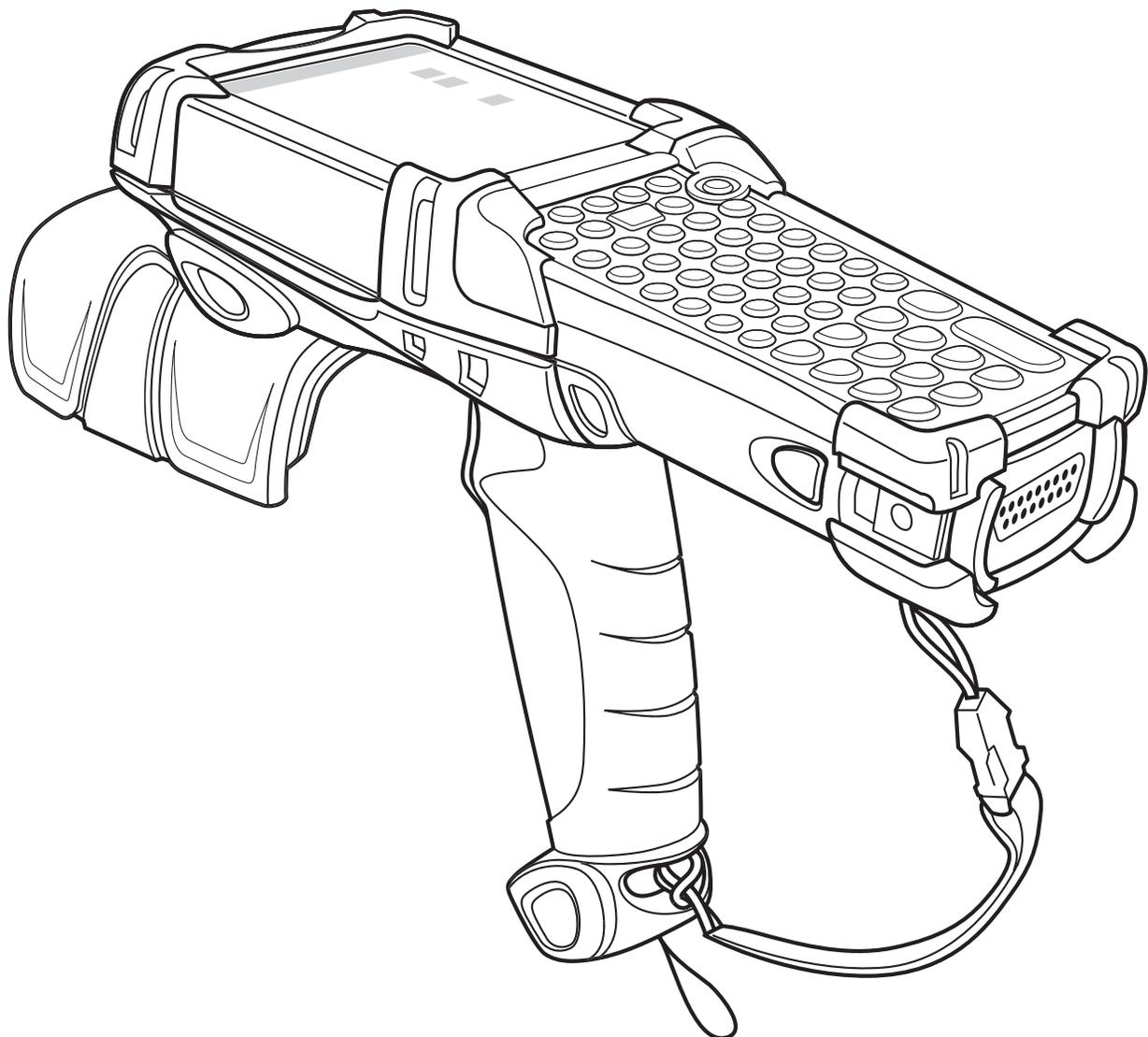




MC9090-Z RFID for Windows Mobile 6 RFID Integrator Guide Supplement



***MC9090-Z RFID for Windows Mobile 6
Integrator Guide Supplement***

72E-134491-03

Revision A

May 2011

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Warranty

For the complete Motorola hardware product warranty statement, go to:
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Revision History

Changes to the original manual are listed below:

Change	Date	Description
-01 Rev A	02/2010	Initial release
-02 Rev A	10/2010	Updated guide for the MC9090-Z configuration.
-03 Rev A	5/2011	Updated guide with MobileRFID software.

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About This Guide

Introduction

This *MC9090-Z RFID for Windows Mobile 6 Integrator Guide* provides the unique set up and operating procedures for MC9090-Z RFID mobile computers. This guide is intended as a supplement to the *MC909X Integrator Guide*, p/n 72E-72216-xx. Procedures common to MC9090-Z products are addressed in the *MC909X Integrator Guide*.

✓ **NOTE** Screens and windows pictured in this guide are samples and may differ from actual screens.

Configurations

Configuration	Radios	Display	Memory	Data Capture	Operating System	Keypad
MC9090-GJ0HJEQZ1US	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	Laser RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)
MC9090-GK0HJEQZ1US	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	2D Imager RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)
MC9090-GU0HJEQZ1US	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	1D Imager RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)
MC9090-GJ0HJEQZ4ER	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	Laser RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)
MC9090-GK0HJEQZ4ER	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	2D Imager RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)
MC9090-GU0HJEQZ4ER	WLAN: 802.11a/b/g WPAN: Bluetooth	Color	64 MB RAM/ 128 MB Flash	1D Scanner RFID	Windows Mobile 6.1 Classic	28-key; 43-key; 53-key Terminal Emulation (5250, 3270, VT)

Chapter Descriptions

Topics covered in this guide are as follows:

- *Chapter 1, Getting Started* provides an overview of RFID technology and components and a description of the MC9090-Z RFID mobile computer and features.
- *Chapter 2, Updating the Mobile Computer* describes how to update the device image and radio firmware.
- *Chapter 3, MobileRFID Functionality* includes information about configuring MobileRFID and reading tags using the MC9090-Z mobile device.
- *Chapter 4, RFID Sample Application* provides information about the RFID sample application and how to use it to assist in custom application development.
- *Chapter 5, Tag Locator (MC9090-Z only)* provides information about the WinCE application used to detect the location of a tag.
- *Chapter 6, Troubleshooting* describes MC9090-Z RFID mobile computer troubleshooting procedures.
- *Appendix A, RFID APIs* provides a reference for information on supported RFID APIs.
- *Appendix B, Technical Specifications* includes the technical specifications for the reader.

Notational Conventions

The following conventions are used in this document:

- “Mobile computer” or “reader” refers to the MC9090-Z RFID mobile computer.
- *Italics* are used to highlight the following:
 - Chapters and sections in this and related documents
 - Dialog box, window, links, software names, and screen names
 - Drop-down list, columns and list box names
 - Check box and radio button names
 - Icons on a screen
- **Bold** text is used to highlight the following:
 - Dialog box, window and screen names
 - Drop-down list and list box names
 - Check box and radio button names
 - Icons on a screen
 - Key names on a keypad
 - Button names on a screen
- Bullets (•) indicate:
 - Action items
 - Lists of alternatives
 - Lists of required steps that are not necessarily sequential.
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Documents and Software

The following documents provide more information about the reader.

- *MC9090-G RFID Quick Start Guide*, p/n 72-89960-xx
- *MC9090 RFID Microsoft® CE and Windows® Mobile® 6.1 Regulatory Guide*, p/n 72-132871-xx
- *MC9090-G RFID User Guide Supplement*, p/n 72E-79962-xx
- *MC909X User Guide*, p/n 72E-72215-xx
- *MC909X Integrator Guide*, p/n 72E-72216-xx
- *Application Guide for Motorola Enterprise Mobility Devices*, p/n 72E-68902-xx
- *Microsoft Applications for Windows Mobile 6 User Guide*, p/n 72E-108299-xx
- Enterprise Mobility Developer Kit
- *Wireless Fusion Enterprise Mobility Suite User Guide for Version 2.55*, p/n 72E-107170-01
- *Mobility Services Platform 3.2 User's Guide*, p/n 72E-100158-xx

For the latest version of this guide and all guides, go to: <http://supportcentral.motorola.com>.

Service Information

If you have a problem with your equipment, contact Motorola Solutions support for your region. Contact information is available at: <http://supportcentral.motorola.com>.

