

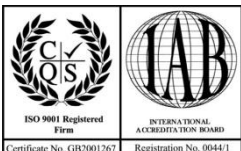
## 1134 LF Reader User Guide



Technology Solutions UK Ltd Suite C,  
Loughborough Technology Centre,  
Epinal Way,  
Loughborough,  
Leicestershire,  
LE11 3GE,  
United Kingdom.

Tel: +44 (0) 1509 238248  
Fax: +44 (0) 1509 220020

Email: [enquiries@tsl.uk.com](mailto:enquiries@tsl.uk.com)



© 2011 TSL. All rights reserved.

No part of this publication may be reproduced or used in any form, or by any electrical or mechanical means, without permission in writing from Technology Solutions (UK) Ltd. This includes electronic or mechanical means, such as photocopying, recording, or information storage and retrieval systems. The material in this manual is subject to change without notice.

Technology Solutions (UK) Ltd (TSL) reserves the right to make changes to any product to improve reliability, function, or design. TSL does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein. No license is granted, either expressly or by implication, estoppel, or otherwise under any patent right or patent, covering or relating to any combination, system, apparatus, machine, material, method, or process in which TSL products might be used. An implied license exists only for equipment, circuits, and subsystems contained in TSL products. TSL and the TSL logo are registered trademarks of TSL. Other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

All software is provided strictly on an "as is" basis. All software, including firmware, furnished to the user is on a licensed basis. TSL grants to the user a non-transferable and non-exclusive license to use each software or firmware program delivered hereunder (licensed program). Except as noted below, such license may not be assigned, sublicensed, or otherwise transferred by the user without prior written consent of TSL. No right to copy a licensed program in whole or in part is granted, except as permitted under copyright law. The user shall not modify, merge, or incorporate any form or portion of a licensed program with other program material, create a derivative work from a licensed program, or use a licensed program in a network without written permission from TSL. The user agrees to maintain TSL's copyright notice on the licensed programs delivered hereunder, and to include the same on any authorized copies it makes, in whole or in part. The user agrees not to decompile, disassemble, decode, or reverse engineer any licensed program delivered to the user or any portion thereof.

TSL reserves the right to make changes to any software or product to improve reliability, function, or design.

TSL does not assume any product liability arising out of, or in connection with, the application or use of any product, circuit, or application described herein.

Symbol is a registered trademark of Motorola Technologies, Inc.

## Contents

1	Introduction .....	4
2	Parts of the 1134 LF Reader .....	4
3	Attaching to an MC55/65 .....	5
4	Detaching from an MC55/65 .....	6
6	Charge and ActiveSync Connection .....	7
7	Reading Transponders .....	8
8	Status LED .....	9
9	Software .....	10
9.1	Driver installation .....	10
9.2	Reader Demonstration .....	10
9.3	SmartWedge RFID application .....	11
9.4	LF RFID Configuration .....	11
9.5	Software support for the 1134 LF RFID reader .....	11
9.5.1	Low level command set .....	11
9.5.2	API .....	11
9.6	Power management with the 1134 LF RFID reader .....	11
10	Troubleshooting and Maintenance .....	12
10.1	Maintenance .....	12
10.2	Troubleshooting .....	12
11	Regulatory information .....	14
11.1	Information to the user - FCC .....	14
11.2	Information to the user – Industry Canada .....	14
12	Technical specifications .....	15
12.1	Summary of specifications .....	15
13	Health and Safety Recommendations .....	17
14	Waste Electrical and Electronic Equipment (WEEE) .....	18
15	Warranty .....	18

## History

Version	Date	Modifications
1.0	6 <sup>th</sup> July 2011	Document Creation
1.1	25 <sup>th</sup> November 2011	Update to regulatory and specifications
1.2	6 <sup>th</sup> December 2011	Update to regulatory

## 1 Introduction

Technology Solutions' 1134 LF Reader provides the Motorola MC55/65 with LF Radio Frequency Identification (RFID) functionality. The unit attaches as a snap on to the MC55/65. The mechanical design of the unit allows it to be quickly and easily removed.

