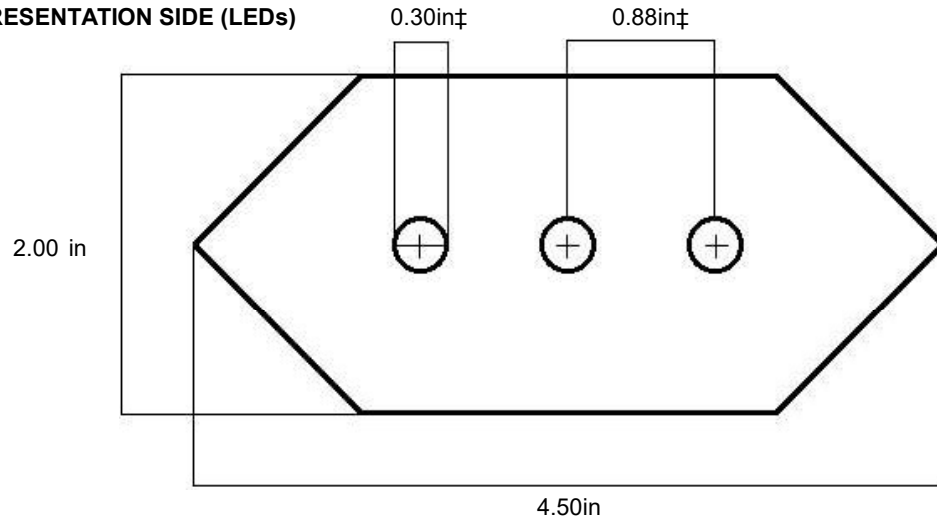
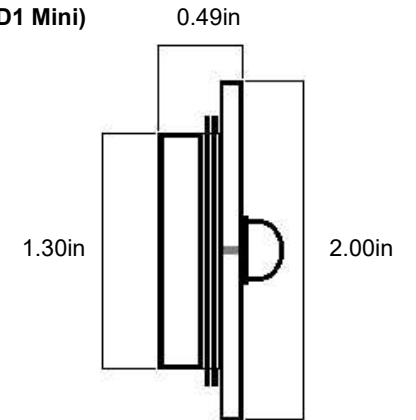


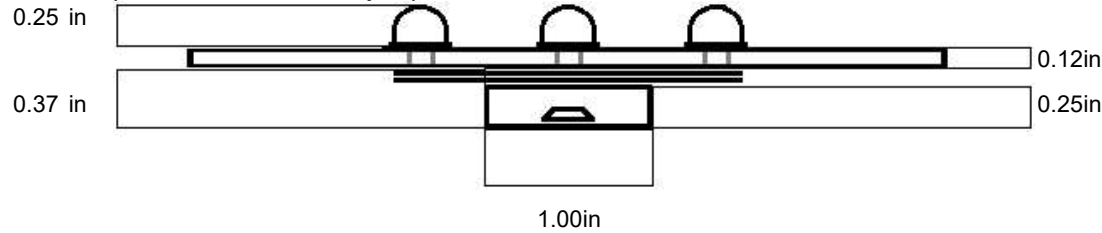
PRESENTATION SIDE (LEDs)



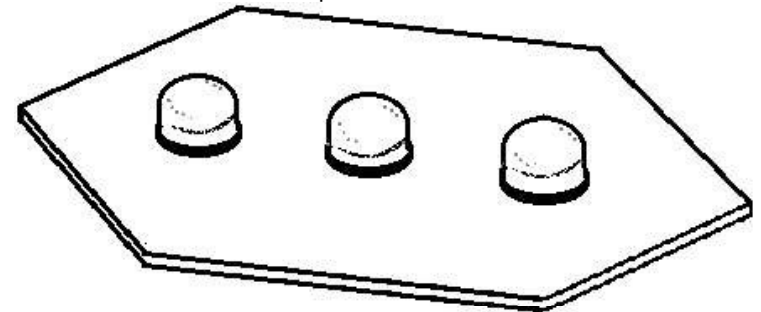
SIDE EDGE VIEW (With D1 Mini)



EDGE VIEW (With D1 Mini/Pro USB port)

