

# CS108-2 EPC Class 1 Gen 2 RFID Sled Handheld Reader User's Manual



Version 5.0

CSL: The One-Stop-Shop for RFID Solutions

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# 2 FCC and IC Statement

#### FCC NOTICE:

To comply with FCC Parts 15 rules in the United States, the system must be professionally installed to ensure compliance with the Parts 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 (such as co-located antennas transmitting the same information) is expressly forbidden.

IC Notice (Industry Canada):

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

# 3 Introduction

#### 3.1 CS108-2 RFID Sled Handheld RFID Reader

The CS108-2 Sled handheld RFID reader is a reader designed to work with an off-the-shelf smart phone (such as iPhone or Android phone) via Bluetooth connection, where the application on the smart phone would control the CS108-2 reader to perform RFID tag reading or barcode reading.

Below photo shows the smart phone separately handled by the user during operation:



Note: Smart phone and CS108 can only be paired via the App provided. They DO NOT pair via the normal Bluetooth Device connection page of the OS. Therefore, install the App first and pair the CS108 from inside the App.

Below photo shows the smart phone mounted (detachable) on top of the CS108-2 reader during operation:



CS108-2 can also be controlled via the USB connection by a PC. In this case, the Bluetooth connection is not used. The control commands enter via the USB cable. The application is on a PC.

Below photo show the CS108-2 handheld reader connected via USB cable to (and controlled by) a PC.



## 3.2 Product Package

#### 3.2.1 Basic Package Content

The reader package contains:

- Handheld reader
- USB cable
- Battery -1 piece, inside the reader

#### 3.3 **Product Specification**



Figure 3-1 CS108-2 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 more than 18 meters for Monza R6 Dogbone tag
- 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 wireless LAN traffic and server loading
- 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

Physical Characteristics:	Length: 16.1 cm; Width: 9.0 cm; Height: 16.1 cm; Weight: 595 grams	
Environment:	Operating Temp: -20 <sup>°</sup> C to 50 <sup>°</sup> C Storage Temp: -40 <sup>°</sup> C to 85 <sup>°</sup> C Humidity: 5% to 95% non-condensing Enclosure: IP-54	
Antenna:	2.7 dBi Gain internal patch antenna	
RF Power:	Internal conducted power 30 dBm	
EIRP Power:	32.7 dBm	
<b>RFID Frequency Ranges:</b>	902-928 MHz band	
Interfaces	Bluetooth 4.0 USB	
Accessories:	USB cable	
Order Code:	CS108-2	
Restrictions on Use:	Approvals, features and parameters may vary depending on country legislation and may change without notice	

#### Specifications:

## 4 Introduction

#### 4.1 Basic Hardware

The CSL CS108-2 handheld RFID Reader is an EPCglobal Class 1 Gen 2 handheld reader product.

Below is the front view of the CS108-2 reader. The barcode lies in a compartment at the top. The RFID reader is in the front box, with the embedded patch antenna inside the cover facing forward.

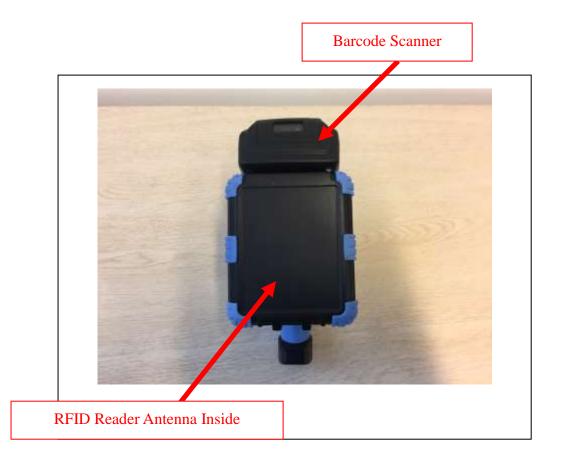


Figure 4-1 CS108-2 Reader Front View

Below is the left side view of the CS108-2 reader. There are 5 LEDs on this side, from left to right, representing respectively:

- 1) RFID Power On
- 2) Status
- 3) Barcode Power On
- 4) Charging
- 5) External Power connected



Figure 4-2 CS108-2 Reader Left Side View

Below is the right side of the CS108-2 reader. There are 2 buttons/LEDs here.

The left button/LED is for Bluetooth pairing, and the LED lighting up meaning Bluetooth is connected.

The right button/LED is for main power, with LED lighting up meaning power is on. Press the button continuously for 3 seconds, then release to power on. When the reader is on, press the button continuously for 3 seconds, then release to power off.



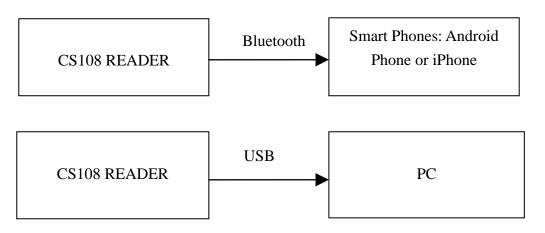
Figure 4-3 CS108-2 Reader Right SideView

Below is the rear view of the CS108-2 reader. Here the USB Type C socket is on the left, allowing the user to connect CS108-2 to a PC for control, or to a USB power source to recharge the battery inside the CS108-2. A reset button is on the right, this is for resetting the CS108-2.



Figure 4-4 CS108-2 Reader Rear SideView

Based on this, one can see the CS108-2 can be connected to either a smart phone via Bluetooth for control and data collection, or to a PC via USB cable for control and data collection.



