mi:node

User Manual

FOR MICRO:BIT V2

Table of Contents

1) Introduction

1.1 Overview

The mi:node kit is a modular, safe and easy to use group of accessories that work along the BBC micro:bit to help introduce children to the Internet of Things (IoT) – a term created to describe the growing network of devices that are able to connect to the Internet, collect data and exchange information.

With this kit there is no need for soldering, just connect and use. The construction of a working circuit can be easily completed in less than one minute.

1.2 Features

- Includes sensors for environmental and physical monitoring, as well as user interface modules (such as a switch) to allow a number of exciting projects including wearable applications and smart home devices.
- Rich education guide with lesson documentation and many project stories.
- Expandable
- Reusable

1.3 Kit Contents

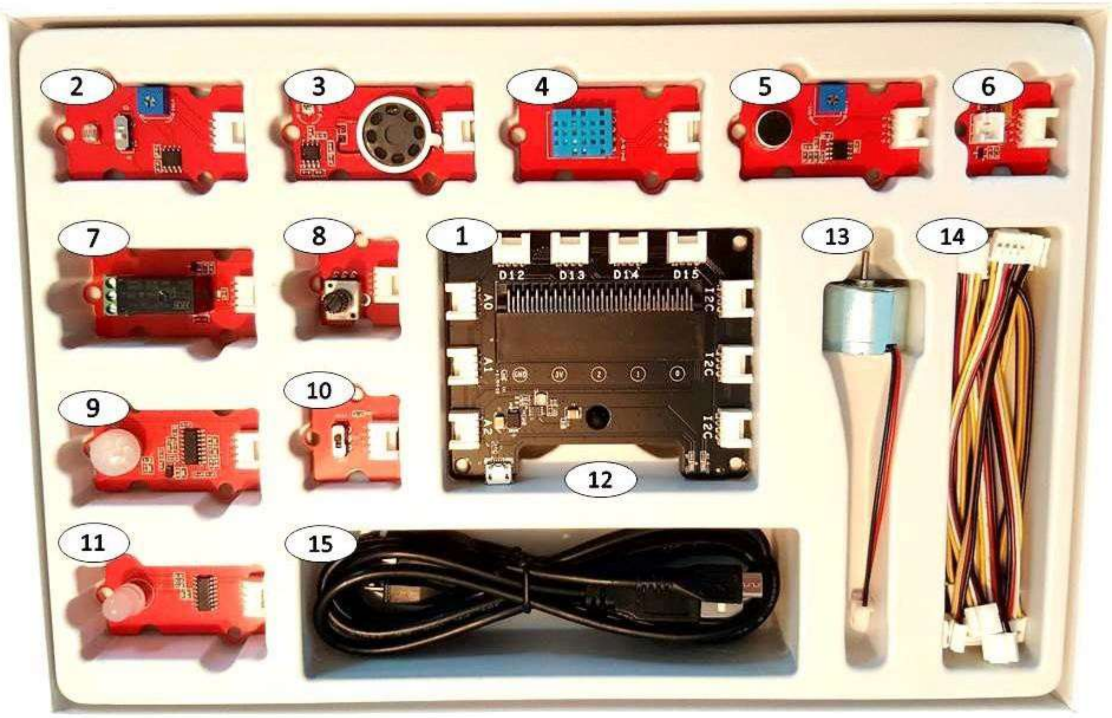


Image 1.3 – mi:node Kit Contents

Category	#	Module	Qty	Connector Type	Description
Connect Board	1	Connect Board	1	NA	A bridge between the micro:bit and the mi:node sensor modules
Sensor Modules (10)	2	Light Sensor	1	Analog Input	Detects the intensity of light in an environment
	3	Speaker	1	Analog Output/ PWM	Voice output amplifier
	4	Temperature and Humidity Sensor	1	Analog Input	Senses temperature and humidity within the environment
	5	Sound Sensor	1	Analog Input	Detects the sound strength within an environment
	6	Mini Fan	1	Analog Output/ PWM	A connector board for the DC Motor and Orbit Fan
	7	Relay	1	Digital Output	A digital switch used to control high-voltage electrical devices, up to a maximum of 250V
	8	Rotary Angle	1	Analog Input	A switch with a 0 - 300 degree dial used to control voltage output from 0V to maximum
	9	PIR Motion Sensor	1	Digital Input	Senses motion; usually human movement within range
	10	Switch	1	Digital Input	Used to switch voltage ON/OFF
	11	RGB LED	1	Digital Output	A colorful Light Emitting Diode. The color and brightness can be programmed.
Accessories	12	Orbit Fan	1	Analog Input	Small handheld fan (Located under the Connect Board in the box)
	13	DC Motor	1	Analog Output/ PWM	Direct Current (DC) motor used to run the Orbit Fan using the Mini Fan connector board. Can be used to run other small devices as well.
Cables	14	E-Brick Connector Cable	8	N/A	Double ended cables of two different lengths used to connect sensor modules to the Connect Board. 2 x 20cm cable 6 x 10cm cable
	15	Micro-USB to USB Cable	2	N/A	Two cables, One for power input to the Connect Board. One for micro:bit program upload.

Table 1.3 – Kit Contents

* Note: BBC mi*cro:bit not include; sold separately.*

2) Getting Started

2.1 The Connector Board

The kit is comprised of a Connector Board and several sensor modules. The Connect Board is a bridge between the BBC micro:bit and the mi:node sensor modules. It converts the BBC micro:bit edge connector into several e-brick connectors. The sensor modules can then easily be attached to it using the provided e-brick cables.

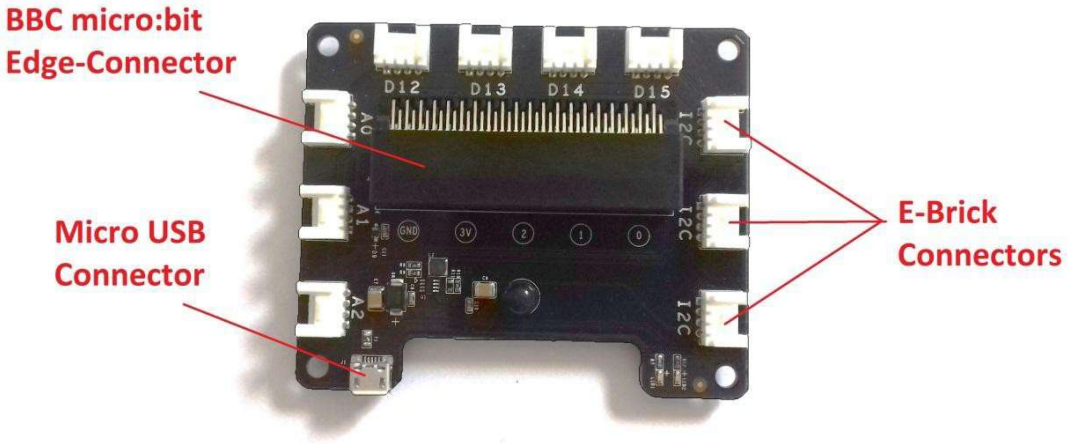


Image 2.1 – mi:node Connect Board

2.2 E-Brick Connectors

E-Brick Connectors are compatible with Grove –a standardized connector for prototyping systems created by the company called Seeed. This connector enables the mi:node to be a plug-and-play type product. The E-Brick Connectors each have 4 pins which connect directly to the E-Brick Connector Cables.

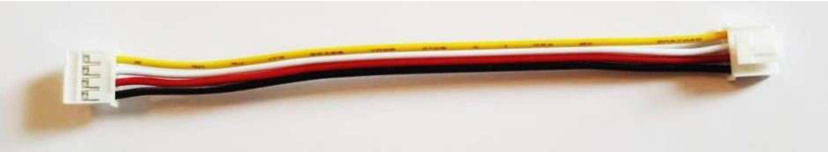


Image 2.2 – E-Brick Connector Cable

E-Brick Connector Pin-Out:

Pin No. (Cable Color)	Pin Name	Description
1 (Yellow)	Signal #1	This is a communication pin. It allows you to connect to the analog input, digital input/output, and the I2C functionality of the micro:bit so that you can read from and control your mi:node sensor modules.
2 (White)	Signal #2	This pin is a duplicate of Pin No. 1 described above. <u>Note:</u> Usually only one communication pin is required for most sensors.
3 (Red)	Vcc	Power connection.
4 (Black)	Gnd	Ground connection.

