CSL CS468-2INT EPC Class 1 Gen 2 RFID Fixed Reader

User's Manual

Version 1.0.3

CSL: The One-Stop-Shop for RFID Solutions

1 Content

2 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.

3   Introduction

3.1   Product Package

3.1.1   Basic Package Content

The reader package contains:

- Fixed reader with 16 RF ports
- USB cable
- GPIO cable
- 12V switching power supply
- Extended mounting stud and nuts
- Plastic caps for connectors and cables

3.1.2 Product Specifications

Fig 3-1   CS468-2INT Reader

Features:

- ISO 18000-6C and EPCglobal Class 1 Gen 2 UHF RFID protocol compliant including dense reader mode
- Ultra long read range – peak at 9 meters for UPM Dogbone RFID tag
- Ultra high read rate – peak at 300 tags per second
- Sophisticated data handling for efficient management of large streams of tag data.
- Highly configurable buffering and tag filtering modes to eliminate the redundant tag data so as to reduce LAN traffic and server loading
- 400 kbps tag-to-reader data rate profile
- Robust performance in dense-reader environments
- Excellent in transmit and receive mode – generates a different combination of unique reader-to-tag command rate, tag-to-reader backscatter rate, modulation format, and backscatter type
- Configurable parameters offer maximum throughput and optimal performance
- Supports all Gen 2 commands, including write, lock and kill

     5

Specifications:

Physical Characteristics:	Reader:
	Length: 27 cm; Width: 16 cm; Height: 2.4 cm; Weight: 700g
	Switch:
	Length: 16cm; Width: 13.5; Height: 2cm; Weight:415g
Environment:	Operating Temp: -20^0C to 50^0C
	Storage Temp: -40^0C to 85^0C
	Humidity: 5% to 95% non-condensing
Power:	12 Volt supplied via an AC/DC adaptor or IEEE 802.3af compliant Power Over Ethernet enabled power source
RFID Frequency Ranges:	902~928MHz ISM band
Interfaces	LAN TCP/IP
	(Configurable to use fixed IP address or DHCP)
Maximum Tag Read Rate:	300 tag/sec.
Maximum Speed of Tag:	660 ft/min
Accessories:	• USB cable
	• GPIO cable
	• 12V switching power supply
	• Extended mounting stud and nuts
	• Plastic caps for connectors and cables
Order Code:	CS468-2INT
Restrictions on Use:	Approvals, features and parameters may vary depending on country legislation and may change without notice

4   Installation

4.1   Devices

4.1.1   Reader

The CSL CS468-2INT fixed RFID Reader is an EPCglobal Class 1 Gen 2 reader product.

Figure 4-1 CS468-2INT Reader Top View

GPIO   USB
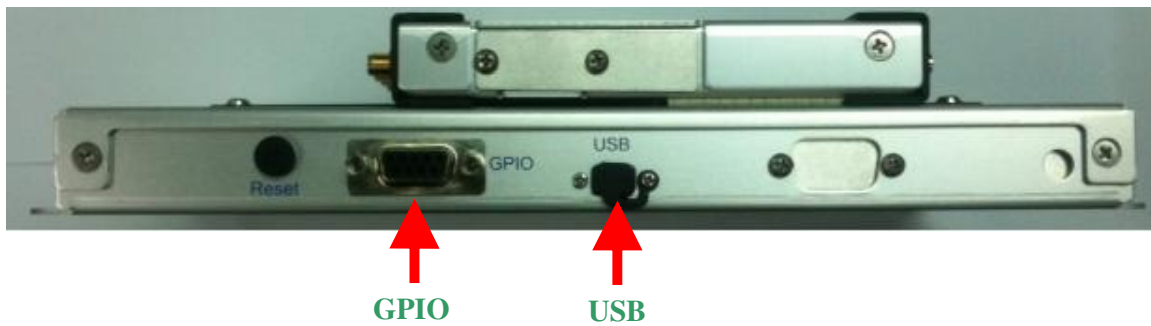
Figure 4-2 CS468-2INT Reader Side View

