

SR128 User Manual

Document History

Date	Version	Author	Change
11 Sep 2022	A	Huy Le	Initial release

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1. Introduction

The Contactless Product consists of PCD module, also known as SIRIUS contactless reader SR128, integrated with a 7" LCD display. The PCD module uses the latest NXP front end NFC IC PN5190 for improved RF performance to meet latest EMVCo L1 and L2 VISA/MasterCard specifications. Its antenna is integrated around the PID making the display as the touch point for validating the Fare Media.

This document aims to describe how to operate the Contactless Product and the connectivity of the reader to the host.

1.1. Abbreviations

Abbreviation	Description
ECU	Electronic Control Unit
LCD	Liquid Crystal Display
LED	Light Emitting Diode
PCD	Proximity Coupling Device
PID	Passenger Information Display
PWM	Pulse-width modulation
RF	Radio Frequency

2. Contactless Product Construction

This section describes the construction of the Contactless Product.

2.1. Overview

The Contactless Product comprises of the following main components:

- a) LCD module
- b) PCD module – Application Processor board, SAM board and Antenna/Reader board

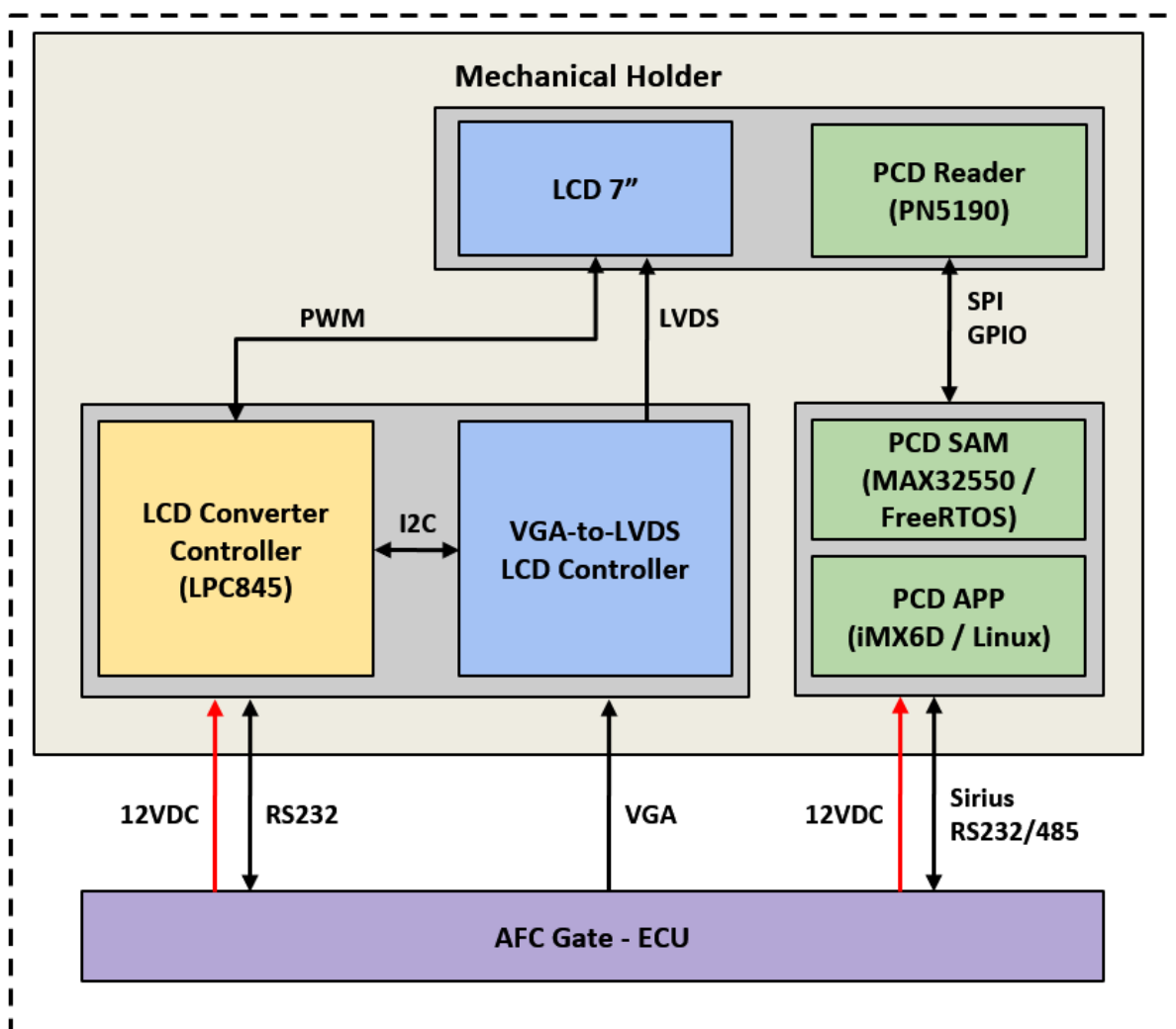


Figure 1. System overview

2.2. PCD Module

2.2.1. PCD-APP board interfaces

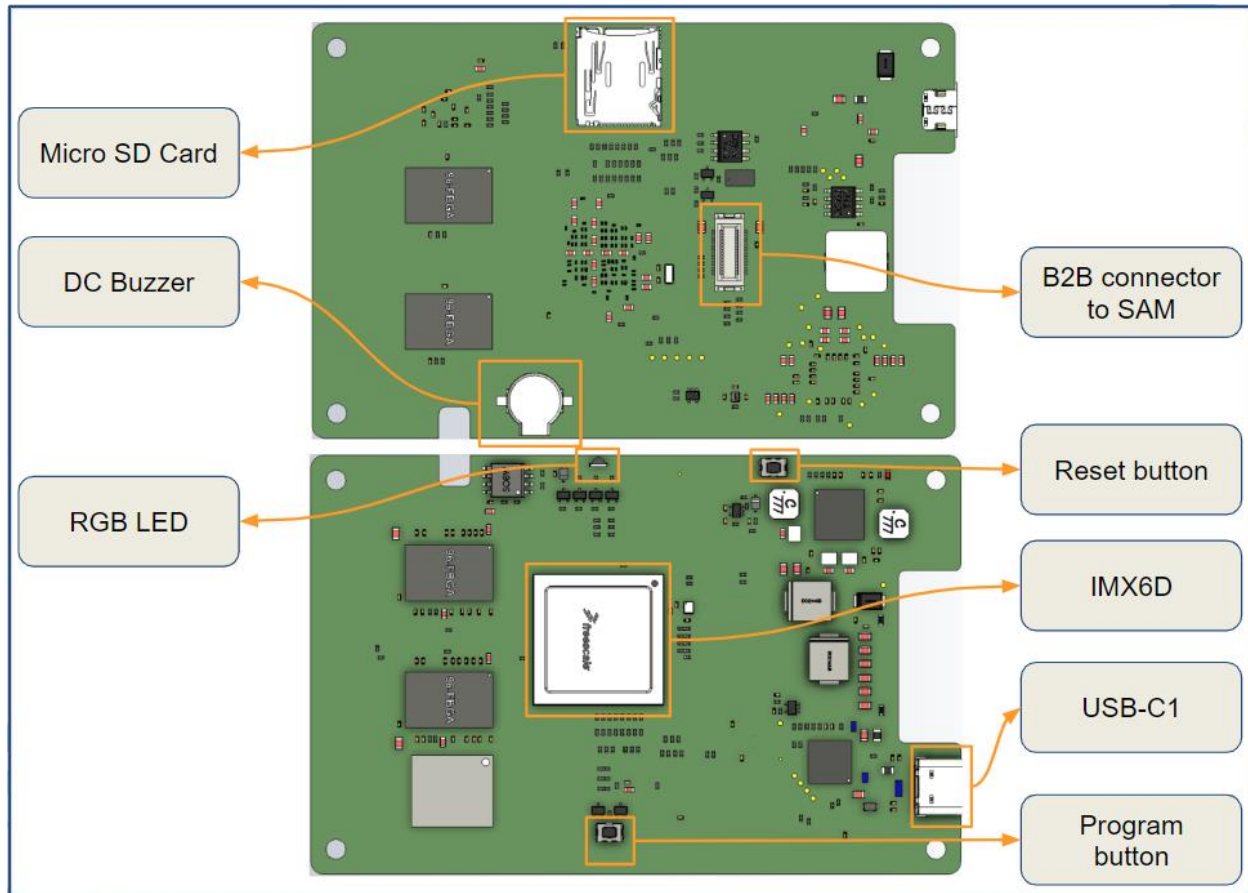


Figure 2. PCD-APP board PCB with main connector pinout

Table 1. PCD-APP board PCB main connectors

Connector	Function
USB-C1 Connector	USB interface to HOST Support USB 2.0 data only
B2B connector	APP board to SAM board connection