Table 2.2 – E-Brick Connector Pin-Out

2.3 Inputs

There are 3 different data transfer types between the E-Brick Connectors on the mi:node Connector Board.

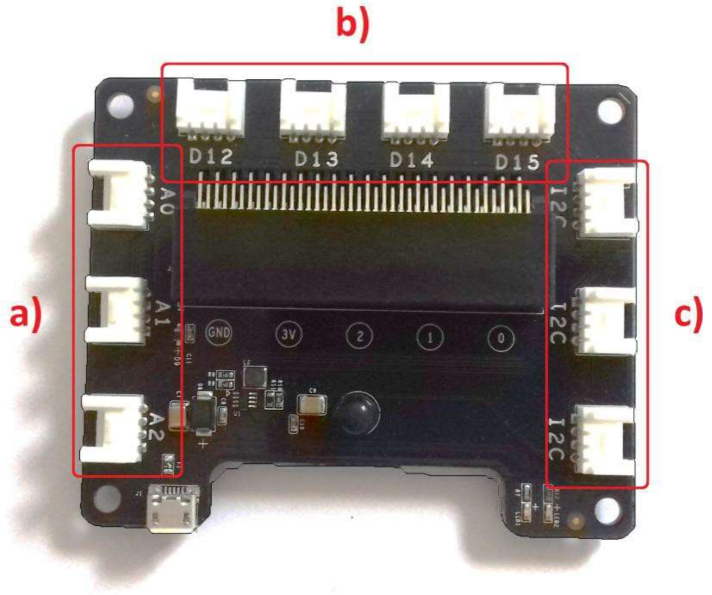


Image 2.3 – mi:node Connector Board 2

a) Analog In/PWM (Pulse Width Modulation)

Pulse Width Modulation (PWM) is a technique used to encode a message into a pulsing signal. Its main use is to allow the control of the power supplied to electrical devices, such as motors.

Pin Name	Description
A0	Connects to a micro:bit pin with analog input or PWM function
A1	Connects to a micro:bit pin with analog input or PWM function
A2	Connects to a micro:bit pin with analog input or PWM function

b) Digital IO

Pin Name	Description
D12	Connects to a micro:bit pin with digital IO (input or output) function
D13	Connects to a micro:bit pin with digital IO (input or output) function
D14	Connects to a micro:bit pin with digital IO (input or output) function
D15	Connects to a micro:bit pin with digital IO (input or output) function

c) I2C (Inter-Integrated Circuit)

This is a form of electronic communication standard that requires two signals, a data signal and a clock signal. It allows information to be sent in packages, on what is called a bus, to and from the BBC micro:bit and any attached sensor modules.
It also allows you to communicate to several sensor modules using the same bus. This is

done by identifying each sensor module with a different address.

Pin Name	Description
I2C SCL	I2C clock signal. Connect to micro:bit pin19
I2C SDA	I2C data signal. Connect to micro:bit pin20

2.4 Pin Mapping

Pin mapping is done to ensure the outputs from the mi:node E-Connector pins are correctly connected (or 'mapped')to the corresponding pins of the BBC micro:bit edge-connector. Below is a table illustrating the mi:node Pin Mapping.

Connector Type	Connector Name	micro:bit Pin Name
Analog Input /Digital IO	A0	pin0, pin1
	A1	pin1, pin2
	A2	pin2, pin3
Digital IO	D12	pin12, pin13
	D13	pin13, pin14
	D14	pin14, pin15
	D15	pin15, pin16
I2C	I2C	pin19, pin20
	I2C	pin19, pin20
	I2C	pin19, pin20

Table 2.4 – Pin Mapping

Typically using names that start with the letter 'A' (like A0,A1, A2) denote ANALOG inputs, but these connections can sometimes also be used as digital inputs or outputs.

Names starting with the letter 'D' can only be used to denote DIGITAL inputs and outputs. This is similar to the I2C in that it can only be used to denote I2C connections.

3) Usage

3.1 Programming Using mi:node

There are five different code editors to choose from on the BBC micro:bit official website.

- Microsoft PXT
- Code Kingdoms JavaScript
- Microsoft Block Editor
- Microsoft Touch Develop
- python

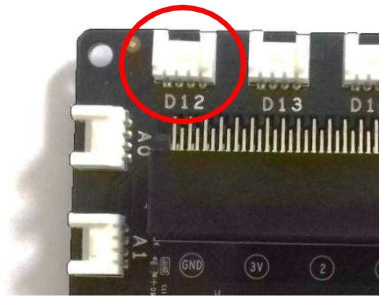
In this document we will focus on using the **Microsoft PXT** editor.

3.2 Working With mi:node Libraries

3.3 Working Without mi:node Libraries

You can also use the micro:bit pin library to control the sensor modules directly. To do so, the micro:bit pin ID is required. This ID can be found using the E-brick connector ID and the lookup table shown in *Table 2.4 – Pin Mapping* above.

For example, if you connect a sensor module to D12 on the Connector Board, from the table you can see that this connector corresponds to pin12 on the micro:bit.



Connector Type	Connector Name	micro:bit Pin Name
Digital IO	**D12**	**pin12**, pin13

3.4 Module Usage & API Reference

This section describes the main uses for each of the mi:node sensor modules and the API (Application Program Interface) references required to carry them out.

a) Light Sensor

The Light Sensor module can be used to detect the intensity of light in the surrounding environment.

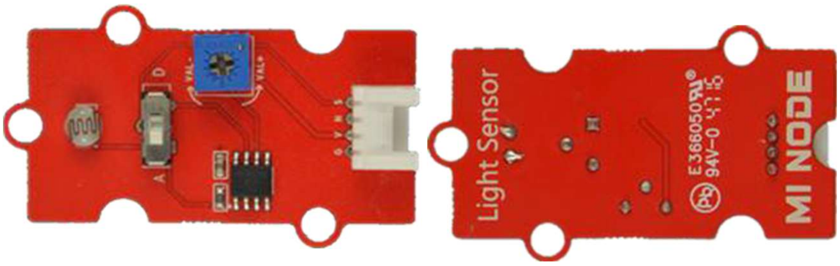


Image 3.4a – Light Sensor Module

This module requires an analog connection, therefore can only be plugged into A0, A1, or A3 on the Connector Board.

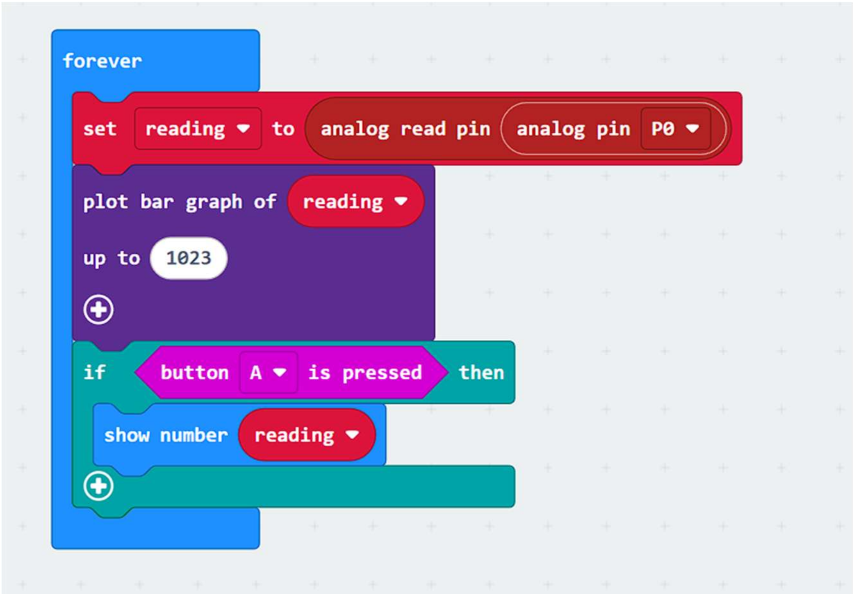
Module	Connect Type	Available Connectors
Light Sensor	Analog	A0, A1, A2

Electrical Characteristics

Parameter	Min.	Typical	Max.	Unit
Photoresistor (light intensity is 10lux)	5	-	10	kΩ
Threshold hysteresis ΔUth	-	VCC*0.09	-	V

Module	Connect Type	Connector
Light Sensor	Analog connect to	A0

Block API:



b) Temperature and Humidity Sensor (DHT11)

This sensor module features a temperature & humidity sensor with a calibrated digital signal output. It can measure temperature and humidity in the surrounding environment.

