



# **User Manual of CSL RTLS System**

CS3151BB2 Tag

CS5111LP Reader

CS5113LP Reader with Ethernet Bridge

## **FCC Statement**

FCC NOTICE: To comply with FCC part 15 rules in the United States, the system must be professionally installed to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States. The use of the system in any other combination is expressly forbidden.

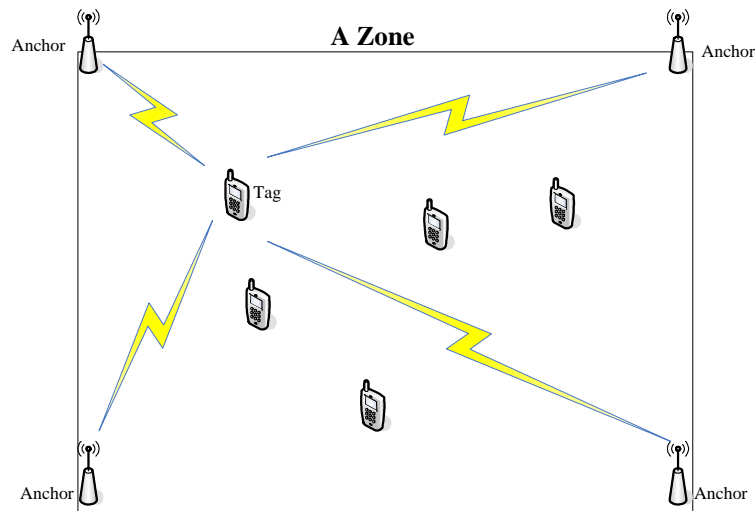
## Table of Content

User Manual of CSL RTLS System .....	1
<b>Introduction</b> .....	<b>4</b>
<b>1 System Component Description</b> .....	<b>5</b>
1.1 CS3151BB2 .....	5
1.1.1 Product Description .....	5
1.1.2 Installation Procedure .....	5
1.1.3 Product Specification .....	6
1.1.4 Antenna Properties .....	6
1.2 CS5111LP .....	10
1.2.1 Product Description .....	10
1.2.2 Installation Procedure .....	10
1.2.3 Product Specifications .....	11
1.3 CS5113LP .....	12
1.3.1 Product Description .....	12
1.3.2 Installation procedure.....	12
1.3.3 Product Specifications .....	13

## Introduction

The CSL RTLS solution is based on the application of time of arrival technology.

In the RTLS, an anchor is the device installed in a known position inside a zone, normally, at the corners of the zone. The moving tag inside the zone can measure the range to each anchor so as to obtain its absolute position inside the zone.



In a minimum system, 4 anchors – 3 normal anchors CS5111LP and 1 master anchor CS5113LP- are installed in a zone. However, the more the anchors are installed, the higher the accuracy of the tag position to be obtained.

The accuracy of positioning is +/-1 meter.

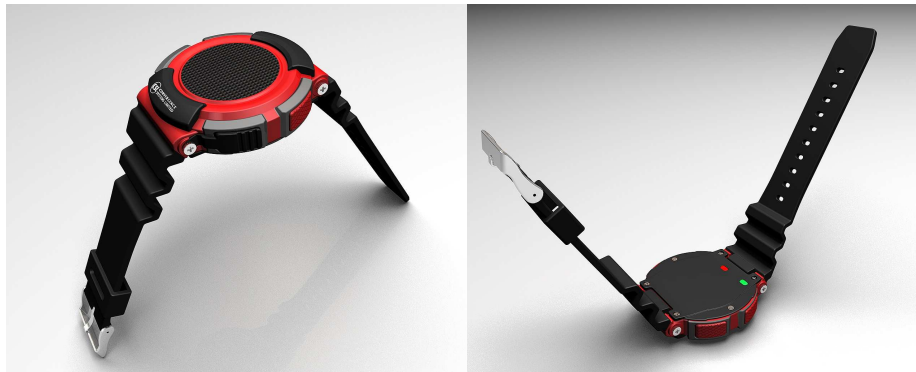
# 1 System Component Description

## 1.1 CS3151BB2

### 1.1.1 Product Description

CS3151BB2 is a battery-operated active RFID tag. Rechargeable Lithium Polymer batteries are installed for normal function. Charging interface is a micro USB connector.

CS3151BB2 are designed so that they can be worn on the wrist of human body to track the position of the moving object. There is a button at the front panel of the tag for various emergency applications. Light indicators are located on the bottom side.



