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SOLUTIONS UK LTD  
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# USER GUIDE: 1101 UHF RFID READER FOR THE MOTOROLA MC70/75/75A



[www.tsl.com](http://www.tsl.com)

Design • Development • Manufacture

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## History

<u>Version</u>	<u>Date</u>	<u>Modifications</u>
1.0	28/04/2010	Document creation
1.1	28/04/2010	Added regulatory information
1.2	23/07/2010	Updated regulatory information
1.3	26/11/2010	Added improved read zone illustration, more regulatory updates.
1.4	17/11/2011	Changed from custom serial cable to Micro USB cable
1.5	01/06/2012	Changed 'Charging/ActiveSync Connection' image, expanded 'LED status' chart

# INTRODUCTION

Technology Solutions' 1101 UHF Reader provides the Motorola MC70/75 with Radio Frequency Identification (RFID) functionality. The unit attaches as a snap on to the MC70/75. The mechanical design of the unit allows it to be quickly and easily removed, alternatively two screws may be used to make the installation semi-permanent.

The 1101 UHF reader is powered from its own internal battery and does not draw power from the MC70/75. It is used with UHF transponders including the EPCGlobal Class 1 Generation 2 transponders.

## PARTS OF THE 1101 UHF READER



**FIGURE 1:** Parts of the 1101 UHF Reader

## ATTACHING TO AN MC70/75



**FIGURE 2:** Attaching to an MC70/75

## DETACHING FROM AN MC70/75



**FIGURE 3:** Detaching from an MC70/75

# BATTERY INSTALLATION OR REMOVAL



Push down and slide to remove cover.

**FIGURE 4:** 1101 UHF Reader Battery

The battery is located under the front cover of the UHF reader. To access the battery compartment:

- Remove the locking screw next to the status LED (if fitted)
- Apply a gentle pressure to the top of the cover either side of the TSL logo and push the cover away as shown
- The cover can then be slid off the reader
- The battery can then be removed

Ensure the battery is fully charged before first use.

**CAUTION:**

*RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.*

*Dispose of used batteries according to local regulations.*

# CHARGING AND ACTIVESYNC CONNECTION

## CONNECTING THE CHARGER CABLE



**FIGURE 5:** Connecting the Charger Cable

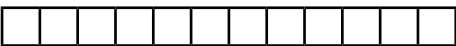






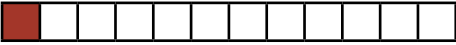
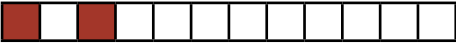
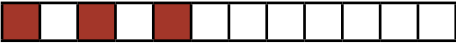


The USB connection connects to a desktop computer to provide USB ActiveSync functionality to the MC70/75.

The power connector is compatible with the standard Motorola 5.4V chargers for the MC70/75. When in use through the accessory both the 1101 UHF reader and the MC70/75 will be charging.

## STATUS LED

The status LED on the front of the 1101 UHF Reader provides an indication of the operating status of the 1101 UHF Reader.

- **Green LED** indicates the reader is ready to talk to the software
- **Red LED** indicates charge status
- **Amber LED** occurs when both the green and red LEDs are lit simultaneously

LED colour and pattern	Connection and Charge Status
Off 	Disconnected from software, not charging
Green continuous 	Connected to software, not charging.
Amber single flash and green pause 	Connected to software and charging. The reader battery is less than 33% charged.
Amber double flash and green pause 	Connected to software and charging. The reader battery is between 33% and 66% charged.
Amber triple flash and green pause 	Connected to software and charging. The reader battery is between 66% and fully charged.
Amber continuous 	Connected to software. The reader battery is fully charged.
Green/Amber continuous flash 	Connected to software. There is a charge error / battery fault.
Red single flash and pause 	Disconnected from software and charging. The reader battery is less than 33% charged.
Red double flash and pause 	Disconnected from software and charging. The reader battery is between 33% and 66% charged.
Red triple flash and pause 	Disconnected from software and charging. The reader battery is between 66% and fully charged.
Red continuous 	Disconnected from software. The reader battery is fully charged.
Red continuous flash 	Disconnected from software. There is a charge error / battery fault.

