

# Rdot Display

Evaluation Kit Guide  
Rev. 2020-01-28



## Version history

Version	Date	Description	Change by
V1.0	2020-01-28	First issue	Felix Karlsson
V1.1	2020-02-10	Minor fixes	Felix Karlsson

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## 1. Evaluation Kit Overview

The evaluation kit has been developed for testing and rapid prototyping purposes. We also offer [R&D services](#), [prototyping production](#), and [roll-to-roll mass-production](#). The standard evaluation kit contains the following items:

- Rdot Displays**
  - 1 Electrochromic segment displays with different segments, shapes, and symbols, suitable for testing and evaluation.
  
- Display Clicker**
  - 2 Manual display controller for ON/OFF operations
  
- Flexible Display Adapter**
  - 3 For convenient connection of the flexible displays on a plastic substrate to rigid electronics (such as development boards), either with FFC/FPC connector or ACF (anisotropic conductive film)
  
- Arduino Shield and Library**
  - 4 Optimized for rapid prototyping with Arduino Uno
  
- ACF Strip**
  - 5 Double-sided adhesive ACF strip for connecting the displays to a (flexible) PCB or the Flexible Display Adapter

## 2. Getting Started

We recommend starting the evaluation by using the Display Clicker to get a feeling of how the displays work and behave when a positive voltage, negative voltage, or no voltage is applied. Please read more detailed instructions on how to use the Display Clicker on [page 3](#).

As a next step in the evaluation process, we recommend to either use the included Arduino Shield to drive the displays, or the Flexible Display Adapter/ACF Strip to build your own prototype. More details on [page 4](#) and [page 5](#).

**Please note** that if the displays do not fit to a connector, simply use a pair of scissors to cut the electrodes and/or excessive plastic into a suitable size and shape. You can also apply regular tape on the opposite side of the connector tail if the substrate is too thin to stick into the connector.

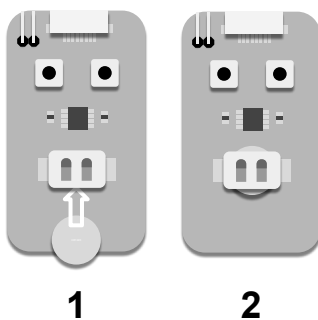
[Link to datasheet](#)

### 3. Manual Display Operation

A positive voltage across the pixel activates the dark state while a negative voltage activates the bright state. No applied voltage results in no color change, for both the bright and the dark state. This phenomenon is referred to as bistability. The display will however eventually fade out to its natural state (bright state), typically within hours or days.

The display requires approximately  $\pm 2.2V$  to reach full contrast and the voltage should not exceed 3.3V to avoid degradation or damage.

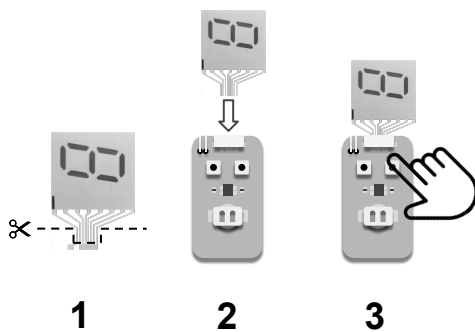
**Cation: Stop applying a voltage when no more color change can be observed. Excessive activation or deactivation may cause damage to the displays.**



#### Insert the battery

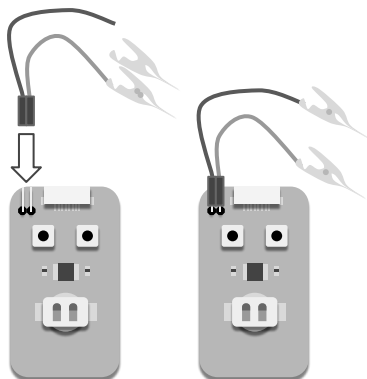
1. Push the battery (CR1220) into the battery holder.
2. Use the right button to turn on and the left button turn off.

*Note: please remove the battery if you are not using the device for a long time.*



#### FPC/FFC Connector

1. If needed, cut the display with a pair of scissors to enable individual addressing.
2. Attach it to the FPC/FFC connector. The leftmost electrode (common) on the display must be attached to the leftmost electrode in the connector.
3. Press the right button to turn the display on. Use the left button to turn it off.



#### Flat Connector Cables

*Not all display designs fit in the FPC connector, if that is the case, connector cables may be attached to the controller.*

1. Attach the cables to the pins on the top left of the PCB
2. Connect the left cable to the common electrode (marked with black) and the right cable to the work electrode(s).

## 4. Display Driving with Arduino Shield

The standard Evaluation kit contains an Arduino Shield suitable for Arduino Uno. The source code and a wiki page exist on Github ([https://github.com/rdotdisplays/RDOT\\_ECD/wiki](https://github.com/rdotdisplays/RDOT_ECD/wiki)).

[Link to Rdot Displays Github Wiki](https://github.com/rdotdisplays/RDOT_ECD/wiki)

### Connect the Rdot Display to the Arduino Shield

We recommend using a single-digit Rdot Display (seven-segment display) for the Arduino shield since it is the most compatible with the software library.

There are two options to connect the display to the Arduino Shield:

1. The on-board FPC/FFC connector
  - Included FPC/FFC: [Molex 52852-0870](#) (1 mm pitch)
  - Carefully insert the display and make sure that the electrodes are aligned
  - Please note that if the displays do not fit to a connector, simply use a pair of scissors to cut the electrodes and/or excessive plastic into a suitable size and shape.
  
2. ACF Film
  - Included ACF: [3M Electrically Conductive Adhesive Transfer Tape 9703](#)
  - The Arduino Shield will either have a piece of ACF attached to the board or there will be a separate strip of ACF
  - The ACF is similar to a double-sided adhesive tape and will be conductive if the electrodes of the display and the Arduino Shield are vertically aligned and overlapped. The ACF is only conductive in the Z-axis.
  - Please note that the protective film from the ACF needs to be removed. It should be adhesive on both sides.
  - Make sure to vertically align the electrodes and apply pressure for about 10 seconds
  - The display should now be connected to the Arduino Shield.
  - It is possible to remove the display from the ACF, but it is not recommended since the electrodes of the display might tear off the display.

### Arduino Shield Circuit and Arduino Source Code

- The Arduino Source code implements “Driving Scheme C” described in section 11 in the [Rdot Display Datasheet](#).
- The Arduino Shield implements “Example Circuit D” described in section 12.1 in the [Rdot Display Datasheet](#).

## 5. Miscellaneous

If you would like to develop prototypes with other development boards than an Arduino Uno, we recommend using the FPC/FFC-to-Pin adapter.

### Connect the Rdot Display to the FPC/FFC-to-Pin Adapter

1. Included FPC/FFC: [Molex 52852-0870](#) (1 mm pitch)
2. Carefully insert the display and make sure that the electrodes are aligned
3. Please note that if the displays do not fit to a connector, simply use a pair of scissors to cut the electrodes and/or excessive plastic into a suitable size and shape.

### Software and Hardware implementation discussion

There are multiple ways to implement the software and hardware solution for the display driver. The factors that decide the optimal display driving solution include:

- Number of display segments
- Operating scenario, lifetime, and environment
- Existing system architecture
- Cost

There are several suggestions regarding both software implementation and driver circuit implementations described in the [datasheet](#). Feel free to contact [support@rdotdisplays.com](mailto:support@rdotdisplays.com)

[Link to Rdot Displays Datasheet](#)