Limited Test report – RFI (2.7 to 6 GHz)

372945-TRFEMC

Date of issue: May 9, 2019

Applicant:

MicroRidge Systems, Inc.

Product:

RF Module

Model:

MICRO-RM2.4

Specification:

EN 301 489-17 V3.1.1 (2017-02)

Electromagnetic compatibility and Radio Spectrum Matters (ERM)
ElectroMagnetic Compatibility (EMC) standard for radio equipment;
Part 17: Specific conditions for Broadband Data Transmission Systems

Lab and test locations

Company name	Nemko USA, Inc.
Address	2210 Faraday Ave, Suite 150
City	Carlsbad
Province	California
Postal code	92008
Country	USA
Telephone	+1 760 444 3500
Website	www.nemko.com
Site number	FCC: US5058; IC: 2040B

Tested by	Enrique Hernández, EMC Test Engineer
Reviewed by	Chip Fleury
Review date	May 15, 2013
Reviewer signature	

Limits of responsibility

Note that 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 samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko USA's ISO/IEC 17025 accreditation.
This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government

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Section 1 Report summary

1.1 Test specifications

EN 301 489-17 V3.1.1 (2017-02)	Electromagnetic compatibility and Radio Spectrum Matters (ERM) Electromagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems
EN 301 489-1 V2.1.1 (2017-02)	Electromagnetic compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements

1.2 Exclusions

None

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant to the RFI requirements from 2.7 to 6GHz

Testing was performed against all relevant requirements of the test standard. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.4 Test report revision history

Table 1.4-1: *Test report revision history*

Revision #	Details of changes made to test report
372945TRFEMC	Original report issued

Notes: None

Section 2 Summary of test results

2.1 Equipment classification

Table 2.1-1: *Equipment classification (EN 301 489-1 V1.9.2 – Clause 5.5)*

Equipment classification	
☐	Radio and ancillary equipment for fixed use (e.g. base stations equipment)
☐	Radio and ancillary equipment for vehicular use (e.g. mobile equipment)
☒	Radio and ancillary equipment for portable use (portable equipment)

Notes: For the purpose of the EMC performance assessment, the radio equipment and/or associated ancillary equipment under test shall be classified into one of the following three classes

This classification determines the extent of applicable EMC tests. However, the following instructions shall also apply to multiple use radio and/or ancillary equipment:

- Radio and/or ancillary equipment for portable use or combinations thereof declared as capable of being powered for intended use by the main battery of a vehicle shall additionally be considered as equipment for vehicular use;
- Radio and/or ancillary equipment for portable or vehicular use or combinations thereof declared as capable of being powered for intended use by an AC mains or DC network shall additionally be considered as equipment for fixed use.

2.2 Results

Table 2.2-1: *Clause 9 of EN 301 489-1 Test methods and levels for immunity tests results*

Environmental phenomenon	Test port	Basic standard	Verdict
Radio frequency electromagnetic field (2700 to 6000 MHz) *– Clause 9.2*	Enclosure	EN 61000-4-3	Pass

Notes:
[1] Not applicable for radio and ancillary equipment for vehicular use (e.g. mobile equipment)
[2] Applicable only for radio and ancillary equipment for fixed use (e.g. base station equipment)
[3] Not applicable for radio and ancillary equipment for portable use (portable equipment)
[4] Applicable only for radio and ancillary equipment for vehicular use (e.g. mobile equipment)

- Equipment is not intended to be used in vehicular environment
- The EUT is DC powered
- The EUT does not contain any telecommunication ports

Section 3 Equipment under test (EUT) details

3.1 Applicant

Company name	MicroRidge Systems, Inc
Address	56888 Enterprise Dr. P.O. Box 3249
City	Sunriver
Province/State	OR
Postal/Zip code	97707-0249
Country	United States

3.2 Manufacturer

Company name	MicroRidge Systems, Inc
Address	56888 Enterprise Dr. P.O. Box 3249
City	Sunriver
Province/State	OR
Postal/Zip code	97707-0249
Country	United States

3.3 Sample information

Receipt date	May 9, 2019
Nemko sample ID number	NEx. 372945

3.4 EUT information

Product name	RF Module
Model	MICRO-RM2.4
Serial number	1
Part number	N/A
Power requirements	USB power 5Vdc
Description/theory of operation	N/A
Operational frequencies	2.4GHz
Software details	ComTestSerial V. 3.0.0.113

3.5 EUT exercise and monitoring details

The EUT is a RF module and need to be paired with the Mobile Collect USB Base for show the receiving and transmitting data between those devices on ComTestSerial window.

