

# Micro:bit Circular RGB LED Expansion Board SKU: ROB0150



# Introduction

This board can be a cool clock, a timer, a Lucky Turntable Game, a wearable ornament, and an interactive colored pendant. With a micro:bit main board, this 24 RGB LEDs circular expansion board changes to an exquisite creator's piece. You can turn it into a tomato timer via the onboard buzzer, and turn it into a colorful music spectrometer through the onboard microphone; There are two external ports P0, P1 in reserve, so you can get more ways to play by connecting a large number of boson and gravity sensors. With different paper-cuts and acrylics, you can put on a variety of new clothes for the expansion board. For example, put on red Chinese knot for it in Chinese New Year, put on the cartoon face for it at Children's Day, put on the snow or Christmas tree for it at Christmas......

## **Features**

- Support USB interface power supply and direct use of power-bank power supply or USB computer power supply.
- Support PH2.0 interface power supply and the battery box or lithium battery power supply are both OK
- 24 RGB single-line lights, 16 million colors free mixing
- Makecode graphical programming
- Onboard microphone and buzzer
- Leaded out P0 and P1 interfaces, and distribute with the connection line, support the boson expansion modules.
- Ultra-thin volume, more suitable for wearable and strap applications.

# **Specification**

- Supply Voltage:3.5~5V
- WS2812 Single-line RGB LEDs x 24
- Onboard buzzer x 1
- Onboard microphone x 1
- Number of interfaces: IO expansion board(P0,P1)x2, PH2.0 Power Interface x1, USB power Interface x1

# **Function Description**

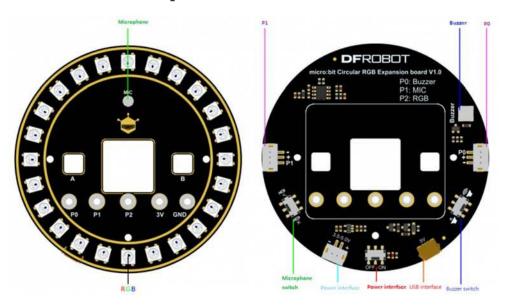
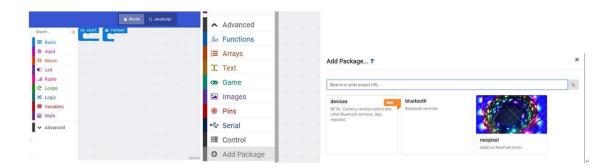


Fig1:ROB0150 Function Description

Note: After uploading the micro: bit program you need to connect the USB cable to the expansion board for power, You can also use 3.5-5.0 V power supply to power from the expansion board battery!

# **Makecode Tutorial Examples**

- Click and enter the graphic programming: <a href="https://makecode.microbit.org/">https://makecode.microbit.org/</a>
- Preparation work, add the **neopixel** software package, in other words, loading the lamp ring library; the steps are as follows.



Add the software package

# **Rotated Circular Light**

Click and enter the graphic programming: <u>The Graphic Programming of Rotated Circular Light</u> **Effect:** The 9 RGB LEDs display 9 colors (gradients), and then on the lamp ring the nine RGB LEDs display the 9 colors in a continuous loop just like a waterfall light.

```
on start
  set LED v to
                  NeoPixel at pin P2 with 24
                                                     leds as RGB (GRB format)
               clear
      LED .
                                                                            to [ 255
                                                     show rainbow from 0
                    range from 🛛
                                    with [ 9
                                               leds
               set brightness (
      LED •
                               100

    pause (ms)

# forever
              rotate pixels by [ 1
              show
    pause (ms)
```

Rotated Circular Light

Light up 9 LEDs from the No. 0 LED

```
range from (0) with (9) leds show rainbow from (0) to (255)
```

Light up 9 LEDs from the No. 0 LED and the color range 0~255.

```
○ LED ▼ set brightness 100
```

Set the brightness of the LED to 100

```
○ LED ▼ rotate pixels by 1
```

Set the rotation speed

#### Modify to solid color rotation effect

Click and enter the graphic programming: Yellow Rotating Circular Light

```
on start
  set LED v to
                 ∴ NeoPixel at pin P2 with 
                                                   leds as RGB (GRB format)
                                               24
     LED •
              clear
                                                   show color (
                                                                  yellow •
       LED •
                                   with [ 9
                                             1eds
                   range from ( 0
              set brightness (
     LED ·
                              50
  Ⅲ pause (ms) ( 50
Ⅲ forever
              rotate pixels by [1
     LED .
     LED 🔻
              show
  ## pause (ms) ( 50
```

solid color

Modify the color behind the show color to get other solid color rotation effects.

