

Nano PinPulse Shield

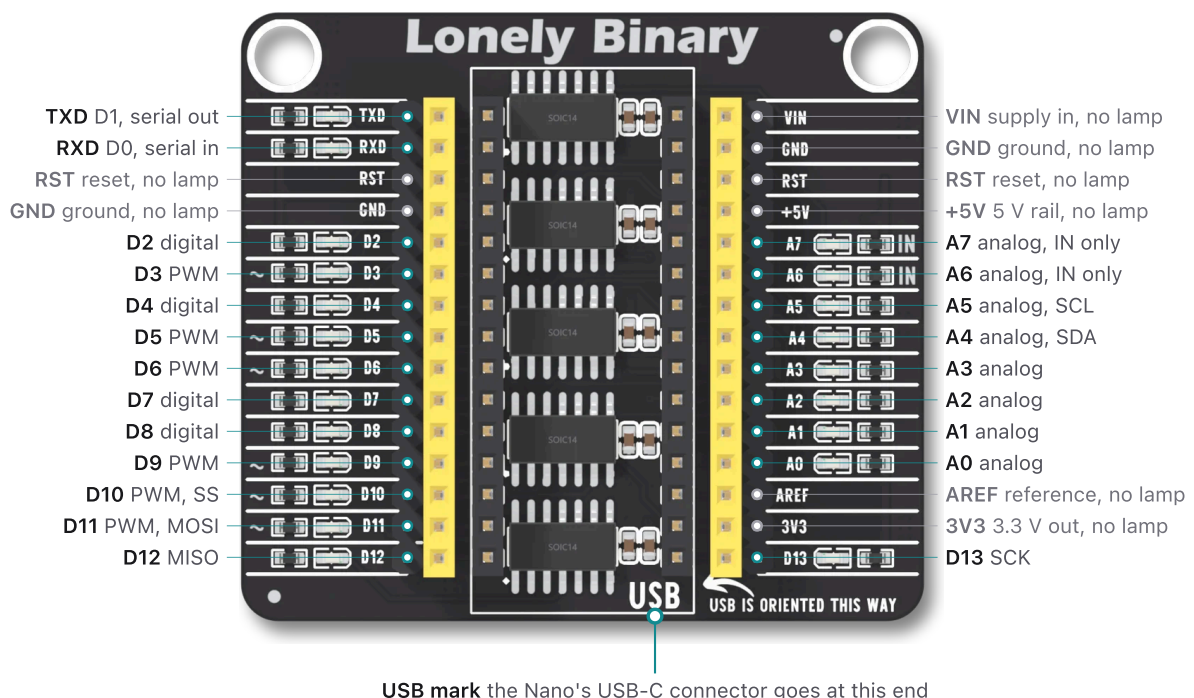
A lamp on 22 of the Nano's pins, and every pin brought out three times.



Power off before the Nano goes in or comes out

Unplug the USB-C cable and anything else that feeds the boards. Check the direction: the Nano's USB-C connector goes at the end of the shield printed USB. Push both rows fully home, every pin in. **Only then connect power.** To take it out, unplug the cable first and lift the Nano after. Seated or lifted with the power on, the shield can get hot.

The shield, side by side



USB mark the Nano's USB-C connector goes at this end

The lamp is not on your pin

Your pin goes to one inverter input, at most 10 pF. The lamp and its 5.1 kΩ resistor hang between the 5 V rail and the inverter's output: pin HIGH, output LOW, lamp on. An ATmega328P HIGH is about 4.1 V at 20 mA, above the inverter's 3.15 V, so it always lights the lamp.

Lamps

22 red LEDs

One lamp

0.6 mA from the 5 V rail

All lit

13 mA from the 5 V rail

Each lamp: $(5.0 \text{ V} - 2.0 \text{ V across the red LED}) / 5.1 \text{ k}\Omega = 0.59 \text{ mA}$. A different LED drops a different voltage and takes a slightly different current.