3.6 EUT setup details

Table 3.6-1: *EUT sub assemblies*

Description	Brand name	Model/Part number	Serial number	Rev.
RF Module	MicroRidge	MICRO-RM2.4	1	A

Table 3.6-2: *EUT interface ports*

Description	Qty.
USB	1
Jack port	1

Table 3.6-3: *Support equipment*

Description	Brand name	Model/Part number	Serial number	Rev.
Mobile Collect USB Base	MicroRidge	N/A	---	---
Laptop	Dell	Vostro	---	---
PC	Dell	Optiplex7050	---	---

Table 3.6-4: *Inter-connection cables*

Cable description	From	To	Length (m)
USB	Laptop	EUT	1
USB	PC	Mobile Collect USB Base	4.8

Figure 3.6-1: *Setup diagram*

Section 4 Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None.

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5 Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	86–106 kPa

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 6 Measurement uncertainty

6.1 Uncertainty of measurement

Nemko USA Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 “Uncertainty in EMC measurements.” Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

Section 7 Terms and definitions

7.1 Performance criterion

Performance criteria: Reference clause 6 of EN 301 489-17 2.2.1 (2012-09)

7.2 General definitions

7.2.1 EN 61000-4-3: (Radiated, radio-frequency, electromagnetic field)

Continuous waves (CW)	Electromagnetic waves, the successive oscillations of which are identical under steady-state conditions, which can be interrupted or modulated to convey information.
Electromagnetic (EM) wave	Radiant energy produced by the oscillation of an electric charge characterized by oscillation of the electric and magnetic fields.
Field strength	The term “field strength” is applied only to measurements made in the far field. The measurement may be of either the electric or the magnetic component of the field and may be expressed as V/m, A/m or W/m2; any one of these may be converted into the others.
Sweep	Continuous or incremental traverse over a range of frequencies.

Section 8 Testing data

8.1 Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz)

8.1.1 References

EN 61000-4-3: 2006 + A1: 2008 + A2: 2010

8.1.2 Test summary

Verdict	Pass		
Test date	May 9, 2019	Temperature	21 °C
Test engineer	Enrique Hernández, EMC Test Engineer	Air pressure	998 mbar
Test location	RFI Chamber	Relative humidity	51 %

8.1.3 Notes

None

8.1.4 Setup details

Table 8.1-1: *Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz) equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Signal Generator	Agilent	E8254A	836	2/25/2019	2/25/2020
RF Amplifier	Amplifier Research	60S1G6	E1176	NCR	NCR
Antenna RF Microwave	Amplifier Research	ATR80M6G	1227	NCR	NCR

Notes: NCR - no calibration required

Table 8.1-2: *Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz) test software details*

Manufacturer of Software	Details
ETS-LINDGREN	TILE! Version 6.0.4.548

Notes: None

8.1.5 Test data

Table 8.1-3: *Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz) results*

Step size increment	1 %
Dwell time[1]	3 s
Antenna polarization	Vertical and Horizontal
Modulation	CW signal amplitude modulated (AM) with 80 % depth with a 1 kHz sine wave
EUT setup configuration	Table top
EUT position facing antenna	Front side, back side, left side and right side

Frequency range, MHz		Test level, V/m	Comments
2700	6000	3	No degradation

Notes: [1]The dwell time at each frequency was not less than the time necessary for the EUT to be exercised and to be able to respond. The time to exercise the EUT is not interpreted as a total time of a program or a cycle but related to the reaction time in case of failure of the EUT.

[2]The exclusion band for immunity testing shall be calculated as follows:

- lower limit of exclusion band = lowest allocated band edge frequency -5 %;
- upper limit of exclusion band = highest allocated band edge frequency +5 %.