When contacting Motorola Solutions support, please have the following information available:

- Serial number of the unit
- Model number or product name
- Software type and version number

Motorola responds to calls by e-mail, telephone or fax within the time limits set forth in service agreements.

If your problem cannot be solved by Motorola Solutions support, you may need to return your equipment for servicing and will be given specific directions. Motorola is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty.

If you purchased your business product from a Motorola business partner, please contact that business partner for support.

Chapter 1 Getting Started

Introduction

This chapter provides an overview of RFID technology and components, and describes the MC9090-Z RFID mobile computer and its features.

RFID Technology Overview

RFID (Radio Frequency Identification) is an advanced automatic identification (Auto ID) technology that uses radio frequency signals to identify *tagged* items. An RFID tag contains a circuit that can store data. This data may be pre-encoded or can be encoded in the field. The tags come in a variety of shapes and sizes.

To read a tag the mobile computer sends out radio frequency waves using its integrated antenna. This RF field powers and charges the tags, which are tuned to receive radio waves. The tags use this power to modulate the carrier signal. The reader interprets the modulated signal and converts the data to a format for computer storage. The computer application translates the data into an understandable format.

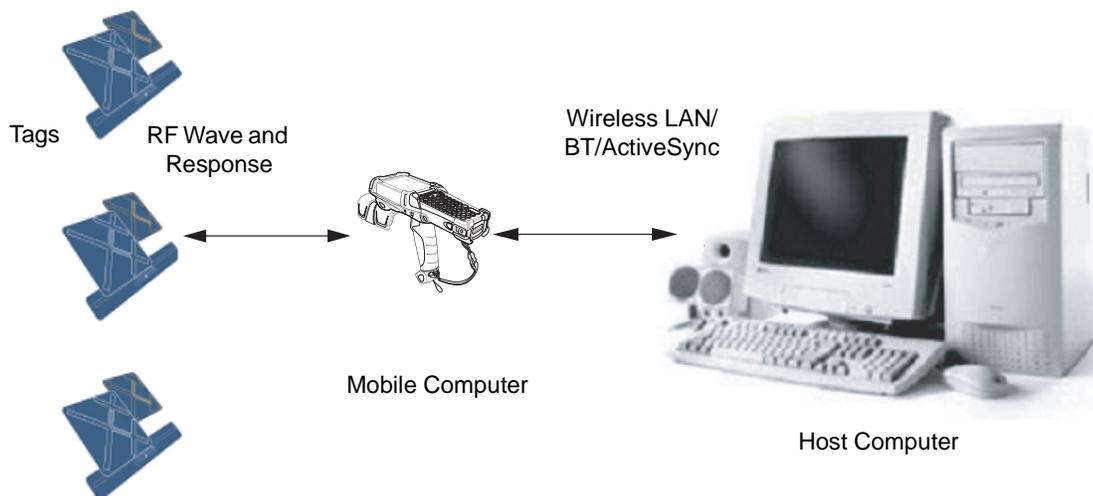


Figure 1-1 RFID System Elements

RFID Components

Motorola RFID solutions offer low cost, long read range, and a high read rate. These features provide real time end-to-end visibility of products and assets in the factory, distribution center, retail outlet, or other facility. The MC9090-Z RFID system consists of the following components:

- Silicon-based RFID tags that attach to retail products, vehicles, trailers, containers, pallets, boxes, etc.
- An integrated antenna that supports applications such as item level tracking and asset tracking.
- An embedded radio module that powers and communicates with tags for data capture and provides host connectivity for data migration.

Tags

Tags contain embedded chips that store unique information. Available in various shapes and sizes, tags, often called **transponders**, receive and respond to data requests. Tags require power to send data.

There are several categories of tags based on the protocol they support, read/write memory, and power options:

- Active RFID tags are powered by internal light-weight batteries, and also use these batteries to broadcast radio waves to the reader.
- Semi-passive RFID tags are also powered by internal light-weight batteries, but draw broadcasting power from the reader.
- Passive RFID tags are powered by a reader-generated RF field. These tags are much lighter and less expensive than active tags, and are typically applied to less expensive goods.

Antenna

Antennas transmit and receive radio frequency signals.

Radio Module

The radio module communicates with the tags and transfers the data to a host computer. It also provides features such as filtering, CRC check, and tag writing. The MC9090-Z RFID mobile computer supports standard RFID tags as described by EPCGlobal™ Class 1 Gen2 protocol.

MC9090-Z RFID Mobile Computer

The Motorola MC9090-Z RFID mobile computer includes an intelligent C1G2 UHF RFID reader with RFID read performance that provides real-time, seamless EPC-compliant tags processing. MC9090-Z RFID mobile computers are designed for indoor inventory management and asset tracking applications, and can host third-party, customer-driven embedded applications. Features include:

- ISO 18000-6C standard (EPC Class 1 Gen 2)
- Read, write, kill, lock, block write/block erase, permalock, and perma tag functionality
- 28-key; 43-key; 53-key; Terminal Emulation (5250, 3270, VT)
- 3.8 in. 1/4 VGA color display
- Orientation-insensitive integrated external antenna
- Laser-based bar code reader - reads 1D bar codes
- Windows® Mobile 6.1
- WLAN 802.11 a/b/g wireless connectivity
- Application-specific setup for ease of installation
- MobileRFID
- Sample application and support for custom or third-party applications
- RFID API support
- Event and tag management support

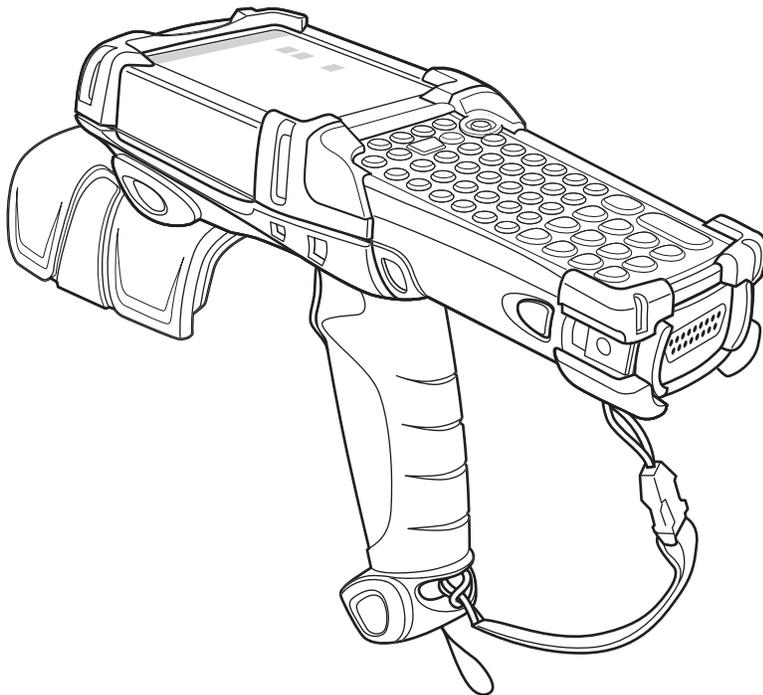


Figure 1-2 MC9090-Z RFID Mobile Computer

The MC9090-Z RFID mobile computer provides a wide range of features that enable implementation of complete, high-performance, intelligent RFID solutions.