#### 4.2 Power Up Sequence

The reader can be turned on to run RFID and Barcode operation in a most simple manner:

- 1. Insert battery into the body of the handheld reader with the top plastic cover removed. Also, make sure it is in the correct direction in terms of front and back. The battery connectors should be at the back of the reader. Put the cover back once battery is inserted.
- 2. Press the power button on the right side of the reader continuously for 3 seconds then release.
- 3. After you release the finger, then the Blue LED should lit up.
- 4. The reader is now turned on.

#### 4.3 Bluetooth Turn On for Discovery Sequence

- Press the Bluetooth button on the right side of the reader continuously until the blue LED starts flashing. Do not release your finger, you need to press UNTIL the Blue LED lit up. Because of that, press the button in a way such that the LED is not obstructed by your pressing finger.
- The reader is now discoverable by smart phone App. Note that only the CSL App can connect to the CS108. <u>The generic Bluetooth Device Search of the OS cannot connect to</u> <u>CS108.</u>

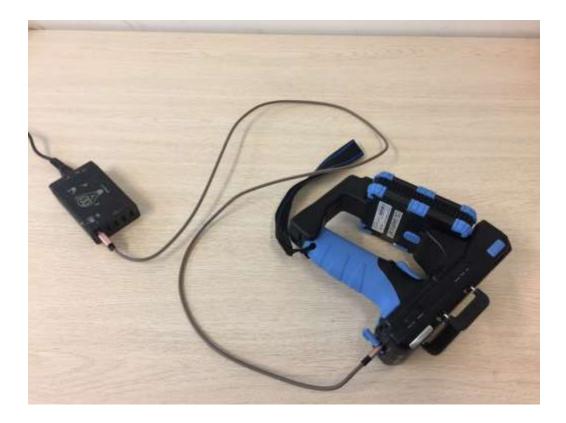
#### 4.4 Charging the CS108

The CS108 can be charged by inserting a USB cable with the following plugs:

- 1) USB Type C plug on one side
- 2) USB Type A plug on the other side
- 3) The above Type A plug connecting to a USB charger with the traditional Type A socket

#### 2 LEDs will light up:

- 1) "Ext. Power" LED: Blue LED. Whenever the USB is connected with power supply, this blue LED will light up.
- 2) "Charging" LED: Red LED. When battery is heavily drained, this red LED will be bright. When battery is completely recharged, this red LED will be very dim. So if you connect the USB cable and this LED is very dim, do not be alarmed. It just means the battery is pretty full already.



#### 4.5 Software on Smart Phones

The reader comes with standard demo application for iPhone and Android Phone, install the application from App Store or Google Play correspondingly, then double click the icon "CS108 Demo App" to start.

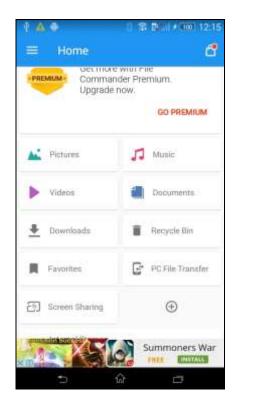
#### 4.5.1 Software on Android Phone

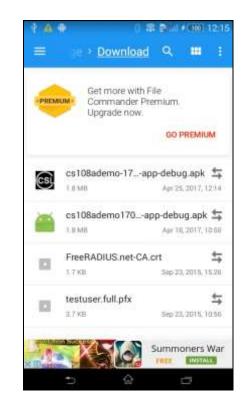
## 4.5.1.1 Installing the Android Software

Download the APK from Convergence website. Save that to the Download folder.

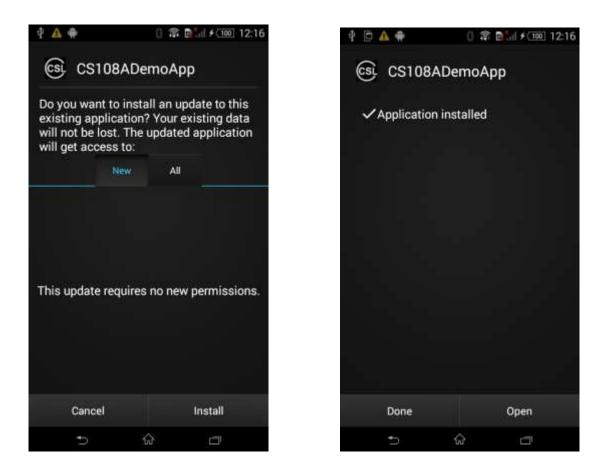
You can directly download that to your Android phone as long as your Android phone is connected to the Internet.

See below:

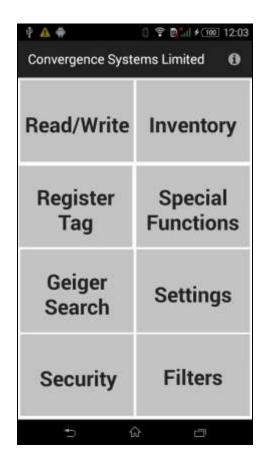




Select and press the APK and start the installation process:



Once installed, start the App and you should see the following:



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## 4.5.1.2 Starting the Android Software

The CS108 Android App icon is as follows.