8.1.6 Setup photo

Figure 8.1-1: *Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz) setup photo*

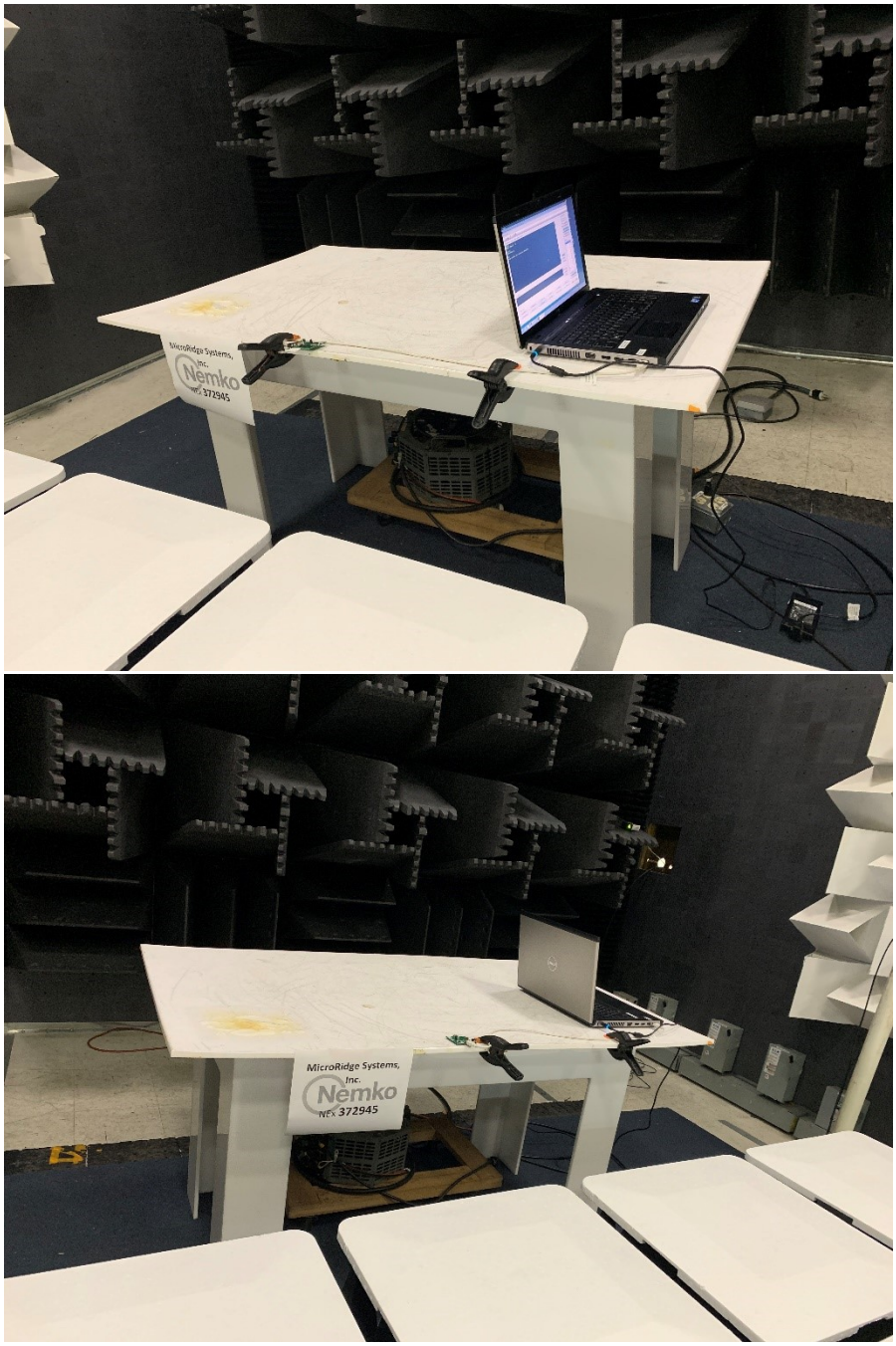


Figure 8.1-2: *Clause 9.2 – Radio frequency electromagnetic field (2.7 GHz to 6GHz) setup photo*

