

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

Note: MikroBus interface is created by MikroElektronika is an open standard anyone can implement in their design. Please visit [MikroE](http://www.mikroe.com) for more detail

Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Bridgetek Pte Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Bridgetek Pte Ltd, 178 Paya Lebar Road, #07-03, Singapore 409030. Singapore Registered Company Number: 201542387H

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.

Table of Contents

| | | |
|--|---|-----------|
| 1 | Introduction | 1 |
| 1.1 | Features..... | 1 |
| 2 | Ordering Information | 2 |
| 3 | Program Support..... | 2 |
| 4 | Module Hardware Feature | 4 |
| 4.1 | Power Supply | 5 |
| 4.2 | Extended I/O Port | 5 |
| 4.3 | FM Radio Module..... | 10 |
| 4.4 | Real Time Clock (RTC) Module | 11 |
| 4.5 | Voltmeter Module..... | 11 |
| 4.6 | Rotary Potentiometer Module | 12 |
| 4.7 | Microphone (MIC) Module..... | 12 |
| 4.8 | Temperature and Humidity Sensor Module | 13 |
| 4.9 | Light Sensor (LDR) Module | 13 |
| 5 | Devices Characteristics and Ratings..... | 14 |
| 5.1 | Electrical Specification | 14 |
| 6 | Board Schematics..... | 15 |
| 7 | Mechanical Dimensions | 17 |
| 7.1 | CleOIO-Shield Main Board Dimensions..... | 17 |
| 7.2 | Daughter Boards Dimensions | 18 |
| 8 | Contact Information..... | 19 |
| Appendix A – References | | 20 |
| Document References | | 20 |
| Acronyms and Abbreviations | | 20 |
| Appendix B - List of Figures and Tables | | 21 |
| List of Tables | | 21 |
| List of Figures | | 21 |
| Appendix C – Revision History | | 22 |