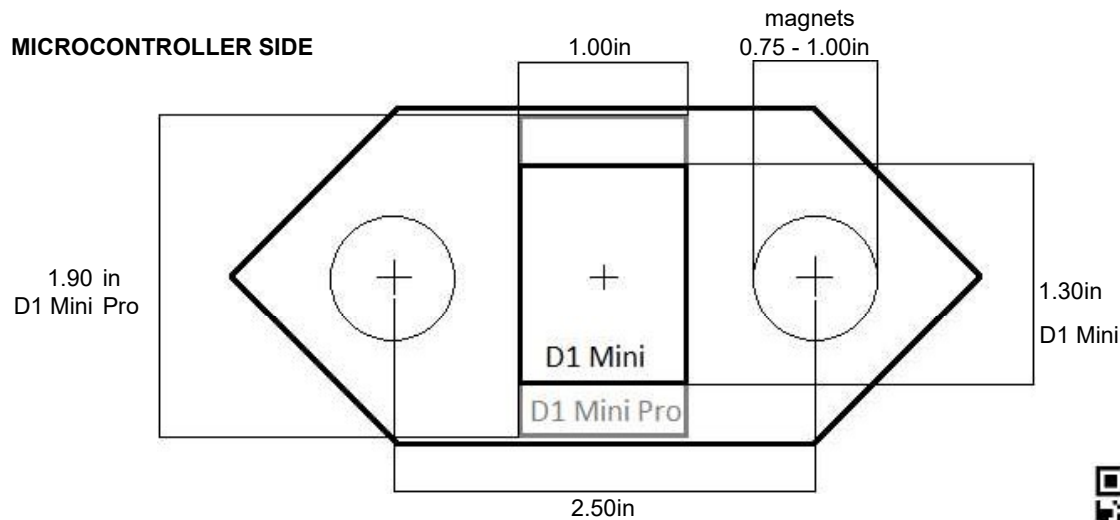


LEDs mounted on top/outside



ISOMETRIC VIEW

MICROCONTROLLER SIDE



VARIANT: CARDBOARD, basic

- Cost: 10.94 USD DIY
- Rating: IP40†
- Color: As per sourced reflective tape
- Material: min. 32LB ECT (ISO Std. 3037) single wall corrugated paper
- Uses: Bicycle Safety
Pedestrian Safety
Alerts and Notications
Others (dry indoor/outdoor)

† = IP54 rating can be achieved per alternate design on subsequent sheet.
‡ = NOTE: Holes are NOT drilled for cardboard version - diode is pushed through the paper.
Attention: Leave room for expansion modules over the D1 Mini in any enclosure designs,



LIFE BLINKER

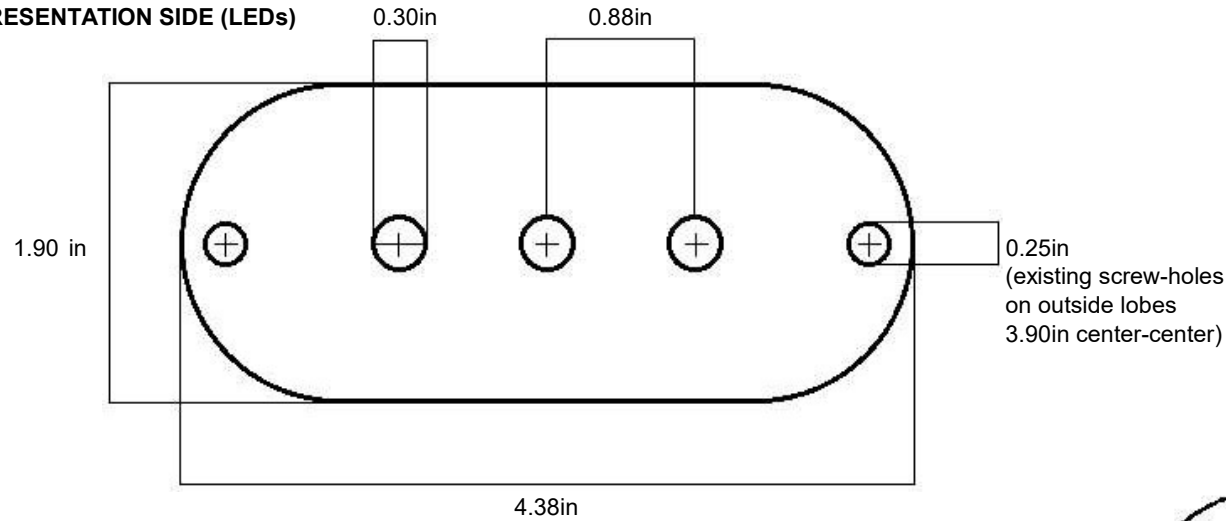
TITLE: Life Blinker Physical Model / Supplemental

Document Detail: LED Safety Light with Arduino core, Cardboard v23-A
REV: 1.1.0

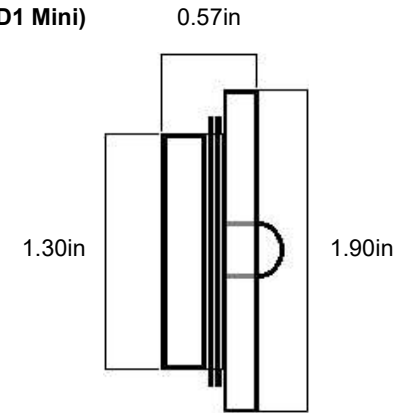
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Author: Jaden Bourdlaies
AutoDesk Student Edition

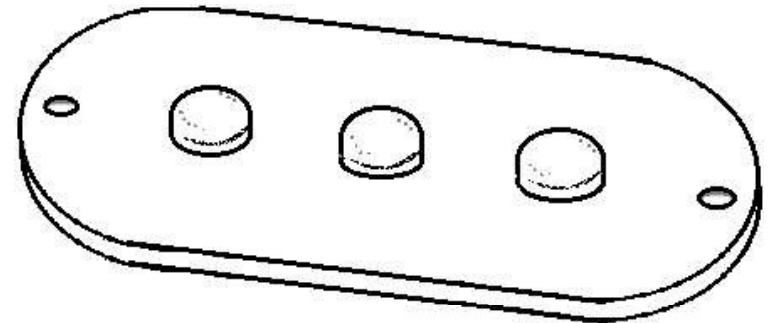
PRESENTATION SIDE (LEDs)