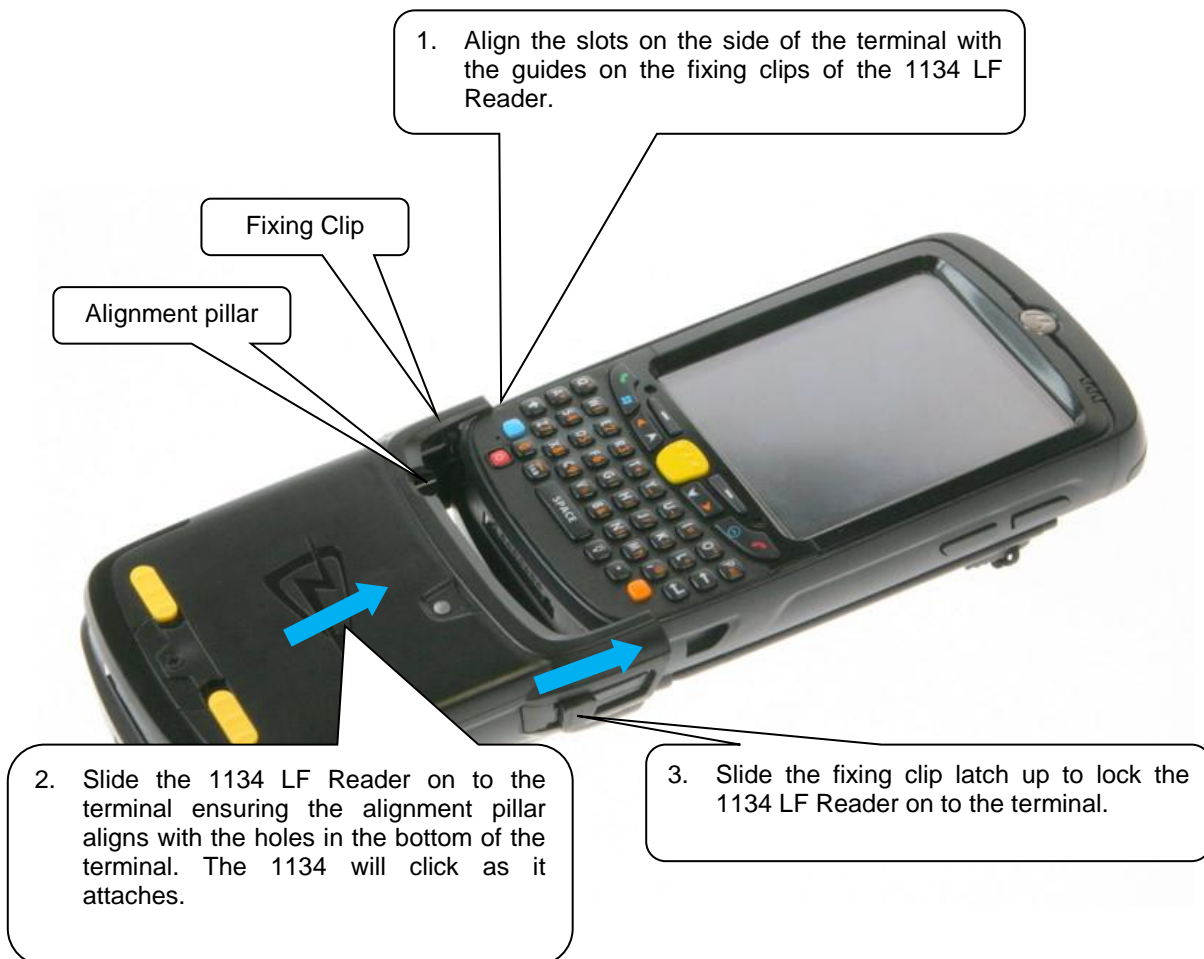
The 1134 LF Reader is powered from the host terminal.