Section 9 EUT photos

9.1 External photos

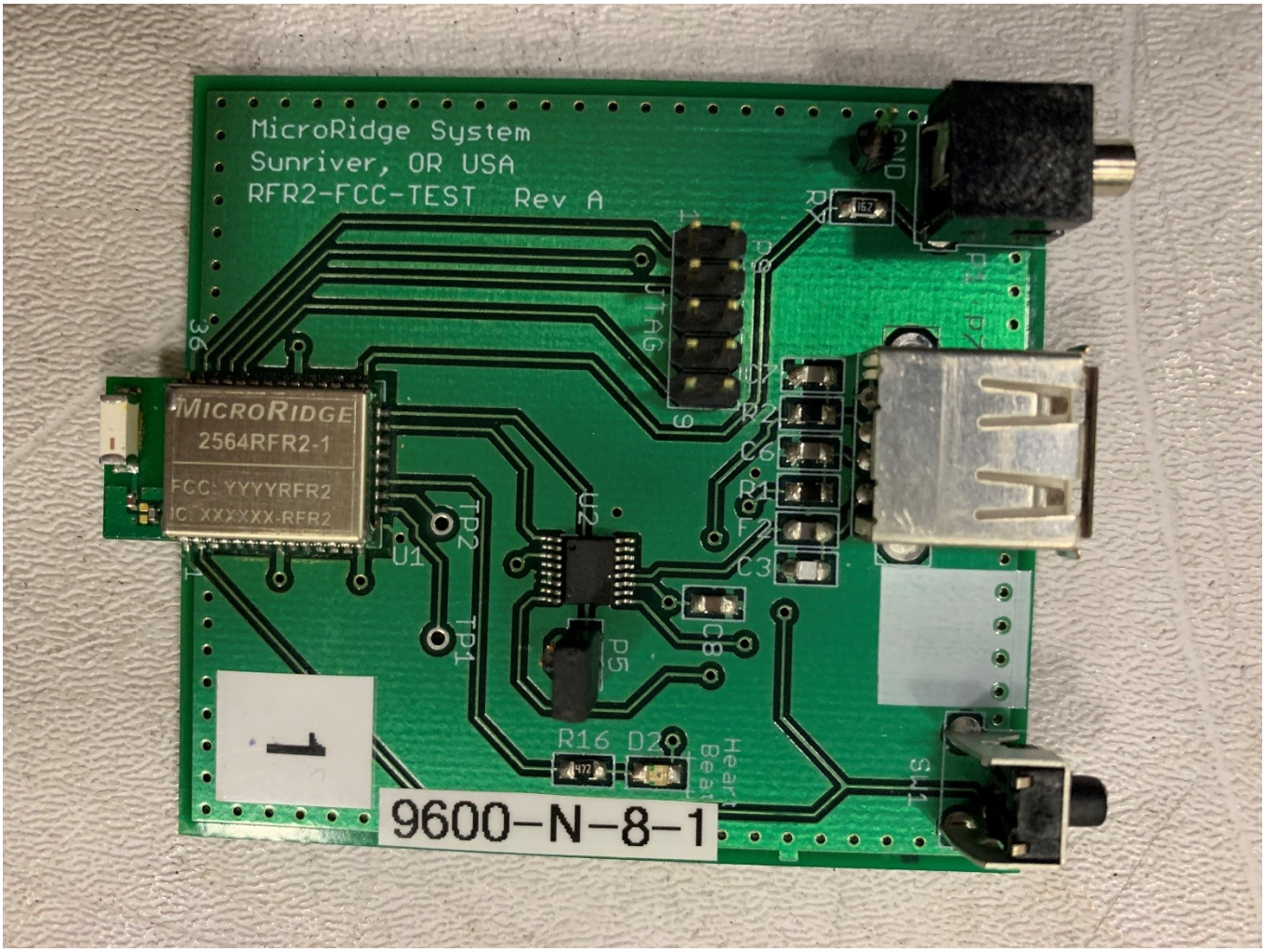


