

GPS 1058 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



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History

Version	Date	Modifications
1.0	31/08/06	Document Creation

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1 Introduction

Technology Solutions' GPS 1058 provides the Symbol MC70 with GPS capability. The unit attaches as a snap on to the MC70. 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 unit is designed to retain compatibility with standard MC70 accessories such as desktop cradles and chargers.

The GPS 1058 is powered from the MC70.

2 Parts of the GPS 1058

Figure 1: The parts of the GPS 1058



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3 Attaching to an MC70

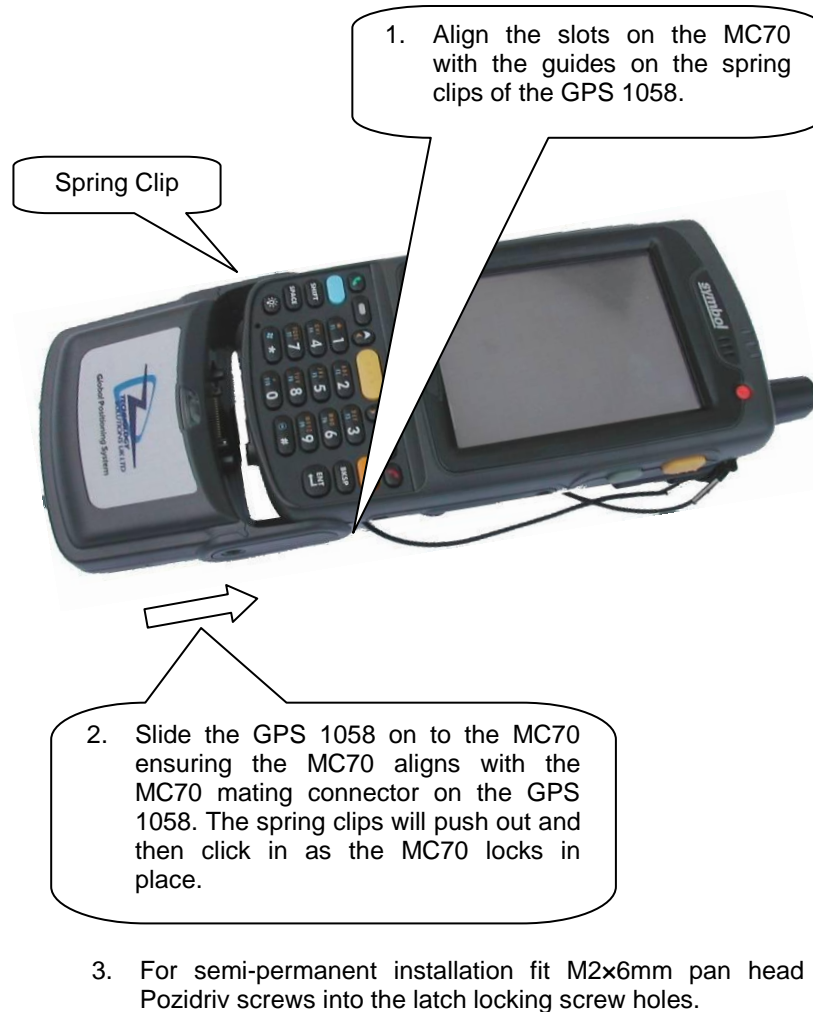


Figure 2: Attaching to an MC70

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4 Detaching from an MC70



Figure 3: Detaching from an MC70

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5 Using the GPS 1058

5.1 Basic operation

There are no drivers required for the GPS 1058 accessory. The GPS 1058 automatically powers up when the serial port on the bottom of the MC70 (COM1) is opened. By default it then outputs the following NMEA 2.2 compatible messages at 9600 baud:

NMEA message	Default output frequency
GGA – Global positioning fix data	Once every second
GSA – DOP and active satellites	Once every second
GSV – Satellites in view	Once every second
RMC – Recommended minimum specific GPS data	Once every second
VTG – track made good and ground speed.	Once every second
GLL – latitude, longitude, UTC of position fix and status	Once every second
ZDA – PPS timing message	Once every second

These messages allow immediate operation with standard navigation applications. If the application does not automatically detect the GPS 1058, select COM1 and 9600baud (8 data bits, no parity, one stop bit) in the appropriate setup screen on the application. A document showing the setup screen for various common GPS navigation applications is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm> .