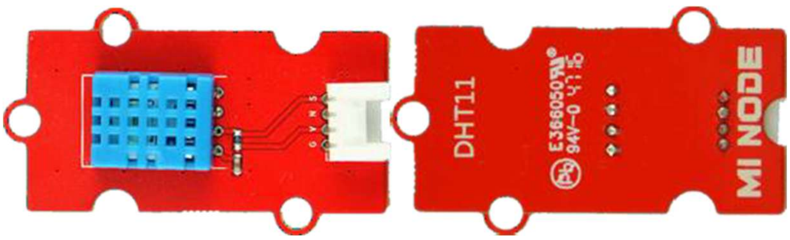


Image 3.4b – Temperature& Humitity Sensor Module

Module	Connect Type	Available Connectors
DHT11	Digital IO	D12, D13, D14, D15

Electrical Characteristics

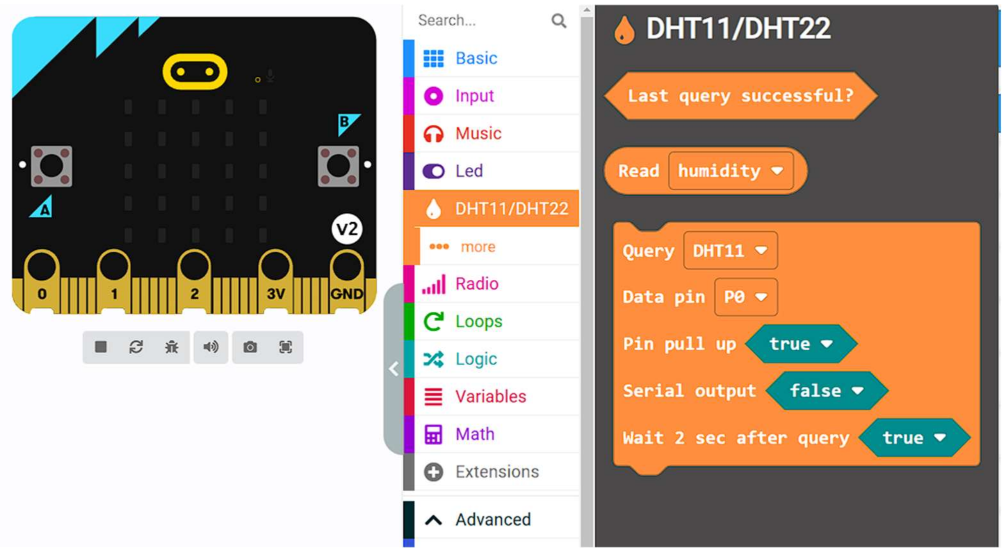
<u>Humidity</u>

Parameter	Min.	Typical	Max.	Unit
Accuracy (25℃)	-	±4	-	%RH
Accuracy (0-50℃)	-	-	±5	%RH
Measurement range (25℃)	20	-	95	%RH
Response time: 1/e (63%) 25℃， 1m/s air	6	10	15	s

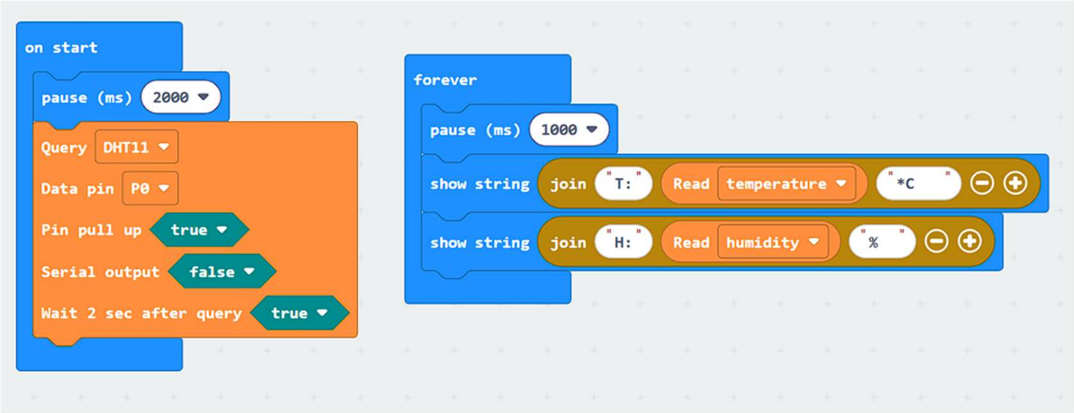
Temperature

Parameter	Min.	Typical	Max.	Unit
Accuracy	±1	-	±2	℃
Measurement range	0	-	50	℃
Response time /e (63%)	6		30	s

Block API



EXAMPLE:



c) Sound Sensor

The Sound Sensor Module can be used to detect the sound strength of the surrounding environment.

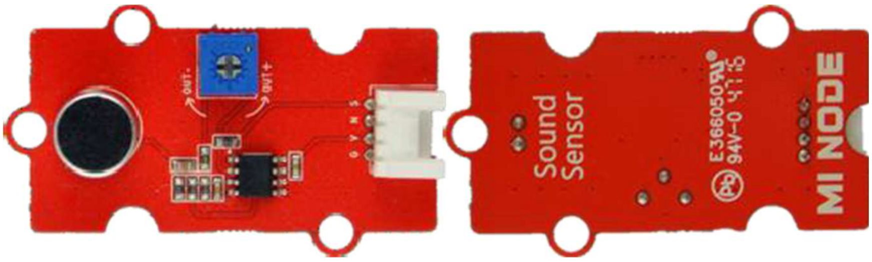


Image 3.4c – Sound Sensor Module

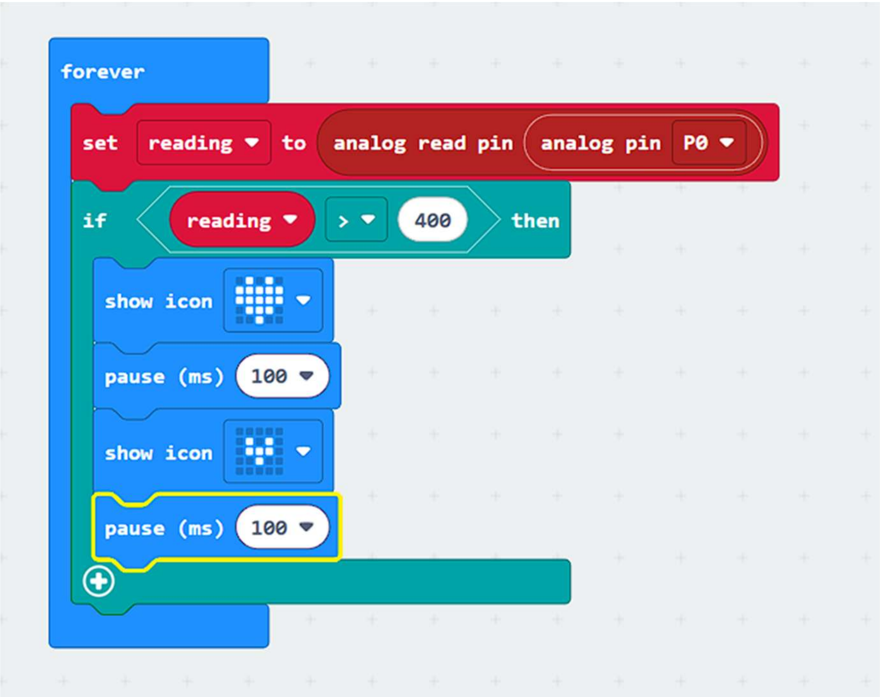
Module	Connect Type	Available Connectors
Sound Sensor	Analog	A0, A1, A2

Electrical Characteristics

Parameter	Min.	Typical	Max.	Unit
Frequency range	100	-	10000	Hz
Sensitivity	-	-50	-	dB

Module	Connect Type	Connector
Sound Sensor	Analog connect to	A0

Block API:



d) Rotary Module

The Rotary Module has a potentiometer that can produce analog output between 0 and Vcc (the supply voltage). This is done by turning the dial, adjusting the range from 0 – 300 degrees.

