



User Manual of CSL RTLS System

CS3151 Tag

CS5111LP Reader

CS5113LP Reader with Ethernet Bridge

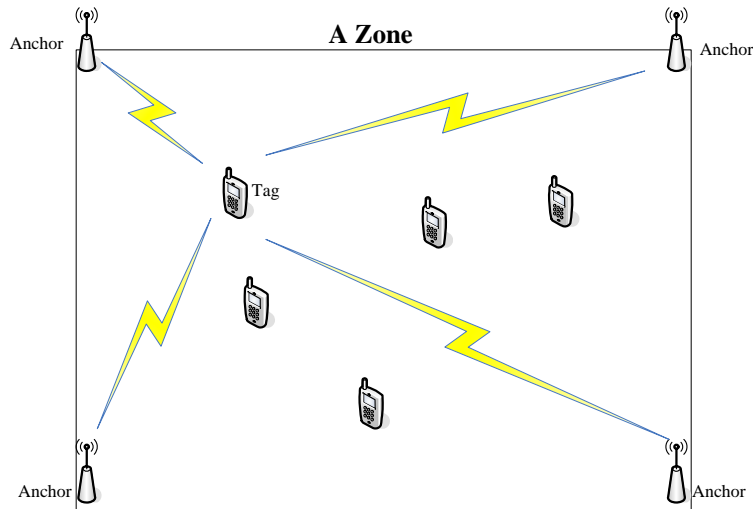
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Introduction

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.

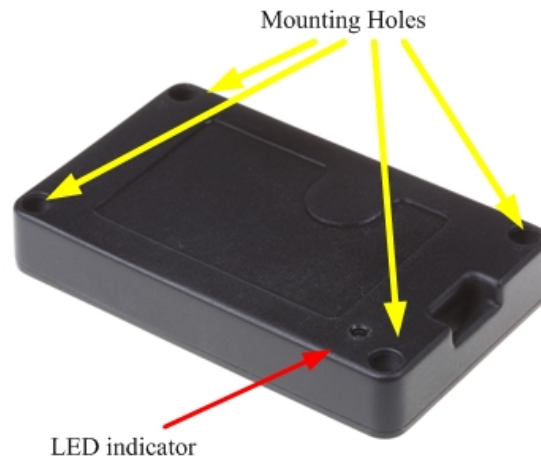
1 System Component Description

1.1 CS3151

1.1.1 Product Description

CS3151 is a battery-operated active RFID tag. Three AAA size primary batteries (either alkaline or lithium/Iron Disulfide)or Ni-MH rechargeable batteries can be installed for normal function.

CS3151 are designed so that they can be attached to the tracking assets or simply hanging on the moving objects, depending on the applications. There are four holes on the corners of the tag housing that can allow the tag to be bolted firmly on the asset. Both of the facets have light indicators so either face can be attached to the asset.



1.1.2 Installation Procedure

When batteries are initially installed, CS3151 tags will be in listening mode. In this mode, the CS3151 tags will listen to the commands from CS5113LP master anchor for configuration.

Once configuration is completed, CS3151 is in the operating mode and ready for RTLS tracking.

1.1.3 Product Specification

Specifications:

Physical Characteristics:	Plastic sealed enclosure: 94 mm x 56 mm x 15 mm; Weight 84 g
Read Range:	Up to 150 meters depending on reader power
Frequency:	2400-2483 MHz ISM license-free band
Environment:	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
Technology:	CHIRP
Output RF Power:	2 dBm EIRP
Ranging Method:	Time Of Arrival (TOA)
Ranging Accuracy:	+/- 1 meter
Protocol:	CSL RTLS Protocol, orderly inventory method to handle large tag population
Memory Content:	2 KBytes
Update Cycle:	1 second to 6 minutes or more
Battery:	3 AAA batteries, off the shelf, Primary cell (alkaline or Lithium) or Low Leakage NiMH (Rayovac), or Lithium Ion Rechargeable AAA cell (typically 300 mAh)
Battery Life:	For 1250 mAh AAA e2 Lithium Energizer – assume 10% time in motion

