NVLAP Lab Code 200087-0

ROGERS LABS, INC.

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Class 2 Permissive Change Application Report

HVIN: RBD22UGS-5HPacD2HnD-15S-US
FCC ID: TV7D2352AC
IC: 7442A-D2352AC

FOR

Mikrotikls SIA

Brivibas gatve 214i
Riga, Latvia LV-1039

FCC Designation: US5305
IC Test Site Registration: 3041A-1
Test Report Number: 200429

Test Dates: April 29, 2020 to June 16, 2020

Authorized Signatory: Scot D Rogers

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Revisions

Revision 1 Issued June 17, 2020

Summary

The following information is submitted for consideration in processing Class 2 Permissive Change (C2PC) of authorized equipment. The product was granted authorization with FCC (FCC ID: TV7D2352AC Issued January 23, 2020) and Canada (IC: 7442A-D2352AC Issued April 14, 2020). The design provides communications operations in the United States as Digital Transmission System (DTS) across the 2412-2462 MHz frequency band and Unlicensed National Information Infrastructure (UNII) across 5180-5240 and 5745-5825 MHz. The design provides communications operations in Canada as Digital Transmission System (DTS) across the 2412-2462 MHz frequency band and Unlicensed National Information Infrastructure (UNII) across 5745-5825 MHz. This report presents test results supporting the use of this product in a modified enclosure with integrated internal antenna. The change to equipment addresses the change to enclosure and integrated antenna. The new configuration will hold same identifier and referenced as HVIN: RBD22UGS-5HPacD2HnD-15S-US.

Name of Applicant: Mikrotikls SIA
Brivibas gatve 214i
Riga, Latvia LV-1039

HVID: RBD22UGS-5HPacD2HnD-15S-US PMN: mANTBox 52 15S
FCC ID: TV7D2352AC IC: 7442A-D2352AC

Opinion / Interpretation of Results

Test Performed per 47CFR, RSS-247	Minimum Margin (dB)	Results
Radiated Emissions	-2.5	Complies

Change to Equipment from Original Design

This request addresses use with integrated Dual-Band Antenna manufactured by Mikrotik (model: Inegral) providing 12 dBi for 2.4 GHz and 15 dBi gain for 5 GHz operations. The information contained in this report addresses radiated emissions measured when using the integrated antenna and enclosure. No modification in the transmitter circuitry was required or performed. The transmitter remains electrically identical and functionally equivalent to the original equipment authorizations. This report presets worst-case emissions when operating in DTS mode across the 2412-2462 MHz frequency band.

Equipment Tested

Equipment	Model / PN	FCC Identifier	IC Identifier
EUT	RBD22UGS-5HPacD2HnD-15S-US	TV7D2352AC	7442A-D2352AC
AC Supply	MT48-480095-11SGU	N/A	N/A
Dell Latitude	E6520	N/A	N/A

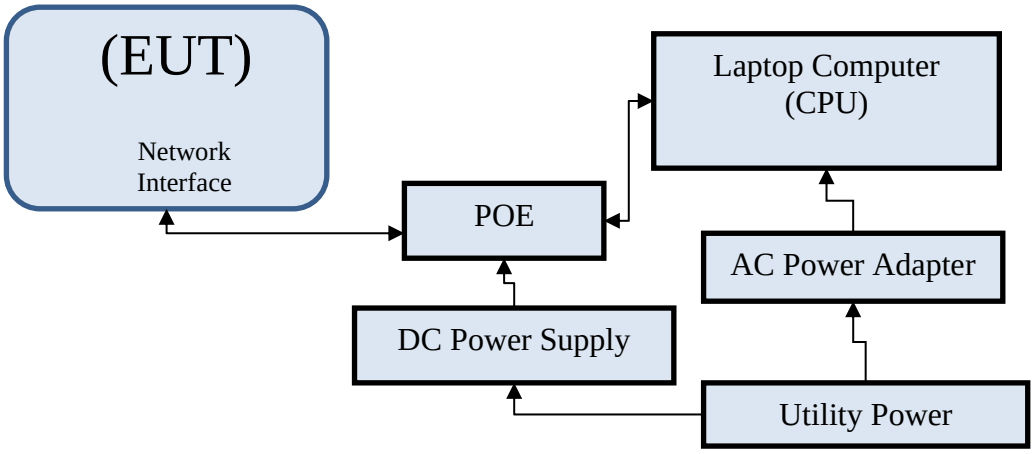
Test results in this report relate only to the items tested.

