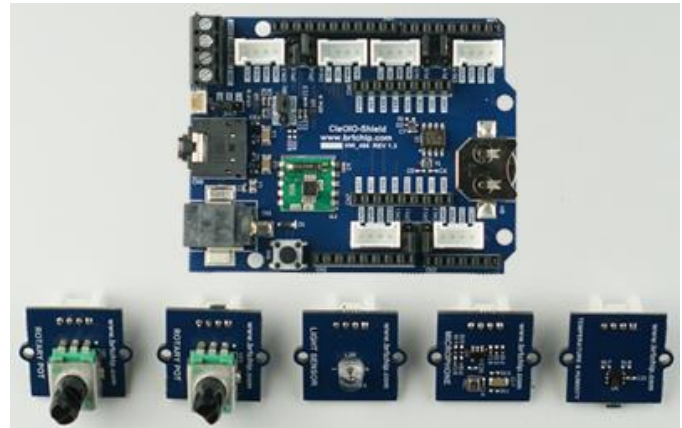


Bridgetek Pte Ltd

CleOIO-Shield Module Datasheet



1 Introduction

The CleOIO-Shield is an input/output expansion shield for *CleO* series and belongs to *CleO* accessories. It is compatible with *CleO35*, *CleO50*, *NerO*, providing easy and extended I/O for Analog, Digital, I²C, SPI, UART interface. I/O features can be connected through Arduino Uno interface, MikroBus header, and Grove-Universal 4pin connector.

The CleOIO-Shield is supplied with 5 daughter boards, One 4pin to 2pinx2 speaker cable.

1.1 Features

- Arduino Uno compatible
- *CleO35*, *CleO50*, *NerO* compatible
- With RTC module including external battery switch over function
- With FM radio module including *CleO* Speaker output and headphone Audio Jack output
- With Voltmeter module up to 20V measurement
- With 5 daughter boards as bundle: rotary potentiometers module, temperature & humidity sensor module, light sensor (LDR) module, microphone (MIC) module
- Contains 3.3V & 5.0V jumper selection
- Hardware reset button provided
- DC power input jack for 7V-20VDC 1A power adapter, 9VDC or 12VDC recommended
- Support Analog & Digital I/O
- Support I²C, SPI, UART interface
- Support MikroBUS interface*
- CE and FCC certified**

*MikroBus interface is created by MikroElektronika as an open standard anyone can implement in their design. Please visit MikroE for more details

**FM function not tested under EN55020

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2 Ordering Information

Part No.	Description
CleOIO-Shield1	CleOIO-Shield1 module, with 5 daughter board modules, one 4pin to 2pinx2 speaker cable.

3 Program Support

Demo applications are provided for *CleO* modules by Bridgetek. Visit <http://brtchip.com/m-cleo/> for more information.

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4 Module Hardware Feature

The dimensions of the CleOIO-Shield main board are 70 mm x 53 mm x 21 mm. See Figures for all the hardware features.