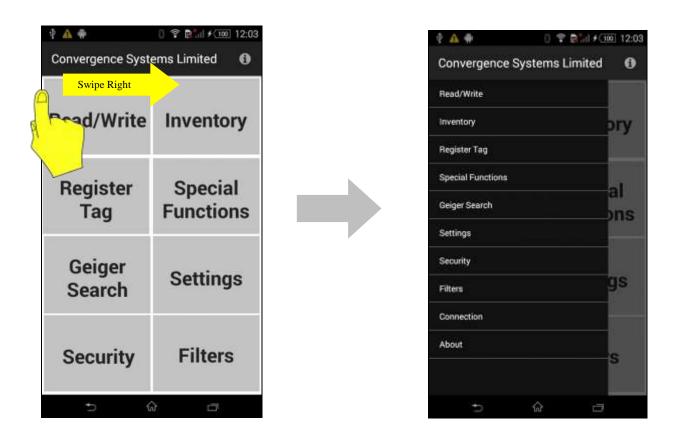


Open the Android App and you should see the following screen:

∲ ▲ ♦	() 🗣 🕵 il ≠ 💷 12:03			
Convergence Systems Limited 🚯				
Read/Write	Inventory			
Register Tag	Special Functions			
Geiger Search	Settings			
Security	Filters			
5 6				

# 4.5.1.3 Searching and Connecting to (Pairing with) CS108

To start searching and connecting to (pairing with) a CS108 nearby, use the finger to SWIPE the screen from the LEFT edge to invoke the menu:



Please make sure the CS108 Bluetooth button has been pressed until the Blue LED is flashing, meaning the CS108 is ready for discovery by Smart Phones nearby.

After that, select the line "Connection" to start the search and connect to CS108 process:

Note the Search icon to the upper right of the page, press that icon:



Then you should see all the available CS108 nearby:



Select the one you want to connect to and press it first to select it and then press it again to start the connection process (IN OTHER WORDS, YOU NEED TO PRESS 2 TIMES):

Available Readers           1         CS108Reader_Wallace 20:C3:8F:E6:2E:F3         -72:0           1         CS108 Reader 7 FCC C8:FD:19:9D:4D:46          -55:0           20:C3:8F:E6:22:03720:46:43430512:10002000000000000000000000000000000	C	ö	ŧ.	2	0
1         CS108Reader_Wallace 20:C3:8F:E6:2E:F3         -72:0           1         CS108 Reader 7 FCC C8:FD:19:9D:4D:46         ✓         -55:0           20:C3:8F:E6:2E:000000000000000000000000000000000	~~	- 55	X:		~
20:C3:8F:E6:2E:F3         □           1         CS108 Reader 7 FCC C8:FD:19:9D:4D:46         ☑         -55.0           scanRecord:=020105030200081309435331303820         ☑         -55.0           526561646572203720464343051210002000000000000000000000000000000	Avail	able Readers			
C8:FD:19:9D:4D:46	A.				-72.0
526561546572203720464343051210002000020Al 000000000000000000000000000	1				-55.0
20:C3:8FE6:2EEB	5268 0000	6164657220 00000000000	372046434	305121000	2000020A0
	1				-89.0
			D5:45		-91.0

After that you should see "Connected" below the reader title:



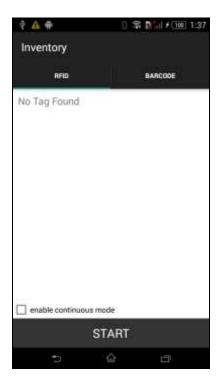
Note: If you have multiple CS108, you should set them to different names to distinguish one from another.

## 4.5.1.4 RFID Inventory

To do an inventory of RFID tags, select the "Inventory" button:

A     Convergence System	0 😤 🕬 ≠ 🚥 12:03 ems Limited 🚯
Read/Write	Inventory
Register Tag	Special Functions
Geiger Search	Settings
Security	Filters
÷ 6	

Click the "enable continuous mode" box for continuous inventory:



Wait for the CS108 to start inventory and then you should see the RFID tags ID as shown below. The first column is the number of reads of that tag ID, second column is the RFID tag EPC ID, last column is the RSSI of the tag return. On the lower right, you can also see the battery voltage at that point. When fully charged, it is around 4.2 Volts. The unit should run to about 3.3 Volts before it stops.



At any point, if you want to stop, just press the middle center location (here showing 6366) which is the location of the original start button, and the reader will stop inventory of RFID tags and the screen will become like the following, where the Start button appears again:

Ŷ	<b>▲</b>	0 🕈	<b>₽</b> 1:42
Inv	ventory		
	RFID		BARCODE
10	19DEC160	00000000000000000	43.2
9	70999950	000000000000000000000000000000000000000	43.2
8	30083382	DDD9014000000998	<b>3</b> 44.1
10	70999950	0000000000000000000	43.2
2	70999950	000000000000000000000000000000000000000	39,6
10	70999950	000000000000000000000000000000000000000	44.1
12	23051400	000000000000000000000000000000000000000	43.2
-34	E2008055	590800840620DA13	42.1
4	19 Abort	operation as STOP is	pressed 45.7
<b></b>	100 B (100 B (10) B (100 B (10) B (100 B (10) B (100 B (10	nuous mode	4.207 V
	19	Start	103,20
	1	ŵ	co.

### 4.5.1.5 Barcode Inventory

To do a barcode inventory, go to Inventory button:

A      Convergence System	0 😤 №11 + 100 12:03 ems Limited 🚯
Read/Write	Inventory
Register Tag	Special Functions
Geiger Search	Settings
Security	Filters
÷ 6	

Then press the BARCODE button:

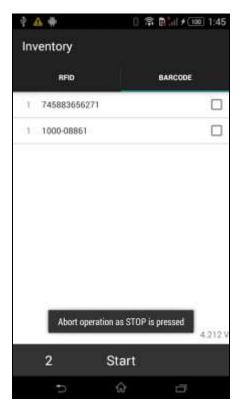


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Press the START button. At this point, the red LED of the barcode reader should lit up to help you aim your CS108 barcode reader onto the barcode. A focused circular dot should appear. That is where the distance of the barcode should be with respect to the reader.



Once the barcode is read, you can now Stop.



