ZumLink® Z9-C and Z9-T

Covers Model: Z9-C and Z9-T

User Manual

Part Number: LUM0075AA
Revision: Apr-2016

Safety Information

The products described in this manual could fail in a variety of modes due to misuse, age, or malfunction. Systems with these products must be designed to prevent personal injury and property damage during product operation and in the event of product failure.

Warning! Remove power before connecting or disconnecting the interface or RF cables.

Warranty Information

FreeWave Technologies, Inc. warrants the FreeWave® ZumLink® Z9-C and Z9-T (Product) against defects in materials and manufacturing for a period of one year from the date of shipment, depending on model number. In the event of a Product failure due to materials or workmanship, FreeWave will, at its discretion, repair or replace the Product. For evaluation of Warranty coverage, return the Product to FreeWave upon receiving a Return Material Authorization (RMA).

In no event will FreeWave Technologies, Inc., its suppliers, or its licensors be liable for any damages arising from the use of or inability to use this Product. This includes business interruption, loss of business information, or other loss which may arise from the use of this Product. OEM customer's warranty periods can vary.

Warranty Policy will **not apply** in the following circumstances:

1. If Product repair, adjustments, or parts replacements are required due to accident, neglect, or undue physical, electrical, or electromagnetic stress.
2. If Product is used outside of FreeWave specifications as stated in the Product's data sheet.
3. If Product has been modified, repaired, or altered by Customer unless FreeWave specifically authorized such alterations in each instance in writing. This includes the addition of conformal coating.

Special Rate Replacement Option

A special rate replacement option is offered to non-warranty returns or upgrades. The option to purchase the replacement unit at this special rate is only valid for that RMA. The special replacement rate option expires if not exercised within 30 days of final disposition of the RMA.

FreeWave Technologies, Inc.
5395 Pearl Parkway, Suite 100
Boulder, CO 80301
303.381.9200
Toll Free: 1.866.923.6168
Fax: 303.786.9948

www.freewave.com

Export Notification

FreeWave Technologies, Inc. products may be subject to control by the Export Administration Regulations (EAR) and/or the International Traffic in Arms Regulations (ITAR). Export, re-export, or transfer of these products without required authorization from the U.S. Department of Commerce, Bureau of Industry and Security, or the U.S. Department of State, Directorate of Defense Trade Controls, as applicable, is prohibited. Any party exporting, re-exporting, or transferring FreeWave products is responsible for obtaining all necessary U.S. government authorizations required to ensure compliance with these and other applicable U.S. laws. Consult with your legal counsel for further guidance.

FCC Notifications

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference and 2) this device must accept any interference received, including interference that may cause undesired operation.

The content of this guide covers FreeWave Technologies, Inc. models sold under FCC ID: KNYPMT0101AA.

All models sold under the listed FCC ID(s) must be installed professionally and are only approved for use when installed in devices produced by FreeWave Technologies or third party OEMs with the express written approval of FreeWave Technologies, Inc. Changes or modifications should not be made to the device.

FCC NEMA Installation and Label

Where applicable, the models described in this guide must be installed in a NEMA enclosure. When any FreeWave Technologies, Inc. module is placed inside an enclosure, a label must be placed on the outside of the enclosure. The label must include the text: "**Contains Transmitter Module with FCC ID: KNYPMT0101AA.**"

FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 52 cm between the radiator & your body.

FCC Notification of Power Warning

The ZumLink® Z9-C and Z9-T covered in this document has a maximum transmitted output power of +30dBm.

The antennas used MUST provide a separation distance of at least 52 cm from all persons and MUST NOT be co-located or operate in conjunction with any other antenna or transmitter.

IC Notifications

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif est conforme aux normes permis-exemptes du Canada RSS d'industrie. L'opération est sujette aux deux conditions suivantes : (1) ce dispositif peut ne pas causer l'interférence, et (2) ce dispositif doit accepter n'importe quelle interférence, y compris l'interférence qui peut causer le fonctionnement peu désiré du dispositif.

GNU License Notification

Some of the software in the firmware is licensed under the GNU General Public License and other Open Source and Free Software licenses. Contact FreeWave to obtain the corresponding source on CD.

Restricted Rights

Any product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

This manual is only for use by purchasers and other authorized users of FreeWave products.

No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, or for any purpose without the express written permission of FreeWave Technologies, Inc. FreeWave reserves

the right to make changes to this manual without notice. FreeWave assumes no responsibility or liability for the use of this manual or the infringement of any copyright or other proprietary right.

UL Power Source

Input power shall be derived from a certified, Class 2:

- single power source or
- an LPS power source in accordance with IEC/EN 60950-1.

ZumLink Z9-C and Z9-T Product Safety

Standards and Editions

- HazLoc Standards
  - ANSI/ISA 12.12.01-2013
- Ordinary Location Standards
  - UL 60950, 2nd Edition
  - CAN/CSA-C22.2 No. 60950, 2nd Edition
  - IEC 60950, 2nd Edition
  - EN 60950, 2nd Edition

Table of Contents

Preface **6**
1. ZumLink Z9-C and Z9-T Included Accessories **8**
1.1 User-supplied Equipment 8
2. ZumLink Z9-C and Z9-T CLI Configuration **9**
3. Approved Antennas **14**
3.1 900MHz Antennas 14
3.1.1 900MHz Omni-Directional Antennas 14
3.1.2 900MHz Directional Antennas 15
3.1.3 Alternative Antennas 15
4. ZumLink Z9-C and Z9-T Data Interface Connector **16**
5. ZumLink Z9-C and Z9-T Settings and Descriptions **18**
config 18
diagPortConfig 19
radioSettings 20
radioStatus 27
serialPortConfig 27
system 29
systemInfo 30
Appendix A: ZumLink Z9-C and Z9-T 900MHz Technical Specifications **31**

Preface

Thank you for purchasing the FreeWave **ZumLink Z9-C and Z9-T**.