Software Version: 6.48beta12

Equipment Function and Configuration

The EUT is a Digital Transmission communications device providing wireless digital communications between network and digital equipment. The design provides input power port, SFP, USB port, and single RJ45 network port. The design provides no other interfacing options than those presented in this report. For testing purposes, the test sample was configured as directed by the manufacturer with all transmitters and chains active and communicating through the network line with the laptop computer. As requested by the manufacturer the equipment was tested for emissions compliance using the available configuration with the worst-case data presented. Test results in this report relate only to the products described in this report.

Equipment Configuration



Applicable Standards & Test Procedures

In accordance with the 47CFR, dated April 29, 2020 Part 2, Subpart J, Paragraph 2.932 and applicable parts of paragraph 15, RSS-GEN and RSS-247 the following information is submitted for processing Class 2 Permissive Change (C2PC) and add model to REL Family.

Test Site Locations

Conducted EMI — AC line conducted emissions testing performed in a shielded screen room located at Rogers Labs, Inc., 4405 West 259th Terrace, Louisburg, KS

Radiated EMI — The radiated emissions tests were performed at the 3 meters, Open Area Test Site (OATS) located at Rogers Labs, Inc., 4405 West 259th Terrace, Louisburg, KS

Registered Site information: FCC Site: US5305 and ISED: 3041A, CAB Identifier: US0096

NVLAP Accreditation — Lab code 200087-0

Units of Measurements

Conducted EMI — Data presented in dBµV; dB referenced to one microvolt

Antenna port Conducted — Data is in dBm; dB referenced to one milliwatt

Radiated EMI — Data presented in dBµV/m; dB referenced to one microvolt per meter

Note: The limit is expressed for a measurement in dBµV/m when the measurement is taken at a distance of 3 or 10 meters. Data taken for this report was taken at distance of 3 meters. Sample calculation demonstrates corrected field strength reading for Open Area Test Site using the measurement reading and correcting for receive antenna factor, cable losses, and amplifier gains.

Sample Calculation:

RFS = Radiated Field Strength, FSM = Field Strength Measured
A.F. = Receive antenna factor, Losses = attenuators/cable losses, Gain = amplification gains
RFS (dBµV/m @ 3m) = FSM (dBµV) + A.F. (dB/m) + Losses (dB) - Gain (dB)

Environmental Conditions

Ambient Temperature	24.4° to 25.3° C
Relative Humidity	39% to 46%
Atmospheric Pressure	1015.1 to 10195 mb

Statement of Modifications and Deviations

No modifications to the EUT were required for the unit to demonstrate compliance with the CFR47 Parts 2 and 15 and Canada RSS-Gen and RSS-247 requirements. There were no deviations to the specifications.

Intentional Radiators

The following information is submitted in support of demonstration of compliance with the requirements of 47CFR Parts 2 and 15C and RSS-247 Class 2 Permissible Change.

Restricted Bands of Operation

Spurious emissions falling in the restricted frequency bands of operation were measured at the OATS. The EUT utilizes frequency, determining circuitry, which generates harmonics falling in the restricted bands. Emissions were investigated at the OATS, using appropriate antennas or pyramidal horns, amplification stages, and a spectrum analyzer. Peak and average amplitudes of frequencies above 1000 MHz were compared to the required limits with worst-case data presented below. Test procedures of ANSI C63.10-2013 were used during testing. No other significant emission was observed which fell into the restricted bands of operation. Computed emission values consider the received radiated field strength, receive antenna correction factor, amplifier gain stage, and test system cable losses. Data presented reflects measurement result corrected to account for measurement system gains and losses. worst-case data presented.