#### 4.5.1.6 **RFID Read and Write memory banks**

You can also read and write specific memory banks of an RFID tag. Press the Read/Write button:

P 🔺 🏶	0 🗣 🛤 🗲 💷 12:03		
Convergence Systems Limited 0			
Read/Write	Inventory		
Register Tag	Special Functions		
Geiger Search	Settings		
Security	Filters		
5 6			

You will now see this. You see the Bank 0, 1, 2, 3 of the EPC tag. Select at least one bank to read or write. Note that Bank 2, TID bank, cannot be written, as defined by EPC.

4 🗛 🕈	0 🕸 1	1:52
Read / Write		
Tag Pattern		
Reserve Memory	Size	4
Kill password	Access passwor	
XMem		
EPC Memory	Size	2
CRC	PC	
EPC		
XPC		
TID Memory	Size	4
User Memory	Size	4
READ	٧	WRITE
Ð	ŵ	<b>3</b>

On the Tag Pattern input box, if you do not input anything, the reader will simply read whatever tag that it sees. You can input a string of hex number to select the pattern. You can either input the whole EPC ID, or part of it to denote a pattern, with the remaining being wild card.

P 🔺 🕈	0 命 🖻	al ≠ 199 1:49
Read / Write		
19DEC160000000	0000000003	Ì
Reserve Memory	Size	4
Kill password	Access password	
XMem		
EPC Memory	Size	10
CRC	PC	
EPC		
XPC		
TID Memory	Size	4
User Memory	Size	4
READ	w	RITE
5	ŵ	٥

Another way to do a Read/Write is to first go to Inventory page to inventory the tag. Then select one by ticking the box on the third column.

\$	A 🕈 0 🕈	P 🖻 💷 🗲 💷 1:55			
Inv	Inventory				
	RFID	BARCODE			
	19DEC16000000000000000000000000000000000000	13 🏹 43.2			
9	709999500000000000000000000000000000000	0 43.2			
8	300833B2DDD90140000009	98 🗌 44.1			
10	7099995000000000000000000	E 🗌 43.2			
2	709999500000000000000000000000000000000	1 🔲 39.6			
10	709999500000000000000000000000000000000	2 44.1			
12	23051400000000000000000000000000000000000	43.2			
4	E2006055590800840620DA1	13 42.1			
e	nable continuous mode	M 🗖 45.7			
	START				
	5 Q	co.			

After that, return to Main Menu and then go to Read/Write page. Then you will see that particular selected ID already in the Tag Pattern box:

III Access assword password Mem J EPC Memory Size 10	Data service belowing the	0	
assword password Mem EPC Memory Size 10 RC 2590 PC 340 PC 19DEC1600000000000000000 PC 00000000	Heserve Memory	Size	4
EPC Memory Size 10 RC 2590 PC 340 PC 19DEC1600000000000000000 PC 00000000			
RC 2590 PC 340 PC 19DEC16000000000000000000 PC 00000000	Mem		
PC 19DEC16000000000000000000000000000000000000	EPC Memory	Size	10
PC 0000000	RC 2590	PC	3400
	PC 19DEC1600000	00000000000	3
] TID Memory Size 4	PC 0000000		
	TID Memory	Size	4
Abort operation as COMMAND END is received		OMMAND EN	D is

At this point you can read or write any specific banks.

## 4.5.1.7 Geiger Search

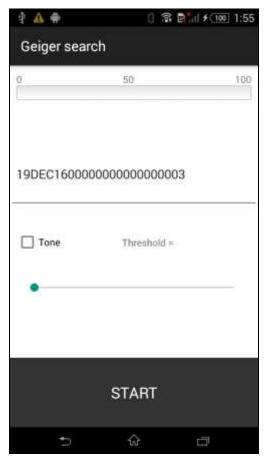
One can do a tag search by going to the Geiger Search page:

Image: Provide state     Image: Provide state </th			
Read/Write	Inventory		
Register Tag	Special Functions		
Geiger Search	Settings		
Security	Filters		
5			

Input the tag ID on the line:

🕆 🗛 Geiger sea		al ≠ <u>100</u> 1:54
0	50	100
Tone	Threshold =	
	START	
Ð	în	Ċ,

Press Start. It will then keep reading that tag and show the RSSI, as well as beeping a tone by selecting the Tone box and also setting the Threshold to emit sound.



One can now use this method to home in onto a tag (in other words, to the asset tagged with that particular tag)

Another way to zero in on a tag that is in an area is to first do an inventory of the whole area, without knowing the exact location of the tag. Then select the tag with the ID that you want to home in onto by ticking the box on the third column:

4	A 🔿	0 1	P P. d	1:55	
Inv	Inventory				
	RFID		BARCO	OE	
	19DEC1600000 400, CRC16=259		03	43.2	
9	7099995000000	000000000000000	0	43.2	
8	30083382DDD9	0140000009	98	44,1	
10	7099995000000	000000000000000000000000000000000000000	)E	43.2	
2	709999500000	0000000000	1	39.6	
10	709999500000	000000000000000000000000000000000000000	)2	44.1	
12	2305140000000	000000000000000000000000000000000000000	)1	43.2	
4	E200805559080	0840520DA	13	42.1	
e	nable continuous		14	H 45.7	
		START			
	*5	ŵ	Ċ	ŋ	

After that, return to Main Menu and then enter the Geiger Search page, now that ID will already be in the Input space, and you can start the Geiger Search:

4 🗛 🏶	0 \$	) 🗊 🖬 🕯 (199) 1:56			
Geiger search					
0	50	100			
	43.2				
19DEC160000	000000000000000000000000000000000000000	03			
Tone Tone	Threshold =	41			
19DEC160000000000000000					
146	7949	152,19			
Ð	ŵ	đ			

To Stop, just press the location of the Start button, here covered by "7949", and the search will stop.