Other ZumLink Z9-C and Z9-T Information

Use the FreeWave www.freewave.com website to download the latest version of these documents.

Document	Description	FreeWave Part Number
User Manual	The User Manual provides detailed information about setup, drag-and-drop configuration, and safety information for the **ZumLink Z9-C and Z9-T**.	LUM0075AA
Quick Start Guide	The Quick Start Guide provides the out-of-the-box setup of the **ZumLink Z9-C and Z9-T**.	QSG0028AA

Contacting FreeWave Technical Support

For up-to-date troubleshooting information, check the **Support** page at www.freewave.com.

FreeWave provides technical support Monday through Friday, 8:00 AM to 5:00 PM Mountain Time (GMT -7).

- Call toll-free at 1.866.923.6168.
- In Colorado, call 303.381.9200.
- Contact us through e-mail at moreinfo@freewave.com.

Printing this Document

This document is set to print double-sided with a front cover and a back cover. Viewing this document online with a PDF viewer, may show pages intentionally left blank to accommodate the double-sided printing.

Document Styles

This document uses these styles:

- FreeWave applications appear as: **FreeWave**.
- Parameter setting text appears as: **[Page=radioSettings]**
- File names appear as: **configuration.cfg**.
- File paths appear as: **C:\Program Files (x86)\FreeWave Technologies**.
- User-entered text appears as: **xxxxxxxxx**.
- 3rd-party names appear as: **Notepad**®.

Caution: Indicates a situation that **MAY** cause damage to personnel, the radio, data, or network.

Example: Provides example information of the related text.

FreeWave Recommends: Identifies FreeWave recommendation information.

Important!: Provides crucial information relevant to the text or procedure.

Note: Emphasis of specific information relevant to the text or procedure.

Provides time saving or informative suggestions about using the product.

Warning! Indicates a situation that **WILL** cause damage to personnel, the radio, data, or network.

Documentation Feedback

Send comments or questions about this document's content to techpubs@freewave.com. In the email, include the title of the document or the document's part number and revision letter (found in the footer).

1. ZumLink Z9-C and Z9-T Included Accessories

The **ZumLink Z9-C and Z9-T** package contains these items:

ZumLink Z9-C and Z9-T Included Accessories	
Qty	**(missing or bad snippet)**
1	**ZumLink Z9-C and Z9-T** device
1	**ZumLink Z9-C and Z9-T** Quick Start Guide

1.1 User-supplied Equipment

- For the **Z9-C** model, use a serial connector (e.g., FreeWave Part Number: ASC2414DJ).
- For the **Z9-T** model, a circuit is required that communicates with the radio (e.g., an RS232 adapter board or FreeWave adapter boards).
- FCC approved antenna for the **ZumLink Z9-C and Z9-T**

Note: See Approved Antennas (on page 14) for detailed information.
Approved antennas can be purchased directly from FreeWave.

2. ZumLink Z9-C and Z9-T CLI Configuration

Note: This information in this document applies to FreeWave ZumLink Z9-C and Z9-T models.

Procedure

Important!: A Serial Port on the computer is required for this procedure.

1. Using the **Data Interface Connector** (see ZumLink Z9-C and Z9-T Data Interface Connector (on page 16) for location):
   a. Apply power to the ZumLink.
   b. Connect to the Serial Interface of the ZumLink.
      - For the Z9-C model, use a serial connector (e.g., FreeWave Part Number: ASC2414DJ).
      - For the Z9-T model, a circuit is required that communicates with the radio (e.g., an RS232 adapter board or FreeWave adapter boards).
2. If the ZumLink is connected to a computer, open a terminal program (e.g., Tera Term).

   Note: In this example procedure, Tera Term is used.

3. In Tera Term, on the **File** menu, select **New Connection**.

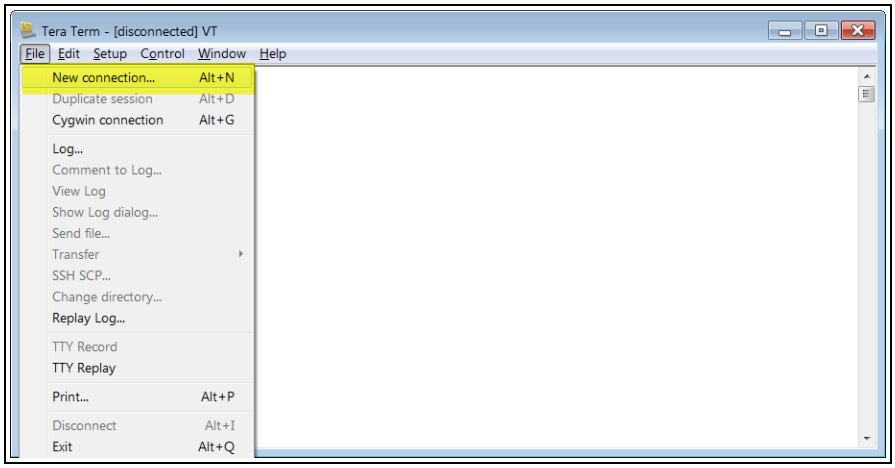

Figure 1: File menu > New Connection

The **Tera Term New Connection** dialog box opens.