## 2 Parts of the 1134 LF Reader



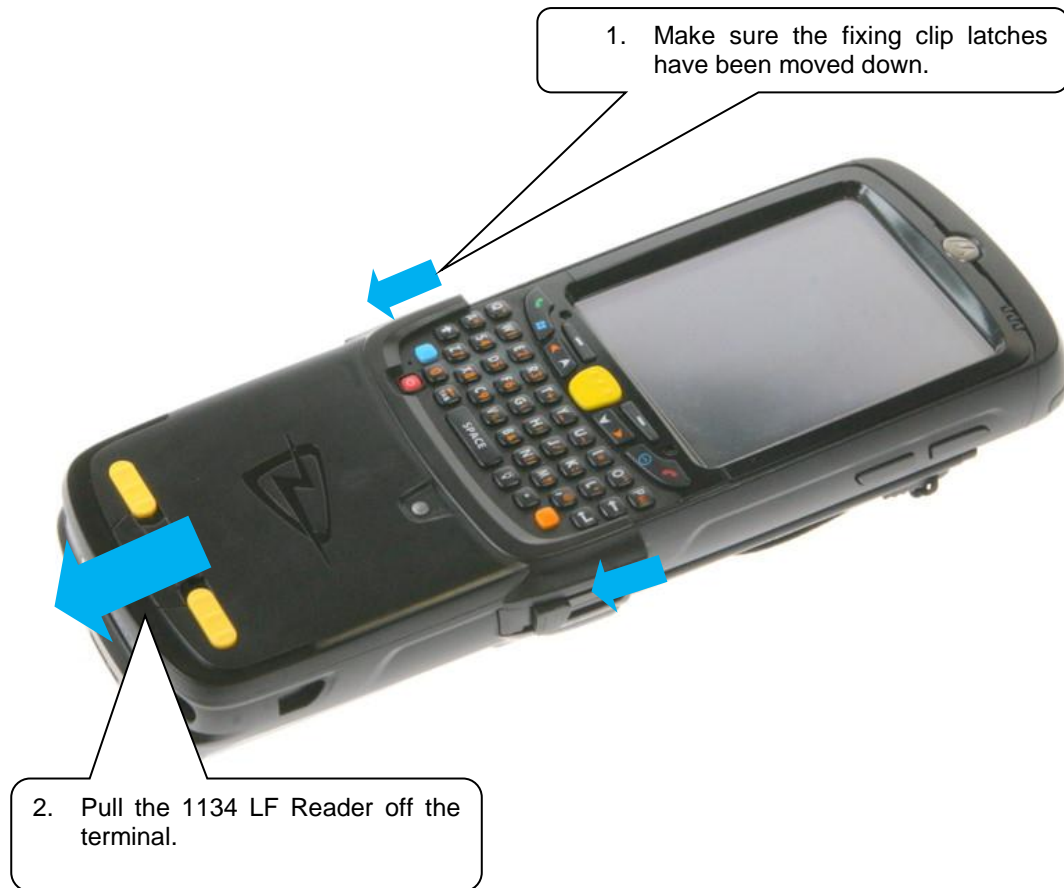
**Figure 1: Parts of the 1134 LF Reader**