2.2.2. PCD-SAM board interfaces

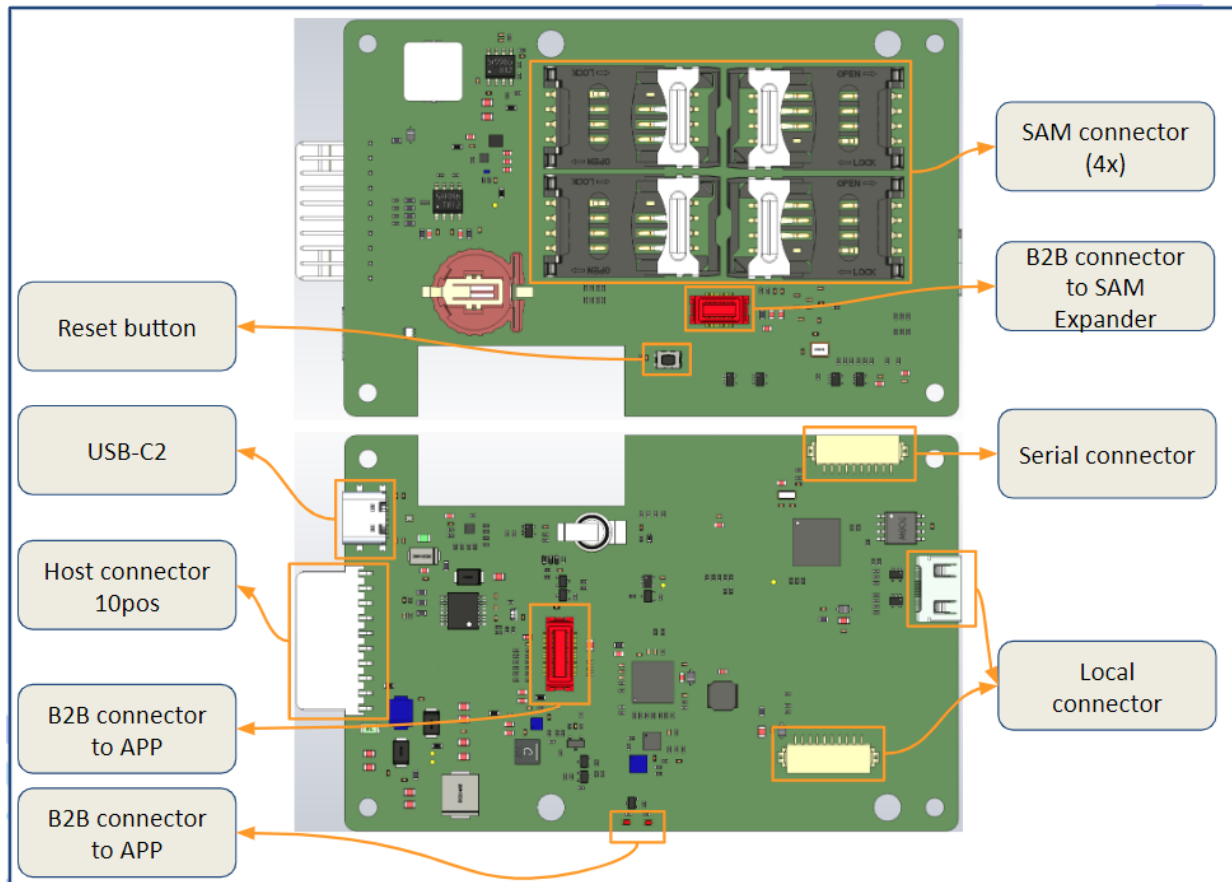


Figure 3. PCD-SAM board PCB main connector

PCD Host 10-pin connector pinout

Connector	Pinout	Designator	Description
PCD-Host 10-pin port	1	J9	NC
	2		GND_IN
	3		12V_IN
	4		RS485_RX-
	5		RS485_RX+
	6		RS485_TX-
	7		RS485_TX+
	8		RS232_TX
	9		GND_RS232
	10		RS232_RX

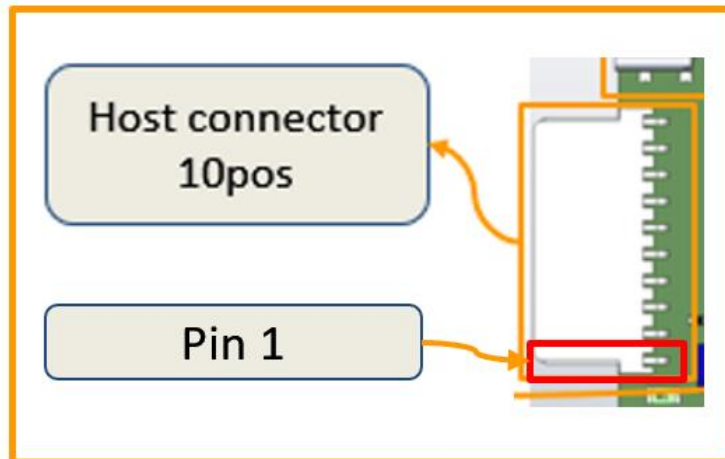


Figure 4. PCD-HOST 10 Pins - main connector pin out configuration

Table 2. PCD-APP board PCB main connectors

Connector	Function
USB-C2 Connector	USB interface for reader operating in PCSC/CCID mode
B2B connector	For expansion to 8 SAM
PCD-Host 10-pin conn	Reader power input and RS232/485 connectivity to HOST
PCD-Reader Antenna conn	Connection to Antenna