### 1.1.2 Installation Procedure

Batteries are preinstalled in factory. When the batteries are recharged, or when the tag is plugged into the charger, CS3151BB2 tag will be in listening mode. In this mode, the CS3151BB2 tags will listen to the beacons from CS5113LP master anchor and commence registration .

Once registration is completed, CS3151BB2 is in the operating mode and ready for RTLS tracking.

### 1.1.3 Product Specification

<b>Specifications:</b>	
<b>Physical</b>	<b>Plastic sealed enclosure: 36 mm x 36 mm x 12 mm;</b>
<b>Characteristics:</b>	<b>Weight 17 g (without wrist strap), 30 g (with wrist strap)</b>
<b>Read Range:</b>	<b>Up to 100 meters depending on reader power</b>
<b>Frequency:</b>	<b>2400-2483 MHz ISM license-free band</b>
<b>Environment:</b>	<b>Operating Temp: -40° C to 65° C (-40° F to 149° F)</b>
	<b>Storage Temp: -40° C to 85° C (-40° F to 185° F)</b>
	<b>Humidity: 0% to 95% RH non-condensing</b>
<b>Technology:</b>	<b>CHIRP</b>
<b>Output RF Power:</b>	<b>2 dBm EIRP</b>
<b>Ranging Method:</b>	<b>Time Of Arrival (TOA)</b>
<b>Ranging Accuracy:</b>	<b>+/- 1 meter</b>
<b>Protocol:</b>	<b>CSL RTLS Protocol, orderly inventory method to handle large tag population</b>
<b>Battery:</b>	<b>Internal rechargeable Li Polymer battery</b>
<b>Order Code:</b>	<b>CS3151BB2</b>

### 1.1.4 Antenna Properties

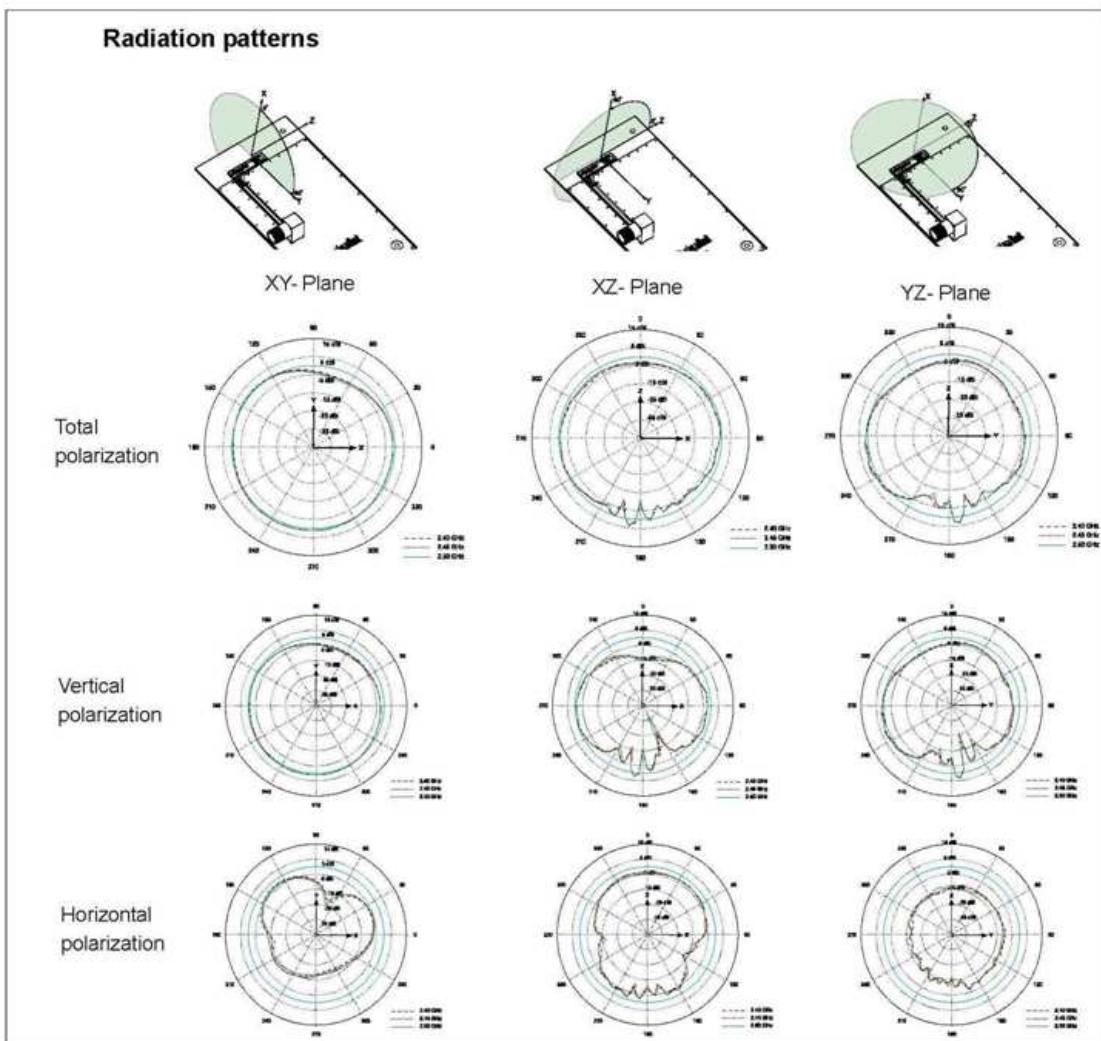
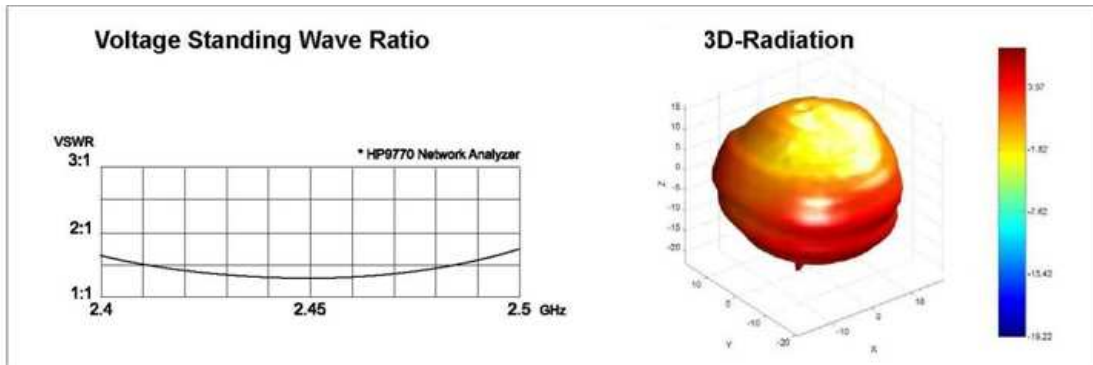
CS3151BB2 employs two miniaturized SMD antennas for effective RF transmission and reception. The antenna properties are as below :