### 3 Attaching to an MC55/65



**Figure 2: Attaching to an MC55/65**

## 4 Detaching from an MC55/65



**Figure 3: Detaching from an MC55/65**

## 6 Charge and ActiveSync Connection

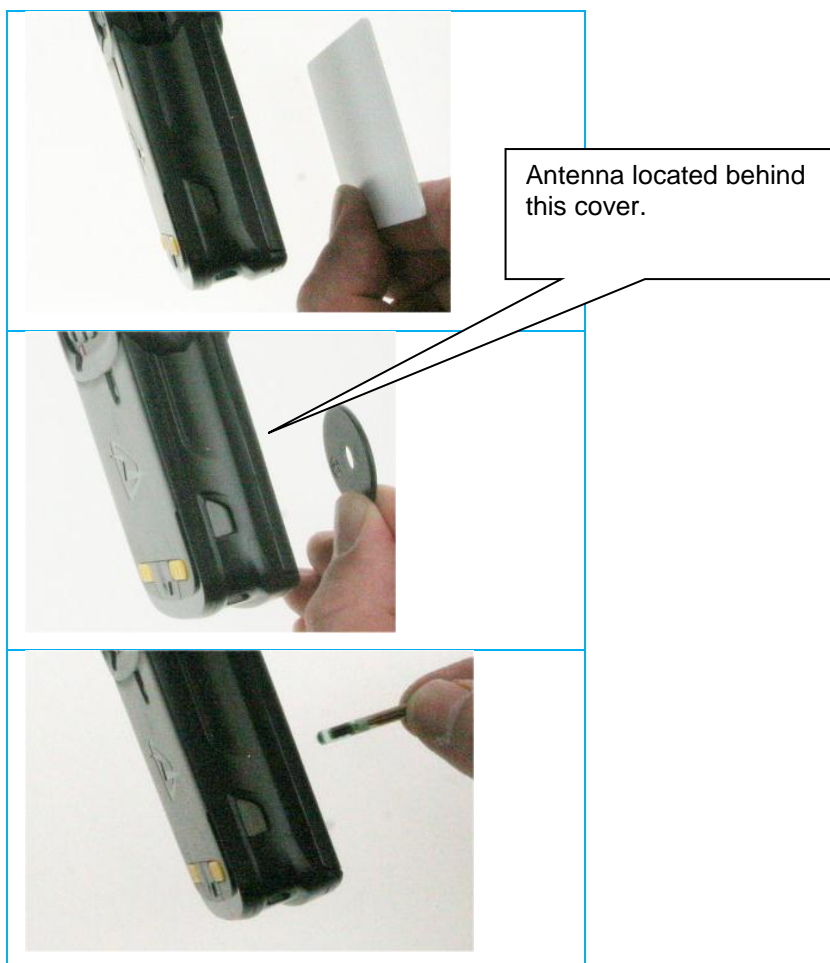
The 1134 LF Reader is designed to fit into a standard MC55/65 desktop charge cradle or cradle cup. When docked into a cradle power is passed through the 1134 so that the host terminal can charge.

When docked and an external USB host is connected, the USB connection from the host terminal is disconnected from the RFID reader and passed straight through to the connector on the bottom of the 1134. This allows an ActiveSync connection to the host terminal but prevents simultaneous ActiveSync and RFID operation. Only ActiveSync connections (external host) are possible. There is no support of USB connection where the terminal is the host (for example USB memory sticks) through the 1134.

If ActiveSync is required for software development and debug purposes it is recommended that ActiveSync over Bluetooth is configured. Instructions for doing this are provided in a separate document 'Bluetooth ActiveSync on Motorola Terminals' included on the Explorer Kit and Software Development Kit CDs and can also be downloaded from <http://www.tsl.uk.com/downloads.htm>.

## 7 Reading Transponders

RFID transponders can be read when they are in range of the antenna. The antenna is located under the back cover of the 1134 LF RFID reader. The range at which a transponder can be read depends on the transponder type and size. Larger transponders can be read further away from the antenna. In many cases it will be possible to read transponders in front and to the side of the 1134 LF RFID reader. For best performance the transponder must be orientated correctly with the antenna. For disk and card shaped transponders this means that the transponder should be parallel to the back cover. For rod style transponders the transponder should have its long axis at right angles to the back cover. The photographs in Figure 4 show examples of optimum transponder orientation:



**Figure 4: Antenna location and read direction**



## 8 Status LED

The status LED on the front of the 1134 LF Reader provides an indication of the operating status of the 1134 LF Reader.

LED colour	Status
Green flash	The previous command was successfully received and processed by the reader.  OR. A transponder was read.
Red flash	The previous command was not successfully processed by the reader.