2.2.3. PCD-Antenna board interfaces

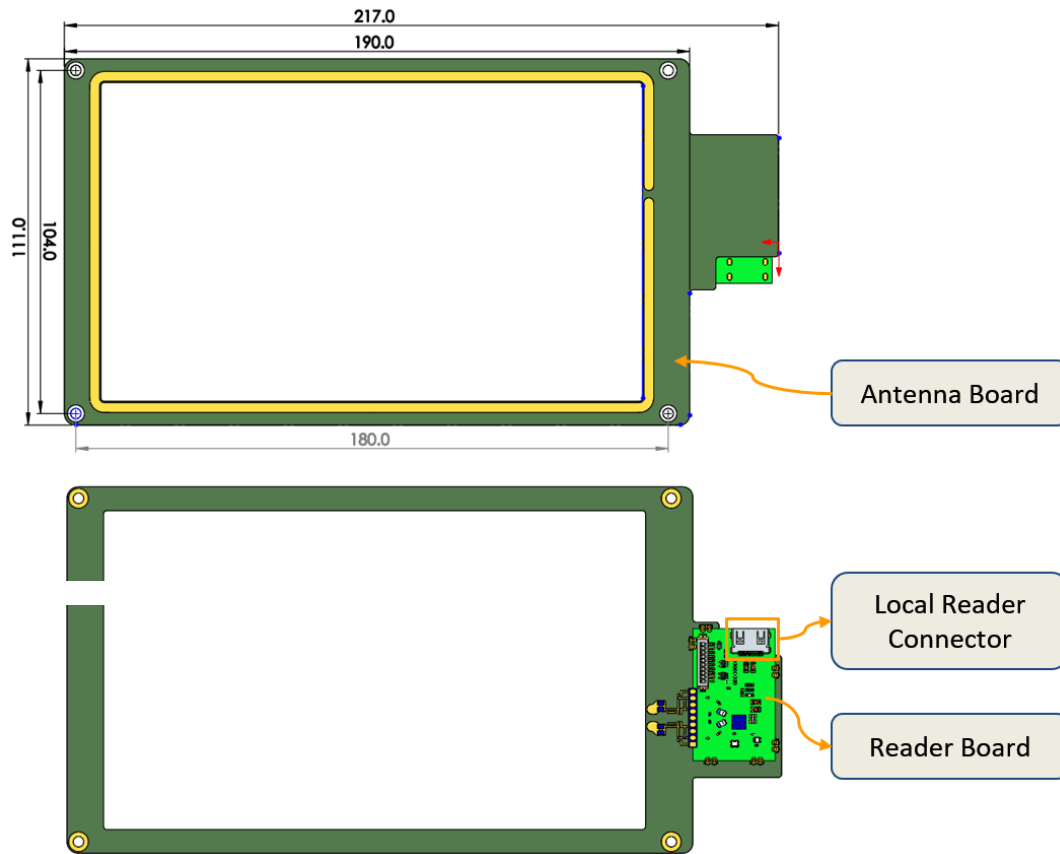


Figure 5. PCD-Reader-Antenna board PCB

Table 3. PCD-READER ANTENNA board PCB main connector

Connector	Function
PCD-Reader Antenna conn	Antenna connection to reader

2.3. Assembly

2.3.1. Contactless Product Assembly

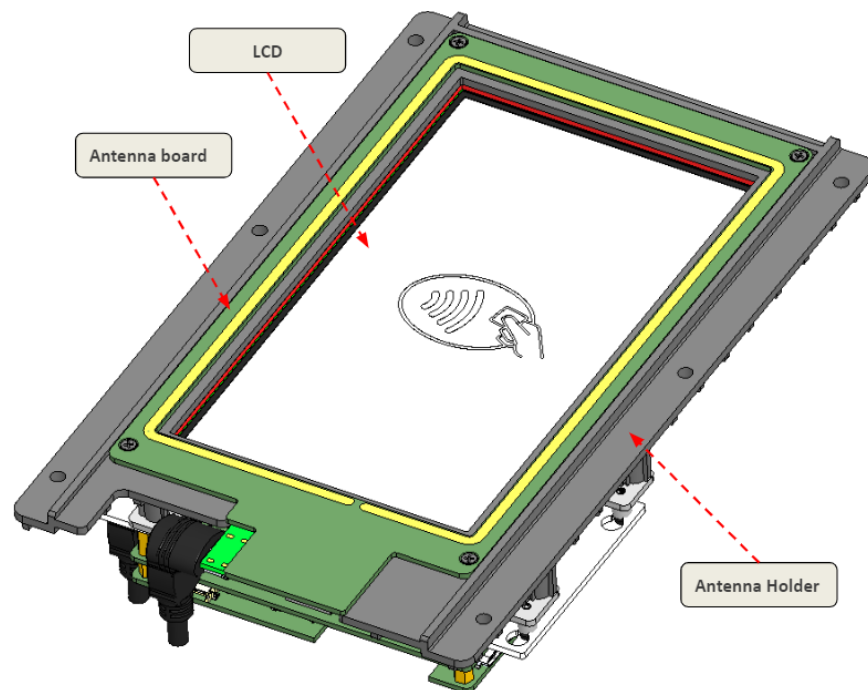


Figure 6. Top view

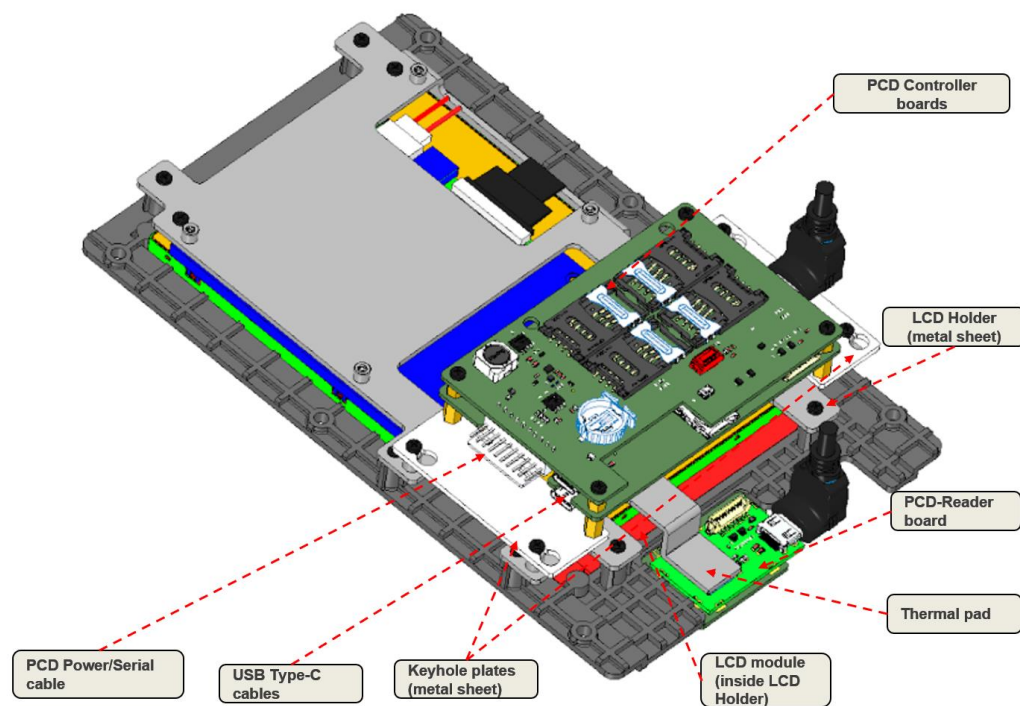


Figure 7. Bottom view

