APPLIED TEST LAB INC.

FCC PART 15 SUBPART C TEST REPORT

FCC PART 15 SUBPART C

Report#:P001E003-65

Manufacturer: Phidgets Inc.

Model: Phidget 125 kHz RFID Reader/Writer 1024_1

Serial Number:374295

EUT Received Date:2023-11-28

Test Start Date:2023-11-28

Test Completion Date:2024-02-28

Test Result:PASS

Report Issue Date:2024-11-14

Tested by	Approved by:
Jaeheon Yun, Test specialist	Adiseshu Nyshadham, Quality Prime
Jaeheon	AdiseshuN

Report Issued to	Report Issued by
Phidgets Inc. Unit 1, 6115 - 4 Street S.E. Calgary, Alberta Canada	Applied Test Lab Inc. Unit 4174-3961 52 Ave NE Calgary, AB, T3J 0J8

Report Revision History

Rev	Description of Change	Date
Release	Initial	2024-04-30
Release 2	Title Pg and Pg 11	2024-11-14

This report contains **48** pages

EQUIPMENT DOCUMENTATION

The user documentation and/or manual shall contain details of any special measures required to be taken by the purchaser or user to ensure EMC compliance of the EUT with the requirements of this standard.

For example
Need to use shielded or special cables, such as category 5 F/UTP or category 6 U/UTP cabling as defined in ISO IEC 11801.

Equipment compliant with the class A requirements of this publication should have a warning notice in the user manual stating that it could cause radio interference.

For example
Warning: Operation of this equipment in a residential environment could cause radio interference.

LABELING INFORMATION – FCC 15.19

Products subject to authorization under Verification procedures shall be labeled as follows: "This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation."

Where a device is constructed in two or more sections connected by wires and marketed together, the statement is required to be affixed only to the main control unit. When the device is so small or for such use that it is not practicable to place the statement on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

INFORMATION TO THE USER - FCC

The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For a Class A digital device or peripheral, the instructions furnished in the user manual shall include the following or similar statement, placed in a prominent location in the text of the manual:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions furnished in the user manual shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE : This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna
Increase the separation between the equipment and receiver
Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
Consult the dealer or an experienced radio TV technician for help

Table of Contents

1 General

1.1 Purpose

The purpose of this report is to document conformance assessment with **FCC PART 15 SUBPART C** and to detail the results of testing performed on the test sample Model: **Phidget 125 kHz RFID Reader/Writer 1024_1** manufactured by **Phidgets Inc.**. The test sample was received in good condition. Testing began on **2023-11-28** and was completed on **2024-02-28**.

1.2 Relevant Standards and References

One or more of the following standards were used to evaluate the EUT:

1. **ANSI C63.4-2014**: American National Standard for Method of Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the 9 kHz to 40 GHz
2. **CFR Title 47 FCC Part 15** - Radio Frequency Devices, Subpart C – Intentional Radiators.
3. **ANSI C63.10-2013**, "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices"

1.3 Performance Requirement

FCC PART 15 SUBPART C prescribes limits of radio noise for Intentional Radiators associated with end-user environment.

The EUT is marketed as **FCC PART 15 SUBPART C** equipment and must comply with the **FCC PART 15 SUBPART C** emission limits.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product which may result in increase of emission levels should be checked and verified to ensure continuous compliance has been maintained (i.e., printed circuit board layout changes, changes to filter performance, power supply changes, I/O cable and interface changes, critical component changes etc.)

1.4 Measurement Uncertainty

Test case	Measurement Uncertainty
Radiated Emission	+/- 3.44 dB
Conducted Emission	+/- 1.50 dB

[NOTE] The measurement uncertainties are evaluated for tests performed on the EUT as per CISPR 16-4-2.
The measurement uncertainties reported above relates to the measurement setups and procedures.
It does not take into account EUT performance variations from sample to sample.

1.5 Test Results Summary

The test samples, as assessed, satisfied the relevant requirements of **FCC PART 15 SUBPART C** detailed in this section below.

Test Case	Test Type	Basic Standard	Limit	Modifications	Result
4.0	AC Power Line Conducted Emission (0.15MHz – 30MHz)	FCC PART 15 SUBPART C ,	FCC15.207	No	PASS
5.0-6.0	Radiated Spurious Emissions	FCC PART 15 SUBPART C	FCC15.209	No	PASS
7.0	Transmitter Fundamental Field Strength	FCC PART 15 SUBPART C	FCC15.209	No	PASS
8.0	Transmitter 20 dB Bandwidth	FCC PART 15 SUBPART C	FCC 15.215	No	PASS

1.6 Notes Relating to the Conformance Assessment

For Sec 4.0-7.0
The above judgment is only based on the measurement data and does not include the measurement uncertainty. Accordingly, the statement below is applied to the test result.

The EUT complies with the limits required in the basic standard and or in case that the margin to the limit is not less than the measurement uncertainty in the laboratory.

The compliance of the EUT with the limits required in the basic standard is more probable than non-compliance in case that the margin to the limit is less than the measurement uncertainty in the laboratory.

The results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of the test samples and date of completion of the testing.

All testing was performed under the following environmental conditions:

Temperature	: 17 to 23 °C
Humidity	: 15 to 75%
Barometric Pressure	: 86 to 106 kPa

Note the actual temperature humidity conditions can be found in the relevant test results sections.
All dates used in this report are in the format yyyy/mm/dd

The assessment has been performed in accordance with the requirements of ISO/IEC 17025.

1.7 Deviations from Test Standards

There were no deviations from the test standard

1.8 Client Information

Name	Phidgets Inc.		
Address	Unit 1, 6115 - 4 Street S.E. Calgary, Alberta Canada		
Telephone	1-403-282-7335	**Website**	
Contact Name	Leo Angelo Marrero	**Contact Email**	leo@phidgets.com

2 Test Sample Information

The **Phidget 125 kHz RFID Reader/Writer 1024_1** was only operated and exercised in the mode(s) and configuration(s) described in this report. All inputs and outputs to and from support equipment associated with the **Phidget 125 kHz RFID Reader/Writer 1024_1** were provided or simulated under the direction and responsibility of **Phidgets Inc.**. A description of these signals and their provision is included in Appendix A.

2.1 Equipment Under Test (EUT)

EUT Type	Host with ☐ an external module(EUT) or ☐ internal module(EUT) or ☐ plug-in module(EUT) or ☐ mounted module(EUT)	☒ Host (EUT) ☒ Single Unit ☐ Multiple Units
Product Description	The Phidget RFID Reader/Writer is a device used to read or write to RFID tags. Using an embedded PCB antenna, the 1024_1 radiates an electromagnetic field in order to read or write tags. When a tag is brought into the read range of the 1024_1, the tag is momentarily powered and rebroadcasts its tag identification number. The tag identification is read by the 1024_1 and made available to the user. There are many different tags available and the 1024_1 can read and/or write to tags that are: EM4102, ISO11784, T5577 Typical applications include: Security - Access Control Payroll - Time Clock Inventory – Livestock, merchandise or goods	
Manufacturer	**Phidgets Inc.**	
Trade Name		
Model Number	**Phidget 125 kHz RFID Reader/Writer 1024_1**	
Serial Number	**374295**	
Model discrepancy/Variations	N/A	
Power Supply and Requirements	USB power and 5V DC external, 500mA max	
FCC ID	SUT1024-1	
Rated Power (W)		
Firmware Version	301	
Software Version	1.17 20231031	
Antenna Type and Gain	PCB Installed Inductive Coil	
Operation Frequency Range	125 kHz	
Modulation type(s)		
Number of TX Chains	1	
Other Information	N/A	
Product Manufacturing Status	☐ Production Unit ☒ Pre-Production Unit	

2.2 Support Equipment

Manufacturer	Description	Model No.	Serial Number	Other Info
Lenovo	Laptop	82C5	PF2G3AL4	-
RFID-Tag	RFID-Tag	-	-	-

2.3 I/O Ports

Port Type	Description	Filter Info	Shielding Info	Other Info
Power port	VINT	N/A	Unshielded	
USB port	Mini USB port	N/A	Unshielded	
Digital Port	LED Driver	N/A	Unshielded	
Digital Port	Digital I/O	N/A	Unshielded	

2.4 Exercising I/O Ports

Port Type	Procedure used to exercise the port	Justification for non-standard procedure

2.5 I/O Port's Testing Applicability

A justification is provided below when one or more measurements were not performed.

Port Type	Manufacturer's Justification for not Assessing the Port
N/A	N/A

2.6 Cables

Cable Description	Length (m)	Port From	Port To	Cable Type	Remarks
USB cable	1.8	EUT	Laptop	-	-

2.7 Primary Function(s)

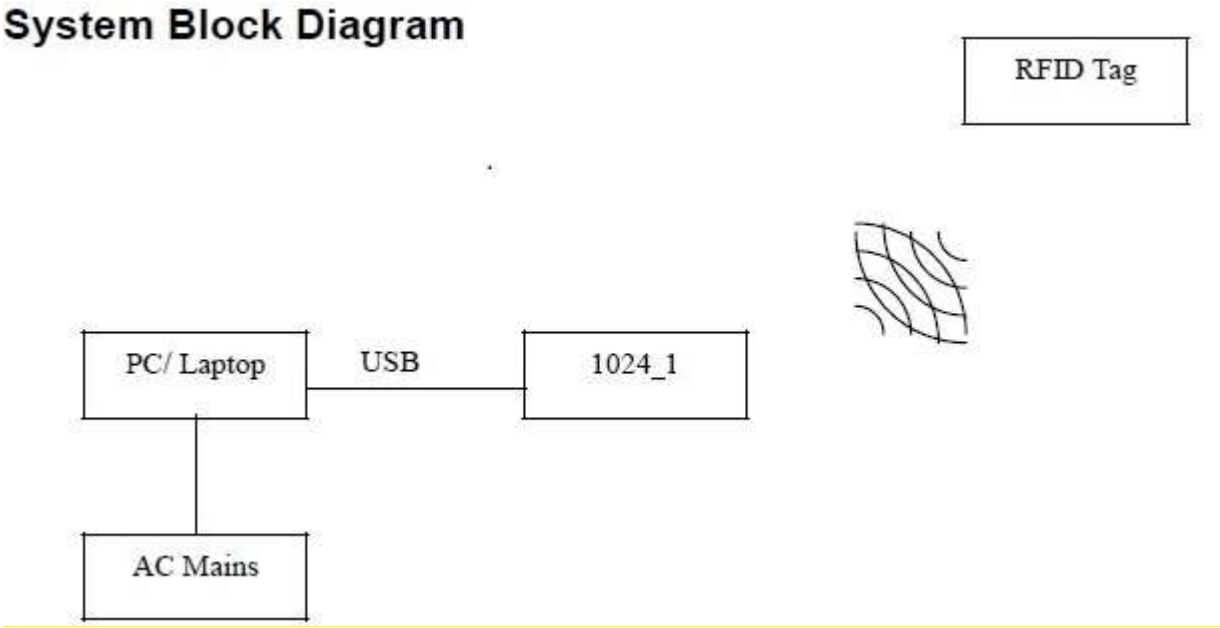
☐ Play Audio	☐ Pressure Measurement	☐ Printing
☐ Play Video	☐ Gas Detection	☐ Transfer Data
☐ Temperature Measurement	☐ Battery Charging	☐ Robotic Movement
☐ Humidity Measurement	☐ Scanning	☒ Other(Reading)
☐ Signal Processing	☐ Data Storage	