Note: On earlier versions of the 1101 UHF Reader charge status is not supported



# READING TRANSPONDERS

## ANTENNA LOCATION AND READ DIRECTION

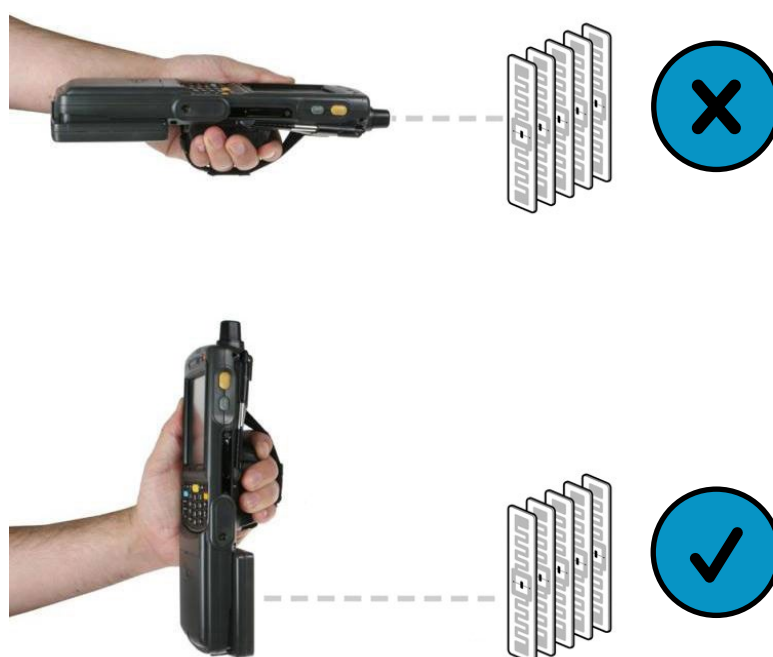
RFID transponders can be read when they are in range of the antenna. The antenna is located on the back of the 1101 UHF Reader.



**FIGURE 6:** Antenna location and read direction

## HOLDING THE READER

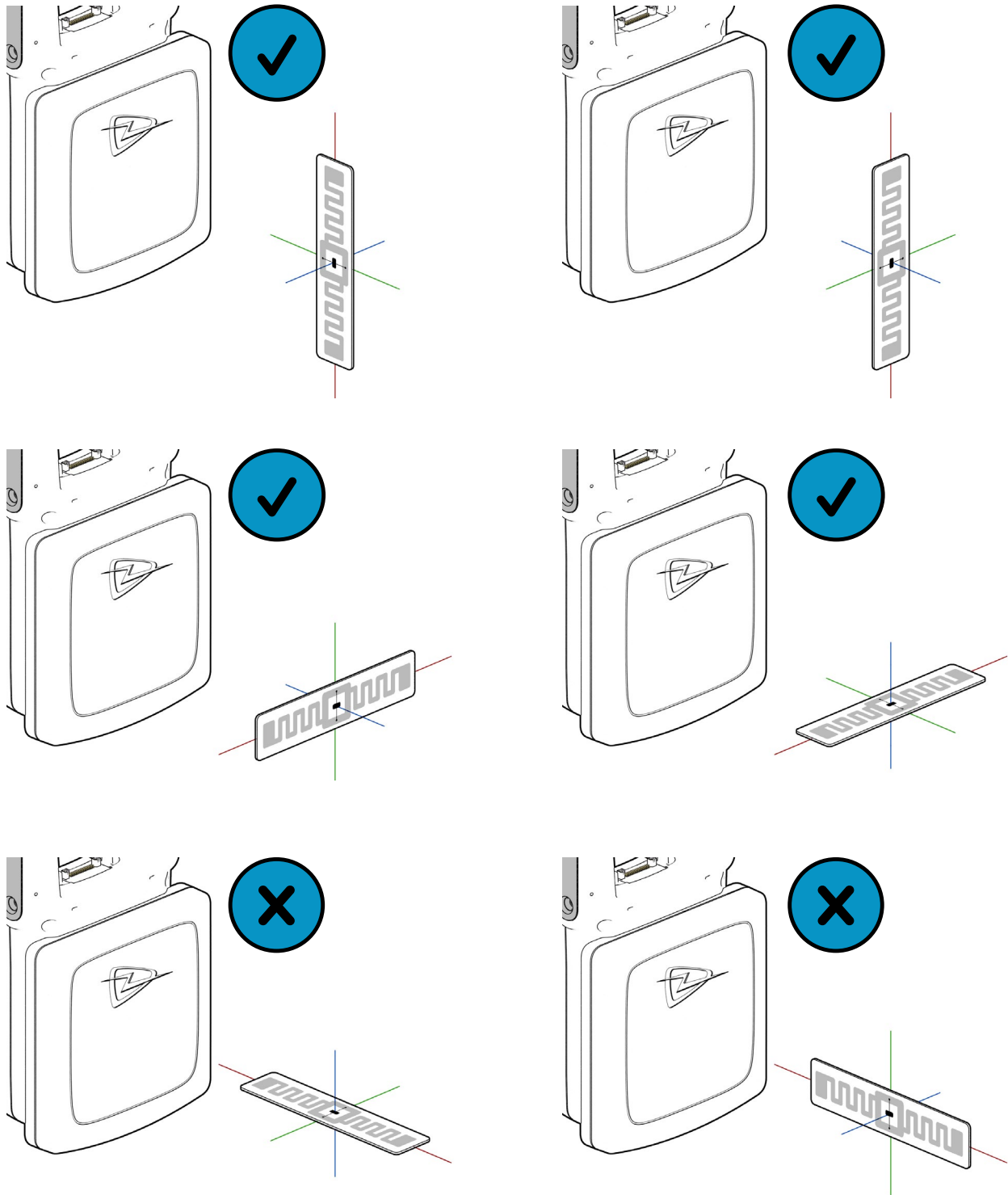
For best results the reader should be held so that the transponders are behind the reader as shown in Figure 7.