SIDE EDGE VIEW (With D1 Mini)

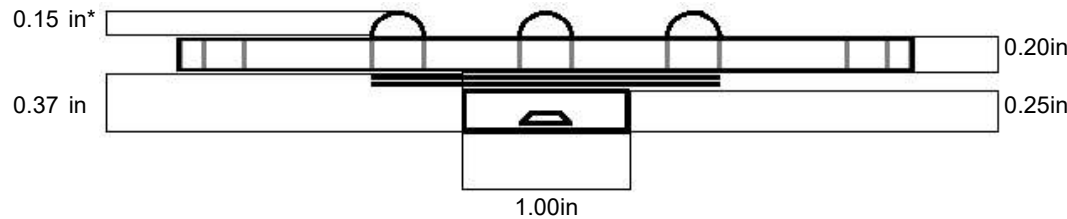


LEDs mounted from microcontroller-side in 5/16in holes

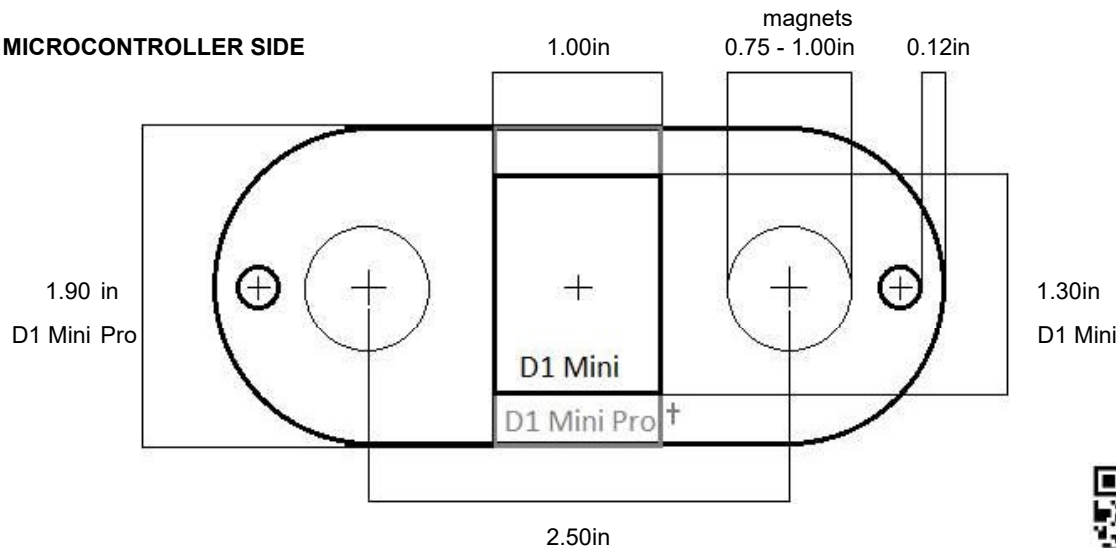


ISOMETRIC VIEW

EDGE VIEW (With D1 Mini/Pro USB port)



MICROCONTROLLER SIDE



VARIANT: PLASTIC, reflective
 Cost: 13.50 USD DIY
 Rating: IP54†
 Color: Reflective orange or red
 Material: SAE DOT 03. Transflective
 Optical-grade plastics, COTS.
 Uses: Bicycle Safety
 Pedestrian Safety
 Traffic Signage
 Not for maritime use as built.

* = +/- 50% tolerance
 † = to achieve IP54 rating apply elastomeric coatings over complete assembly in conjunction with sealing grommet, rotate or backset D1 Mini for connector clearance. D1 Mini Pro will interfere with seals.



LIFE BLINKER

TITLE: Life Blinker Physical Model / Supplemental	
Document Detail: LED Safety Light with Arduino core, Reflector v24-2	REV: 1.1.0
Date: 2024-02-12 17:09	Page: 2 / 5
Author: Jaden Bourdlaies	AutoDesk Student Edition

LED SELECTION GUIDE

LED Color:

Recommended LED colors are Red (625nm), Orange (605nm), or Yellow (588nm).
 Red marker lights provide the least blinding effect on human vision at night but clear noticeability and meaning.
 Blue marker lights should be avoided for both physiological and compliance reasons.
 Green marker lights should be avoided as these could be confused for a distant green traffic light.

LED Form factor:

Through-hole LEDs will provide the simplest DIY experience.
 Viewing Angle (usually rated as 2θ 1/2') is ideally 120°.
 Angles of 15° are workable but not ideal. "Straw hat" type domed LEDs were used for the most effective builds.
 -at 4500mcd rating, a 2.0V LED provides about 0.96 apparent Lumens at a 30° beam angle.
 -at 4500mcd rating, a 2.0V LED provides about 14.7 apparent Lumens at a 120° beam angle.