4 Module Hardware Feature

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

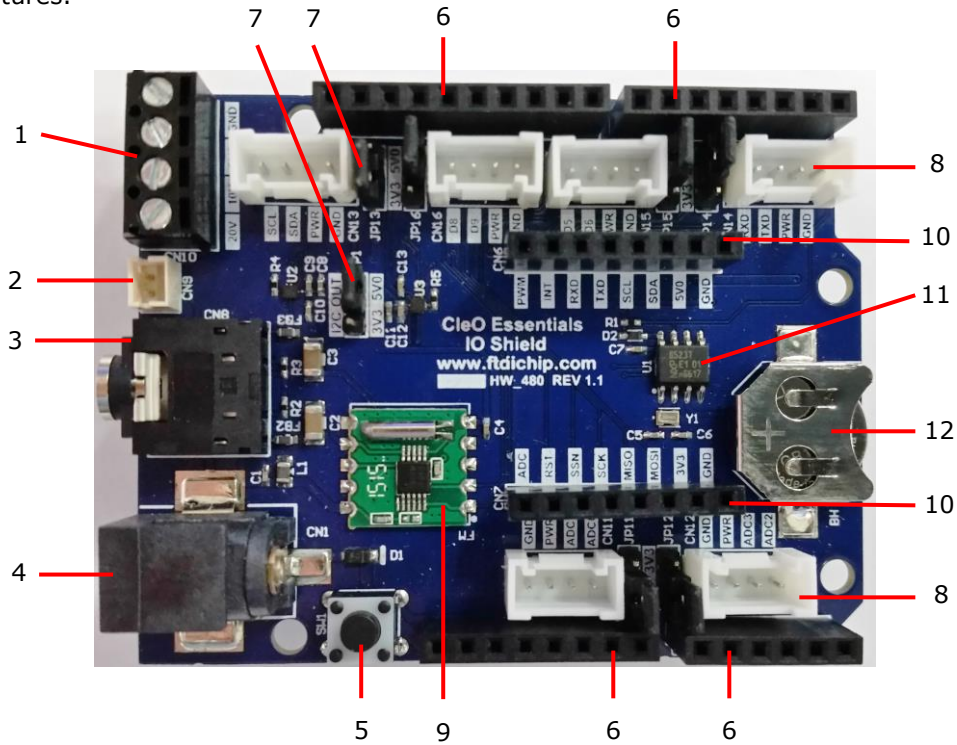


Figure 1 – CleIOIO-Shield Top View

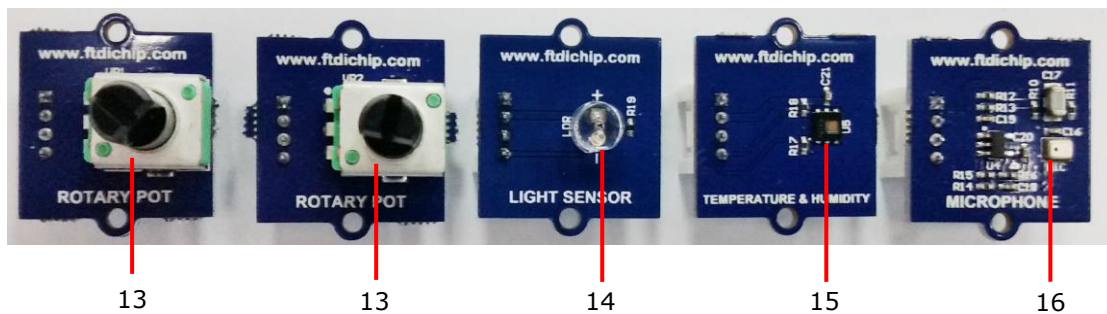


Figure 2 – Five Daughter Modules Top View

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**.

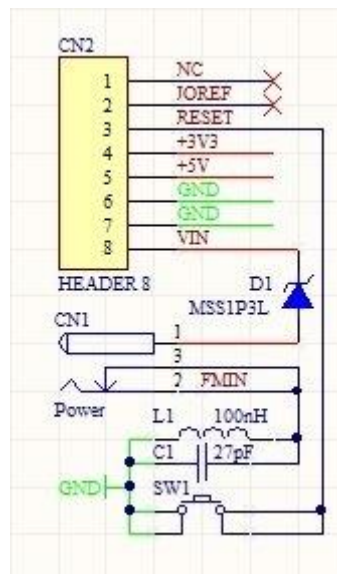


Figure 3 – Power Supply

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:

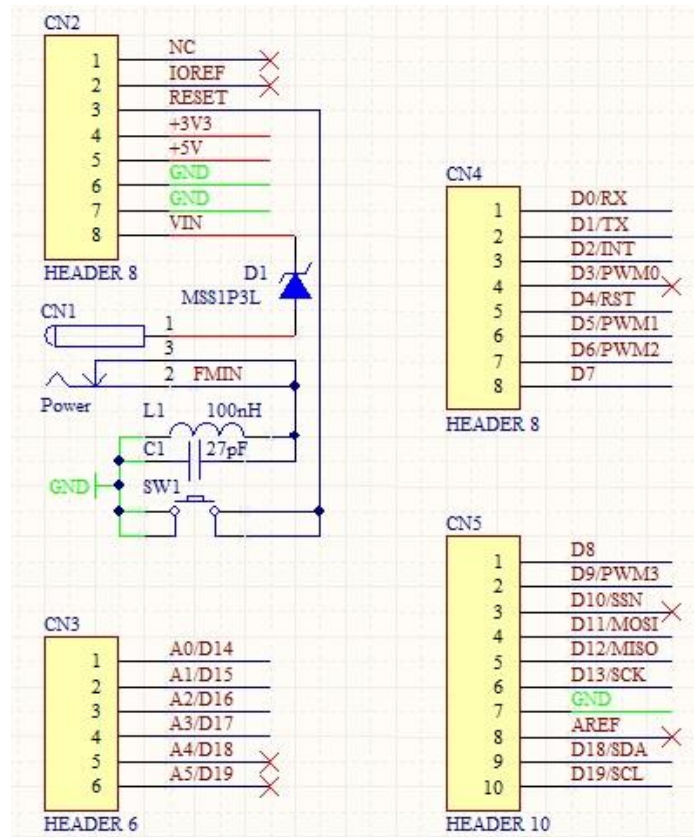


Figure 4 – Arduino Interface

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:

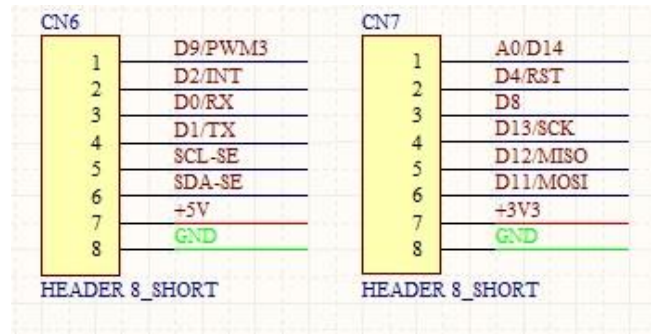


Figure 5 – MikroBUS Headers

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:

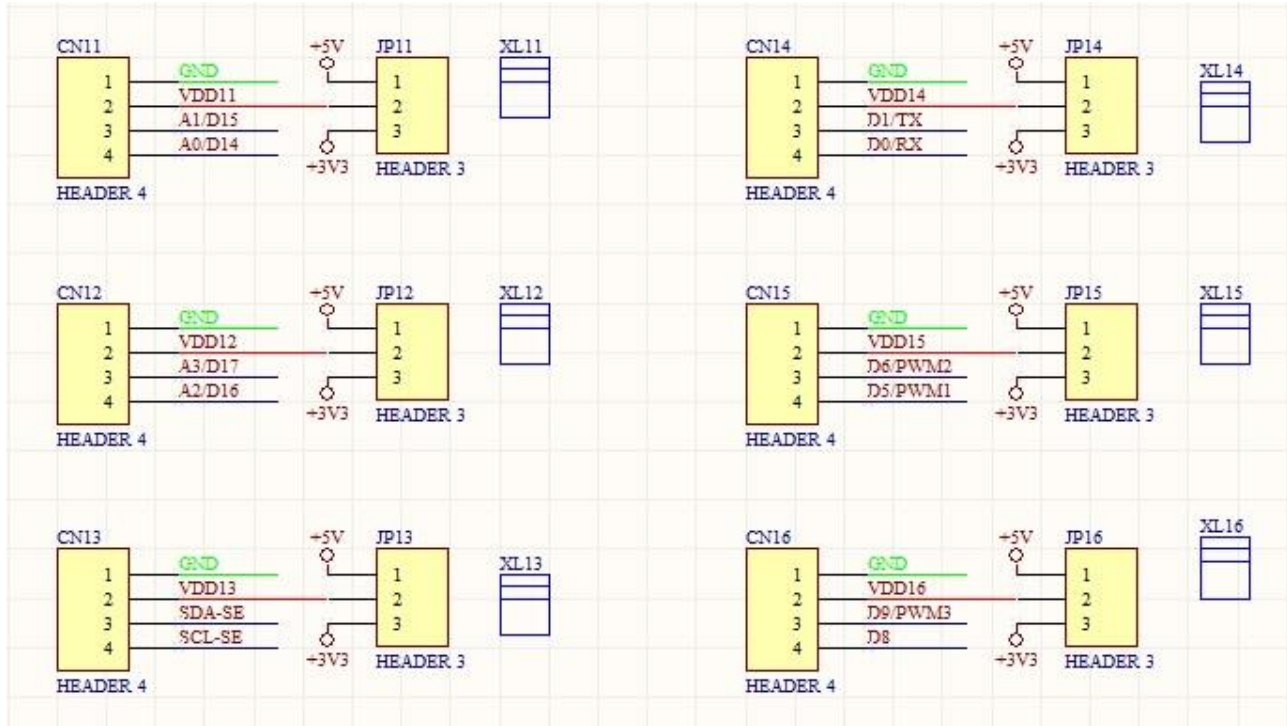


Figure 6 – Grove-Universal 4pin Connectors

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.

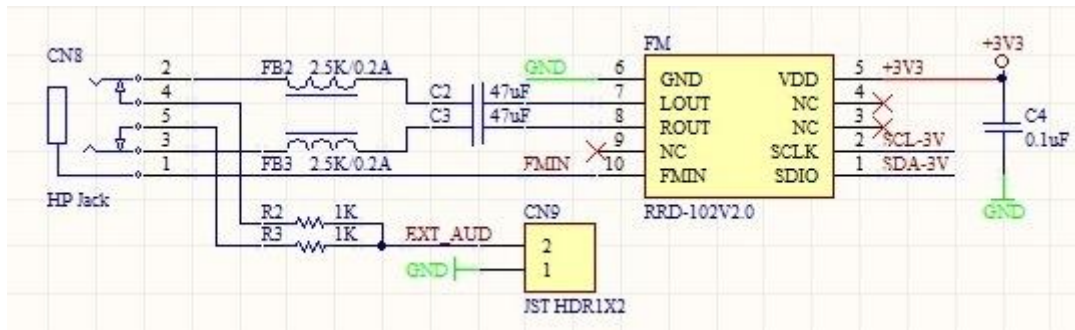


Figure 7 – FM Module

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.