MC9090-Z RFID Mobile Computer Parts

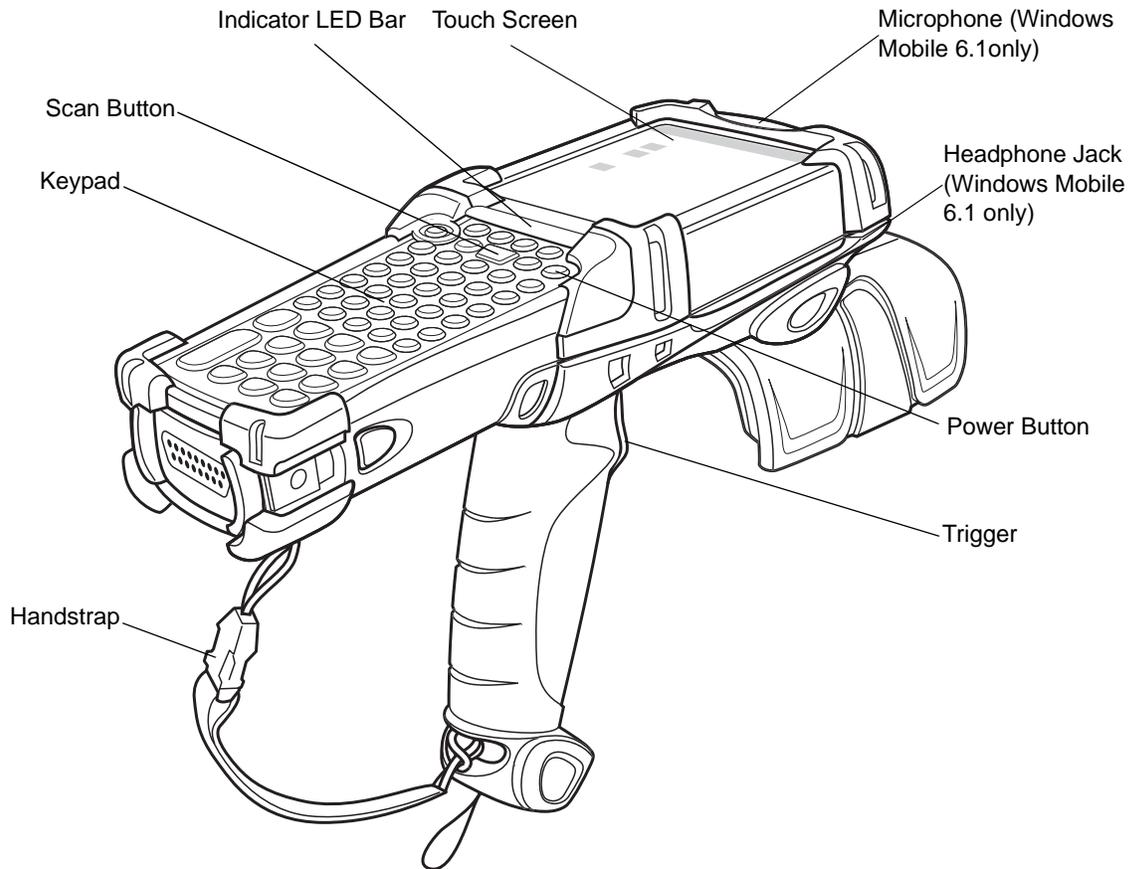


Figure 1-3 MC9090-Z RFID Mobile Computer Parts

MC9090-Z RFID Mobile Computer LEDs

The mobile computer LEDs indicate charging and reader status as described in [Table 1-1](#).

Table 1-1 LED Status Indicators

LED	Indication
Charging Indicators	
Off	Mobile computer not in cradle or the mobile computer is not attached to the CAM or MSR. Mobile computer not placed correctly. Charger is not powered.
Fast Blinking Amber	Error in charging; check placement of the mobile computer.
Slow Blinking Amber	Mobile computer is charging.
Solid Amber	Charging complete.

Reading Tags

To read RFID tags:

1. Use an RFID reader application to enable tag reading. For a sample application, select **RFID Demo** from the **Start** menu. See [Chapter 4, RFID Sample Application](#).
2. Aim the mobile computer at the tag, oriented horizontally or vertically depending on the tag orientation. The distance between the tag and the antenna is the approximate read range.
3. Press the trigger or tap the on-screen **Read** command within the application to interrogate all RFID tags within the radio frequency (RF) field of view and capture data from each new tag found. Release the trigger or tap the **Stop Read** command to stop interrogating tags.

Chapter 2 Updating the Mobile Computer

Introduction

This chapter describes how to update the device image and radio firmware.

Updating the Device Image

Windows Mobile contains an Image Update feature that updates all operating system components. Motorola distributes all updates as update packages on the Support Central Web site at <http://supportcentral.motorola.com>. These packages contain either partial or complete updates for the operating system.

To update operating system images, copy the update package to the mobile computer using the SD card, or AirBEAM. For detailed information about AirBEAM Client, refer to AirBeam Smart guide.

Downloading an Update Loader Package

1. Download the appropriate update loader package from the Motorola Support Central web site <http://supportcentral.motorola.com> to a host computer.
2. Locate the update loader package file on the host computer and un-compress the file into a separate directory:
 - **90XXw61RFIDSDxxxxx.zip** for updating via the SD card
 - **90XXw61RFIDABxxxxx.zip** for updating via AirBEAM.

Updating Images via the SD Card

To install an update loader package using the SD card:

1. Insert the SD card into the SD card slot in the device. Insert the mobile computer into the cradle and connect the cradle to AC power.
2. Connect the mobile computer to the host computer using ActiveSync.
3. In ActiveSync on the host computer, open **Explorer** for the mobile computer.
4. Copy the contents of **90XXw61MenUPR10903\UpdateLoader** (the files only, not the folder) into the **\Storage Card** folder in the root directory on the mobile computer.
5. On the mobile computer, navigate to the **\Storage Card** folder and tap the program **STARTUPDLDR.EXE**. The update takes approximately 10 minutes. Do not remove AC power during this time.
6. Copy the contents of **90XXw61RFIDPkgXXXX** (the files only, not the folder) into the **\Storage Card** folder on the mobile computer.
7. Remove the mobile computer from the cradle or AC power if fully charged.
8. On the mobile computer, navigate to the **\Storage Card** folder and tap the program **ClickHereRFIDSetup.exe**.

The device boots after the installation. Note that the MobileRFID application disconnects when the mobile computer is charging, and re-connects when the mobile computer is removed from AC power.

Updating Images via AirBEAM

Install the AirBEAM package files within **90XXw61RFIDABxxxxx.zip** in sequence:

1. **90XXw61MenUPRXXXX.apf**
2. **90XXw61RFIDPkgXXXX.apf**

90XXw61RFIDPkgXXXX.apf executes silently and the mobile computer boots after installation, which takes approximately 7-10 seconds. Refer to the *MC909X Integrator Guide* for more information on AirBEAM.

Updating the RFID Firmware

The RFID_FLASH utility, used to update the RFID radio firmware, is no longer provided. For related issues, contact Motorola Solutions support.

Chapter 3 MobileRFID Functionality

Introduction

✓ **NOTE** Screens pictured in this chapter are not to scale.

MobileRFID is an RFID server application that runs in the background on the mobile computer. The MobileRFID icon appears in the system tray. This chapter includes information on using and configuring MobileRFID.

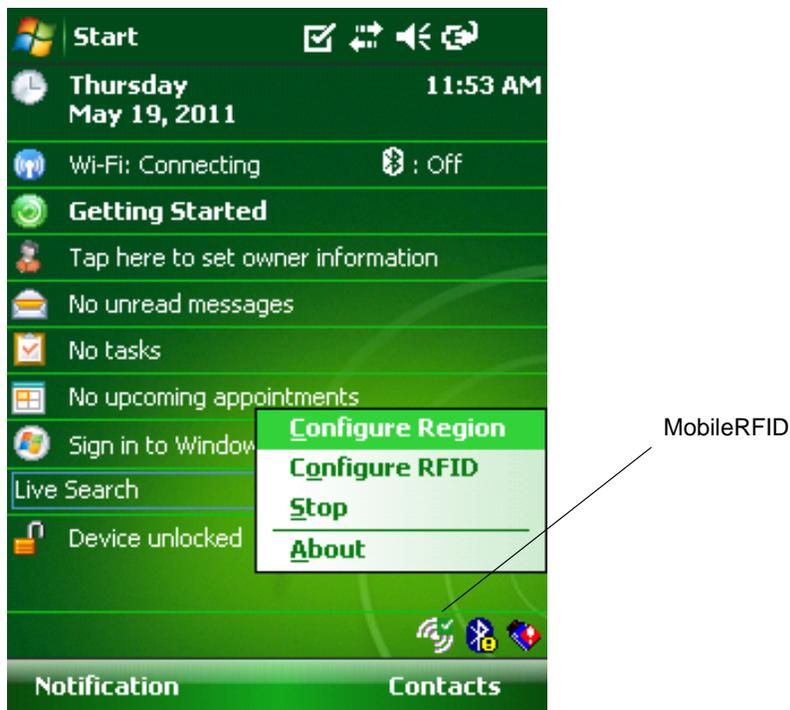


Figure 3-1 MobileRFID Icon

MobileRFID Icons

The MobileRFID icon indicates RFID radio status as described in [Table 3-1](#).

Table 3-1 *MobileRFID Icon Indicators*

Icon	Indication
	RFID running, radio on.
	RFID running, radio off.
	RFID stopped (radio not found/battery critical/stopped from user interface).
	RFID critical (radio muted, laser enabled).*
	RFID warning (Tx low power).*

***RFID critical and RFID warning due to transmit low power is not applicable to the MC9090-Z.**

MobileRFID Menu

Tap the MobileRFID icon in the system tray. A menu appears.