The status LEDs on the front of the GPS 1058 provide an indication of the operating status of the GPS 1058.

LED colour	Status
Off	The GPS 1058 is off.
Green	The GPS 1058 is powered on but does not have a position fix.
Green and Orange	The GPS 1058 is powered on and has a valid position fix.

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5.2 Compatible peripherals

The GPS 1058 is compatible with any standard Symbol peripheral that does not use the serial port (COM1) because this is used for GPS data. The serial port is not connected to the Docking Connector on the bottom of the GPS 1058. A list of compatible peripherals for the GPS 1058 is available for download from the Technology Solutions website at <http://www.tsl.uk.com/downloads.htm>.

It is not possible to use the GPS1058 with the vehicle cradle (part number VCD7000-P000R). To charge the MC70 in a vehicle it is necessary to remove the GPS 1058 from the MC70 or to use the Auto charge cable (part number 25-70979-01).

5.3 ActiveSync

The MC70 with GPS 1058 attached can be used with ActiveSync, but the USB rather than the serial connection must be used.

5.4 GPS Operation

5.4.1 GPS Reception

The GPS 1058 is designed specifically for applications where rapid Time To First Fix (TTFF) and operation under low signal levels are primary requirements. The high sensitivity of the module makes it ideal for:

- + Navigation systems – where athermic glass, or an unsuitable location of the GPS 1058 inside the vehicle will reduce visibility and signal strength
- + Situations where the view of the satellites is obstructed e.g. car parks, walkways or foliage. The GPS 1058 will usually continue tracking indoors
- + Marine applications where multipath and unstable sea conditions make satellite visibility irregular

TTFF is the actual time required by a GPS receiver to achieve a position solution. This specification will vary with the operating state of the receiver, the length of time since the last position fix, the location of the last fix, and the specific receiver design. These start up situations are usually defined as follows:

- + **Hot start**

A hot start results from a software reset after a period of continuous navigation, or a return from a short idle period (i.e. a few minutes) that was preceded by a period of continuous navigation. In this state, all of the critical data (position, velocity, time, and satellite ephemeris) is valid to the specified accuracy and available in the GPS receiver memory.

The GPS 1058 has integral power back up to ensure that a hot start can be performed for as long as the critical data remains valid.

- + **Warm start**

A warm start typically results from user-supplied position and time initialisation data or continuous RTC operation with an accurate last known position available in memory. In this state, position and time data are present and valid but ephemeris data validity has expired.

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+ **Cold start**

A cold start acquisition results when either position or time data is unknown. Almanac information is used to identify previously healthy satellites.

5.4.2 Acquisition times

The TTFF is dependant on the state of the GPS receiver and the signal strength. Typical times are given below:

Mode	Strong signal	Weak signal
Hot start	500ms	1s
Warm start	32s	49s
Cold start	34s	52s
Re-acquisition (<10s loss of signal)	1s	1s

The cold start time will increase significantly when the signal strength is low. At very low signal strengths the GPS 1058 will continue to hot start and navigate, but may not be able to cold start. For best performance cold starts should be performed outdoors with a clear view of the sky.

5.4.3 Adaptive TricklePower

The GPS 1058 can use the SiRF Adaptive TricklePower (ATP) feature, which reduces power consumption by intelligently switching between full power in tough GPS environments and low power in strong GPS signal areas.

When signal levels drop, the receiver returns to full power so that message output rates remain constant. This results in variable power savings but much more reliable performance for a fixed output rate. Applications using ATP should give performance very similar to full power, but with significant power savings in strong signal conditions.

ATP is best suited for applications that require solutions at a fixed rate as well as low power consumption and still maintain the ability to track weak signals.

With ATP at a 1 second update, a power saving of 50% can easily be achieved with minimal degradation in navigation performance.

5.4.4 Dynamic constraints

The GPS 1058 receiver is programmed to deliberately lose track if any of the following limits is exceeded:

- + velocity: 500 m/s
- + acceleration: 4 G (39.2 m/s²)
- + vehicle jerk: 5 m/s³
- + altitude: 18 000 m (referenced to Mean Sea Level)

5.4.5 Position accuracy

The position accuracy of the GPS 1058 is given below. These values assume that the full accuracy C/A code is available and that the receiver has a clear view of the sky with a well spread satellite constellation. The values are the same in normal operation and when Adaptive TricklePower is active.