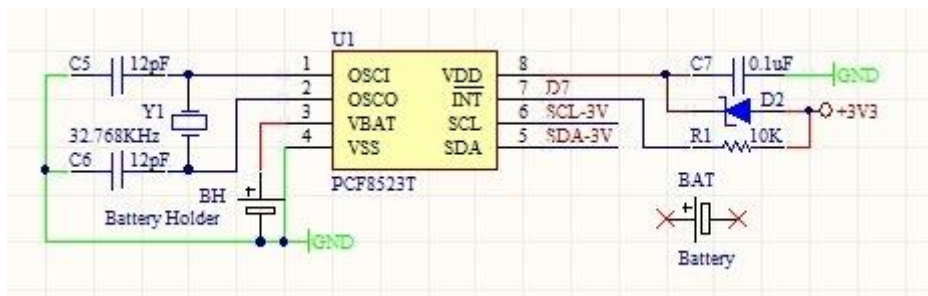


Figure 8 – RTC Module

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 to analog A3 pin of Arduino I/F.

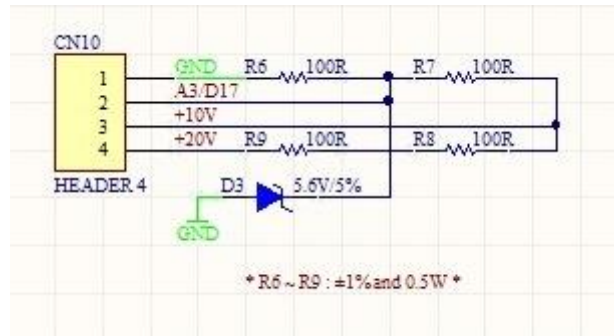


Figure 9 – Voltmeter Module

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.

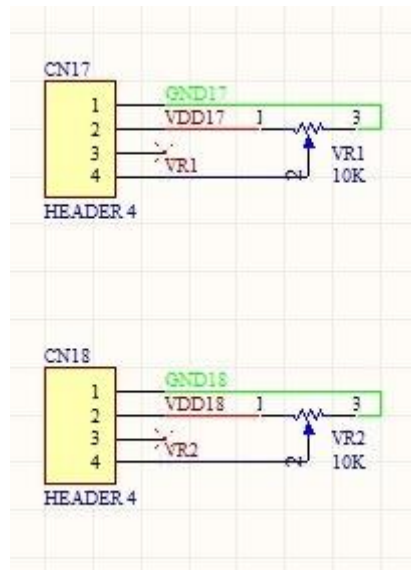


Figure 10 – Rotary Potentiometer Module

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.

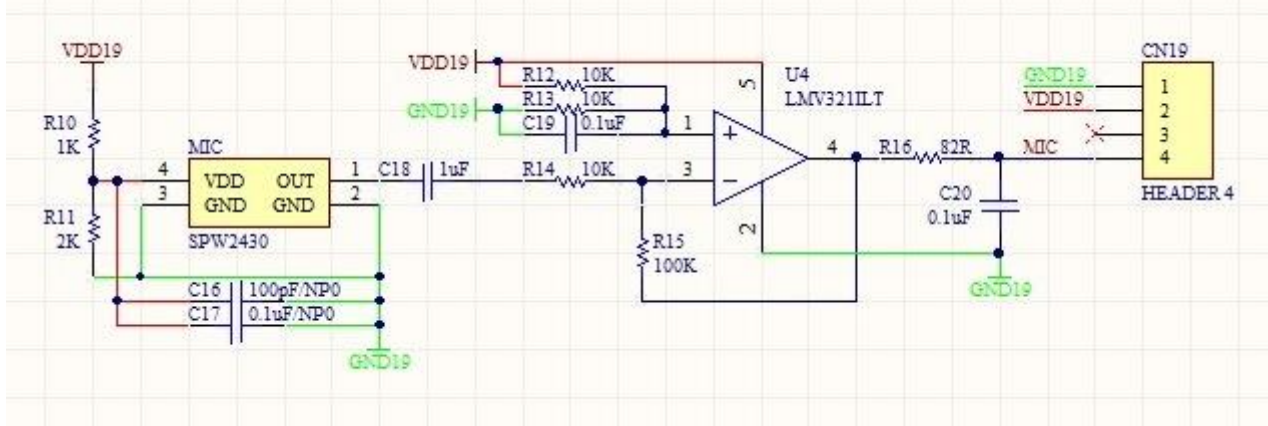


Figure 11 – Microphone Module

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.