Image 3.4d – Rotary Module

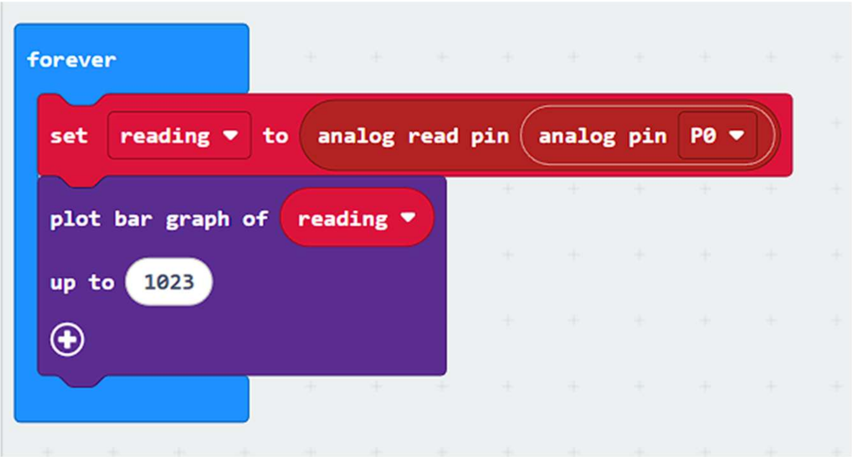
Module	Connect Type	Available Connectors
Rotary Sensor	Analog	A0, A1, A2

Electrical Characteristics

Parameter	Min.	Typical	Max.	Unit
Resistance range	0	-	10	kΩ

Module	Connect Type	Available Connectors
Rotary Sensor	Analog connect to	A0

EXAMPLE:



e) Mini Fan Module

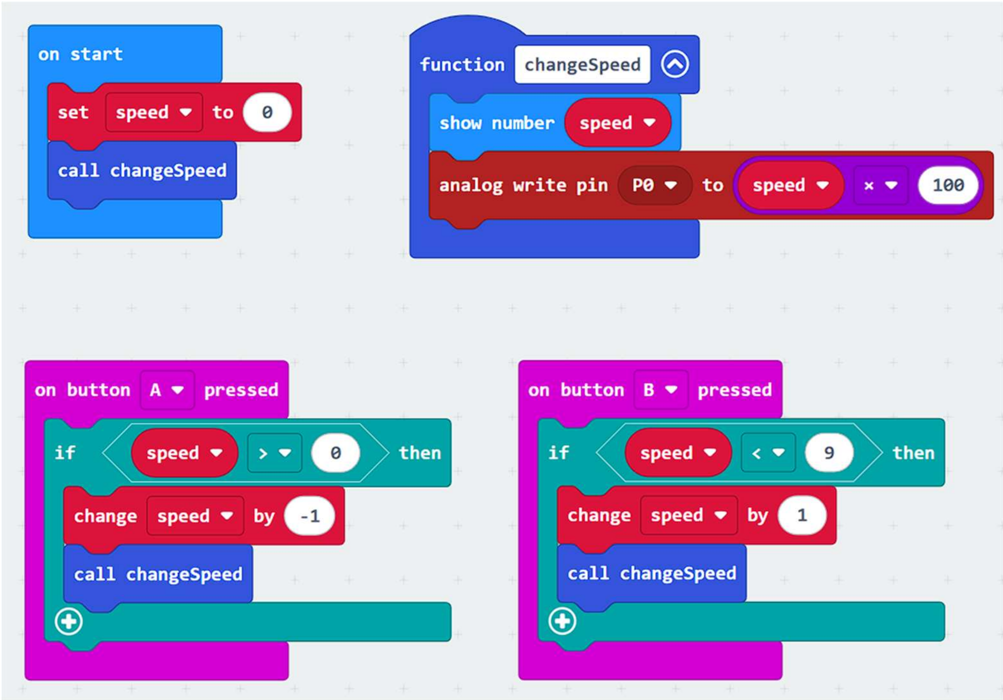
The mini fan module is designed to be used with the DC motor and Orbit Fan. The speed of the motor can be controlled according to different situations.

Image 3.4e – Mini Fan Module with DC Motor and Orbit Fan

Module	Connect Type	Available Connectors
Mini Fan Module	Analog	A0, A1, A2

Module	Connect Type	Connector
Mini Fan Module	Analog connect to	A0

EXAMPLE:



f) Speaker Module

The Speaker can be used to make a sound.

<u>NOTE:</u> As a default, the speaker is connected through pinP0 of the micro:bit, therefore it is important to connect the speaker module to Connector A0.

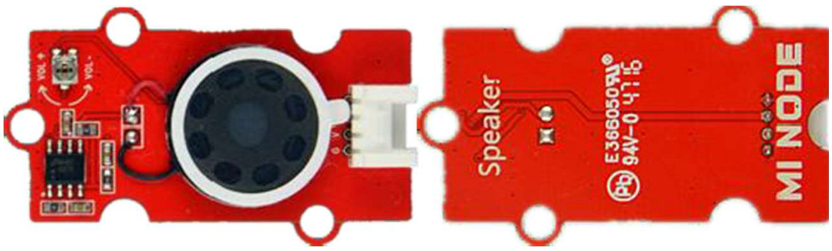
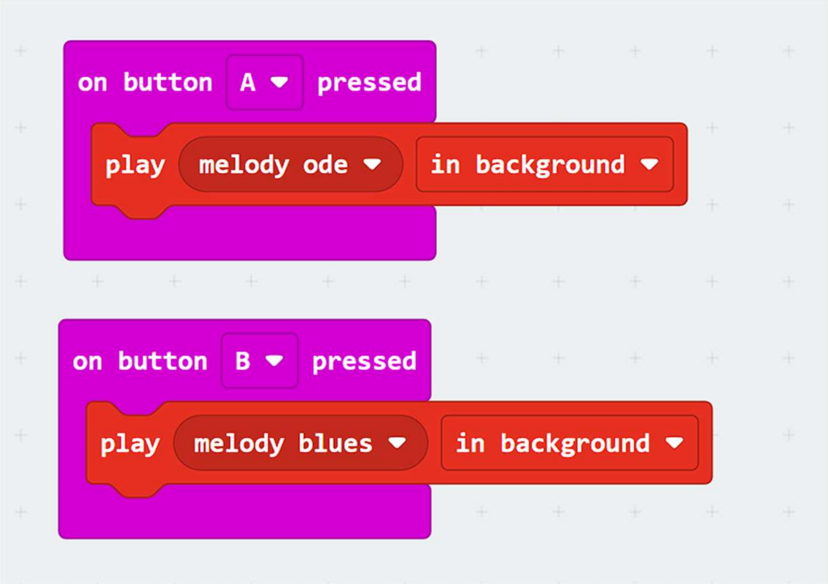


Image 3.4f – Speaker Module

Module	Connect Type	Available Connectors
Speaker Module	Analog	A0

EXAMPLE:



g) PIR Sensor Module

This PIR (passive infrared sensor) module detects movement, usually human, within its range. When the PIR detects motion the modules acts like a switch, the signal line will change from low to high and then stay high for 3 seconds before dropping back to low.

