



# element

**Glowforge Incorporated**

**GFD-100**

**FCC 15.247:2024, RSS-247 Issue 3:2023  
RSS-Gen Issue 5:2018+A1:2019+A2:2021**

**Bluetooth FHSS radio**

**Report: GLOW0052.1 Rev. 0, Issue Date: February 8, 2024**



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# CERTIFICATE OF TEST

**Last Date of Test: January 25, 2024**  
**Glowforge Incorporated**  
**EUT: GFD-100**

## Radio Equipment Testing

### Standards

Specification	Method
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

### Guidance

FCC KDB 558074 v05r02:2019
Notice 2021 - CEB0001

### Results

Test Description	Result	Specification Section(s)	Method Section(s)	Comments
Powerline Conducted Emissions	N/A	15.207	6.2	Not required to show compliance of the module in the host.
Spurious Radiated Emissions - Spot Checks	Pass	15.247(d)	6.5, 6.6	The testing is limited to the frequency ranges most likely to cause the highest emissions.
Duty Cycle	N/A	15.247	7.5	Not required to show compliance of the module in the host.
Carrier Frequency Separation	N/A	15.247(a)(1)	7.8.2	Not required to show compliance of the module in the host.
Number of Hopping Frequencies	N/A	15.247(a)(1)(iii)	7.8.3	Not required to show compliance of the module in the host.
Dwell Time	N/A	15.247(a)(1)(iii)	7.8.4	Not required to show compliance of the module in the host.
Output Power	Pass	15.247(b)(1)	7.8.5	
Equivalent Isotropic Radiated Power	N/A	15.247(b)(1)	7.8.5	Not required to show compliance of the module in the host.
Band Edge Compliance	N/A	15.247(d)	7.8.6	Not required to show compliance of the module in the host.
Band Edge Compliance - Hopping Mode	N/A	15.247(d)	7.8.6	Not required to show compliance of the module in the host.
Emissions Bandwidth (20 dB)	N/A	15.247(a)(1)	7.8.7	Not required to show compliance of the module in the host.
Spurious Conducted Emissions	N/A	15.247(d)	7.8.8	Not required to show compliance of the module in the host.

### Deviations From Test Standards

None

*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.*

# CERTIFICATE OF TEST



## Approved By:

Cole Ghizzone, Operations Manager

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# REVISION HISTORY



Revision Number	Description	Date (yyyy-mm-dd)	Page Number
00	None		

# ACCREDITATIONS AND AUTHORIZATIONS



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## United States

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

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

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## Canada

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

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## European Union

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

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## United Kingdom

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

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## Australia/New Zealand

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

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## Korea

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

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## Japan

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

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## Taiwan

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

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

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## Singapore

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

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## Israel

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

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## Hong Kong

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

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## Vietnam

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

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## SCOPE

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

[California](#)

[Minnesota](#)

[Oregon](#)

[Texas](#)

[Washington](#)

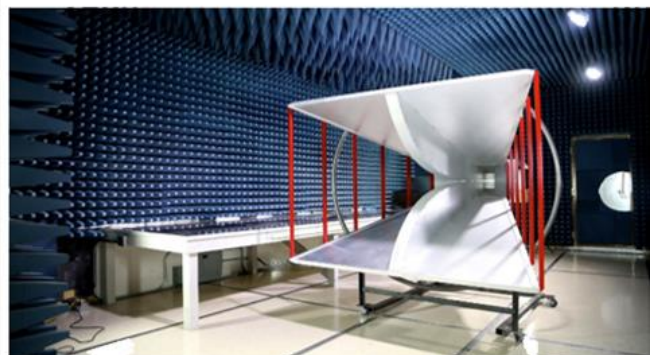
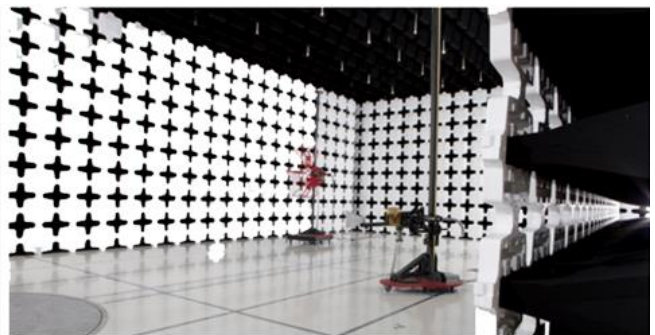
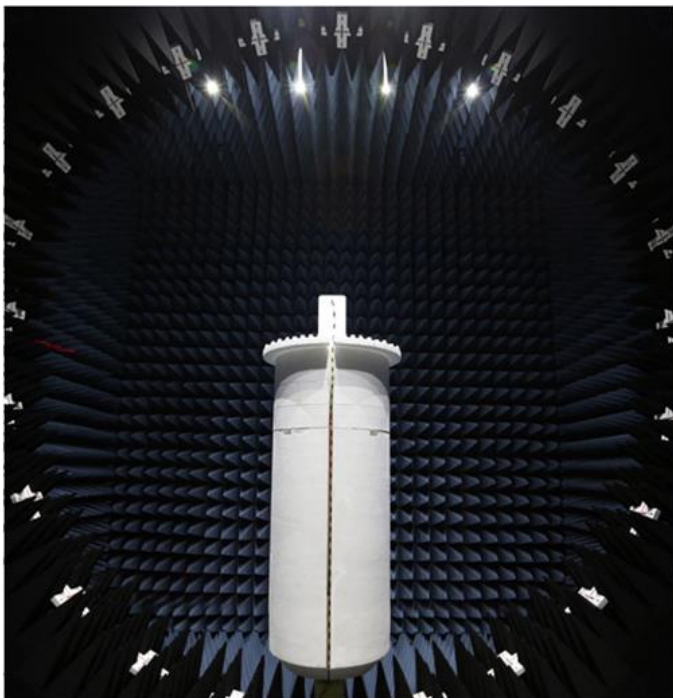
# FACILITIES

Testing was performed at the following location(s)

Location	Labs <sup>(1)</sup>	Address	A2LA <sup>(2)</sup>	ISED <sup>(3)</sup>	BSMI <sup>(4)</sup>	VCCI <sup>(5)</sup>	CAB <sup>(6)</sup>	FDA <sup>(7)</sup>
<input type="checkbox"/> California	OC01-17	41 Tesla Irvine, CA 92618 (949) 861-8918	3310.04	2834B	SL2-IN-E-1154R	A-0029	US0158	TL-55
<input type="checkbox"/> 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
<input type="checkbox"/> 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
<input type="checkbox"/> Texas	TX01-09	3801 E Plano Pkwy Plano, TX 75074 (469) 304-5255	3310.03	2834G	SL2-IN-E-1158R	A-0201	US0191	TL-54
<input checked="" type="checkbox"/> 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
<input type="checkbox"/> 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



## Measurement Uncertainty

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

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

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

<b>Test</b>	<b>+ MU</b>	<b>- MU</b>
Frequency Accuracy	0.0007%	-0.0007%
Amplitude Accuracy (dB)	1.2 dB	-1.2 dB
Conducted Power (dB)	1.2 dB	-1.2 dB
Radiated Power via Substitution (dB)	0.7 dB	-0.7 dB
Temperature (degrees C)	0.7°C	-0.7°C
Humidity (% RH)	2.5% RH	-2.5% RH
Voltage (AC)	1.0%	-1.0%
Voltage (DC)	0.7%	-0.7%
Field Strength (dB)	5.2 dB	-5.2 dB
AC Powerline Conducted Emissions (dB)	3.1 dB	-3.1 dB



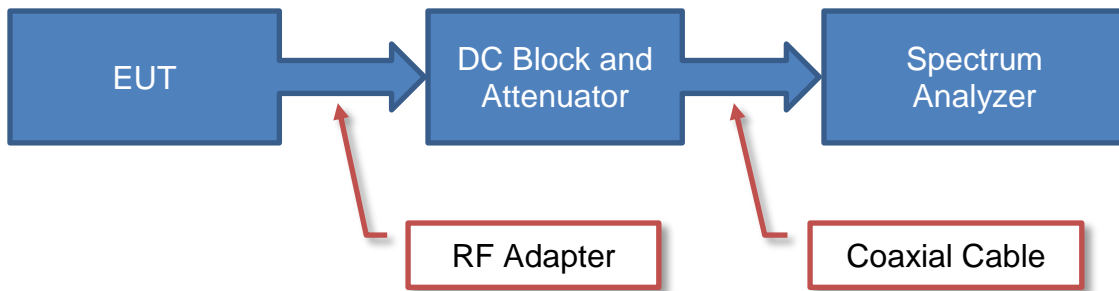
# TEST SETUP BLOCK DIAGRAMS

## Measurement Bandwidths

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

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

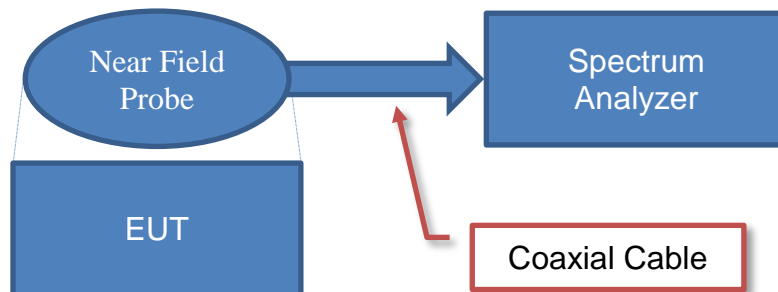
## Antenna Port Conducted Measurements



### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$

## Near Field Test Fixture Measurements

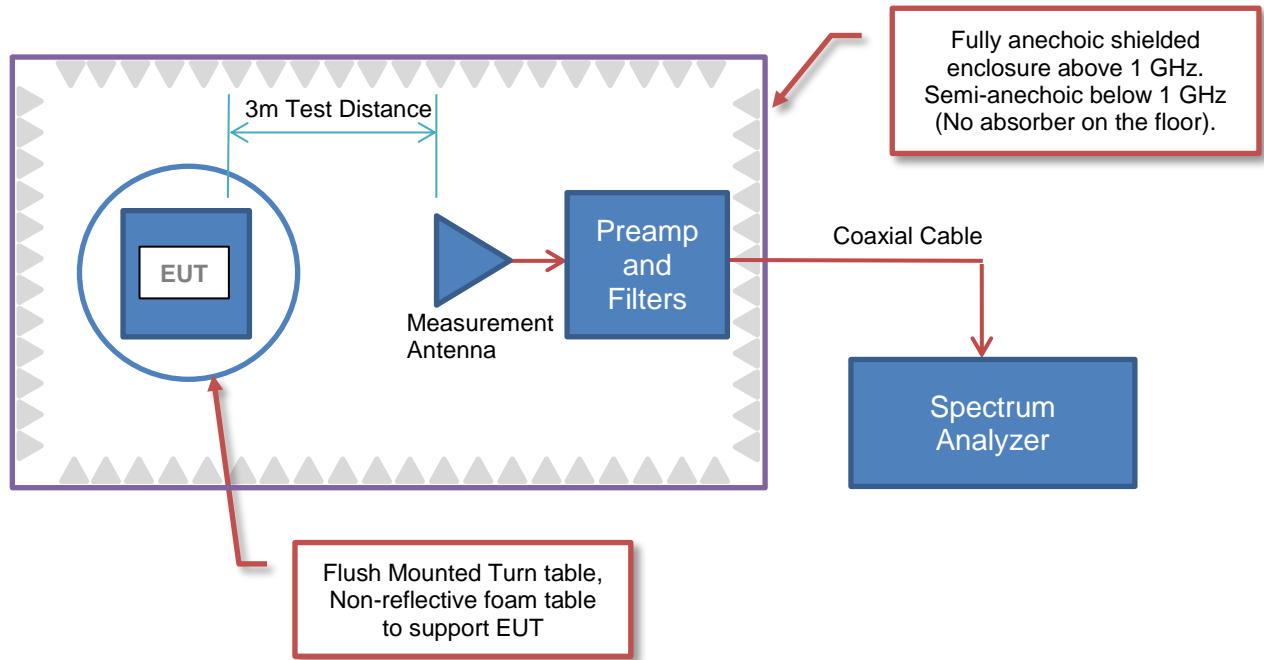


### Sample Calculation (logarithmic units)

$$\begin{array}{r}
 \text{Measured Value} \\
 71.2
 \end{array}
 =
 \begin{array}{r}
 \text{Measured Level} \\
 42.6
 \end{array}
 +
 \begin{array}{r}
 \text{Reference Level Offset} \\
 28.6
 \end{array}$$