2.3.2. Physical dimension

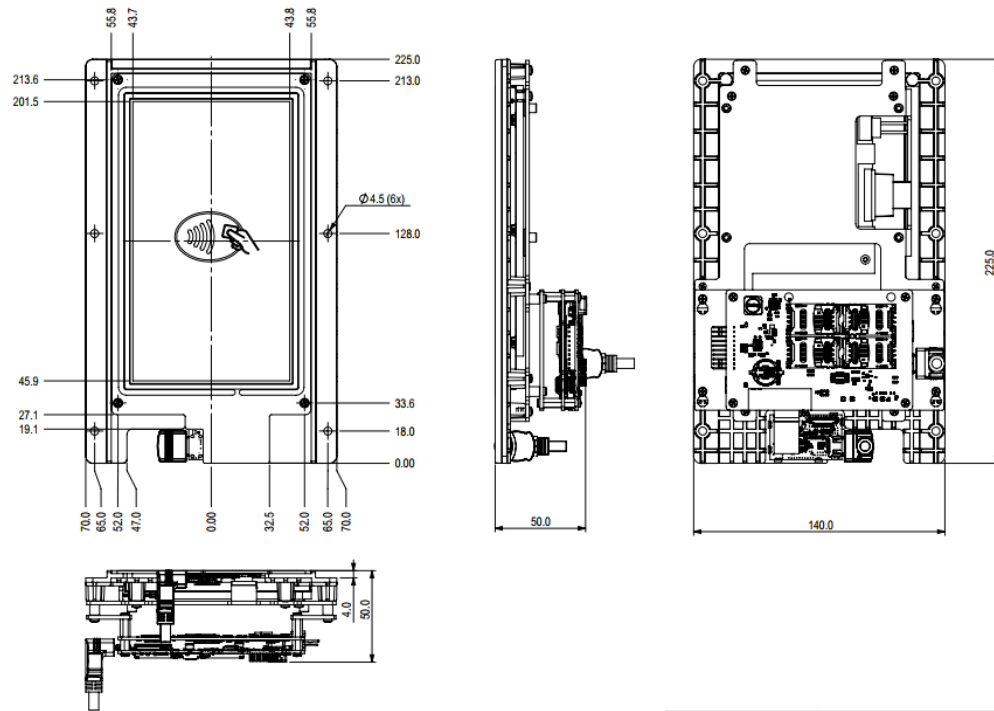


Figure 8. Physical dimension without cables

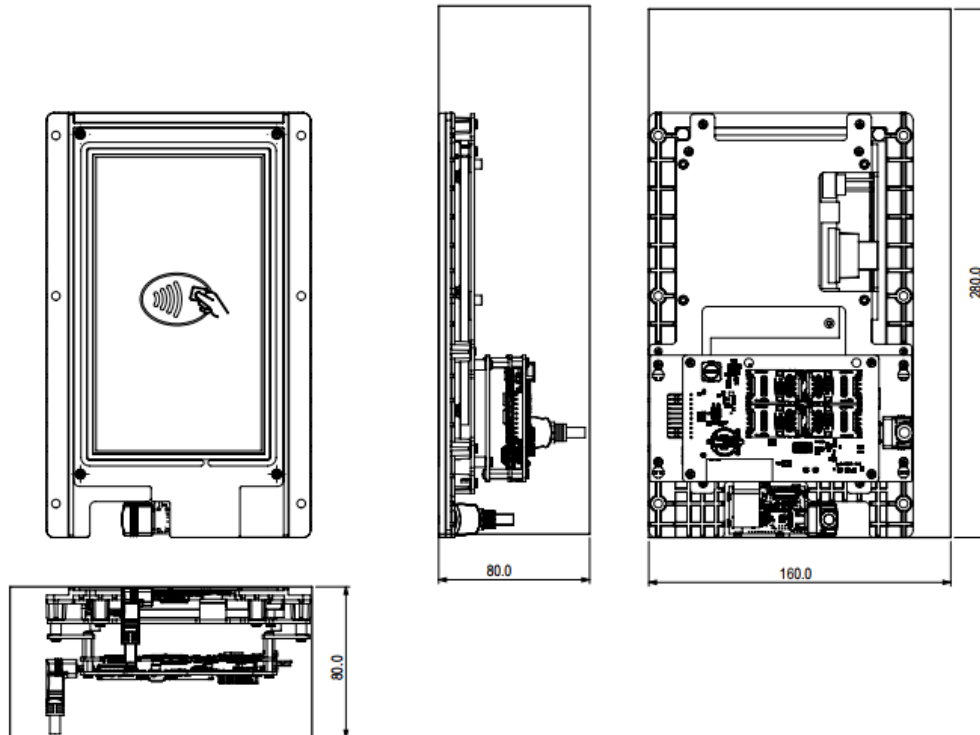


Figure 9. Physical dimension with cables

3. Specifications

3.1. Operating Conditions

No.	Specification	Type	Min.	Typ.	Max.	Unit	Remarks
1	Temperature	Operating	-10	-	+60	°C	
2	Temperature	Storage	-20	-	+85	°C	
3	Humidity	Relative	0	-	95	%	non-condensing

