QUICK REFERENCE · TK95

Dual Bright LEDs

A warm and a cool white, a pin each. Your pins only switch the transistors.

On 5 V, PWM at 170 of 255 or less

Held fully on from 5 V an LED takes about 168 mA, past its 150 mA rating. **Cap analogWrite at 170, or wire VCC to 3V3.** Never above 5 V. Do not look into the LEDs.

Pins, and which to wire

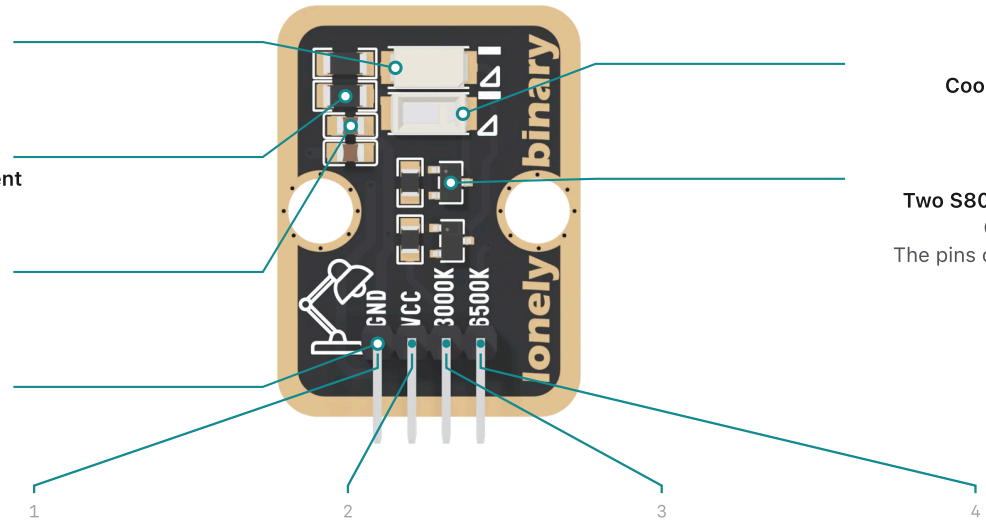
Parts up, header at the bottom. All four pins are wired: GND, VCC and a PWM pin for each white. Set both pins LOW first, then analogWrite sets each colour's brightness.

Warm white, 3000K
5730 size, 150 mA rated, the upper LED.

10 Ω per LED sets the current
About 168 mA from 5 V, 62 mA from 3.3 V.

22 µF and 100 nF
Across VCC, for the edges of each pulse.

GND is the square pad
Count from it. The back prints no pin names.



Cool white, 6500K
The lower LED. Same rating.

Two S8050 transistors
One per colour. The pins only feed them.

Front	GND	VCC	3000K	6500K
Light it	GND	VCC	3000K	6500K

VCC powers the light, not your pins

Each colour pin feeds only 1 kΩ into a transistor's base, about 2.6 mA from a 3.3 V pin. The LEDs' current comes from VCC, so VCC must be wired, and it may be 5 V on a 3.3 V board.

What it draws, and from where

Both on 3V3, full

123 mA, worked out

About 62 mA per LED, about 44 % of the light on 5 V. No cap needed.

Both on 5V at 170

224 mA average, worked out

Pulses of 168 mA per LED, averaging 112. Inside every rating.

Both on 5V, 255

336 mA, worked out

Past the LEDs' 150 mA and the 10 Ω's 1/4 W. Not a way to leave it.

Half of each white is about 4100 K: share the duty between the two pins and the colour moves while the brightness stays. On an Uno never use the 3.3V pin for VCC; it gives 50 mA.

Arithmetic on the net list, XINGLIGHT's typical 5730 curve (2.8 to 3.4 V at 150 mA), an assumed 0.15 V across the transistor and exactly 10 Ω, not measured. Held on from 5 V each 10 Ω dissipates about 282 mW of its 250. The sketch compiles for an ESP32-S3, an ESP32 and an Uno; the block has not been bench-tested for this sheet.

The first light, on an ESP32-S3

Arduino IDE · Board: ESP32S3 Dev Module · USB CDC On Boot: Enabled · No library

```
// Uno: 9. ESP32: 25. ESP32-S3: 4. Pico: 14.
const int WARM_PIN = 4;
// Uno: 10. ESP32: 26. ESP32-S3: 5. Pico: 15.
const int COOL_PIN = 5;
// VCC on 5V: stop at two thirds. On 3V3, 255 is fine.
const int MAX_DUTY = 170;

void show(int warm, int cool, const char *what) {
  analogWrite(WARM_PIN, warm);
  analogWrite(COOL_PIN, cool);
  Serial.println(what);
  delay(2000);
}

void setup() {
  // LOW first: nothing on the board holds the transistors off.
  pinMode(WARM_PIN, OUTPUT);
  digitalWrite(WARM_PIN, LOW);
  pinMode(COOL_PIN, OUTPUT);
  digitalWrite(COOL_PIN, LOW);
  Serial.begin(115200);
}

void loop() {
  show(MAX_DUTY, 0, "warm: 3000K");
  show(0, MAX_DUTY, "cool: 6500K");
  show(MAX_DUTY / 2, MAX_DUTY / 2, "both, half each: about 4100 K");
  show(0, 0, "off");
}
```

```
warm: 3000K
cool: 6500K
both, half each: about 4100 K
off
```

Serial Monitor at 115200, a line every two seconds. The upper LED lights yellowish white, then the lower one bluish white, then both.

Wiring

	FRONT	S3	UNO	ESP32	PICO
1	GND	GND	GND	GND	GND
2	VCC	5V	5V	5V	VBUS
3	3000K	GPIO 4	D9	GPIO 25	GP14
4	6500K	GPIO 5	D10	GPIO 26	GP15

Hole 1 is the square pad. VCC goes to a 5 V pin on every board, VBUS on the Pico: it feeds only the LEDs. Both colour pins must be PWM pins; on an Uno D2 is not.

Dimming, and a fade that looks even

analogWrite switches the LED fully on for part of each cycle, 490 times a second on an Uno's D9 and D10, 1000 on an ESP32 or a Pico. Every pulse carries the full current; only the average falls. For a fade that looks even, send each step through a 2.2 power: duty = pow(step / 100.0, 2.2) * 170.

When it does not work

Neither LED lights

VCC or GND: the pins only switch. Wire VCC.

One colour never lights

That pin: check its GPIO number and OUTPUT.

Full on or off, never dims

Not a PWM pin. On an Uno use D9 and D10.

Board resets as they light

VCC on a 3.3 V pin. Move it to 5V; cap at 170.

LEDs and board hot

Held on at 5 V. Cap the duty or use 3V3.

Flicker on a phone camera

That is the PWM. Full on removes it.

Specifications

LEDs	5730, 3000 K and 6500 K	**LED rating**	150 mA, 500 mW each
Drive	62 mA from 3.3 V, 168 mA from 5 V	**Colour pins**	1 kΩ into an S8050 base, active high
From the pin	About 2.6 mA at 3.3 V	**PWM on 5 V**	170 of 255 at most
Beam	120° each	**Supply**	5V, or 3V3 for about half