12VDC   Ethernet

Figure 4-3 CS468-2INT Reader Side View
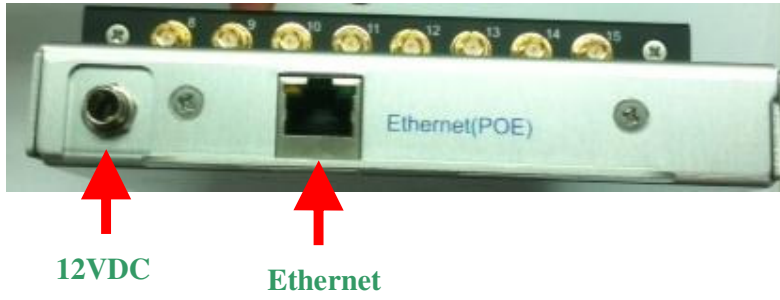
4.2   Operating Setup

CS468-2INT has two power up modes: POE mode and 12V adaptor mode.
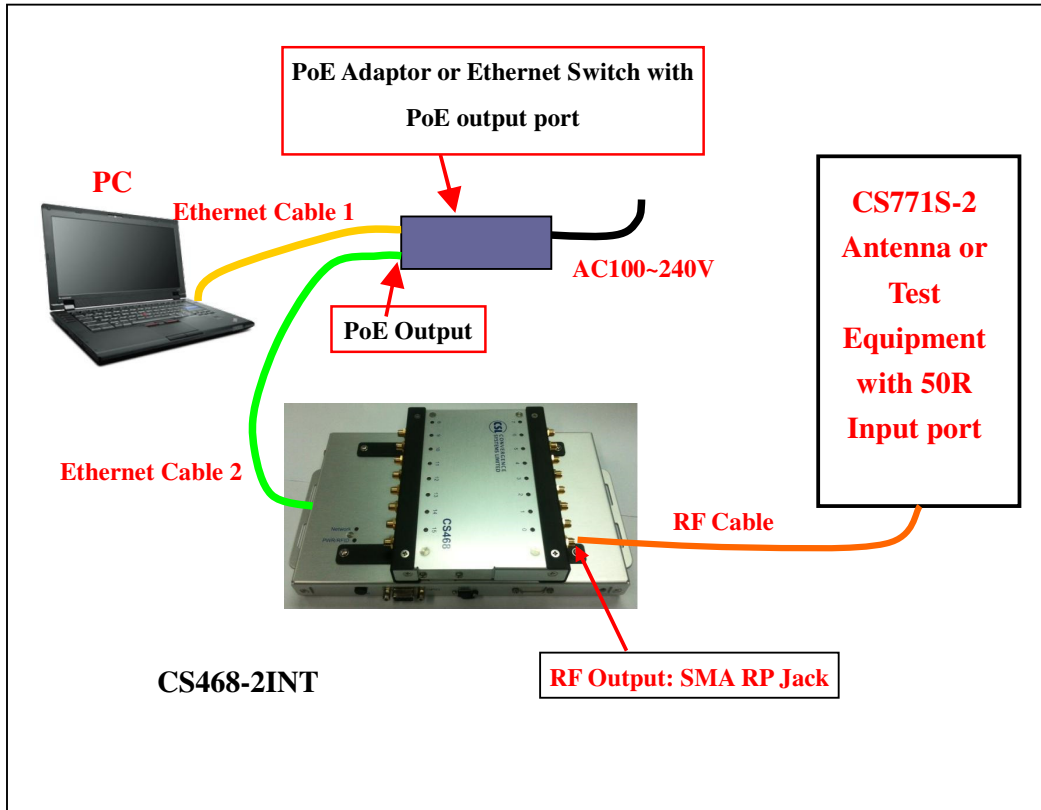