LED Size:

8.0mm (or 7.9mm) LEDs provide about 8000mcd output, and a 5/16 drill bit can make holes in plastic for this size.
 Height/protrusion of the diode above the substrate not consequential. Squat 6mm diodes were used in testing.
 If the project is constrained, smaller or larger diodes may be substituted.
 See Fig. 1 for 8mm LED dimensions.

LED Operating Conditions:

Per model in Fig. 2 and the respective data sheet of the diode used, ensure the led is not overdriven.
 TIP: a CR2023 coin cell does not have enough current to damage Red, Orange, and Yellow (2.0-2.4V) LEDs, testing an LED with the coin cell can provide a reference level of ideal brightness (when other tools are lacking).
 Use the coin cell reference level to determine if your Arduino output pins need add-on resistors.
 NOTE: An overdriven diode is actually dimmer than a properly driven diode, and can cause damage.
 Duty-cycle of the diodes also extends LED and battery life.

ESP8266 CONNECTION AND POWER GUIDES

Connections for LED and switch pins:

D1 mini pins are set in the github code comments. Life Blinker Basic wiring is shown Table 1.

Power Source

The Life Blinker's Arduino core can be driven from a USB battery bank, which typically use 18650 cells with J5019 DC:DC PUPS, providing a runtime of over 11 hours.
 Further runtime can be realized using a 3.3v direct-wire approach (min max is 2.58-3.6v).
 Solar options require additional engineering considerations. 5v in min max is 4.0-6.0v.

TABLE 2: Power usage characteristics

VCC	State	Server †	Client †	As Built†	As Built‡	No LEDs‡	VLP‡
3.3V	Idle	0.021a	0.019a	0.031a	0.026a	0.014a	0.008a
3.3V	Peak	0.061a	0.058a	0.084a	0.045a	0.019a	0.011a
5.0V	Idle	0.029a	0.028a	0.091a	0.077a	0.014a	0.008a
5.0V	Peak	0.064a	0.063a	0.131a	0.087a	0.019a	0.011a

† = Wifi Radio enabled for expansion options.

‡ = Wifi Radio disabled for power savings.

ESP8266 Radios use internationally certified open-spectrum 2.4GHz Wifi (802.11x).

Empirical Data shows the marker diodes are operating at or near the ideal current.

The D1 mini is rated for 458mA peak at 5v, lower power usage depending on peripherals, state and mode.

No understanding of electronics required. Information provided for educational purposes. Images are license-free.

Life Blinker is an Open Source Project - for details see <http://sigma-designs.com/LifeBlinker>

FIG. 1: 8mm LED DIMS AND POLES

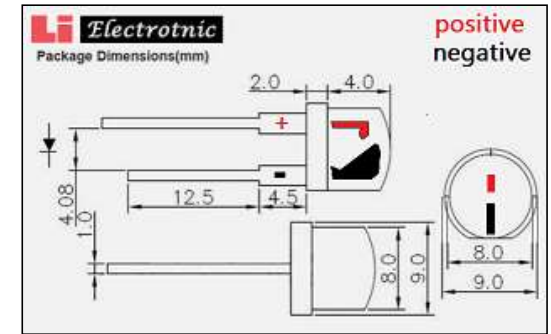
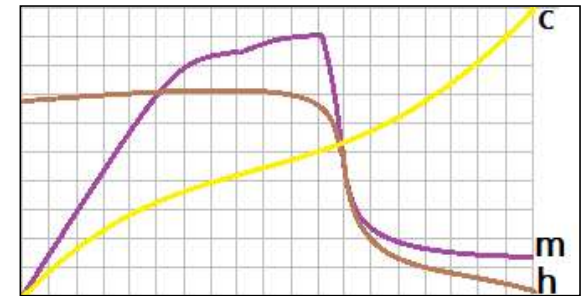


FIG. 2 DEPICTING LED OUTPUT VS CURRENT VS MTBF



c, the drive current
 m, the mcd rated light output of the diode
 h, the hours of life a diode can provide (mtbf)

TABLE 1: Life Blinker Pin out for D1 Mini

TO:	PIN	D1	m1n1	PIN	TO:
	RST			TX	Left LED
Future use	A0			RX	Right LED
	D0			D1	Future use
Left Sw.	D5			D2	Future use
Right Sw.	D6			D3	
	D7			D4	Main LED
	D8			G	Common
	3V3			5V	

LIFE BLINKER

TITLE: Life Blinker Physical Model / Supplemental

Document Detail: LED selection details and wiring info for DIY project. **REV:** 1.1.0

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Author: Jaden Bourdlaies AutoDesk Student Edition