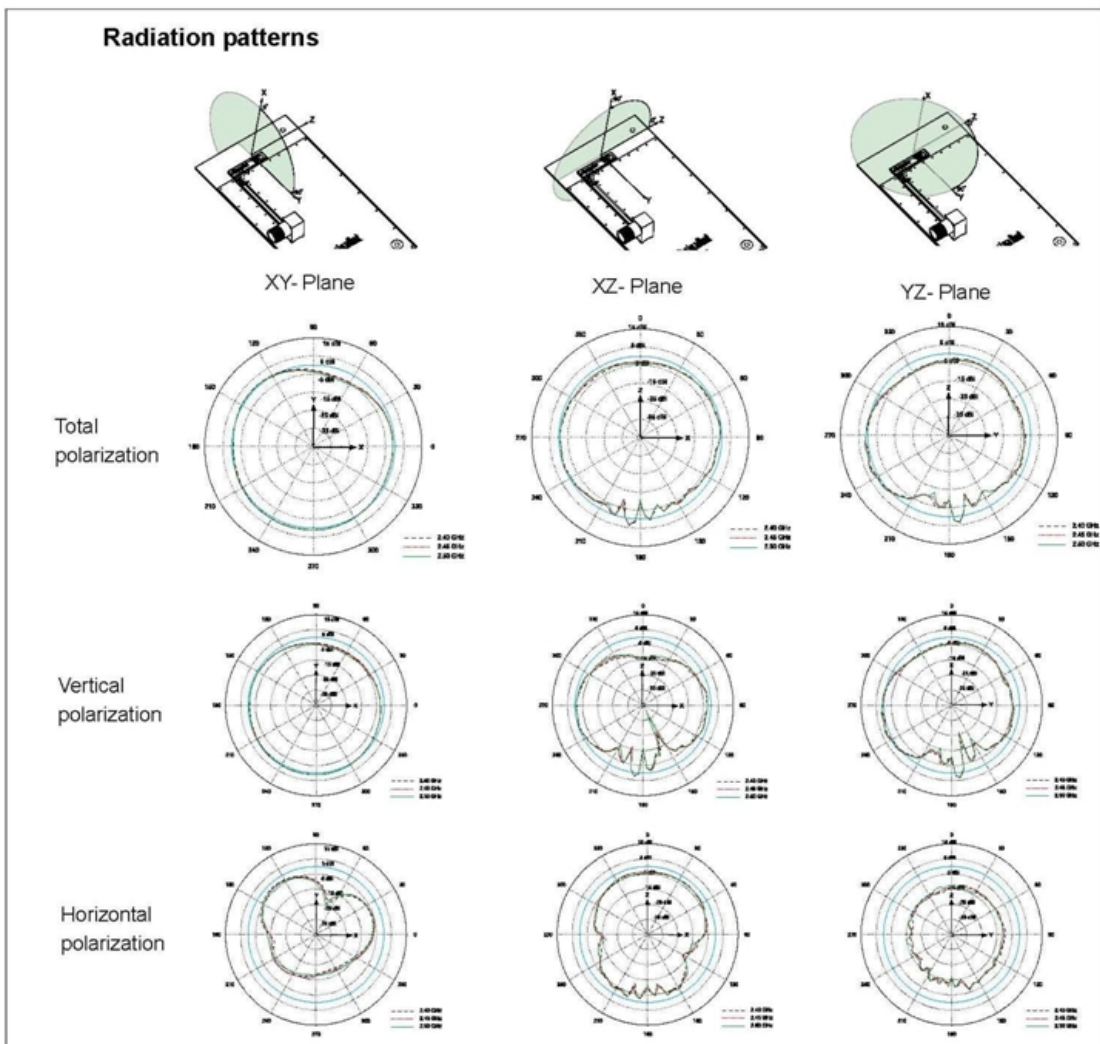
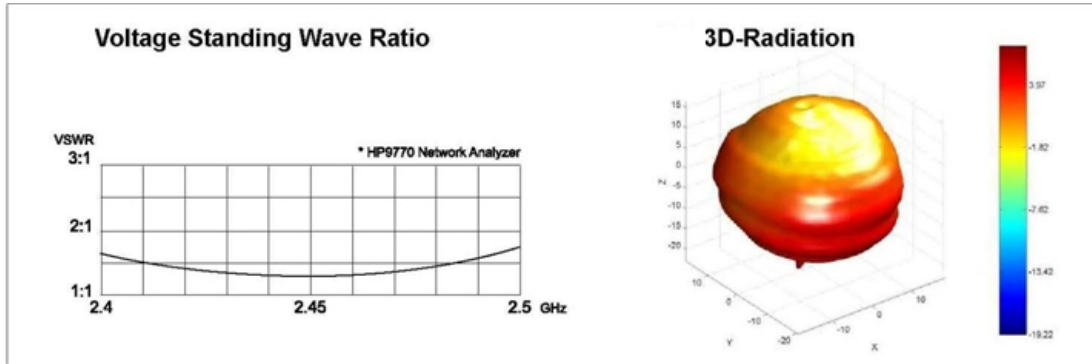
Update Cycle Time	Battery Life	
	w/o Motion Sensor	with Motion Sensor (10% motion)
1 second	1 month	9 months
2 seconds	1.5 months	18 months
5 seconds	4 months	40 months
10 seconds	9 months	70 months

