Relay Nixie Clock — optional underglow (WLED + ESP32)

Bill of materials · one addressable LED under each IN-14 tube, run by WLED on an ESP32 from the clock's 12 V

Revision: A **Date:** 2026-11-03 **Lines:** 13 **Source:** clocks.fubsypoly.com/relay-nixie-clock/vol-5/

Every part for the optional underglow add-on, in the order of Volume 5's parts list: the ESP32 running WLED, a 12 V to 5 V buck converter on a fused tap from the clock, a 74AHCT125 level shifter, four addressable 5 mm LEDs in the IN-14 sockets' centre pads, and an IR receiver for a remote. Reference designators follow the Volume 5 schematic (Figure 5.2). Part numbers are examples that meet the specification; check each LED's pin order against its own datasheet. The add-on is low-voltage, but its wiring runs beside tube wiring at about 174 V: keep the two apart.

Tick **Ord** when ordered, **Have** when it is in hand and checked against the part number, **Fit** when it is installed. Write the vendor, order number and price on the last page. Alternates for obsolete (EOL) parts are in **bold**.

Same A standard current part; buy it as listed. **EOL** Obsolete: buy the alternate given. **Spec** No single part number: buy any part meeting the specification.

Conflict The sources disagree; the resolution is given. **Choice** One of several parts that work; the listed one is the design's pick.

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
Controller and power										
☐	☐	☐	**1**	ESP32 board	**ESP32 development board, ESP32-WROOM-32 module** DevKitC style, or a smaller 'mini' ESP32 board; classic ESP32	`Espressif ESP32-DevKitC (WROOM-32)`	Any classic-ESP32 board with GPIO18/19 free. Avoid the ESP32-C3 (experimental in WLED).	Digi-Key www.digikey.com Mouser www.mouser.com	**Choice**	
☐	☐	☐	**1**	U1	**12 V → 5 V buck converter, 1 A** Regulated 5 V	`Pololu D24V10F5`	Any regulated 5 V buck rated 1 A or more	Pololu www.pololu.com/product/2831	**Choice**	Check the output with a meter before connecting anything.
☐	☐	☐	**1**	F1	**0.5 A fuse or resettable polyfuse** With holder, or inline			Digi-Key Mouser	**Spec**	Protects the clock's 12 V supply.
☐	☐	☐	**1**	U2	**74AHCT125 quad buffer, DIP-14** 3.3 V → 5 V data level shifter; one gate used	`SN74AHCT125N`	74HCT125	Digi-Key Mouser	**Same**	
☐	☐	☐	**1**	U3	**IR receiver, 38 kHz** 2.5–5.5 V; runs from 3.3 V here	`Vishay TSOP38238`		Digi-Key Mouser	**Same**	Lens at the shelf's front edge.
☐	☐	☐	**1**	Remote	**IR remote for RGB LED controllers, 24 or 44 key** A layout WLED supports			Amazon AliExpress	**Spec**	
LEDs										
☐	☐	☐	**4**	LED1–LED4	**Addressable 5 mm through-hole RGB LED** Four leads: +5 V, GND, DI, DO	`WS2812D-F5`	PL9823-F5	AliExpress Adafruit www.adafruit.com	**Choice**	Pin orders differ: check each datasheet and wire to suit.
Passives										
☐	☐	☐	**1**	R1	**330 Ω, 1/4 W, 1%** Data-line series resistor				**Same**	

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**1**	R2	**100 Ω, 1/4 W, 1%** IR receiver supply filter				Same	
☐	☐	☐	**1**	C1	**470 µF 10 V electrolytic** 5 V bulk, near the first LED				Same	
☐	☐	☐	**1**	C2	**4.7 µF ceramic or electrolytic** IR receiver supply filter				Same	
☐	☐	☐	**5**	C3–C7	**0.1 µF ceramic, 50 V** One at U2, one across each LED at its socket pads				Same	

Wiring and hardware

ORD	HAVE	FIT	QTY	REF. DES.	PART / SPECIFICATION	PART NUMBER	ALTERNATES / SUBSTITUTES	WHERE TO BUY	TAG	NOTES
☐	☐	☐	**—**	Controller, shelf	**Small perfboard, headers, JST/XH-style connectors, 24–26 AWG wire** Make the shelf wiring unpluggable			Digi-Key Tayda www.taydaelectronics.com	Spec	Insulate it and keep it away from the tube wiring.

Orders

VENDOR	ORDER NO.	DATE	TOTAL	RECEIVED	LINES / NOTES

Build total: _____ **Started:** _____ **First power-up:** _____

Notes