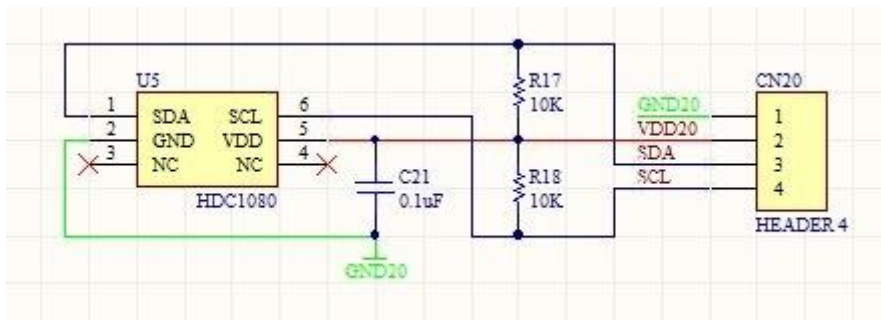


Figure 12 – Temperature & Humidity Sensor Module

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.

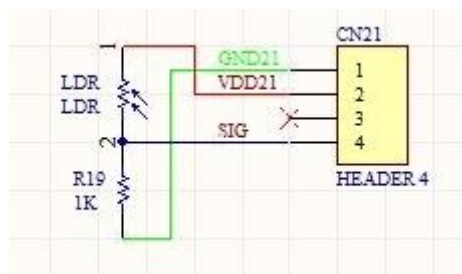


Figure 13 – Light Sensor Module

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