NODE MCU ESP12

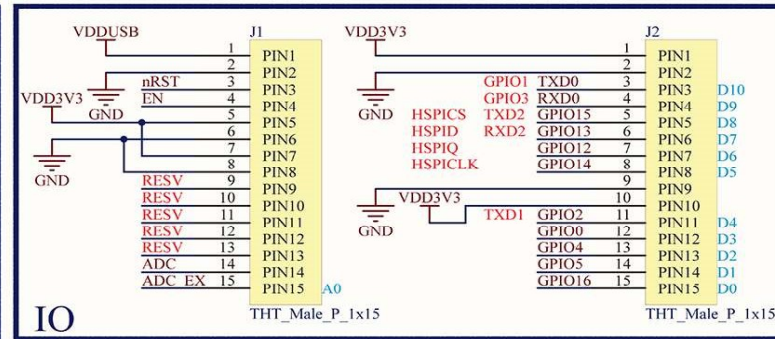
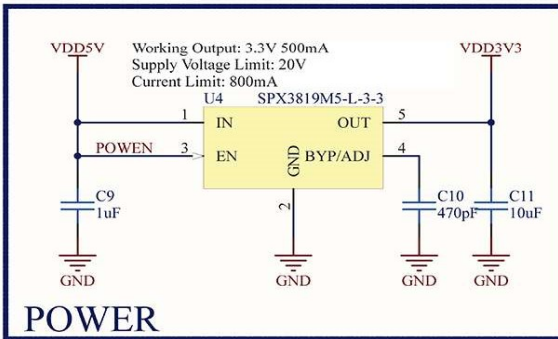
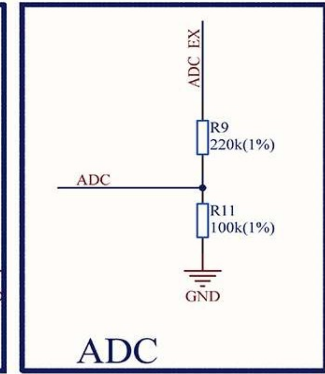
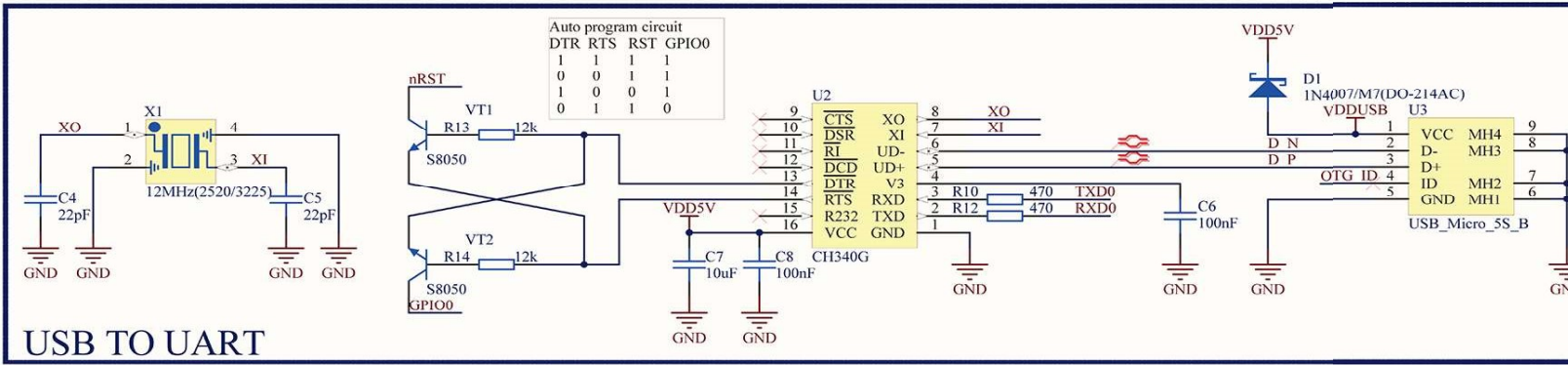
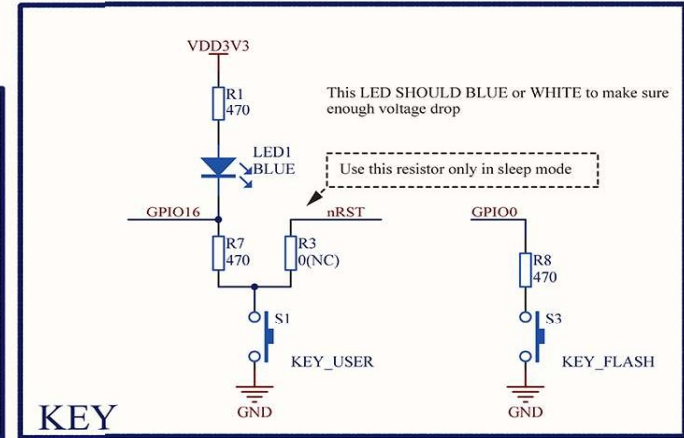
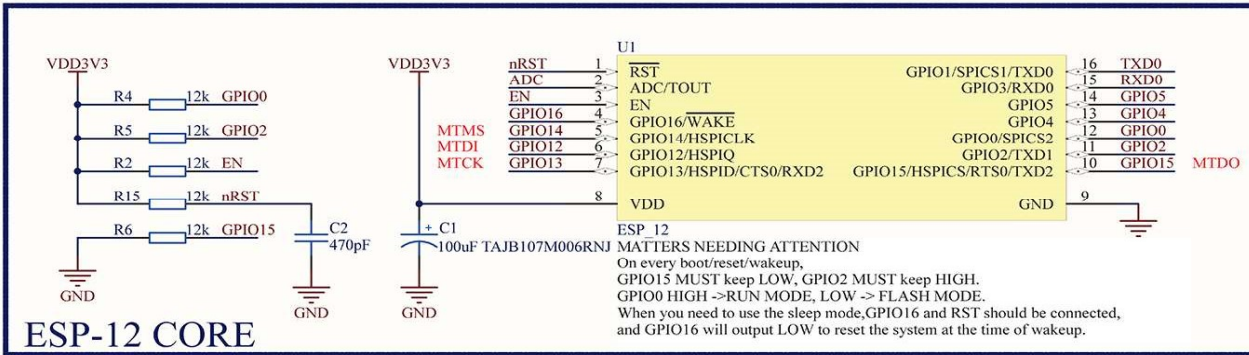