### Sound Control Circular Light

Click and enter the graphic programming: <u>The Graphical Programming of Voice Control Circular</u> Light

**Effect:** Light up 24 RGB LEDs in sequence according to the size of the detected sound, forming a gradual pulsating light ring.

```
on start
                    NeoPixel at pin P2 with 24
                                                     leds as RGB (RGB format)

    show icon

Ⅲ forever
  set RGB v to
                       map
                             0
                                analog read pin P1 ·
                             0
                   from low
                  from high
                             200
                    to low
                             23
                   to high 🛭
  show number RGB
              clear
      LED .
                                                         show rainbow from 255
                                    with RGB *
       LED +
                   range from (
                                                  leds
                                0
              set brightness [ 100
      LED •
      LED .
              show
```

Sound Control Circular Light

By modifying the "Map" to change the relationship between sound intensity and the number of alight leds. 0~300 represents the range of sound; 0~23 represents 24 RGB LEDs.

## Control the Circular Light via Key A, B

Click and enter the graphic programming: <u>Control the Annular Light via Key A, B</u> **Effect:** Turn on the power, then 24 RGB LEDs display some colors randomly in the beginning. When key A is pressed, executing the waterfall light mode once; When B is pressed, the circular light refreshes the color in every 20ms, and there are 7 colors at all.

```
on start
               NeoPixel at pin P2 with 24 leds as RGB (GRB format) v
  repeat ( 10 times
      the least show rainbow from [ 1]
                                          pick random 0 to 1 360
        LED .
                set brightness $ 50
      III show icon
⊙ on button A pressed
  for RGB2 - from 0 to 24
                                                     show rainbow from [ 255] to [ 0]
          C LED range from RGB2 with 1 leds
     Ⅲ pause (ms) ( 200
        LED set brightness 50
     C LED
     O LED show
          C (LED v range from ( 24 C ) ( RGB2 v
                                                                 show rainbow from [ 230 to [ 255
                                                   with [ 1 leds
⊙ on button B pressed
  for RGB4 from 0 to 6
      for RGB3 from 0 to 24
                                                         show rainbow from [1] to [ RGB4 + + + 1
              C LED range from RGB3 with 1 leds
          Ⅲ pause (ms) [ 20
```

Control the Circular Light by Key A, B

RGB LEDs display color randomly when power on.

```
pick random 0 to $360
```

Display colors randomly

When key A is pressed, two-way waterfall light is started, that is, forward, reverse simultaneously.

```
Of the contract of the contrac
```

Forward Waterfall Light

```
C | LED | range from 24 - RGB2 | with 1 leds | show rainbow from 230 to 255
```

Reverse Waterfall Light

When key B is pressed, the circular light is refreshed in every 20 ms.

```
show rainbow from 1 to RGB4 + 11
```

color+1, show 7 colors at all

## **Breathing Light**

Click and enter the graphic programming: Breathing Light

**Effect:** 24 RGB LEDs light up red at the same time, the brightness changes from weak to strong in loop, like breathing.

```
on start
                       ☼ NeoPixel at pin P2 with ( 24)
                                                            leds as RGB (GRB format)
  set r v to
Ⅲ forever
  change r by (
       lampion •
                   set brightness (
                                    20
       lampion •
                   show color
                                                            blue [
                                                green 🔰 0
       lampion •
                   show

    pause (ms)
```

**Breathing Light** 

#### **Tomato Timer**

The Pomodoro technique is a simple time management method. Essentially, it is to set a 25-minute work period and do only one thing in this period. So this is a 25 mins timer.

Click and enter the graphic programming: Tomato Timer

**Effect:** Press key A to start the program and light a LED on the main board in every minute. When all LEDs are on, the buzzer beeps; When key B is pressed, stops the buzzer and stops timing. The circular light refreshes the color in every second.

```
The forest temporary of the figures of the figures
```

**Tomato Timer** 

#### **Execution Process:**

Firstly, define some variables. Such as "X", "Y", "pressed", "minutes". Where "X" and "Y" are the LED dot matrix coordinates of the micro:bit board.

Turn on the leds

```
on button A pressed
 set pressed * to [ 1
 stop animation
 for Y from 0 to
                  4
  do
      for X from 0 to
     do
         Ⅲ pause (ms)
                       60000
         if
                    remainder of
         then
               plot x
         else
               plot x
 Ⅲ pause (ms) 🚺
               60000
```

Set Dot Matrix

Set Time Minutes<25;minutes+1; When minutes=25, the buzzer rings;

```
Ⅲ forever
  if
                                and •
            pressed •
                                       minutes • 25
                       then
       change minutes • by [ 1
       Ⅲ pause (ms) ( 60000
          minutes •
  then
                                                       show color
                                                                    purple .
           C LED •
                      range from RGB •
                                       with ( 24
                                                 leds
                 set brightness [ 30
         LED •
                         ba ding . repeating once .
          start melody
```

Set Time

Set the effect of circular light

When key A is pressed, start the circular light program; refresh the color in every second.

Set the Effect

Calculation formula for the time interval between each RGB LED: 6000ms (1min) / 24 (24 RGB LEDs) / 60 (repeat 60 times) ≈41ms.