Figure 9.1-1: *Front view photo*

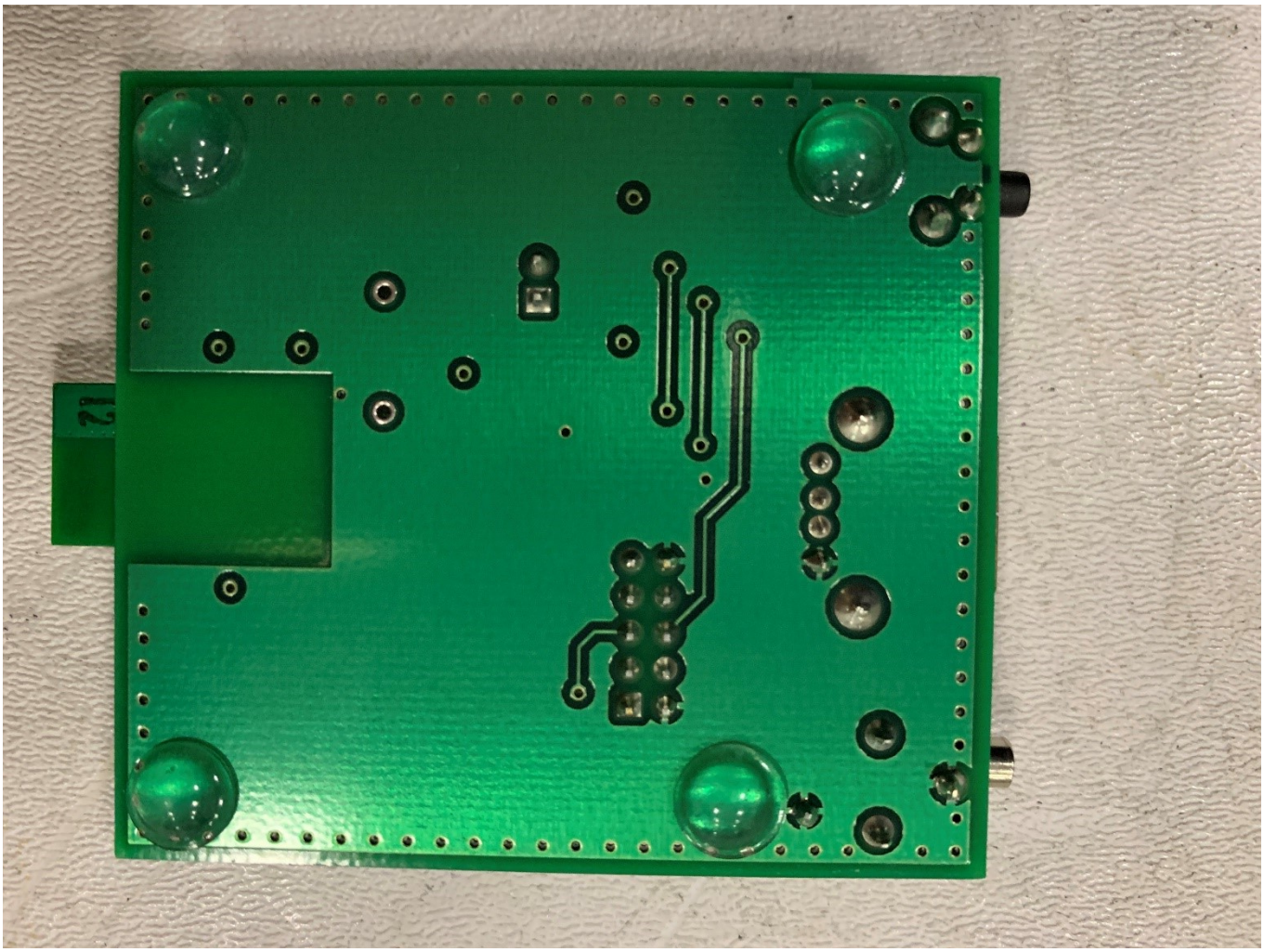
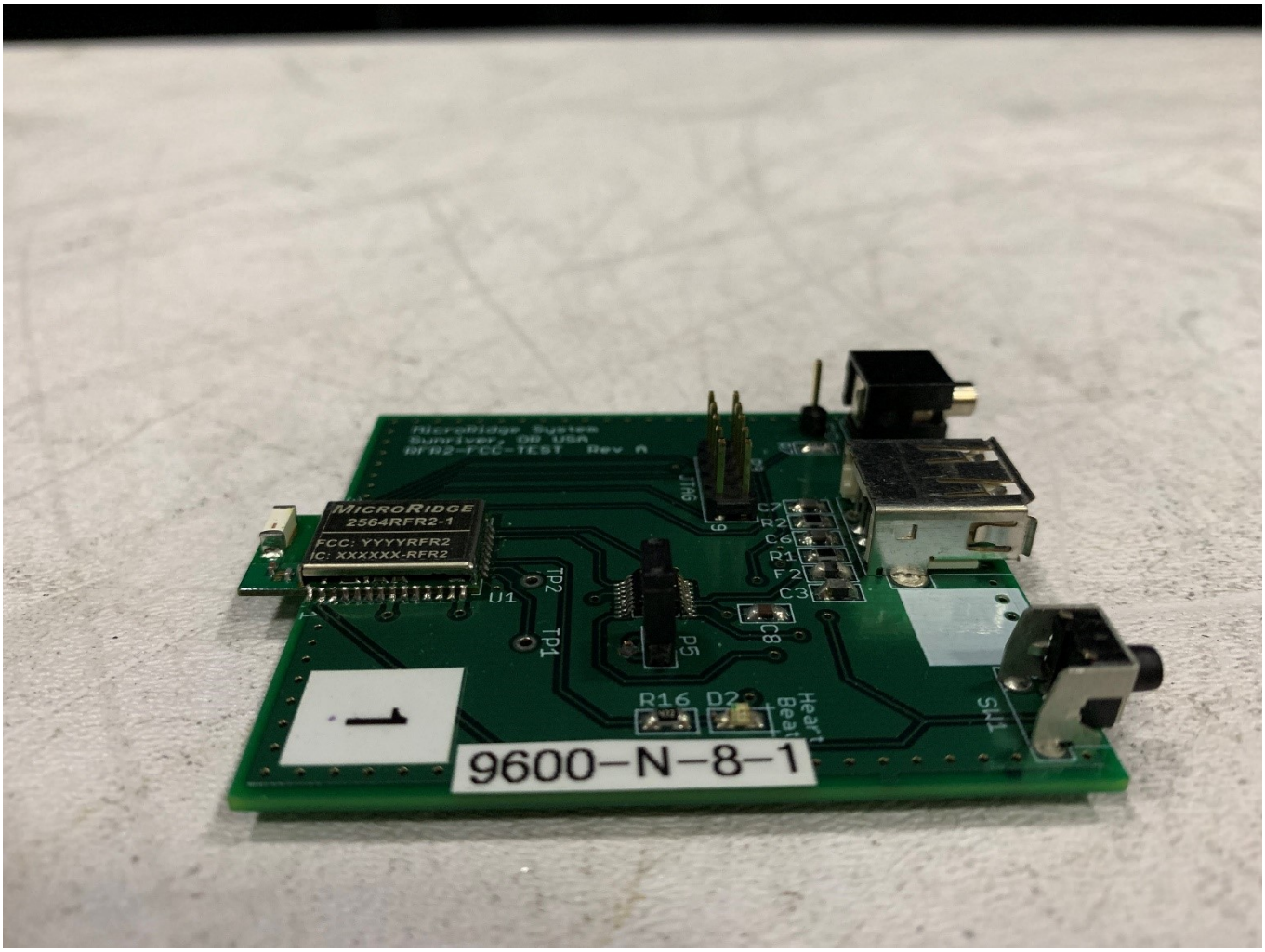