Note that custom configuration of the 1134 LF RFID reader may prevent it from operating as described above.

## 9 Software

### 9.1 Driver installation

The drivers required for the 1134 LF Reader may be deployed as part of the installation of a custom application. Otherwise they can be deployed by copying 'RFID Reader Driver.CAB' to the host terminal and running it. When prompted, choose 'Device' as the destination to install the drivers to.

RFID Reader Driver.CAB is included on the Explorer Kit and Software Development Kit CDs and can also be downloaded from <http://www.tsl.uk.com/downloads.htm>.

### 9.2 Reader Demonstration

Technology Solutions provide a demonstration application which can be used to explore the functionality of the 1134 LF Reader and test the read range for a particular transponder. This application and full instructions are available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm>.

An example screenshot of the Demonstration software is shown in Figure 5.

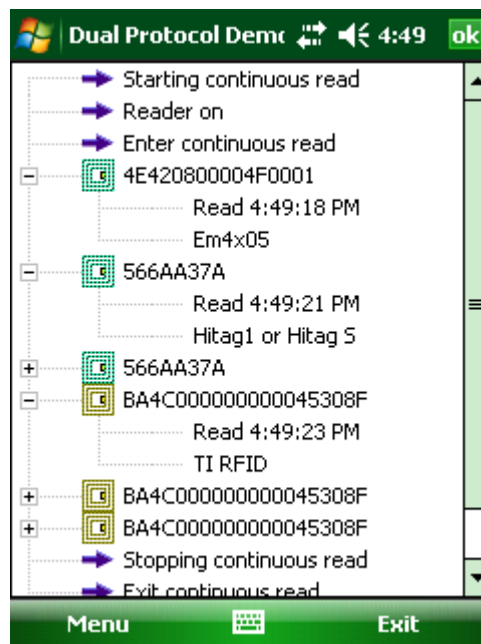


Figure 5 : Demonstration software

### 9.3 SmartWedge RFID application

A Wedge application has been developed for use with the 1134 and other Technology Solutions RFID readers. This activates the RFID reader whilst any of the yellow scan buttons are held down. Any transponder serial numbers that are read are sent out as though they had been typed on the keypad to whichever application has focus.

Instructions for installing and using the Wedge application are provided separately from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

### 9.4 LF RFID Configuration

A Configuration application has been developed for use with the 1134 and other Technology Solutions RFID readers. This allows common operating parameters to be changed and stored.

Instructions for installing and using the Configuration Application are provided separately from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

### 9.5 Software support for the 1134 LF RFID reader

To make full use of the functionality of the LF RFID reader, a customised software application will be required. Technology Solutions support two approaches to this; direct communication with the reader using the low level command set or the use of an API to simplify application development.

#### 9.5.1 Low level command set

The Low level command set supports two modes; ASCII and binary. ASCII mode is typically used for simple applications, for example collecting transponder unique identifiers (UIDs). The binary protocol is more suited where complex interaction with transponders is required.

The command set format and content is described in the document 'LF RFID Command Protocol.pdf' which is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

#### 9.5.2 API

An API is provided for use with the LF RFID reader. This can be downloaded from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

A document is provided as part of the .zip folder which introduces the API. The RFID API is provided with Microsoft style compiled HTML help (.chm) and an intelli-sense file for general reference to the API. A sample application is also provided which demonstrates the use of the API.

### 9.6 Power management with the 1134 LF RFID reader

All power for the LF RFID is drawn from the host terminal. Maximum operating time is therefore obtained by managing the operation of the RFID reader optimally.

The LF RFID reader has three operating modes; continuous read mode, idle mode and standby mode. The reader is switched between read mode and idle modes by software commands, documented in the Low level command set. The reader is set into standby mode when the virtual COM port is closed. The reader remains in standby mode for as long as the USB is active on the host terminal.