3.2. Power Supply

No.	Specification	Type	Min.	Typ.	Max.	Unit	Remarks
1	10 Pin Connector	Voltage	-	12	-	VDC	
		Current	-	-	650	mA	
2	USB C1	Voltage	-	5	-	VDC	
		Current		500	900	mA	500mA (for USB2.0) or 900mA (for USB3.1)
					1500	mA	USB PD support
3	USB C2	Voltage	-	5	-	VDC	
		Current		500	900	mA	500mA (for USB2.0) or 900mA (for USB3.1)

3.3. Processors and Controller

No.	Specification	Description
1	Processor	Application: iMX6 dual-core ARM Cortex-A9 800MHz RF: Maxim Secure ARM Cortex-M3 108MHz
2	Memory	2GB DDR RAM and 4GB NAND Flash

3.4. Indicator

No.	Specification	Description
1	LED Indicators	Power LED, RGB status LED
2	Alert	DC Buzzer

3.5. PCD

No.	Specification	Description
1	Carrier Frequency	13.56MHz
2	Standard compliance	ISO/IEC 14443-1 to 14443-4 Type A & B ISO/IEC 15693 Sony Felica™ ECMA-340, ECMA-352 and ISO18092

No.	Specification	Description
3	Baud-rate	106kbps, 212kbps, 424kbps, 848kbps
4	Card type supported	All ISO 14443-X contactless cards
5	Communication Range	CPU-based card: up to 8.5cm Memory-based card: up to 10cm

3.6. Data Communication Interface

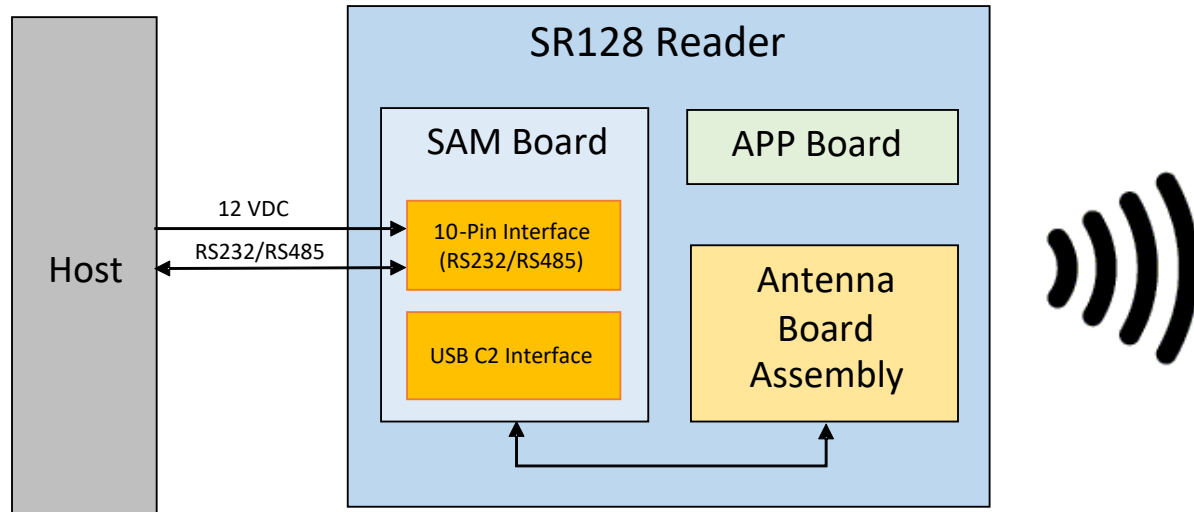
No.	Specification	Description
1	USB interface	USB Type C
2	Serial interface	RS232/422/485 Baud-rate configurable 9600, 19200, 115200 and 230400 kbps