2.8 Modes of Operation and Conditions

☐ Color Pattern on Monitor	☐ USB Traffic	☐ Video Playback
☐ "H" Pattern on Monitor	☐ Audio Signal to Earphone	☐ Audio Playback
☐ "H" Pattern to Printer	☐ LAN Traffic	☐ R/W function with HDD
☐ "H" Pattern to Modem	☐ RS232 Traffic	☒ Other(Reading)

2.9 EUT System and Support Equipment Block Diagram

The EUT is to be installed in accordance with the manufacturer's instructions. The installation process includes, product assembly, connecting any support equipment, connecting power and configuration of the equipment under test. All unused ports should be terminated as instructed by the test standard. The EUT should indicate normal operation in accordance with the Operation Manual or manufacturer's instructions.



EUT functional setup Diagram

3 Test Facilities

3.1 Test Facility Information

Laboratory Location

The radiated and conducted emission test sites are located at the following address:

Name	Applied Test Lab Inc.		
Address	Unit 4174-3961 52nd Avenue NE, Calgary, Alberta, T3J 0J8, Canada		
Telephone	403 590 8701	**Fax**	403 590 8570
Email	emctesting@appliedtestlab.com	**Website**	www.appliedtestlab.com

Laboratory Accreditation/Recognitions/Certifications

The Semi-Anechoic Chamber Test Site and Conducted Emission Site have been fully described, submitted to, and accepted by the FCC and Industry Canada for testing Interference by information technology equipment. In addition, ATL has implemented an in-house quality system which is based on the ISO 17025 standard and is fully accredited. The following certification numbers have been issued in recognition of the certifications:

FCC Registration Number: **209928**
Industry Canada Lab Code: **IC 10988A**
ISO 17025**: ANAB AT-2694.** The latest accreditation scope can be found as listed on the ANAB website.

Country	Agency	Accreditation/Certification	LOGO
USA	FCC	3m Semi-Anechoic Chamber to perform FCC Part 15B, C, D, E, F, G, H , 18, 22, 24, 25, 27, 30, 73, 74, 80, 87, 90, 95, 96, 97, and 101 related measurements	
Canada	Industry Canada	3 m Semi-Anechoic Chamber to perform ICES-003 and RSS standards related measurements	Industry Canada Industrie Canada
USA	RTCA	3m Semi-Anechoic Chamber and other facilities to perform DO-160 related measurements	
Europe		3m Semi-Anechoic Chamber and other facilities to perform ETSI, EN, CISPR, IEC standards related measurements	

Note: Unless otherwise specified, ATL performs the tests using standard test methods to evaluate the EUT for compliance to the defined International standards. However, the report is not to be used to claim compliance, certification or endorsement by FCC or Industry Canada, or ATL or any other government agency unless specifically submitted to such agency for such purpose.

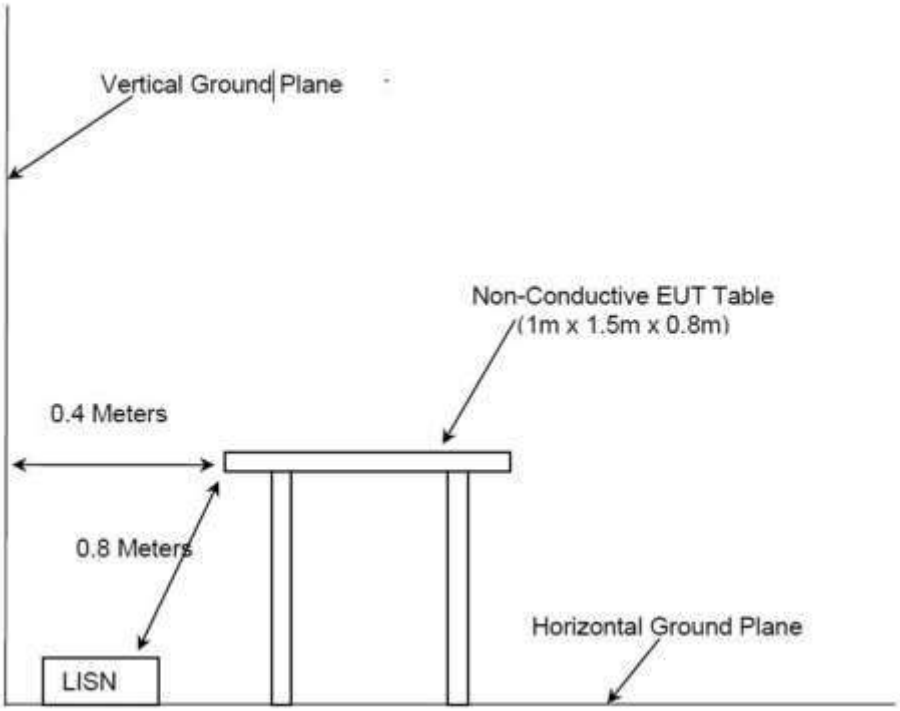
also available for testing using battery strings and DC power supplies.

The chamber is equipped with a multi speed, bore sight, and remotely controlled Mast that controls the polarization and height of the antenna. Control of the mast and turntable occurs in the control space adjoining to the Semi-Anechoic Chamber. Radiated emission measurements are performed using an Active Loop, Bi-Log antenna and a Horn antenna and Radiated Immunity measurements are performed using a Bi-Log antenna, Horn antenna and a Stripline where applicable.

3.3 Conducted Emission Test Site Description

The AC mains conducted EMI site is located in the main floor of Applied Test Lab Inc.'s (ATL) EMC department. It consists of a 2.66 x 2.04 meter 1/16 inch thick solid copper horizontal ground reference plane (GRP) bonded to an 2.46 x 3.04 meter vertical ground plane.

The Conducted Emissions Test site is of sufficient size to test table top and floor standing equipment in accordance with section 6 of ANSI C63.4 standard. A diagram of the test site is shown below:



The EUT shall be placed in the conducted emission area and will be plugged into the equipment under test (EUT) receptacle of a LISN/AMN. LISN is electrically bonded to the metallic ground floor. In a table top configuration, to evaluate conducted emission compliance, the EUT is placed on a wooden table of 80 cm high and is 40 cm from the vertical metallic wall. The vertical metallic wall is bonded to GRP. The phase or neutral 50-Ω output port will be connected to the EMI Receiver via a Limiter and a 20' coaxial cable. The EMI Receiver's bandwidths, sweep time, detectors and limits are computer software controlled and the Conducted Measurement test is done using an EMI Receiver.

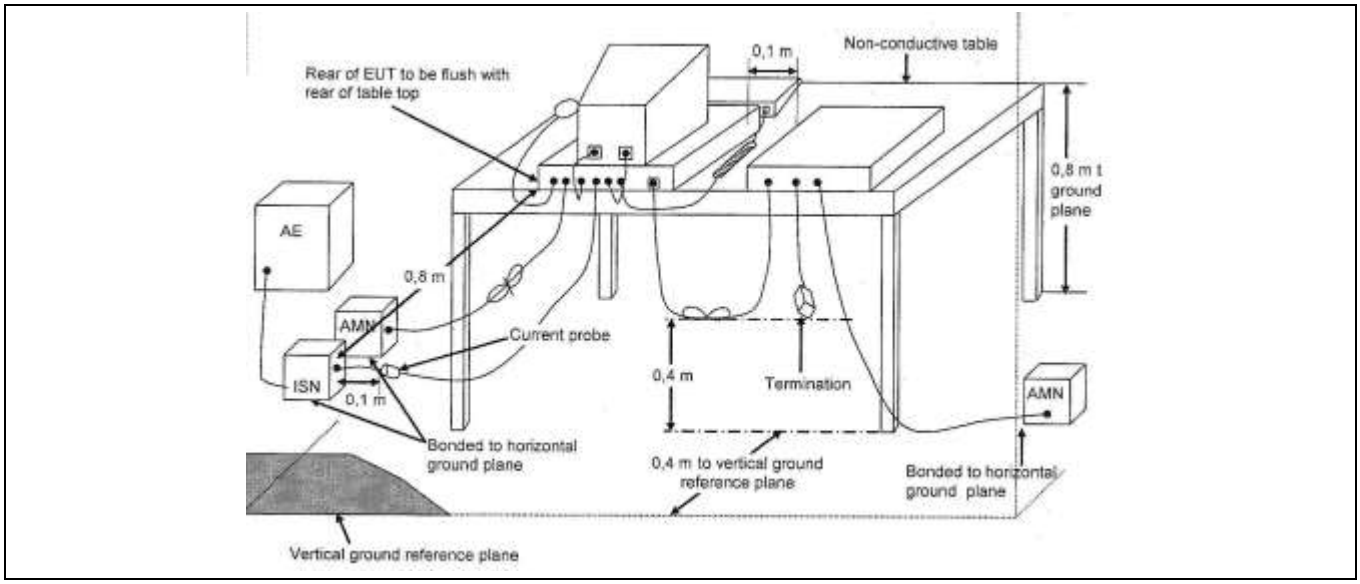
4 Power Line Conducted Emission (0.15MHz – 30MHz)

4.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Next Cal
LISN	Com-Power	LI-215A	191933	2024/09/23
EMI Receiver & RF filter section	Hewlett Packard	8546A, 85460A	3545A00306, 3330A00109	2024/08/11
Cable	ATL	N/A	N/A	PV
Transient Limiter	Com-Power	LIT-930	531577	PV
Test SW	DVT Solutions Inc	RECEDvtAtlV3p41.exe - (20190618)		

Note: The equipment in the above table are within the valid calibration period.