#### Antenna 1 :

<b>Electrical Items</b>	<b>Specifications</b>
Model	3030A5887-01
Type of antenna	SMD chip type
Frequency range	2400MHz – 2500MHz
Nominal impedance	50 ohm
Polarization	Linear
V.S.W.R	1.5 typically, mounting on CS3151BB2
Gain	2dBi typically, mounting on CS3151BB2
<b>Mechanical Items</b>	<b>Specifications</b>
Dimension in millimeter	12.8(L) x 3.9(W) x 1.1(H)

Weight

0.1gram



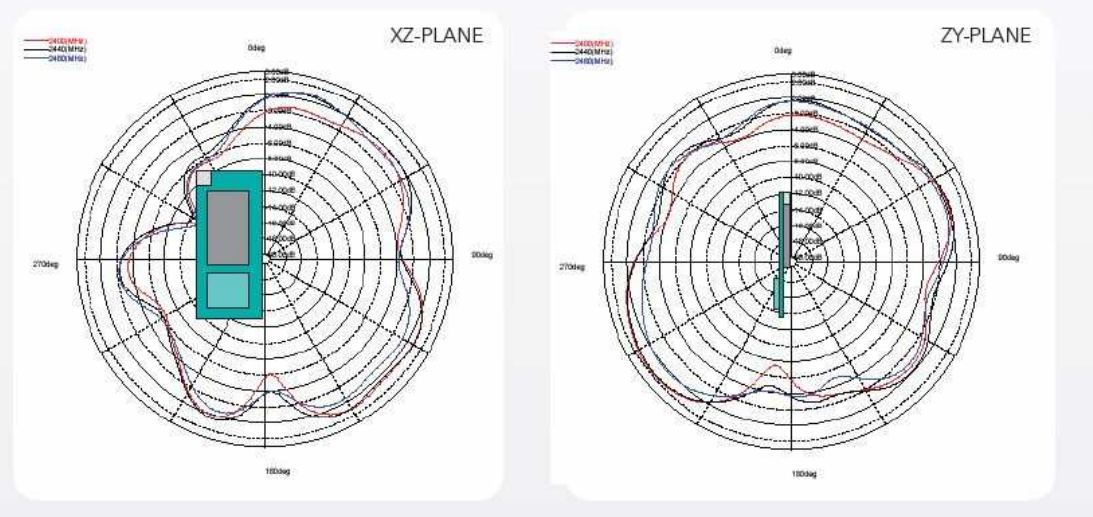
**Antenna2 :**

Electrical Items	Specifications
Model	W3108
Type of antenna	SMD type
Frequency range	2400MHz – 2500MHz
Nominal impedance	50 ohm
Polarization	Linear
V.S.W.R	1.5 typically, mounting on CS3151BB2
Gain	1.5dBi typically, mounting on CS3151BB2
Mechanical Items	Specifications
Dimension in millimeter	5(W) x 2.5(L) x 5.5(H)
Weight	0.14gram

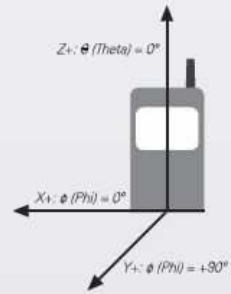
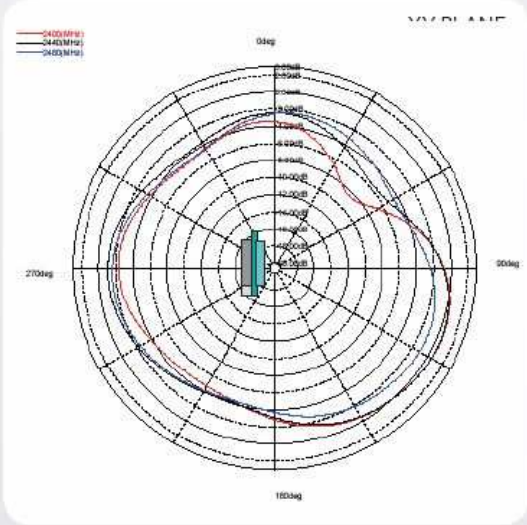
## 2.4 GHz Helical WiFi SMD Antenna

Ground cleared under antenna, clearance area 7.50 x 5.50 mm. Pulse Part Number: W3108

### Typical Free space Radiation Patterns



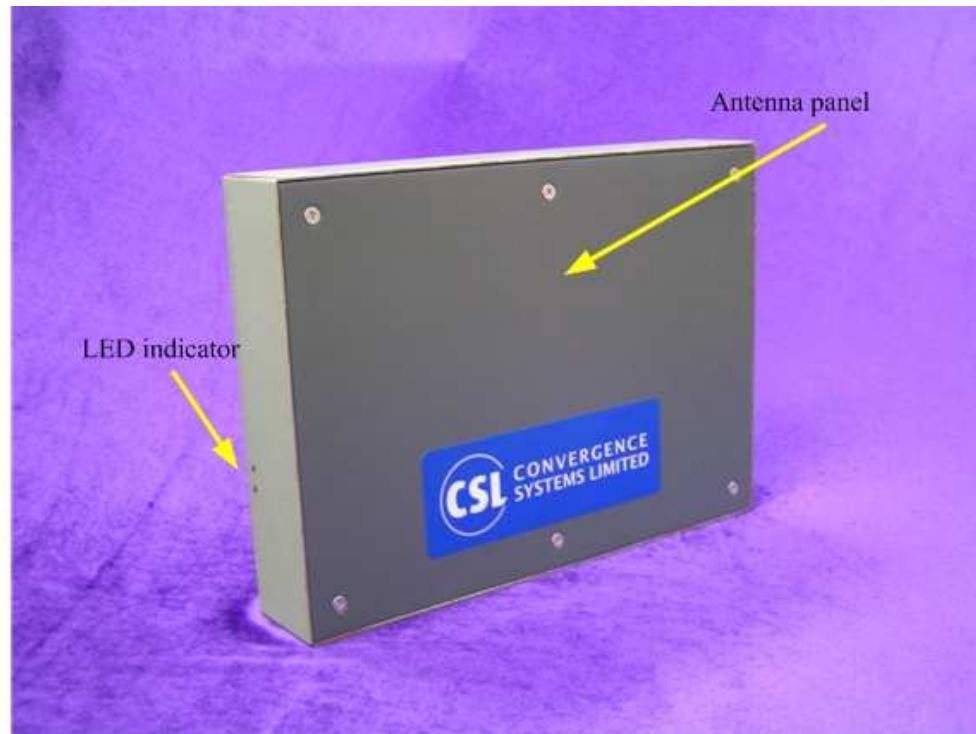




## 1.2 CS5111LP

### 1.2.1 Product Description

CS5111LP is the RTLS anchor( or reader). It integrates the high gain 2.4GHz ISM band antenna and the electronics PCB into one housing for robustness and easy installation. CS5111LP is designed to be mounted at the back panel.