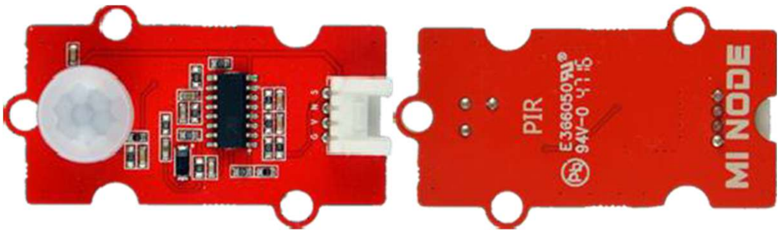


Image 3.4g – PIR Sensor Module

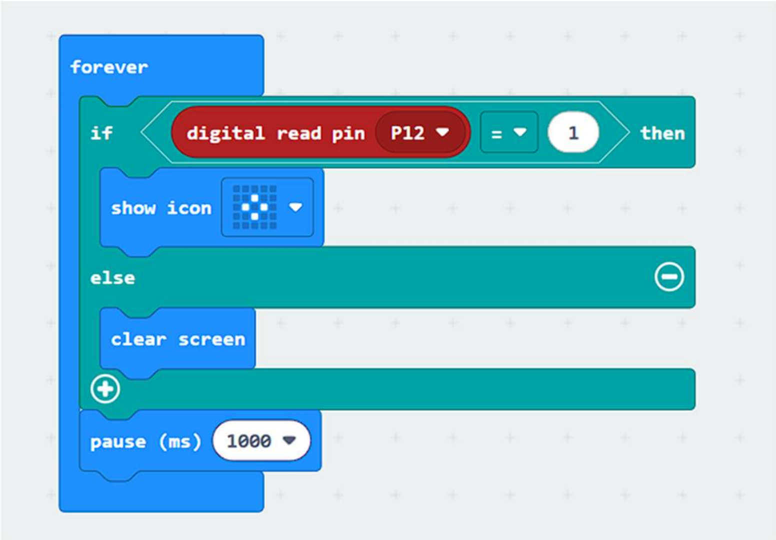
Module	Connect Type	Available Connectors
PIR Module	Digital IO	D12, D13, D14, D15

Electrical Characteristics

Parameter	Min.	Typical	Max.	Unit
Detection angle(solid angle)	-	-	110	°
Detection range	-	-	7	m
Delay time of high level	-	2.5	-	s

Module	Connect Type	Connector
PIR Module	Digital IO connect to	D12

EXAMPLE:



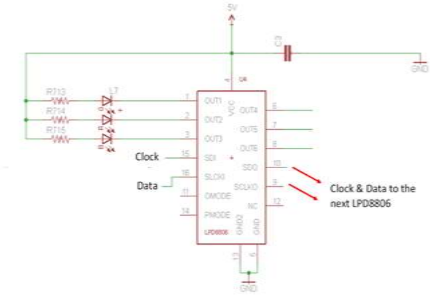
h) RGB LED Module

This module includes an LED that can display a number of different colors. The color and brightness can be programmed and are controlled by the greyscale value of red, green and blue, the circuit LPD8806.

Image 3.4h – RGB LED Module

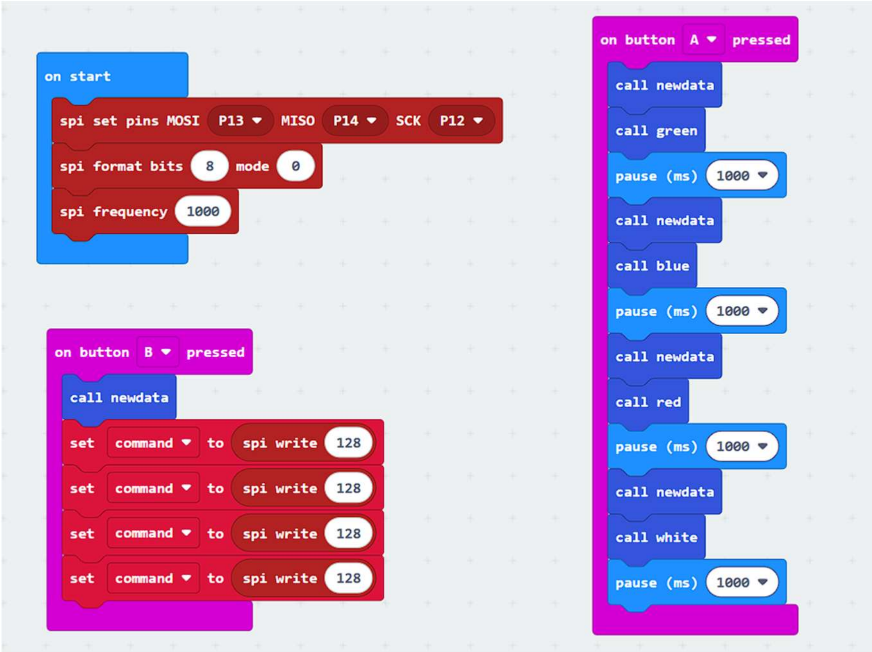
Module	Connect Type	Available Connectors
RGB LED	Digital IO	D12, D13, D14, D15

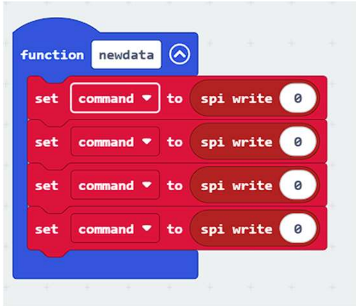
Module	Connect Type	Connector
RGB LED	connect to	D12

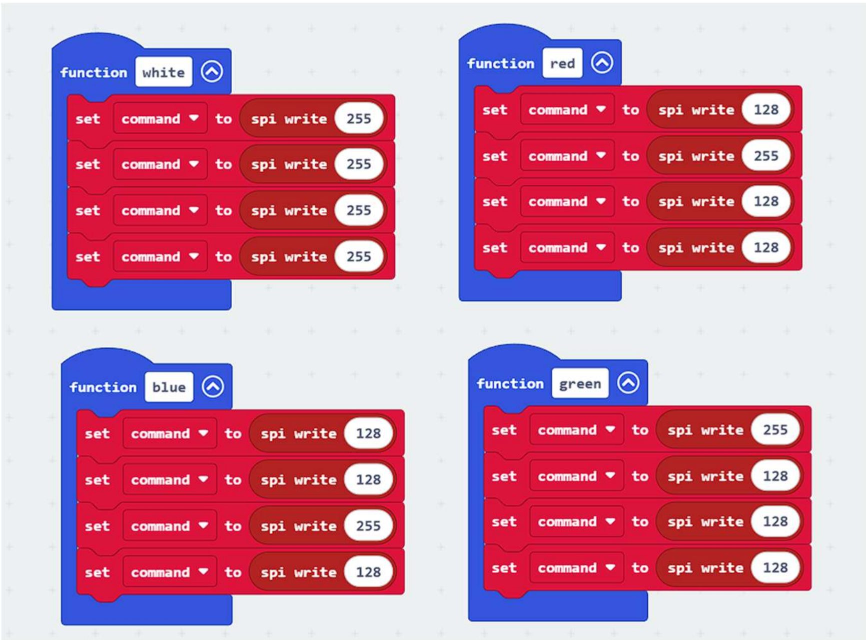


COLOR	BYTE 1	BYTE 2	BYTE 3
ONLY GREEN 100%	255	128	128
ONLY BLUE 100%	128	128	255
ONLY RED 100%	128	255	128
WHITE 100%	255	255	255
LED OFF 0%	128	128	128

EXAMPLE:


on start
spi set pins MOSI P13 MISO P14 SCK P12
spi format bits 8 mode 0
spi frequency 1000
on button A pressed
call newdata
call green
pause (ms) 1000
call newdata
call blue
pause (ms) 1000
call newdata
call red
pause (ms) 1000
call newdata
call white
pause (ms) 1000
on button B pressed
call newdata
set command to spi write 128
set command to spi write 128
set command to spi write 128
set command to spi write 128


function newdata
set command to spi write 0
set command to spi write 0
set command to spi write 0
set command to spi write 0


function white
set command to spi write 255
set command to spi write 255
set command to spi write 255
set command to spi write 255
function red
set command to spi write 128
set command to spi write 255
set command to spi write 128
set command to spi write 128
function blue
set command to spi write 128
set command to spi write 128
set command to spi write 255
set command to spi write 128
function green
set command to spi write 255
set command to spi write 128
set command to spi write 128
set command to spi write 128

i) Switch Module

The switch module can used to switch between two options (ie. on/off).