The recommended power saving method is to close the serial port when the reader is not being used. Idle mode does not provide much power saving and the time taken to exit Idle mode is not much shorter than that from the serial port being opened. Any application using the 1134 LF RFID reader should therefore only open the COM port when an RFID transaction is to be performed. This is the approach taken with the Demonstration application and with SmartWedge RFID.

## 10 Troubleshooting and Maintenance

### 10.1 Maintenance

For trouble-free service treat the 1134 LF Reader in the same way as you would the MC55/65 and observe the following tips when using the 1134 LF Reader:

- + Do not store or use the 1134 LF Reader in any location that is dusty, damp, or wet.
- + Protect the 1134 LF Reader from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.

### 10.2 Troubleshooting

Symptoms	Possible Cause	Action
The Application on the MC55/65 cannot communicate with the 1134 LF Reader.	The MC55/65 is not firmly seated into the 1134 LF Reader.	Remove and re-insert the MC55/65 from the 1134 LF Reader, ensuring it is firmly seated.
	The port has not been opened.	Check that the Application has been configured to use the correct virtual COM port (COM2 by default).
	The port is in use by another application.	Close the other application and try again.
	The baud rate is set incorrectly in the application.	Check that the application is set to 19200 baud, 8 data bits, no parity and one stop bit (settings may be different if the 1134 RFID reader has been reconfigured) .
The 1134 LF Reader does not read a particular transponder	The 1134 LF Reader has been configured to exclude some transponders types.	Refer to the command documentation to include the appropriate transponder type.
	The transponder is out of range of the 1134 LF Reader.	Move the transponder closer to the antenna.
MC55/65 battery does not charge	The battery is faulty.	Verify that other batteries charge properly. If so, replace the faulty battery.
	Ambient temperature is too warm.	Move the unit to an area where the ambient temperature is between 0°C and 35°C.
	The MC55/65 is not firmly seated into the 1134 LF Reader.	Remove and re-insert the MC55/65 from the 1134 LF Reader, ensuring it is firmly seated.

Symptoms	Possible Cause	Action
	The 1134 LF Reader is not firmly seated into the cradle.	Remove and re-insert the 1134 LF Reader from the cradle, ensuring it is firmly seated.
ActiveSync cannot connect to the MC55/65	ActiveSync is not correctly configured on the PC or the MC55/65.	Detach the 1134 LF Reader from the MC55/65 and try to ActiveSync directly to the MC55/65. If this does not work then consult the MC55/65 User Guide.
	The MC55/65 is not firmly seated into the 1134 LF Reader or the 1134 LF Reader is not firmly seated into the cradle.	Remove and re-insert the MC55/65 from the 1134 LF Reader, ensuring it is firmly seated. Remove and re-insert the 1134 LF Reader from the cradle, ensuring it is firmly seated.

## 11 Regulatory information

### 11.1 Information to the user - FCC

- 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.

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

### 11.2 Information to the user – Industry Canada

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication."

This device complies with Industry Canada licence-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.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada.

Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante."

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) l'appareil ne doit pas produire de brouillage, et

(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 12 Technical specifications

### 12.1 Summary of specifications

The following table summarises the 1134 LF Reader's intended operating environment and technical hardware specifications:

<b>Performance Characteristics</b>	
RF Transmit Frequency	125kHz, 134.2kHz
Supported RFID Standards	ISO 11784, ISO 11785, ISO 18000-2
Supported Tag-ICs	NXP HITAG1, HITAG2, HITAGS Sokymat Q5 EM Microelectronics EM4x02, EM4x05 (ISO FDX B), EM4x50 Texas Instruments 64 bit Read Only, 64 Read Write, 1088 bit Multipage.
Typical read time (serial number only)	HITAG 2 – 30ms HITAG S – 59ms EM4002 – 65ms EM4005 – 58ms EM4050 – 95ms Q5 – 55ms Texas Instruments – 93ms
Host interface	Serial interface on COM2 of MC55/65, ASCII or Binary Protocols 9600bit/s to 115200bit/s 8,N,1.
Reading distance	Dependent on transponder type and antenna. Typically up to 8cm for Texas Instruments 32mm glass, up to 6cm for EM4102 30mm diameter disc.
<b>Current consumption</b>	
Current Consumption	< 100mA during RFID read
	< 60mA in idle mode
	< 30mA in standby mode
<b>User indication</b>	
Red, Green LEDs	Flash indicating activity (function may also be customised).
<b>Connection Interfaces</b>	
Physical interface	USB and power in to charge MC55/65

Technology Solutions (UK) Limited reserves the right to change its products, specifications and services at any time without notice.