### 1.2.2 Installation Procedure

CS5111LP can be fed with DC voltage ranges from 12V to 34Vdc. The dc plug is 2.5mm locked type. CS5111LP is fully programmed and ready for normal operation once power is on. No extra configuration procedure is required.

### 1.2.3 Product Specifications

#### Specifications:

<b>Physical Characteristics:</b>	Sealed enclosure: 29 cm x 22.2 cm x 6.5 cm; Weight 2 Kg
<b>Mounting:</b>	4 mounting holes at corners for screw mounting onto surface, mounting fixture for wall mounting, ceiling mounting, table mounting, shelf mounting available
<b>Read Range:</b>	Up to 100 meters
<b>Frequency Range:</b>	2400-2483 MHz ISM license-free band
<b>Environment:</b>	Operating Temp: -40°C to 65°C (-40°F to 149°F) Storage Temp: -40°C to 85°C (-40°F to 185°F) Humidity: 0% to 95% RH non-condensing
<b>Technology:</b>	CHIRP
<b>Output RF Power:</b>	10 dBm EIRP
<b>Antenna:</b>	Embedded 12 dBi patch antenna
<b>Ranging Method:</b>	Time Of Arrival (TOA)
<b>Ranging Accuracy:</b>	+/- 1 meter
<b>Protocol:</b>	CSL RTLS Protocol, orderly inventory method to handle large tag population
<b>Display:</b>	LED x 2, Power and Signal
<b>Power Requirement:</b>	12 Volt DC, 50 mA; actual supply can range from 5 VDC to 24 VDC, can be operated using battery, battery low detect value needs to be software configured.
<b>Order Code:</b>	CS5111LP

## 1.3 CS5113LP

### 1.3.1 Product Description

CS5113LP is the RTLS master anchor( or reader). It integrates the high gain 2.4GHz ISM band antenna and the electronics PCB into one housing for robustness and easy installation. CS5113LP has Ethernet connectivity function to communicate with the server application. CS5113LP is also a POE PD that can allow it to be powered through IEEE 802.3 certified PSE.

### 1.3.2 Installation procedure

CS5113LP can be fed with DC voltage ranges from 12V to 34Vdc. The dc plug is 2.5mm locked type. Once powered on, CS5113LP is ready to communicate with server through Ethernet port for configuration and RTLS functions.

CS5113LP can also be powered by a IEEE802.3 certified PSE. When the POE is in function, the DC adapter should be unplugged from the DC jack.

When connected to the server via Ethernet connection, Shielded-FTP Ethernet cables should be used to for optimal performance.

### 1.3.3 Product Specifications

<b>Specifications:</b>	
<b>Physical Characteristics:</b>	Sealed enclosure: 29 cm x 22.2 cm x 6.5 cm; Weight 2 Kg
<b>Mounting:</b>	4 mounting holes at corners for screw mounting onto surface, mounting fixture for wall mounting, ceiling mounting, table mounting, shelf mounting available
<b>Read Range:</b>	Up to 100 meters
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<b>Environment:</b>	Operating Temp: -40°C to 65°C (-40°F to 149°F) Storage Temp: -40°C to 85°C (-40°F to 185°F) Humidity: 0% to 95% RH non-condensing
<b>Technology:</b>	CHIRP
<b>Output RF Power:</b>	10 dBm EIRP
<b>Antenna:</b>	Embedded 12 dBi patch antenna
<b>Ranging Method:</b>	Time Of Arrival (TOA)
<b>Ranging Accuracy:</b>	+/- 1 meter
<b>Network Connectivity</b>	Ethernet, POE (Power Over Ethernet)
<b>Protocol:</b>	CSL RTLS Protocol, orderly inventory method to handle large tag population
<b>Display:</b>	LED x 2, Power and Signal
<b>Power Requirement:</b>	2 methods, auto-select: 1. 5 VDC – 24 VDC supply, at 12 VDC, 100 mA; can be operated using battery, battery low detect value needs to be software configured 2. POE
<b>Order Code:</b>	CS5113LP

# Federal Communications Commission Interference

## Statement

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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. 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.(3) This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.