1.1.4 Antenna Properties

CS3151 employs embedded miniaturized Omni-directional chip antenna for effective RF transmission and reception. The antenna property is as below :

Electrical Items	Specifications
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 CS3151

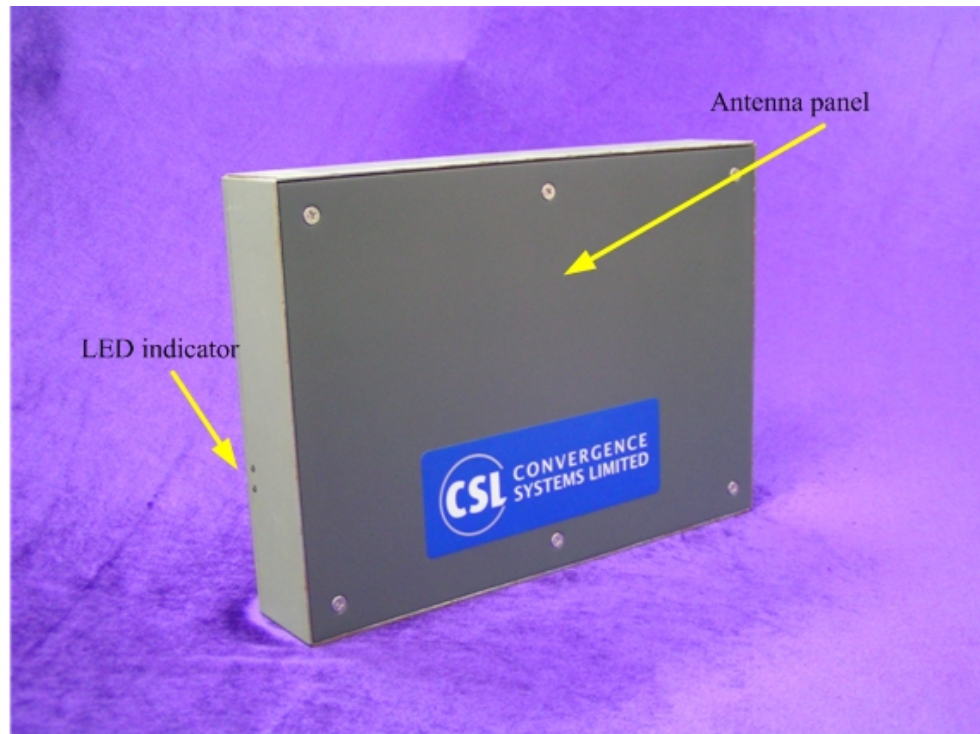
Gain	2dBi typically, mounting on CS3151
Mechanical Items	Specifications
Dimension in millimeter	12.8(L) x 3.9(W) x 1.1(H)
Weight	0.1gram



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:

Physical Characteristics:	Sealed enclosure: 29 cm x 22.2 cm x 6.5 cm; Weight 2 Kg
Mounting:	4 mounting holes at corners for screw mounting onto surface, mounting fixture for wall mounting, ceiling mounting, table mounting, shelf mounting available
Read Range:	Up to 100 meters
Frequency Range:	2400-2483 MHz ISM license-free band
Environment:	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
Technology:	CHIRP
Output RF Power:	10 dBm EIRP
Antenna:	Embedded 12 dBi patch antenna
Ranging Method:	Time Of Arrival (TOA)
Ranging Accuracy:	+/- 1 meter
Protocol:	CSL RTLS Protocol, orderly inventory method to handle large tag population
Display:	LED x 2, Power and Signal
Power Requirement:	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.
Order Code:	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

Specifications:	
Physical Characteristics:	Sealed enclosure: 29 cm x 22.2 cm x 6.5 cm; Weight 2 Kg
Mounting:	4 mounting holes at corners for screw mounting onto surface, mounting fixture for wall mounting, ceiling mounting, table mounting, shelf mounting available
Read Range:	Up to 100 meters
Frequency Range:	2400-2483 MHz ISM license-free band
Environment:	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
Technology:	CHIRP
Output RF Power:	10 dBm EIRP
Antenna:	Embedded 12 dBi patch antenna
Ranging Method:	Time Of Arrival (TOA)
Ranging Accuracy:	+/- 1 meter
Network Connectivity	Ethernet, POE (Power Over Ethernet)
Protocol:	CSL RTLS Protocol, orderly inventory method to handle large tag population
Display:	LED x 2, Power and Signal
Power Requirement:	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
Order Code:	CS5113LP

Federal Communication 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.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.

This product must be installed by a professional technician/installer.