Reader power supply	Powered from host terminal
ActiveSync	via USB
<b>Physical Characteristics</b>	
Dimensions	85x100x30mm (3.35"x3.93"x1.18")
Weight	95g (3.35 oz)
Enclosure material	Polycarbonate
Colour	Black
Material finish	Sparked surface
Mechanical attachment	Snap-on action with locking tabs
Docking	Attachment maintains dockability with Motorola docking cradle for charging and ActiveSync
<b>Environmental</b>	
Operating Temperature	-10°C to +50°C (14°F to 122°F)
Storage Temperature	-40°C to +70°C (-40°F to 140°F)
Drop specification	1.2m (4ft) to concrete.
Tumble	250 0.5m tumbles (500 drops)
Sealing	IP54
Electrostatic discharge	+/-15kV air discharge, +/-8kV direct discharge
Construction	RoHS compliant
<b>Regulatory</b>	
EMI/RFI	EN 300 330-2, EN 301 489-3, FCC CFR47 Part 15(c), IC RSS210
Electrical Safety	Europe - EN60950-1 with CB Scheme Group and National Differences USA - UL60950-1
<b>Notes</b>	
All PCBs are conformally coated	

Technology Solutions (UK) Limited reserves the right to change its products, specifications and services at any time without notice.



## 13 Health and Safety Recommendations

### Ergonomic Recommendations

**Caution: In order to avoid or minimize the potential risk of ergonomic injury, follow the recommendations below. Consult with your local Health & Safety Manager to ensure that you are adhering to your company's safety programs to prevent employee injury.**

- + Reduce or eliminate repetitive motion
- + Maintain a natural position
- + Reduce or eliminate excessive force
- + Keep objects that are used frequently within easy reach
- + Perform tasks at correct heights
- + Reduce or eliminate vibration
- + Reduce or eliminate direct pressure
- + Provide adjustable workstations
- + Provide adequate clearance
- + Provide a suitable working environment
- + Improve work procedures.

### For vehicle installation and use

An air bag inflates with great force. DO NOT place objects, including either installed or portable wireless equipment, in the area over the air bag or in the air bag deployment area. If in-vehicle wireless equipment is improperly installed and the air bag inflates, serious injury could result.

RF signals may affect improperly installed or inadequately shielded electronic systems in motor vehicles (including safety systems). Check with the manufacturer or its representative regarding your vehicle. You should also consult the manufacturer of any equipment that has been added to your vehicle.

### Power Supply

Use only Motorola-approved cradles, chargers and power supplies with the 1134 LF Reader. Use of an alternative power supply will invalidate any approval given to this device, void the warranty for the product and may be dangerous.

### RF Exposure

The reader antenna is designed to direct RF energy away from the user and the reader in the direction shown in Figure 4. To reduce RF exposure and provide best reading performance do not cover the antenna with your hand or other part of your body.

## 14 Waste Electrical and Electronic Equipment (WEEE)

For EU Customers: All products at the end of their life must be returned to TSL for recycling. For information on how to return product please contact TSL.

## 15 Warranty

**(A) Warranty** TSL's hardware Products are warranted against defects in workmanship and materials for a period of twelve (12) months from the date of shipment, unless otherwise provided by TSL in writing, provided the Product remains unmodified and is operated under normal and proper conditions. Warranty provisions and durations on software, integrated installed systems, Product modified or designed to meet specific customer specifications ("Custom Products"), remanufactured products, and reconditioned or upgraded products, shall be as provided in the applicable Product specification in effect at the time of purchase or in the accompanying software license.