Figure 4-4 POE mode Setup

The reader is connected to POE enabled power source's output port via the cable provided in the package.
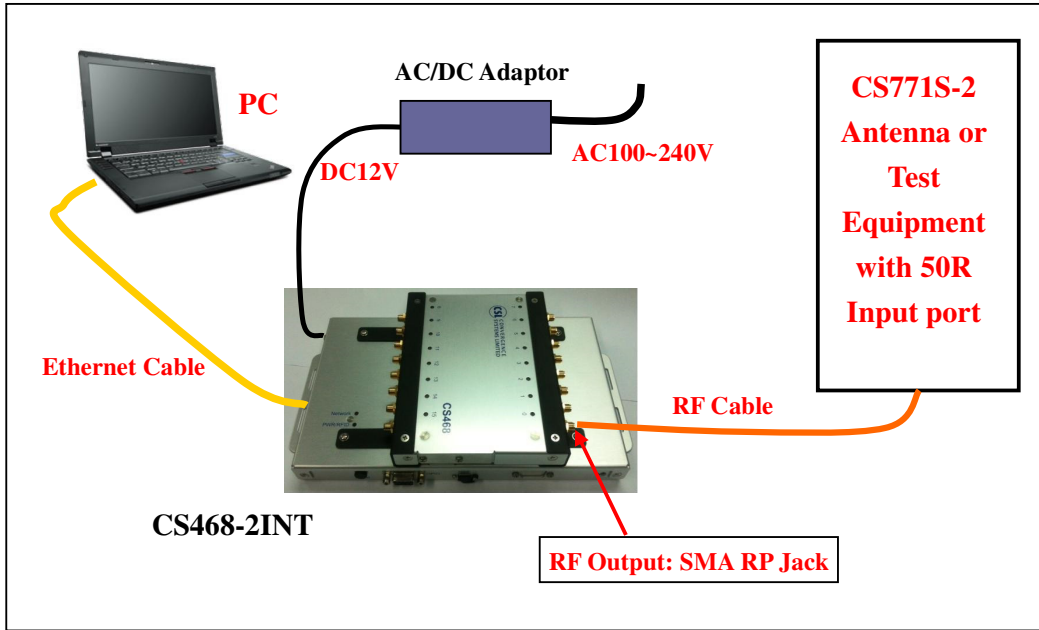
Figure 4-5   12V power adaptor mode Setup

The reader is directly connected to a host computer via the cable provided in the package.

5   Regulatory Information

5.1   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.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

