



Delivering information

## Wireless RF Repeater

## ISL024DB1R User's Guide

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This document contains information about the hardware interface between ISL024DB1R transceiver and Receiver. Information includes the theory of operation, specifications, interface definitions, configuration information and mechanical drawings

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**THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EITHER EXPRESS OR IMPLIED, AS TO DESCRIPTION, QUALITY, AND MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR ANY OTHER MATTER.**

## Revision History

Issue	Date	Author	Comments
0-1	09/09/2011	Vahid Tambe	Initial Release
0-2	29/09/2011	Rob Jevans	Removed antenna references

**Operation is subject to the following two conditions: this device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.**

**Caution: any changes or modifications not expressly approved by the Manufacturer could void the user's authority to operate the equipment.**

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## 1. Safety Information

### FCC WARNING

This equipment generates or uses radio frequency energy. Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made

### Agency Identification Numbers

Part #	FCC	
ISL024DB1R	ZWZISL024DB1R	

### Approved Antenna List

The ISL024DB1 has been designed with an internal PCB antenna only.

**Caution:** Any changes or modifications not expressly approved by Invisible Systems could void the user's authority to operate the equipment.

## FCC REQUIREMENTS

**NOTE:** 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 generates, uses, and can radiate radio frequency energy. 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 not 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:

- Re-orient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver
- Connect the equipment to an outlet on a circuit that is different from that to which the receiver is connected.

### Replacing battery

**!CAUTION:**  
**RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.**  
**DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS**

### **WARNING!**

Only qualified service personnel may install this equipment. The instructions in this manual are intended for use by qualified service personnel only.

### ***Only qualified persons should service the system.***

The installation and service of this hardware is to be performed only by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the danger to themselves or other persons. Electrical shock hazards from the telecommunication network and AC mains are possible with this equipment. To minimize risk to service personnel and users, the system must be connected to an outlet with a third-wire Earth.

Service personnel must be alert to the possibility of high leakage currents becoming available on metal system surfaces during power line fault events near network lines.

These leakage currents normally safely flow to Protective Earth via the power cord.

Therefore, it is mandatory that connection to an earthed outlet is performed first and removed last when cabling to the unit. Specifically, operations requiring the unit to be powered down must have the network connections (exchange lines) removed first.

**Intrinsic safety**

Do not install the unit in conditions where there is a danger of electrically ignited explosions.

**Exposure to sunlight, heat and moisture**

Do not expose the unit to direct sunlight for long periods. Keep away from excessive heat and moisture.

**Spare parts and accessories**

Use only approved spare parts and accessories. The operation of non-approved parts cannot be guaranteed and may even cause damage.



## DECLARATION OF CONFORMITY

Measurement Standard Applied

**ANSI C63.10:2009**

Manufacturer:

Invisible Systems Ltd  
9 Beetham Rd  
Milnthorpe  
Cumbria  
LA7 7QL  
U.K

Product Description

925.78MHz Transceiver  
designed for low cost solution  
for wireless application

Product Model

ISL024DB1R

Part Number

250001R

Test Laboratories



Unit E  
South Orbital Trading Park  
Hedon Road  
Hull  
HU9 1NJ  
UK  
T 01482 801801  
F 01482 801806

### STANDARDS TO WHICH CONFORMITY IS DECLARED

Part 15 Specific conditions for 900MHz

**Title 47 CFR 15.209, 15.249 (a),(e), 15.215, 15.109, 15.203**

I the undersigned, hereby declare that the equipment specified above conforms to the specified Directive and Standards.

Signature

Date

Print Name

Title



## 2. ISL024DB1R

The ISL024DB1R repeater is designed for use with the ISL024DB1 transceiver system to extend the range of the transmitter from the receiver. The ISL024DB1R incorporates intelligent messages so that the receiver may receive messages from either the receiver and/or repeater directly without conflict. This further enhances the flexibility of the ISL024DB1 with minimal user input.

To determine whether you actually need a repeater, if you have a major obstruction(s) or already know that you need to employ multiple chains in your network, then you will need a solution to extend your data transmission range.

The repeater connection includes the following:

- Power supply connection **Note:** The power supply for the repeater is to be ordered separately.