Parameter	Value
Horizontal CEP	>2.2m (i.e. 50% of the time the location provided will be within a 2.2m radius circle of the true location)
Horizontal 2D RMS	5.5m (95% of the time the location provided will be within a 5.5m radius circle of the true location)
Vertical VEP (50%)	2.0m

5.4.6 Sharing GPS data between multiple applications

At present it is recommended that the GPS Settings applet included in the MC70 operating system should only be used in conjunction with the Microsoft GPS API. To share data between multiple applications using virtual comm. ports a more reliable solution is to use a third party application, such as GPSTalk by Franson (www.franson.com).

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6 Troubleshooting and Maintenance

6.1 Maintenance

For trouble-free service treat the GPS 1058 in the same way as you would the MC70 and observe the following tips when using the GPS 1058:

- Do not store or use the GPS 1058 in any location that is dusty, damp, or wet.
- Protect the GPS 1058 from temperature extremes. Do not leave it on the dashboard of a car on a hot day, and keep it away from heat sources.

6.2 Troubleshooting

Symptoms	Possible Cause	Action
The Application on the MC70 does not receive any GPS data and the green LED is not on.	The MC70 is not firmly seated into the GPS 1058.	Remove and re-insert the MC70 from the GPS 1058, ensuring it is firmly seated.
	The port has not been opened.	Check that the Application has been configured to use COM1.
The Application on the MC70 does not receive any GPS data but the green LED is on.	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 9600 baud, 8 data bits, no parity and one stop bit.
	The GPS 1058 baud rate has been reconfigured or the data format has been set to SiRF binary mode.	Change the settings in the Application to match the settings of the GPS 1058 or use the GPS Configuration Tool available from the TSL website.
The GPS unit does not get a position fix (the Orange LED never lights)	The signal strength is too low for the unit to cold start.	Move outdoors to get a clear view of the sky.
MC70 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 MC70 is not firmly seated into the GPS 1058.	Remove and re-insert the MC70 from the GPS 1058, ensuring it is firmly seated.
ActiveSync cannot connect to	ActiveSync is not correctly	Detach the GPS 1058 from

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Symptoms	Possible Cause	Action
the MC70	configured on the PC or the MC70.	the MC70 and try to ActiveSync directly to the MC70. If this does not work then consult the MC70 User Guide.
	ActiveSync is using a serial connection.	ActiveSync must use USB with the GPS 1058 connected.
	The MC70 is not firmly seated into the GPS 1058.	Remove and re-insert the MC70 from the GPS 1058, ensuring it is firmly seated.
An accessory connected to the GPS 1058 does not work	The accessory uses a serial connection to the MC70.	The accessory is not compatible with the GPS 1058 because only the USB port is available on the docking connector.
	The MC70 is not firmly seated into the GPS 1058.	Remove and re-insert the MC70 from the GPS 1058, ensuring it is firmly seated.

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7 Technical specifications

7.1 Summary of specifications

The following table summarises the GPS 1058's intended operating environment and technical hardware specifications:

Performance Characteristics	
Open sky accuracy	Horizontal accuracy: better than 2.2 m (CEP), 5.2 m (2 dRMS)
Datum	WGS-84
Acquisition/reacquisition performance	@ -125 dBm
	hot start TTFF: <1s (95%), 500 ms (typ) valid almanac, time, position and ephemeris
	warm start TTFF: 38 s (95%), 32 s (typ) valid almanac, time and position
	cold start TTFF: 42 s (95%), 34 s (typ) valid almanac
	@ -140 dBm
	hot start TTFF: <1s (95%), <1s (typ) valid almanac, time, position and ephemeris
	warm start TTFF: 59 s (95%), 49 s (typ) valid almanac, time and position
	cold start TTFF: 66 s (95%), 52 s (typ) valid almanac
Dynamic conditions	Maximum altitude 18 000m
	Maximum velocity 515 ms ⁻¹
Tracking capability	20 satellites simultaneously
Protocol messages	NMEA-0183, version 2.20 with baud rate selection and SiRF binary.
	Control NMEA – GGA, GLL, GSA, GSV, RMC and VTG.
	SiRF – Binary position, velocity, altitude and status.
	Selected NMEA-0183/SiRF binary messages: latitude, longitude, elevation, velocity, heading, time, satellite tracking status, command/control messages
Update rate	1Hz maximum
Operating frequency	L1 1575.42 MHz
Backup power for GPS module	Supercap provides 2 hours Almanac data retention
Antenna	Internal patch