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.
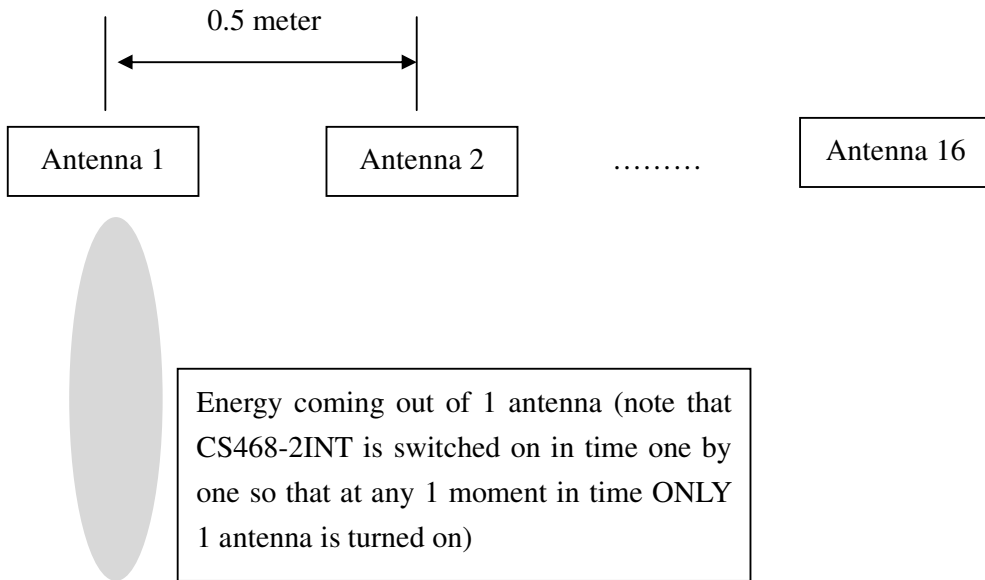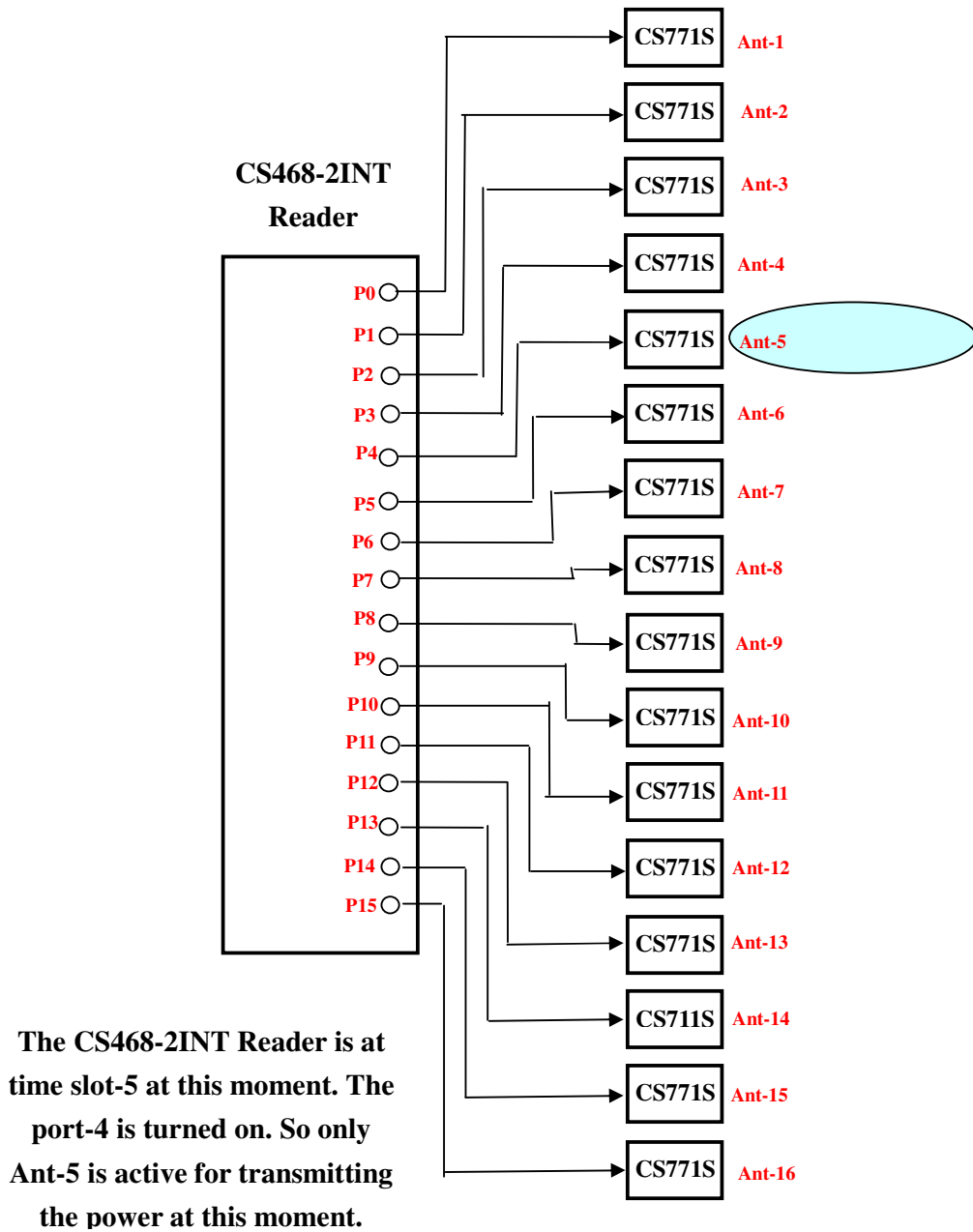
6   Antenna Setup

CS468-2INT is a 16 port reader where the ports are switched on in time one by one.   At any time only 1 port is switched on and the RF power comes out only at that port.   The rest of the ports are turned off so that no energy comes out from the other ports.