**FIGURE 7:** Correct read orientation

## TRANSPONDER ORIENTATION

The 1101 UHF RFID reader has a circularly polarised antenna. This means that the alignment of the transponder relative to the reader is unimportant. In many cases a transponder will only be sensitive along two of its three axes. Read and write performance will be poor along its insensitive axis. Figure 8 shows the correct and incorrect orientations for a typical transponder relative to the 1101 UHF reader.



**FIGURE 8:** Correct transponder orientation

## READ AND WRITE RANGE

The range at which a transponder can be read depends on the transponder type, size and location. Generally;

- larger transponders can be read at greater distances
- moving transponders closer to each other reduces read distance
- metal or water nearby reduces read range, unless a mount on metal transponder is used
- write range is between 50% and 90% of the read range for a given transponder.

## SOFTWARE

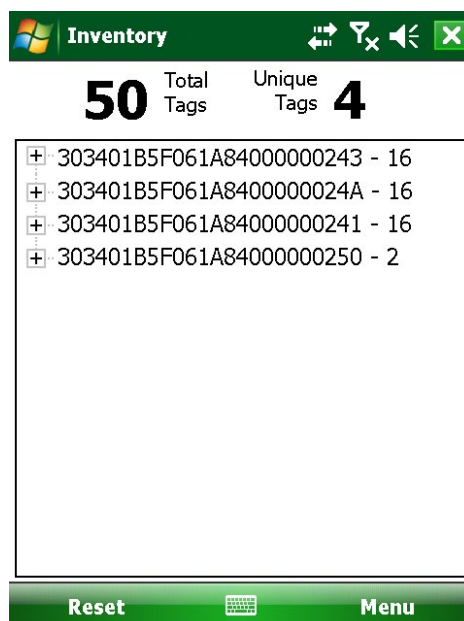
### DRIVER INSTALLATION

The drivers required for the 1101 UHF READER are deployed as part of any application written using Technology Solution's software development kit. The unit is automatically powered up when the serial port on the bottom of the MC70/75 (COM1) is opened.

### READER DEMONSTRATION

Technology Solutions provide a demonstration application which can be used to explore the functionality of the 1101 UHF 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 <https://www.tsl.com/downloads/tsl-products/1101-downloads/>

An example screenshot of the Demonstration software is shown in Figure 9.



**FIGURE 9 :** Demonstration software

## SOFTWARE DEVELOPMENT

To make full use of the functionality of the 1101 UHF Reader, a customised software application will be required. There are two approaches that can be taken:

- For basic applications requiring minimal software development expertise the reader supports an ASCII command mode. Simple, text based commands are sent to the reader and responses are returned as text. This allows straightforward access to RFID tag functions such as inventory, read and write. Details of the ASCII command mode are included on the Explorer Kit CD and are available for download from <https://www.tsl.com/downloads/tsl-products/1101-downloads/> . A simple Motorola Pocket Browser compatible application which uses the ASCII command mode is included on the Explorer Kit CD.
- For more advanced application requiring full control and configuration of the reader a full managed code API is provided on the Explorer Kit CD. This is supported with the source code for a sample application which demonstrates the use of all the reader functionality.