4. Click the **Port** list box arrow and select the COM port the **ZumLink** device is connected to.

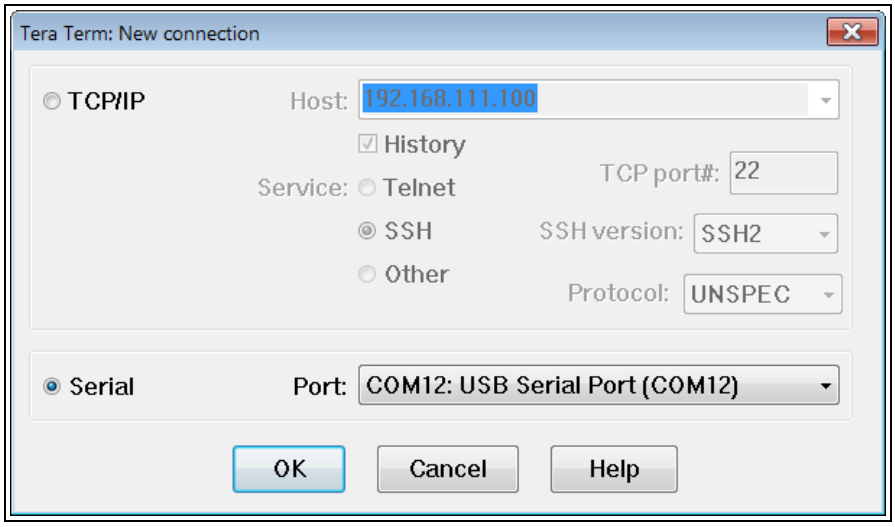

Figure 2: Select the ZumLink COM port

5. Click **OK** to save the changes and close the dialog box.
   The **Tera Term** window shows the connected COM port and Baud rate in the title bar of the window.
6. In the **Tera Term** window, click the **Setup** menu and select **Serial Port**.

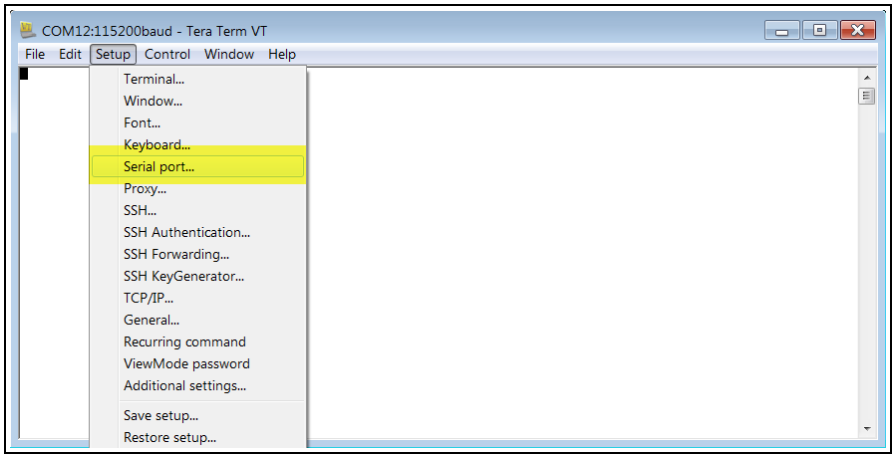

Figure 3: Serial menu > Setup Port

The **Tera Term: Serial Port Setup** dialog box opens.

Note: The image shows the default **ZumLink** settings.

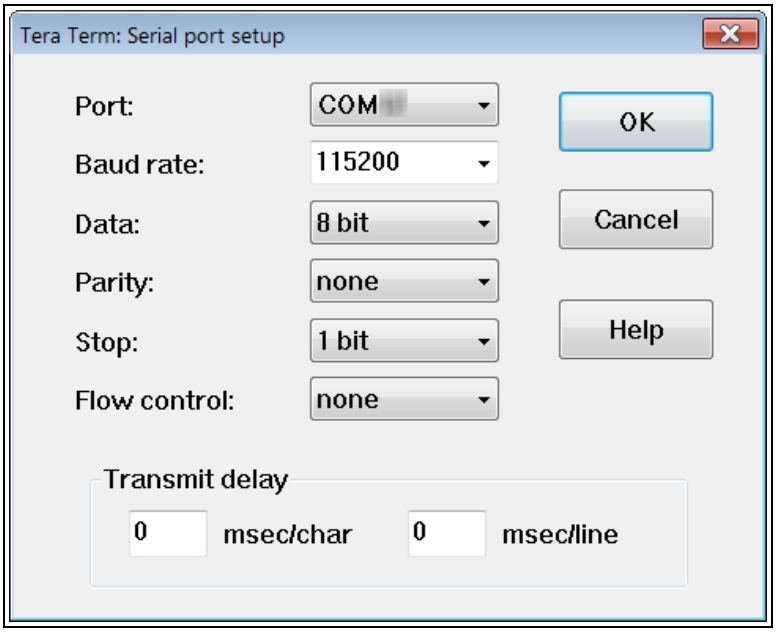

Figure 4: Tera Term: Serial Port Setup dialog box with default settings

7. Verify, and change if required, the **Tera Term** serial port settings (except the **Port** setting) of the connected **ZumLink** so the settings are the same as the defaults shown in the image.