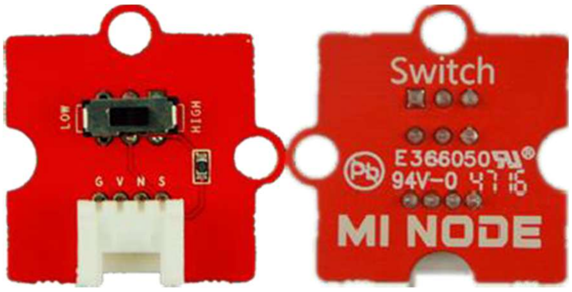


Image 3.4i – Switch Module

Module	Connect Type	Available Connectors
Switch Module	Digital IO	D12, D13, D14, D15

j) Relay Module

The relay is an electrically operated switch. It is a digital switch that can be used to control high-voltage electrical devices, such as some home appliances. (Up to a maximum of 250V).

***IMPORTANT:** It can be dangerous to attach the relay module to an AC(110V/220V) device. Our purpose for this module is to illustrate how home appliances can be controlled. It is NOT necessary to connect a real appliance. A ‘clicking’ sound can be heard when the relay switches ON/OFF.*

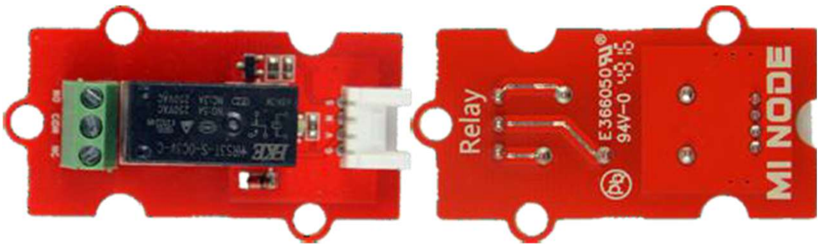


Image 3.4j – Relay Module

Module	Connect Type	Available Connectors
Relay Module	Digital IO	D12, D13, D14, D15

Electrical Characteristics

Parameter	Description
Contact Rating	NO:5A250VAC/28VDC NC:3A 250VAC/28VDC
Operate Voltage ≤ V dc	2.25
Release Voltage ≥ V dc	0.3

4) Appendix

4.1 Microsoft MakeCode

- Home: https://makecode.microbit.org
- Reference: https://makecode.microbit.org/reference
- MakeCode (PXT) Documentation: https://makecode.com/docs

4.2 Support

- Website: http://www.embest-tech.com/prod_view.aspx?TypeId=83&Id=383&Fid=t3:83:3
- Github Repository: http://github.com/minodekit

LPD-8803/8806 Datasheet

LPD8803/LPD8806 as a new generation of driver chips are designed for the LED lighting system, which uses industrial grade CMOS process, providing multi-channel constant current driver and grayscale modulation output, it is programable, LPD8803 and LPD8806 output 3chanhel and 6 channel respectively,signal particularly suitable for discrete multi-gray full-color lighting system.

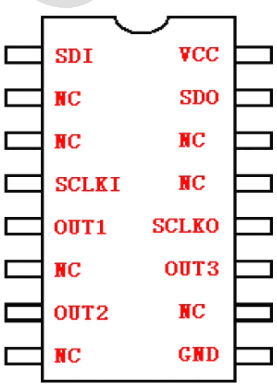
Features

1. Constant current driving mode, the default driving current is 18mA, supporting LED lighting voltage up to 12V.
2. LPD8803 support three-way output (pin downward compatible with LPD6803), LPD8806 support the six outputs (pin arrangement conducive to single-panel layout).
3. Two-wire control mode, the shift clock up to 20MHz.
4. Unique data clock regeneration mechanism, super signal drive capability, support cascading length over 2000 pixels.
5. Built-in 1.2M oscillation circuit, support FREE-RUN mode, easy to programable design (refresh rate greater than 4000Hz).
6. Built-in 256 independent PWM grayscale control circuit for each channel, 1024 grayscale effect can be achieved by programming.
7. The seven output polarity is Optional ,support an external drive or as a source of high-power LED driver circuit.
8. Industrial-grade design, input signal processing Schmidt, strong anti-interference performance.

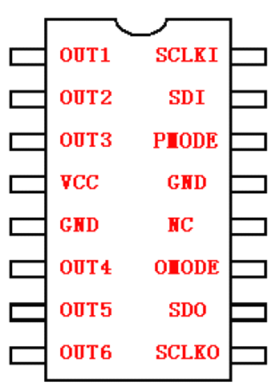
Applications

1. LED decorative lighting system
2. PWM signal generator
3. LCD backlight driver

Pin Figure



LPD8803



LPD8806

Pin Descriptions

SDI: Serial data input, built-in pull-up

SCLK1: Serial clock input, built-in pull-up

OUT1-OUT6: Drive output

SD0: Serial data output ,the strong internal drive output

SCLK0: Serial clock output, strong internal drive and renewable output

VCC: Power supply voltage is 3.3-5.5V, recommend an external the 10uF decoupling capacitor

OMOD: control output polarity, OMOD=1 or Null, Output of the constant current mode; OMOD=0, Output of the plug-in drive mode

PMOD: Control single-pixel output, PMOD=1 or Null, 6-channel output independent; PMOD=0,OUT1 and OUT2, OUT3 and OUT4, OUT5 and OUT6 are sync output, occupies only three sets of data on the data link

NC: Empty feet

GND: Ground

Limit Parameters

Absolute parameter

Parameter	Symbol	Range	Unit
supply voltage	V_{CC}	2.7~5.5	V
LED' voltage	V_{LED}	3~12	V
clk/dat frequecy	F_{CLK}	20	MHz
max drive-current	I_{OMAX}	20 (constant current)	mA
current deviation	D_{IO}	Inner <5%, External <6%	%
power consumption	P_{DMAX}	600	mW
solder temperature	T_M	250(8S)	℃
work temperature	T_{OP}	-40~+80	℃
storage temperature	T_{ST}	-65~+120	℃

Recommended Working Parameters

Recommand parameter：

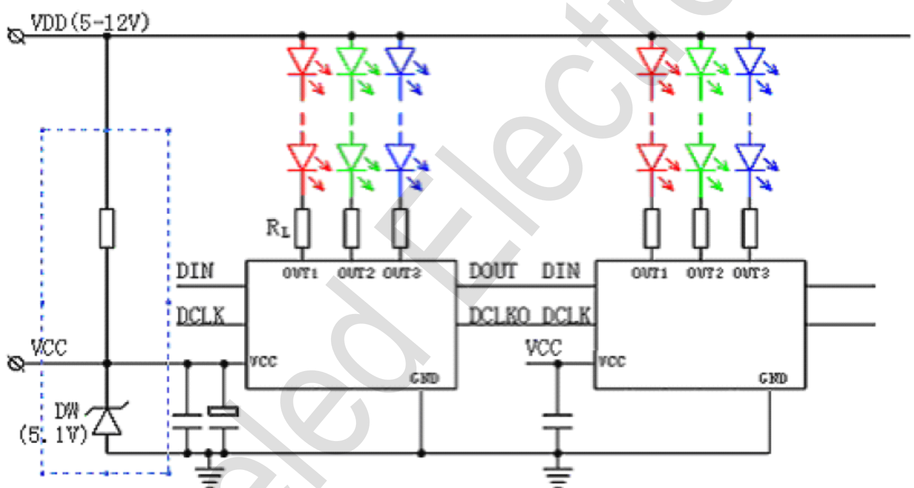
Parameter	symbol	Range	Unit
supply voltage	V_{DD}	4.5~5.5	V
input voltage	V_{IN}	-0.4~V_{OUT}+0.4	V
dat/clk frequecy	F_{CLK}	0~2	MHz
High-level width	T_{CLKH}	>40	ns
low-level width	T_{CLKL}	>40	ns
data setup time	T_{SETUP}	>10	ns
data hold time	T_{HOLD}	>5	ns
power comsuption	P_D	<350	mW
operation temperature	T_{OP}	-20~+60	℃

Timing Parameters

Timing parameter （T=25℃, V_{CC}=5V,OMODE=1）

parameter	symbol	test condition	range	unit
max rise and fall time for input signal	T_R	V_{CC}=5V	<500	ns
	T_F		<400	
max rise and fall time for cascade output signal	T_{TLH}	C_L=30pF,R_L=1K	<15	ns
	T_{THL}		<15	
max delay time for cascade output signal	T_{PD}	C_L=30pF,R_L=1K	<12	ns
	T_{CO}		<12	
mininum PWM opening width	T_{ONMIN}	I_{OUT}=18mA	400	ns
maxmuim opening and closing time of output signal	T_{ON}	I_{OUT}=18mA	<100	ns
	T_{OFF}		<80	