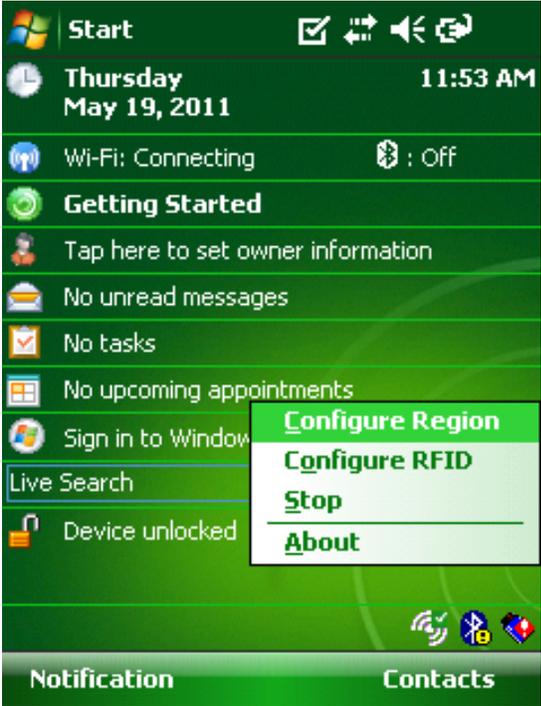


Figure 3-2 MobileRFID Icon Menu

Configure Region

When the device starts up for the first time after installation, it prompts the user to select a region (country of operation).

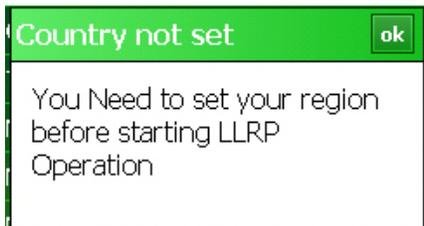


Figure 3-3 *Country Not Set Reminder Window*

To set the region of operation:

1. Tap **ok** to close the *Country not set* reminder window. The *Region Configuration* window displays.
2. Tap the **Region of Operation** drop-down arrow and select the country in which the device operates. Then select the communication standard as allowed by the regulatory standards of that country/region.



Figure 3-4 *Region Configuration Window*

3. Select **Apply**. The following warning message appears.

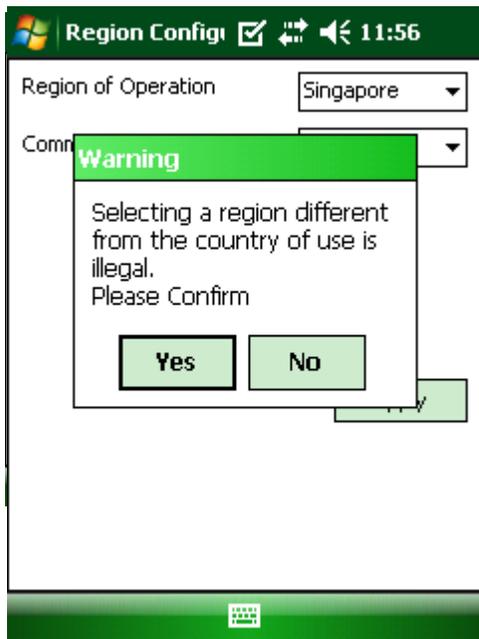


Figure 3-5 Region Configuration Warning Window

4. Tap the **Yes** to confirm the correct region was selected. A window appears, indicating success.

If the country of operation was not selected at startup, or to change the country of operation:

1. Tap the MobileRFID icon to display the option menu (see [Figure 3-2 on page 3-3](#)) and tap **Configure Region** on the menu. The *Region Configuration* window displays.



Figure 3-6 Region Configuration Window

2. Continue with [Step 2 on page 3-4](#) to complete the region configuration.

Configure MobileRFID

MobileRFID is in Server Mode by default. To configure MobileRFID to operate in Client Mode:

1. Tap the MobileRFID icon, then tap **Configure RFID**.

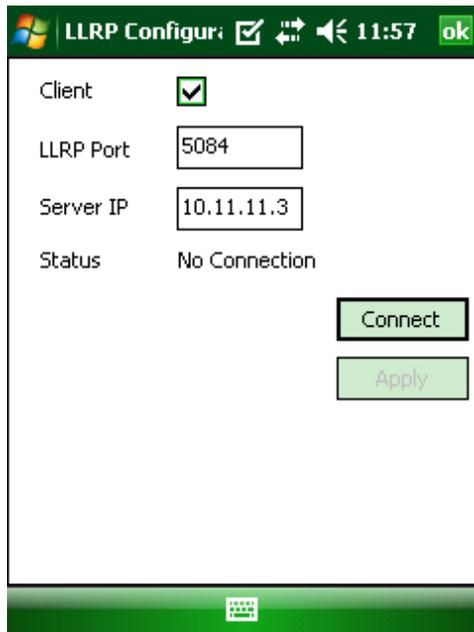


Figure 3-7 LLRP Configuration Window

2. Select the **Client Mode** check box.
3. In the **LLRP Port** field, enter the port number on which the server waits for the MobileRFID client to communicate. The default is 5084.
4. In the **Server IP** field, enter the server IP for the remote host to which MobileRFID communicates as a client.
5. Tap **Apply**.
6. Tap **OK** to close the window.

Version Information

To view software version information for the MobileRFID application, tap the MobileRFID icon, then tap **About**.

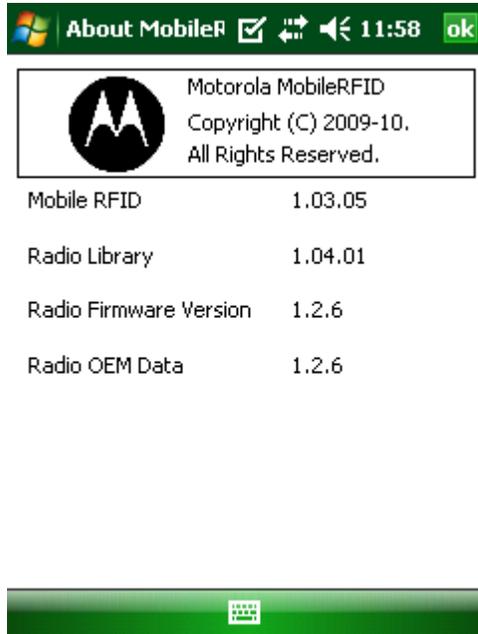


Figure 3-8 *MobileRFID Versions Window*

This window displays the MobileRFID server application version, RFID library version, radio firmware version, and radio OEM data version.

✓ **NOTE** The version information in [Figure 3-8](#) may differ from the information on the actual mobile computer screen.

Run/Stop RFID

To stop RFID service, tap **Stop** in MobileRFID menu. This frees the RFID radio.

To restart RFID, tap **Run** in MobileRFID menu.

Chapter 4 RFID Sample Application

Introduction

The RFID Demo application CS_RFID3Sample6.exe provides an overview of how the application works and assists application developers in developing custom applications.

The mobile computer can read, write, lock, kill, and program Gen2 tags. Each tag contains the EPC number (64 or 96 bits), CRC, and kill code. The mobile computer can also collect data by decoding in-range EPC Gen2 RFID tags.

Initiating the read command within the sample application causes the mobile computer to interrogate all RFID tags within the radio frequency (RF) field of view. The reader captures data from each new tag and adds it to the list box in the **EPC ID** window. Select **Stop Read** to stop interrogating tags.

Launching the RFID Sample Application

Select **RFID Demo** in the **Start** menu to start the RFID sample application.

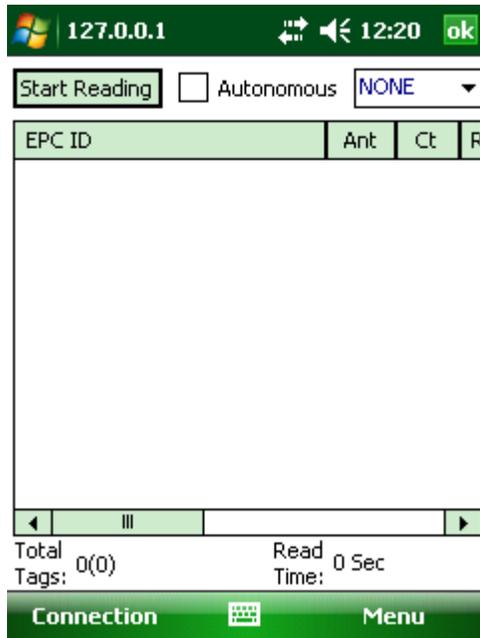


Figure 4-1 *RFID Sample Application Window*

In the sample application window:

- Tap the **Start Reading** button to initiate the tag read. Tap **Stop Reading** to terminate tag reading.
- Use the drop-down menu at the top right of the window to select a tag memory bank to read. The default memory bank is **NONE**. Other options are **EPC**, **TID**, **Reserved**, and **User**.
- Select the **Autonomous** check box to enable tag event reporting, which reports activities such as new tag and tag visibility events.