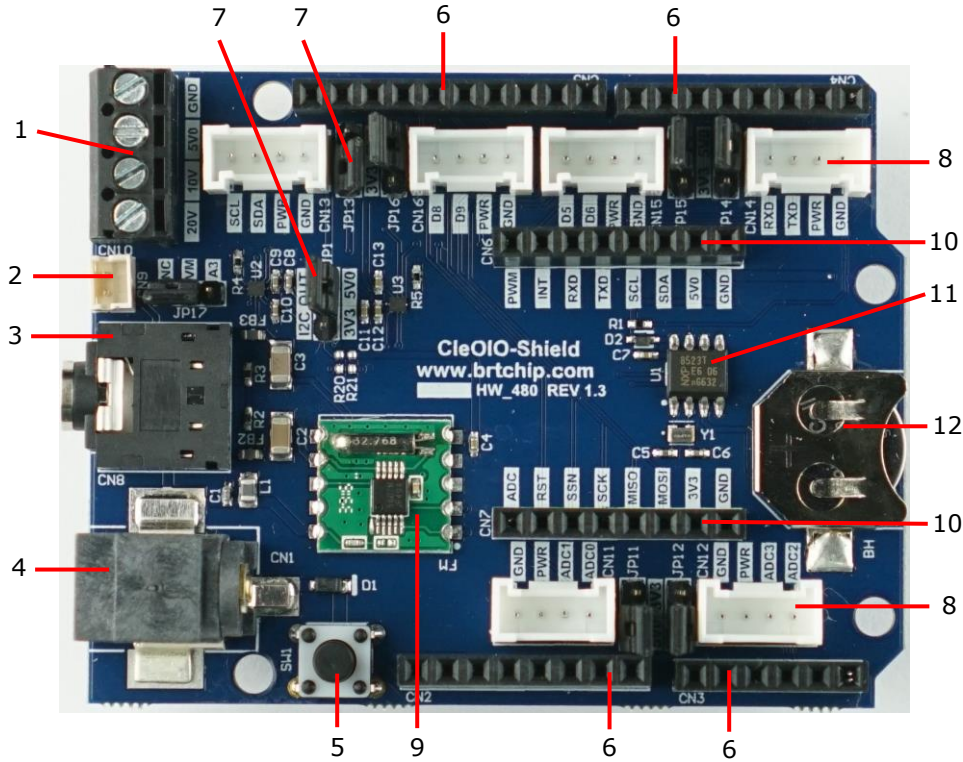


Figure 1 – CleOIO-Shield Top View

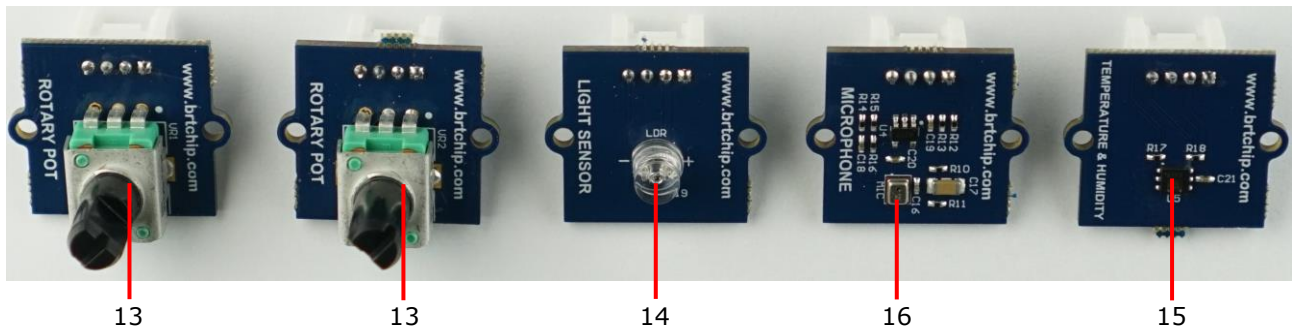


Figure 2 – Five Daughter Modules Top View

Key Features:

- | | |
|--------------------------------|------------------------------------|
| 1 Voltmeter module | 2 FM radio audio output |
| 3 FM radio headphone jack | 4 DC power jack |
| 5 Reset button | 6 Arduino I/F |
| 7 3.3V & 5.0V jumper selection | 8 Grove – Universal 4pin connector |
| 9 FM radio module | 10 MikroBUS headers |

- | | |
|---|------------------------------|
| 11 RTC module | 12 Battery holder |
| 13 Rotary Potentiometer module | 14 Light Sensor (LDR) module |
| 15 Temperature & Humidity Sensor module | 16 Microphone (MIC) module |

4.1 Power Supply

The CleOIO-Shield receives power externally. Power can either be drawn from external source through DC power jack or power pins (+3V3 and +5V) of **CN2**.

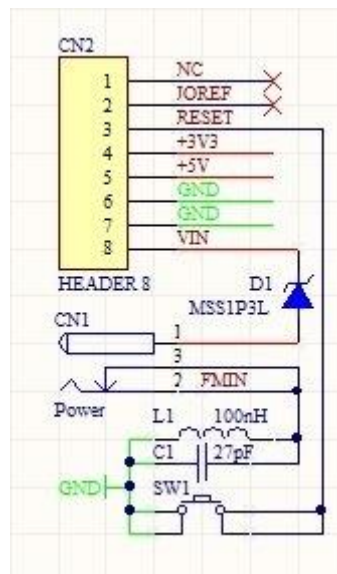


Figure 3 – Power Supply

4.2 Extended I/O Port

The CleOIO-Shield board contains extended I/O ports for user's convenience. Arduino interface headers **CN2, CN3, CN4, CN5** enable easy-access to many Arduino shields. MikroBUS headers **CN6, CN7** are compatible to popular Click™ boards for fast prototyping. Grove – Universal 4pin connectors are also ready for user to connect various simple application modules, with the jumper option on 3.3V or 5.0V voltage supply.

Arduino interface headers:

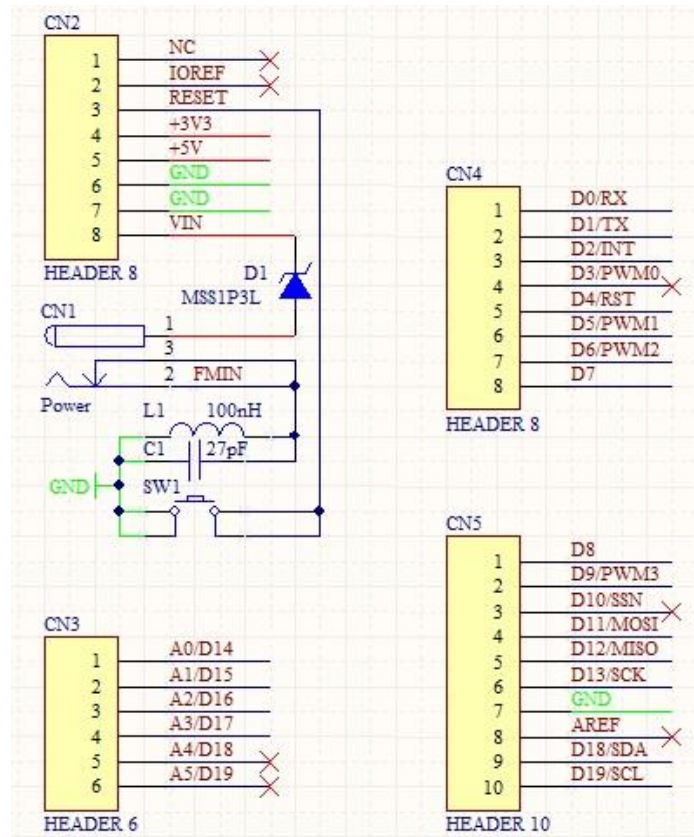


Figure 4 – Arduino Interface

Table 1 lists the entire pin mapping on **CN2**.

Pin No	Pin Name	Description
1	NC	-
2	IOREF	Reference voltage for input/output
3	RESET	Reset pin
4	+3V3	3.3V output
5	+5V	5V output
6	GND	Ground
7	GND	Ground
8	VIN	DC voltage supply input from DC power jack CN1

Table 1 - Pin Mapping of CN2

Table 2 lists the entire pin mapping on **CN3**.

Pin No	Pin Name	Description
1	A0/D14	Analog pin 0/ Digital pin 14
2	A1/D15	Analog pin 1/ Digital pin 15
3	A2/D16	Analog pin 2/ Digital pin 16

4	A3/D17	Analog pin 3/ Digital pin 17
5	A4/D18	Analog pin 4/ Digital pin 18
6	A5/D19	Analog pin 5/ Digital pin 19

Table 2 - Pin Mapping of CN3

Table 3 lists the entire pin mapping on **CN4**.