4.2 Block Diagram of Test Configuration



4.3 Test Requirement for Class B Device

Conducted Emission Limit per clause(s) FCC15.207 (a)

Emission Type	Frequency Range (MHz)	Limit (dBuV)	
		Quasi-peak	Average
Conducted Emission	0.15 - 0.5	66-56*	56-46*
	0.5 - 5	56	46
	5 - 30	60	50

Notes:

1) The tighter limit applies at the band edges
2) '*' the limitation decreases linearly with logarithm of the frequency in the range

Test Procedure

Method of measurement of conducted disturbance

1. The power line conducted emission measurements are performed using a setup in accordance with ANSI C63.4/ CISPR 16-2-1 clause 7.4.1 and CISPR 16-1-2 clause 4.3.
2. The EUT is arranged and connected with cables terminated in accordance with the product specification. The EUT with its various internal components was operated and exercised as per the instructions provided by the manufacturer.
3. An Artificial Mains Network (AMN) or Line Impedance Stabilization Network (LISN) is required to provide defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the EUT from the ambient noise on the power lines.
4. The AMN/LISN provides 50 Ohm/50uH of coupling impedance for the measuring instrument.
5. The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN/LISN is 80cm.
6. Where a flexible mains cord is provided by the manufacturer, this shall be 100 cm long. If it is more, the excess cable is folded back and forth so as to form a bundle not exceeding 40 cm in length.
7. Interconnecting cables that hang closer than 40cm to the ground plane are folded back and forth in the center forming a bundle 30 to 40 cm long.
8. I/O cables that are not connected to a peripheral are bundled in the center. The end of the cable is terminated, if required, using the correct terminating impedance. The overall length is not to exceed 100 cm
9. Where possible, loop-back cables are arranged so that outgoing line is not closely coupled to the return.
10. The quasi-peak measuring receiver shall be in accordance with Clause 4 and 5 of CISPR 16-1-1.
11. Receivers with peak detectors shall be in accordance with Clause 6 of CISPR 16-1-1 and shall have a 6 (dB) bandwidth in accordance with Clause 4 of CISPR 16-1-1.
12. The Average measuring receiver shall be in accordance with Clause 7 of CISPR 16-1-1. The measurement instrumentation shall be as specified in CISPR 16-1-1.
13. The EUT is placed on a 1m by 1.5m non-conductive table 80cm above the ground plane.
14. A vertical, metal reference plane is placed 40cm from the EUT. The vertical metal reference-plane is at least 200cm by 200cm.
15. Before any testing is performed on EUT, the Ambient (measurement noise floor) is recorded, and a QA check is performed to show that the system is functioning correctly.
16. Conducted disturbance is measured over the frequency range of 150 (kHz) to 30 (MHz) between the phase or line lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.
17. The software is programmed to perform a sweep of the frequency band using the max hold function and peak detector.
18. This sweep is performed for every power conductor of the power line.
19. During the sweep measurement the Spectrum Analyzer/Receiver's 6dB resolution bandwidth was set to 9 (kHz) and the video bandwidth is set to 30 (kHz).
20. The peak detector scan provides emission data with a good indication of pass or fail.
21. During the peak detector scan a list of frequencies of interest is generated.
22. Quasi- Peak measurements are performed at the frequencies of interest with the Spectrum Analyzer/Receiver's 6dB resolution bandwidth set to 9 (kHz) and Video Bandwidth set to 30 (kHz).
23. Average measurements are performed with the resolution bandwidth set to 9 (kHz) and the video bandwidth set to 30 (kHz).

24. All emissions not reported are at least 10 dB below the limits.
25. Numbers with a minus sign in margin column indicates that disturbance levels are below the limit.
26. Based on ANSI C63.4 Section 4.2, if the Peak or Quasi-Peak detector measurements do not exceed the Average limits, , as long as the required resolution bandwidth is maintained or exceeded, then the EUT is deemed to have conformed to the requirements.

4.4 Sample Calculation

The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV) = Analyzer/Receiver Reading (dBuV) + Correction Factor (dB)

Correction Factor (dB) = LISN/AMN Insertion Loss (dB) + Cable Insertion Loss (dB) + Transient Limiter Insertion Loss (dB)

Margin dB) = Corrected Reading (dBuV) – Applicable Limit (dBuV)

4.5 Test Arrangement

EUT arrangement

☒ Table-top EUT arrangement
☐ Floor-Standing arrangement due to a physical hazard in lieu of
☐ Wall Mount or ☐ Ceiling Mount or ☐ Handheld or ☐ Body Worn arrangement
Justification: N/A

☐ EUT is bonded to RGP for a dedicated ground connection with a grounding connection specified by the manufacturer.

Auxiliary Equipment Arrangement

☐ Placed below the RGP
☐ Placed on the RGP with an insulating support;
☐ Placed outside the measurement area and are routed to the remote location while being insulted from RGP with insulation thickness not more than 15cm

Cabling Arrangement

☒ Manufacturer-supplied or commercially available cabling as specified in the installation manual or user manual.
☐ Cables are bonded to the RGP in accordance with the manufacturer's recommendation.
☐ The effective length of all loop-back cables not routed overhead is longer than 2 m.
☐ The effective length of the mains cable is 100 cm ± 10 cm.
☐ Cables with mitigation features details (screening, tighter/more, twists per length, ferrite beads, etc)

Cable Type	Details of Mitigation Features

Positions of cables

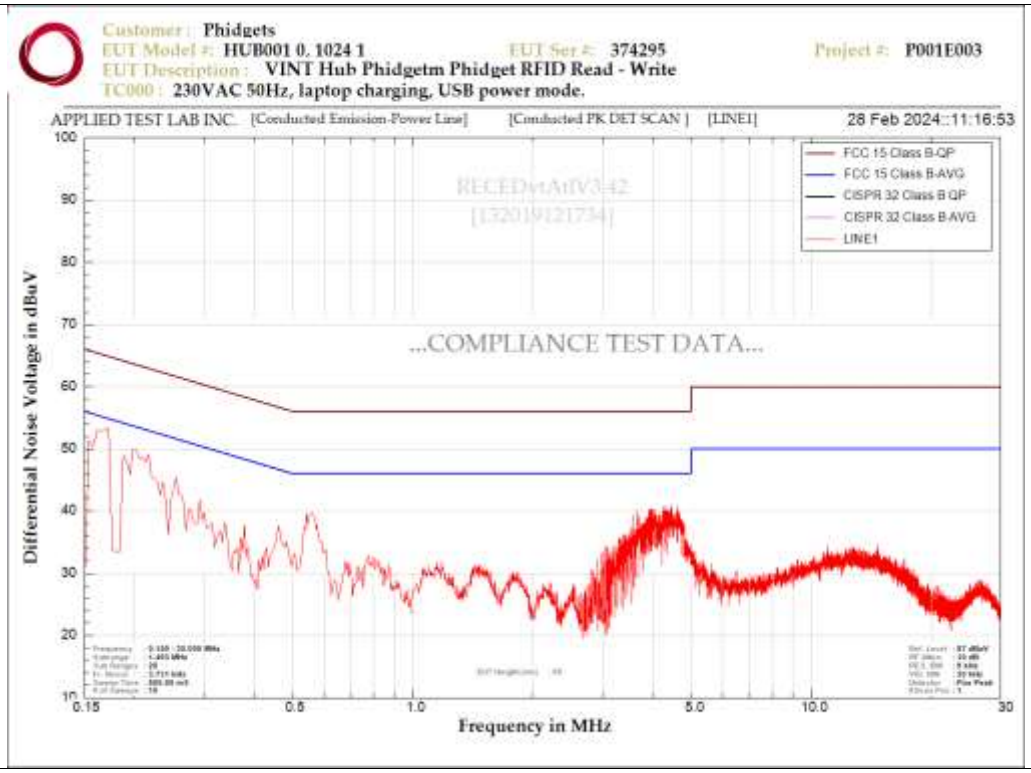
☐ The excess cable is bundled non-inductively on, but separated from, the RGP.
☐ Specify cable lengths if those defined cannot be achieved.

4.7 Test Data – Line

Client:	**Phidgets Inc.**	Test Standard:	**FCC15.207,**
Model No.:	**Phidget 125 kHz RFID Reader/Writer 1024_1**	Product:	**Phidget 125 kHz RFID Reader/Writer 1024_1**
Serial No.:	**374295**	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	**FCC15.207**
Test Distance:	80cm from LISN	Line/Polarity	Line L
Temperature:	22°C	Humidity:	18%
Tested By:	Jaeheon Yun	Date of Test:	2024/02/28
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Correction Factor (dB)	Measured Reading (dBuV)		Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AVG	QP	AVG	QP	AVG	QP	AVG

☒ Fewer than six emissions within 10 dB of the limit are observed.



