

Test Report

Prepared for: Etherstack, Inc

Model: XBR5100T5V

Description: XBR Digital Base Station/Repeater P25 Phase 1

FCC ID:2ADAKXBR5100T5V

To

FCC Part 1.1310

Date of Issue: October 5, 2023

On the behalf of the applicant:

Etherstack Inc
16 Madison Square W. FL12 Suite 1200
New York, NY 10010

Attention of:

Doug Chapman
Ph: (917) 258-6601
E-Mail: dougc@etherstack.com

Prepared By
Compliance Testing, LLC
1724 S. Nevada Way
Mesa, AZ 85204
(480) 926-3100 phone / (480) 926-3598 fax
www.compliancetesting.com
[Project No: p2380009](#)



[Greg Corbin](#)
[Project Test Engineer](#)

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All results contained herein relate only to the sample tested.

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	10/5/2023	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

EUT Description

Model: XBR5100T5V

Description: XBR Digital Base Station / Repeater, P25 Phase 1

Firmware: 0.2.01_7

Serial Number: 230700002

Additional Information:

The EUT is a 100-watt digital base station / repeater transmitter using C4FM modulation operating in the 700, 800 MHz bands as noted in Table 1.

The transmitter consists of 2 units, a P25 channel controller (Model: P25CC) and a transmitter (model: XBR5100T5V). Both units are required for operation and are marketed as a single system.

Table 1 – Frequency Range, Modulation Type and Emission Designators

Frequency Range (MHz)	Test Frequency (MHz)	Modulation	Emission Designator
769 - 775	769.025 774.975	C4FM	8K10F1D 8K10F1E 8K10F1W
851 - 869	851.025 859.975 868.975	C4FM	8K10F1D 8K10F1E 8K10F1W

EUT Operation during Tests

The EUT requires 3 power supplies for operation.

The channel controller requires a 12.0 vdc.

The transmitter requires 13.8 vdc and 28 vdc.

The P25 channel Controller was used to set the transmitter parameters.

The output power was set to the maximum (100 watts) for all tests.

The highest power and lowest frequency in each band from the Part 90 test report was used for calculating the worst-case RF exposure.

The antenna used with this transmitter is determined at the time of installation.

Final RF exposure must be addressed at the time of licensing.

The calculations in this report assume an antenna gain of 0 dBi.

MPE Evaluation

This is a mobile device used in Uncontrolled Exposure environment.

Limits Controlled Exposure
47 CFR 1.1310
Table 1, (A)

0.3-3.0 MHz:	Limit [mW/cm ²] = 100
3.0-30 MHz:	Limit [mW/cm ²] = (900/f ²)
30-300 MHz:	Limit [mW/cm ²] = 1.0
300-1500 MHz:	Limit [mW/cm ²] = f/300
1500-100,000 MHz	Limit [mW/cm ²] = 5

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

Test Frequency, MHz	769
Power, Conducted, mW (P)	113200
Antenna Gain Isotropic	0 dBi
Antenna Gain Numeric (G)	1
Antenna Type	N/A
Distance (R)	20 cm

$S = \frac{P * G}{4\pi r^2}$
Power Density (S) mw/cm ²

Power Density (S) = 22.52 mw/cm ²
Limit = (from above table) = 0.513 mw/cm ²

For the 700 MHz band, with an antenna gain of 0 dBi, the transmitter at 22.52 mw/cm² is over the RF exposure limit of 0.513 mw/cm² when calculated at 20 cm.

The minimum safe distance is calculated on the next page.

Minimum Safe Distance Evaluation

This is a mobile device used in Uncontrolled Exposure environment.

Limits Controlled Exposure
47 CFR 1.1310
Table 1, (A)

0.3-3.0 MHz:	Limit [mW/cm ²] = 100
3.0-30 MHz:	Limit [mW/cm ²] = (900/f ²)
30-300 MHz:	Limit [mW/cm ²] = 1.0
300-1500 MHz:	Limit [mW/cm ²] = f/300
1500-100,000 MHz	Limit [mW/cm ²] = 5

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

Test Frequency, MHz	769
Power, Conducted, mW (P)	113200
Antenna Gain Isotropic	0 dBi
Antenna Gain Numeric (G)	1
Antenna Type	N/A
Limit (L)	0.513

$R = \sqrt{(PG/4\pi L)}$			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit (L)
132.5 cm	113200	1	0.513

At 769 MHz, the minimum safe distance is 132.5 cm when using an antenna with 0 dBi gain. If an antenna is used with a gain of > 0 dBi, the minimum safe distance will change and will need to be re-evaluated.

MPE Evaluation

This is a mobile device used in Uncontrolled Exposure environment.

Limits Controlled Exposure 47 CFR 1.1310 Table 1, (A)

0.3-3.0 MHz:	Limit [mW/cm ²] = 100
3.0-30 MHz:	Limit [mW/cm ²] = (900/f ²)
30-300 MHz:	Limit [mW/cm ²] = 1.0
300-1500 MHz:	Limit [mW/cm ²] = f/300
1500-100,000 MHz	Limit [mW/cm ²] = 5

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

Test Frequency, MHz	851
Power, Conducted, mW (P)	116400
Antenna Gain Isotropic	0 dBi
Antenna Gain Numeric (G)	1
Antenna Type	N/A
Distance (R)	20 cm

$S = \frac{P * G}{4\pi r^2}$
Power Density (S) mw/cm ²

Power Density (S) = 23.16 mw/cm ²
Limit = (from above table) = 0.567 mw/cm ²

For the 800 MHz band, with an antenna gain of 0 dBi, the transmitter at 23.16 mw/cm² is over the RF exposure limit of 0.567 mw/cm² when calculated at 20 cm.

The minimum safe distance is calculated on the next page.

Minimum Safe Distance Evaluation

This is a mobile device used in Uncontrolled Exposure environment.

Limits Controlled Exposure
47 CFR 1.1310
Table 1, (A)

0.3-3.0 MHz:	Limit [mW/cm ²] = 100
3.0-30 MHz:	Limit [mW/cm ²] = (900/f ²)
30-300 MHz:	Limit [mW/cm ²] = 1.0
300-1500 MHz:	Limit [mW/cm ²] = f/300
1500-100,000 MHz	Limit [mW/cm ²] = 5

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

Test Frequency, MHz	851
Power, Conducted, mW (P)	116400
Antenna Gain Isotropic	0 dBi
Antenna Gain Numeric (G)	1
Antenna Type	N/A
Limit (L)	0.567

$R = \sqrt{(PG/4\pi L)}$			
Distance (R) cm	Power mW (P)	Numeric Gain (G)	Limit (L)
127.85 cm	116400	1	0.567

At 851 MHz, the minimum safe distance is 127.85 cm when using an antenna with 0 dBi gain. If an antenna is used with a gain of > 0 dBi, the minimum safe distance will change and will need to be re-evaluated.

END OF TEST REPORT