Connection

Tap **Connection** to display the reader IP and port number.



Host Name/Reader IP

Port

Disconnect

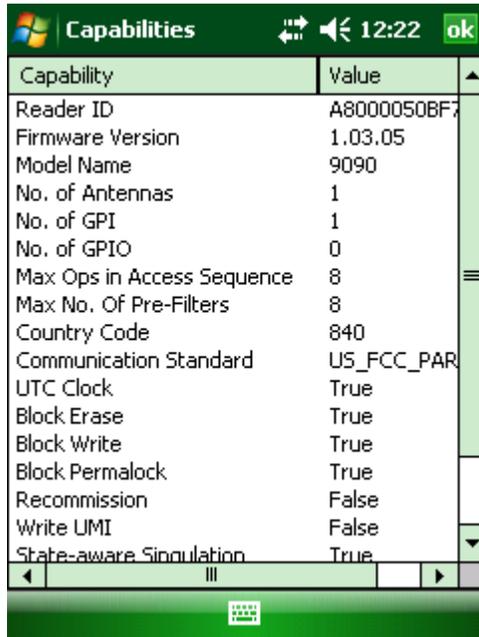


Figure 4-2 *Connection Window*

Select **Disconnect** to disconnect the reader.

Capabilities

Select **Menu > Capabilities** to view the capabilities of the connected reader.



The screenshot shows a Windows Mobile 6 interface with a green header bar. The title bar reads "Capabilities" and includes navigation icons, a speaker icon, the time "12:22", and an "ok" button. The main content is a table with two columns: "Capability" and "Value". The table lists various reader capabilities and their current values. At the bottom, there is a navigation bar with a back arrow, a home button, and a forward arrow.

Capability	Value
Reader ID	A8000050BF7
Firmware Version	1.03.05
Model Name	9090
No. of Antennas	1
No. of GPI	1
No. of GPIO	0
Max Ops in Access Sequence	8
Max No. Of Pre-Filters	8
Country Code	840
Communication Standard	US_FCC_PAR
UTC Clock	True
Block Erase	True
Block Write	True
Block Permalock	True
Recommission	False
Write UMI	False
State-aware Singulation	True

Figure 4-3 Capabilities Window

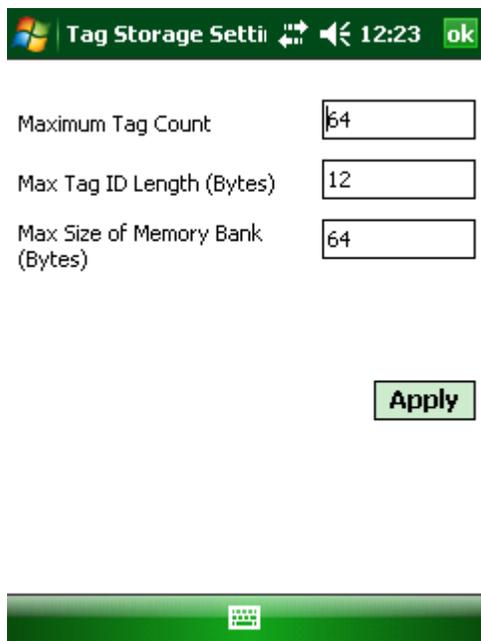
Configuration Menu Options

The Configuration menu includes the following options:

- Tag Storage Settings
- Antenna
- RF Mode
- Singulation
- Power On/Off Radio
- Reset to Factory Defaults

Tag Storage Settings

Select **Menu > Config > Tag Storage Settings** to view/configure tag storage settings.



Tag Storage Setti 12:23 ok

Maximum Tag Count	<input type="text" value="64"/>
Max Tag ID Length (Bytes)	<input type="text" value="12"/>
Max Size of Memory Bank (Bytes)	<input type="text" value="64"/>

Apply

Figure 4-4 Tag Storage Settings Window

This window includes the following fields:

- **Maximum Tag Count** - The maximum number of tags to store in the DLL.
- **Max Tag ID Length** - The maximum tag length.
- **Max Size of Memory Bank** - Storage to allocate for the memory bank's data.
- **Apply** - Select to apply the configuration changes.

Antenna

Select **Menu > Config > Antenna** to view/configure the antenna.

The screenshot shows the 'Antenna Config' window with the following fields and values:

- Antenna ID:** 1
- Receive Sensitivity (dB):** 0
- Transmit Power (dBm):** 2700
- Hop Table Index:** 1

Below these fields is a list of frequencies:

```
915750, 915250, 903250, 926750,
926250, 904250, 927250, 920250,
919250, 909250, 918750, 917750,
905250, 904750, 925250, 921750,
914750, 906750, 913750, 922250,
911250, 911750, 903750, 908750,
905750, 912250, 906250, 917250,
914250, 907250, 918250, 916250,
```

An 'Apply' button is located below the frequency list.

Figure 4-5 Antenna Configuration Window

This window includes the following fields:

- **Antenna ID** - Selecting an antenna ID updates the configuration values in the other fields.
- **Receive Sensitivity (dB)** - Lists the reader-supported values for the selected antenna.
- **Transmit Power (dBm)** - Lists the reader-supported values for the selected antenna.
- **Hop Table Index** - Updates the Hop Frequency list with its corresponding frequencies.
- **Apply** - Select to apply the configuration changes.

RF Mode

Select **Menu > Config > RF Mode** to view/configure the RF mode for each antenna.

Parameter	Value
Mode Identifier	18
DR	DR_64_3
Bdr	62500
M	MV_4
Forward Link Modulat...	FORWARD_LI...
PIE	1500
Min Tari	25000
Max Tari	25000
Step tari	0

Figure 4-6 RF Mode Window

This window includes the following fields:

- **Antenna ID** - Selecting an antenna ID updates the configuration values in the other fields.
- **Tari Value** - TARI specified in nsec.
- **RF Mode Table** - RF mode table configured for the current antenna.
- **Apply** - Select to apply the configuration changes.

Singulation

Select **Menu > Config > Singulation** to view/configure the singulation control settings for each antenna.

The screenshot shows a Windows Mobile application window titled "Singulation". The title bar includes a signal strength indicator, a speaker icon, the time "12:24", and an "ok" button. The main content area contains the following settings:

- Antenna ID:** A dropdown menu with a green bar and a downward arrow.
- Session:** A dropdown menu with the value "50" and a downward arrow.
- Tag Population:** A text input field containing the number "100".
- Tag Transit Time:** A text input field containing the number "0".
- State Aware:** An unchecked checkbox.
- Inventory State:** A dropdown menu.
- SL Flag:** A dropdown menu.

An "Apply" button is located at the bottom center of the settings area.



Figure 4-7 Singulation Control Settings Window

This window includes the following fields:

- **Antenna ID** - Selecting an antenna ID updates the configuration values in the other fields.
- **Session** - The session number for the inventory operation.
- **Tag Population** - The approximate tag population in the RF field of the antenna.
- **Tag Transit Time** - The time in milliseconds that the tag typically remains in the RF field of the antenna.
- **State Aware** - Indicates if the antenna performs state aware or state unaware singulation.
- **Inventory State** - Select a tag of state A or B. Valid only for State Aware singulation
- **SL Flag** - Valid only for State Aware singulation
- **Apply** - Select to apply the configuration changes.

Power On/Off Radio

Select **Menu > Config > Power On/Off Radio** to power the RFID radio on or off.