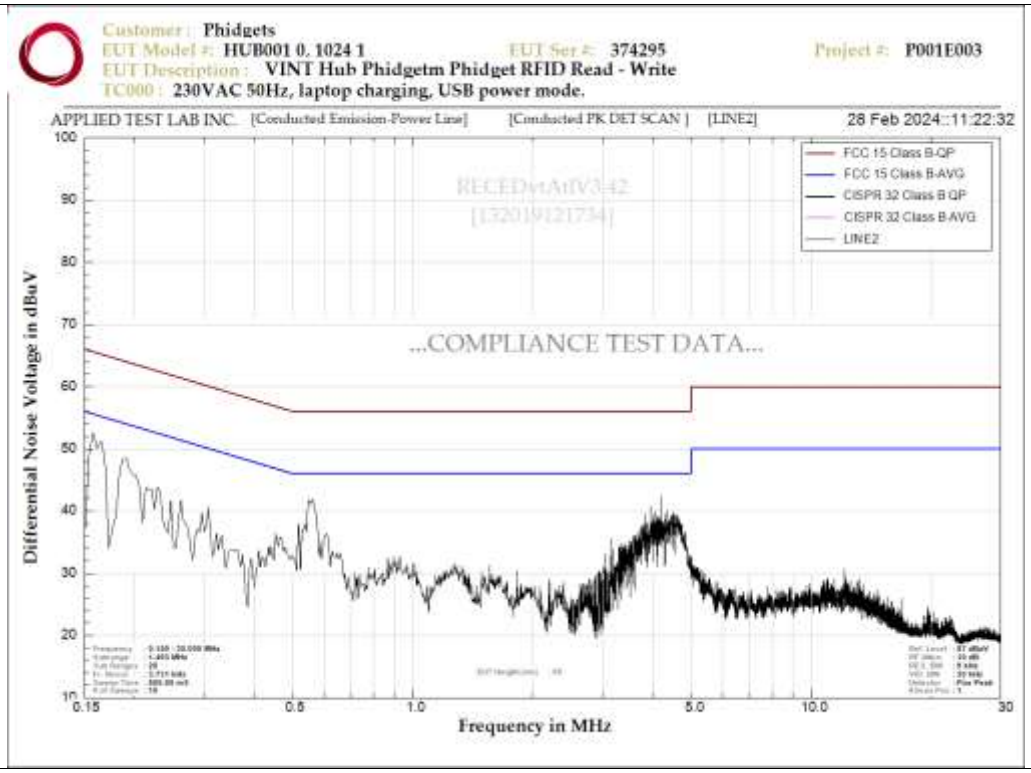
Conducted Emission Scan Line 1 (Line L)

4.8 Test Data – Line N

Client:	Phidgets Inc.	Test Standard:	FCC15.207,
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	FCC15.207
Test Distance:	80cm from LISN	Line/Polarity	Line L
Temperature:	22°C	Humidity:	18%
Tested By:	Jaeheon Yun	Date of Test:	2024/02/28
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Correction Factor (dB)	Measured Reading (dBuV)		Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AVG	QP	AVG	QP	AVG	QP	AVG

☒ Fewer than six emissions within 10 dB of the limit are observed.



Conducted Emission Scan Line 1 (Line N)

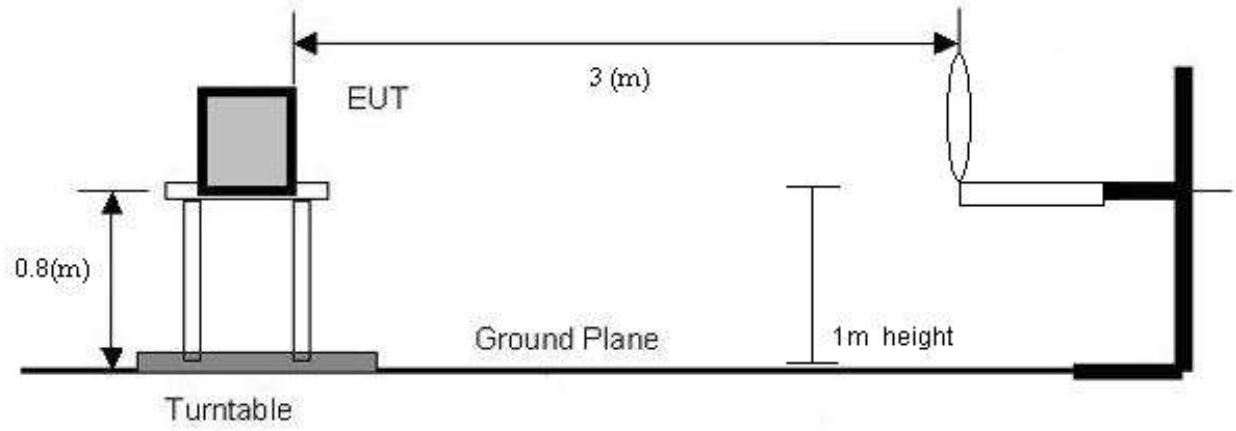
5 Radiated Emission (0.009MHz - 30MHz)

5.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Next Cal
Active loop antenna	Com-power Corporation	AL-130	121035	2025/03/04
EMI Receiver & RF filter section	Hewlett Packard	8546A, 85460A	3545A00306, 3330A00109	2024/08/11
Cable 1.5m+8.84m+2m	Micro Coax UTIFLEX	UFA200A+ UFB311A+ UFB205A	BUAO1G-0523+ 50224-H+ MFR 64639 210796-008	PV
Test SW	DVT Solutions Inc	REDvtAtlV3p42.exe - (20240321)		

Note: The equipment in the above table are within the valid calibration period.

5.2 Block Diagram of Test Configuration



5.3 Test Requirement for Intentional radiator

Radiated Emission Limits at 3m per Clause(s) FCC15.209(a)

Frequency (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	67 – 20 x Log 10(F)	300
0.490 – 1.705	24000/F(kHz)	87 – 20 x Log 10(F)	30
1.705 – 30	30	29.5	30
30 – 88	100	40	3
88 – 216	150	43.5	3

216 – 960	200	46.0	3
Above 960	500	54.0	3

5.4 Test Procedure

Method of measurement of radiated disturbance

1. The radiated emission/ disturbance measurements are performed using the setup in accordance with ANSI C63.4/ Clause 7.3 of CISPR 16-2-3 radiated emission/ disturbance measurement procedure.
2. The EUT is arranged and connected with cables terminated in accordance with the product specification. The EUT with its various internal components was operated and exercised as per the instructions provided by the manufacturer.
3. Where a flexible mains cord is provided by the manufacturer, this shall be 100 cm long. If it is more, the excess cable is folded back and forth so as to form a bundle not exceeding 40cm in length.
4. Interconnecting cables that hang closer than 40cm to the ground plane are folded back and forth in the center forming a bundle 30 to 40 cm long.
5. I/O cables that are not connected to a peripheral are bundled in the center. The end of the cable is terminated, if required, using the correct terminating impedance. The overall length is not to exceed 100 cm
6. Where possible, loop-back cables are arranged so that outgoing line is not closely coupled to the return.
7. Radiated emission/ disturbance measurements are conducted with a Average detector instrument in the frequency range of 0.009 MHz to 30 MHz
8. Before any testing is performed on EUT, the Ambient (measurement noise floor) is recorded, and a QA check is performed to show that the system is functioning correctly.
9. Measurements of the radiated emission/ disturbance were made with the antenna located at a distance of 3 meters from the EUT.
10. An inverse proportionality factor of 20 dB per decade was used to normalize the measured data to the specified distance for determining compliance.
11. The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.
12. The EUT azimuth is varied during the measurement to find the maximum field-strength readings.
13. The EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.
14. The EUT was placed on a non-conductive fiber glass/foam table 80cm above the ground plane and centered on the turntable.
15. A complete scan from 0.009-30 MHz was made with antenna oriented horizontally and vertically.
16. The quasi-peak measuring receiver shall be in accordance with Clause 4 and 5 of CISPR 16-1-1.
17. Receivers with peak detectors shall be in accordance with Clause 6 of CISPR 16-1-1 and shall have a 6 (dB) bandwidth in accordance with Clause 4 of CISPR 16-1-1.
18. The antenna can be a tuned dipole or Bi-conical or log-periodic dipole array LPDA or hybrid type such as Bi-Log. Further detailed information is given in Clause 4.5 of CISPR 16-1-4.
19. The software is programmed to perform a peak sweep of the frequency band using the max hold function and peak detector.
20. This sweep is performed for every 90deg with receiving antenna in both horizontal and vertical polarities and at receiving antenna heights of 100(cm).
21. This type of scan provides emission data with a good indication of pass or fail.
22. During the peak detector scan a list of frequencies of interest is generated.

23. For each frequency of interest, the EUT is arranged to its worst case and then the antenna is adjusted to heights from 1 meter and turntable is turned from 0 to 360 degrees to find the maximum reading.
24. Average detector measurements are performed at the frequencies of interest with the Spectrum Analyzer/Receiver's 6dB resolution bandwidth set to 10 (kHz) and Video Bandwidth set to 30 (kHz).
25. For unintentional radiators, for each of the frequencies to which the device is tuned, the frequency and amplitude of the six highest radiated emissions relative to the limit and the operating frequency, or frequency to which the EUT is tuned (if appropriate), are reported unless such emissions are more than 10 (dB) below the limit.
26. If less than the specified number (less than six) emissions / disturbances are within 10 (dB) of the limit, the noise level of the measuring instrument at representative frequencies are reported.
27. The polarization of the measurement antenna (horizontal or vertical) is identified for each of the reported emissions / disturbances.
28. Radiated emission / disturbance measurements taken at alternative distances are to be converted to the limit distance using the inverse distance relationship, unless data can be presented to validate a different conversion.
29. Numbers with a minus sign in margin column indicates that disturbance levels are below the limit.

5.5 Sample Calculation

The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV/m) = Analyzer/Receiver Reading (dBuV) + Correction Factor (dB/m)
Correction Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
Margin (dB) = Corrected Reading (dBuV/m) - Applicable Limit (dBuV/m)

5.6 Test Arrangement

EUT arrangement

☒ Table-top EUT arrangement
☐ Floor-Standing arrangement due to a physical hazard in lieu of
☐ Wall Mount or ☐ Ceiling Mount or ☐ Handheld or ☐ Body Worn arrangement
Justification: N/A

☐ EUT is bonded to Chamber floor for a dedicated ground connection with a grounding connection specified by the manufacturer.