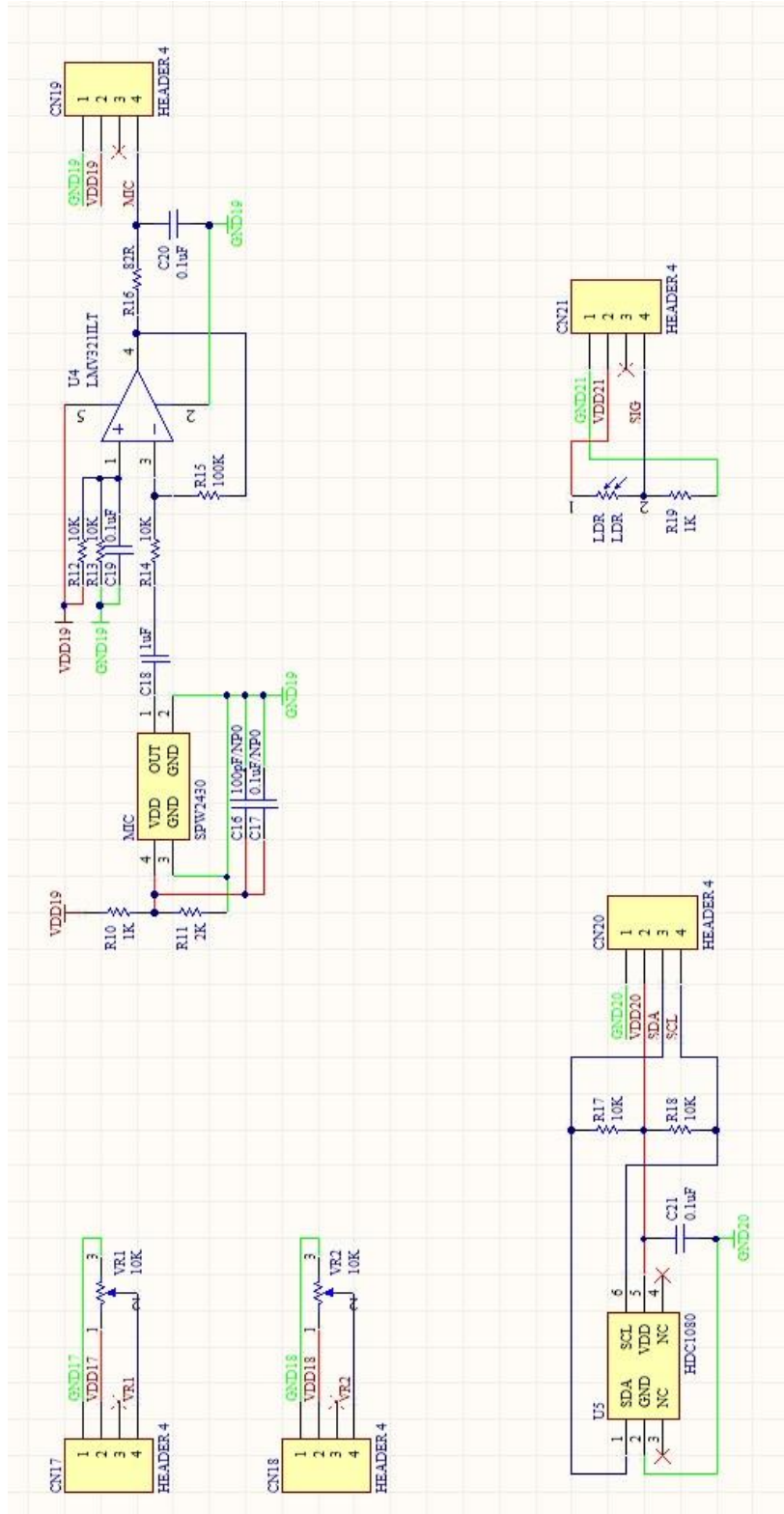


Figure 15 – Sheet 2 – Daughter Boards

7 Mechanical Dimensions

7.1 CleIO-Shield Main Board Dimensions

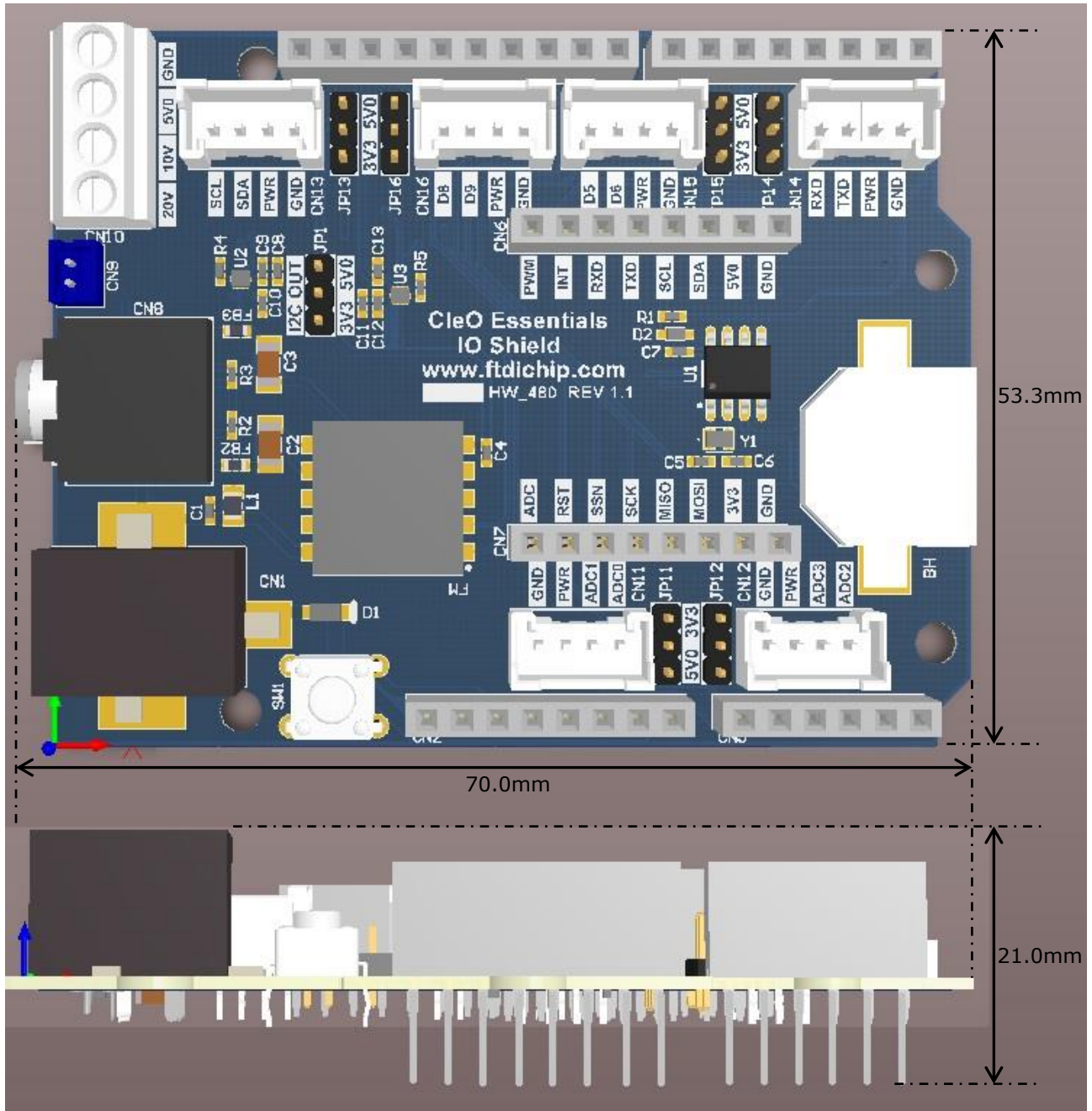


Figure 16 – CleIO-Shield Main Board Dimensions