### 3 Theory of operation

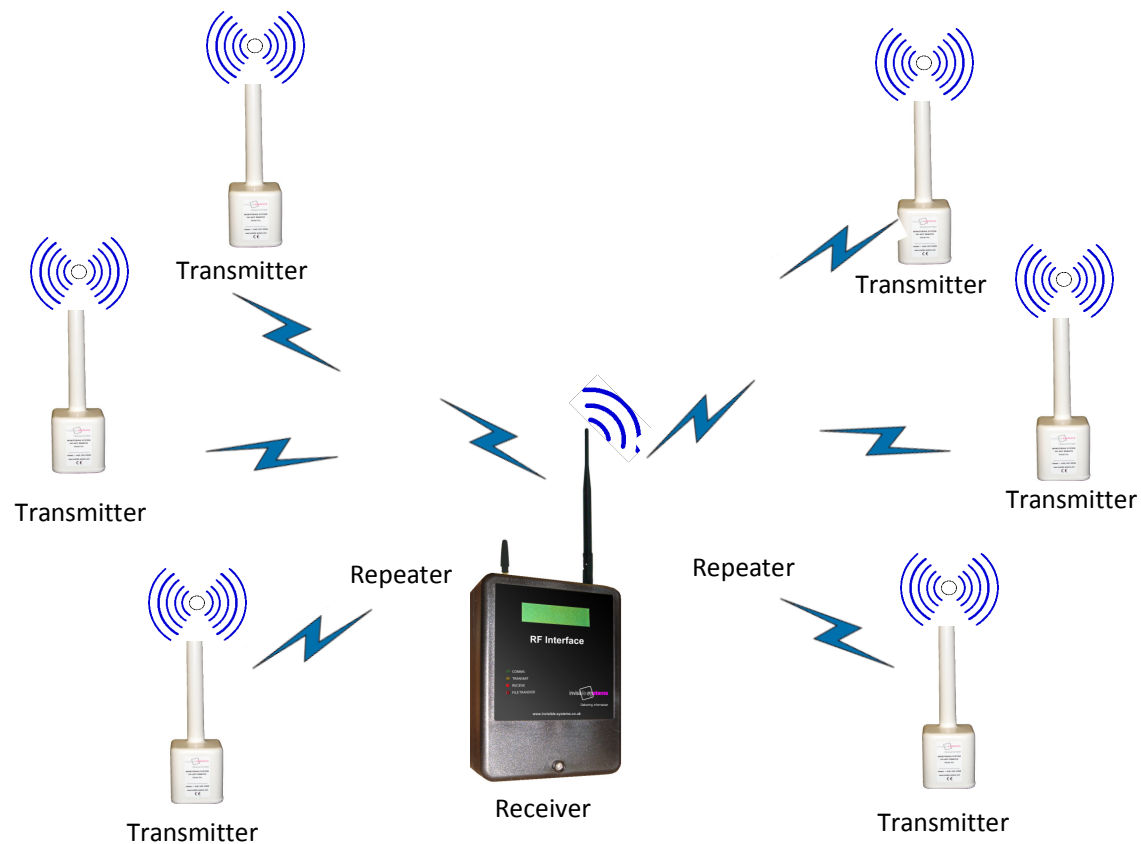
#### 3.1 Repeater networks

Though there is no functionality for a transmitter to automatically forward a message along to another radio, repeater networks can be setup to provide for additional coverage.

This example of a repeater network would still be useful for a point-to-multipoint network where some of the transmitters are not in range of the primary access point.

In this network topology an ISL024DB1R is setup to act as the primary access point.

To cover additional areas, a repeater consisting of two ISL024DB1R can be added to the network.



#### Limitations:

There are some limitations to this setup.

- The addition of the repeaters requires additional radios which increases the cost of the systems.
- The repeater setup must be powered sufficiently.

- The antennas of the transmitter and the receiver in the repeater should be positioned to minimize interference. For best performance the antennas should be placed more than 10ft from each other.
- There is some additional latency associated with the repeater; this latency is between 200 and 400ms typically

#### 4. Installing the ISL024DB1R Repeater

Before beginning the installation, determine the position of the repeater for best coverage. The coverage depends on the construction of the building, architecture, and the choice of building materials.

##### Environmental requirements

- Avoid installing repeaters on large concrete or marble columns because these columns affect radio coverage. If possible, place the base station a minimum of one meter/3.3 feet from these types of columns.
- Do not install a repeater with the antenna housings near metal objects. Be careful not to damage existing wiring or panels.
- Do not position repeaters in ducts, plenums or hollow spaces used to transport environmental air except where the duct, plenum or hollow space is created by a suspended ceiling having lay-in panels.
- Keep the repeater away from steel constructions.
- Do not position repeaters directly on metallic surfaces. If possible, place the receiver a minimum of one meter/3.3 feet from these types of surfaces.
- Only position repeaters where the signal is needed.
- The installation area must be clean, free of traffic and excess dust, dry, and well ventilated.
- The installation area must be within the temperature ranges of 10°C and 40°C/50°F and 104°F.
- The installation area must be between 20% and 80% non-condensing relative humidity.

**Note** The repeater does not add channels; it only adds additional coverage area.

For best RF coverage, the repeater must be mounted vertically on walls. The antennas must always be kept perpendicular to the floor.

**Caution** The repeater must not be installed at any angle other than vertical. If the repeater is placed upside-down, the coverage area of the repeater is decreased by 40 - 50% and it might not transmit or receive effectively.

### **Powering the ISL024DB1R Repeater**

The power supply for the repeater is 3.6VDC, 300mA

**Appropriate RF  
safety/installation information**

The repeater is intended to be installed by authorised personal. The repeater shall be installed in accordance with FCC rules.

**TABLE 2: ISL024DB1R DETAILED SPECIFICATIONS**

<b>INTERFACES</b>	
<b>RF Connector</b>	None internal PCB antenna.
<b>OPERATIONAL</b>	
<b>Network Topologies</b>	Point-to-Point, Point-to-Multi Point
<b>Security</b>	N/A
<b>Frequency Band</b>	925.78MHz
<b>RF Data rate</b>	2400 kbps
<b>RF Technology</b>	Narrowband
<b>Output Power</b>	1mW
<b>Maximum radiated power (EIRP)</b>	19.7mV/m measured at 3 meter
<b>Range Line of sight</b>	Outdoor: up to 300m Indoor: up to 30m
<b>Sensitivity</b>	-115dBm at 2400kbps RF rate
<b>ELECTRICAL/ENVIROMENTAL</b>	
<b>Supply voltage</b>	+3.3 v DC
<b>Current consumption</b>	35mA
<b>Temperature (Operating)</b>	-30°C to 75°C
<b>Temperature (storage)</b>	-50°C to 85°C
<b>PHYSICAL</b>	
<b>Dimensions</b>	35x50mm
<b>Weight</b>	8g
<b>CERTIFICATIONS</b>	
<b>FCC</b>	FCC ID: ZWZISL024DB1R
<b>CE</b>	ANSI C63.10:2009
<b>ROHS</b>	yes