Auxiliary Equipment Arrangement

☐ Placed below the chamber floor;
☒ Placed on the chamber floor with an insulating support;
☐ Placed outside the measurement area and are routed to the remote location while being insulted from turntable with insulation thickness not more than 15cm

Cabling Arrangement

☒ Manufacturer-supplied or commercially available cabling as specified in the installation manual or user manual.
☐ Cables are bonded to the turntable in accordance with the manufacturer's recommendation.
☐ The effective length of all loop-back cables not routed overhead is longer than 2 m.
☐ The effective length of the mains cable is 100 cm ± 10 cm.
☐ Cables with mitigation features details (screening, tighter/more, twists per length, ferrite beads, etc)

Cable Type	Details of Mitigation Features

Positions of cables

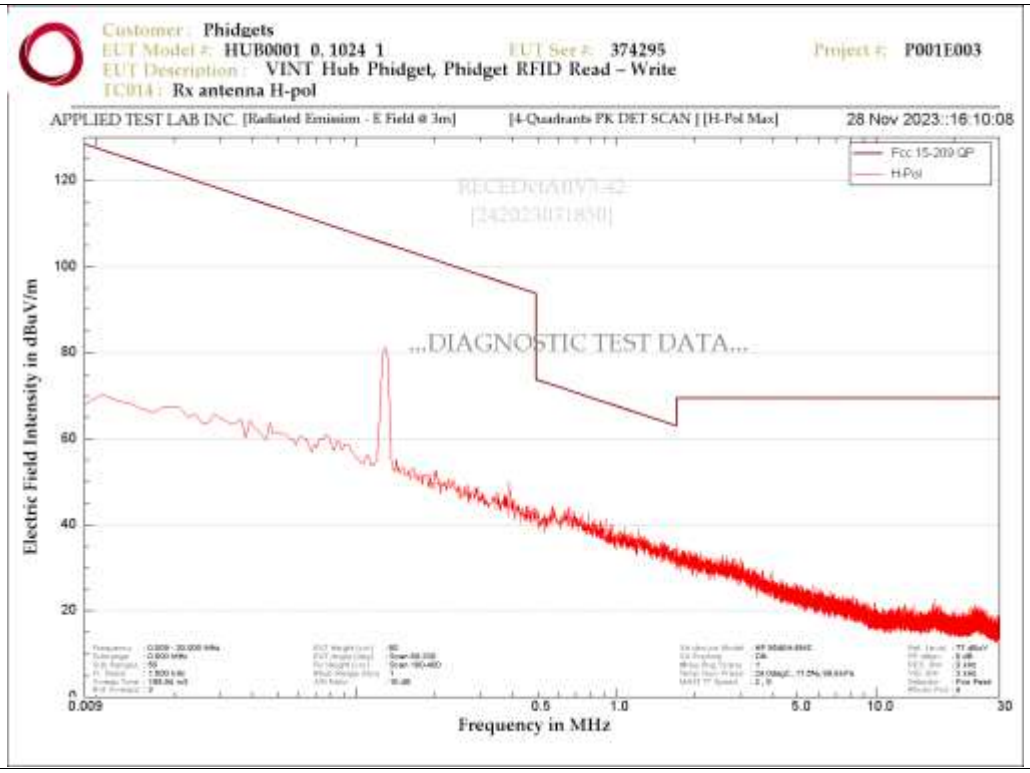
☒ The excess cable is bundled non-inductively on, but separated from, the chamber floor.
☐ Specify cable lengths if those defined cannot be achieved.

5.8 Test Data – Horizontal Polarization

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	FCC PART 15 SUBPART C
Test Distance:	3m	Line/Polarity	Horizontal
Temperature:	24°C	Humidity:	17%
Tested By:	Jaeheon Yun	Date of Test:	2023/11/28
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)

☒ Fewer than six emissions within 10 dB of the limit are observed.



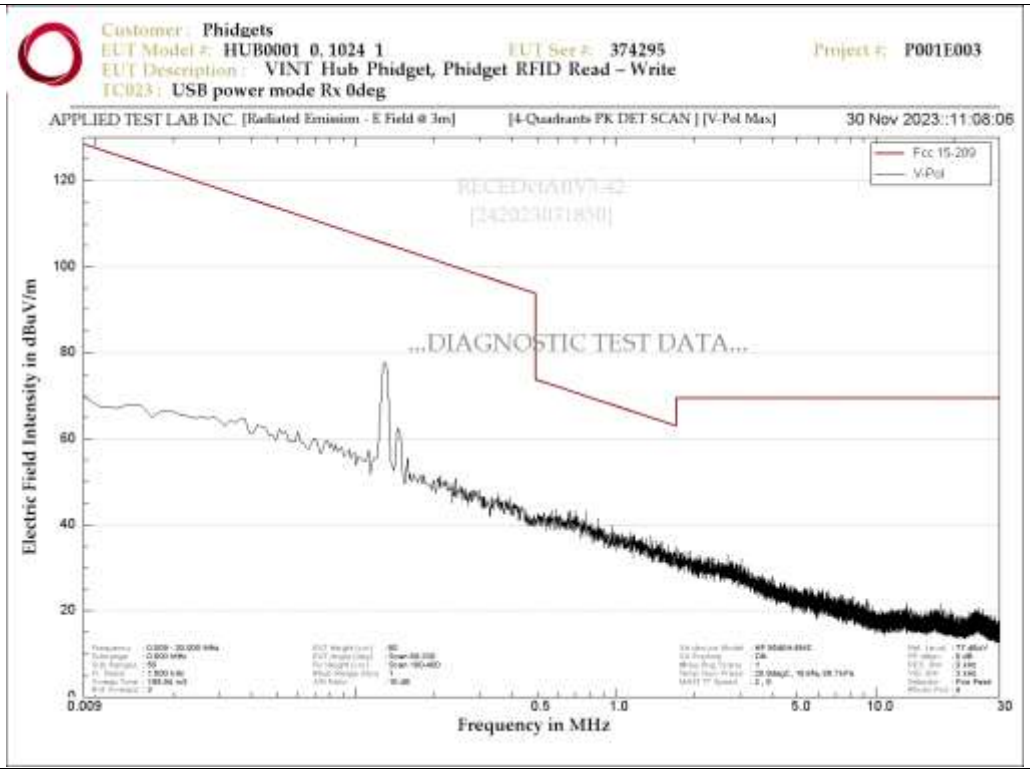
Radiated Emission - Scan Horizontal Polarization (30MHz - 1000MHz)

5.9 Test Data – Vertical Polarization

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	FCC15.209
Test Distance:	3m	Line/Polarity	Vertical
Temperature:	20°C	Humidity:	18%
Tested By:	Jaeheon Yun	Date of Test:	2023/11/30
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)

☒ Fewer than six emissions within 10 dB of the limit are observed.



Radiated Emission - Scan Vertical Polarization (30MHz - 1000MHz)

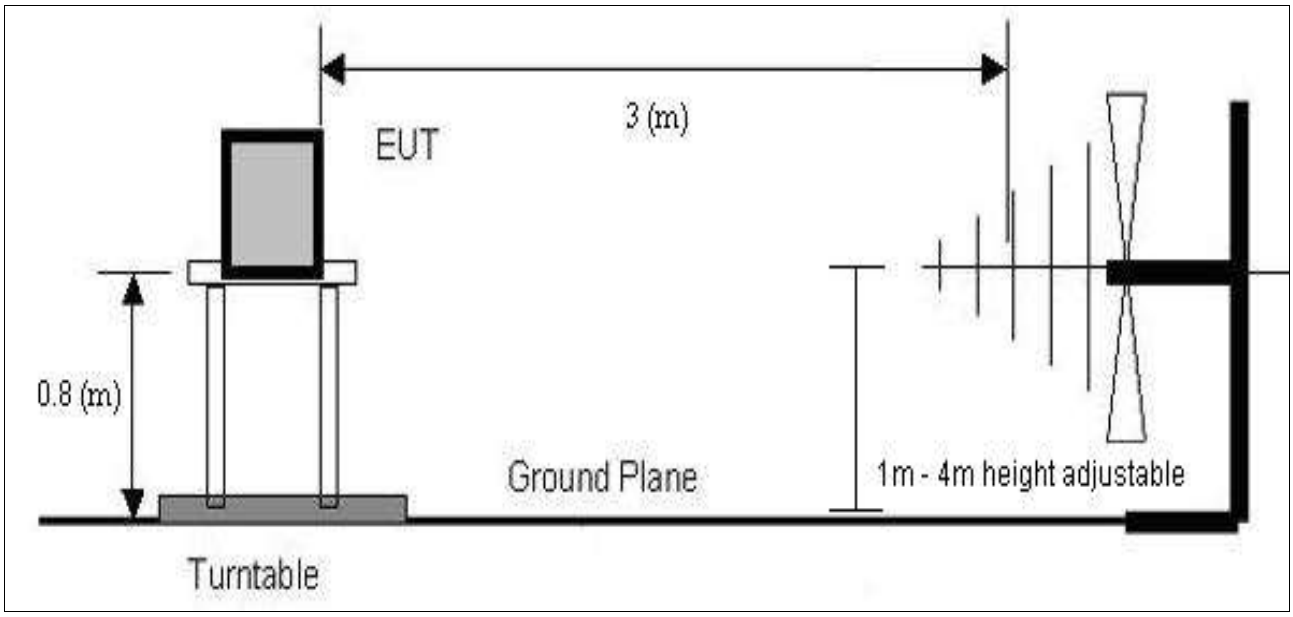
6 Radiated Emission (30MHz - 1000MHz)

6.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Next Cal
Bi-Log antenna	ETS Lindgren	3142E	144761	2024/08/01
EMI Receiver & RF filter section	Hewlett Packard	8546A, 85460A	3545A00306, 3330A00109	2024/08/11
Cable 1.5m+8.84m+2m	Micro Coax UTIFLEX	UFA200A+ UFB311A+ UFB205A	BUAO1G-0523+ 50224-H+ MFR 64639 210796-008	PV
Test SW	DVT Solutions Inc	REDvtAtlV3p42.exe - (20240321)		

Note: The equipment in the above table are within the valid calibration period.