# TEST SETUP BLOCK DIAGRAMS

## Emissions Measurements



### Sample Calculation (logarithmic units)

#### Radiated Emissions:

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

#### Conducted Emissions:

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

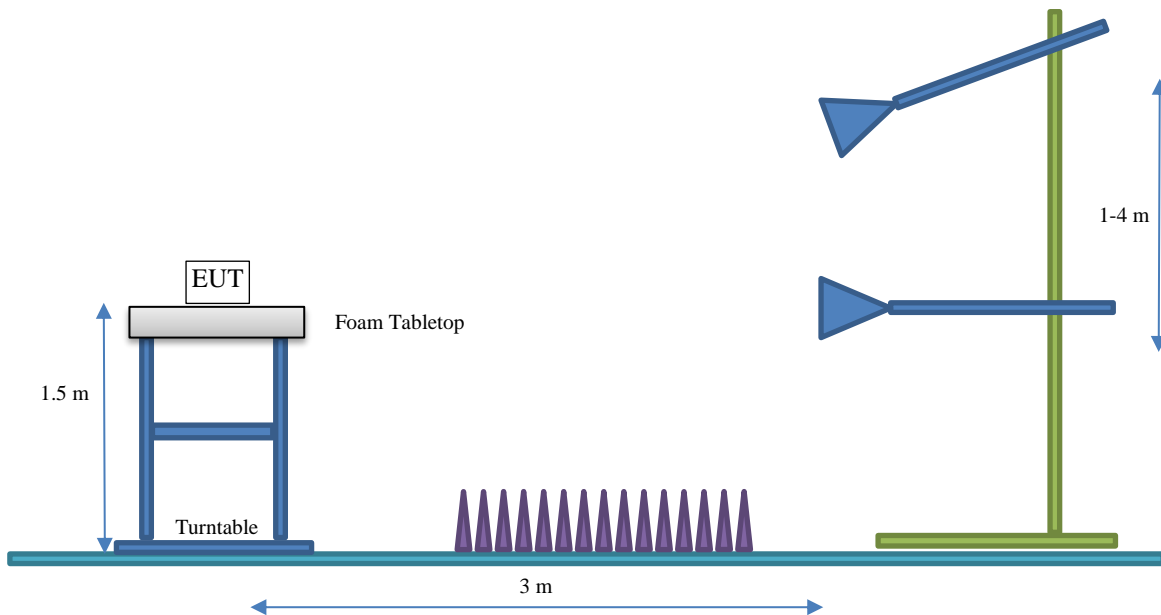
#### Radiated Power (ERP/EIRP) – Substitution Method:

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

<b>Company Name:</b>	Glowforge Incorporated
<b>Address:</b>	1938 Occidental Avenue S Suite C
<b>City, State, Zip:</b>	Seattle, WA 98134
<b>Test Requested By:</b>	Nick Woolger
<b>EUT:</b>	GFD-100
<b>First Date of Test:</b>	January 24, 2024
<b>Last Date of Test:</b>	January 25, 2024
<b>Receipt Date of Samples:</b>	January 24, 2024
<b>Equipment Design Stage:</b>	Production
<b>Equipment Condition:</b>	No Damage
<b>Purchase Authorization:</b>	Verified

## Information Provided by the Party Requesting the Test

### Functional Description of the EUT:

Craft laser cutter and engraver

### Testing Objective:

To demonstrate compliance of the module in the host per KDB 996369 for 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)
PIFA	ProAnt	2400 – 2500	4.9

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

- Test software settings      Test software/firmware installed on EUT: 1.0.1-219
- Rated power settings

## SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Data Rate	Channel	Position	Frequency (MHz)	Power Setting
BLE	1 Mbps	0	Low Channel	2402	34
		20	Mid Channel	2442	34
		39	High Channel	2480	34

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 Rated power settings

## SETTINGS FOR ALL TESTS IN THIS REPORT

Modulation Types	Type	Channel	Position	Frequency (MHz)	Power Setting
DH5 GFSK	FHSS	0 or 1	Low Channel	2402	34
		39	Mid Channel	2440 or 2441	34
		78 or 79	High Channel	2480	34
2DH5 pi/4-DQPSK	FHSS	0 or 1	Low Channel	2402	34
		39	Mid Channel	2440 or 2441	34
		78 or 79	High Channel	2480	34
3DH5 8-DPSK	FHSS	0 or 1	Low Channel	2402	34
		39	Mid Channel	2440 or 2441	34
		78 or 79	High Channel	2480	34

# CONFIGURATIONS



## Configuration GLOW0052-1

Software/Firmware Running During Test	
Description	Version
Firmware provided by manufacturer	v1.0.1-219

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Laser Printer	Glowforge, Inc.	GFD-100	D4D-T28

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	None	2 m	None	EUT	AC Mains

## Configuration GLOW0052-2

Software/Firmware Running During Test	
Description	Version
Firmware provided by manufacturer	v1.0.1-219

EUT			
Description	Manufacturer	Model/Part Number	Serial Number
Laser Printer	Glowforge, Inc.	GFD-100	XB2-839

Cables					
Cable Type	Shield	Length (m)	Ferrite	Connection 1	Connection 2
AC Power	None	2 m	None	EUT	AC Mains

# MODIFICATIONS



## Equipment Modifications

Item	Date	Test	Modification	Note	Disposition of EUT
1	2024-01-24	Spurious Radiated Emissions - Spot Checks	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	2024-01-25	Output Power	Tested as delivered to test Station.	No EMI suppression devices were added or modified during this test.	Scheduled testing was completed.



# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## 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 (in no-hop, single channel mode) and the modes as showed in the data sheets.

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

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

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

- QP = Quasi-Peak Detector
- PK = Peak Detector
- AV = RMS Detector

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

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

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of  $10 \cdot \log(1/dc)$ .

RMS measurements taken for a FHSS radio also may have a duty cycle correction subtracted using the formula  $10 \cdot \log(DC)$ , where DC is the worst-case dwell time of the radio while in a hopping mode in a 100 ms period.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	EMCO	3115	AHM	2022-07-13	2024-07-13
Cable	Northwest EMC	3115 Horn Cable	NC2	2023-04-25	2024-04-25
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	2023-04-25	2024-04-25
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2023-08-29	2024-08-29
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	NCR
Cable	High Speed Interconnects	EW292A-NGNG-300	NC3	2023-09-01	2024-09-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	2023-08-09	2024-08-09
Antenna - Standard Gain	EMCO	3160-08	AHO	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	2023-08-09	2024-08-09
Filter - High Pass	Micro-Tronics	HPM50111	HHI	2023-10-09	2024-10-09
Attenuator	Fairview Microwave	SA18E-20	AQV	2023-07-31	2024-07-31

## MEASUREMENT UNCERTAINTY

Description	Value	Value
Expanded k=2	5.2 dB	-5.2 dB

## FREQUENCY RANGE INVESTIGATED

1 GHz TO 18 GHz
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# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## POWER INVESTIGATED

120VAC/60Hz

## CONFIGURATIONS INVESTIGATED

GLOW0052-1

## MODES INVESTIGATED

Transmitting BT EDR. Low Channel 0 = 2402 MHz, Middle Channel 39 = 2441 MHz, High Channel 78 = 2480 MHz,  
Power setting = 34

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	D4D-T28	Date:	2024-01-24
Customer:	Glowforge Incorporated	Temperature:	21.3°C
Attendees:	Nathan Hills	Relative Humidity:	40.8%
Customer Project:	None	Bar. Pressure (PMSL):	1005 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	120VAC/60Hz	Configuration:	GLOW0052-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	13	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

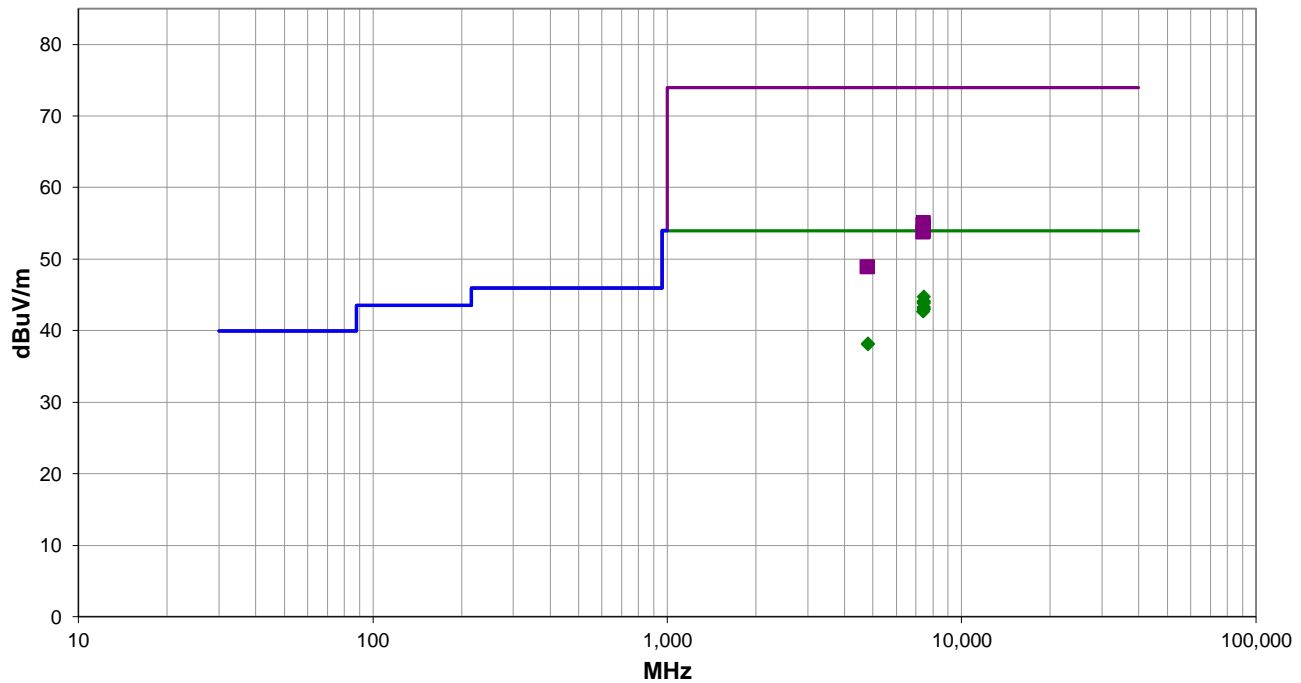
The test mode operates at 93% duty cycle (DC), an upward duty cycle correction factor (DDCF) of  $10 \cdot \log(1/0.93) = .31$  dB was applied to average measurements. See data comments below for EUT orientation, data rates, and channel.