   Example: If the **Baud Rate** is 9600, click the list box arrow and select 115200.

8. Click **OK** to save the changes and close the dialog box.
9. On the **ZumLink**, pull the **Pin 2-Interrupt** line **Low** to activate the **FreeWave Shell** and disrupt data flow.
10. Return **Pin 2-Interrupt** to **High**.

11. In **Tera Term**, press <Enter>.
    The **FreeWave Shell** returns.

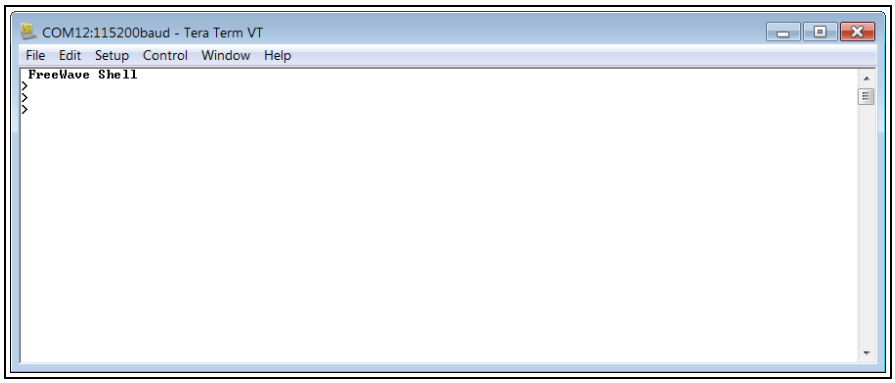

Figure 5: FreeWave Shell in Tera Term

12. At the > prompt, type **pages** and press <Enter>.
    The available **ZumLink** information appears.

update w/ new screen shot

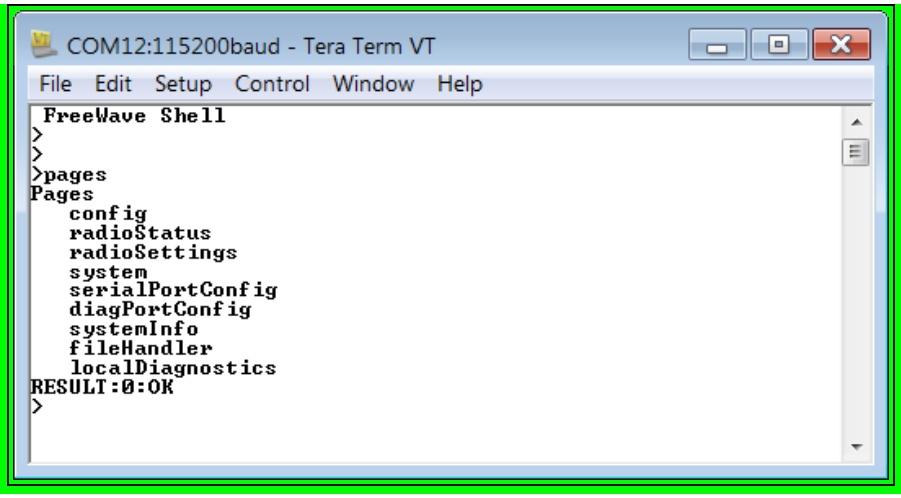

Figure 6: Pages information

13. Type **radiosettings** and press <Enter>.
    The **ZumLink radioSettings** appear.

update w/ new screen shot

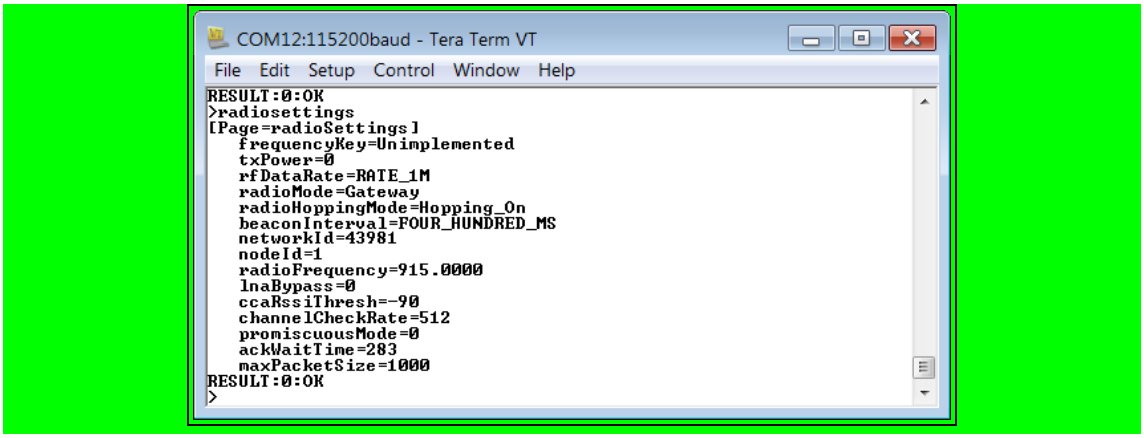

Figure 7: ZumLink radioSettings

14. Set the **radioSettings.txPower** between 0 (zero) and 30.

    Example: **txPower=30** or **radioSettings.txPower=30**.