TABLE 1: Life Blinker Pinout for D1 Mini

TO:	PIN	PIN	TO:
	RST	TX	Left LED
Future use	A0	RX	Right LED
Left Sw.	D5	D2	Future use
Right Sw.	D6	D3	Future use
	D7	D4	Main LED
	D8	G	Common
	3V3	5V	
	D1		
	D2		
	D3		
	D4		
	D5		
	D6		
	D7		
	D8		
	D9		
	D10		
	D11		
	D12		
	D13		
	D14		
	D15		
	D16		
	D17		
	D18		
	D19		
	D20		
	D21		
	D22		
	D23		
	D24		
	D25		
	D26		
	D27		
	D28		
	D29		
	D30		
	D31		
	D32		

NOTE: RTS is not the same as RST

The ESP-12E is a 32-pin breakout of the ESP8266EX

Note that on some vendor implementations, the crystal X1 is integral to the CH340C, which is a self-oscillated variant of the CH340G. D1 Mini is slightly different, but the schematic above is well organized and provides insights for the boot states (e.g. GPIO16 states).

- CPU 32-bit
- CLOCK 80 MHz
- FLASH 4MB
- SRAM 128kb
- EEPROM 512b
- ADC 10b reg

LIFE BLINKER

TITLE: Life Blinker Physical Model / Supplemental

Document Detail: ESP12 Schematic, see Table 1 for core knowledge	REV: 1.1.0
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Author: Jaden Bourdlaies AutoDesk Student Edition

No understanding of circuitry required. D1 series have "Data Pins" D0-D8 to be referenced instead of GPIO pins.

Life Blinker is an Open Source Project - for details see <http://sigma-designs.com/LifeBlinker>