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LED indication	Power, fix indication
High accuracy mode	SBAS enabled
Baud rate	Selectable (4800 - 57600)
Current consumption	
GPS module	100mA maximum during streaming of NMEA data
	20mA using Adaptive TricklePower™ mode
Connection Interfaces	
Physical interface	USB and power in to charge MC70
Power supply	Powered from host terminal
ActiveSync	via USB
Physical Characteristics	
Dimensions	90×82×32mm (3.54"×3.23"×1.26")
Weight	95g (3.35 oz)
Enclosure material	PC/ABS
Colour	Grey
Material finish	Sparked surface
Mechanical attachment	Snap-on action with optional locking screws
Docking	Attachment maintains dockability with Symbol docking cradle for charging and ActiveSync
Environmental	
Operating Temperature	-10°C to +50°C (14°F to 122°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; 1.5m (5ft) to concrete, 2 drops per 6 sides at ambient temperature 23°C (73°F)
Sealing	Internal components conformal coated
Electrostatic discharge	+/-15kV air discharge, +/-8kV direct discharge
Construction	RoHS compliant
Regulatory	
EMI/RFI	Europe: EN 55022:1998 EN 55024:1998 + A1:2001 EN 301 489-3 V1.4.1

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	USA - FCC Part 15
Electrical Safety	IEC 60950-1

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7.2 Pin-outs



PIN	Docking Connector (Socket)
1	Power Ground
2	Cradle Detect
3	RS232 DCD/Trigger
4	USB_D-
5	USB_D+
6	USB_Gnd
7	USB_Vbus
8	USB_ID
9	Not Connected
10	Not Connected
11	Not Connected
12	Not Connected
13	Not Connected
14	Not Connected
15	Not Connected
16	External DC In 5.4V

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7.3 Regulatory Information

All TSL devices are designed to be compliant with appropriate regulations and standards and are CE marked. Any changes or modifications to TSL equipment, not expressly approved by TSL, could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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7.4 Statement of compliance

Technology Solutions hereby declares that this device is in compliance with the essential requirements and other relevant provisions of Directives 1999/5/EC, 89/336/EEC and 73/23/EEC. Declaration of Conformities may be obtained from Technology Solutions on request.

The GPS 1058 has been tested to and found to comply with the following standards for use within the Economic Union:

EMC Directive 89/336/EEC:

EN 55022:1998

EN 55024:1998 + A1:2001

R&TTE Directive 99/5/EC:

EN 301 489-3 V1.4.1 (2002-08)

Low Voltage Directive 73/23/EEC:

IEC 60950-1 1st Edition 2001 (National and group differences in accordance with CB Bulletin No. 109A December 2005)

The GPS 1058 has also been tested and found to comply with:

Title 47 of the CFR:2004, Part 15, Subpart (b)

Class B Radiated Electric Field Emissions and Power Line Conducted Emissions

The GPS 1058 complies with:

RoHS Directive 2002/95/EC

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8 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 Symbol-approved cradles, chargers and power supplies with the GPS 1058. Use of an alternative power supply will invalidate any approval given to this device, void the warranty for the product and may be dangerous.

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9 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.

10 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

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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.

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+ About TSL

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TSL designs and manufactures both standard and custom embedded, snap on and standalone peripherals for handheld computer terminals. Embedded technologies include:

- GPS
- RFID – Low Frequency, High Frequency and UHF
- GPRS/GSM
- IrDA
- Contact Smartcard
- Fingerprint Biometrics
- 1D and 2D Barcode Scanning
- Bluetooth
- 802.11 WiFi
- Magnetic Card Readers
- OCR – B and ePassport

Utilizing class leading Industrial design, TSL develops products from concept through to high volume manufacture for Blue Chip companies around the world. Using the above technologies TSL develops innovative products in a timely and cost effective manner for a broad range of handheld devices.

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

Postal Address: Technology Solutions (UK) Limited,
 Suite C, Loughborough Technology Centre,
 Epinal Way,
 Loughborough,
 Leicestershire,
 LE11 3GE.
 United Kingdom.

Email: enquiries@tsl.uk.com



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