7.2 Daughter Boards Dimensions

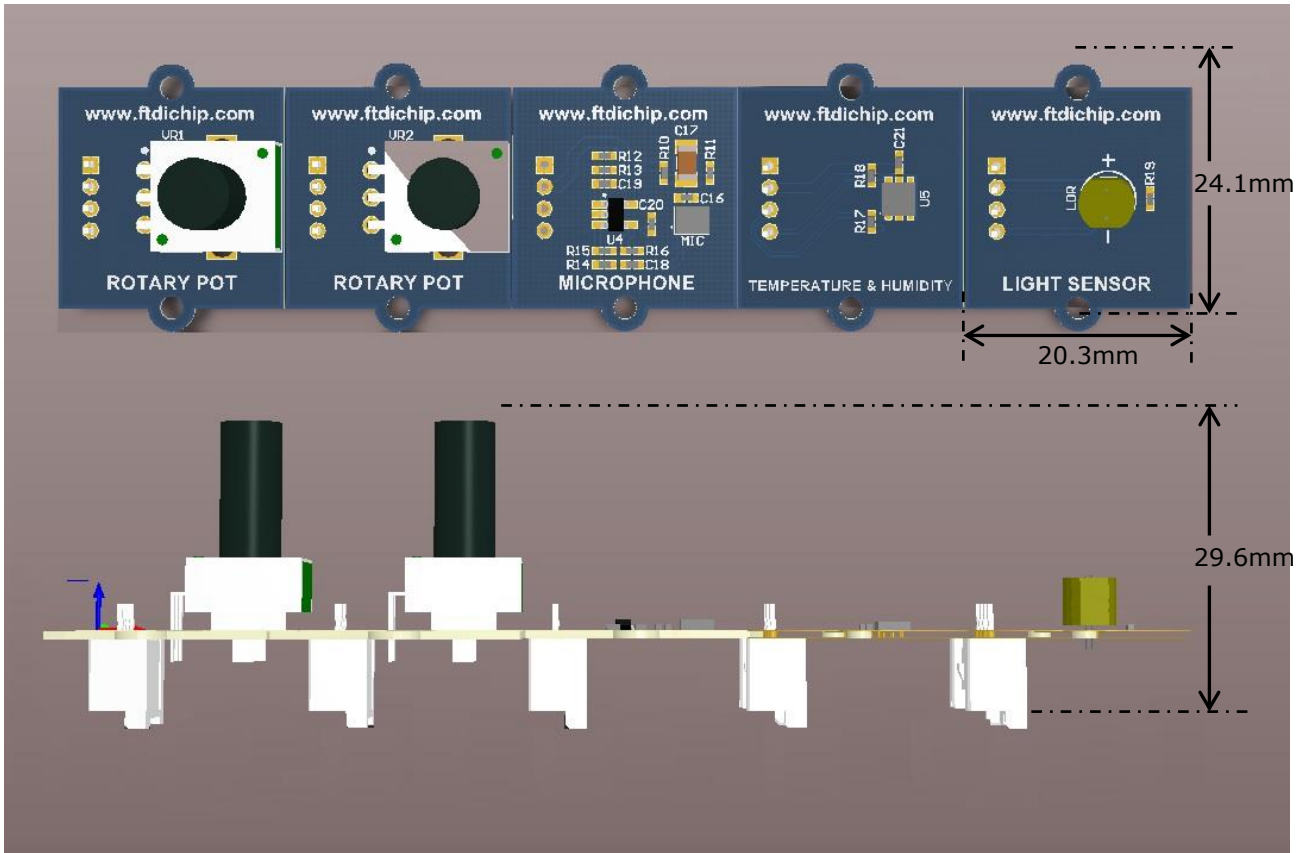


Figure 17 – Daughter Boards Dimensions

8 Contact Information

Headquarters – Singapore

Bridgetek Pte Ltd
178 Paya Lebar Road, #07-03
Singapore 409030
Tel: +65 6547 4827
Fax: +65 6841 6071