A pin nothing drives is not LOW

A pin your sketch has not set is floating, and its lamp can flicker when a finger comes near or glow half lit. Set pinMode to OUTPUT and write HIGH or LOW. The back of the shield says the same.

The first program, a light down every safe pin

Arduino IDE · Board Arduino Nano · Processor ATmega328P · Port the CH340 port · no wiring

```
// Chase a light down D2-D12, then up A0-A5. Wiring: none.
// Left out: D0, D1 (serial), D13 (Nano's lamp), A6, A7 (in only).
const byte PINS[] = {
  2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12,    // left column
  A0, A1, A2, A3, A4, A5,                // right column
};
const byte COUNT = sizeof(PINS);
void setup() {
  for (byte i = 0; i < COUNT; i++) {
    pinMode(PINS[i], OUTPUT);    // driven, so no lamp floats
    digitalWrite(PINS[i], LOW);
  }
}
void loop() {
  for (byte i = 0; i < COUNT; i++) {
    digitalWrite(PINS[i], HIGH);
    delay(80);
    digitalWrite(PINS[i], LOW);
  }
}
```

Left side, top to bottom

POS	SILK	NANO PIN	PORT	LAMP
L1	TXD	D1/TX	PD1	✓
L2	RXD	D0/RX	PD0	✓
L3	RST	RESET	RESET	—
L4	GND	GND	—	—
L5	D2	D2	PD2	✓
L6	D3	D3 PWM	PD3	✓
L7	D4	D4	PD4	✓
L8	D5	D5 PWM	PD5	✓
L9	D6	D6 PWM	PD6	✓
L10	D7	D7	PD7	✓
L11	D8	D8	PB0	✓
L12	D9	D9 PWM	PB1	✓
L13	D10	D10 PWM/SS	PB2	✓
L14	D11	D11 PWM/MOSI	PB3	✓
L15	D12	D12/MISO	PB4	✓

Right side, top to bottom

POS	SILK	NANO PIN	PORT	LAMP
R1	VIN	VIN	—	—
R2	GND	GND	—	—
R3	RST	RESET	RESET	—
R4	+5V	+5V	—	—
R5	A7	A7	ADC7	✓
R6	A6	A6	ADC6	✓
R7	A5	A5/SCL	PC5	✓
R8	A4	A4/SDA	PC4	✓
R9	A3	A3	PC3	✓
R10	A2	A2	PC2	✓
R11	A1	A1	PC1	✓
R12	A0	A0	PC0	✓
R13	AREF	AREF	AREF	—
R14	3V3	3V3	—	—
R15	D13	D13/SCK	PB5	✓

When it does not work

The shield is warm and no lamp is lit

Unplug the cable and anything else feeding the boards, then pull the Nano. Turned 180 degrees, power pins meet signal holes.

The lamps flicker, or the Nano keeps resetting

Suspect contact. Power off, reseal with every pin in both rows, then swap the cable and port before the board.

A lamp is lit on a pin my sketch never touched

That pin is floating. Set pinMode to OUTPUT and write HIGH or LOW.

The Nano is warm and nothing is wired to it

Unplug it. Look for a bent pin touching its neighbour, or a jumper wire in the sockets.

I think the board is dead

Take the Nano out and plug only the cable in. ON lit and a port present: the fault is the seat, the shield or your wiring.

Nothing lights and the Serial Monitor is empty

The sketch is not running. Check the seat and direction, and that the upload ended with Done uploading.

Specifications

Fits	Nano V3.0, rows 15.24 mm apart	Lamps	22 red, about 0.6 mA each
Inverters	5 × SN74HC04, from 5 V	Pin load	10 pF at most
Each pin	socket, male strip, yellow socket	Supply	the Nano's 5V pin, none of its own
Mounting	2 holes, 4.8 mm, 48 mm apart	Size	55.0 × 49.0 mm, 10.1 mm tall