## EUT OPERATING MODES

Transmitting BT EDR. Low Channel 0 = 2402 MHz, Middle Channel 39 = 2441 MHz, High Channel 78 = 2480 MHz, Power setting = 34

## DEVIATIONS FROM TEST STANDARD

None



Run #: 13

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## RESULTS - Run #13

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor (dB)	External Attenuation (dB)	Polarity/Transducer Type	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7440.033	29.0	15.4	1.5	158.0	0.3	0.0	Vert	AV	0.0	44.7	54.0	-9.3	Ch. 78, EUT Horizontal, DH5
7440.033	28.4	15.4	1.5	158.0	0.3	0.0	Vert	AV	0.0	44.1	54.0	-9.9	Ch. 78, EUT Horizontal, 3DH5
7440.133	28.3	15.4	1.5	158.0	0.3	0.0	Vert	AV	0.0	44.0	54.0	-10.0	Ch. 78, EUT Horizontal, 2DH5
7440.108	28.1	15.4	1.5	309.0	0.3	0.0	Vert	AV	0.0	43.8	54.0	-10.2	Ch. 78, EUT side facing down, DH5
7439.992	27.7	15.3	1.5	35.0	0.3	0.0	Vert	AV	0.0	43.3	54.0	-10.7	Ch. 78, EUT front facing down, DH5
7440.025	27.4	15.4	1.5	31.0	0.3	0.0	Horz	AV	0.0	43.1	54.0	-10.9	Ch. 78, EUT side facing down, DH5
7440.175	27.2	15.4	1.5	140.0	0.3	0.0	Horz	AV	0.0	42.9	54.0	-11.1	Ch. 78, EUT front facing down, DH5
7439.583	27.0	15.3	1.5	172.0	0.3	0.0	Horz	AV	0.0	42.6	54.0	-11.4	Ch. 78, EUT Horizontal, DH5
4806.458	27.9	10.0	1.5	181.0	0.3	0.0	Horz	AV	0.0	38.2	54.0	-15.8	Ch. 0, EUT Horizontal, DH5
4806.208	27.8	10.0	1.5	314.0	0.3	0.0	Vert	AV	0.0	38.1	54.0	-15.9	Ch. 0, EUT Horizontal, DH5
7440.500	39.6	15.4	1.5	158.0	0.0	0.0	Vert	PK	0.0	55.0	74.0	-19.0	Ch. 78, EUT Horizontal, 3DH5
7439.725	39.5	15.3	1.5	158.0	0.0	0.0	Vert	PK	0.0	54.8	74.0	-19.2	Ch. 78, EUT Horizontal, DH5
7439.983	39.4	15.3	1.5	158.0	0.0	0.0	Vert	PK	0.0	54.7	74.0	-19.3	Ch. 78, EUT Horizontal, 2DH5
7442.267	38.7	15.4	1.5	172.0	0.0	0.0	Horz	PK	0.0	54.1	74.0	-19.9	Ch. 78, EUT Horizontal, DH5
7442.317	38.6	15.4	1.5	31.0	0.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	Ch. 78, EUT side facing down, DH5
7439.508	38.5	15.3	1.5	140.0	0.0	0.0	Horz	PK	0.0	53.8	74.0	-20.2	Ch. 78, EUT front facing down, DH5
7441.917	38.4	15.4	1.5	309.0	0.0	0.0	Vert	PK	0.0	53.8	74.0	-20.2	Ch. 78, EUT side facing down, DH5
7439.767	38.4	15.3	1.5	35.0	0.0	0.0	Vert	PK	0.0	53.7	74.0	-20.3	Ch. 78, EUT front facing down, DH5
4806.450	38.8	10.0	1.5	314.0	0.0	0.0	Vert	PK	0.0	48.8	74.0	-25.2	Ch. 0, EUT Horizontal, DH5
4805.075	38.8	10.0	1.5	181.0	0.0	0.0	Horz	PK	0.0	48.8	74.0	-25.2	Ch. 0, EUT Horizontal, DH5

## CONCLUSION

Pass

Tested By

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	D4D-T28	Date:	2024-01-24
Customer:	Glowforge Incorporated	Temperature:	21.3°C
Attendees:	Nathan Hills	Relative Humidity:	40.8%
Customer Project:	None	Bar. Pressure (PMSL):	1005 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	120VAC/60Hz	Configuration:	GLOW0052-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	14	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

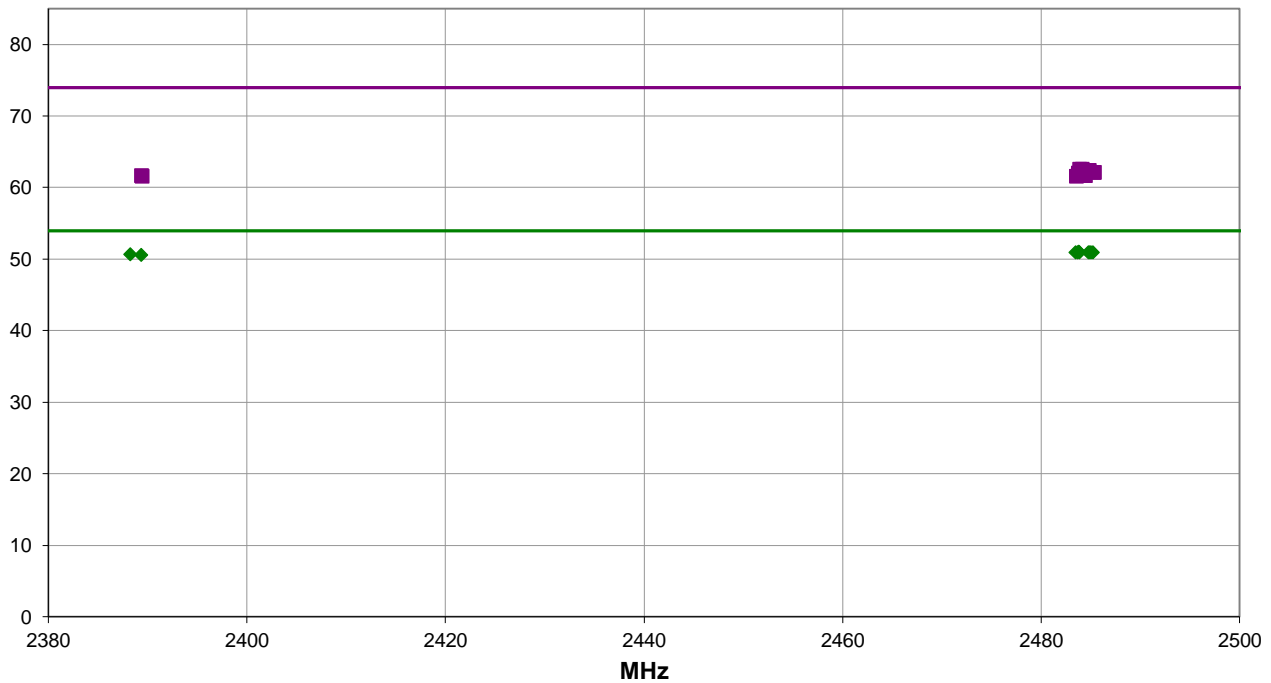
The test mode operates at 93% duty cycle (DC), an upward duty cycle correction factor (DDCF) of  $10 \cdot \log(1/0.93) = .31$  dB was applied to average measurements. See data comments below for EUT orientation, data rates, and channel.

## EUT OPERATING MODES

Transmitting BT EDR. Low Channel 0 = 2402 MHz, Middle Channel 39 = 2441 MHz, High Channel 78 = 2480 MHz, Power setting = 34

## DEVIATIONS FROM TEST STANDARD

None



Run #: 14

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## RESULTS - Run #14

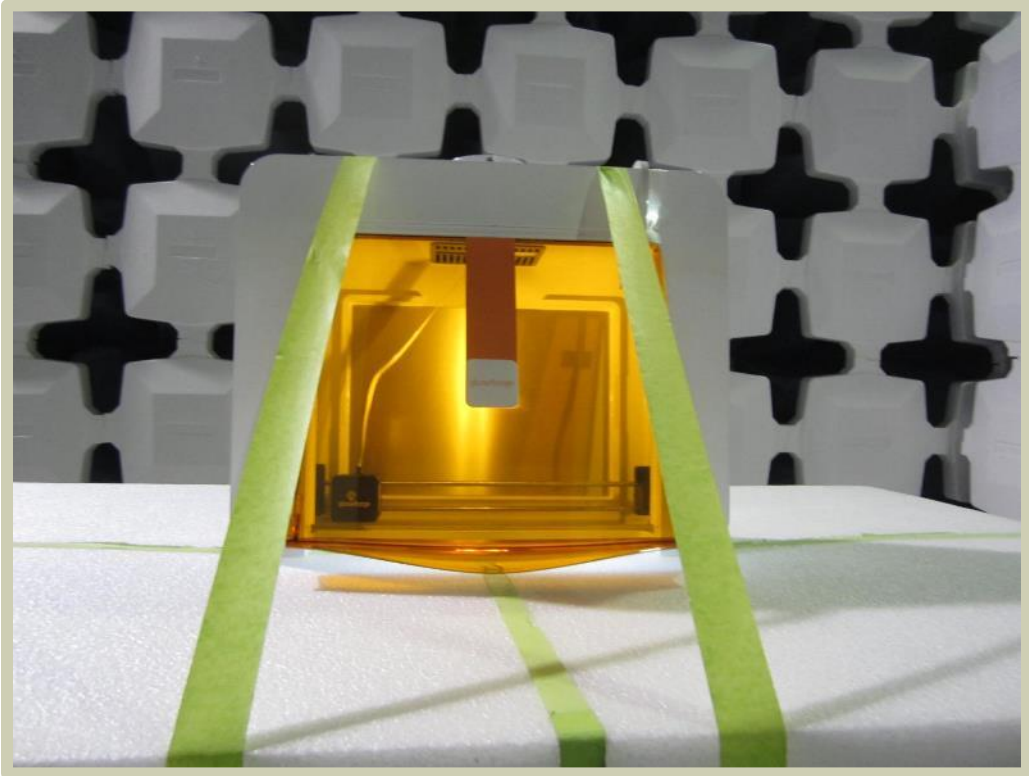
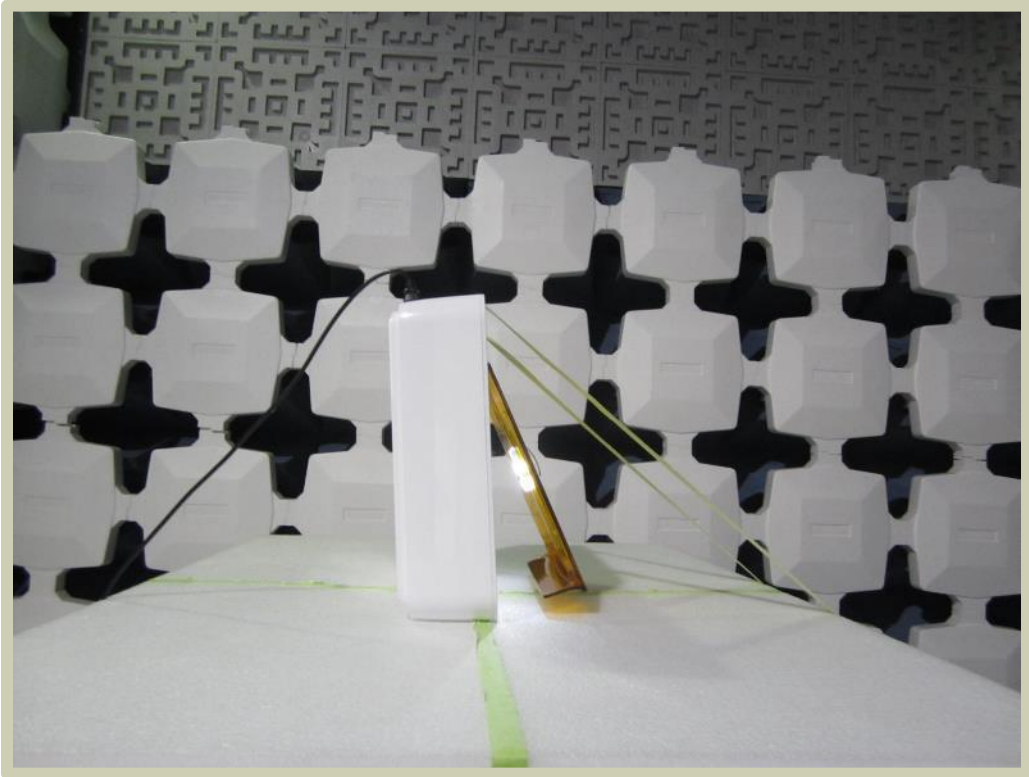
Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2483.793	29.4	1.3	2.2	144.0	0.3	20.0	Horz	AV	0.0	51.0	54.0	-3.0	Ch. 78, EUT Horizontal, 3DH5
2483.513	29.3	1.3	2.2	144.0	0.3	20.0	Horz	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT Horizontal, DH5
2484.950	29.3	1.3	1.5	193.0	0.3	20.0	Vert	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT Horizontal, DH5
2483.863	29.3	1.3	1.0	303.0	0.3	20.0	Horz	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT front facing down, DH5
2485.273	29.3	1.3	1.5	188.0	0.3	20.0	Vert	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT front facing down, DH5
2484.763	29.3	1.3	1.6	211.0	0.3	20.0	Horz	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT side facing down, DH5
2483.680	29.3	1.3	3.6	169.0	0.3	20.0	Vert	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT side facing down, DH5
2485.057	29.3	1.3	2.2	144.0	0.3	20.0	Horz	AV	0.0	50.9	54.0	-3.1	Ch. 78, EUT Horizontal, 2DH5
2388.257	29.2	1.1	3.8	152.0	0.3	20.0	Horz	AV	0.0	50.6	54.0	-3.4	Ch. 0, EUT Horizontal, DH5
2389.357	29.1	1.1	1.5	161.0	0.3	20.0	Vert	AV	0.0	50.5	54.0	-3.5	Ch. 0, EUT Horizontal, DH5
2483.950	41.2	1.3	2.2	144.0	0.0	20.0	Horz	PK	0.0	62.5	74.0	-11.5	Ch. 78, EUT Horizontal, DH5
2484.190	41.2	1.3	2.2	144.0	0.0	20.0	Horz	PK	0.0	62.5	74.0	-11.5	Ch. 78, EUT Horizontal, 2DH5
2484.897	41.0	1.3	1.6	211.0	0.0	20.0	Horz	PK	0.0	62.3	74.0	-11.7	Ch. 78, EUT side facing down, DH5
2485.427	40.7	1.3	1.0	303.0	0.0	20.0	Horz	PK	0.0	62.0	74.0	-12.0	Ch. 78, EUT front facing down, DH5
2485.400	40.7	1.3	3.6	169.0	0.0	20.0	Vert	PK	0.0	62.0	74.0	-12.0	Ch. 78, EUT side facing down, DH5
2483.803	40.6	1.3	2.2	144.0	0.0	20.0	Horz	PK	0.0	61.9	74.0	-12.1	Ch. 78, EUT Horizontal, 3DH5
2484.537	40.3	1.3	1.5	193.0	0.0	20.0	Vert	PK	0.0	61.6	74.0	-12.4	Ch. 78, EUT Horizontal, DH5
2389.423	40.5	1.1	1.5	161.0	0.0	20.0	Vert	PK	0.0	61.6	74.0	-12.4	Ch. 0, EUT Horizontal, DH5
2483.617	40.2	1.3	1.5	188.0	0.0	20.0	Vert	PK	0.0	61.5	74.0	-12.5	Ch. 78, EUT front facing down, DH5
2389.463	40.4	1.1	3.8	152.0	0.0	20.0	Horz	PK	0.0	61.5	74.0	-12.5	Ch. 0, EUT Horizontal, DH5