Table 1 Radiated Harmonic Emissions in Restricted Bands DTS (802.11b)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2390.0	50.5	37.6	52.2	37.7	54.0	-16.4	-16.3
2483.5	49.8	35.9	50.6	37.1	54.0	-18.1	-16.9
4824.0	50.3	39.1	49.5	37.0	54.0	-14.9	-17.0
4874.0	49.6	37.6	52.9	42.0	54.0	-16.4	-12.0
4924.0	51.7	35.8	52.9	43.8	54.0	-18.2	-10.2
7236.0	53.1	39.9	53.7	40.9	54.0	-14.1	-13.1
7311.0	53.1	39.8	55.7	42.5	54.0	-14.2	-11.5
7386.0	53.2	39.9	53.5	40.7	54.0	-14.1	-13.3
12060.0	57.9	44.9	58.8	46.1	54.0	-9.1	-7.9
12185.0	58.9	46.2	62.0	49.2	54.0	-7.8	-4.8
12310.0	58.8	46.2	60.3	47.2	54.0	-7.8	-6.8

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 2 Radiated Harmonic Emissions in Restricted Bands DTS (802.11g)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2390.0	50.5	37.0	50.8	37.3	54.0	-17.0	-16.7
2483.5	49.5	35.6	50.6	37.0	54.0	-18.4	-17.0
4824.0	49.8	36.3	48.5	36.0	54.0	-17.7	-18.0
4874.0	49.2	37.3	48.7	35.9	54.0	-16.7	-18.1
4924.0	48.7	35.8	49.1	36.3	54.0	-18.2	-17.7
7236.0	52.3	39.5	53.3	39.8	54.0	-14.5	-14.2
7311.0	52.2	39.6	52.6	39.8	54.0	-14.4	-14.2
7386.0	52.8	39.7	53.1	39.7	54.0	-14.3	-14.3
12060.0	58.0	44.9	58.6	45.4	54.0	-9.1	-8.6
12185.0	59.3	46.2	59.9	46.4	54.0	-7.8	-7.6
12310.0	59.3	46.0	58.7	46.0	54.0	-8.0	-8.0

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 3 Radiated Harmonic Emissions in Restricted Bands DTS (802.11n)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2390.0	50.4	37.0	51.4	37.1	54.0	-17.0	-16.9
2483.5	49.5	35.5	51.5	37.1	54.0	-18.5	-16.9
4824.0	49.3	36.9	48.8	36.2	54.0	-17.1	-17.8
4874.0	48.7	36.2	49.2	36.3	54.0	-17.8	-17.7
4924.0	49.3	36.1	48.8	36.0	54.0	-17.9	-18.0
7236.0	52.1	39.6	52.7	39.6	54.0	-14.4	-14.4
7311.0	52.1	39.5	52.8	39.7	54.0	-14.5	-14.3
7386.0	53.6	39.7	52.8	40.1	54.0	-14.3	-13.9
12060.0	57.7	44.8	58.2	45.3	54.0	-9.2	-8.7
12185.0	58.6	46.2	58.8	46.2	54.0	-7.8	-7.8
12310.0	59.4	45.9	59.0	46.3	54.0	-8.1	-7.7

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 4 Radiated Harmonic Emissions in Restricted Bands DTS (802.11n40)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2390.0	49.1	35.7	49.8	36.3	54.0	-18.3	-17.7
2483.5	48.8	34.9	49.6	36.6	54.0	-19.1	-17.4
4864.0	53.7	46.3	52.6	43.7	54.0	-7.7	-10.3
4874.0	55.2	50.0	52.7	44.7	54.0	-4.0	-9.3
4884.0	55.0	48.0	53.0	45.1	54.0	-6.0	-8.9
7296.0	53.1	39.6	53.4	40.0	54.0	-14.4	-14.0
7311.0	53.3	39.7	53.0	40.0	54.0	-14.3	-14.0
7326.0	53.1	39.5	53.2	39.8	54.0	-14.5	-14.2
12160.0	57.8	44.9	58.2	45.8	54.0	-9.1	-8.2
12185.0	59.3	45.8	58.7	46.1	54.0	-8.2	-7.9
12210.0	59.3	45.7	58.9	46.0	54.0	-8.3	-8.0