Figure 9.1-2: *Rear view photo*


MICRORIDGE
256ARFR2-1
JTAG
GND
MicroRidge System
Sunriver, OR USA
RFR2-FCC-TEST Rev A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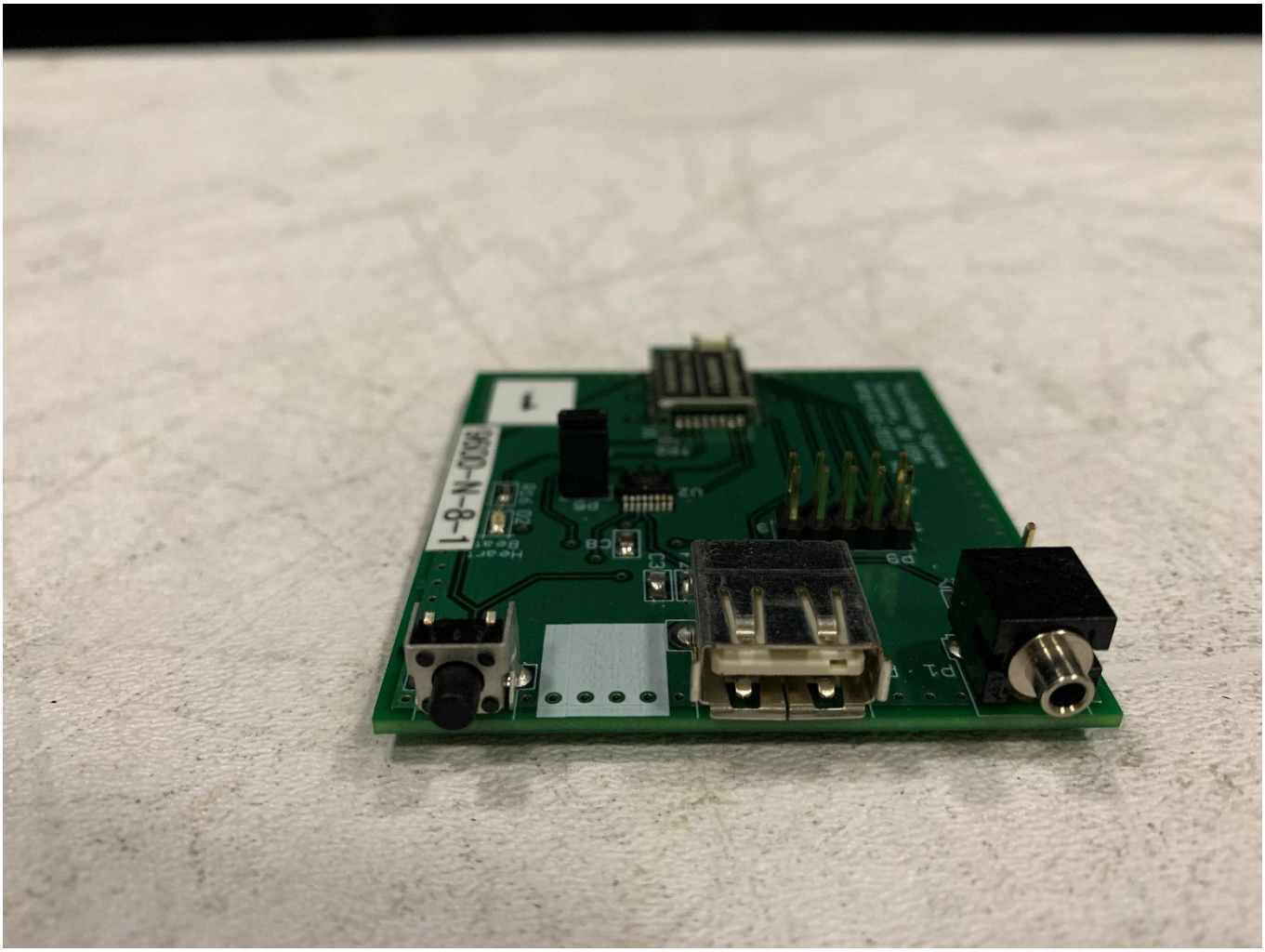
FCC: YYYYRFR2
IC: XXXXXX-RFR2
U1
TP2
TP1
P5
JTAG
C7
R2
C6
R1
F2
C3
C8
R16
D2
SW1
9600-N-8-1