## CONCLUSION

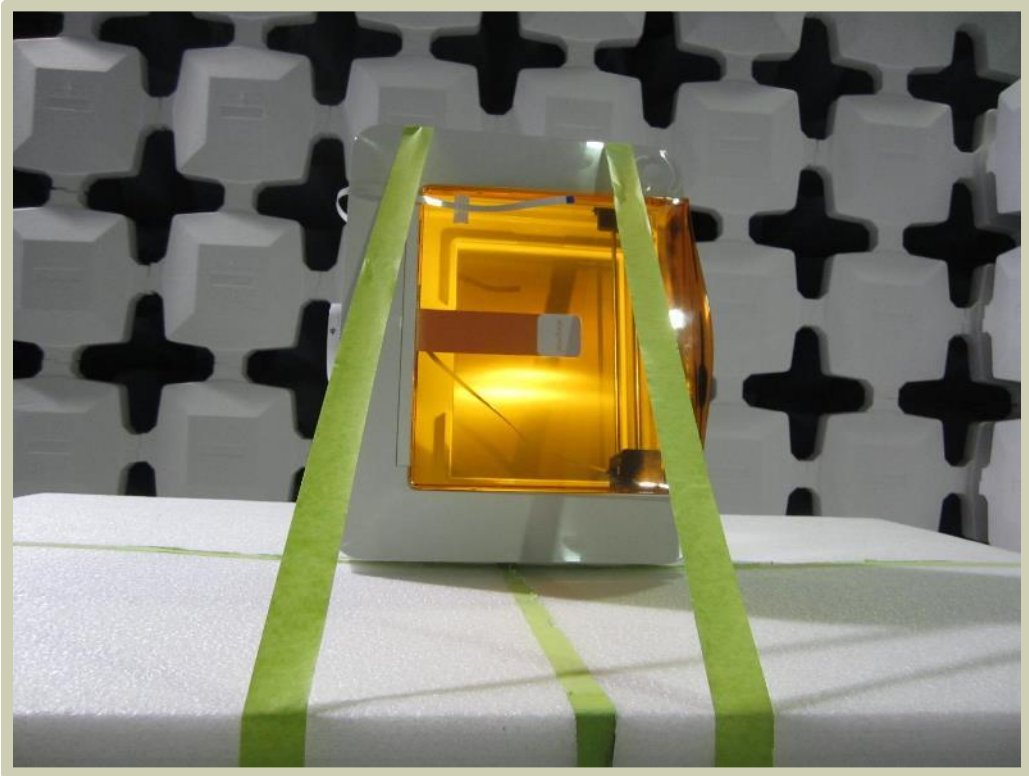
Pass

Tested By

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

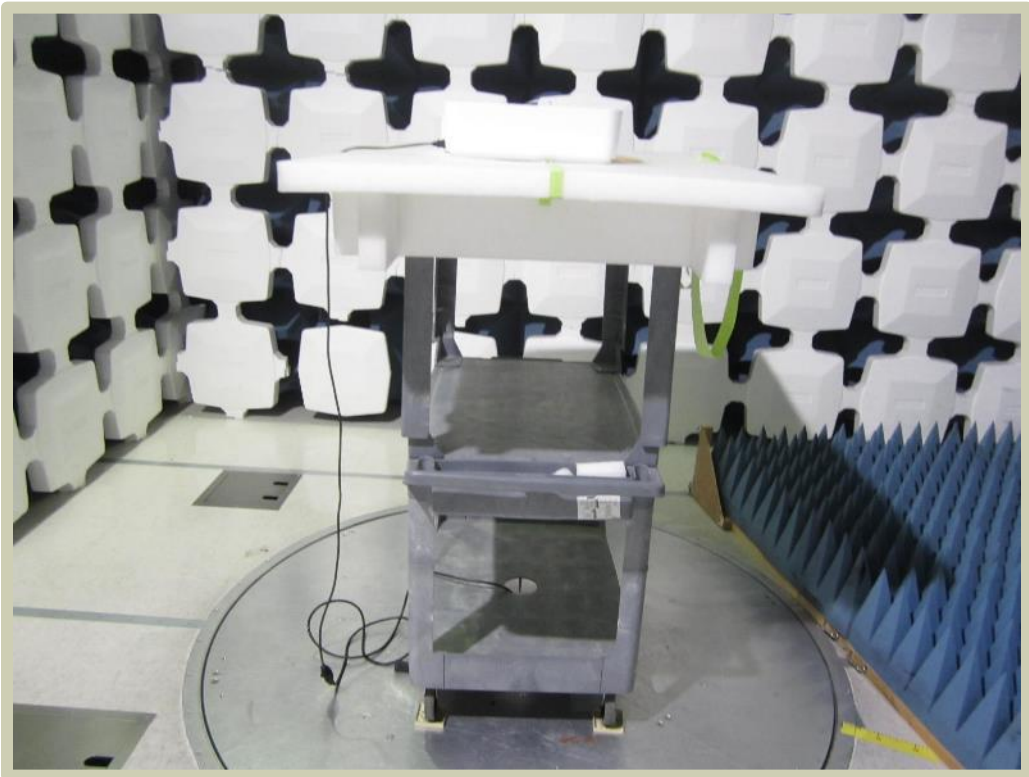


# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

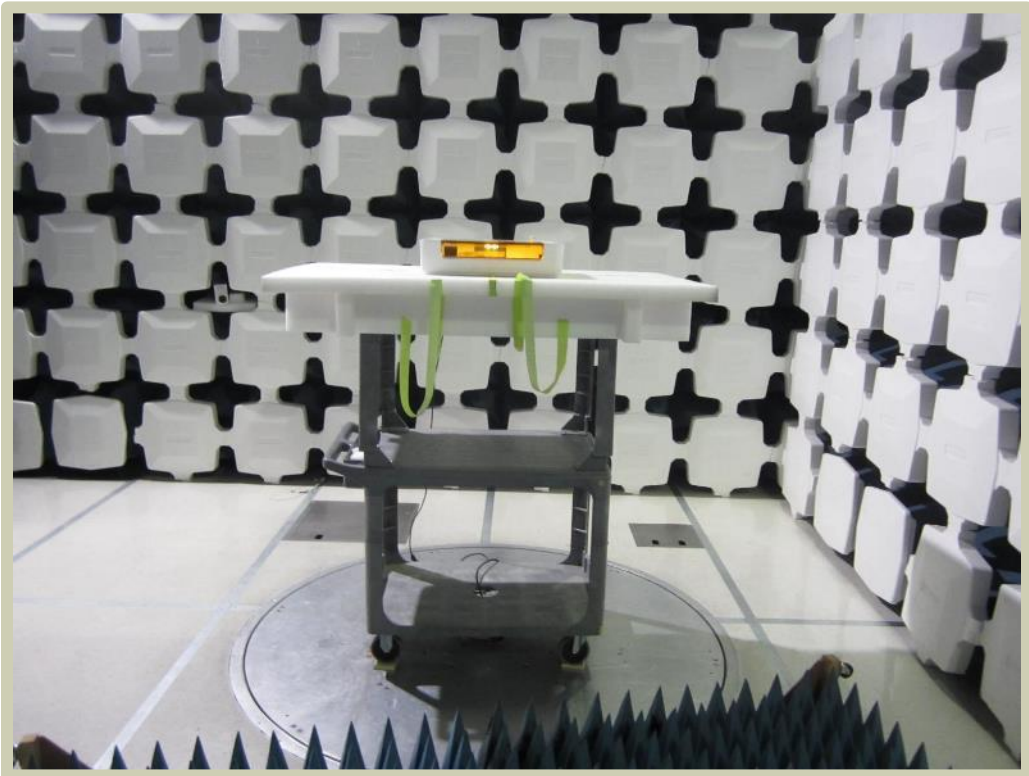
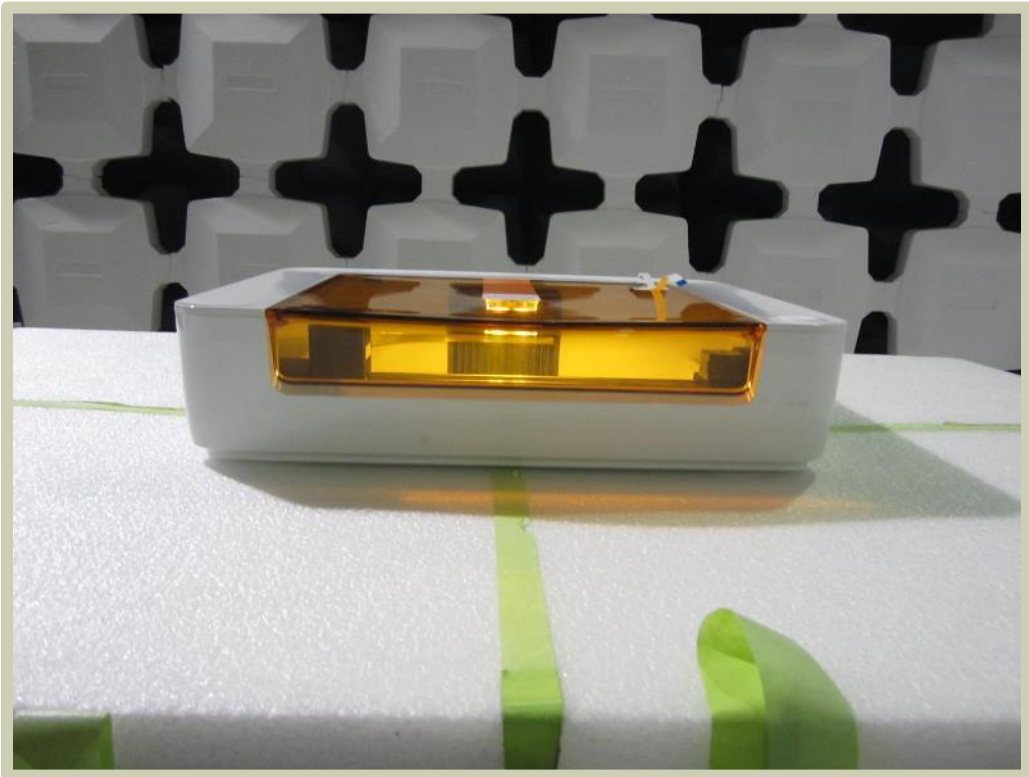




# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## TEST DESCRIPTION

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

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

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

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

- QP = Quasi-Peak Detector
- PK = Peak Detector
- AV = RMS Detector

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

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

Measurements within 2 MHz of the allowable band may have been taken using the integration method from ANSI C63.10 clause 11.13.3. This procedure uses the channel power feature of the spectrum analyzer to integrate the power of the emission within a 1 MHz bandwidth.