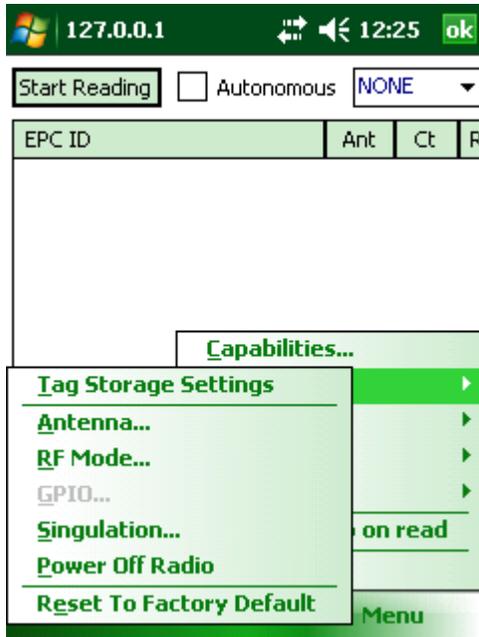


Figure 4-8 Radio Power Settings Menu

Reset to Factory Default

Select **Menu > Config > Reset to Factory Default** to restore the default reader configuration.

Operations Menu Options

The **Operations** menu includes the following options:

- Antenna Info
- Filter
- Access
- Triggers

Antenna Info

Select **Menu > Operations > Antenna Info** to view/configure the list of antennas that can be used for inventory/access operations.

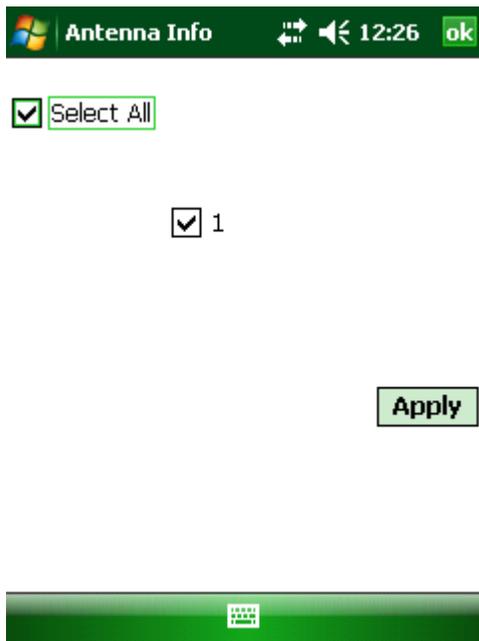


Figure 4-9 *Antenna Info Window*

Filter

Select **Menu > Operations > Filter** to view/configure the following filters:

- Pre-Filter
- Post-Filter
- Access-Filter

Pre-Filter

Select **Menu > Operations > Filter > Pre-Filter** to view/configure pre-filters.



Figure 4-10 *PreFilter Window*

This window includes the following fields:

- **Antenna ID** - Selecting an antenna ID updates the configuration values in the other fields.
- **Memory Bank** - Memory bank on which the filter is applied.
- **Offset** - The first (msb) bit location of the specified memory bank against which to compare the tag mask.
- **Tag Pattern** - The pattern against which to compare the specified memory bank.
- **Filter Action** - Select the required filter action. For more information, refer to the Gen2 specification available at <http://www.epcglobalinc.org/standards/>.
- **Action** - After selecting a **Filter Action**, select the required action. For more information, refer to the Gen2 specification available at <http://www.epcglobalinc.org/standards/>.
- **Target** - After selecting an **Action**, select the **Target** if applicable. For more information, refer to the Gen2 specification available at <http://www.epcglobalinc.org/standards/>.

Post-Filter

Select **Menu > Operations > Filter > Post-Filter** to view/configure post-filters.

The screenshot shows the PostFilter configuration window. The title bar includes the Windows logo, the text 'PostFilter', a signal strength indicator, a speaker icon, the time '12:28', and an 'ok' button. The main area contains the following controls:

- Memory Bank:** A dropdown menu with 'EPC' selected.
- Offset (Bits):** An empty text input field.
- Tag Pattern (Hex):** An empty text input field.
- Tag Mask (Hex):** An empty text input field.
- Tag Pattern A / Tag Pattern B:** Two tabs, with 'Tag Pattern A' currently selected.
- Match Pattern:** A dropdown menu with 'A AND B' selected.
- Use Filter:** A checked checkbox.
- Apply:** A button to save the configuration.

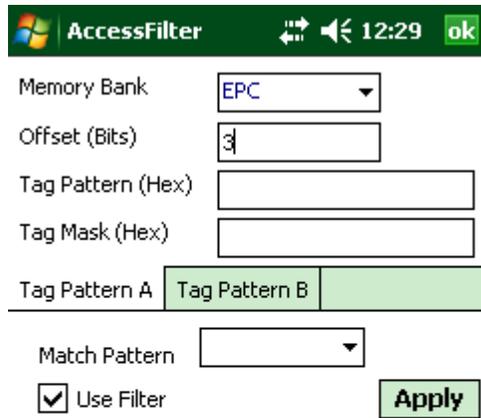
Figure 4-11 *PostFilter Window*

This window includes the following fields:

- **Memory Bank** - Memory bank on which the filter is applied.
- **Offset** - The first (msb) bit location of the specified memory bank against which to compare the tag mask.
- **Tag Pattern** - The pattern against which to compare the specified memory bank.
- **Tag Mask** - The bit mask to facilitate bit wise filtering.
- **Match Pattern** - Select the tag pattern to match (A, B, both, or neither).

Access-Filter

Select **Menu > Operations > Filter > Access-Filter** to view/configure the access-filters.



AccessFilter 12:29 ok

Memory Bank

Offset (Bits)

Tag Pattern (Hex)

Tag Mask (Hex)

Tag Pattern A **Tag Pattern B**

Match Pattern

Use Filter



Figure 4-12 *AccessFilter Window*

See [Post-Filter on page 4-12](#) for field descriptions.

Access

Select **Menu > Operations > Access** to perform the following access operations.

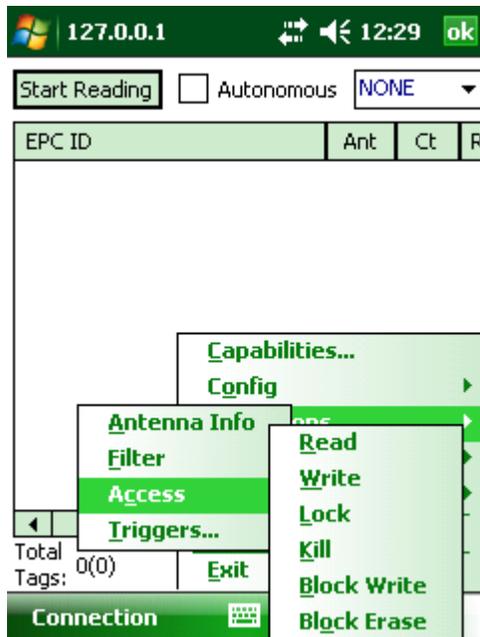


Figure 4-13 Access Menu

The **Access** menu includes the following options:

- Read
- Write
- Lock
- Kill
- Block Write
- Block Erase

Read 12:31 ok

Tag ID (Hex) AD8B04001BDF17F827000054

Password (Hex) 0

Memory Bank EPC

Offset (Bytes) 0 Length (Bytes) 12

Data Read (Hex)

Access Filter Read



Figure 4-15 Read Access Operation Window

Write Tags 12:32 ok

Tag ID (Hex) AD8B04001BDF21F92A000055

Password (Hex) 0

Memory Bank USER

Offset (Bytes) 0 Length (Bytes) 4

Data (Hex)

Access Filter Write



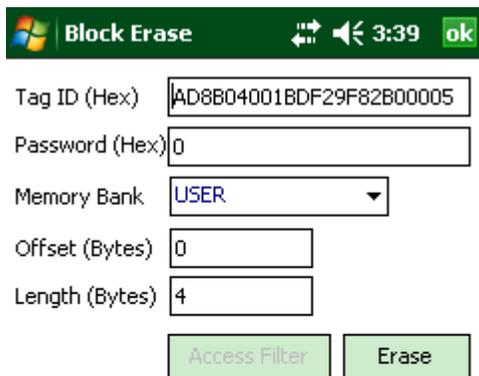
Figure 4-16 Write / Block-Write Access Operation Window



Figure 4-17 Lock Access Operation Window



Figure 4-18 Kill Access Operation Window



Block Erase

Tag ID (Hex) AD8B04001BDF29F82B00005

Password (Hex) 0

Memory Bank USER

Offset (Bytes) 0

Length (Bytes) 4

Access Filter Erase



Figure 4-19 Block Erase Access Operation Window

Triggers

Select **Menu > Operations > Trigger** to view/configure the following triggers:

- Start Trigger
- Stop Trigger
- Report Trigger

For more information on the various triggers, refer to the RFID3 documentation in the EMDK for .NET