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Radiated Emissions in Restricted Bands

The EUT demonstrated compliance with the radiated emissions requirements of 47 CFR Part 15 and RSS-GEN restricted frequency bands requirements. The EUT worst-case operation demonstrated a minimum radiated emission margin of -4.0 dB below the requirements in restricted frequency bands. Peak and average amplitudes were checked for compliance with the regulations. Worst-case emissions are reported with other emissions found in the restricted frequency bands at least 20 dB below the requirements.

Operation in the 2400-2483.5 MHz Frequency Band

Radiated emissions were measured on the Open Area Test Site (OATS) at a three-meter distance. Radiated emissions measurements were performed on the described configuration. Testing procedures defined in publication ANSI C63.10-2013 were used during compliance testing. The EUT was placed on a turntable elevated as required above the ground plane at a distance of 3 meters from the FSM antenna located on the OATS. The peak and quasi-peak amplitude of the frequencies below 1000 MHz were measured using a spectrum analyzer / EMC receiver. The peak and average amplitude of emissions above 1000 MHz were measured using a spectrum analyzer / EMC receiver. Emissions data was recorded from the measurement results. Data presented reflects measurement result corrected to account for measurement system gains and losses.

Transmitter Emissions Data

Table 5 Radiated Transmitter Emissions DTS (802.11b)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2412.0	-	-	-	-	-	-	-
4824.0	50.3	39.1	49.5	37.0	54.0	-14.9	-17.0
7236.0	53.1	39.9	53.7	40.9	54.0	-14.1	-13.1
9648.0	56.0	42.8	56.5	43.7	54.0	-11.2	-10.3
12060.0	57.9	44.9	58.8	46.1	54.0	-9.1	-7.9
14472.0	60.9	47.9	62.5	49.1	54.0	-6.1	-4.9
16884.0	62.4	49.8	63.4	50.9	54.0	-4.2	-3.1
2437.0	-	-	-	-	-	-	-
4874.0	49.6	37.6	52.9	42.0	54.0	-16.4	-12.0
7311.0	53.1	39.8	55.7	42.5	54.0	-14.2	-11.5
9748.0	55.3	42.3	58.3	44.9	54.0	-11.7	-9.1
12185.0	58.9	46.2	62.0	49.2	54.0	-7.8	-4.8
14622.0	61.6	48.8	64.7	51.5	54.0	-5.2	-2.5
17059.0	62.5	49.0	65.6	51.0	54.0	-5.0	-3.0
2462.0	-	-	-	-	-	-	-
4924.0	51.7	35.8	52.9	43.8	54.0	-18.2	-10.2
7386.0	53.2	39.9	53.5	40.7	54.0	-14.1	-13.3
9848.0	55.7	42.6	56.2	43.5	54.0	-11.4	-10.5
12310.0	58.8	46.2	60.3	47.2	54.0	-7.8	-6.8
14772.0	61.6	48.7	63.2	49.8	54.0	-5.3	-4.2
17234.0	61.9	48.6	62.2	49.6	54.0	-5.4	-4.4