Pin No	Pin Name	Description
1	D0/RX	Digital pin 0/ Receive pin (Serial data)
2	D1/TX	Digital pin 1/ Transmit pin (Serial data)
3	D2/INT	Digital pin 2/ External Interrupt pin (MikroBUS)
4	D3/PWM0	Digital pin 3/ Pulse Width Modulation pin 0
5	D4/RST	Digital pin 4/ Reset pin (MikroBUS)
6	D5/PWM1	Digital pin 5/ Pulse Width Modulation pin 1
7	D6/PWM2	Digital pin 6/ Pulse Width Modulation pin 2
8	D7	Digital pin 7

Table 3 - Pin Mapping of CN4

Table 4 lists the entire pin mapping on **CN5**.

Pin No	Pin Name	Description
1	D8	Digital pin 8
2	D9/PWM3	Digital pin 9/ Pulse Width Modulation pin 3
3	D10/SSN	Digital pin 10/ Slave Select (SPI Bus)
4	D11/MOSI	Digital pin 11/ Master Output, Slave Input (SPI Bus)
5	D12/MISO	Digital pin 12/ Master Input, Slave Output (SPI Bus)
6	D13/SCK	Digital pin 13/ Serial Clock (SPI Bus)
7	GND	Ground
8	AREF	Reference voltage for analog input
9	D18/SDA	Digital pin 18/ Serial Data Line (I ² C Bus, external)
10	D19/SCL	Digital pin 19/ Serial Clock Line (I ² C Bus, external)

Table 4 - Pin Mapping of CN5

MikroBUS headers:

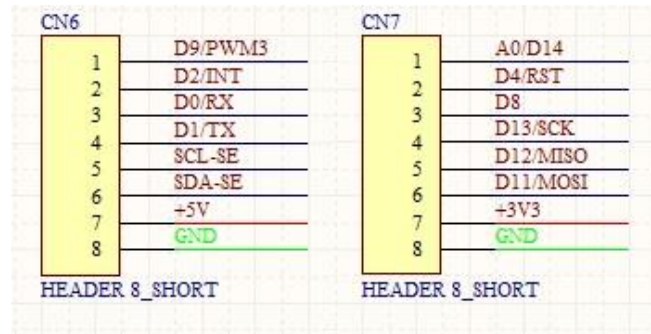


Figure 5 – MikroBUS Headers

Table 5 lists the entire pin mapping on **CN6**.

Pin No	Pin Name	Description
1	D9/PWM3	Digital pin 9/ Pulse Width Modulation pin 3
2	D2/INT	Digital pin 2/ External Interrupt pin (MikroBUS)
3	D0/RX	Digital pin 0/ Receive pin (Serial data)
4	D1/TX	Digital pin 1/ Transmit pin (Serial data)
5	SCL-SE	Serial Clock Line (I ² C Bus, associated with translator U3)
6	SDA-SE	Serial Data Line (I ² C Bus, associated with translator U3)
7	+5V	5V output
8	GND	Ground

Table 5 - Pin Mapping of CN6

Table 6 lists the entire pin mapping on **CN7**.

Pin No	Pin Name	Description
1	A0/D14	Analog pin 0/ Digital pin 14
2	D4/RST	Digital pin 4/ Reset pin (MikroBUS)
3	D8	Digital pin 8
4	D13/SCK	Digital pin 13/ Serial Clock (SPI Bus)
5	D12/MISO	Digital pin 12/ Master Input, Slave Output (SPI Bus)
6	D11/MOSI	Digital pin 11/ Master Output, Slave Input (SPI Bus)
7	+3V3	3.3V output
8	GND	Ground

Table 6 - Pin Mapping of CN7

Grove – Universal 4pin connectors:

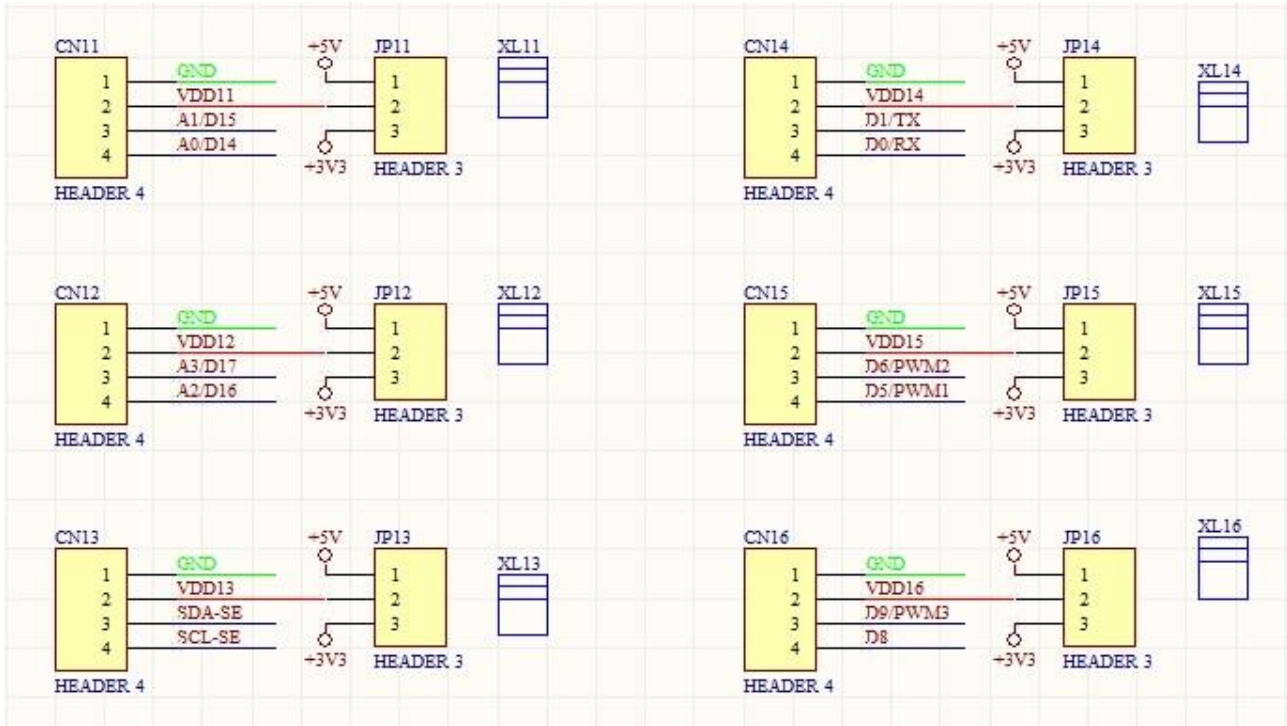


Figure 6 – Grove-Universal 4pin Connectors

Table 7 lists the entire pin mapping on **CN11**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD11	3.3V or 5.0V Supplied Voltage for CN11
3	A1/D15	Analog pin 1/ Digital pin 15
4	A0/D14	Analog pin 0/ Digital pin 14

