QUICK REFERENCE · TK53

74HC595 Segment LED

One 0.8-inch digit on three wires: one byte, eight segments.

VCC goes to your board's logic supply

The chip reads a HIGH from 0.7 of VCC: 3.5 V at 5 V, more than a 3.3 V board gives. **5V on an Uno, 3V3 on an ESP32, ESP32-S3 or Pico.** At 5 V an 8 asks the chip for about 117 mA, past its 70 mA rating.

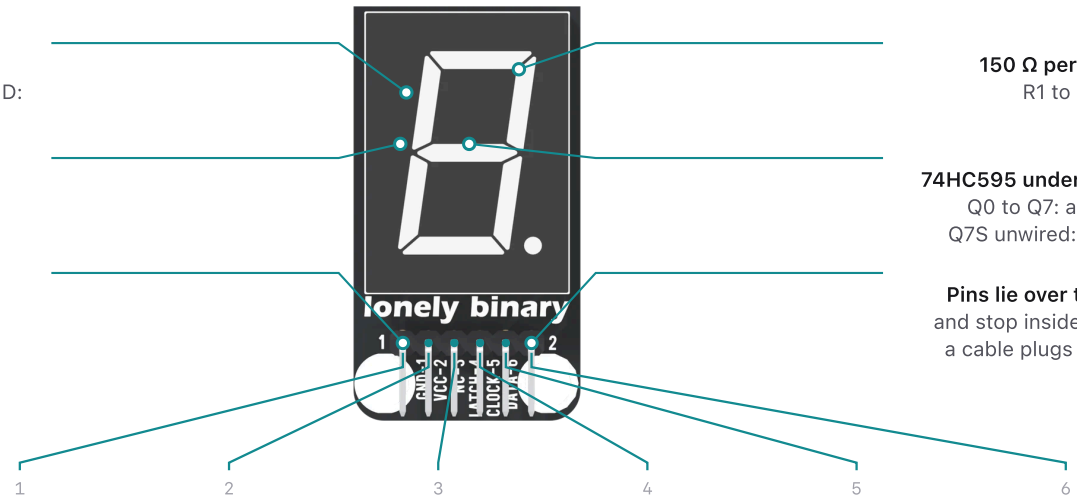
Pins, and which to wire

Digit up, header at the bottom. Five pins are wired; NC-3 is not. No pad is square: the numbers 1 to 6 are printed on both faces.

SM420806N, 0.8 inch
Common cathode on GND: a 1 lights a segment.

Supply capacitor
100 nF, VCC to GND, under the digit.

No square pad
Count from GND-1. Back: GND-1 at right.



150 Ω per segment
R1 to R8, under the digit.

74HC595 under the digit
Q0 to Q7: a to g, dot. Q7S unwired: no chain.

Pins lie over the board
and stop inside its edge: a cable plugs on below.

Front	GND	VCC	NC	LATCH	CLOCK	DATA
Back	GND	VCC	NC	LATCH	CLOCK	DATA
shiftOut	GND	VCC	•	LATCH	CLOCK	DATA

One byte is one digit

Bit 0 is segment a, bit 6 is g, bit 7 the dot, and a 1 lights, because the digit is common cathode. Send it MSBFIRST: 2 is 0x5B. A common-anode table lights the gaps, and LSBFIRST mirrors every digit.

Three numbers to drive it by

Per segment, 3.3 V

8.7 mA at most

(3.3 – 2.0 V) / 150 Ω. All eight lit stay inside the chip's 70 mA.

Per segment, 5 V

17 mA typical

11.5 to 20 mA with the chip's own output. Brighter.

Chip limit

70 mA in all

Through the 595's VCC pin. At 5 V, 4 segments fit; an 8 is 7.

At 3.3 V the digit is dimmer and inside every rating. At 5 V it is brighter, and a digit with more than 4 segments lit is outside the chip's absolute maximum. It usually runs; the datasheet does not promise it.

