Infrared Transmitter

SIGNAL HIGH switches a 940 nm LED on. Your pin only drives the transistor.

5 V on VCC is the most it takes

VCC feeds the LEDs through a fixed 150 Ω, and nothing else limits their current. **Wire VCC to 5V or 3V3, never higher**: the resistor reaches its 1/8 W rating near 5.7 V.

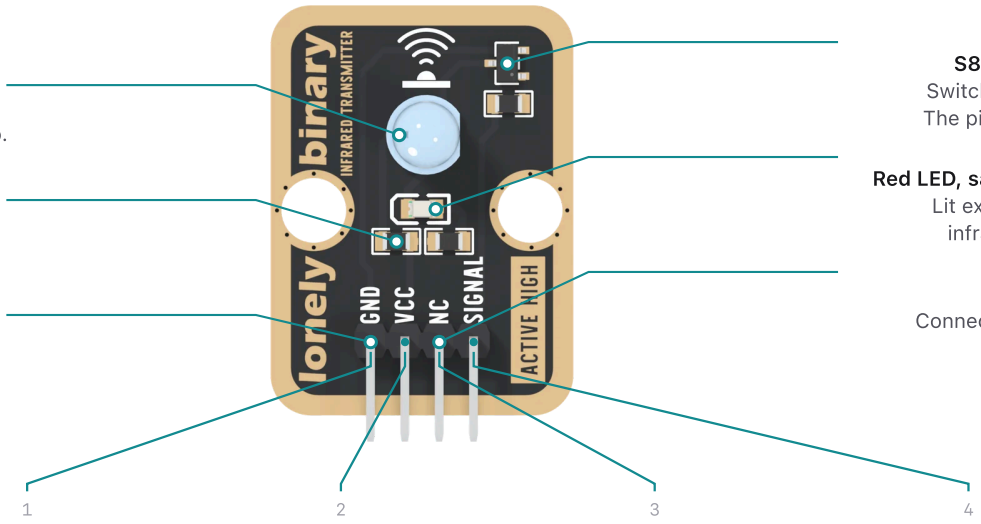
Pins, and which to wire

Parts up, header at the bottom. Wire GND, VCC and SIGNAL; NC is connected to nothing on the board. Set the pin LOW first, then HIGH turns the LED on.

IR333C-A infrared LED
940 nm, 20° beam, points up. Invisible when lit.

150 Ω sets the current
About 24 mA from 5 V, 13 mA from 3.3 V.

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



S8050 transistor
Switches both LEDs. The pin only feeds it.

Red LED, same transistor
Lit exactly when the infrared LED is on.

NC
Connected to nothing on the board.

Front	GND	VCC	NC	SIGNAL
Drive it	GND	VCC	●	SIGNAL

A remote-control receiver cannot see a steady beam

A TK15 hears only light flashing at 38 kHz. Nothing on this board makes that: IRremote or micropython_ir switches the pin for you. A steady HIGH suits a TK64 break-beam, not a remote.

What it draws, and from where

SIGNAL LOW

0 mA

The transistor is off, so no current flows from VCC at all.

On, VCC on 3V3

14 mA, worked out

About 13 mA in the infrared LED, the rest in the red one.

On, VCC on 5V

27 mA, worked out

About 24 mA in the infrared LED: about 37 % more reach.

None of it comes from your pin, which gives the transistor about 2.6 mA through 1 kΩ. So a 3.3 V board can run this block on 5V, for the most range.

Arithmetic on the net list, Everlight's typical 1.2 V forward voltage, an assumed 0.15 V across the transistor and a red LED's usual 2 V, not measured. The LED is rated 100 mA continuous; at 5 V the 150 Ω dissipates about 89 mW of its 125. The sketch compiles for an ESP32-S3 and an Uno; the block has not been bench-tested for this sheet.

The first blink, on an ESP32-S3

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

```
// The pin SIGNAL is wired to.
// Uno: 3. ESP32: 22. ESP32-S3: 6. Pico: 17.
const int IR_PIN = 6;

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

void loop() {
  // HIGH turns the transistor on: both LEDs light.
  digitalWrite(IR_PIN, HIGH);
  Serial.println("on: the red LED is lit; look through a camera");
  delay(1000);

  digitalWrite(IR_PIN, LOW);
  Serial.println("off");
  delay(1000);
}
```

```
on: the red LED is lit; look through a camera
off
```

Serial Monitor at 115200, a line a second. The red LED blinks; a phone camera often shows the infrared LED as a faint violet glow.

Wiring

	FRONT	S3	UNO	ESP32	PICO
1	GND	GND	GND	GND	GND
2	VCC	5V	5V	5V	VBUS
3	NC				
4	SIGNAL	GPIO 6	D3	GPIO 22	GP17

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. 3V3 works, with less range. The pins are the TK16 IR Sender's.

Sending a code, and the pin to avoid

For a TK15, install IRremote and call IrSender.begin(IR_PIN), then IrSender.sendNEC(address, command, 0): the library makes the 38 kHz. Stand the two blocks about 30 cm apart, facing. On an ESP32-S3 avoid GPIO 0: SIGNAL holds it at about 0.94 V against the BOOT pull-up, and the chip may start in its download mode.

When it does not work

Red LED never lights

Check SIGNAL is on IR_PIN, not NC, and that setup() sets OUTPUT.

Red LED lit, camera sees nothing

The infrared LED is on too. Try another camera.

TK15 hears nothing

A steady HIGH is invisible to it. Send with IRremote.

TK15 decodes nothing up close

Within about 20 cm it is swamped. Move to 30 cm.

Works only close up

Move VCC to 5V, then aim: the beam is 20° across.

Both LEDs light at reset

Nothing holds the base LOW. Set the pin LOW first.

Specifications

LED	IR333C-A, 5 mm, 940 nm	**Beam**	20° across, points up from the board
LED rating	100 mA continuous	**Drive**	13 mA from 3.3 V, 24 mA from 5 V
SIGNAL	1 kΩ into the S8050's base, active high	**From the pin**	About 2.6 mA at 3.3 V
Current	0 off; 27 mA on at 5 V	**Supply**	5V for range, or 3V3