Where the radio test software does not provide for a duty cycle at continuous transmit conditions (> 98%) and the RMS (power average) measurements were made across the on and off times of the EUT transmissions, a duty cycle correction is added to the measurements using the formula of  $10 \cdot \log(1/dc)$ .

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Antenna - Double Ridge	EMCO	3115	AHM	2022-07-13	2024-07-13
Cable	Northwest EMC	3115 Horn Cable	NC2	2023-04-25	2024-04-25
Amplifier - Pre-Amplifier	Miteq	AMF-3D-00100800-32-13P	AVZ	2023-04-25	2024-04-25
Analyzer - Spectrum Analyzer	Agilent	N9010A	AFI	2023-08-29	2024-08-29
Antenna - Standard Gain	EMCO	3160-07	AHP	NCR	NCR
Cable	High Speed Interconnects	EW292A-NGNG-300	NC3	2023-09-01	2024-09-01
Amplifier - Pre-Amplifier	Miteq	AMF-6F-08001200-30-10P	AOK	2023-08-09	2024-08-09
Antenna - Standard Gain	EMCO	3160-08	AHO	NCR	NCR
Amplifier - Pre-Amplifier	Miteq	AMF-6F-12001800-30-10P	AOJ	2023-08-09	2024-08-09
Filter - High Pass	Micro-Tronics	HPM50111	HHI	2023-10-09	2024-10-09
Attenuator	Fairview Microwave	SA18E-20	AQV	2023-07-31	2024-07-31

## MEASUREMENT UNCERTAINTY

Description		
Expanded k=2	5.2 dB	-5.2 dB

## FREQUENCY RANGE INVESTIGATED

1 GHz TO 18 GHz

## POWER INVESTIGATED

120VAC/60Hz

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



## CONFIGURATIONS INVESTIGATED

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GLOW0052-1

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## MODES INVESTIGATED

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Transmitting BLE. Low Channel 0 = 2402 MHz, Middle Channel 20 = 2442 MHz, High Channel 39 = 2480 MHz, Power setting = 34

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# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	D4D-T28	Date:	2024-01-24
Customer:	Glowforge Incorporated	Temperature:	21.4°C
Attendees:	Nathan Hills	Relative Humidity:	43.3%
Customer Project:	None	Bar. Pressure (PMSL):	1006 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	120VAC/60Hz	Configuration:	GLOW0052-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	26	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

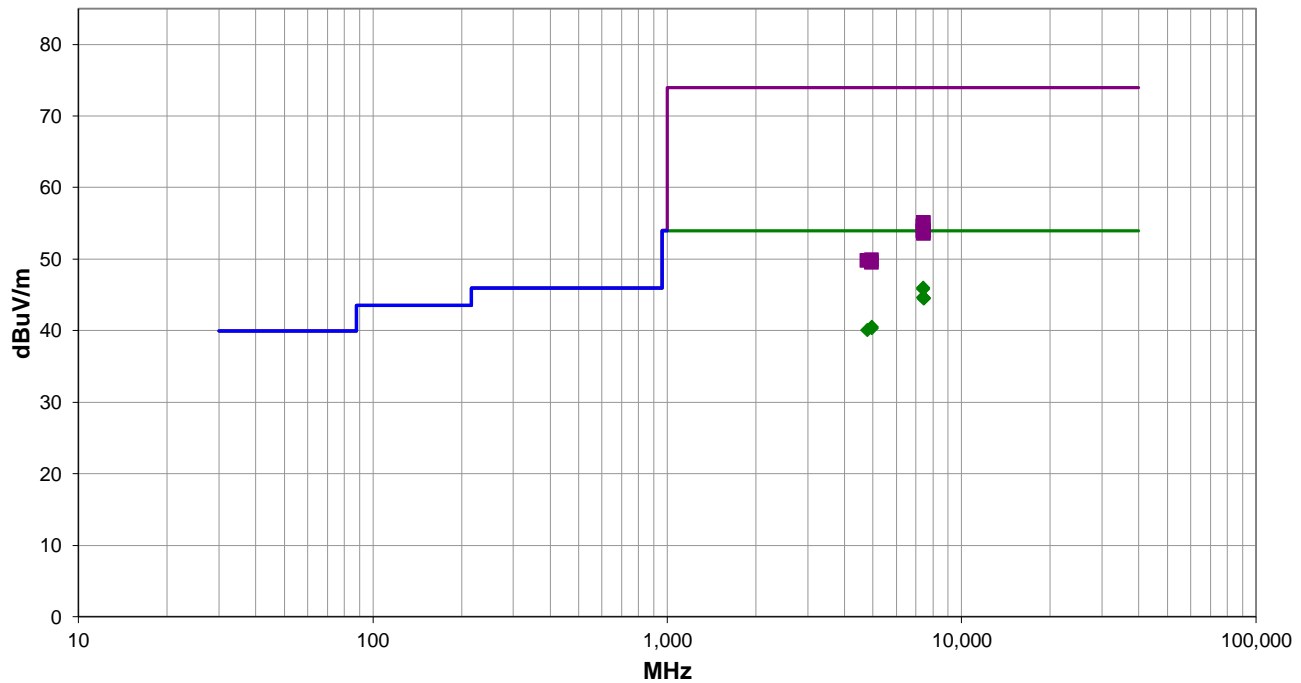
The test mode operates at 62.65% duty cycle (DC), an upward duty cycle correction factor of  $10 \cdot \log(1/0.6265) = 2.03$  dB was applied to the average measurements. See data comments below for EUT orientation, data rates, and channel.

## EUT OPERATING MODES

Transmitting BLE. Low Channel 0 = 2402 MHz, Middle Channel 20 = 2442 MHz, High Channel 39 = 2480 MHz, Power setting = 34

## DEVIATIONS FROM TEST STANDARD

None



Run #: 26

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

## RESULTS - Run #26

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
7439.633	28.6	15.3	2.6	194.0	2.0	0.0	Vert	AV	0.0	45.9	54.0	-8.1	Ch. 39, EUT Horizontal, 1 Mbps
7439.600	28.5	15.3	3.8	111.0	2.0	0.0	Vert	AV	0.0	45.8	54.0	-8.2	Ch. 39, EUT front on table, 1 Mbps
7439.510	27.3	15.3	1.5	255.0	2.0	0.0	Horz	AV	0.0	44.6	54.0	-9.4	Ch. 39, EUT on side, 1 Mbps
7440.627	27.1	15.4	1.0	340.0	2.0	0.0	Vert	AV	0.0	44.5	54.0	-9.5	Ch. 39, EUT on side, 1 Mbps
7440.667	27.1	15.4	1.5	294.0	2.0	0.0	Horz	AV	0.0	44.5	54.0	-9.5	Ch. 39, EUT Horizontal, 1 Mbps
7440.787	27.0	15.4	1.5	176.0	2.0	0.0	Horz	AV	0.0	44.4	54.0	-9.6	Ch. 39, EUT front on table, 1 Mbps
4959.887	28.3	10.2	1.5	161.0	2.0	0.0	Vert	AV	0.0	40.5	54.0	-13.5	Ch. 39, EUT Horizontal, 1 Mbps
4960.483	28.1	10.2	1.5	19.0	2.0	0.0	Vert	AV	0.0	40.3	54.0	-13.7	Ch. 39, EUT front on table, 1 Mbps
4803.960	28.0	10.0	1.5	228.0	2.0	0.0	Vert	AV	0.0	40.0	54.0	-14.0	Ch. 0, EUT front facing down, 1 Mbps
7440.817	39.6	15.4	3.8	111.0	0.0	0.0	Vert	PK	0.0	55.0	74.0	-19.0	Ch. 39, EUT front on table, 1 Mbps
7439.290	39.3	15.3	2.6	194.0	0.0	0.0	Vert	PK	0.0	54.6	74.0	-19.4	Ch. 39, EUT Horizontal, 1 Mbps
7440.253	38.6	15.4	1.5	255.0	0.0	0.0	Horz	PK	0.0	54.0	74.0	-20.0	Ch. 39, EUT on side, 1 Mbps
7440.437	38.5	15.4	1.5	176.0	0.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	Ch. 39, EUT front on table, 1 Mbps
7439.737	38.6	15.3	1.5	294.0	0.0	0.0	Horz	PK	0.0	53.9	74.0	-20.1	Ch. 39, EUT Horizontal, 1 Mbps
7440.570	38.1	15.4	1.0	340.0	0.0	0.0	Vert	PK	0.0	53.5	74.0	-20.5	Ch. 39, EUT on side, 1 Mbps
4959.440	39.6	10.2	1.5	161.0	0.0	0.0	Vert	PK	0.0	49.8	74.0	-24.2	Ch. 39, EUT Horizontal, 1 Mbps
4804.957	39.7	10.0	1.5	228.0	0.0	0.0	Vert	PK	0.0	49.7	74.0	-24.3	Ch. 0, EUT front facing down, 1 Mbps
4960.197	39.3	10.2	1.5	19.0	0.0	0.0	Vert	PK	0.0	49.5	74.0	-24.5	Ch. 39, EUT front on table, 1 Mbps

## CONCLUSION

Pass



Tested By

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	D4D-T28	Date:	2024-01-24
Customer:	Glowforge Incorporated	Temperature:	21.4°C
Attendees:	Nathan Hills	Relative Humidity:	43.3%
Customer Project:	None	Bar. Pressure (PMSL):	1006 mb
Tested By:	Harry Zhao	Job Site:	NC01
Power:	120VAC/60Hz	Configuration:	GLOW0052-1

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## TEST PARAMETERS

Run #:	27	Test Distance (m):	3	Ant. Height(s) (m):	1 to 4(m)
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## COMMENTS

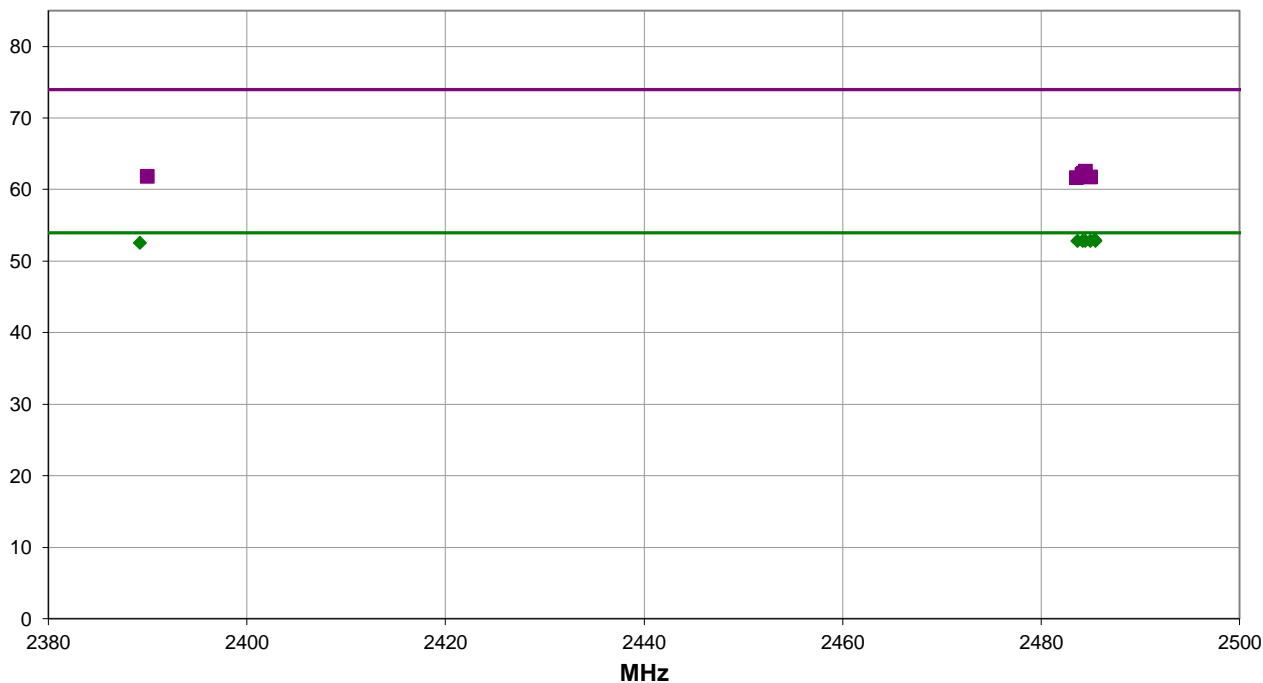
The test mode operates at 62.65% duty cycle (DC), an upward duty cycle correction factor of  $10 \cdot \log(1/0.6265) = 2.03$  dB was applied to the average measurements. See data comments below for EUT orientation, data rates, and channel.