Start Trigger

Trigger

Trigger Type: Periodic

Start Date: Feb/17/11 02:13:35 PM

Period(ms): 1

Start Trigger | Stop Trigger | Report Trigger

Tag Report Trigger: 0 | Apply

Figure 4-20 Start Trigger - Periodic Window

Trigger

Trigger Type: GPI

Event: 1

High To Low

Low To High

Start Trigger | Stop Trigger | Report Trigger

Tag Report Trigger: 0 | Apply

Figure 4-21 Start Trigger - GPI Window

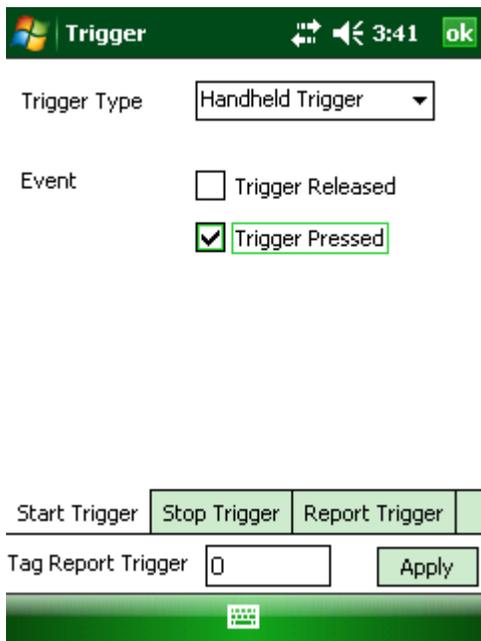


Figure 4-22 Start Trigger - Handheld Trigger Window

Stop Trigger

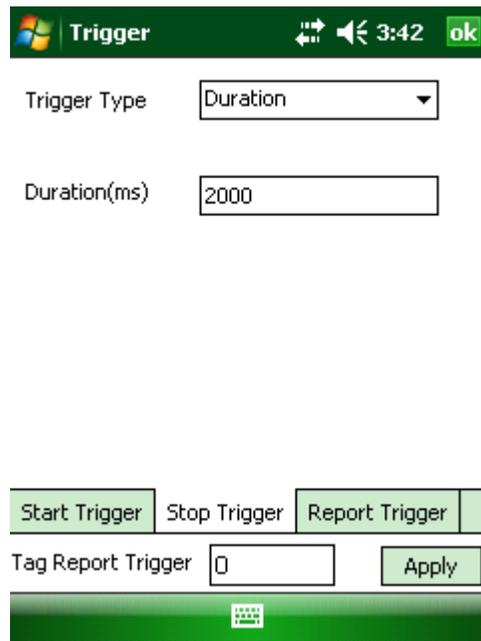


Figure 4-23 Stop Trigger - Duration Window

The screenshot shows a window titled "Trigger" with a Windows logo on the left and navigation icons (back, forward, home, search) and a timer (3:43) and "ok" button on the right. The configuration is as follows:

- Trigger Type: **GPI with Timeout** (dropdown menu)
- Port: **1** (dropdown menu)
- Timeout(ms):
- Event:
 - High To Low
 - Low To High

At the bottom, there are three buttons: "Start Trigger", "Stop Trigger", and "Report Trigger". Below these is a "Tag Report Trigger" field with the value "0" and an "Apply" button. A keyboard icon is visible at the very bottom of the window.

Figure 4-24 Stop Trigger - GPI with Timeout Window

The screenshot shows a window titled "Trigger" with a Windows logo on the left and navigation icons (back, forward, home, search) and a timer (3:43) and "ok" button on the right. The configuration is as follows:

- Trigger Type: **Tag Observation** (dropdown menu)
- Tag Observation: **5** (text input field)
- Timeout(ms): **1000** (text input field)

At the bottom, there are three buttons: "Start Trigger", "Stop Trigger", and "Report Trigger". Below these is a "Tag Report Trigger" field with the value "0" and an "Apply" button. A keyboard icon is visible at the very bottom of the window.

Figure 4-25 Stop Trigger - Tag Observation Window

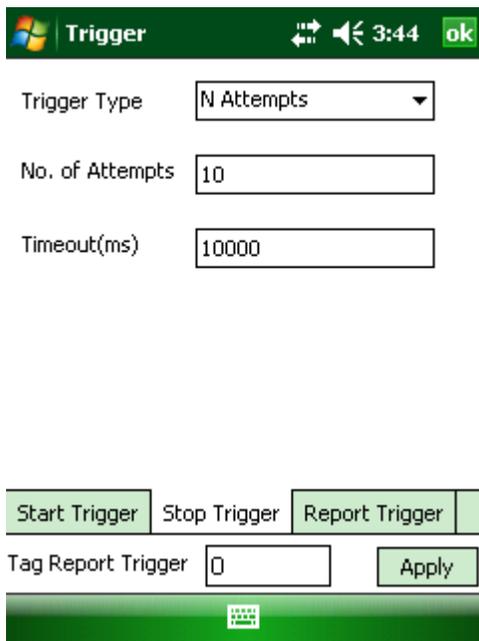


Figure 4-26 Stop Trigger - N Attempts Window

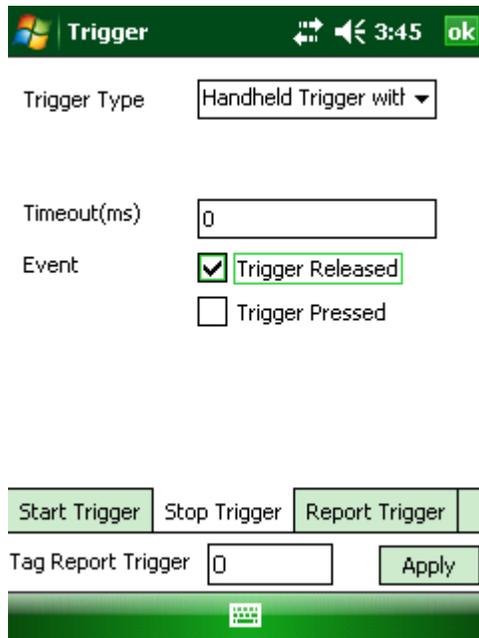


Figure 4-27 Stop Trigger - Handheld Trigger with Timeout Window

Report Trigger

Trigger 3:46 ok

New Tag Moderated 500

Tag Invisible Moderated 500

Tag back to visibility Moderated 500

Start Trigger Stop Trigger Report Trigger

Tag Report Trigger 0 Apply

Figure 4-28 Report Trigger Window

Management Menu Options

Management options are not applicable for handheld readers.

Help Menu

Select **Menu > Help > About** to display the version information.



CS_RFID3Sample6

C-Dll: 5.1.24.1, .NET-Dll: 1.1.0.0

Copyright (C) 2010



Figure 4-29 *About Window*

The version numbers displayed in this window are examples. Actual version numbers are based on the versions of the files on the device.

Exit

Select **Menu > Exit** to exit the RFID sample application.

Chapter 5 Tag Locator (MC9090-Z only)

Introduction

Tag Locator is a WinCE application used to detect the location of a tag. This is accomplished by finding the relative position of the tag, with respect to the device, by providing the TagID of the tag to be located. The handheld reader can be moved back and forth to get its relative position as indicated by the frequency of beeps sounded, and a vertical progress bar which shows the relative position of the tag.

To execute the application the following components/DLLs are required in the device.

- RFIDAPI32.dll - Version 5.1.15 or higher
- Symbol.RFID3.Device.dll - Assembly version 1.1.0.1, File version 1.1.0.7 or higher
- Symbol.Audio.dll
- Symbol.dll
- Symbol.Notification.dll
- Symbol.StandardForms.dll

Using Tag Locator

To use the tag locator application:

1. Open the *TagLocator* application from \Application folder on the device. The initial window displays.



Figure 5-1 *TagID Locator Window*

2. Enter the tag ID to locate in the *TagID* text box using one of the following methods:
 - Type the tag ID in the *TagID* text box. Upon entering the tag ID, the **Locate** button displays.

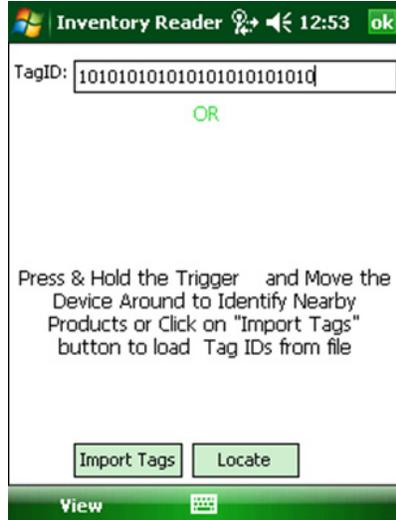


Figure 5-2 *TagID Locator Window - Locate*

- Tap **Locate**, or press and hold the trigger.
- Leave the *TagID* text box empty and perform a search by tapping **Search Tags**, or press and hold the trigger.
- Load a list of tags saved in the application, in a .csv file, by tapping **Import Tags**.