3.7. Standards & Certification

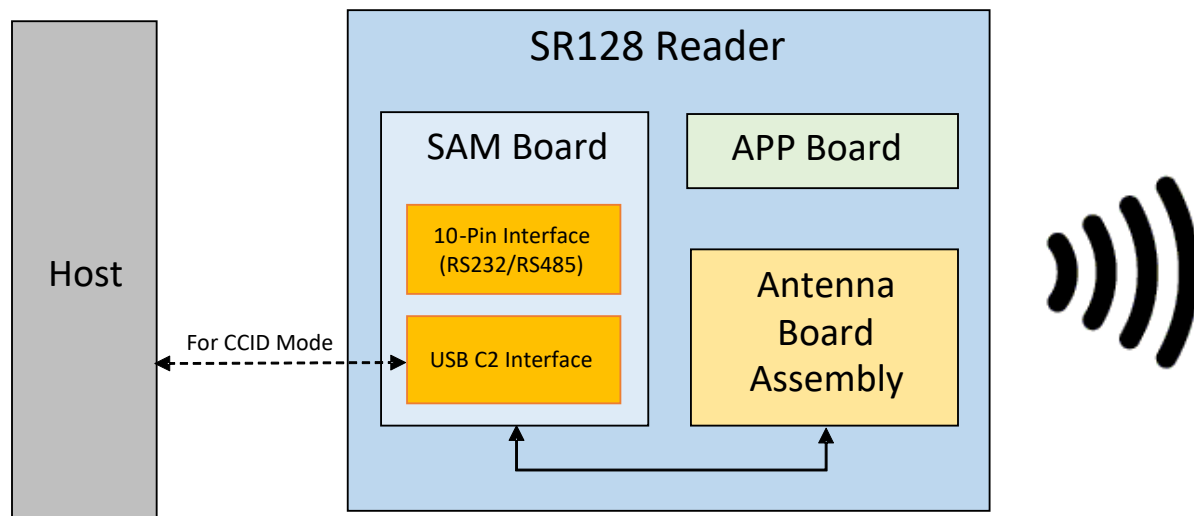
No.	Specification	Description
1	EMC	EN50121-4 - Railway applications
2	Regulatory	CE / FCC approved
3	EMV	EMV L1 v3.1a VISA payWave L2 VCPS v2.2c and VCTKS 1.1a MasterCard PayPass L2 v3.1.4
4	Shock	Acceleration: 20g, Pulse duration: 11ms, Direction: 3 perpendicular axes, No of shocks: 5 per axes
5	Vibration	IEC-68 part 2-31 and DIN EN 60721-3-5 class 5M2

4. Reader Connection

The SR128 reader interfaces with the host via the 10pin serial and power connection when operating host-reader configuration.



In PCSC/CCID mode, the host can connect to the reader using the USB-C2 interface. The reader will present itself as a standard PCSC reader to the Operating System.



5. Installing and Replacing SAM card

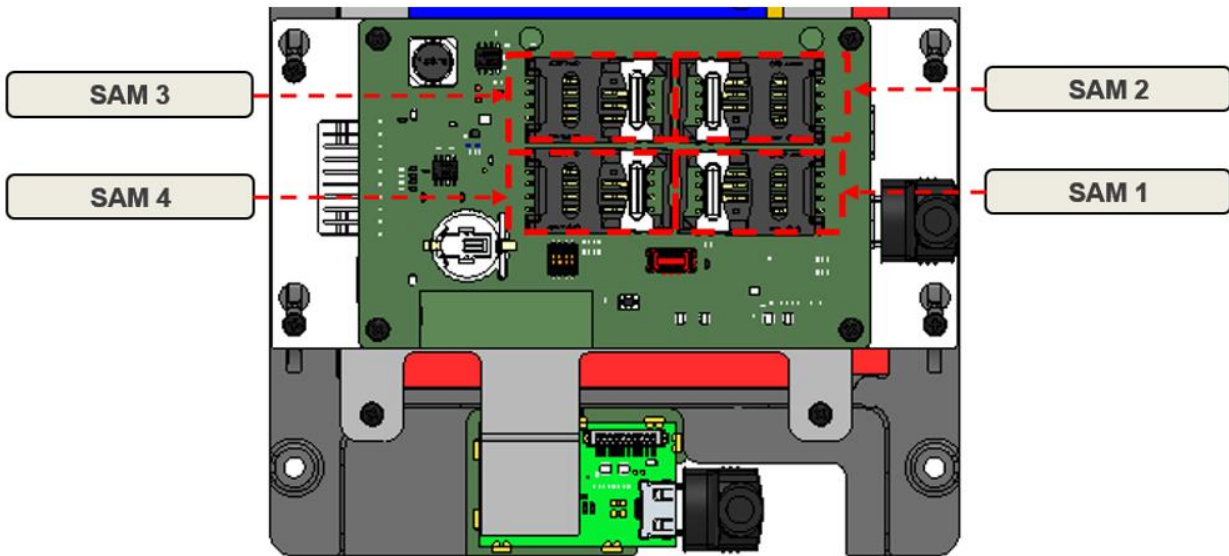
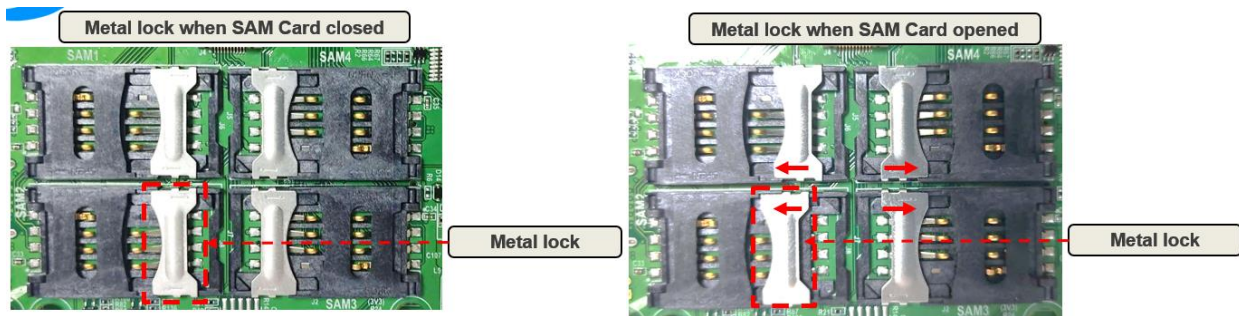