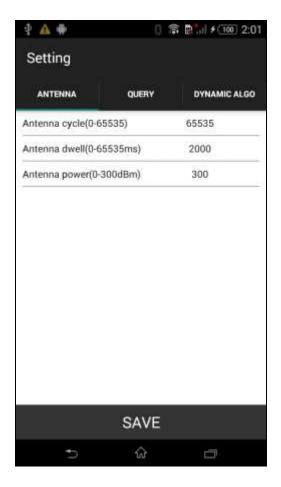


## 4.5.1.8 Setup

One can set up the reader's parameters in the Settings page:



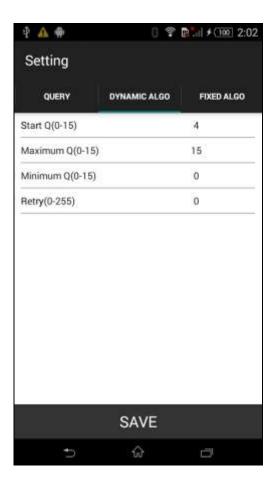
In the Antenna menu, one can define the Antenna Cycle (65535 means continuous read), Antenna Dwell Time (2000 means 2 seconds). Antenna Power (300 means 30 dBm).



In the Query menu, one can define the Query Target, Query Session, Query Select, Q Algorithm, and Link Profile (See Appendix B). For definitions of the above, please read the EPC Air Interface Protocol document.

Setting	0 5	ŝ <b>₿ ¦</b>   <i>†</i> 100 2:01
ANTENNA	QUERY	DYNAMIC ALGO
Query target	Target A/B al	ternative
Query session(0-3)	Inver	ntoried S2
Query select(0-3)	SL	
Algorithm dynamic (	not fixed)	
Profile(0-3)		1
	SAVE	
	SAVE	
Ð	ŵ	

The Dynamic Algo menu contains the setting for Dynamic Q algorithm.



The Fixed Algo menu contains the parameters for Fixed Q algorithm:

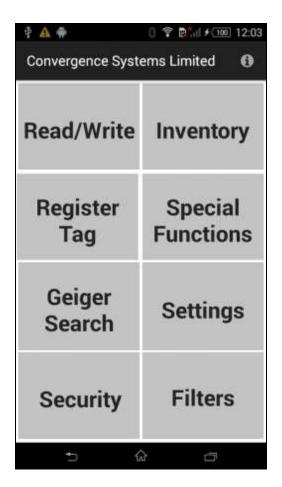


Whatever changes one has made, one must press the SAVE button.

ANTENNA	QUERY	DYNAMIC ALGO
Antenna cycle(0-65535)		1
Antenna dwell(0-65535r	ms)	2000
Antenna power(0-300dE	3m)	300

## 4.5.1.9 Filter: Pre Filter

One can add a pre-filter, i.e., a Select Filter, to only have a certain group of tags respond to the reader's query. To implement this, go to the Filters page:



P 🛆 🏶	0 🕸 📴 d 🗲 💷 2:19
Filters	
PRE-FILTER	POST-FILTER
Mask data	
Offset (bits)	0
Memory Bank	EPC *
Action	Match(inventory A), else(set inventory * B)
Target	Inventoried S0 *
Enable Filter	
Index	0
SA	/E
⊃ û	ø

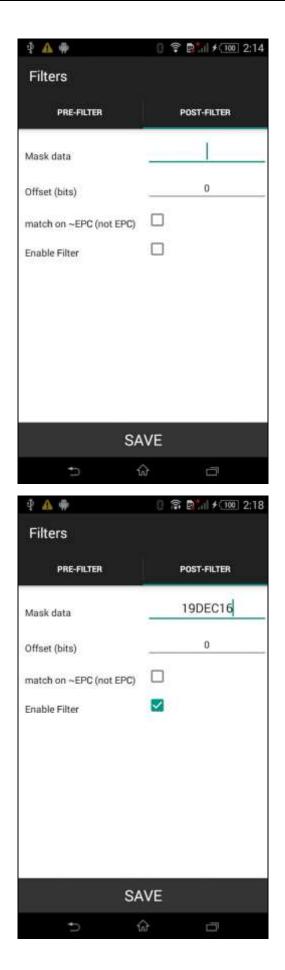
P 🔺 🖶	() 😤 📴 d 🕫 2	2:10
Filters		
PRE-FILTER	POST-FILTER	
Mask data	19DEC16000000 00000003	000
Offset (bits)	32	_
Memory Bank	EPC	÷
Action	Match(assert SL), else(deassert SL)	•
Target	SL	٠
Enable Filter		
Index	0	
	SAVE	
Ð	ŵ 🛛	

Filters	
PRE-FILTER	POST-FILTER
Mask data	19DEC160000000 00000003
Offset (bits)	32
Memory Bank	EPC
Action	Match(assert SL), else(deassert SL)
Target	SL
Enable Filter	
Index	0
*⊃ ≹ <b>▲</b> #	ি
₹ <b>A</b> ♥	
Filters Pre-filter	() ଛ ∎tal ≯(100 2:1
Tilters PRE-FILTER Mask data	0 இ இி⊪ி ≯ 100 2: Post-Filter 19DEC1600000000
	0 இ இியி ⊀ 100 2: Post-Filter 19DEC160000000 0000003
A     A     Filters     PRE-FILTER Mask data Offset (bits) Memory Bank	0 இ இ%  ≠ 100 2: POST-FILTER 19DEC160000000 0000003 32
A      Filters     PRE-FILTER Mask data Offset (bits) Memory Bank Action	0 இ இ%il ≯ 100 2: POST-FILTER 19DEC1 600000000 00000003 32 EPC Match(assert SL),
Filters PRE-FILTER Mask data Offset (bits) Memory Bank Action Target	0 இ இ∿il ≯ 100 2: POST-FILTER 19DEC1 60000000 00000003 32 EPC Match(assert SL), else(deassert SL)
≹ 🔺 ಈ Filters	0 இ இ l ⊀ 100 2: POST-FILTER 19DEC160000000 00000003 32 EPC Match(assert SL), else(deassert SL)

