, 2 Mbps, EUT on Side
2483.500	47.6	-2.0	1.5	79.0	3.0	10.0	Vert	PK	0.0	55.6	74.0	-18.4	High Ch, 2 Mbps, EUT on Side

CONCLUSION

Pass

Tested By

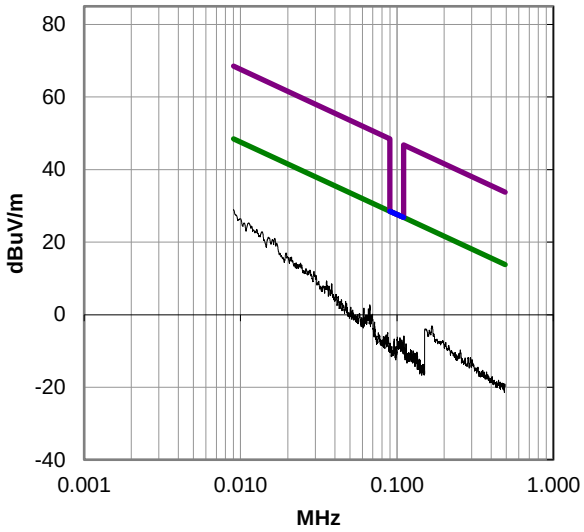
SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

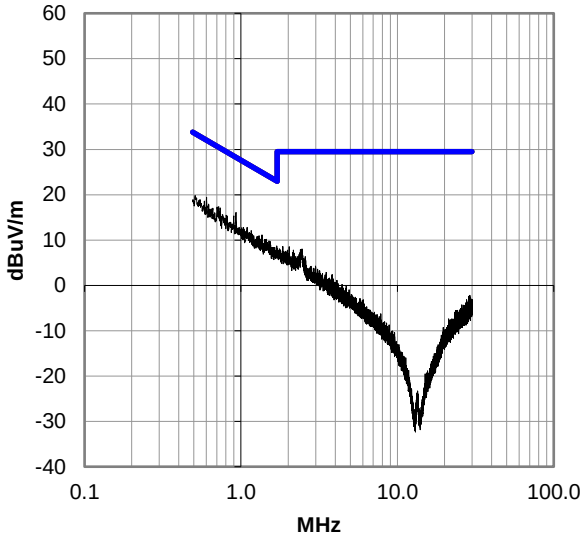
PRESCAN DATA

Radiated spurious emissions from the EUT are initially reviewed with Pre-scans (Preview scans). Pre-scans are performed, with the EUT transmitting on the lowest applicable data rate, for both vertical and horizontal polarizations. The Pre-scan plots below are shown with a peak detector and RBW for the following frequency ranges: 9 kHz RBW (< 30 MHz); 120 kHz RBW (30 - 1000 MHz); 1 MHz RBW (> 1 GHz). In the case where unintentional emissions are observed, an ambient or idle pre-scan with the radio off, will be shown for comparison.

