

Test Report

Prepared for: G-Way Solutions, LLC

Model: 1BOX-U453.5/2-33/33-70-N

Description: Patented 1-BOX(tm) system which includes a Bi-Directional Amplifier (BDA), Annunciator, and Battery backup unit in a single enclosure.

FCC ID: Q8KUHF3680N

Serial Number: 24101001

Project No: p2490009

To

FCC Part 1.1310

Date of Issue: February 5, 2025

On the behalf of the applicant:

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Attention of:

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ANAB Cert#: AT-2901
FCC Site Reg. #US2901
ISED Site Reg. #2044A-2

Reviewed / Authorized By:



Greg Corbin
Project Test Engineer

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	2/5/2025	Greg Corbin	Original Document

ANAB

Compliance Testing, LLC, has been 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 the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

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FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

EUT Description

Model:	1BOX-U453.5/2-33/33-70-N
Serial:	24101001
Firmware:	GWY20190111
Software:	N/A
Description:	UHF Bi-Directional Amplifier Patented 1-BOX(tm) system which includes a Bi-Directional Amplifier (BDA), Annunciator, and Battery backup unit in a single enclosure
Additional Information:	This test report is to support a C2PC. The manufacturer installed a battery, battery monitoring circuitry and digital alarm circuitry. The RF portion of the EUT was not changed from the original design. Spot testing was performed to verify no change in RF performance. All tests were performed with the EUT gain set to maximum. Uplink gain = 72 dB Downlink Gain = 71 dB
Receipt of Sample(s):	October 21, 2024
EUT Condition:	Visual Damage No State of Development Production/Production Equivalent

Frequency of operation

The EUT is a UHF Bi-directional Amplifier that operates within the UHF band from 380 - 512MHz and tested from 406.1 – 430, and 450 – 512 MHz in both directions.

The system uses modules which have 2 MHz wide bandpass filters with the frequencies selected per the installation requirements.

Frequency - MHz	Emission Designators
406.1 – 430 MHz 450 – 512 MHz	F3E, F3D, F1E

Per the user manual, the composite output power for the uplink and downlink is 33 dBm.

For the uplink, the user manual states the maximum antenna gain is 10.1 dBi and a cable loss of 1 – 10 dB. This makes the maximum antenna gain = 10.1 dB – 1 dB = 9.1 dBi.

For the downlink, the user manual states the maximum antenna gain is 2.0 dBi and a cable loss of 1 – 10 dB. This makes the maximum antenna gain = 2.0 dB – 1 dB = 1 dBi.

MPE Evaluation

This is a Fixed device used in Uncontrolled Exposure environment.

Limits Uncontrolled Exposure
47 CFR 1.1310
Table 1, (B)

0.3-1.234 MHz:	Limit [mW/cm ²] = 100
1.34-30 MHz:	Limit [mW/cm ²] = (180/f ²)
30-300 MHz:	Limit [mW/cm ²] = 0.2
300-1500 MHz:	Limit [mW/cm ²] = f/1500
1500-100,000 MHz	Limit [mW/cm ²] = 1.0

Test Data

For the **Uplink**, MPE was calculated using the lowest frequency in the band (406.1 MHz), the composite output power (+33 dBm) and the maximum antenna gain minus the cable loss (9.1 dBi).

Test Frequency, MHz	406.1
Power, Conducted, mW (P)	1995.2
Antenna Gain Isotropic	9.1 dBi
Antenna Gain Numeric (G)	8.13
Distance (R)	20 cm
$S = \frac{P * G}{4\pi r^2}$	
Power Density (S) mw/cm ²	3.227

Power Density (S) = 3.227 mw/cm ²
Limit =(from above table) = 0.271 mw/cm ²

With the output power set to **manufacturer rated output power (+33 dBm)** using a 9.1 dBi antenna, the EUT does not meet the power density requirements at 20 cm, so the minimum safe distance was calculated below.

Minimum Safe Distance Evaluation

This is a Fixed device used in Uncontrolled Exposure environment.

Test Frequency, MHz	406.1
Power, Conducted, mW (P)	1995.2
Antenna Gain Isotropic	9.1 dBi
Antenna Gain Numeric (G)	8.13
Limit, mw/cm ² (L)	0.271

R = $\sqrt{(PG/4\pi L)}$			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit (L)
69.0 cm	1995.2	8.13	0.271

With the output power set to the manufacturer's (Mfr) rated output power (+33 dBm) using an antenna with 9.1 dBi gain, the minimum safe distance for the Uplink is 69.0 cm.

For the **Downlink**, MPE was calculated using the lowest frequency in the band (406.1 MHz), the composite output power (+33 dBm) and the maximum antenna gain minus the cable loss (1.0 dBi).

Test Frequency, MHz	406.1
Power, Conducted, mW (P)	1995.2
Antenna Gain Isotropic	1.0 dBi
Antenna Gain Numeric (G)	1.26
Distance (R)	20 cm
$S = \frac{P * G}{4\pi r^2}$	
Power Density (S) mw/cm ²	0.500

Power Density (S) = 0.500 mw/cm ²
Limit =(from above table) = 0.271 mw/cm ²

With the output power set to **manufacturer rated output power (+33 dBm)** using a 1.0 dBi antenna, the EUT does not meet the power density requirements at 20 cm, so the minimum safe distance was calculated below.

Minimum Safe Distance Evaluation

This is a Fixed device used in Uncontrolled Exposure environment.

Test Frequency, MHz	406.1
Power, Conducted, mW (P)	1995.2
Antenna Gain Isotropic	1.0 dBi
Antenna Gain Numeric (G)	1.26
Limit mw/cm ² (L)	0.0271

R=√(PG/4πL)			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit mw/cm ² (L)
27.2 cm	1995.2	1.26	0.0271

With the output power set to the manufacturer's (Mfr) rated output power (+33 dBm) using an antenna with 1.0 dBi gain, the minimum safe distance for the Downlink is 27.2 cm.

END OF TEST REPORT