## 4.5.1.10 Filter: Post Filter

One can filter the inventoried tags further using the Post Filter:







## 4.5.1.11 Security

One can add security action, such as Locking or Killing, to the EPC tags. Go to Security page:

A     Convergence System	0 😤 № / 👓 12:03 ems Limited 🚯
Read/Write	Inventory
Register Tag	Special Functions
Geiger Search	Settings
Security	Filters
t) 6	3 6

Ý 🔺 🕈 🛛 🔅 🕅 🕴 🔟 2		0 2:21
Security		
LOCK	KILL	
Tag Pattern		
Password	-	
Kill password	Unchanged	
Access password	Unchanged	.*
EPC Memory	Unchanged	
TID Memory	Unchanged	*
User Memory	Unchanged	
	_оск	
Ð	☆ 🗆	

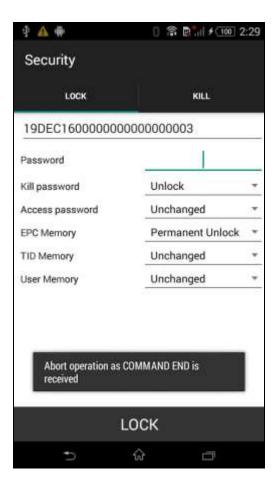
You can either lock or kill a tag. Here is locking a tag:

Here is killing a tag. Note it asks you for the Kill password immediately:



19DEC1600000000 Password Kill password Access password EPC Memory TID Memory User Memory	000000003 Unlock Unchanged Unchanged Unlock		
Kill password Access password EPC Memory TID Memory	Unchanged Unchanged		
Access password EPC Memory TID Memory	Unchanged Unchanged		
EPC Memory TID Memory	Unchanged		
TID Memory	13. 19. 19.		
	Unlock		
	Permanent Unlock		
	Lock		
	Permanent Lock		
Ĺ	оск		
÷	ŵ 🗗		
₽ 🔺 🖷	() 🎓 💽 i + 💷 2:2		
1 48 W			
Security			
Security			
Security LOCK	Kill		
LOCK			
LOCK 19DEC1600000000 Password			
LOCK 19DEC1600000000 Password Kill password	000000003		
LOCK	000000003		
LOCK 19DEC1600000000 Password Kill password Access password	0000000003 Unlock Unchanged		

After a successful operation, here is the screen pop up. Command End means successful implementation of the lock command.



## 4.5.1.12 Register Tags

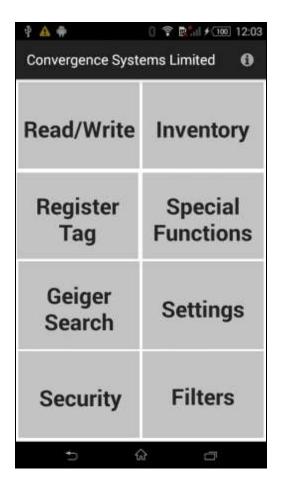
TBD

## 4.5.1.13 Special Functions

TBD

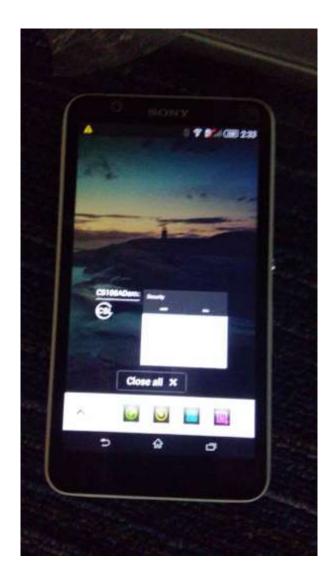
## 4.5.1.14 Exiting the Software

By pressing the Home button, middle icon of the menu at the bottom, one can exit the software. <u>Note that the software is not really completely stopped</u>, as is well known by smart phone users. The software is really only sleeping.



## 4.5.1.15 Truly Exiting the Software

To truly exit the software, press the lower right hand side button (folder view), and then you will see the following screen:



At this point, you can truly exit the software by pressing your finger on the software and drag it out of the smart phone.

## 4.5.1.16 Source Codes

Source codes of this application are available on Convergence Systems Limited website:

www.convergence.com.hk

## 4.5.2 Software on iPhone

## 4.5.2.1 Installing the iPhone Software

#### Formal CS108 App:

The formal CS108 iPhone App can be downloaded from App Store. However, at this point, since the software is still in beta stage, it is not available on App Store yet.

#### Beta Stage CS108 App:

In Beta stage the App is downloaded using TestFlight. TestFlight is a free software from Apple for distribution of Beta software. After installing it, then you can download beta software. The process is as follows:

- 1) Download and install TestFlight from App Store. TestFlight is free of charge software from Apple Inc.
- 2) Send user's Apple ID to Convergence support team. Apple ID is an email address. Make sure that email address is real and you can receive that email.
- 3) Convergence support team will submit the Apple ID to Apple and the new software, and a special email will be sent to the email address of the Apple ID to invite you to join iTunes Connect. The following is an example email. Click the "<u>activate your account</u>" in your email to participate in iTunes Connect.