Table 7 - Pin Mapping of CN11

Table 8 lists the entire pin mapping on **CN12**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD12	3.3V or 5.0V Supplied Voltage for CN12
3	A3/D17	Analog pin 3/ Digital pin 17
4	A2/D16	Analog pin 2/ Digital pin 16

Table 8 - Pin Mapping of CN12

Table 9 lists the entire pin mapping on **CN13**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD13	3.3V or 5.0V Supplied Voltage for CN13
3	SDA-SE	Serial Data Line (I ² C Bus, associated with translator U3)
4	SCL-SE	Serial Clock Line (I ² C Bus, associated with translator U3)

Table 9 - Pin Mapping of CN13

Table 10 lists the entire pin mapping on **CN14**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD14	3.3V or 5.0V Supplied Voltage for CN14
3	D1/TX	Digital pin 1/ Transmit pin (Serial data)
4	D0/RX	Digital pin 0/ Receive pin (Serial data)

Table 10 - Pin Mapping of CN14

Table 11 lists the entire pin mapping on **CN15**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD15	3.3V or 5.0V Supplied Voltage for CN15
3	D6/PWM2	Digital pin 6/ Pulse Width Modulation pin 2
4	D5/PWM1	Digital pin 5/ Pulse Width Modulation pin 1

Table 11 - Pin Mapping of CN15

Table 12 lists the entire pin mapping on **CN16**.

Pin No	Pin Name	Description
1	GND	Ground
2	VDD16	3.3V or 5.0V Supplied Voltage for CN16
3	D9/PWM3	Digital pin 9/ Pulse Width Modulation pin 3
4	D8	Digital pin 8

Table 12 - Pin Mapping of CN16

4.3 FM Radio Module

The CleOIO-Shield contains FM radio module with support frequency range 50MHz to 115MHz. The FM radio module is connected using the I²C interface through a voltage translator IC **U2** (FXMAR2102UMX_F106), which allows different voltage translation (3.3V or 5.0V) between master and slave. The FM radio module is connected with either headphone jack **CN8** for stereo audio output or speaker port **CN9** for mono audio output. User may connect an earpiece cable to headphone jack **CN8** or a DC power cord to DC power jack **CN1** to work as antenna for the FM radio module.

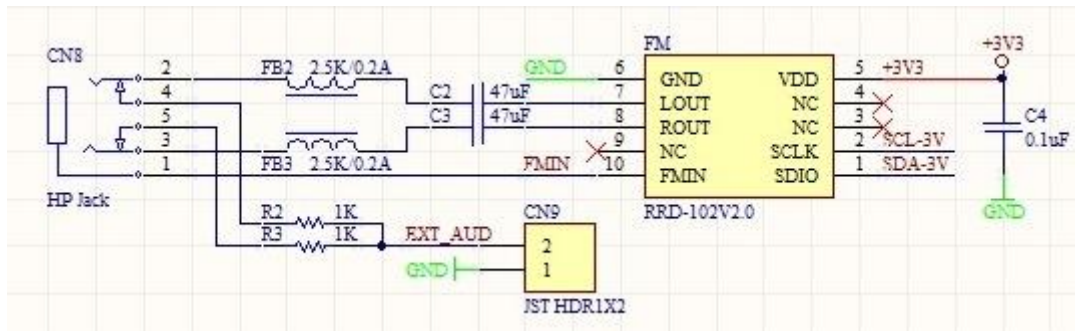


Figure 7 – FM Module

4.4 Real Time Clock (RTC) Module

The CleOIO-Shield contains RTC circuitry. The RTC is connected using I²C interface through a voltage translator IC **U2** (FXMAR2102UMX_F106), which allows different voltage translation (3.3V or 5.0V) between master and slave. The RTC can be powered by 3V 12.5mm backup Lithium coin battery (CR-1220) during off-mode.

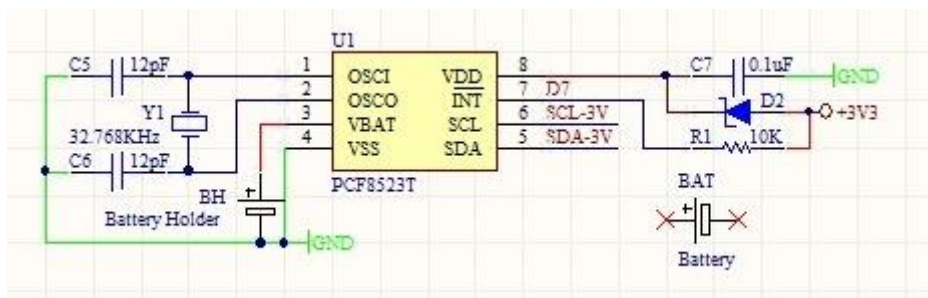


Figure 8 – RTC Module

4.5 Voltmeter Module

Voltmeter module with 4position terminal block allows user to carry out voltage measurement up to 5V, 10V and 20V. Measured voltage result is transmitted through terminal block pin 2 by jumper setting to analog A3 pin of Arduino I/F.