15. Select one radio and set the **radiosettings.radioMode=Gateway**.
16. Set the other radios in the network with a **radiosettings.radioMode=Endpoint**.
17. Set the **radioSettings.networkId** to be the same on all radios in the network.
18. On each Endpoint, set the **radioSettings.nodeId** to a unique number (between 2 and 65533) in the network.

    Important!: The Gateway' **radioSettings.nodeId** defaults to 1 and CANNOT be changed.

19. Type **Save** (for the settings to remain after a power cycle) and press <Enter>.
20. Type **exit** and press <Enter> to exit the FreeWave Shell.

    Tip! Type **help** to view additional information about the ZumLink settings.

3. Approved Antennas

3.1 900MHz Antennas

3.1.1 900MHz Omni-Directional Antennas

The **ZumLink** 900MHz is approved by the FCC for use with omni-directional antennas with a 7.15dBi gain or less.

Note: These antennas, including antenna gains, are approved for use with the **ZumLink** device.

900MHz Omni-Directional Antennas				
Gain (dBd)	**Gain (dBi)**	**Manufacturer**	**Manufacturer Model Number**	**FreeWave Part Number**
5.00	7.15	Antenex	EB8965C	EAN0905WC
3	5.15	Maxrad	MAX-9053	EAN0900WC
-0.15	2.0	Mobile Mark	PSKN3-925S	EAN0900SR
-2.15	0	Mobile Mark	PSTG0-915SE	EAN0900SQ

3.1.2 900MHz Directional Antennas

The **ZumLink** 900MHz is approved by the FCC for use with directional antennas with a 8.6dBi gain or less.

900MHz Directional Antennas				
Gain (dBd)	**Gain (dBi)**	**Manufacturer**	**Manufacturer Model Number**	**FreeWave Part Number**
6.45	8.6	WaveLink	PRO890-8-40F02N4	EAN0906YC
5.85	8.0	WaveLink	PRO898-8	

3.1.3 Alternative Antennas

Antennas other than those listed in this section can potentially be used with the **ZumLink** with provisions.

- The antennas must be of a similar type and cannot exceed the gain of those listed in the tables.
- The antenna gain CANNOT exceed 7.15dBi for Omni-directional.
- The antenna gain CANNOT exceed 8.6dBi for Directional antennas.
- The overall system EIRP does not exceed 36dBm.

Warning! FreeWave approval is required prior to using any antenna other than those listed in this section. A proper combination with the **ZumLink** is required to ensure the system meets FCC requirements.

4. ZumLink Z9-C and Z9-T Data Interface Connector

Note: The ZumLink radio has a 14-pin header.
FreeWave defines TTL as 0 (zero) to 3.3VDC.

ZumLink Z9-C and Z9-T Data Interface Connector				
Pin #	**Signal Description and Name**	**Radio Input / Output**	**Z9-C Signal Level**	**Z9-T Signal Level**
1	Power (B+)	Input	+3 to +5VDC (±10%)	+3 to +5VDC (±10%)
2	Interrupt	Input	TTL	TTL
3	Data Terminal Ready (DTR)	Input	RS-232	TTL
4	Ground (GND)	N/A		
5	Transmitted Data (TXD)	Output	RS-232	TTL
6	Radio Reset	Input	TTL	TTL
7	Received Data (RXD)	Input	RS-232	TTL
8	Carrier Detect (CD)	Output	RS-232	TTL
9	Request To Send (RTS)	Input	RS-232	TTL
10	Clear To Send (CTS)	Output	RS-232	TTL
11	Diagnostic Received Data (Diag RX)	Input	RS-232	TTL
12	Diagnostic Transmitted Data (Diag TX)	Output	RS-232	TTL
13	Ground (GND)	N/A		
14	Unused	N/A		