### 🕷 iTunes Connect

Hi Albert,

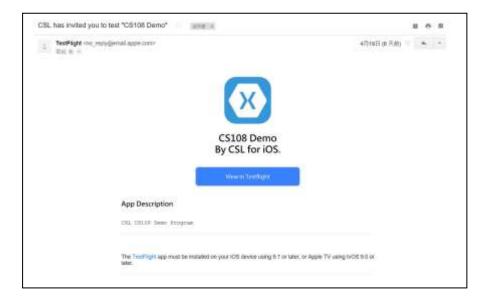
CONVERGENCE SYSTEMS LIMITED invited you to join iTunes Connect. To get started, <u>activate</u> <u>your account</u>. Sign in with your Apple ID, or if you don't have one, click the link to create an Apple ID.

If you have any questions, contact us.

Regards, The iTunes Store team

4) After that, you will receive another email inviting you to participate in the test. Open that email, and click the link inside to acknowledge to Apple. Note that your opened email

needs to be in the iPhone in order to immediately "view in TestFlight".



- 5) After that the new beta software will appear inside TestFlight. Open TestFlight to find out this application is there.
- 6) You can then download and then open that App.
- 7) After that you can start using the CS108 iPhone App.

## 4.5.2.2 Starting the iPhone Software

With the CS108 App for iPhone installed, you will see an icon in your iPhone:



Now press that icon to start the CS108 iPhone App.

# 4.5.2.3 Searching and Connecting to (Pairing with) CS108

The first thing you will see when you start the CS108 iPhone App is the search and connect screen. The search and connect screen starts immediately when you start the App. It will search for CS108 nearby and list them out. Please make sure the CS108 Bluetooth button has been pressed until the Blue LED is flashing, meaning the CS108 is ready for discovery by Smart Phones nearby.



You can refresh the search process by using a finger to swipe the whole menu DOWNWARD and then release. (This is a typical method in iPhone environment)

Once you select a particular reader, then a pop up window will ask you if you want to connect to that reader. Type "Ok" to connect.



After that, you will enter the main screen of the application:

••000 csl. 😤	3:11 PM	\$ 68% 🔳 )
List of CS108 Dete	ected Connected	1
Read/Write	Inve	entory
Register Tag	Speic	al Func
Geiger Search	Set	tings
Security	RFID	) Filter

## 4.5.2.4 RFID Inventory

Press the Inventory button to go to the Inventory page. You can either read RFID tag or barcode, selected at the bottom of the App.

iPod 😤	9:43 AM	* ===+
< Connec	ted	
-		
	Start Inventory	1
0 tags	Clear	0 tags/s
RFID Inv		ode Scien

24180548703	4 52.8 76.8
24180548703	76.8
24180548703	
24100340703	54.4
05095213750	56
05095227234	4 53.6
66081234580	64.8
0000000000	5 57.6
00000001688	59.2
EEEEEEEEEEEEEEE0000	
art Invent	ory
Clear	15 tags/s
	Barcode Scan
	605095227234 66081234580 00000000000 00000001688 EEEEEE0000 art Invent

## 4.5.2.5 Barcode Inventory

iPod 🗢	9:43 AM	* 💼 +
< Connected		
13		
Ç		
S <del></del>		
24		
>		
S	tart Scan	
	Clear	
RFID Inventory	Ba	rcode Scan

iPod 🗢	9:49 AM	* 💼
Connected		
690123634215	2	3
3		
3		
·		
13		
9	Start Scan	
	Clear	
RFID Inventory	Ba	rcode Scan

## 4.5.2.6 RFID Read and Write memory banks

TBD

## 4.5.2.7 Geiger Search

One can search and home in onto a tag using the Geiger Search page.

First you go to Inventory page and inventory the tag, then select that tag. A pop up window asks if you want to select that tag for subsequent Read/Write operation or Geiger Search operation. Press OK here.

Geiger search 530 Cancel OK 04100800000000000000001688 EEEEEEEEEEEEEEEEEEEEEO000 Start Inventory	* -+			
80000002 000000020090424180548703 000 Selected Tag for Read/Write an Geiger search 530 Cancel OK 041008000000000000001688 EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE				
000000020090424180548703 000 Selected Tag for Read/Write an Geiger search 530 Cancel OK 041008000000000000001688 EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE	52.8			
000 Selected Tag for Read/Write an Geiger search 530 Cancel OK 041008000000000000001688 EEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE	76.8			
Select Tag         000       Selected Tag for Read/Write an Geiger search         530       Cancel         041008000000000000000000000000000000000	54.4			
000       Selected Tag for Read/Write an Geiger search         530       Cancel         600       OK         041008000000000000000000000000000000000				
Cancel OK O410080000000000000000000000000000000000	Selected Tag for Read/Write and			
E00 041008000000000000000000 EEEEEEEEEEEEEEEEE	- 1			
EEEEEEEEEEEEEEEEEEEEO000 Start Inventory				
Start Inventory	59.2			
	54.4			
2 million - 1 mill				
15 tags Clear	15 tags/s			
RFID Inventory Barcode	Sean			

Now return to Main Menu and then enter the Geiger Search menu. The tag ID would already be there. Press Start to begin Geiger Search.

iPod 🗢	9:45 AM	* 💼 +
< Connected	Geiger	
Selected EPC		
8000000000	00000000012	234
	RSSI	
	Start	
	oturt	

## 4.5.2.8 Setup

One can go to Setup page to edit the operation parameters.

In Antenna page, Inventory Delay Time is a smart phone specific Bluetooth operation parameters. DO NOT CHANGE THIS VALUE OF 15.

Dwell Time is the time of antenna port operation. 2000 means 2 seconds.