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 6 Radiated Transmitter Emissions DTS (802.11g)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2412.0	-	-	-	-	-	-	-
4824.0	49.8	36.3	48.5	36.0	54.0	-17.7	-18.0
7236.0	52.3	39.5	53.3	39.8	54.0	-14.5	-14.2
9648.0	55.6	42.9	56.2	42.8	54.0	-11.1	-11.2
12060.0	58.0	44.9	58.6	45.4	54.0	-9.1	-8.6
14472.0	60.8	48.1	61.6	48.3	54.0	-5.9	-5.7
16884.0	62.9	50.1	63.5	50.3	54.0	-3.9	-3.7
2437.0	-	-	-	-	-	-	-
4874.0	49.2	37.3	48.7	35.9	54.0	-16.7	-18.1
7311.0	52.2	39.6	52.6	39.8	54.0	-14.4	-14.2
9748.0	54.4	42.1	55.5	42.4	54.0	-11.9	-11.6
12185.0	59.3	46.2	59.9	46.4	54.0	-7.8	-7.6
14622.0	62.1	48.7	62.1	48.9	54.0	-5.3	-5.1
17059.0	61.9	49.1	62.5	49.2	54.0	-4.9	-4.8
2462.0	-	-	-	-	-	-	-
4924.0	48.7	35.8	49.1	36.3	54.0	-18.2	-17.7
7386.0	52.8	39.7	53.1	39.7	54.0	-14.3	-14.3
9848.0	55.5	42.5	55.6	42.5	54.0	-11.5	-11.5
12310.0	59.3	46.0	58.7	46.0	54.0	-8.0	-8.0
14772.0	61.3	48.6	62.0	48.6	54.0	-5.4	-5.4
17234.0	62.0	48.5	61.5	48.5	54.0	-5.5	-5.5

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 7 Radiated Transmitter Emissions DTS (802.11n)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2412.0	-	-	-	-	-	-	-
4824.0	49.3	36.9	48.8	36.2	54.0	-17.1	-17.8
7236.0	52.1	39.6	52.7	39.6	54.0	-14.4	-14.4
9648.0	56.3	42.9	55.8	42.7	54.0	-11.1	-11.3
12060.0	57.7	44.8	58.2	45.3	54.0	-9.2	-8.7
14472.0	61.7	48.2	62.0	48.2	54.0	-5.8	-5.8
16884.0	63.6	49.9	63.3	50.3	54.0	-4.1	-3.7
2437.0	-	-	-	-	-	-	-
4874.0	48.7	36.2	49.2	36.3	54.0	-17.8	-17.7
7311.0	52.1	39.5	52.8	39.7	54.0	-14.5	-14.3
9748.0	54.8	42.2	55.2	42.3	54.0	-11.8	-11.7
12185.0	58.6	46.2	58.8	46.2	54.0	-7.8	-7.8
14622.0	61.6	48.8	61.8	48.9	54.0	-5.2	-5.1
17059.0	62.9	50.0	63.5	50.0	54.0	-4.0	-4.0
2462.0	-	-	-	-	-	-	-
4924.0	49.3	36.1	48.8	36.0	54.0	-17.9	-18.0
7386.0	53.6	39.7	52.8	40.1	54.0	-14.3	-13.9
9848.0	55.2	42.5	55.3	42.8	54.0	-11.5	-11.2
12310.0	59.4	45.9	59.0	46.3	54.0	-8.1	-7.7
14772.0	62.9	48.8	62.5	49.1	54.0	-5.2	-4.9
17234.0	63.1	49.5	62.7	49.9	54.0	-4.5	-4.1

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Table 8 Radiated Transmitter Emissions DTS (802.11n40)