## EUT OPERATING MODES

Transmitting BLE. Low Channel 0 = 2402 MHz, Middle Channel 20 = 2442 MHz, High Channel 39 = 2480 MHz, Power setting = 34

## DEVIATIONS FROM TEST STANDARD

None



Run #: 27

■ PK    ◆ AV    ● QP

# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS

## RESULTS - Run #27

Freq (MHz)	Amplitude (dBuV)	Factor (dB/m)	Antenna Height (meters)	Azimuth (degrees)	Duty Cycle Correction Factor	External Attenuation (dB)	Polarity/Transducer	Detector	Distance Adjustment (dB)	Adjusted (dBuV/m)	Spec. Limit (dBuV/m)	Compared to Spec. (dB)	Comments
2485.430	29.6	1.3	1.5	284.0	2.0	20.0	Horz	AV	0.0	52.9	54.0	-1.1	Ch. 39, EUT front facing down, 1 Mbps
2484.473	29.5	1.3	1.5	304.0	2.0	20.0	Horz	AV	0.0	52.8	54.0	-1.2	Ch. 39, EUT Horizontal, 1 Mbps
2485.487	29.5	1.3	1.5	0.0	2.0	20.0	Vert	AV	0.0	52.8	54.0	-1.2	Ch. 39, EUT Horizontal, 1 Mbps
2483.677	29.5	1.3	2.4	29.0	2.0	20.0	Vert	AV	0.0	52.8	54.0	-1.2	Ch. 39, EUT front facing down, 1 Mbps
2484.197	29.5	1.3	1.5	241.0	2.0	20.0	Horz	AV	0.0	52.8	54.0	-1.2	Ch. 39, EUT on side, 1 Mbps
2484.967	29.5	1.3	1.5	179.0	2.0	20.0	Vert	AV	0.0	52.8	54.0	-1.2	Ch. 39, EUT on side, 1 Mbps
2389.267	29.4	1.1	1.5	1.0	2.0	20.0	Horz	AV	0.0	52.5	54.0	-1.5	Ch. 0, EUT front facing down, 1 Mbps
2484.520	41.2	1.3	1.5	179.0	0.0	20.0	Vert	PK	0.0	62.5	74.0	-11.5	Ch. 39, EUT on side, 1 Mbps
2484.317	40.9	1.3	2.4	29.0	0.0	20.0	Vert	PK	0.0	62.2	74.0	-11.8	Ch. 39, EUT front facing down, 1 Mbps
2484.227	40.7	1.3	1.5	304.0	0.0	20.0	Horz	PK	0.0	62.0	74.0	-12.0	Ch. 39, EUT Horizontal, 1 Mbps
2484.190	40.6	1.3	1.5	0.0	0.0	20.0	Vert	PK	0.0	61.9	74.0	-12.1	Ch. 39, EUT Horizontal, 1 Mbps
2390.000	40.7	1.1	1.5	1.0	0.0	20.0	Horz	PK	0.0	61.8	74.0	-12.2	Ch. 0, EUT front facing down, 1 Mbps
2485.033	40.4	1.3	1.5	241.0	0.0	20.0	Horz	PK	0.0	61.7	74.0	-12.3	Ch. 39, EUT on side, 1 Mbps
2483.600	40.3	1.3	1.5	284.0	0.0	20.0	Horz	PK	0.0	61.6	74.0	-12.4	Ch. 39, EUT front facing down, 1 Mbps

## CONCLUSION

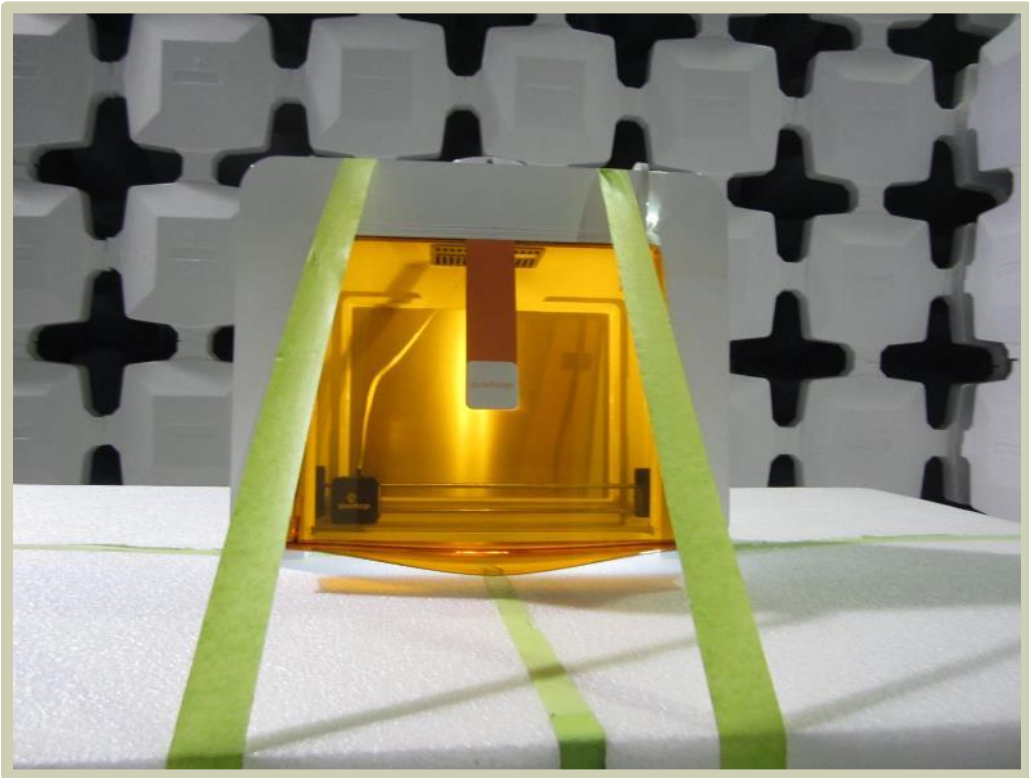
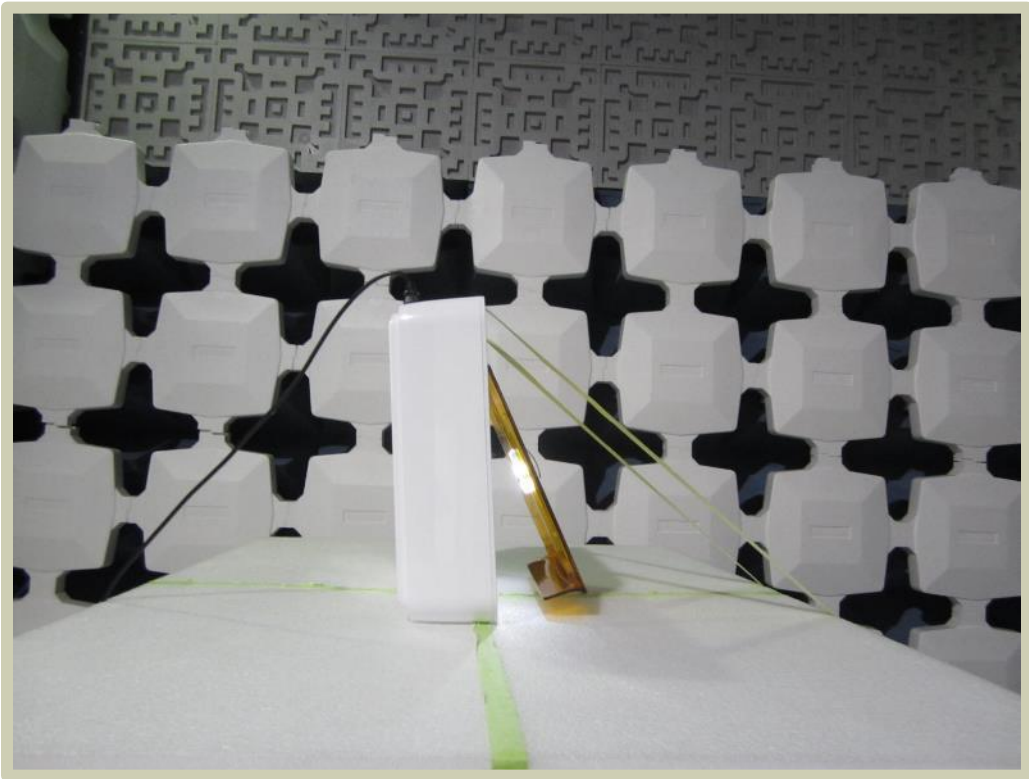
Pass



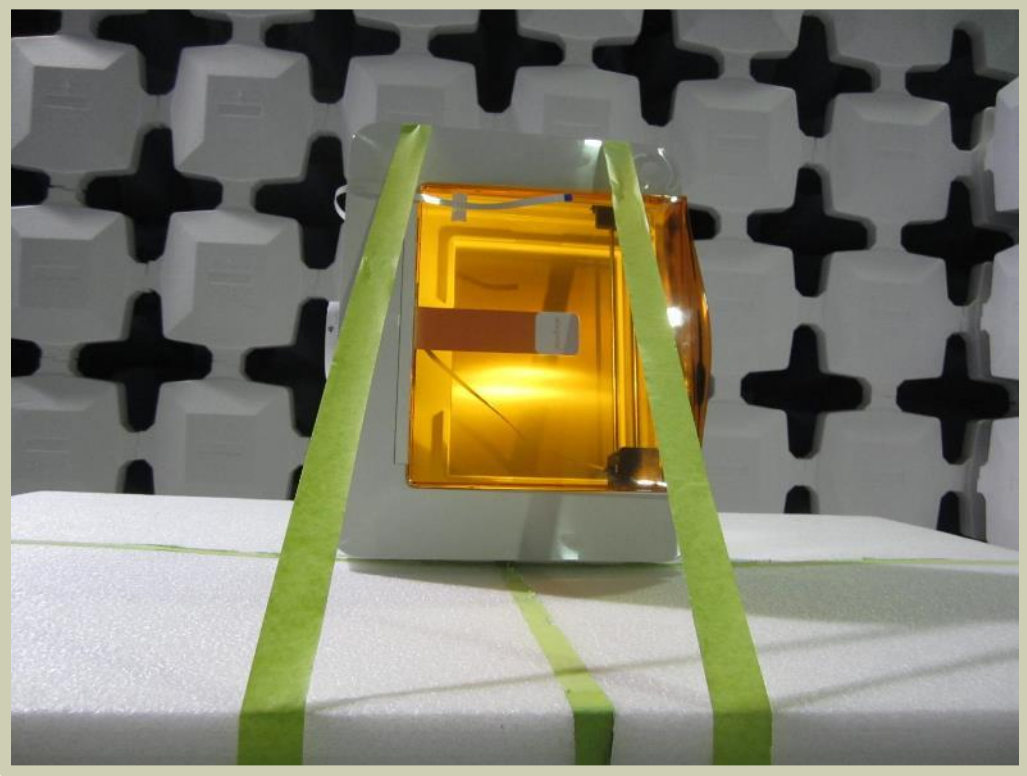
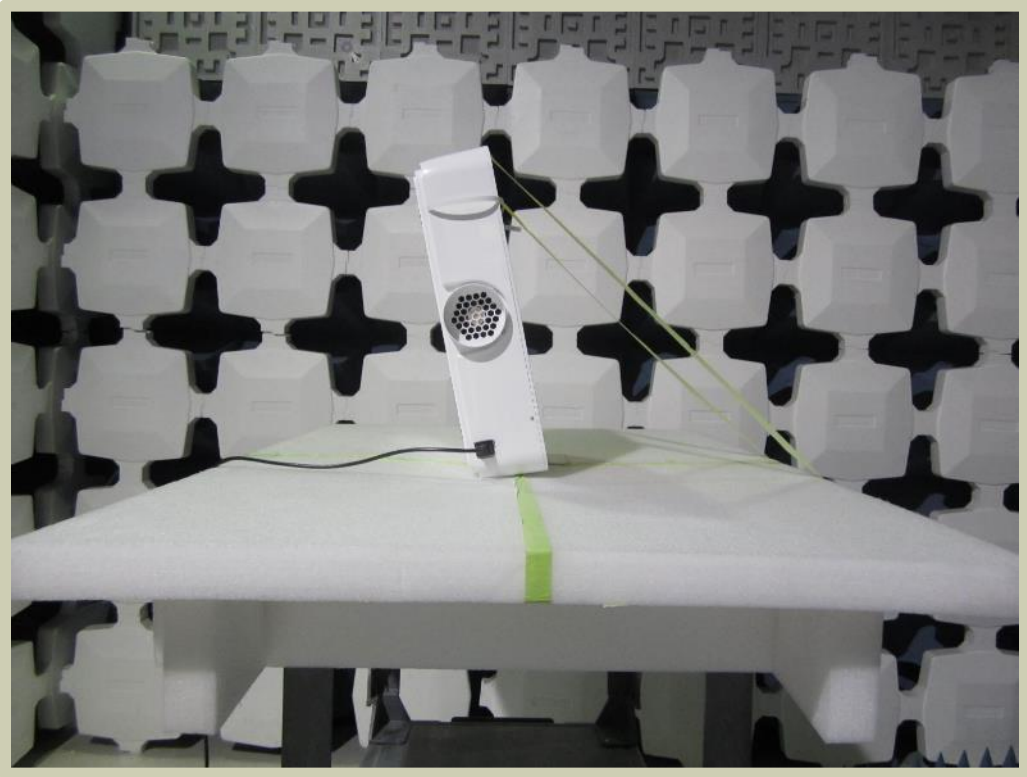
Tested By