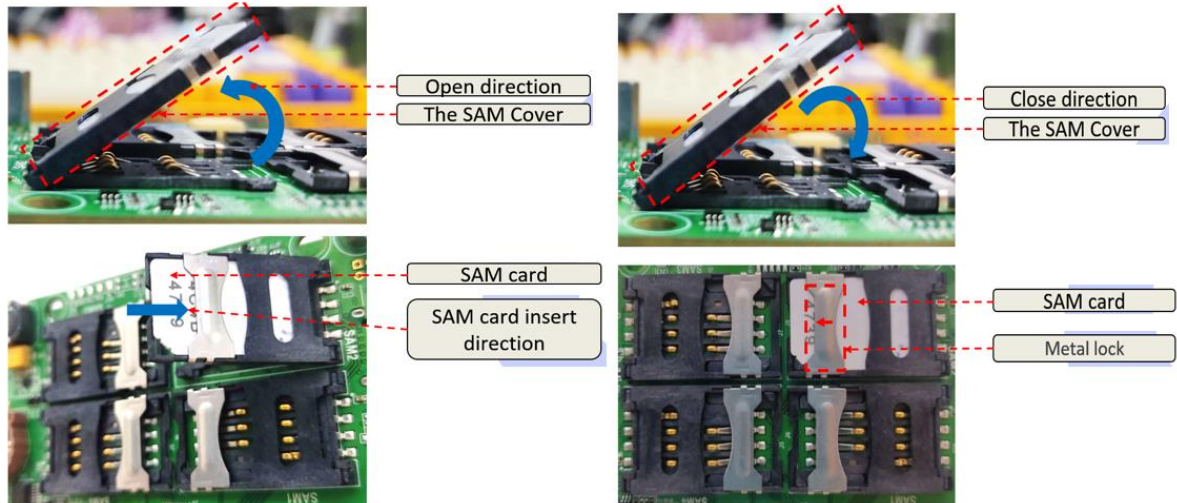
Figure 10. SAM cards position in bottom view

• Installing and Uninstalling SAM card

Step 1: Push the metal lock of the sim towards the arrow



Step 2: Open the cover and insert the SAM card inside and then close the cover and wipe the metal lock towards the arrow



Step 4: Reversed the Step to take out the SAM Card.

6. Operational Precautions

6.1. General Safety Instructions

The SR128 reader contains ESD sensitive components. When handling with the device, avoid in contact with components especially the ICs on the boards. The operating voltage of the SR128 reader has 12VDC. The 10pin connector accepts 12VDC. Operating the SR128 reader other than the rated voltage will experience performance deterioration or damage the reader.

6.2. Installation

The SR128 Reader uses inductive coupling to communicate with contactless cards. Therefore, the reader is highly sensitive to ferrous or non-ferrous metal alike. Installation near to metal may affect operating distance. It is important to keep a comfortable distance away these metal surfaces for optimum performance.

6.3. Reader Status Indicators

There are LED indicators and DC Buzzer located on Reader module APP/SAM boards for various Reader status indicators.

No	Color	Freq (Hz)	Meaning
1	WHITE	0	No Error
2	RED	5	Power Supply OVER 12V
3	GREEN	5	Power Supply UNDER 12V
4	YELLOW	5	PN5190 NO RESPONSE
5	BLUE	5	SAM NO RESPONSE
6	PURPLE	5	TEMP SENSOR NO RESPONSE
7	CYAN	5	TEMP SENSOR OVERHEAT
8	RED	0	ANTENNA DETUNED
9	GREEN	0	RF PROCESS RAM CHECK FAILED
10	YELLOW	0	RF PROCESS NO RESPONSE

No	Color		Meaning
1	RED	Remaining	NO ERROR
2	RED	Blinking	USB CCID mode
3	OFF		SAM Board cannot boot

6.4. Battery Safety Information

CAUTION

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

- a. Use only CR1220, BATTERY LITHIUM COIN 3V 20MM. Observe the following guidelines for safe use of Li Ion batteries.
- b. Do not expose the battery to excessive heat or cold. Do not short-circuit. It may explode.
- c. To avoid risk of fire, burn or damage to your battery, do not allow a metal object to touch battery contacts.
- d. Do not disassemble the battery. There are no user serviceable parts inside.
- e. If battery leakage is observed, avoid any contact with affected area and properly dispose of the battery.
- f. If you come in contact with battery leakage, rinse exposed area with soap and water. If it contacts the eye, flush the eye with water for 15 minutes and seek medical attention.
- g. When discarding a battery, contact your local waste disposal provider to understand local restrictions for disposal or recycling of batteries.

6.5. Fuse Information

This product contains Fuses in its circuit. The Fuse part numbers are 1206L150/12SLYR; PTC RESET FUSE 12V 1.5A 1206 (Littelfuse).

7. FCC Compliance Statement

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.

Note: 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 or more 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.

Important: Caution: Any changes or modifications not expressly approved by the party responsible for compliance to this equipment would void the user's authority to operate this device.