Arithmetic, not a bench measurement: the LED at 2.0 V (ARKLED SM420806N), the 595's HIGH output worked out to 30 Ω typical and 110 Ω worst from Nexperia's VOH at 6 mA (Nexperia 74HC595; 74HCT595, Rev. 12, 20 March 2024). No row exists at 3.3 V, so that figure is the ceiling.

Count 0 to 9

Arduino IDE · Board: your board · ESP32-S3: USB CDC On Boot: Enabled

```
// Uno pins. ESP32: 27, 26, 25. ESP32-S3: 6, 5, 4. Pico: 2, 3, 4.
const int LATCH_PIN = 8;
const int CLOCK_PIN = 12;
const int DATA_PIN = 11;

// Bit 0 is segment a, bit 7 the dot. A 1 lights.
const byte DIGITS[10] = {
  0x3F, 0x06, 0x5B, 0x4F, 0x66,  // 0 1 2 3 4
  0x6D, 0x7D, 0x07, 0x7F, 0x6F,  // 5 6 7 8 9
};

void show(byte pattern) {
  digitalWrite(LATCH_PIN, LOW);
  shiftOut(DATA_PIN, CLOCK_PIN, MSBFIRST, pattern);
  digitalWrite(LATCH_PIN, HIGH);        // the digit changes here
}

void setup() {
  Serial.begin(115200);
  pinMode(LATCH_PIN, OUTPUT);
  pinMode(CLOCK_PIN, OUTPUT);
  pinMode(DATA_PIN, OUTPUT);
  show(0);                              // blank
}

void loop() {
  for (int n = 0; n < 10; n++) {
    show(DIGITS[n]);
    Serial.println(n);
    delay(1000);
  }
}
```

```
0
1
2
```

The digit counts 0 to 9, a second each; the Serial Monitor at 115200 prints each digit as it is shown.

Wiring

	FRONT	UNO	ESP32	S3	PICO
1	GND	GND	GND	GND	GND
2	VCC	5V	3V3	3V3	3V3(OUT)
3	NC	—	—	—	—
4	LATCH	D8	GPIO 27	GPIO 6	GP2
5	CLOCK	D12	GPIO 26	GPIO 5	GP3
6	DATA	D11	GPIO 25	GPIO 4	GP4

Hole 1 is GND-1; no pad is square. VCC is the board's logic supply, never 5V beside a 3.3 V board. Any three free outputs work for LATCH, CLOCK and DATA; these are the sketch's.

In MicroPython, and two digits

On an ESP32, ESP32-S3 or Pico there is no shiftOut: `latch(0)`, then for bit 7 down to 0 set `data` and pulse `clock`, then `latch(1)`. Two TK53s: share DATA and CLOCK and give each its own LATCH. Only the board whose LATCH rises shows the byte.

When it does not work

Nothing lights

Check GND-1 and VCC-2, then LATCH-4: until LATCH rises, the digit never changes.

The same wrong shape every time

Bit order. The table goes with MSBFIRST; LSBFIRST mirrors it.

Everything lit but the digit

A common-anode table. This digit is common cathode: a 1 lights.

Random segments

DATA and CLOCK swapped, or the Uno's pin numbers left in on an ESP32.

Dim on a 3.3 V board

Expected: at most 8.7 mA a segment against about 17 at 5 V.

A second board stays blank when chained

Q7S is not connected. Share DATA and CLOCK, one LATCH each.

Specifications

Digit	ARKLED SM420806N, 0.8 in, red, CC	**Chip**	Nexperia 74HC595D, SOIC-16
Byte map	Q0 to Q7 = a to g, dot; 1 lights	**Resistors**	150 Ω, one per segment
Supply	2 to 6 V: your logic supply	**Chip limit**	70 mA through VCC (abs. max)
Tied off	OE to GND, MR to VCC, Q7S open	**Board**	22.4 × 41.0 mm, 6-pin header