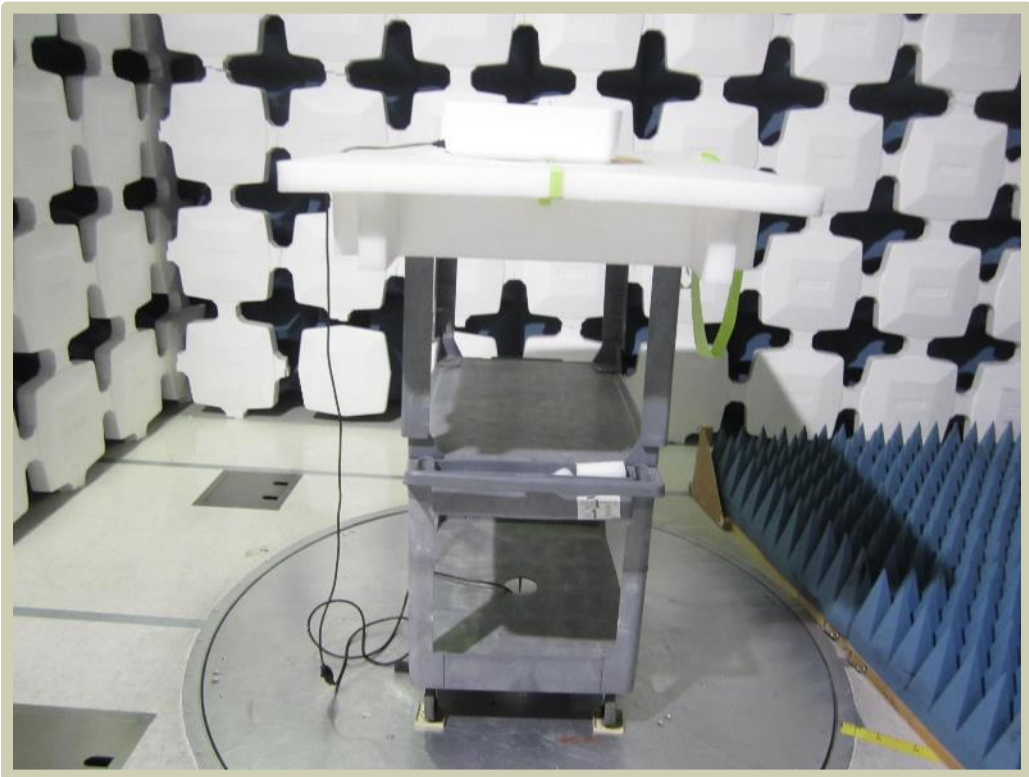
# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



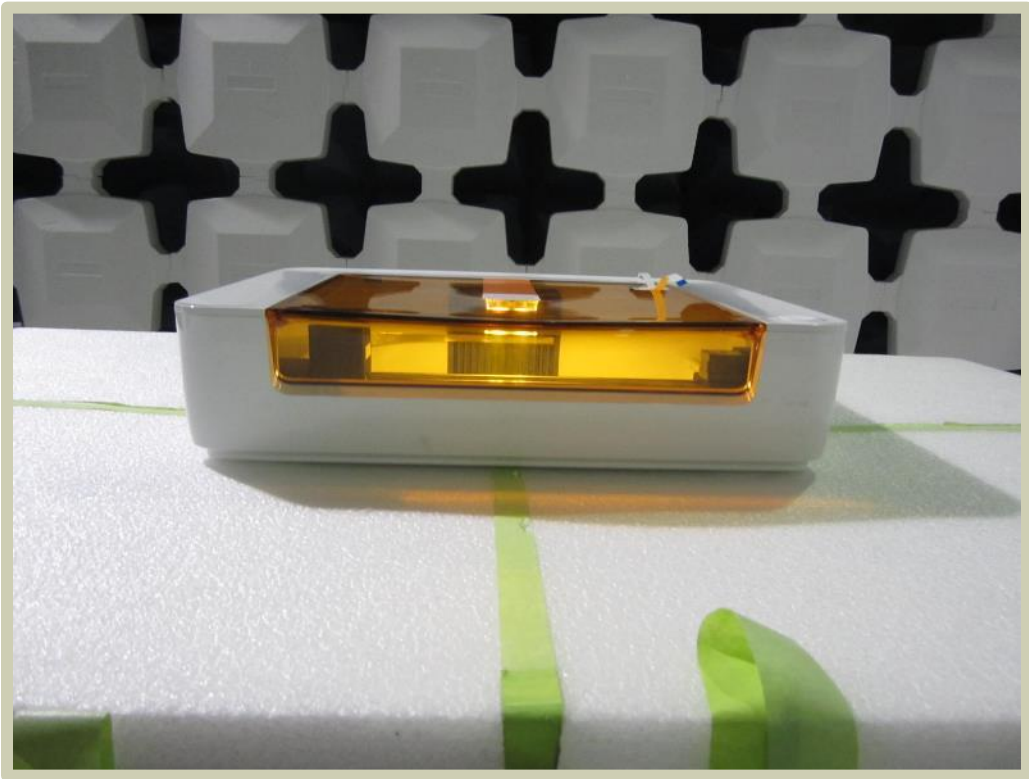
# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



# SPURIOUS RADIATED EMISSIONS – SPOT CHECKS



# OUTPUT POWER

## 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 peak output power was measured with the EUT set to low, medium and high transmit frequencies. The EUT was transmitting in a no hop mode at the data rate(s) listed in the datasheet.

The method found in ANSI C63.10:2013 Section 7.8.5 was used for a FHSS radio.

## TEST EQUIPMENT

Description	Manufacturer	Model	ID	Last Cal.	Cal. Due
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Generator - Signal	Agilent	N5183A	TIA	2022-06-25	2024-06-25
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Cable	Micro-Coax	UFD150A-1-0720-200200	NCW	2024-01-24	2025-01-24
Attenuator	S.M. Electronics	SA18H-20	REK	2023-03-08	2024-03-08

# OUTPUT POWER



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	XB2-839	Date:	2024-01-25
Customer:	Glowforge Incorporated	Temperature:	20.9°C
Attendees:	Nathan Hills	Relative Humidity:	42.7%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	120VAC/60Hz	Configuration:	GLOW0052-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

## DEVIATIONS FROM TEST STANDARD

None

## CONCLUSION

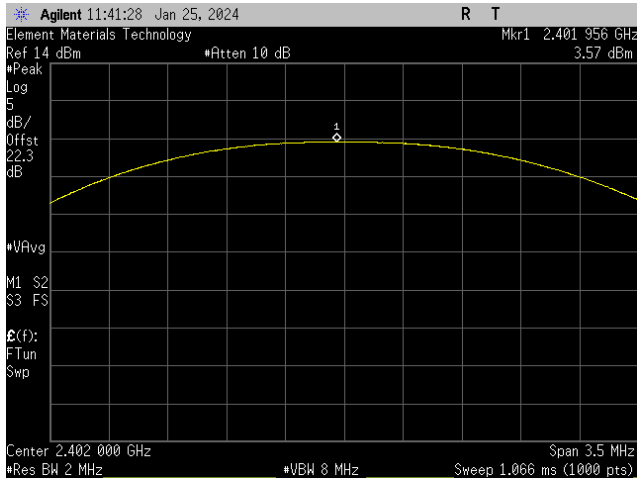
Pass

Tested By

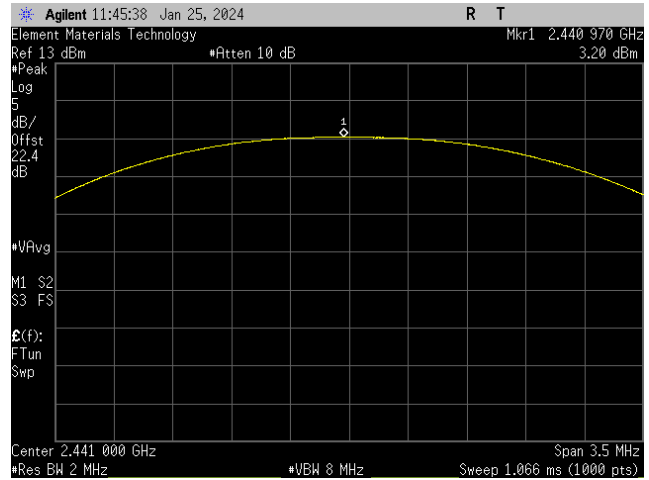
## TEST RESULTS

	Out Pwr (dBm)	Limit (dBm)	Result
<b>DH5, GFSK</b>			
Low Channel, 2402 MHz	3.567	21	Pass
Mid Channel, 2441 MHz	3.203	21	Pass
High Channel, 2480 MHz	2.35	21	Pass
<b>2DH5, pi/4-DQPSK</b>			
Low Channel, 2402 MHz	4.465	21	Pass
Mid Channel, 2441 MHz	4.284	21	Pass
High Channel, 2480 MHz	3.494	21	Pass
<b>3DH5, 8-DPSK</b>			
Low Channel, 2402 MHz	5.031	21	Pass
Mid Channel, 2441 MHz	4.826	21	Pass
High Channel, 2480 MHz	4.016	21	Pass