The control logic of the antenna is shown as below table

Time Slot	Antenna Port Status															
	P0	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**	**P13**	**P14**	**P15**
1	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
2	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
3	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
4	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
5	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
6	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off
7	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off	Off
8	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off	Off
9	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off	Off
10	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off	Off
11	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off	Off
12	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off	Off
13	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off	Off
14	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off	Off
15	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**	Off
16	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	**On**

The Antenna should be set up 0.5 meter apart is shown as below:

0.5 meter

| Antenna 1 | | Antenna 2 | ……… | Antenna 16 |

Energy coming out of 1 antenna (note that CS468-2INT is switched on in time one by one so that at any 1 moment in time ONLY 1 antenna is turned on)

**CS468-2INT
Reader**

Port	Antenna
	CS771S Ant-1
	CS771S Ant-2
	CS771S Ant-3
	CS771S Ant-4
P0	CS771S Ant-5
P1	
P2	CS771S Ant-6
P3	
P4	CS771S Ant-7
P5	
P6	CS771S Ant-8
P7	
P8	CS771S Ant-9
P9	CS771S Ant-10
P10	
P11	CS771S Ant-11
P12	
P13	CS771S Ant-12
P14	
P15	CS771S Ant-13
	CS711S Ant-14
	CS771S Ant-15
	CS771S Ant-16

The CS468-2INT Reader is at time slot-5 at this moment. The port-4 is turned on. So only Ant-5 is active for transmitting the power at this moment.

The distance between each antenna should be 50cm or more

Appendix A. RFID Basics

Passive tag RFID technology involves the reader, the antenna and the tag.

The reader sends out energy in the relevant frequency band to the antenna via RF cables, and the antenna radiates the energy out.   This energy impinges on an RFID tag.

The RFID tag consists of an antenna coupled to an RFID IC.   This IC converts the AC voltage it receives at the antenna port to DC voltage that in turn is used to empower the digital circuit inside.

The digital circuit then turns on and off some components connected to the antenna port, thereby changing its scattering behavior, in a pre-designed clock rate.

This changing of antenna port parameters then causes a "modulation" of the back-scattered RF energy.

This modulated back-scattered energy is detected by the reader and the modulation is captured and analyzed.

Appendix B. Operation Profiles

Region 2: FCC

Profile	0	1	2	3	4	5
R-T Modulation	DSB-ASK	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK	PR-ASK
Tari (µs)	25.00	12.50	25.00	25.00	6.25	25.00
R-T speed (kbps)	40	80	40	40	160	40
PIE	2:1	2:1	1.5:1	1.5:1	1.5:1	1.5:1
Pulse Width (uS)	12.50	6.25	12.50	12.50	3.13	12.50
T-R LF (kbps)	40	160	250	300	400	250
T-R Modulation	FM0	Miller-2	Miller-4	Miller-4	FM0	Miller-2
Divide Ratio	8	8	64/3	64/3	8	64/3
T-R Data Rate (kbps)	40	80	62.5	75	400	125

Appendix C. RF channels

Region 2: FCC

Channel number	Frequency (MHz)	Channel number	Frequency (MHz)	Channel number	Frequency (MHz)
1	902.75	18	911.25	35	919.75
2	903.25	19	911.75	36	920.25
3	903.75	20	912.25	37	920.75
4	904.25	21	912.75	38	921.25
5	904.75	22	913.25	39	921.75
6	905.25	23	913.75	40	922.25
7	905.75	24	914.25	41	922.75
8	906.25	25	914.75	42	923.25
9	906.75	26	915.25	43	923.75
10	907.25	27	915.75	44	924.25
11	907.75	28	916.25	45	924.75
12	908.25	29	916.75	46	925.25
13	908.75	30	917.25	47	925.75
14	909.25	31	917.75	48	926.25
15	909.75	32	918.25	49	926.75
16	910.25	33	918.75	50	927.25
17	910.75	34	919.25		