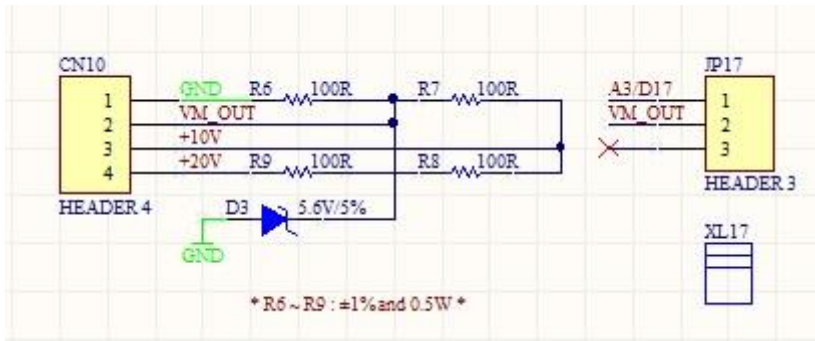


Figure 9 – Voltmeter Module

4.6 Rotary Potentiometer Module

The CleOIO-Shield has two Rotary Potentiometer modules as daughter boards. The Rotary Potentiometer module is a simple potential/voltage variation tool for various applications. It can be connected to the CleOIO-Shield main board through Grove-Universal 4pin cable.

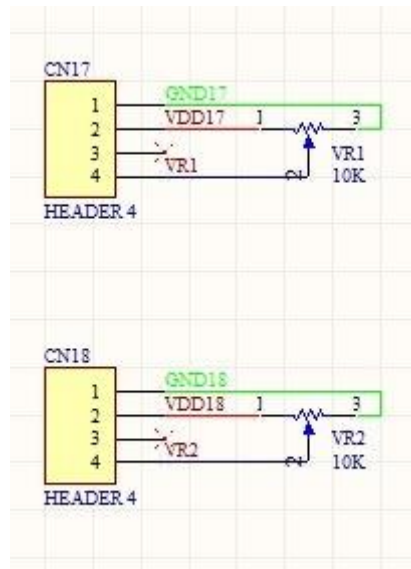


Figure 10 – Rotary Potentiometer Module

4.7 Microphone (MIC) Module

The CleOIO-Shield has one Microphone module as daughter board. Within the module there is an op-amp (LMV321ILT) for signal amplification. The module can be connected to the CleOIO-Shield main board through Grove-Universal 4pin cable.

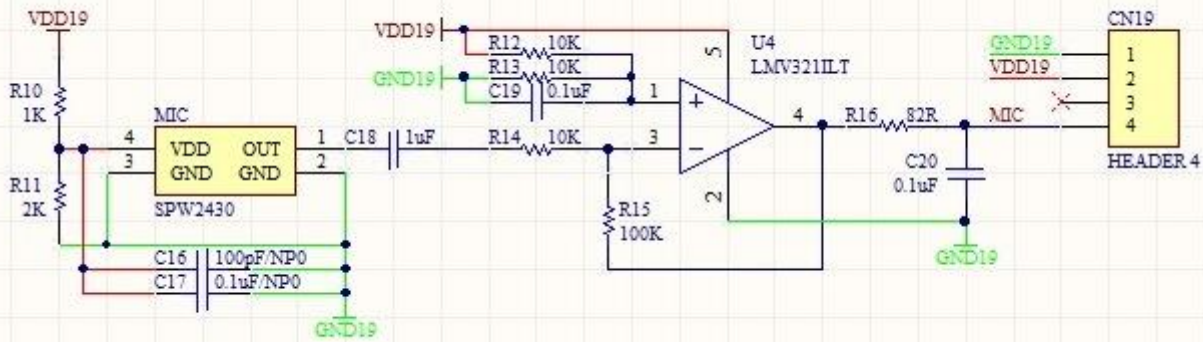


Figure 11 – Microphone Module

4.8 Temperature and Humidity Sensor Module

The CleOIO-Shield has one Temperature and Humidity Sensor module as daughter board. It features a low power, low cost and small digital sensor (HDC1080) with I²C communication interface. It can be connected to the CleOIO-Shield main board through Grove-Universal 4pin cable.

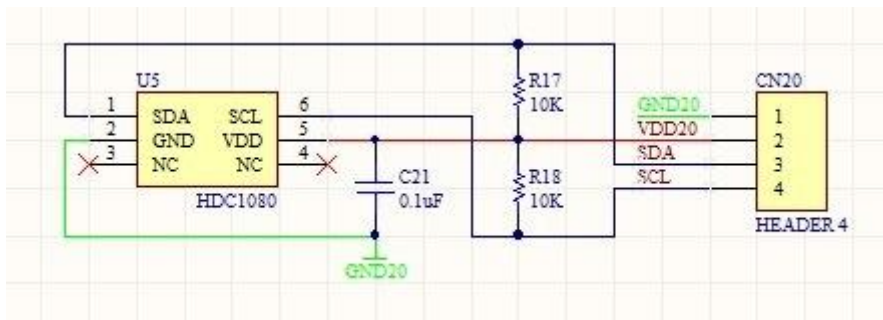


Figure 12 – Temperature & Humidity Sensor Module

4.9 Light Sensor (LDR) Module

The CleOIO-Shield has one Light Sensor module as daughter board. It provides simple solution for ambient light detection. It can be connected to the CleOIO-Shield main board through Grove-Universal 4pin cable.