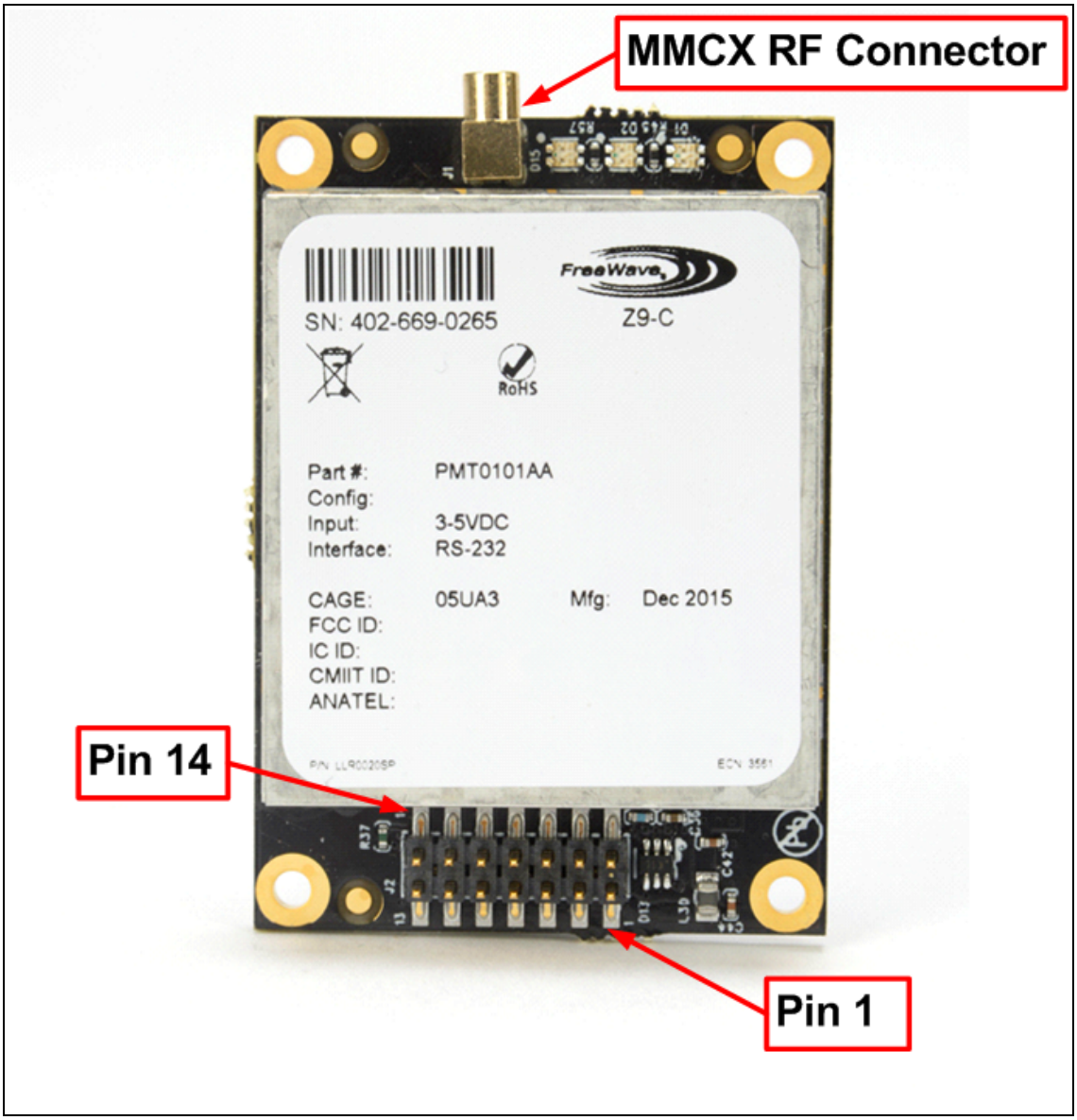

Figure 8: ZumLink Z9-C and Z9-T MMCX RF Connector, Pin 1, and Pin 14 of Data Interface Connector

5. ZumLink Z9-C and Z9-T Settings and Descriptions

These are the **Page Settings** for the **ZumLink Z9-C and Z9-T**:

- config (on page 18)
- radioSettings (on page 20)
- systemInfo (on page 30)
- diagPortConfig (on page 19)
- radioStatus (on page 27)
- serialPortConfig (on page 27)
- system (on page 29)

config

config - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=config]	config.factoryDefaults=	This setting restores the **ZumLink** to its factory default configuration. **Example**: **config.factoryDefaults=set**
[Page=config]	config.reset=	All options reset the **ZumLink Z9-C and Z9-T**. The options are: • config.reset=**now** • config.reset=**reboot** • config.reset=**reset**
[Page=config]	config.restore=	This setting reloads the config settings of the **ZumLink** that were saved.

config - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: Restore happens automatically when the ZumLink starts.
[Page=config]	config.save=	This setting saves changes made to the ZumLink configuration. **Example**: config.save=now

diagPortConfig

diagPortConfig - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=diagPortConfig]	diagPortConfig.diagMode=	**Note**: The default value is Diag.
[Page=diagPortConfig]	diagPortConfig.cliBaudRate=	**Note**: The default value is 115200.
[Page=diagPortConfig]	diagPortConfig.diagBaudRate=	**Note**: The default value is 115200.
[Page=diagPortConfig]	diagPortConfig.databits=	

diagPortConfig - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: The default value is 8.
[Page=diagPortConfig]	diagPortConfig.parity=	**Note**: The default value is None.
[Page=diagPortConfig]	diagPortConfig.stopbits=	**Note**: The default value is 1.

radioSettings

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=radioSettings]	radioSettings.ackWaitTime=	**Note**: The default value is 283.
[Page=radioSettings]	radioSettings.beaconInterval=	**Note**: This is a ZumLink Golden Setting. The **beaconInterval** controls how often a Gateway radio sends out a

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		beacon packet and changes to the next radio frequency in the hopping pattern. • A longer **beaconInterval** will give the system better throughput in channel environments where interference is minimal. • Throughput can be improved in some situations with shorter beacon intervals. **Important!**: The Gateway and Endpoint radios MUST use the same value for this setting. The options are: • TWENTY_FIVE_MS • FIFTY_MS • ONE_HUNDRED_MS • FOUR_HUNDRED_MS **Example**: **radioSettings.beaconInterval=FIFTY_MS**. **Note**: The default value is FOUR_HUNDRED_MS.
[Page=radioSettings]	radioSettings.ccaRssiThresh=-	**Note**: The default value is 90.
[Page=radioSettings]	radioSettings.channelCheckRate=	