6.2 Block Diagram of Test Configuration



6.3 Test Requirement for Intentional radiator

Radiated Emission Limits at 3m per Clause(s) FCC15.209(a)

Frequency Range (MHz)	Quasi-peak Limit (dBuV/m)
	FCC15.209
30 - 88	48.54
88 - 216	53.98
216 - 230	56.9
230 - 960	60
960 - 1000	-

6.4 Test Procedure

Method of measurement of radiated disturbance

30. The radiated emission/ disturbance measurements are performed using the setup in accordance with ANSI C63.4/ Clause 7.3 of CISPR 16-2-3 radiated emission/ disturbance measurement procedure.
31. The EUT is arranged and connected with cables terminated in accordance with the product specification. The EUT with its various internal components was operated and exercised as per the instructions provided by the manufacturer.
32. Where a flexible mains cord is provided by the manufacturer, this shall be 100 cm long. If it is more, the excess cable is folded back and forth so as to form a bundle not exceeding 40cm in length.
33. Interconnecting cables that hang closer than 40cm to the ground plane are folded back and forth in the center forming a bundle 30 to 40 cm long.
34. I/O cables that are not connected to a peripheral are bundled in the center. The end of the cable is terminated, if required, using the correct terminating impedance. The overall length is not to exceed 100 cm
35. Where possible, loop-back cables are arranged so that outgoing line is not closely coupled to the return.
36. Radiated emission/ disturbance measurements are conducted with a quasi-peak detector instrument in the frequency range of 30 MHz to 1000 MHz
37. Before any testing is performed on EUT, the Ambient (measurement noise floor) is recorded, and a QA check is performed to show that the system is functioning correctly.
38. Measurements of the radiated emission/ disturbance were made with the antenna located at a distance of 3 meters from the EUT.
39. An inverse proportionality factor of 20 dB per decade was used to normalize the measured data to the specified distance for determining compliance.
40. The antenna is adjusted between 1m and 4m in height above the ground plane for maximum meter reading at each test frequency.
41. The EUT azimuth is varied during the measurement to find the maximum field-strength readings.
42. The EUT polarization (horizontal and vertical) is varied during the measurements to find the maximum field-strength readings.
43. The EUT was placed on a non-conductive fiber glass/foam table 80cm above the ground plane and centered on the turntable.
44. A complete scan from 30-1000 MHz was made with antenna oriented horizontally and vertically.
45. The quasi-peak measuring receiver shall be in accordance with Clause 4 and 5 of CISPR 16-1-1.
46. Receivers with peak detectors shall be in accordance with Clause 6 of CISPR 16-1-1 and shall have a 6 (dB) bandwidth in accordance with Clause 4 of CISPR 16-1-1.
47. The antenna can be a tuned dipole or Bi-conical or log-periodic dipole array LPDA or hybrid type such as Bi-Log. Further detailed information is given in Clause 4.5 of CISPR 16-1-4.
48. The software is programmed to perform a peak sweep of the frequency band using the max hold function and peak detector.
49. This sweep is performed for every 22.5 deg with receiving antenna in both horizontal and vertical polarities and at receiving antenna heights of 100, 200, 300 and 400 (cm).
50. This type of scan provides emission data with a good indication of pass or fail.
51. During the peak detector scan a list of frequencies of interest is generated.
52. For each frequency of interest, the EUT is arranged to its worst case and then the antenna is adjusted to heights from 1 meter to 4 meters and turntable is turned from 0 to 360 degrees to find the maximum reading.
53. Quasi- Peak measurements are performed at the frequencies of interest with the Spectrum

Analyzer/Receiver's 6dB resolution bandwidth set to 120 (kHz) and Video Bandwidth set to 300 (kHz).

54. For unintentional radiators, for each of the frequencies to which the device is tuned, the frequency and amplitude of the six highest radiated emissions relative to the limit and the operating frequency, or frequency to which the EUT is tuned (if appropriate), are reported unless such emissions are more than 10 (dB) below the limit.
55. If less than the specified number (less than six) emissions / disturbances are within 10 (dB) of the limit, the noise level of the measuring instrument at representative frequencies are reported.
56. The polarization of the measurement antenna (horizontal or vertical) is identified for each of the reported emissions / disturbances.
57. Radiated emission / disturbance measurements taken at alternative distances are to be converted to the limit distance using the inverse distance relationship, unless data can be presented to validate a different conversion.
58. Numbers with a minus sign in margin column indicates that disturbance levels are below the limit.

6.5 Sample Calculation

The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV/m) = Analyzer/Receiver Reading (dBuV) + Correction Factor (dB/m)
Correction Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
Margin (dB) = Corrected Reading (dBuV/m) - Applicable Limit (dBuV/m)

6.6 Test Arrangement

EUT arrangement

☒ Table-top EUT arrangement
☐ Floor-Standing arrangement due to a physical hazard in lieu of
☐ Wall Mount or ☐ Ceiling Mount or ☐ Handheld or ☐ Body Worn arrangement
Justification: N/A

☐ EUT is bonded to Chamber floor for a dedicated ground connection with a grounding connection specified by the manufacturer.

Auxiliary Equipment Arrangement

☐ Placed below the chamber floor;
☒ Placed on the chamber floor with an insulating support;
☐ Placed outside the measurement area and are routed to the remote location while being insulted from turntable with insulation thickness not more than 15cm

Cabling Arrangement

☒ Manufacturer-supplied or commercially available cabling as specified in the installation manual or user manual.
☐ Cables are bonded to the turntable in accordance with the manufacturer's recommendation.
☐ The effective length of all loop-back cables not routed overhead is longer than 2 m.
☐ The effective length of the mains cable is 100 cm ± 10 cm.
☐ Cables with mitigation features details (screening, tighter/more, twists per length, ferrite beads, etc)

Cable Type	Details of Mitigation Features

Positions of cables

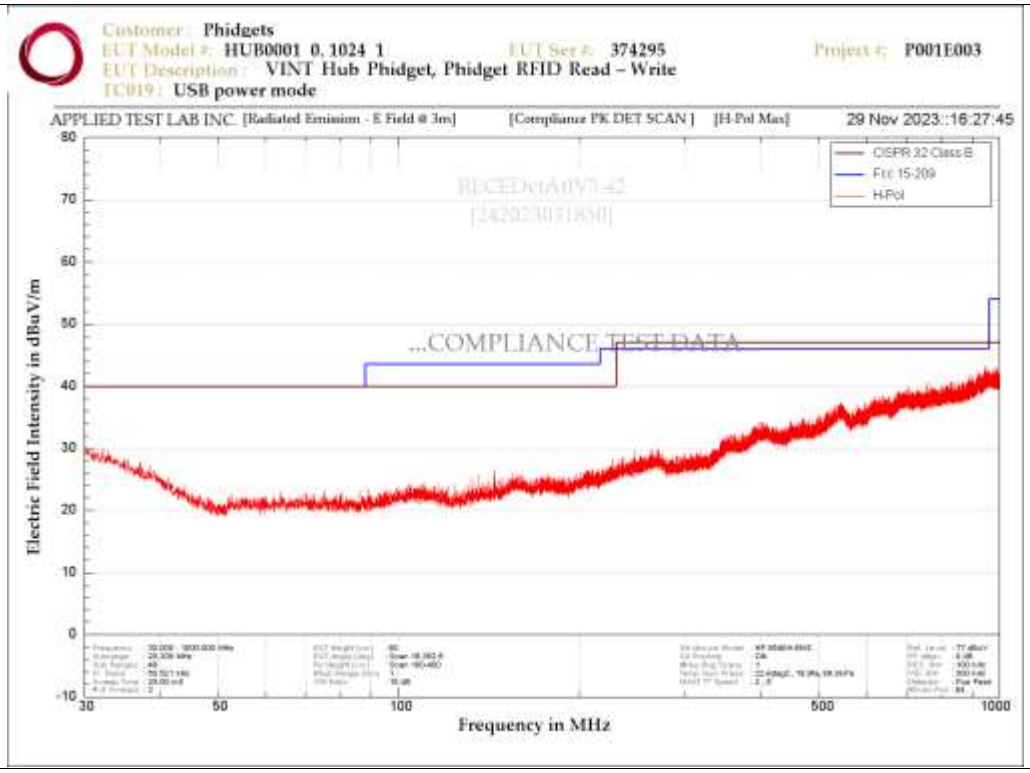
☒ The excess cable is bundled non-inductively on, but separated from, the chamber floor.
☐ Specify cable lengths if those defined cannot be achieved.

6.8 Test Data – Horizontal Polarization

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	FCC15.209
Test Distance:	3m	Line/Polarity	Horizontal
Temperature:	22°C	Humidity:	19%
Tested By:	Jaeheon Yun	Date of Test:	2023/11/29
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)

☐ Fewer than six emissions within 10 dB of the limit are observed.



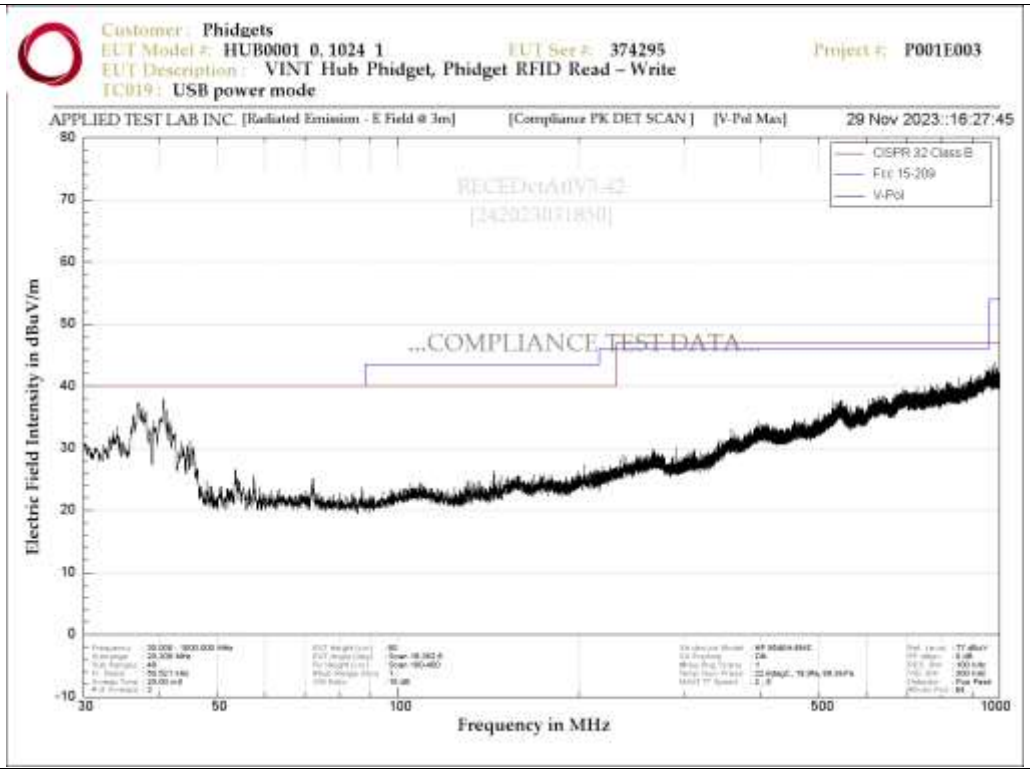
Radiated Emission - Scan Horizontal Polarization (30MHz - 1000MHz)

6.9 Test Data – Vertical Polarization

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.4
Test Voltage:	USB powered	Class:	FCC15.209
Test Distance:	3m	Line/Polarity	Vertical
Temperature:	22°C	Humidity:	19%
Tested By:	Jaeheon Yun	Date of Test:	2023/11/29
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Azimuth Angle (deg)	Antenna Height (cm)	Measured Reading (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)

☐ Fewer than six emissions within 10 dB of the limit are observed.