Frequency in MHz	Horizontal Peak (dBµV/m)	Horizontal Average (dBµV/m)	Vertical Peak (dBµV/m)	Vertical Average (dBµV/m)	Limit @ 3m (dBµV/m)	Horizontal Margin (dB)	Vertical Margin (dB)
2432.0	-	-	-	-	-	-	-
4864.0	53.7	46.3	52.6	43.7	54.0	-7.7	-10.3
7296.0	53.1	39.6	53.4	40.0	54.0	-14.4	-14.0
9728.0	56.0	42.9	56.0	42.9	54.0	-11.1	-11.1
12160.0	57.8	44.9	58.2	45.8	54.0	-9.1	-8.2
14592.0	61.1	48.3	62.3	49.2	54.0	-5.7	-4.8
17024.0	63.1	50.1	63.2	50.2	54.0	-3.9	-3.8
2437.0	-	-	-	-	-	-	-
4874.0	55.2	50.0	52.7	44.7	54.0	-4.0	-9.3
7311.0	53.3	39.7	53.0	40.0	54.0	-14.3	-14.0
9748.0	54.7	42.0	55.4	42.4	54.0	-12.0	-11.6
12185.0	59.3	45.8	58.7	46.1	54.0	-8.2	-7.9
14622.0	61.3	48.6	61.7	48.9	54.0	-5.4	-5.1
17059.0	63.1	49.7	63.4	49.9	54.0	-4.3	-4.1
2442.0	-	-	-	-	-	-	-
4884.0	55.0	48.0	53.0	45.1	54.0	-6.0	-8.9
7326.0	53.1	39.5	53.2	39.8	54.0	-14.5	-14.2
9768.0	55.4	42.2	55.3	42.5	54.0	-11.8	-11.5
12210.0	59.3	45.7	58.9	46.0	54.0	-8.3	-8.0
14652.0	61.8	48.9	62.0	49.2	54.0	-5.1	-4.8
17094.0	63.0	49.8	62.7	50.1	54.0	-4.2	-3.9

Other emissions present had amplitudes at least 20 dB below the limit. Peak and Quasi-Peak amplitude emissions are recorded above for frequency range below 1000 MHz. Peak and Average amplitude emissions are recorded above for frequency range above 1000 MHz.

Summary of Results for Transmitter Radiated Emissions of Intentional Radiator

The EUT demonstrated compliance with the radiated emissions requirements of 47CFR Part 15C and RSS-247. The minimum radiated harmonic emission provided -2.5 dB margin below requirements. There were no other significantly measurable emissions in the restricted bands other than those recorded in this report. Other emissions were present with amplitudes at least 20 dB below the requirements. There were no other deviations or exceptions to the requirements.

Annex

- Annex A Measurement Uncertainty Calculations
- Annex B Test Equipment List
- Annex C Rogers Qualifications
- Annex D Roger Labs Certificate of Accreditation

Annex A Measurement Uncertainty Calculations

The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16–4. Result of measurement uncertainty calculations are recorded below. Component and process variability of production devices similar to those tested may result in additional deviations. The manufacturer has the sole responsibility of continued compliance.

Measurement	Expanded Measurement Uncertainty $U_{(lab)}$
3 Meter Horizontal 0.009-1000 MHz Measurements	4.16
3 Meter Vertical 0.009-1000 MHz Measurements	4.33
3 Meter Measurements 1-18 GHz	5.14
3 Meter Measurements 18-40 GHz	5.16
10 Meter Horizontal Measurements 0.009-1000 MHz	4.15
10 Meter Vertical Measurements 0.009-1000 MHz	4.32
AC Line Conducted	1.75
Antenna Port Conducted power	1.17
Frequency Stability	1.00E-11
Temperature	1.6˚C
Humidity	3%