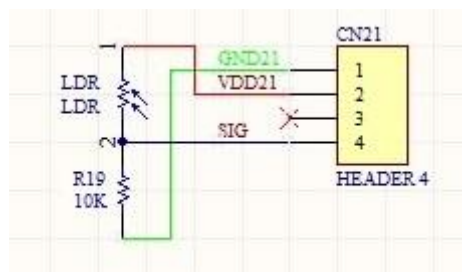


Figure 13 – Light Sensor Module

5 Devices Characteristics and Ratings

5.1 Electrical Specification

Parameter	Value	Unit	Conditions
Storage Temperature	-30°C to 80°C	Degrees C	
Ambient Operating Temperature (Power Applied)	-20°C to 70°C	Degrees C	

Table 13 - Temperature Parameter

DC Characteristics (Ambient Temperature = -20°C to +70°C)

Parameter	Description	Minimum	Typical	Maximum	Units	Conditions
V _{DC}	DC Power Supply	7	9,12	20	V	External source from <i>NerO</i>
I _{DC}	DC Supply Current			1	A	External source from <i>NerO</i>
V _{io}	5.0 Vio Voltage Reference	4.75		5.25	V	
V _{io}	3.3 Vio Voltage Reference	3.0		3.6	V	
I _{io}	Max current draw from IO pin			25	mA	

