849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
HTTP://WWW.TIMCOENGR.COM

TIMCO
ENGINEERING, Inc.
www.timcoengr.com

RF Exposure Evaluation Report

APPLICANT	EF JOHNSON COMPANY
	123 N State Street Waseca Minnesota 56093 USA
FCC ID	ATH2425M80
MODEL NUMBER	242-5M80
PRODUCT DESCRIPTION	DUAL BAND VHF AND 700-800 MHZ MOBILE TRANSCEIVER
STANDARD APPLIED	CFR 47 Part 2.1091
PREPARED BY	Cory Leverett

We, TIMCO ENGINEERING, INC. would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and meets the requirements.

The attached report shall not be reproduced except in full without the written approval of TIMCO ENGINEERING, INC.

GENERAL REMARKS

Attestations

This equipment has been evaluated in accordance with the standards identified in this report. To the best of my knowledge and belief, these evaluations were performed using the procedures described in this report.

I attest that the necessary evaluations were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, FL 32669

Authorized Signatory Name:

Cory Leverett

Engineering Project Manager

Date: 11/20/2015

RF Exposure Requirements

General information

Device type: DUAL BAND VHF AND 700-800 MHZ MOBILE TRANSCEIVER

Devices that operate under Part 90 of this chapter are subject to RF exposure evaluation prior to equipment authorization or use.

Antenna

The manufacturer does not specify an antenna, but a typical antenna has a gain of 0 dBi.

Configuration	Antenna p/n	Type	Max. Gain (dBi)
Fixed mounted	Any	omni	0

Operating configuration and exposure conditions:

The conducted output power is shown in the table below. Typical use qualifies for a maximum duty cycle factor of 100%.

Operation: A typical installation consists of an antenna system with a 10 meter coaxial cable of the type RG 213/ U type which has a loss as follows;

Nom. Attenuation for RG 213/U:

Frequency MHz	Attenuation per 100ft. dB
1	.27
10	.55
50	1.3
100	1.9
200	2.7
400	4.1
700	6.5
900	7.6
1000	8.0
4000	21.5

MPE Calculation:

The minimum separation distance is calculated as follows:

$$E(V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power density: } P_d(mW/cm^2) = \frac{E^2}{3770}$$

The limit for general uncontrolled exposure environment is shown in FCC rule Part 1.11310, Table 1.

Minimum Separation Distance for Mobile or Fixed Devices
Controlled Exposure

Insert values in yellow highlighted boxes to determine Minimum Separation Distance

Max Power	50	W	*equals*	Max Power	50000	mW
Duty Cycle	50	%	*equals*	Duty Factor	0.5	numeric
Antenna Gain	3	dBi	*equals*	Gain numeric	1.995262315	numeric
Coax Loss	0	dB		Gain - Coax Loss	1.995262315	numeric
Power Density	2.9	mW/cm^2				

Enter power Density from the chart to the right

| Frequency | 869 | MHz |

Rule Part 1.1310, Table 1 (A)

Freq range	Power density	Enter this value
MHz	mW/cm^2	mW/cm^2
0.3 - 3	100	**100**
3 - 30	900/f^2	**0.0**
30-300	1	**1**
300-1,500	f/300	**2.9**
1,500-100,000	5	**5**

f = frequency in MHz

Minimum Separation Distance	37 cm	0.37 m

Minimum Seperation in Inches   14.55461 Inches

Applicant: EF JOHNSON COMPANY
FCC ID: ATH2425M80
Report: E\EF JOHNSON\1535AZUT15\1535AZUT15TestReport.docx