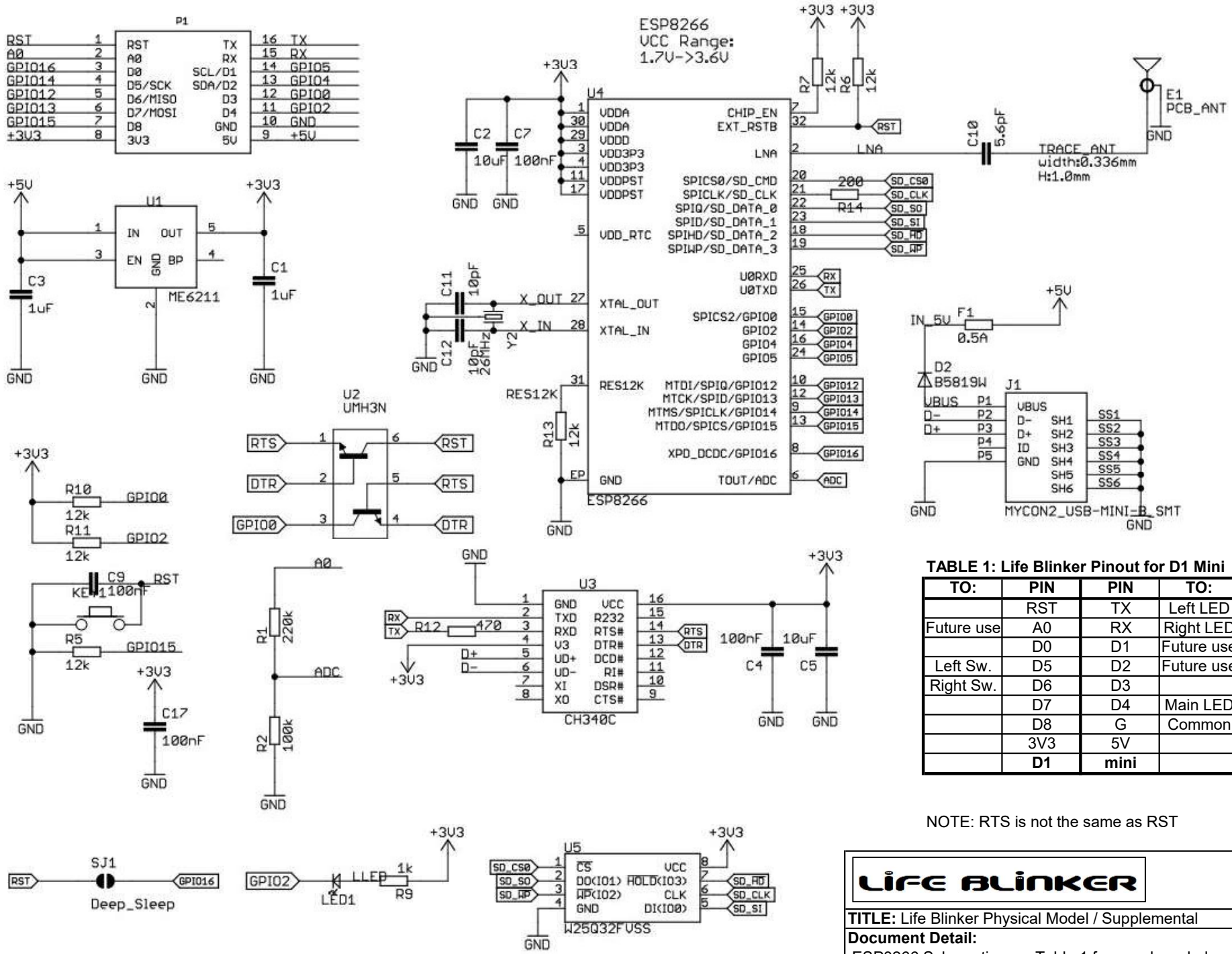


TABLE 1: Life Blinker Pinout for D1 Mini

TO:	PIN	PIN	TO:
	RST	TX	Left LED
Future use	A0	RX	Right LED
	D0	D1	Future use
Left Sw.	D5	D2	Future use
Right Sw.	D6	D3	
	D7	D4	Main LED
	D8	G	Common
	3V3	5V	
	D1	mini	

NOTE: RTS is not the same as RST



TITLE: Life Blinker Physical Model / Supplemental

Document Detail: ESP8266 Schematic, see Table 1 for core knowledge

Date: 2024-02-12 17:09

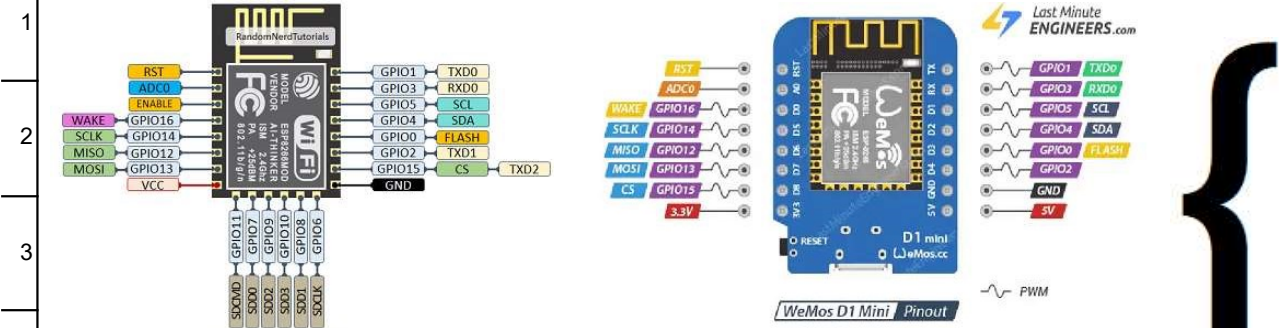
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REV: 1.1.0

Author: Jaden Bourdlaies AutoDesk Student Edition

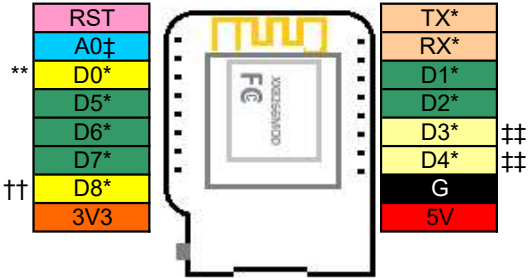
No understanding of circuitry required. D1 series have "Data Pins" D0-D8 to be referenced instead of GPIO pins.

Life Blinker is an Open Source Project - for details see <http://sigma-designs.com/LifeBlinker>

