QUICK REFERENCE · TK59

Piezo-Ceramic Sensor

A disc that makes its own voltage when tapped. Two wires, no supply.

Nothing on the block holds SIGNAL below 3.3 V

Its one diode clamps only below 0 V. Finger taps read a volt or two, but a hard blow can pass a 3.3 V pin's limit, about 3.6 V. **On an ESP32, ESP32-S3 or Pico, for anything struck hard, add a Schottky diode from SIGNAL to 3V3**, stripe to 3V3.

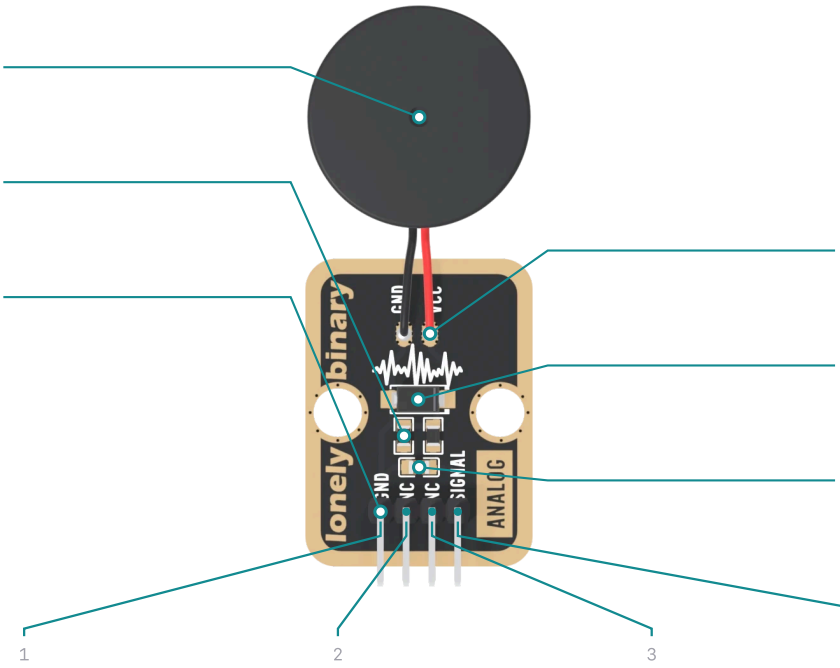
Pins, and which to wire

Drawn turned, the disc at the top, so the header lies along the bottom: **GND, NC, NC, SIGNAL**, GND on the square pad. Wire GND and SIGNAL; both NC pins are connected to nothing.

XHXDZ-22045 piezo disc
Ø22 mm. Tap the disc, not the table beside it.

1 MΩ drains the disc
Back to 0 V in about a tenth of a second.

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



The pad printed VCC
Is the disc's red lead, not a supply.

SS14, clamps below 0 V
Only. Nothing on the block holds it under 3.3 V.

100 nF on SIGNAL
Fed through 1 kΩ: turns each tap into a hump.

Front	GND	NC	NC	SIGNAL
Read it	GND	●	●	SIGNAL

There is no VCC pin Both middle pins are printed NC and are connected to nothing. The disc makes its own voltage, and nothing else on the block needs power. The pad printed VCC beside the red wire is the disc's own node.

What a tap looks like

At rest

0 V

The 1 MΩ holds SIGNAL at 0 V between taps. A steady press drains back to 0 as well.

A finger tap, Uno

1.8 V, highest reading

The owner's log, one reading about every 100 ms: each tap was caught on its way down.

Drains to a third in

0.12 s, worked out

1 MΩ across the 100 nF and the disc. The diode's leakage makes it quicker.

A tap is a hump: up in about a millisecond, down over a tenth of a second. Read with no delay and keep the highest reading in each 20 ms; a reading every 100 ms sees each tap three or four times, and never at its top.

The 1.8 V is the highest of the owner's Uno readings, taken about 100 ms apart, so it is a floor on that tap's top. The drain time is arithmetic on the BOM with a model 20 nF for the disc, whose sheet gives no capacitance. The sketches compile for an ESP32-S3, an ESP32 and an Uno.

The first reading, on an ESP32-S3

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

```
// The analog pin SIGNAL is wired to.
// Uno: A0. ESP32: 34. ESP32-S3: 4. Pico: 26.
const int PIEZO_PIN = 4;

// A tap is a hump: up in about a millisecond, down over a
// tenth of a second. Keep the highest reading in each 20 ms.
const unsigned long WINDOW_MS = 20;

void setup() {
  Serial.begin(115200);
}

void loop() {
  int peak = 0;
  unsigned long start = millis();
  while (millis() - start < WINDOW_MS) {
    int mv = analogReadMilliVolts(PIEZO_PIN);
    if (mv > peak) peak = mv;
  }
  Serial.print("mV:");
  Serial.println(peak);
}
```

```
mV:0
mV:0
```

Serial Plotter at 115200: a line at 0 that spikes with each tap and falls back over a few points. Uno and Pico: see the handbook's version.

Wiring

	FRONT	S3	UNO	ESP32	PICO
1	GND	GND	GND	GND	GND
2	NC	—	—	—	—
3	NC	—	—	—	—
4	SIGNAL	GPIO 4	A0	GPIO 34	GP26

Hole 1 is the square pad. There is no supply wire: both NC pins are connected to nothing. The pins are the TK27 Analog Microphone block's.

Counting taps, and hard blows

Count a rise, not a level: a reading 150 mV above the lowest since the last tap is a tap; then ignore everything for 150 ms. A second tap on the tail of the first still counts. For hard blows on a 3.3 V board, a Schottky diode (1N5817 or BAT54) from SIGNAL to 3V3, stripe to 3V3, conducts before the chip's own diode and takes the current.

When it does not work

Reads 0 when tapped

SIGNAL is the pin farthest from the square pad. Tap the disc itself.

One tap, several counts

Count a rise, then pause 150 ms. Read with no delay.

ESP32 stops near 3.1 V

Its reading runs out. Tap lighter, or add the Schottky.

Wanders with nothing touching

GND is not wired. Wire the square pad.

Only hard taps show

Tap the disc, not the table; or fix it flat to the surface.

MicroPython reads full scale

On an ESP32, set adc.atten(ADC.ATTN_11DB) first.

Specifications

Disc	XHXDZ-22045, Ø22 × 4.5 mm	**Supply**	None: no VCC pin
SIGNAL	0 V at rest, a hump per tap	**Rise**	About 1 ms
Drain	To a third in about 0.12 s	**Circuit**	1 MΩ, SS14, 1 kΩ, 100 nF
Clamp	Below 0 V only	**Board**	22.4 × 30.4 mm, 4.8 mm holes