## GENERAL NOTES

### COMPATIBLE PERIPHERALS

The 1101 UHF Reader is not compatible with other MC70/75 peripherals that attach to the MC70/75.

It is charged using a standard Motorola 5.4V power supply via the supplied ActiveSync and charge cable.

### ACTIVESYNC

The MC70/75 with 1101 UHF Reader attached can be used with ActiveSync, but the USB rather than the serial connection must be used.

# TROUBLESHOOTING AND MAINTENANCE

## MAINTENANCE

For trouble-free service treat the 1101 UHF tt in the same way as you would the MC70/75 and observe the following tips when using the 1101 UHF Reader:

- Do not store or use the 1101 UHF Reader in any location that is dusty, damp, or wet.
- Protect the 1101 UHF 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.

## TROUBLESHOOTING

Symptoms	Possible cause	Action
The Application on the MC70/75 cannot communicate with the 1101 UHF Reader.	The MC70/75 is not firmly seated into the 1101 UHF Reader.	Remove and re-insert the MC70/75 from the 1101 UHF Reader, ensuring it is firmly seated.
	The port has not been opened.	Check that the Application has been configured to use COM1.
	The port is in use by another application.	Close the other application and try again.
The 1101 UHF Reader does not read a particular transponder	The 1101 UHF Reader has been configured to exclude some transponders based on a mask value.	Correct the mask value.
	The transponder is out of range of the 1101 UHF Reader.	Move the transponder closer to the antenna.
	The transponder has been inventoried into a persistent session.	Wait for the session persistence to expire, use a different session or use a different target flag.
MC70/75 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.
ActiveSync cannot connect to the MC70/75	The MC70/75 is not firmly seated into the 1101 UHF Reader.	Remove and re-insert the MC70/75 from the 1101 UHF Reader, ensuring it is firmly seated.
	ActiveSync is not correctly configured on the PC or the MC70/75.	Detach the 1101 UHF Reader from the MC70/75 and try to ActiveSync directly to the MC70/75. If this does not work then consult the MC70/75 User Guide.
	The MC70/75 is not firmly seated into the 1101 UHF Reader.	Remove and re-insert the MC70/75 from the 1101 UHF Reader, ensuring it is firmly seated.

# TECHNICAL SPECIFICATIONS

## SUMMARY OF SPECIFICATIONS

The following table summarises the 1101 UHF Reader's intended operating environment and technical hardware specifications:

Symptoms	
Frequenc	865 – 868 MHz (ETSI version) 902 – 928 MHz (FCC version)
RF Power	10 - 800 mW (10dBm to 29dBm) (software controlled)
Antenna	Circularly Polarised radiating from the back plane of the reader and host terminal.
Read distance	Up to 2m (6 feet) (tag/antenna dependent)
Supported UHF tags	EPC Class 1 Generation 2 (ISO18000-6C)
Physical Characteristics	
Dimensions (without host terminal)	87(w) × 135 max (l) × 42(d) – 3.43" x 5.31" x 1.65"
Weight	295g (10.4 oz)
Enclosure material	GE Lexan Polycarbonate
Colour	Grey
Material finish	Sparked surface
Mechanical attachment to hand scanner	Snap-on action with locking screws
Environmental	
Operating Temperature	-20°C to +60°C (-4°F to 140°F)
Storage Temperature	-40°C to +60°C (-40°F to 140°F)
Humidity	Up to 90% Relative humidity Non Condensing
Drop specification	1.3m (4.26ft) to concrete, 6 drops per 6 sides over operating temperature
Sealing	Conformal coated electronics
Electrostatic discharge	+/-15kV air discharge, +/-8kV direct discharge
Construction	RoHS compliant

# REGULATORY INFORMATION

## 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 that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

## INDUSTRY CANADA

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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.

# 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 HF 1097 UHF 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.



# 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.

## 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.

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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.

# ABOUT

## ABOUT TSL®



Technology Solutions UK Ltd (TSL®), part of HID Global, is a leading manufacturer of high performance mobile RFID readers used to identify and track products, assets, data or personnel.

For over two decades, TSL® has delivered innovative data capture solutions to Fortune 500 companies around the world using a global network of distributors and system integrators. Specialist in-house teams design all aspects of the finished products and software ecosystems, including electronics, firmware, application development tools, RF design and injection mould tooling.

TSL® is an ISO 9001:2015 certified company.



ISO 9001: 2015

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