Inner constant current drive mode:



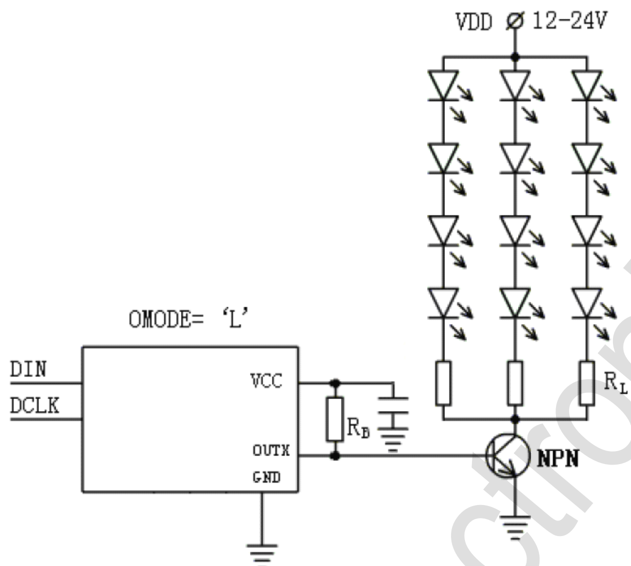
The mode (OMODE = high level or left floating) is applied when the VDD voltage is not greater than 12V and the current of each channal is less than 18mA, if VDD <5.5V, the figure above within the blue dashed box can be omitted, just connect VDD to VCC directly .

When the figure above within the blue dashed box is omitted, the constant current I_{LED} = 18mA (pls Note that after connected, in order to maintain the constant current state, the conduction-to-ground output voltage V_{OUT} must be between 0.8-5V range). The R_L here is the resistor for current limited, it can be deleted if you don't need it, when R_L is more than several10ohms, the I_{LED} is adjustable. Also the R_L is helpful to contribute the power dissipation P_D of the chip, and to improve the working stability.

When designing the circuits, pls note that the power dissipation P_D should not bigger than the maximum P_{DMAX}, the P_D = = ΣI_{LEDX} * V_{OUTX} + P_{IC}(PIC is the basic power comsuption of the IC, normally no more than 25mW) .

Note： VDD voltage can't exceed 12V for a long time, the voltage fluctuation is a little large when practical application, you can increase the capacitor of the filter on VDD, to prevent the overshoot causes damage to the output port, it is recommended to use plug-in constant voltage drive mode, as it it much safer.

the plug-in constant voltage drive mode:



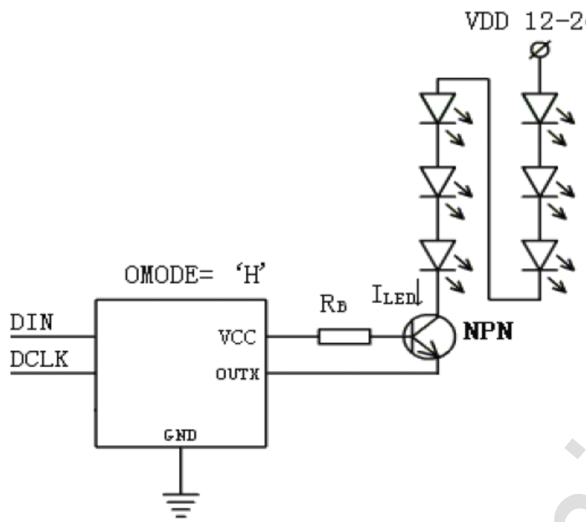
This mode (OMODE = ground) is applicable when multi-LEDs are in series, or the lamp's voltage is very high. It is actually drived by the OUT_X outputs level to control the external NPN triodes.

Current limited resistors' calculation mothed: $R_L = (V_{DD}-V_{LED}-V_{CE}) / 20mA$

The triodes here work in switch region, V_{CE} is the saturation voltage drop, generally adopted from 0.5V to 0.8V, the base resistance R_B can be adpoted about 2K, the other signals' connected methods are the same as previous mode.

When there are many channals, and they are series connected at first, then parallel connected, this mode is also commonly used. In the series connected branch chanels, any one led opens circuit, the total leds in this branch channels will be off, so pls obey the following principles: The leds' quantity in the series connected branch chanels cann't be too much, usually connect from 3pcs to 6pcs. In this branch channel, the parallel connected number should not be too little. It not only reduces the failure affect the face by 1pc LED's burnt off, but also breaks up the whole current limited resistors into parts. Changing the high power resistors into low power resistors, and chaning concentrate installations into dispersal installations, they are useful for both heat radiation of the resistors and making the lighting designs more compacted.

Plug-in constant current drive mode:



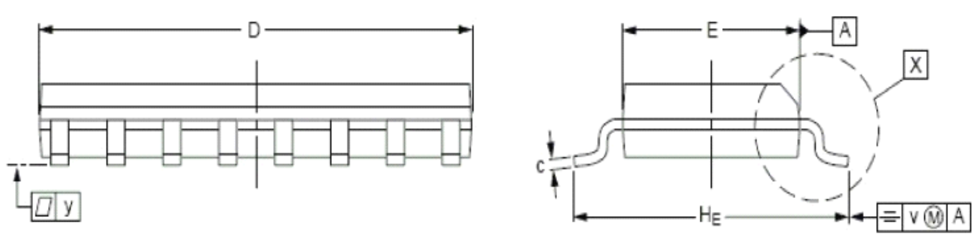
The mode (OMODE = HIGH level or floating) appliable when each single string has multiple LEDs and the VDD exceeds 12V.
It is using the external NPN triodes to improve the drive voltage capability, at the same time, make all the device characteristics maintain the constant current drive: I_{LED} = 18mA.

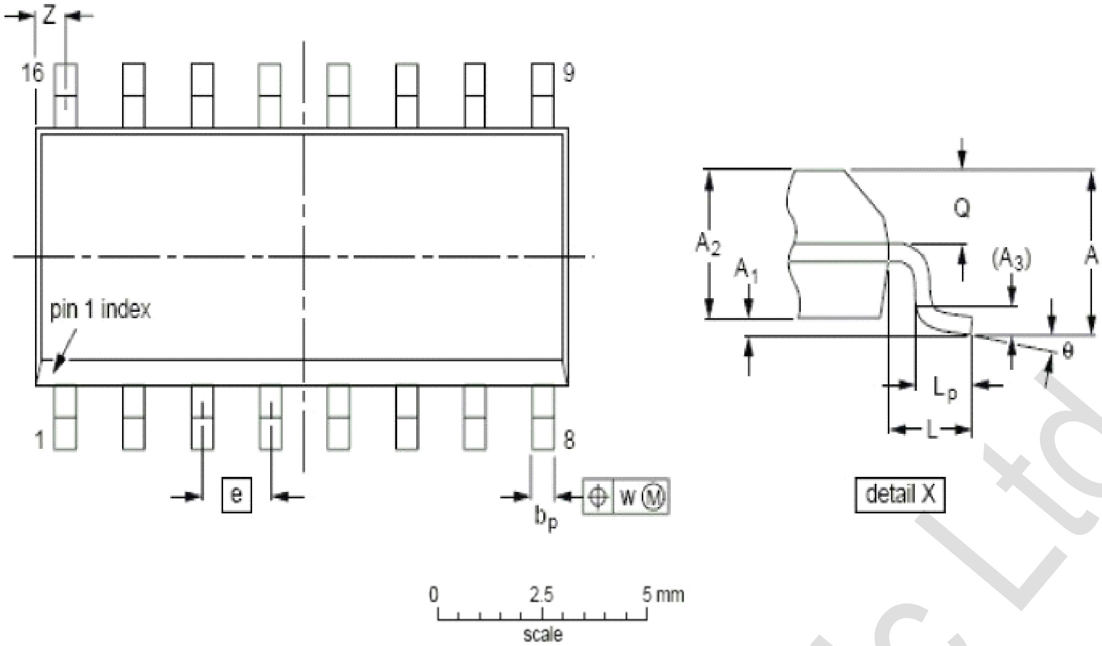
The maximum VDD's withstand voltage is depended on the NPN triodes' VCEO, as usual, more than 25V.