Table 14 - Operating Voltage and Current

6 Board Schematics

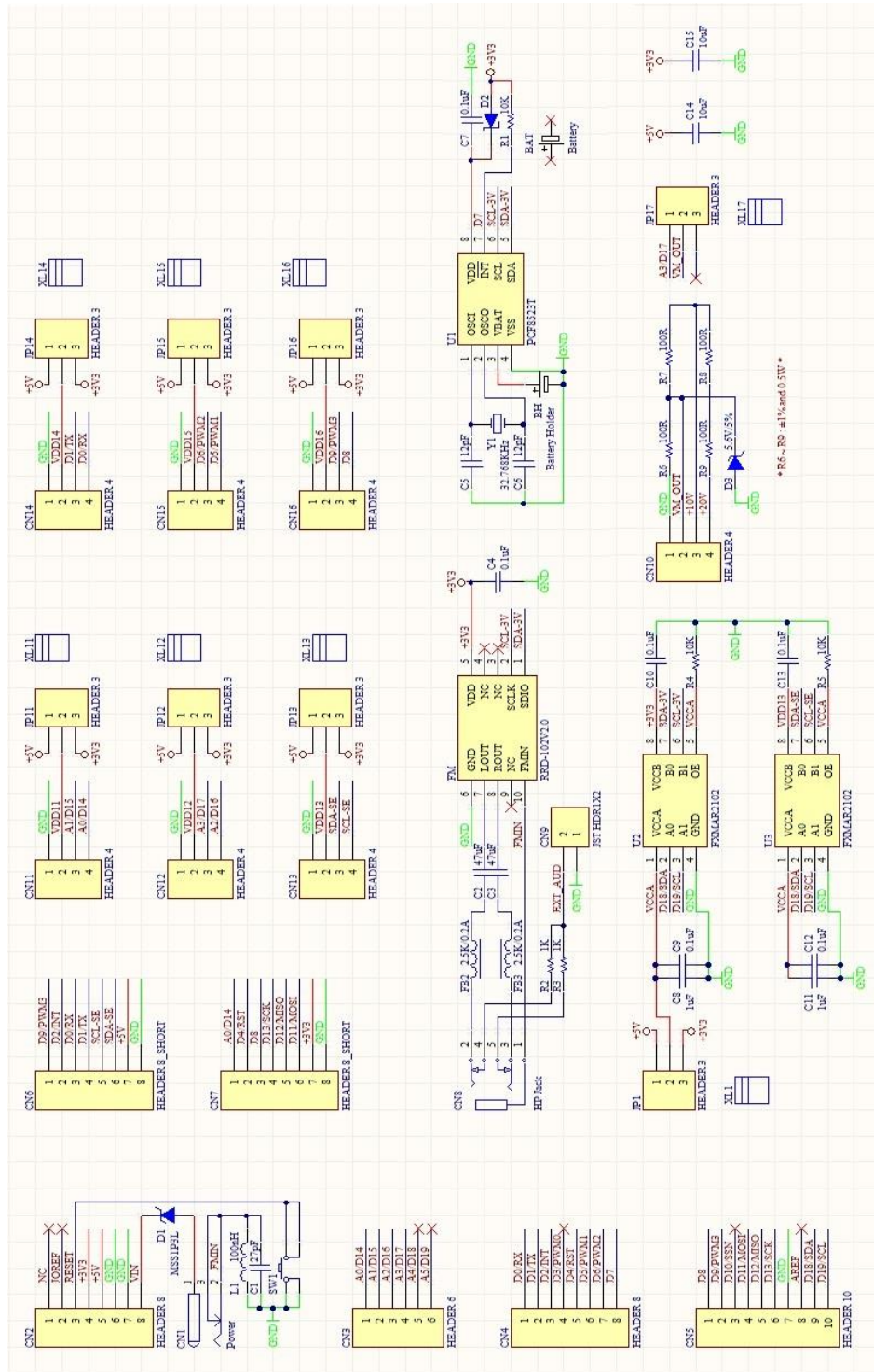


Figure 14 – Sheet 1 – CleIO-Shield Main Board

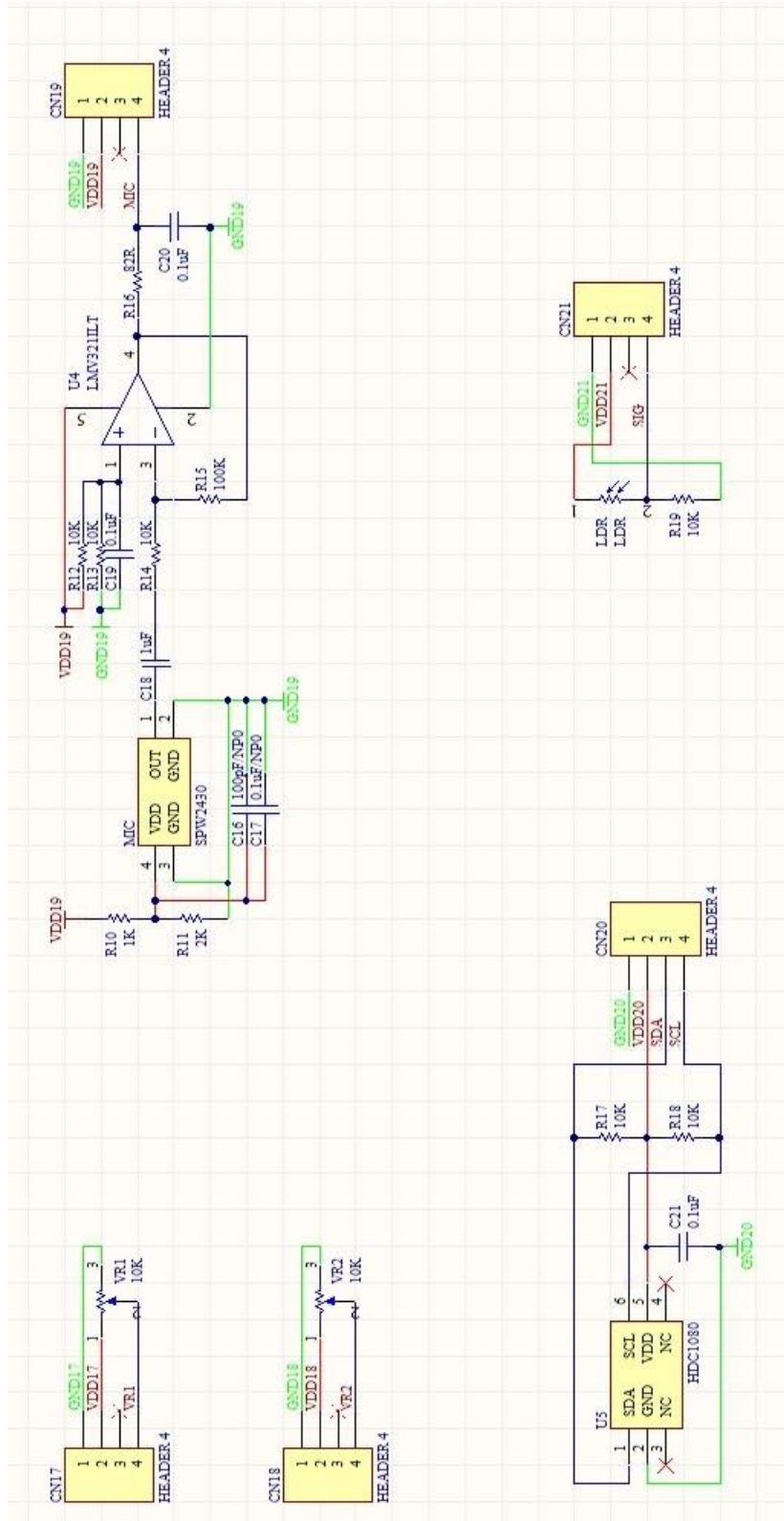


Figure 15 – Sheet 2 – Daughter Boards

7 Mechanical Dimensions

7.1 CleOIO-Shield Main Board Dimensions

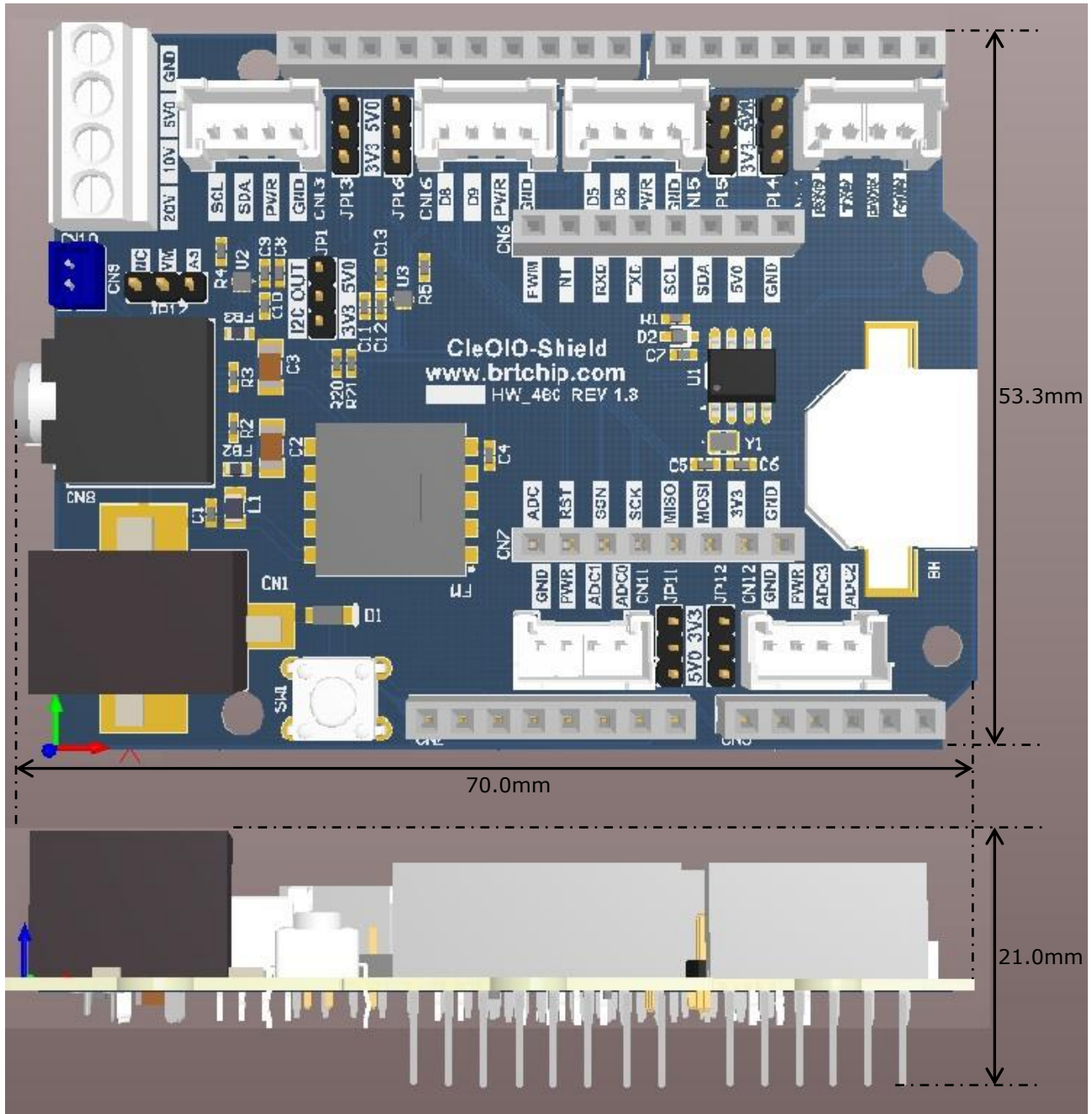


Figure 16 – CleOIO-Shield Main Board Dimensions

7.2 Daughter Boards Dimensions

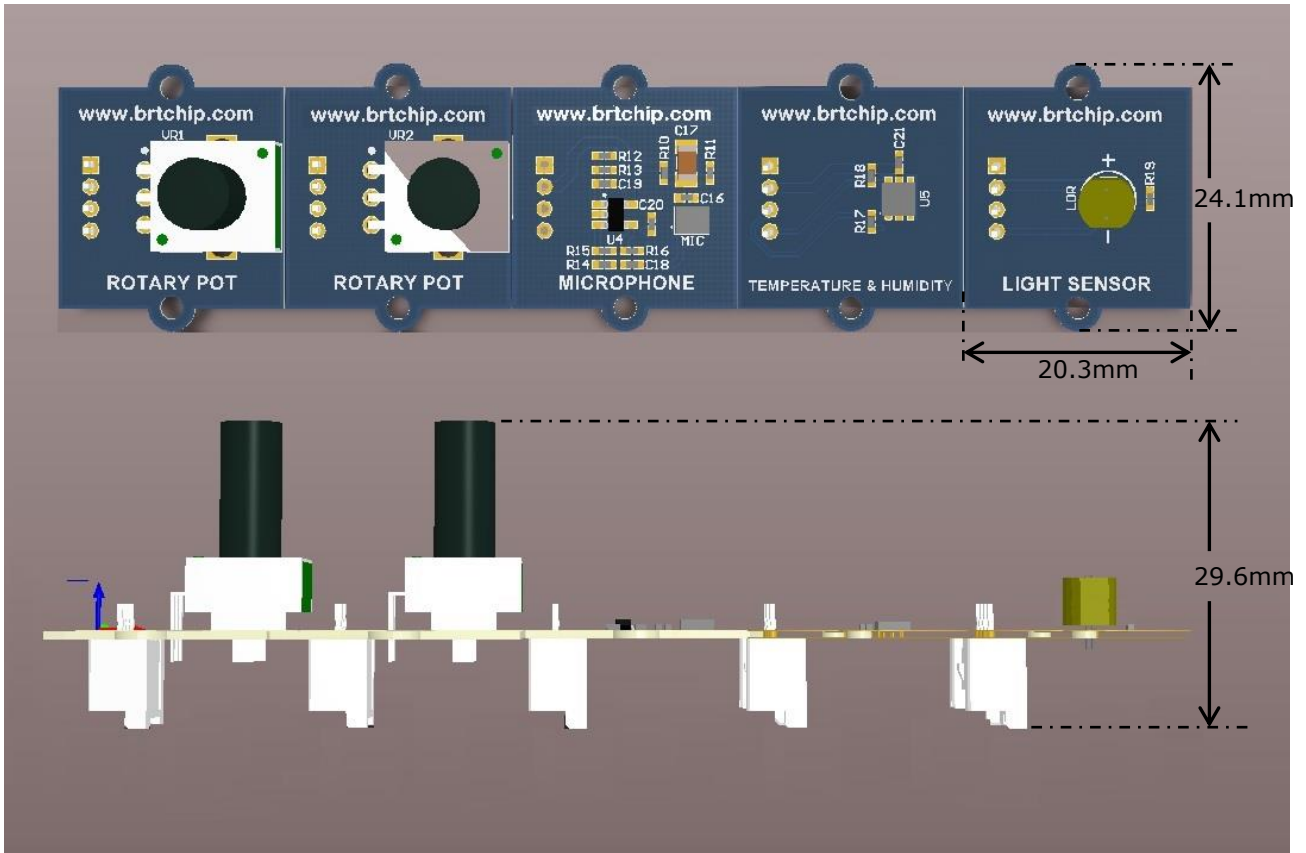


Figure 17 – Daughter Boards Dimensions

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Appendix A – References

Document References

For module documentations, please refer to URL below:

FM Radio RDA5807M datasheet: [FM Radio RDA5807M datasheet](#)

RTC PCF8523 datasheet: [RTC PCF8523 datasheet](#)

Temperature & Humidity sensor HDC1080 datasheet : [Temperature & Humidity Sensor HDC1080 datasheet](#)

Microphone SPW2430HR5H-B datasheet: [Microphone SPW2430HR5H-B datasheet](#)

Light sensor HW5P-1 datasheet: [Light sensor HW5P-1 datasheet](#)

mikroBus: <http://www.mikroe.com/mikrobus/>

Arduino: <https://www.arduino.cc/>

CleO Product Page: <http://brtchip.com/m-cleo/>

CleO Resources: [CleOstuff](#)

Acronyms and Abbreviations

Terms	Description
DC	Direct Current
FM	Frequency Modulation
IC	Integrated Circuit
I/F	Interface
I/O	Input/output
I ² C	Inter-Integrated Circuit
LDR	Light Dependent Resistor
MIC	Microphone
RTC	Real Time Clock
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver/Transmitter

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Appendix C – Revision History

Document Title: CleOIO-Shield Module Datasheet
Document Reference No.: BRT_000080
Clearance No.: BRT#066
Product Page: <http://brtchip.com/m-cleo/>
Document Feedback: [Send Feedback](#)

Revision	Changes	Date
Version 1.0	Initial Release	2017-03-02
Version 1.1	Updated the CleOIO-Shield pictures with latest version	2017-05-16

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