Radiated Emission - Scan Vertical Polarization (30MHz - 1000MHz)

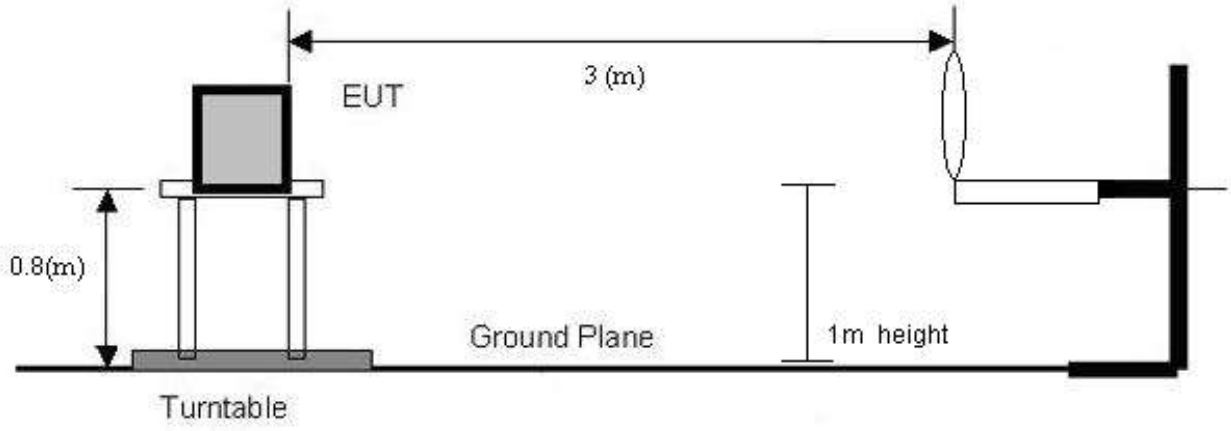
7 Transmitter Fundamental Field Strength

7.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Next Cal
Active loop antenna	Com-power Corporation	AL-130	121035	2025/03/04
MXA Signal Analyzer	Keysight	N9020A	MY48011091	2025/01/15
Cable 1.5m+8.84m+2m	Micro Coax UTIFLEX	UFA200A+ UFB311A+ UFB205A	BUAO1G-0523+ 50224-H+ MFR 64639 210796-008	PV
Test SW	DVT Solutions Inc	REDvtAtlV3p42.exe - (20240321)		

Note: The equipment in the above table are within the valid calibration period.

7.2 Block Diagram of Test Configuration



7.3 Test Requirement for Intentional radiator

Transmitter Fundamental Field Strength Limits at 300m per Clause(s) FCC15.209(a)

Frequency Range (MHz)	Quasi-peak Limit (microvolts/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

7.4 Test Procedure

Method of measurement of Transmitter Fundamental Field Strength.

1. The Transmitter Fundamental Field Strength measurements are performed using the setup in accordance with ANSI C63.10 sec 6.4 measurement procedure.
2. The EUT is arranged and connected with cables terminated in accordance with the product specification. The EUT with its various internal components was operated and exercised as per the instructions provided by the manufacturer.
3. Where a flexible mains cord is provided by the manufacturer, this shall be 100 cm long. If it is more, the excess cable is folded back and forth so as to form a bundle not exceeding 40cm in length.
4. Interconnecting cables that hang closer than 40cm to the ground plane are folded back and forth in the center forming a bundle 30 to 40 cm long.
5. I/O cables that are not connected to a peripheral are bundled in the center. The end of the cable is terminated, if required, using the correct terminating impedance. The overall length is not to exceed 100 cm
6. Where possible, loop-back cables are arranged so that outgoing line is not closely coupled to the return.
7. The limit is specified at a test distance of 300 meters. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
8. Pre-scan measurements were performed using a signal analyzer with a peak detector and measurement bandwidth of 510 Hz and video bandwidth of 5.1 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. The signal analyzer was then switched to test receiver mode and the final measurement on the maximized level was performed.
9. The measurement was performed at a measurement distance of 3 m. This value was later extrapolated to a distance of 300 m by subtracting 80 dB from the result.
10. A transducer factor was added to the test receiver measurement level. This factor includes correction between the fixed gain of the magnetic loop antenna and the calibration values. It also includes the value of the RF cable used to connect the antenna to the test receiver.
11. Since field strength compliance was shown with MaxPeak detector, hence no quasi-peak detector measurement was required.
12. Numbers with a minus sign in margin column indicates that disturbance levels are below the limit.

7.5 Sample Calculation

The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV/m) = Analyzer/Receiver Reading (dBuV) + Correction Factor (dB/m)
Correction Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
Margin (dB) = Corrected Reading (dBuV/m) - Applicable Limit (dBuV/m)

7.6 Test Arrangement

EUT arrangement

☒ Table-top EUT arrangement
☐ Floor-Standing arrangement due to a physical hazard in lieu of
☐ Wall Mount or ☐ Ceiling Mount or ☐ Handheld or ☐ Body Worn arrangement
Justification: N/A

☐ EUT is bonded to Chamber floor for a dedicated ground connection with a grounding connection specified by the manufacturer.

Auxiliary Equipment Arrangement

☐ Placed below the chamber floor;
☒ Placed on the chamber floor with an insulating support;
☐ Placed outside the measurement area and are routed to the remote location while being insulted from turntable with insulation thickness not more than 15cm

Cabling Arrangement

☒ Manufacturer-supplied or commercially available cabling as specified in the installation manual or user manual.
☐ Cables are bonded to the turntable in accordance with the manufacturer's recommendation.
☐ The effective length of all loop-back cables not routed overhead is longer than 2 m.
☐ The effective length of the mains cable is 100 cm ± 10 cm.
☐ Cables with mitigation features details (screening, tighter/more, twists per length, ferrite beads, etc)

Cable Type	Details of Mitigation Features

Positions of cables

☒ The excess cable is bundled non-inductively on, but separated from, the chamber floor.
☐ Specify cable lengths if those defined cannot be achieved.

7.8 Test Data – RFID 125 kHz

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.10 Sec 6.4
Test Voltage:	USB powered	Class:	FCC15.209
Test Distance:	3m	Line/Polarity	Horizontal & Vertical
Temperature:	22°C	Humidity:	23%
Tested By:	Adiseshu Nyshadham	Date of Test:	2024/04/30
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

Frequency (MHz)	Azimuth Angle (deg)	Measured Reading at 3m (dBuV)	Correction Factor (dB)	Corrected Reading (dBuV/m)	Extrapolated Level at 300 m (dBuV/m)	Limit at 300 m (dBuV/m)	Margin (dB)
0.125	0 to EUT	73.18	13.37	86.55	6.55	25.67	-19.12

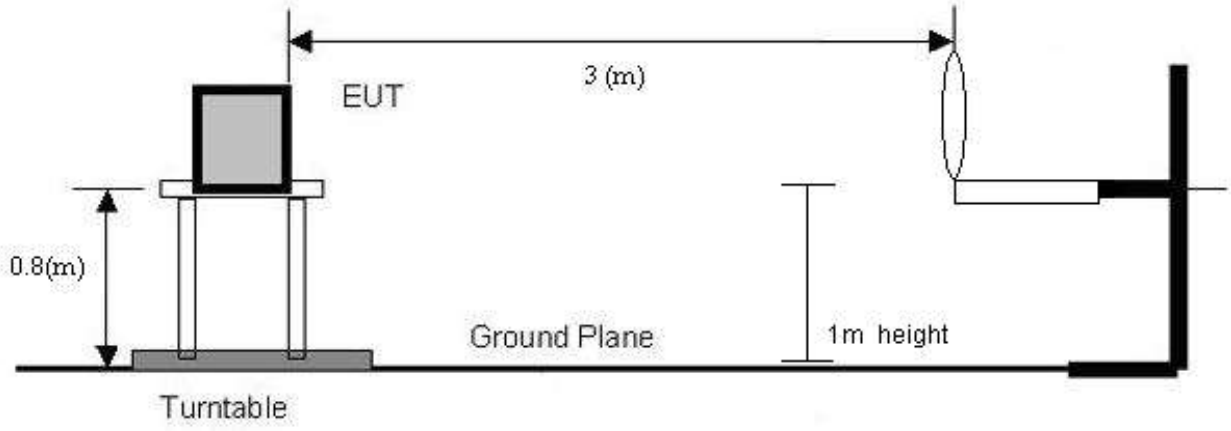
8 Transmitter 20 dB Bandwidth

8.1 Test Equipment

Description	Manufacturer	Model Number	Serial Number	Next Cal
Active loop antenna	Com-power Corporation	AL-130	121035	2025/03/04
MXA Signal Analyzer	Keysight	N9020A	MY48011091	2025/01/15
Cable 1.5m+8.84m+2m	Micro Coax UTIFLEX	UFA200A+ UFB311A+ UFB205A	BUAO1G-0523+ 50224-H+ MFR 64639 210796-008	PV
Test SW	DVT Solutions Inc	WIRELESSv1.1.exe - (132019111616)		

Note: The equipment in the above table are within the valid calibration period.

8.2 Block Diagram of Test Configuration



8.3 Test Requirement for Intentional radiator

Transmitter 20 dB Bandwidth Limits at 300m per Clause(s) FCC15.215

Frequency Range (MHz)	Quasi-peak Limit (microvolts/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

8.4 Test Procedure

Method of measurement of Transmitter Fundamental Field Strength.

13. The Transmitter Fundamental Field Strength measurements are performed using the setup in accordance with ANSI C63.10 sec 6.4 measurement procedure.
14. The EUT is arranged and connected with cables terminated in accordance with the product specification. The EUT with its various internal components was operated and exercised as per the instructions provided by the manufacturer.
15. Where a flexible mains cord is provided by the manufacturer, this shall be 100 cm long. If it is more, the excess cable is folded back and forth so as to form a bundle not exceeding 40cm in length.
16. Interconnecting cables that hang closer than 40cm to the ground plane are folded back and forth in the center forming a bundle 30 to 40 cm long.
17. I/O cables that are not connected to a peripheral are bundled in the center. The end of the cable is terminated, if required, using the correct terminating impedance. The overall length is not to exceed 100 cm
18. Where possible, loop-back cables are arranged so that outgoing line is not closely coupled to the return.
19. The limit is specified at a test distance of 300 meters. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
20. Pre-scan measurements were performed using a signal analyzer with a peak detector and measurement bandwidth of 510 Hz and video bandwidth of 5.1 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. The signal analyzer was then switched to test receiver mode and the final measurement on the maximized level was performed.
21. The measurement was performed at a measurement distance of 3 m. This value was later extrapolated to a distance of 300 m by subtracting 80 dB from the result.
22. A transducer factor was added to the test receiver measurement level. This factor includes correction between the fixed gain of the magnetic loop antenna and the calibration values. It also includes the value of the RF cable used to connect the antenna to the test receiver.
23. Since field strength compliance was shown with MaxPeak detector, hence no quasi-peak detector measurement was required.
24. Numbers with a minus sign in margin column indicates that disturbance levels are below the limit.