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: The default value is 512.
[Page=radioSettings]	radioSettings.frequencyKey=	**Note**: This is a **ZumLink** Golden Setting. Changing **Frequency Keys** changes the hop patterns. The options are: • 0 to 9 • A to E **Important!**: Do NOT use **Frequency Key E** with the 915 to 928MHz, 916 to 920MHz, and 921 to 928MHz hop tables. Tip! This helps reduce interference from nearby radios operating in the same proximity. **Note**: The default value is 0 (zero).
[Page=radioSettings]	radioSettings.frequencyMasks=	**Note**: The default value is WHAT.
[Page=radioSettings]	radioSettings.frequencyMasksClr=	**Note**: The default value is WHAT.
[Page=radioSettings]	radioSettings.lnaBypass=	This setting controls enabling and disabling the Low Noise Amplifier

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		(LNA) which can boost the receive signal by 10dB. • The options are 0 (zero) and 1. • When set to a value of 1, the LNA of the radio module is bypassed. • It can be useful to bypass the LNA if there is a presence of strong signals in band and packet reception is not good. **Note**: The default value is 0 (zero).
[Page=radioSettings]	radioSettings.networkId=	**Note**: This is a ZumLink Golden Setting. This is the Network Identifier. • Radio units can only communicate with other units that have the same **networkId** setting. **Note**: If radios are on the same frequency they will still receive data from radios of a different **networkId**, but the data is dropped. Enter any number between 1 and 65533. **Note**: The default value is 0xABCD = 43981.
[Page=radioSettings]	radioSettings.nodeId=	**Important!**: Each radio with the same **networkId** must have a UNIQUE **nodeId**. • This setting defines the ID of the radio. • Enter any number between 1 and 65533. **Note**: The default value is 1. The Gateway device will always have a **nodeId** of value 1.

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=radioSettings]	radioSettings.maxPacketSize=	**Note**: This is a ZumLink Golden Setting. • The options are any number between 0 and 9. • Max packet size can be optimized. **FreeWave Recommends**: Use the default settings for normal operation. **Note**: The default value is 1000.
[Page=radioSettings]	radioSettings.promiscuousMode=	**Note**: The default value is 0 (zero).

[Page=radioSettings]	radioSettings.radioFrequency=	**Note**: This is a ZumLink Golden Setting.
		This setting designates the Operating Center Frequency in MHz.
		• This parameter ONLY takes effect when **radioHoppingMode=Hopping_Off**.
		• All radios in a network must have the same frequency.
		• For the 1Mbps, enter a frequency between 903.25MHz and 926.75MHz.
		  • 1Mbps Min frequency setting = 902.6912
		  • 1Mbps Max frequency setting = 927.3088
		Note: The frequency can be set on 5kHz boundaries.
		Note: The default value is 915.0000.

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=radioSettings]	radioSettings.radioHoppingMode=	**Note**: This is a **ZumLink** Golden Setting. This parameter is used to enable or disable frequency hopping. • For **rfDataRate** values greater than 500kbs, the choice of hopping mode should be selected based on network frequency planning and channel conditions. • The Hopping Mode for **ZumLink Z9-C and Z9-T** is NEVER forced on, unless a **WaveContact - DataConcentrator** is connected. **Important!**: The Gateway and Endpoint radios MUST use the same value for this setting. The format of the option is: • Hopping_Off • Hopping_On **Example**: **radioSettings.radioHoppingMode=Hopping_On**. **Note**: The default value is Hopping_Off.
[Page=radioSettings]	radioSettings.radioMode=	This setting designates the device as a Gateway or Endpoint unit. • Each network MUST have only ONE Gateway unit. • The remaining units MUST be configured as Endpoints. **Note**: The Gateway device will always have a **nodeId** of value 1. The options are: • Endpoint • Gateway

radioSettings - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: The default value is Gateway.
[Page=radioSettings]	radioSettings.rfDataRate=	**Note**: This is a **ZumLink** Golden Setting. This setting defines the RF link data rate speed in bits per second. • A higher RF link data rate provides more throughput at the expense of link distance or fade margin. **Important!**: The Gateway and Endpoint radios MUST use the same value for this setting. The options are: • RATE_1M • RATE_4M • RATE_500K • RATE_250K • RATE_115.2K **Note**: The default value is RATE_1M.
[Page=radioSettings]	radioSettings.txPower=	• This setting defines the RF output transmit power for the radio. • A higher power can be used to increase link margin. • Use a lower transmit power to reduce interference when multiple radio networks are in close proximity. • Enter 0 (zero) to 30 **Note**: The default value is What.

radioStatus

radioStatus - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=radioStatus]	radioStatus.curRssi=-	This setting designates the WHAT. Enter any number between what and what. **Note**: The default value is 89.