Power is 300, meaning 30 dBm.

iPod 穼	9:4	4 AM	* 📖
< Connec	ted		
Inventory	Delay Tin	пе	
15			
D Well Tin	ne		
2000			
Power			
300			
	S	AVE	
e:			
Antenna	Query	Dynamic Aloo	Fixed Algo

Query page contains all the query setting. Refer to EPC Air Interface protocol document for details.

iPod ᅙ	9:44 AM	* 🛑 +
< Connect	ed	
Operation	Mode	
CONTINU	OUS	
Selected		
ALL		
Session		
SO		
Target		
Α		
Algorithm		
DYNAMIC	(	
Profile (0-3	3)	
2		
	SAVE	
Antenna	Query Dynamic Alg	o Fixed Algo

Dynamic Algo contains the parameters for Dynamic Q algorithm:

iPod 🗢	9	44 AM	* 💼 +
Connect	ed		
Start Q			
7			
Min Q			
0			
Max Q			
15			
Max Query	Rep		
0			
Retry			
0			
Toggle			
Toggle			
	S	SAVE	
Antenna	Query	Dynamic Algo	Fixed Algo

Fixed Algo contains the parameters for Fixed Q algorithm:

iPod ᅙ	9:	44 AM	*
< Connec	ted		
Q Value			
7			
Retry			
0			
Toggle			
Toggle			
Repeat			
Not Repe	eat		
	S	Save	
Antenna	Query	Dynamic Algo	Fixed Algo

## 4.5.2.9 Filter: Pre Filter

Pre-filter page contains the settings for Select Filter:

iPod 🗢	9:45 AM	* 💼 +
< Connected		
Mask data		
Offset (bits)		
0		
Action		
Index		
Enable Filter		
$\bigcirc$		
	SAVE	
PreFilter	p	sstFilter

### 4.5.2.10 Filter: Post Filter

Post Filter contains parameters for filtering AFTER the tags are inventoried by the reader:

iPod 🗢	9:45 AM	* 💼 +
< Connecte	d	
Mask data		
Offset (bits)	0	
0		
Match on n	ot EPC (except EP	PC)
$\bigcirc$		
Enable Filte	r	
$\bigcirc$		
	SAVE	
e -	SAVE	
PreFilte	Po	stFilter

# 4.5.2.11 Security

TBD

# 4.5.2.12 Register Tags

TBD

# 4.5.2.13 Special Functions

TBD

#### 4.5.2.14 Exiting the Software

One can exit the software by simply pressing the Home button. However, as smart phone users know, this is only sending the App to sleep.

### 4.5.2.15 Truly Exiting the Software

To truly exit the software, one needs to double click the Home button, and then the CS108 demo App will show as one of the pages piled. Select that page and then use finger to drag it out of the phone to truly exit the software.

### 4.5.2.16 Source Codes

Source codes of this application are available on Convergence Systems Limited website:

www.convergence.com.hk

#### 4.6 Software on PC

The CS108-2 can also be controlled via the USB cable. In this case the mobile phone is not required and Bluetooth is not turned on.

Below is the screen capture of an application on PC controlling CS108-2. Everything is self-explanatory in the application:

FID								
Index	PC	EPC					Count	1
0	3000	3005FB63ABEEAFC1EC88851A					345	
1	3000	E28068100000039	01BFF799			44.8	16	
2	3000	E28068100000039	028E1D84			45.6	97	
3	3000	300833B2DDD9014	00000ABCD			43.2	53	
4	3E00	00800080B0443C00	000001208DD3A6B21			40	22	
5	3000	E28068100000039	012CCDEF			38.4	24	
6	3000	1A1A1A1A1A1A1A1	A1A1A1A1A			40.8	38	
7	3000	E28068100000039	012C94B3			38.4	21	
8	3000	E28068100000039	012CCDFF			43.2	30	
9	3000	AAAB000000000000	00000006			37.6 36.8	13 31	
10	3000	E28068100000039	E28068100000039028E62E7					
11	3000	300833B2DDD906C00000000				45.6	16	
12	3000	АААААААААААААААААААА			38.4	3		
13	3000	E280116060000205303BCABC			42.4	22		
¢								>
Pow	ver On	Power Off	Start Inventory	Stop Inventory	Clear			
ettings								
ower:	300 0	- 320						
hannel:	0 0	= hopping; 1-50 = fixed	l channel					
rofile:	1 0	-3	Set	t	Get Version			
D:								
tenna Cj	vole End Pac vole End Pac vole End Pac	:ket.				^		

#### Figure 4-5 PC Application Screen – controlling CS108-2 via USB

Source codes of the PC App for CS108 is also available for download from Convergence website: <u>www.convergence.com.hk</u>

# **Appendix A. Federal Communications Commission Compliance**

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 when the equipment is operated in a commercial environment. 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
- Consult the dealer or an qualified radio/TV technician for assistance •

#### 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 (such as co-located antennas transmitting the same information) is expressly forbidden.

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

#### Note:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

# Appendix B. Link Profiles of CS108 RFID Reading

Link Profile	0	1	2	3
R-T Modulation	DSB-ASK	PR-ASK	PR-ASK	DSB-ASK
Tari (µs)	25.00	25.00	25.00	6.25
Х	1.00	0.50	0.50	0.50
PW (Pulse Width in usec)	12.50	12.50	12.50	3.13
RTcal (usec)	75.00	62.50	62.50	15.63
TRcal (usec)	200.00	85.33	71.11	20.00
DR (Divide Ratio)	8	64/3	64/3	8
T-R Modulation	FM0	Miller-4	Miller-4	FM0
TRExt	1	1	1	1
LF (kbps)	40	250	300	400
Data Rate (kbps)	40	62.5	75	400