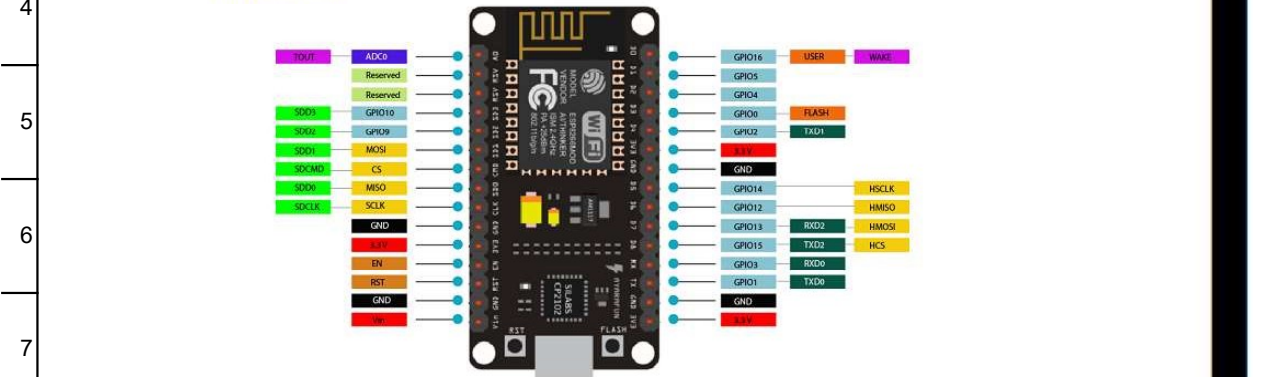


NOTE: ESP8266 is a smart device core, which many vendors install in to various breakout boards. Pin relation, labels, color codes, and capabilities differ. Figure and table below relates to D1 Mini only

FIG. 1, for pin limitations, uses, and debugging



* = denotes PWM support
 ** = high at boot, connect with care
 †† = boot will fail if pulled high
 †† = boot will fail if pulled low
 (Colors per legend in Table 1)



NodeMCU V3 Pinout www.TheEngineeringProjects.com

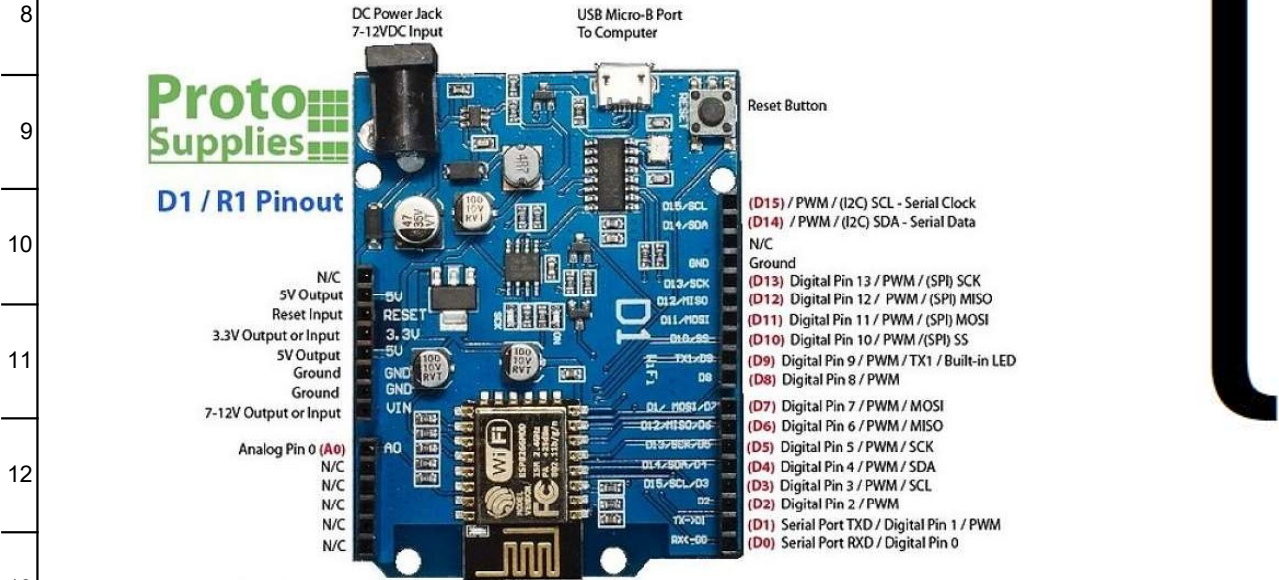


TABLE 1: D1 Mini breakout pins relative to ESP8266

ESP8266	D1 Mini	Uses:	ESP8266	D1 Mini	Uses:
Reset	RST	Integration	GPIO1	TX	LED only
ADC0	A0±	Analog in	GPIO3	RX	LED only
GPIO16	D0	WAKE	GPIO5	D1	(SCL) i2c
GPIO14	D5	SPI-SCLK	GPIO4	D2	(SDA) i2c
GPIO12	D6	SPI-MISO	GPIO0	D3	Program
GPIO13	D7	SPI-MOSI	GPIO2	D4	Mobo Led
GPIO15	D8†	SPI-CS	Ground	G	common
V out/in	3V3	power	V in	5V	power
Note for above color code scheme					
Good for input or output			Pulled-up, best for sw. input		
Limited use		tolerance 2.58-3.6v	tolerance 4.0-6.0v		
† = Pulled to Ground		Workaround/hack	± = 1024@3.3v max		

LIFE BLINKER

TITLE: Life Blinker Physical Model / Supplemental

Document Detail: Various sizes and implementations of Arduino boards. **REV:** 1.1.0

Date: 2024-02-12 17:09 **Page:** exh. A

Author: Jaden Bourdlaies AutoDesk Student Edition

Development boards differ in pinout and pin capability. D1 Mini combines pins that are otherwise discrete on the pro. No understanding of electronics required. Information provided for educational purposes. Images are license-free.