serialPortConfig

serialPortConfig - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=serialPortConfig]	serialPortConfig.cliBaudRate=	This setting designates the WHAT. Enter any number between what and what. The default value is 89. **Note**: The default value is 115200.
[Page=serialPortConfig]	serialPortConfig.packetizedBaudRate=	 **Note**: The default value is 3000000.
[Page=serialPortConfig]	serialPortConfig.passthruBaudRate=	

serialPortConfig - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: The default value is 115200.
[Page=serialPortConfig]	serialPortConfig.databits=	**Note**: The default value is 8.
[Page=serialPortConfig]	serialPortConfig.parity=	**Note**: The default value is None.
[Page=serialPortConfig]	serialPortConfig.stopbits=	**Note**: The default value is 1.
[Page=serialPortConfig]	serialPortConfig.flowControl=	**Note**: The default value is Hardware.
[Page=serialPortConfig]	serialPortConfig.passthruLatencyMode=	

serialPortConfig - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
		Note: The default value is Auto.
[Page=serialPortConfig]	serialPortConfig.passthruLatencyTimer=	**Note**: The default value is 16.

system

system - ZumLink Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=system]	system.exit	
[Page=system]	system.serialMode=	**Note**: The default value is Packetized.
[Page=system]	system.pages	

systemInfo

systemInfo - ZumLink Z9-C and Z9-T Settings and Descriptions		
Page	**CLI Command**	**Description**
[Page=systemInfo]	systemInfo.deviceConfiguration=	**Note**: The default value is A.
[Page=systemInfo]	systemInfo.deviceFirmwareVersion=	This setting identifies the ZumLink firmware version.
[Page=systemInfo]	systemInfo.deviceModel=	**Note**: The default value isPMT0110AA.
[Page=systemInfo]	systemInfo.deviceSerialNumber=	
[Page=systemInfo]	systemInfo.FirmwareVersion=	

Appendix A: ZumLink Z9-C and Z9-T 900MHz Technical Specifications

Note: Specifications may change at any time without notice. For the most up-to-date specifications information, see the product's data sheet available at www.freewave.com.

ZumLink Z9-C and Z9-T 900MHz Technical Specifications	
Specification	**Description**
Interfaces	
Data Connector	• Z9-C - RS-232 , Dual row 14-pin header, 2mm pin spacing • Z9-T - TTL, Dual row 14-pin header, 2mm pin spacing
Serial Interface - Baud Rates	• RS-232 - 9600 to 921,600 bps • TTL - 9600 to 3,000,000 bps
RF Connector	MMCX
Transmitter	
Frequency Range	902 to 928MHz
Output Power	10mW to 1W User selectable
Data Link Range	40 miles with clear Line of Sight
Modulation	• GFSK • 8-ary FSK
Channel Sizes	• 230.4kHz • 345.6kHz • 691.2kHz

<table>
<tr><th colspan="2">ZumLink Z9-C and Z9-T 900MHz Technical Specifications</th></tr>
<tr><th>Specification</th><th>Description</th></tr>
<tr><td></td><td>• 1382.4kHz
• 3225.6kHz</td></tr>
<tr><td>RF Data Rate</td><td>• 115.2kbps
• 250kbps
• 500kbps
• 1000kbps
• 4000kbps
• User selectable</td></tr>
<tr><td>Hopping Channels</td><td>User selectable
<table><tr><th>Data Rate (kbps)</th><th>Hopping Channels</th></tr><tr><td>115.2</td><td>110</td></tr><tr><td>250</td><td>73</td></tr><tr><td>500</td><td>36</td></tr><tr><td>1000</td><td>18</td></tr><tr><td>4000</td><td>7</td></tr></table></td></tr>
<tr><td>Hopping Patterns</td><td>Maximum of 16 patterns
Note: There are less with larger channel bandwidths.
User selectable</td></tr>
<tr><td>Hopping Rates</td><td>• 25ms
• 50ms
• 100ms
• 400ms
User selectable</td></tr>
<tr><td>Occupied Bandwidth</td><td><table><tr><th colspan="2">Occupied Bandwidth</th></tr><tr><th>Data Rate (kbps)</th><th>Occupied BW (kHz)</th></tr><tr><td>115.2</td><td>230.4</td></tr><tr><td>250</td><td>295</td></tr><tr><td>500</td><td>630</td></tr><tr><td>1000</td><td>1230</td></tr><tr><td>4000</td><td>3150</td></tr></table></td></tr>
<tr><th>Receiver</th><th></th></tr>
<tr><td>Sensitivity</td><td>-106 dBm @ 115.2kbps for BER 10^{-4}</td></tr>
<tr><td>IF Selectivity</td><td>>40dB</td></tr>
</table>

ZumLink Z9-C and Z9-T 900MHz Technical Specifications	
Specification	**Description**
System Gain	Maximum of 136dB
Data Transmission	
Error Detection	CRC, FEC, and ARQ
Link Throughput	Maximum of 2000kbps
Data Encryption	AES 128
Protocol	Proprietary CSMA
Power Requirements	
Operating Voltage	+3 to +5VDC (±10%)
Tx Current	• 1230 mA @ 3VDC • 680 mA @ 5VDC
Rx Current	• 30 mA @ 3VDC • 13 mA @ 5VDC
Idle Current	• 30 mA @ 3VDC • 13 mA @ 5VDC
General Information	
Operating Temperature Range	-40 °C to +85 °C -40° F to 185° F
Humidity	0 to 95% non-condensing
Dimensions	50.8mm Long x 35.56mm Wide x 9.65mm High 2" Long x 1.4" Wide x 0.38" High
Weight	15g Phil says this is not the correct weight - but the Data Sheet (in the Sales Tool Kits Dropbox) has this - so what is the correct weight? 0.53lb.


FreeWave®