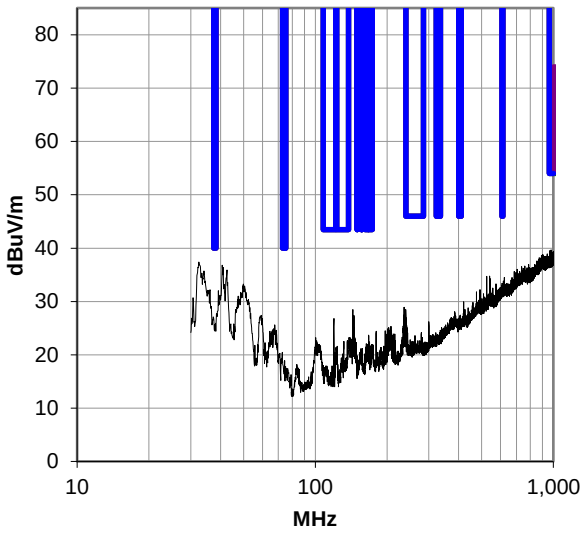
0.009-0.49 MHz, Run 54



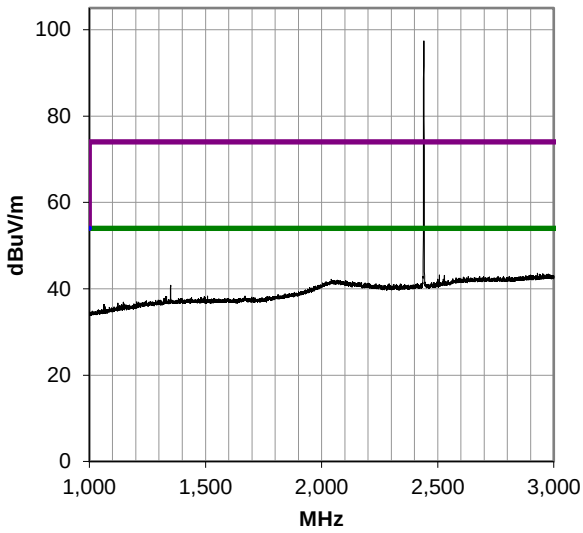
0.49-30 MHz, Run 53



30-1000 MHz, Run 58



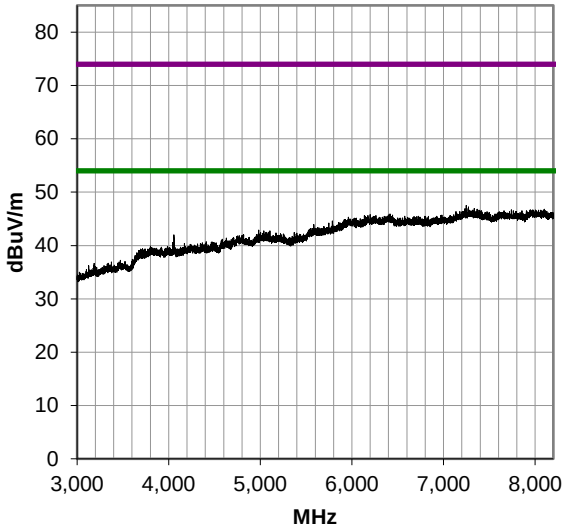
1000-3000 MHz, Run 64



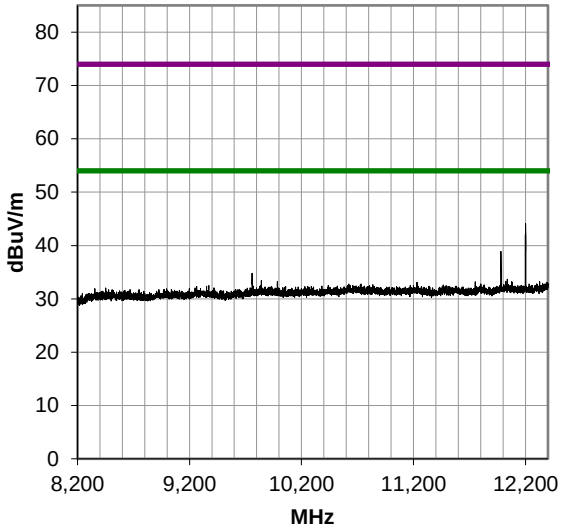
SPURIOUS RADIATED EMISSIONS

element
WTD.2024.01.16.0
EmiR5 2023.08.29.0
PSA-ESCI 2023.12.23.0

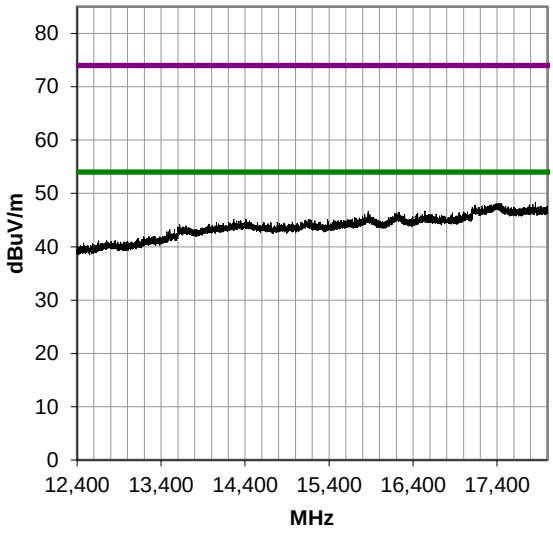
3000-8200 MHz, Run 65



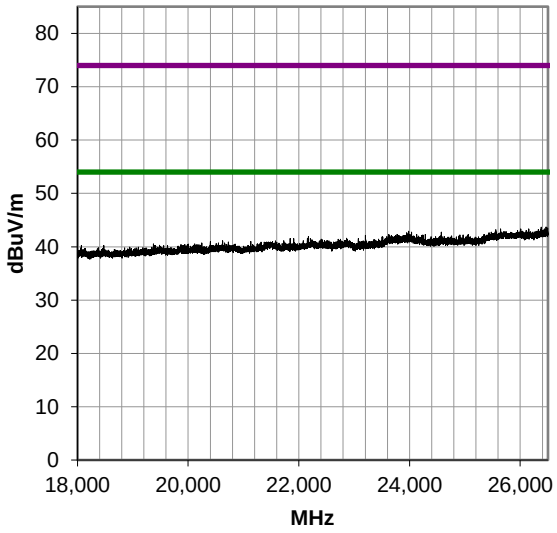
8200-12400 MHz, Run 66



12400-18000 MHz, Run 67



18000-26500 MHz, Run 33



End of Test Report