Annex B Test Equipment

Equipment	Manufacturer	Model (SN)	Band	Cal Date(m/d/y)	Due
☐ LISN	FCC	FCC-LISN-50-25-10(1PA) (160611)	.15-30MHz	4/21/2020	4/21/2021
☐ LISN	Compliance Design	FCC-LISN-2.Mod.cd,(126)	.15-30MHz	10/14/2019	10/14/2020
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(L10M)(303073)	9kHz-40 GHz	10/14/2019	10/14/2020
☒ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303069)	9kHz-40 GHz	10/14/2019	10/14/2020
☐ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303071)	9kHz-40 GHz	10/14/2019	10/14/2020
☐ Cable	Belden	RG-58 (L1-CAT3-11509)	9kHz-30 MHz	10/14/2019	10/14/2020
☐ Cable	Belden	RG-58 (L2-CAT3-11509)	9kHz-30 MHz	10/14/2019	10/14/2020
☐ Antenna	Com Power	AL-130 (121055)	.001-30 MHz	10/14/2019	10/14/2020
☐ Antenna:	EMCO	6509	.001-30 MHz	10/16/2018	10/16/2020
☐ Antenna	ARA	BCD-235-B (169)	20-350MHz	10/14/2019	10/14/2020
☐ Antenna:	Schwarzbeck Model:	BBA 9106/VHBB 9124 (9124-627)		4/21/2020	4/21/2021
☒ Antenna	Sunol	JB-6 (A100709)	30-1000 MHz	10/14/2019	10/14/2020
☐ Antenna	ETS-Lindgren	3147 (40582)	200-1000MHz	10/14/2019	10/14/2020
☐ Antenna:	Schwarzbeck Model:	VULP 9118 A (VULP 9118 A-534)		4/21/2020	4/21/2021
☒ Antenna	ETS-Lindgren	3117 (200389)	1-18 GHz	4/21/2020	4/23/2022
☐ Antenna	Com Power	AH-118 (10110)	1-18 GHz	10/14/2019	10/14/2020
☒ Antenna	Com Power	AH-840 (101046)	18-40 GHz	4/21/2020	4/21/2021
☒ Analyzer	Rohde & Schwarz	ESU40 (100108)	20Hz-40GHz	4/21/2020	4/21/2021
☒ Analyzer	Rohde & Schwarz	ESW44 (101534)	20Hz-44GHz	1/27/2020	1/27/2021
☐ Analyzer	Rohde & Schwarz	FS-Z60, 90, 140, and 220	40GHz-220GHz	12/22/2017	12/22/2027
☐ Amplifier	Com-Power	PA-010 (171003)	100Hz-30MHz	10/14/2019	10/14/2020
☒ Amplifier	Com-Power	CPPA-102 (01254)	1-1000 MHz	10/14/2019	10/14/2020
☒ Amplifier	Com-Power	PAM-118A (551014)	0.5-18 GHz	10/14/2019	10/14/2020
☒ Amplifier	Com-Power	PAM-840A (461328)	18-40 GHz	10/14/2019	10/14/2020
☐ Power Meter	Agilent	N1911A with N1921A	0.05-40 GHz	4/21/2020	4/21/2021
☐ Generator	Rohde & Schwarz	SMB100A6 (100150)	20Hz-6 GHz	4/21/2020	4/21/2021
☐ Generator	Rohde & Schwarz	SMBV100A6 (260771)	20Hz-6 GHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	BRC50722 (009).9G notch	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	HPM50114 (017)1.5G HPF	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	HPM50117 (063) 3G HPF	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	HPM50105 (059) 6G HPF	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	BRM50702 (172) 2G notch	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	BRC50703 (G102) 5G notch	30-18000 MHz	4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	BRC50705 (024) 5G notch	30-18000 MHz	4/21/2020	4/21/2021
☐ Attenuator	Fairview	SA6NFNF100W-40 (1625)	30-18000 MHz	4/21/2020	4/18/2021
☐ Attenuator	Mini-Circuits	VAT-3W2+ (1436)	30-6000 MHz	4/21/2020	4/21/2021
☐ Attenuator	Mini-Circuits	VAT-3W2+ (1445)	30-6000 MHz	4/21/2020	4/21/2021
☐ Attenuator	Mini-Circuits	VAT-3W2+ (1735)	30-6000 MHz	4/21/2020	4/21/2021
☐ Attenuator	Mini-Circuits	VAT-6W2+ (1438)	30-6000 MHz	4/21/2020	4/21/2021
☐ Attenuator	Mini-Circuits	VAT-6W2+ (1736)	30-6000 MHz	4/21/2020	4/21/2021
☒ Weather station	Davis	6312 (A81120N075)		11/4/2019	11/4/2020