Importing Tags

When you choose to import tags saved in a .csv file:

1. Tap **Import Tags** on the window display in [Figure 5-1](#). The following window displays.



Figure 5-3 TagID Locator Open File Window

2. Find the appropriate folder and ensure the file type is CSV Files .csv.
3. In the list of tags select any tag from the list.



Figure 5-4 TagID Locator Tag List Window

4. Tap **Locate**, or press and hold the trigger.

5. Move the device back and forth in all directions to get the relative position either by beeps sounded, by the vertical progress bar (shown below), or both.

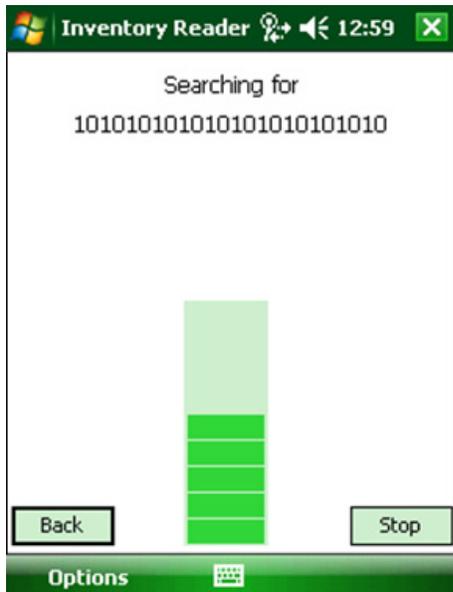
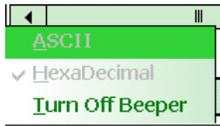


Figure 5-5 TagID Locator Tag List Window

- ✓ **NOTE** If the tag ID entered is not in the reader's field of view, the vertical progress bar is empty indicating the tag is not seen.
- ✓ **NOTE** Tap **Options** to display the menu on which to control the beeper and display types (ASCII or Hexadecimal).



6. When the current tag is located, tap **Back** to start another search.

Chapter 6 Troubleshooting

Introduction

Table 6-1 provides troubleshooting information.

Troubleshooting

Table 6-1 *Troubleshooting*

Problem	Possible Causes	Possible Solutions
Mobile computer does not turn on.	Lithium-ion battery not charged.	Charge or replace the lithium-ion battery.
	Lithium-ion battery not installed properly.	Ensure battery is installed properly. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
	System crash.	Perform a warm boot. If the RFID reader still does not turn on, perform a cold boot. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
Rechargeable lithium-ion battery did not charge.	Battery failed.	Replace battery. If the mobile computer still does not operate, try a warm boot, then a cold boot. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
	Mobile computer removed from cradle while battery was charging.	Insert mobile computer in cradle and begin charging. The lithium-ion battery requires less than four hours to recharge fully.

Table 6-1 Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
RFID reader turns itself off.	RFID reader is inactive.	The RFID reader turns off after a period of inactivity. If the RFID reader is running on battery power, this period can be set to 30 sec., 1, 2, 3, 4, 5 or 6 minutes. If the RFID reader is running on external power, this period can be set to 1, 2, 3, 5, 10, 15 and 30 minutes. For Windows Mobile 6.1 devices, Check the power settings by tapping Start > Settings > System tab > Power icon > Advanced tab. Change the setting if a longer delay is required before the automatic shutoff feature activates.
	Battery is depleted.	Replace the battery.
	Battery is not inserted properly.	Insert the battery properly. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
No sound.	Volume setting is low or turned off.	Increase the volume setting. Unit may be a beeper only unit or incorrect Config Block is programmed into device.
Tapping the window buttons or icons does not activate the corresponding feature.	LCD screen not aligned correctly.	Re-calibrate the screen.
	Battery is not inserted properly.	Insert the battery properly. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
A message appears stating that the mobile computer memory is full.	Too many files stored on the mobile computer.	Delete unused memos and records. Save these records on the host computer.
	Too many applications installed on the mobile computer.	If additional applications have been installed on the RFID reader, remove them to recover memory. Tap Start > Settings > System tab > Remove Programs icon.
Reader is not reading tags.	Read application is not loaded.	Verify that the unit is loaded with a read application. See the System Administrator.
	Tags are damaged.	Use tags of good quality.
	The tag is out of its read range.	Move the tag into the read range. See Reading Tags on page 1-5 .
	RFID reader is not programmed for the tag type.	Ensure the RFID reader is programmed to accept the tag type being read.
	Battery is low.	If the reader stops reading check the battery level. When the battery is low, the reader shuts off. Note: If the reader is still not reading, contact the distributor or Motorola.
	Tags are not EPC Gen2.	Use EPC Gen2 tags.

Table 6-1 Troubleshooting (Continued)

Problem	Possible Causes	Possible Solutions
Reader is not reading tags and the MobileRFID icon is red.	The battery is cold or degraded.	Recharge or replace the battery. If the problem still exists, exit and restart MobileRFID.
Cannot see characters on display.	RFID reader not powered on.	Press the Power button.
During data communication, no data was transmitted, or transmitted data was incomplete.	RFID reader removed from cradle or unplugged from host computer during communication.	Replace the RFID reader in the cradle, or reattach the Synchronization cable and re-transmit.
	Incorrect cable configuration.	See the System Administrator.
	Communication software was incorrectly installed or configured.	Perform setup. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> . Ensure that Microsoft ActiveSync 4.1 or greater is installed on the host computer.
Tapping the window buttons or icons does not activate the corresponding feature.	LCD screen not aligned correctly.	Re-calibrate the screen.
	Battery is not inserted properly.	Insert the battery properly. Refer to the <i>MC909X Mobile Computer Integrator Guide</i> .
The RFID reader does not accept scan input.	Scanning application is not loaded.	Verify that the unit is loaded with a scanning application. See the System Administrator.
	Unreadable bar code.	Ensure the symbol is not defaced.
	Distance between exit window and bar code is incorrect.	Ensure RFID reader is within proper scanning range.
	Mobile computer is not programmed for the bar code.	Ensure the RFID reader is programmed to accept the type of bar code being scanned.
	Mobile computer is not programmed to generate a beep.	If a beep on a good decode is expected and a beep is not heard, check that the application is set to generate a beep on good decode.
	Battery is low.	If the scanner stops emitting a laser beam when the trigger is pressed, check the battery level. When the battery is low, the scanner shuts off before the mobile computer low battery condition notification. Note: If the scanner is still not reading symbols, contact the distributor or Symbol Technologies.

 **NOTE** If problems still occur, contact the distributor or call the local contact. See [page ix](#) for contact information.

Appendix A RFID APIs

RFID APIs are available in C and .NET. For information on supported RFID APIs, refer to the *Enterprise Mobility Developer Kit* (EMDK), available at <http://supportcentral.motorola.com>.

For C, refer to the EMDK for C v2.1 or later. For .Net, refer to the EMDK for .NET v2.2 or later.

Appendix B Technical Specifications

Technical Specifications

Table B-1 includes technical specifications related only to the MC9090-Z RFID reader. For all technical specifications for the MC9090-G mobile computer, refer to the *MC909X Integrator Guide*, p/n 72E-72216-xx.

Table B-1 MC9090-Z RFID Technical Specifications

Item	MC9090-Z RFID
Performance Characteristics	
Operating System	Microsoft Windows Mobile 6.1 Classic
Data Capture Options	<ul style="list-style-type: none">- 1D Standard Range scan engine- 1D Long Range scan engine Omni-directional 1D and 2D imaging engine reads symbologies and captures grayscale images and signatures with intuitive laser aiming.- Gen2 tags
RFID	
Standards Supported	EPC Generation 2 UHF
Nominal read range	10 ft./3.04 m with the RFX6000 4x4 tag optimally oriented.
Field	Half read range beam width: +/- 80 degrees (with tags optimally oriented).
Antenna	Integrated, circularly polarized, 6 dBi effective linear gain per axis (nominal).
Frequency Range	902-928 MHz
Output power	1W conducted (4W EIRP with integrated antenna)

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