Cascade signal's driving and connecting:

Considering the cascade transmission distance may be very long among the chips, the output ends of the SDO and SCLKO are designed with strong push-pull type drive circuits, Tests show that when the CLOCK is 2M, it can drive up to 6M signal line. To avoid the signal reflection, pls series connect a about 33ohms resistor at both ends of SDO and SCLKO, and then output to the next level during your application

Dimensions





DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1	A_2	A_3	b_p	c	$D^{(1)}$	$E^{(1)}$	e	H_E	L	L_p	Q	v	w	y	$Z^{(1)}$	θ
mm	1.75	0.25 0.10	1.45 1.25	0.25	0.49 0.36	0.25 0.19	10.0 9.8	4.0 3.8	1.27	6.2 5.8	1.05	1.0 0.4	0.7 0.6	0.25	0.25	0.1	0.7 0.3	8° 0°
inches	0.069	0.010 0.004	0.057 0.049	0.01	0.019 0.014	0.0100 0.0075	0.39 0.38	0.16 0.15	0.050	0.244 0.228	0.041	0.039 0.016	0.028 0.020	0.01	0.01	0.004	0.028 0.012	

Note

1. Plastic or metal protrusions of 0.15 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT109-1	076E07S	MS-012AC				~~95-01-23~~ 97-05-22

https://www.cactuselectronics.com/LPD8806.html

Use of LPD8806

Introduction

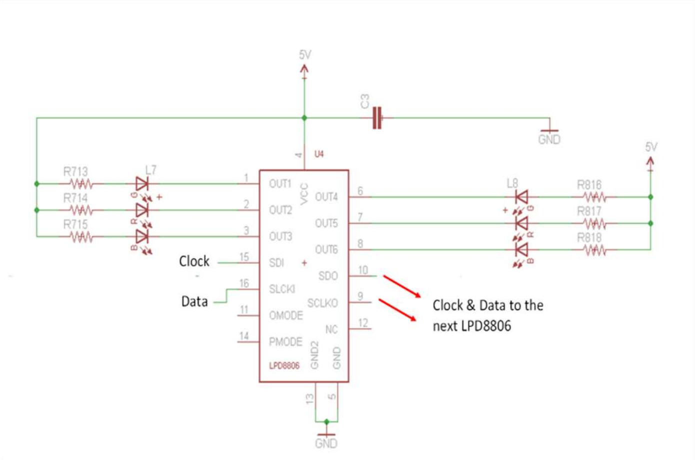
The LPD8806 PWM controller for RGB LEDs is well known to be used for color effects in long daisy chains of RGB leds. The LED strips are available online and sold by meter usually having 32 LEDs per meter which are controlled by 16 LPD8806s.

Most electronic applications require light indication of some sort not to mention the trivial power ON lamp. As single color lamp can bear two states of information. Several small embedded applications, apart from the ON/OFF states used to produce different blinking patterns in order to convey more information to the user. The RGB LEDs are multiplying the information that a single source of light can produce (which can also be increased using blinking patterns).

Application

The purpose of this article is to provide basic information on how to use these LED driver integrated circuits.

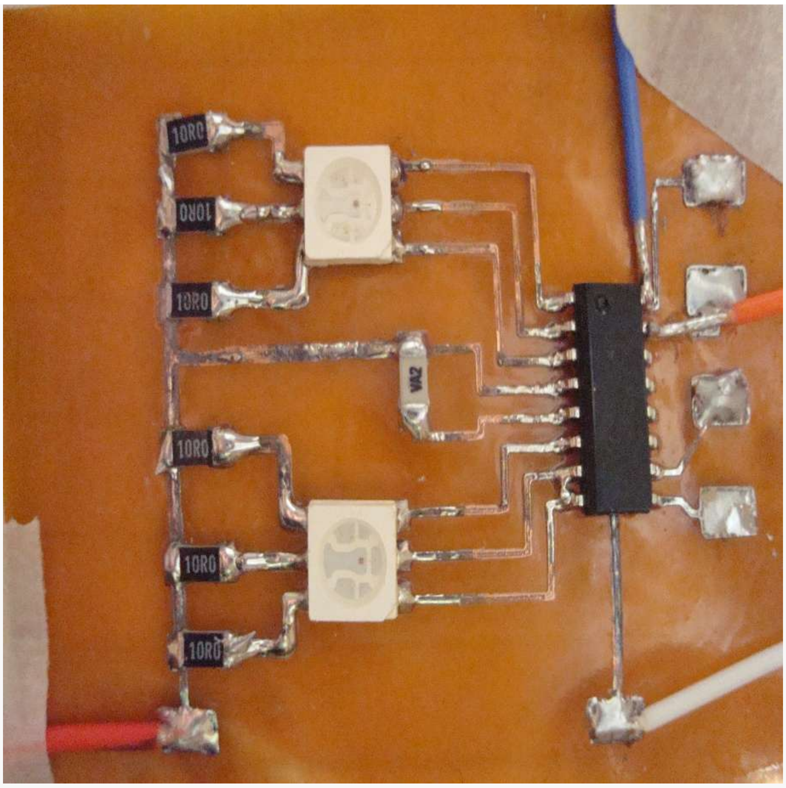
The LPD8806 can control 2 RGB LEDs receiving the status infotmation via SPI and requiring a minimum number of external components just the the current limiting resistors and power filtering capacitor.



Basic LPD8806 Schematic

The LED's color are changed varying the pulse width (PWM) on each of the idividual subpixels primary color (RGB) The chip receives the PWM information as a 7 bit information from zero (LED turned OFF) to 127 maximun brightness via SPI and it latches upon receiving the byte for each subpixel. Hence, three bytes are used to set the status of an individual RGB LED or pixel. These color bytes have all the most significant bit set at the value of 1, thus, the byte value for the brighness is from 128 to 255. This is so in order to allow an all zeroes byte to perform a particular operation.

As there is not official information on the communication protocol (the only availbale and poorly translated datasheet), the control routines were developed by reverse engineering a commercial controller. The first case I know of was from LadyAda who developed and published a library for the Arduino on GitHub in 2011. At that time it was not clear the use of the zero bytes and the very first routines used to send a bunch of zeros in order to "prime" the strip; or the way to put the whole strip on a known initial state to start a sequence or particular color pattern display. Later on, users obtained more information from experimentation and trial an error testing and contributed in GitHub to reach what looks to be the final version and interpretation on what and how many zeroes are needed to be included in the communication stream dependinding on the total numbers of LEDs involved (more on this below).
Depending on the status of the pin PMOD (pixel mode) , the LPD8806 can control what is called a single pixel output (PMOD floating or tied to 5 Volts) where each RGB subpixels are controlled independently on each LED or using the same RGB information for both LEDs if PMOD is tied to GND.



Two SMD RGB LEds on a Piralux flexible PCB

Controlling the LEDs or pixels is a matter of sending an stream of bytes via SPI. For example, to control 1 pixel, 3 bytes must be sent being the first byte the data for the Green , the second the data for the RED and the last the data for the BLUE. The LPD8806 latches each subpixels on on the fly as the corresponding byte arrives. Any non zero byte arriving after the BLUE data is just passed thru for the next pixel. Following with the example, the fourth byte sent by the controller bringing the GREEN data for the second pixel will be passed to the 2 LED which is also connceted to the same LPD8806. Similarly , byte nymber 7 sent by the controller will completely pass thru the LPD8806 and is routed to the pin SDO (Data Out) if s second LPD8806 is used, its SDI pin must be tied to the SDO pin of the first one.

If the controller keeps sending non zero bytes the process will cpontinue for ever, once each pixel driver is latched, further data is just passed thru to the next in the chain. So here is where the zero byte use comes to the scene; a zero byte will just get the LEDs drivers ready to receive new data after being read by each driver . As per above description it may be inferred that, similarly, a zero byte will get every driver ready and then pass thru until the end of the chain. But this is not the case , users thru experiments verified that a zero byte can propagate only thru 32 pixels (or 16 LDP8806 in PMOD = 1). If more than 32 pixels are chained, the controller must sent a second zero byte to account for pixels 33 to 64 and so on.