8.5 Sample Calculation

The calculation for the radiated emission field strength is as follows:

Corrected Reading (dBuV/m) = Analyzer/Receiver Reading (dBuV) + Correction Factor (dB/m)
Correction Factor (dB/m) = Cable Loss (dB) + Antenna Factor (dB/m)
Margin (dB) = Corrected Reading (dBuV/m) - Applicable Limit (dBuV/m)

8.6 Test Arrangement

EUT arrangement

☒ Table-top EUT arrangement
☐ Floor-Standing arrangement due to a physical hazard in lieu of
☐ Wall Mount or ☐ Ceiling Mount or ☐ Handheld or ☐ Body Worn arrangement
Justification: N/A

☐ EUT is bonded to Chamber floor for a dedicated ground connection with a grounding connection specified by the manufacturer.

Auxiliary Equipment Arrangement

☐ Placed below the chamber floor;
☒ Placed on the chamber floor with an insulating support;
☐ Placed outside the measurement area and are routed to the remote location while being insulted from turntable with insulation thickness not more than 15cm

Cabling Arrangement

☒ Manufacturer-supplied or commercially available cabling as specified in the installation manual or user manual.
☐ Cables are bonded to the turntable in accordance with the manufacturer's recommendation.
☐ The effective length of all loop-back cables not routed overhead is longer than 2 m.
☐ The effective length of the mains cable is 100 cm ± 10 cm.
☐ Cables with mitigation features details (screening, tighter/more, twists per length, ferrite beads, etc)

Cable Type	Details of Mitigation Features

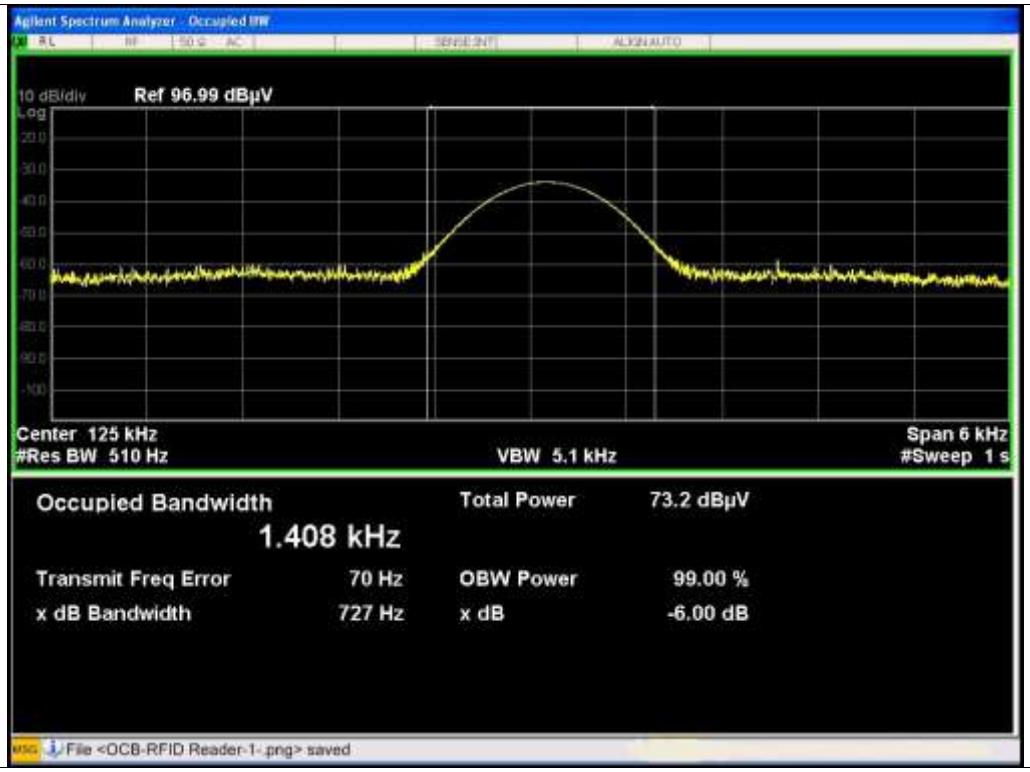
Positions of cables

☒ The excess cable is bundled non-inductively on, but separated from, the chamber floor.
☐ Specify cable lengths if those defined cannot be achieved.

8.8 Test Data – RFID 125 kHz

Client:	Phidgets Inc.	Test Standard:	FCC15.209
Model No.:	Phidget 125 kHz RFID Reader/Writer 1024_1	Product:	Phidget 125 kHz RFID Reader/Writer 1024_1
Serial No.:	374295	Test Reference:	ANSI C63.10 Sec 6.9
Test Voltage:	USB powered	Class:	FCC15.209
Test Distance:	3m	Line/Polarity	Horizontal & Vertical
Temperature:	22°C	Humidity:	23%
Tested By:	Adiseshu Nyshadham	Date of Test:	2024/04/30
Decision Rule-Supporting Evidence	☒ Data obtained ☐ Video	☐ Email conversation ☐ Inherent in the requested specification ☐ Other	

RFID Channel (MHz)	20 dB Bandwidth (kHz)
0.125	1.408



20 dB Bandwidth

Appendix A – Test Sample Description

(From Data Provided by the Customer)

EUT Information

The test sample is a hand-built production sample, which was assembled, soldered & tested by Phidgets Inc. Called a “Gold Board”, the test sample is intended to mimic the final product as closely as possible. This is to ensure that the final appearance and packaging is correct and within acceptable tolerances. It is also loaded with the final version of firmware to ensure proper operation and to verify full functionality. Once tested, the designs are provided to Contract Manufacturer for mass production.

Appendix B – List of Abbreviations and Acronyms

A	Ampere	
AC	Alternating Current	
AE	Associated Equipment or Auxiliary Equipment	
AAN	Asymmetric Artificial Network	
AM	Amplitude Modulation	ANSI C63.14-2014
AMN	Artificial Mains Network	ANSI C63.14-2014
ANSI	American National Standards Institute	ANSI C63.14-2014
ATL	Applied Test Lab Inc.	
Av	Average Detector	
BCI	Bulk Current Injection	ANSI C63.14-2014
°C	Degree Centigrade	
CB	Citizens' Band	
CENELEC	Committee for Electrotechnical Standardization	
CFR	Code of Federal Regulations	
CISPR	International Special Committee on Radio Interference	
cm	Centimeter	
CDN	Coupling Decoupling Network	
CW	Continuous Wave	ANSI C63.14-2014
dB	Decibel	ANSI C63.14-2014
dBuV	Decibels (voltage level) referenced to 1 microvolt across 50 ohms	ANSI C63.14-2014
dBuV/m	Decibels (voltage level) referenced to 1 microvolt per meter	ANSI C63.14-2014
DoD	Department of Defense	
DRG	Double Ridged Guide	
DSA	Dynamic Spectrum Access	
E	Earth Power Line	
EFT	Electrical Fast Transients	
EIRP	Equivalent Isotropically Radiated Power	ANSI C63.14-2014
ESD	Electro-Static Discharge	ANSI C63.14-2014
EMC	ElectroMagnetic Compatibility	ANSI C63.14-2014
EMI	Electro-Magnetic Interference	ANSI C63.14-2014
EN	European Standards	
ERP	Equivalent Radiated Power	ANSI C63.14-2014
ETSI	European Telecommunications Standards Institute	
EUT	Equipment Under Test	ANSI C63.14-2014
FCC	Federal Communication Commission	ANSI C63.14-2014
FM	Frequency Modulation	ANSI C63.14-2014
GHz	Gigahertz	
GPS	Global Positioning System	
GRP	Ground Reference Plane	
H	Horizontal Polarization	
HCP	Horizontal Coupling Plane	
HDD	Hard disk drive	
Hz	Hertz	
I/O	Input / Output	
IEC	International Electrotechnical Commission	ANSI C63.14-2014
ISM	Industrial, Scientific, and Medical	ANSI C63.14-2014
ISN	Impedance Stabilization Network	
ISO	International Organization for Standardization	ANSI C63.14-2014
ITE	Information Technology Equipment	ANSI C63.14-2014

kHz	Kilohertz	
kPa	Kilopascal	
LAN	Local Area Network	
lb	Pound	
LCL	Longitudinal Conversion Loss	
LED	Light Emitting Diode	
LF	Low Frequency	
Line L	Live Power Line	
Line N	Neutral Power Line	
LISN	Line Impedance Stabilization Network	ANSI C63.14-2014
LPDA	Log-Periodic Dipole Array	
MHz	Megahertz	
MME	Multimedia Equipment	
N/A	Not Applicable	
NCR	No Calibration Required	
NSA	Normalized Site Attenuation	ANSI C63.14-2014
PC	Personal Computer	
PCS	Personal Communication Services	
Pk	Peak Detector	
Pol	Polarization	
PV	Periodic Verification	
QA	Quality Assurance	
QP	Quasi Peak Detector	
R/W	Read / Write	
RF	Radio Frequency	ANSI C63.14-2014
RFID	Radio Frequency Identification	
RGP	Reference Ground Plane	
RS232	Recommended Standard 232 for a type of serial communication used for transmission of data	
RTCA	Radio Technical Commission For Aeronautics	
SAMWAH	Manufacturer of Flt type Ferrite tile absorber	
SE	Support Equipment	
TCF	Technical Construction File	
TV	Television	
USB	Universal Serial Bus	
UTP	Unshielded Twisted Pair	
V	Vertical Polarization	
VAC	AC Voltage	
VCP	Vertical Coupling Plane	
WiMAX	Worldwide Interoperability for Microwave Access	
WLAN	Wireless Local Area Network	
WRAN	Wireless Regional Area Network	
WUSB	W**ireless** USB	

End of document