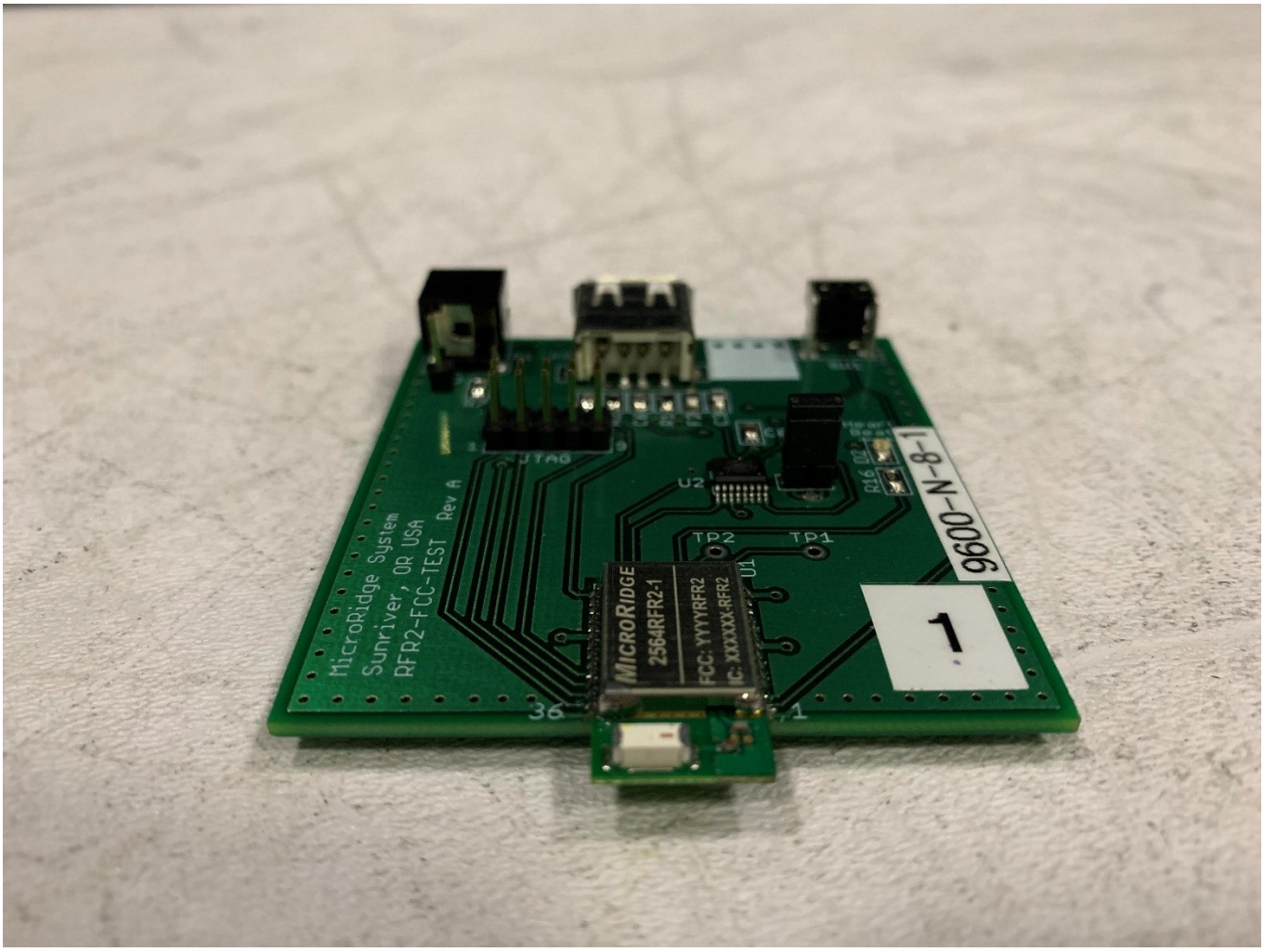


Figure 9.1-3: *Side view photo*