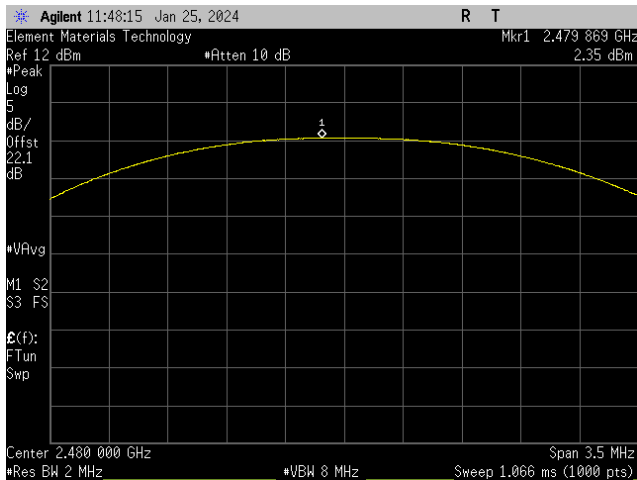
# OUTPUT POWER



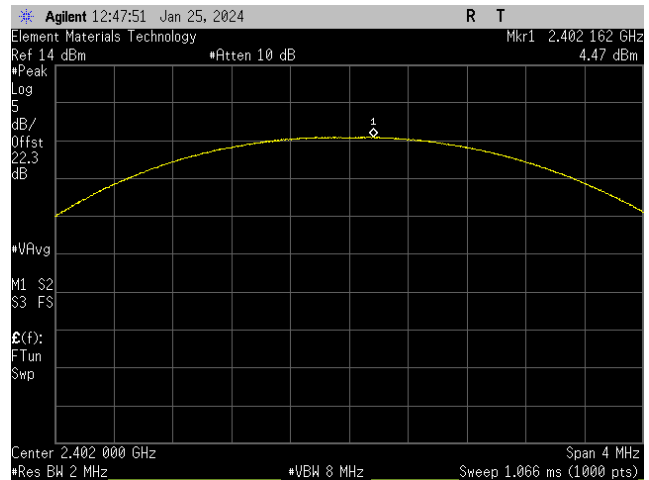
**DH5, GFSK**  
**Low Channel, 2402 MHz**



**DH5, GFSK**  
**Mid Channel, 2441 MHz**

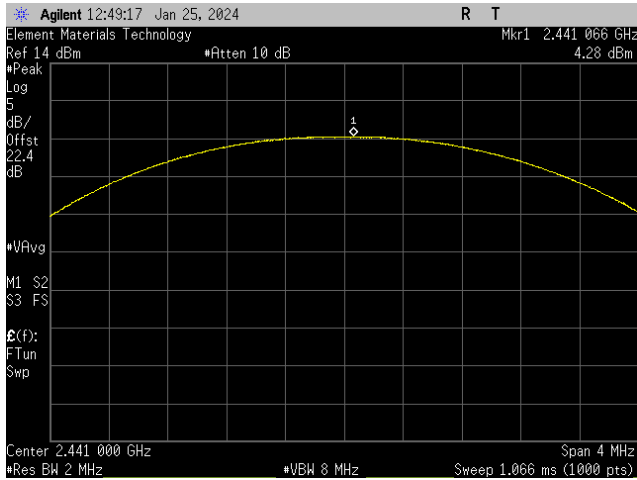


**DH5, GFSK**  
**High Channel, 2480 MHz**

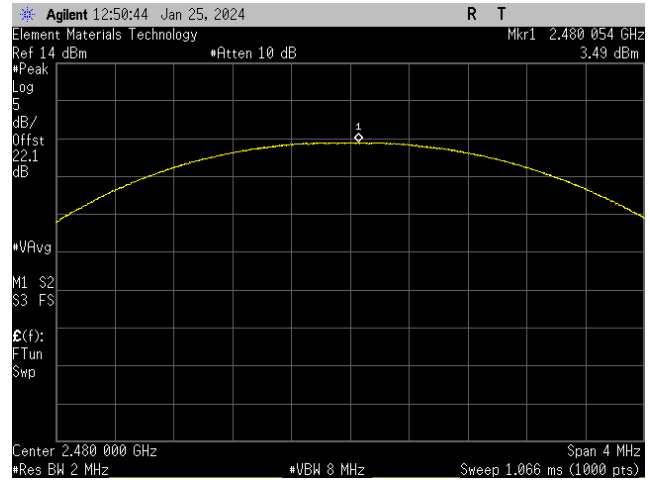


**2DH5, pi/4-DQPSK**  
**Low Channel, 2402 MHz**

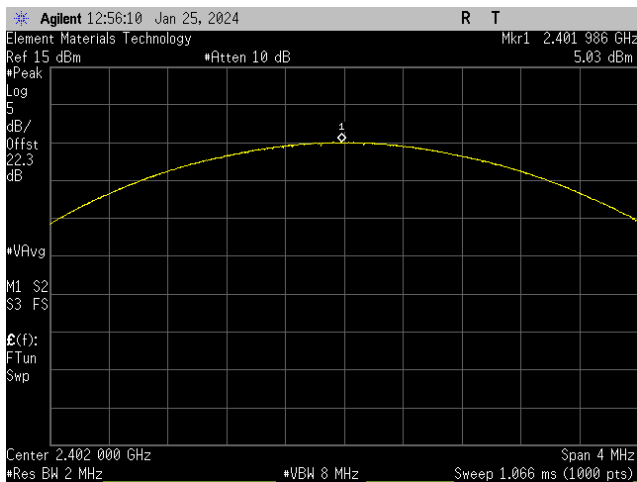
# OUTPUT POWER



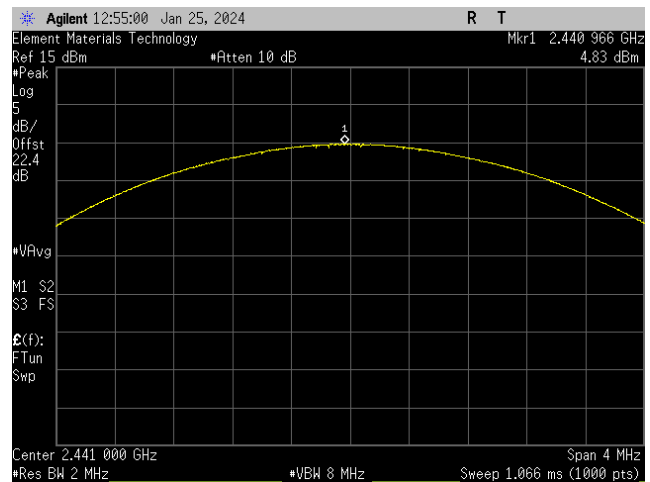
**2DH5, pi/4-DQPSK  
Mid Channel, 2441 MHz**



**2DH5, pi/4-DQPSK  
High Channel, 2480 MHz**



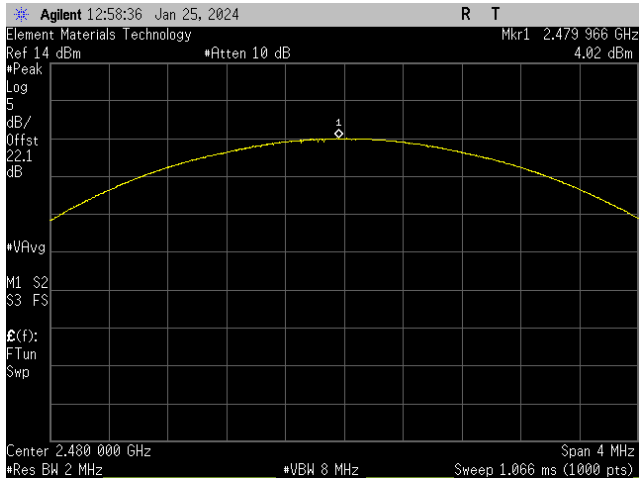
**3DH5, 8-DPSK  
Low Channel, 2402 MHz**



**3DH5, 8-DPSK  
Mid Channel, 2441 MHz**



# OUTPUT POWER



**3DH5, 8-DPSK**  
**High Channel, 2480 MHz**

# OUTPUT POWER

## 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
Analyzer - Spectrum Analyzer	Agilent	E4440A	AAX	2023-12-14	2024-12-14
Generator - Signal	Agilent	N5183A	TIA	2022-06-25	2024-06-25
Block - DC	Weinschel Corp.	7006	AMS	2024-01-24	2025-01-24
Cable	Micro-Coax	UFD150A-1-0720-200200	NCW	2024-01-24	2025-01-24
Attenuator	S.M. Electronics	SA18H-20	REK	2023-03-08	2024-03-08

# OUTPUT POWER



EUT:	GFD-100	Work Order:	GLOW0052
Serial Number:	XB2-839	Date:	2024-01-25
Customer:	Glowforge Incorporated	Temperature:	21°C
Attendees:	Nathan Hills	Relative Humidity:	42.4%
Customer Project:	None	Bar. Pressure (PMSL):	1015 mbar
Tested By:	Harry Zhao	Job Site:	NC06
Power:	120VAC/60Hz	Configuration:	GLOW0052-2

## TEST SPECIFICATIONS

Specification:	Method:
FCC 15.247:2024	ANSI C63.10:2013
RSS-247 Issue 3:2023	ANSI C63.10:2013
RSS-Gen Issue 5:2018+A1:2019+A2:2021	ANSI C63.10:2013

## COMMENTS

Reference level offset includes measurement cable, attenuator, DC block, and customer's patch cable.

## DEVIATIONS FROM TEST STANDARD

None

## CONCLUSION

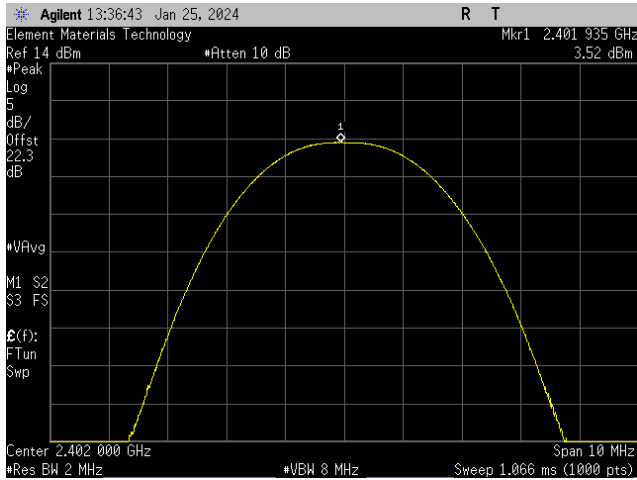
Pass

Tested By

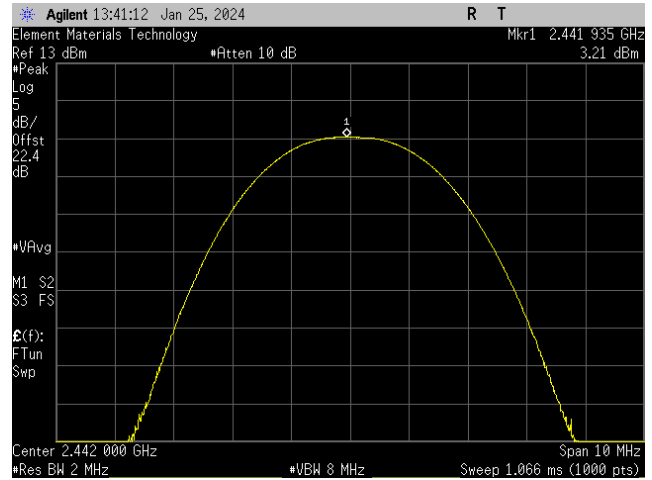
## TEST RESULTS

	Out Pwr (dBm)	Limit (dBm)	Result
BLE/GFSK 1 Mbps			
Low Channel, 2402 MHz	3.518	30	Pass
Mid Channel, 2442 MHz	3.207	30	Pass
High Channel, 2480 MHz	2.352	30	Pass

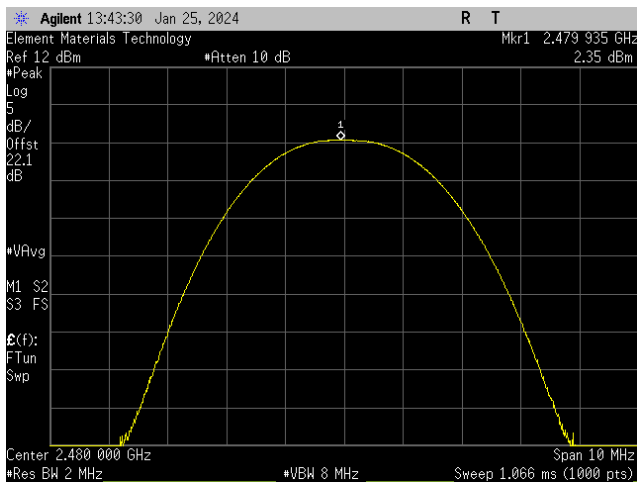
# OUTPUT POWER



**BLE/GFSK 1 Mbps  
Low Channel, 2402 MHz**



**BLE/GFSK 1 Mbps  
Mid Channel, 2442 MHz**



**BLE/GFSK 1 Mbps  
High Channel, 2480 MHz**

End of Test Report