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office – Taipei, Taiwan

Bridgetek Pte Ltd, Taiwan Branch
2 Floor, No. 516, Sec. 1, Nei Hu Road, Nei Hu
District
Taipei 114
Taiwan, R.O.C.
Tel: +886 (2) 8797 5691
Fax: +886 (2) 8751 9737

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Branch Office - Glasgow, United Kingdom

Bridgetek Pte. Ltd.
Unit 1, 2 Seaward Place, Centurion Business Park
Glasgow G41 1HH
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales) sales.emea@brtchip.com
E-mail (Support) support.emea@brtchip.com

Branch Office – Vietnam

Bridgetek VietNam Company Limited
Lutaco Tower Building, 5th Floor, 173A Nguyen
Van Troi,
Ward 11, Phu Nhuan District,
Ho Chi Minh City, Vietnam
Tel : 08 38453222
Fax : 08 38455222

E-mail (Sales) sales.apac@brtchip.com
E-mail (Support) support.apac@brtchip.com

Web Site

<http://brtchip.com/>

Distributor and Sales Representatives

Please visit the Sales Network page of the [Bridgetek website](#) for the contact details of our distributor(s) and sales representative(s) in your country.

System and equipment manufacturers and designers are responsible to ensure that their systems, and any Bridgetek Pte Ltd (BRT Chip) devices incorporated in their systems, meet all applicable safety, regulatory and system-level performance requirements. All application-related information in this document (including application descriptions, suggested Bridgetek devices and other materials) is provided for reference only. While Bridgetek has taken care to assure it is accurate, this information is subject to customer confirmation, and Bridgetek disclaims all liability for system designs and for any applications assistance provided by Bridgetek. Use of Bridgetek devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold harmless Bridgetek from any and all damages, claims, suits or expense resulting from such use. This document is subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Neither the whole nor any part of the information contained in, or the product described in this document, may be adapted or reproduced in any material or electronic form without the prior written consent of the copyright holder. Bridgetek Pte Ltd, 178 Paya Lebar Road, #07-03, Singapore 409030. Singapore Registered Company Number: 201542387H.

Appendix A – References

Document References

For module documentations, please refer to URL below:

FM Radio RDA5807M datasheet: [FM Radio RDA5807 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 |

Appendix B - List of Figures and Tables

List of Tables

| | |
|---|----|
| Table 1 - Pin Mapping of CN2 | 6 |
| Table 2 - Pin Mapping of CN3 | 7 |
| Table 3 - Pin Mapping of CN4 | 7 |
| Table 4 - Pin Mapping of CN5 | 7 |
| Table 5 - Pin Mapping of CN6 | 8 |
| Table 6 - Pin Mapping of CN7 | 8 |
| Table 7 - Pin Mapping of CN11 | 9 |
| Table 8 - Pin Mapping of CN12 | 9 |
| Table 9 - Pin Mapping of CN13 | 10 |
| Table 10 - Pin Mapping of CN14 | 10 |
| Table 11 - Pin Mapping of CN15 | 10 |
| Table 12 - Pin Mapping of CN16 | 10 |
| Table 13 - Temperature Parameter | 14 |
| Table 14 - Operating Voltage and Current..... | 14 |

List of Figures

| | |
|---|----|
| Figure 1 – CleOIO-Shield Top View | 4 |
| Figure 2 – Five Daughter Modules Top View | 4 |
| Figure 3 – Power Supply..... | 5 |
| Figure 4 – Arduino Interface | 6 |
| Figure 5 – MikroBUS Headers..... | 8 |
| Figure 6 – Grove-Universal 4pin Connectors | 9 |
| Figure 7 – FM Module..... | 11 |
| Figure 8 – RTC Module | 11 |
| Figure 9 – Voltmeter Module | 12 |
| Figure 10 – Rotary Potentiometer Module | 12 |
| Figure 11 – Microphone Module..... | 13 |
| Figure 12 – Temperature & Humidity Sensor Module..... | 13 |
| Figure 13 – Light Sensor Module | 13 |
| Figure 14 – Sheet 1 – CleOIO-Shield Main Board | 15 |
| Figure 15 – Sheet 2 – Daughter Boards..... | 16 |
| Figure 16 – CleOIO-Shield Main Board Dimensions | 17 |
| Figure 17 – Daughter Boards Dimensions | 18 |

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 |