**(B) Spare Parts** Spare parts (i.e. parts, components, or subassemblies sold by TSL for use in the service and maintenance of Products) are warranted against defects in workmanship and materials for a period of thirty (30) days from the date of shipment. Spare parts may be new or originate from returned units under the conditions set forth in subsection D below.

**(C) Repair of TSL branded hardware** For repairs on TSL branded hardware Products under this Agreement, including repairs covered by warranty, the repair services provided are warranted against defects in workmanship and materials on the repaired component of the Product for a period of thirty (30) days from the shipment date of the repaired Product, or until the end of the original warranty period, whichever is longer. Any such defects shall be notified to TSL in writing within 7 days of the same becoming apparent.

**(D) Product Service** Products may be serviced or manufactured with parts, components, or subassemblies that originate from returned products and that have been tested as meeting applicable specifications for equivalent new material and Products. The sole obligation of TSL for defective hardware Products is limited to repair or replacement (at TSL's option) on a "return to base (RTB)" basis with prior TSL authorisation.

Customer is responsible for prompt shipment to TSL and assumes all costs and risks associated with this transportation; return shipment to the Customer will be at TSL's expense. Customer shall be responsible for return shipment charges for product returned where TSL determines there is no defect ("No Defect Found"), or for product returned that TSL determines is not eligible for warranty repair. No charge will be made to Buyer for replacement parts for warranty repairs. TSL is not responsible for any damage to or loss of any software programs, data or removable data storage media, or the restoration or reinstallation of any software programs or data other than the software, if any, installed by TSL during manufacture of the Product.

**(E) Original Warranty Period** Except for the warranty applying solely to the repaired component arising from a repair service as provided in Section C above, the aforementioned provisions do not extend the original warranty period of any Product that had either been repaired or replaced by TSL.

**(F) Warranty Provisions** The above warranty provisions shall not apply to any Product

(i) which has been repaired, tampered with, altered or modified, except by TSL's authorized service personnel; (ii) in which the defects or damage to the Product result from normal wear and tear, misuse, negligence, improper storage, water or other liquids, battery leakage, use of parts or accessories not approved or supplied by TSL, or failure to perform operator handling and scheduled maintenance instructions supplied by TSL;

(iii) which has been subjected to unusual physical or electrical stress, abuse, or accident, or forces or exposure beyond normal use within the specified operational and environmental parameters set forth in the applicable Product specification; nor shall the above warranty provisions apply to any expendable or consumable items, such as batteries, supplied with the Product.

EXCEPT FOR THE WARRANTY OF TITLE AND THE EXPRESS WARRANTIES STATED ABOVE, TSL DISCLAIMS ALL WARRANTIES ON PRODUCTS FURNISHED HEREUNDER INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. ANY IMPLIED WARRANTIES THAT MAY BE IMPOSED BY LAW ARE LIMITED IN DURATION TO THE LIMITED WARRANTY PERIOD. SOME STATES OR COUNTRIES DO NOT ALLOW A LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES OR CONSUMER PRODUCTS. IN SUCH STATES OR COUNTRIES, FOR SUCH PRODUCTS, SOME EXCLUSIONS OR LIMITATIONS OF THIS LIMITED WARRANTY MAY NOT APPLY.

The stated express warranties are in lieu of all obligations or liabilities on the part of TSL for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of the Product or service. TSL's liability for damages to Buyer or others resulting from the use of any Product or service furnished hereunder shall in no way exceed the purchase price of said Product or the fair market value of said service, except in instances of injury to persons or property.

TSL 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 the original shipping container was not kept, contact your local distributor or TSL to have another sent to you.

TSL shall not be responsible for any injury, damage or loss of whatever kind caused directly or indirectly by the goods whether as a result of their manufacture, operation, use or otherwise and the customer shall indemnify TSL from any claim arising from any loss suffered by any third party.