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List of Test Equipment				Calibration	Date (m/d/y)	Due
☐ Frequency Counter: Leader LDC-825 (8060153					4/21/2020	4/21/2021
☐ LISN: Com-Power Model LI-220A					10/14/2019	10/14/2020
☐ LISN: Com-Power Model LI-550C					10/14/2019	10/14/2020
☐ ISN: Com-Power Model ISN T-8					4/21/2020	4/21/2021
☐ LISN: Fischer Custom Communications Model: FCC-LISN-50-16-2-08					4/21/2020	4/21/2021
☐ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303070)	9kHz-40 GHz		10/14/2019	10/14/2020
☐ Cable	Huber & Suhner Inc.	Sucoflex102ea(1.5M)(303072)	9kHz-40 GHz		10/14/2019	10/14/2020
☐ Cable	Huber & Suhner Inc.	Sucoflex102ea(L4M)(281184)	9kHz-40 GHz		10/14/2019	10/14/2020
☐ Cable	Huber & Suhner Inc.	Sucoflex102ea(L10M)(317546)	9kHz-40 GHz		10/14/2019	10/14/2020
☐ Cable	Time Microwave	4M-750HF290-750 (4M)	9kHz-24 GHz		10/14/2019	10/14/2020
☐ RF Filter	Micro-Tronics	BRC17663 (001) 9.3-9.5 notch	30-1800 MHz		4/21/2020	4/21/2021
☐ RF Filter	Micro-Tronics	BRC19565 (001) 9.2-9.6 notch	30-1800 MHz		10/16/2018	4/21/2021
☐ Analyzer	HP	8562A (3051A05950)	9kHz-125GHz		4/21/2020	4/21/2021
☐ Analyzer	HP External Mixers	11571, 11970	25GHz-110GHz		4/18/2015	4/18/2025
☐ Analyzer	HP	8591EM (3628A00871)			4/21/2020	4/21/2021
☐ Antenna: Solar 9229-1 & 9230-1					2/22/2020	2/22/2021
☐ CDN: Com-Power Model CDN325E					10/14/2019	10/14/2020
☐ Injection Clamp Luthi Model EM101					10/14/2019	10/14/2020
☐ Oscilloscope Scope: Tektronix MDO 4104					2/22/2020	2/22/2021
☐ EMC Transient Generator HVT TR 3000					2/22/2020	2/22/2021
☐ AC Power Source (Ametech, California Instruments)					2/22/2020	2/22/2021
☐ Field Intensity Meter: EFM-018					2/22/2020	2/22/2021
☐ ESD Simulator: MZ-15					2/22/2020	2/22/2021
☐ R.F. Power Amp ACS 230-50W					not required	
☐ R.F. Power Amp EIN Model: A301					not required	
☐ R.F. Power Amp A.R. Model: 10W 1010M7					not required	
☐ R.F. Power Amp A.R. Model: 50U1000					not required	
☒ Shielded Room					not required	

Annex C Rogers Qualifications

Scot D. Rogers, Engineer

Rogers Labs, Inc.

Mr. Rogers has approximately 34 years' experience in the field of electronics. Engineering experience includes six years in the automated controls industry and remaining years working with the design, development and testing of radio communications and electronic equipment.

Positions Held

Systems Engineer: A/C Controls Mfg. Co., Inc. 6 Years

Electrical Engineer: Rogers Consulting Labs, Inc. 5 Years

Electrical Engineer: Rogers Labs, Inc. Current

Educational Background

1) Bachelor of Science Degree in Electrical Engineering from Kansas State University.

2) Bachelor of Science Degree in Business Administration Kansas State University.

3) Several Specialized Training courses and seminars pertaining to Microprocessors and Software programming.

Scot D Rogers

Scot D. Rogers

NVLAP Lab Code 200087-0

Annex D Rogers Labs Certificate of Accreditation

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2017

NVLAP LAB CODE: 200087-0

Rogers Labs, Inc.
Louisburg, KS

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2020-02-25 through 2021-03-31
Effective Dates

For the National Voluntary Laboratory Accreditation Program