

Readiness report — DPScope USB Oscilloscope

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Readiness: DPScope USB Oscilloscope

Verdict: Ready with caveats · 2026-09-02 · est. parts cost \$65-\$95

All functional integrated circuits, passives, and mechanical components can be procured from authorized distributors or verified retail channels. However, several caveats must be addressed before ordering: the dsPIC microcontroller part number in the snapshot is malformed and requires selecting the Skinny DIP package variant; the specified Murata trimmer capacitor is obsolete and requires a footprint-compatible substitute; the Murata ceramic resonator is flagged Not For New Designs (NFND); and the representative precision resistor and IC socket part numbers are out of stock or obsolete, requiring standard catalog drop-in replacements. This cold check establishes the initial baseline for future drift monitoring.

Action required

Part	Problem	Recommended action
dsPIC30F2020-E/P	Invalid MPN; Microchip dsPIC30F2020 28-pin DIP devices use the /SP (Skinny DIP) package designation, not /P.	Order active drop-in replacement DSPIC30F2020-20E/SP or DSPIC30F2020-30I/SP .
TZ03Z500E169B00	Obsolete; zero stock globally across authorized distributors.	Substitute active through-hole trimmer capacitor EW Electronics GKG50015 .
CSTLS16M0X53-B0	Not For New Designs (NFND); impending supply chain obsolescence.	Sourcing is healthy today (>30,000 units in distribution), but prepare a board redesign or alternate clock source for future runs.
RNMF14FTC249K	Out of stock across all authorized distributors (19–21 week factory lead time).	Substitute standard in-stock axial 249 kΩ 1% 0.25 W resistors such as Stackpole RNF14FTD249K or Yageo MFR-25FTE52-249K .
4828-3000-CP	Obsolete; zero stock globally.	Substitute standard active 28-pin 300 mil through-hole DIP socket Mill-Max 110-44-328-41-001000 .

Parts

Integrated Circuits

Part	Spec/Package	Status	Stock	Price	Source
Microcontroller (dsPIC): dsPIC30F2020-E/P	DIP-28 (300 mil)	Invalid MPN	0	—	Microchip
Programmable Gain Amplifier (PGA1, PGA2): MCP6S22-I/P	DIP-8	Active	25	\$1.97	DigiKey
Dual 12-Bit DAC (DAC1): MCP4822-E/P	DIP-8	Active	1,172	\$4.28	DigiKey
Quad Op-Amp (OP1): MCP6024-I/P	DIP-14	Active	295	\$2.72	DigiKey

Passive Components

Part	Spec/Package	Status	Stock	Price	Source
Precision Resistors (249 kΩ): RNMF14FTC249K	Axial 0207, 0.25 W, 1%	Active (Out of stock)	0	\$0.01476	DigiKey
Precision Resistors (9.1 kΩ): Axial metal film	Axial 0207, 0.25 W, 1%	not checked	—	—	—
General Resistors (470 Ω, 1 kΩ, 750 kΩ): CF14JT1K00 (rep.)	Axial 0207, 0.25 W, 5%	Active	527,893	\$0.10	DigiKey
Trimmer Resistors (VR1, VR2): 3362P-1-504LF	500 kΩ, through-hole top adjust	Active	869	\$1.23	DigiKey
Ceramic Capacitors (0.1 μF rep.): K104K15X7RF53L2	Radial, ≥16 V	Active	32,668	\$0.27	DigiKey
Ceramic Capacitors (22 pF, 47 pF, 100 pF): Radial MLCC/disc	Radial, ≥16 V	not checked	—	—	—
Trimmer Capacitors (C18, C19): TZ03Z500E169B00	10..60 pF, radial 2-pin	Obsolete	0	—	DigiKey
Electrolytic Capacitor (C9): ECA-1VHG101I	100 μF, 35 V, radial 2.50 mm pitch	Active	417	\$0.44	DigiKey

Discrete Semiconductors & Clocking

Part	Spec/Package	Status	Stock	Price	Source
Protection Diodes (D1, D2, D3, D4): 1N914ATR	DO-35 axial	Active	50,665	\$0.30	DigiKey
Status Indicator (LED1): WP7113ID	5 mm (T-1 3/4) red	Active	145,555	\$0.21	DigiKey

Part	Spec/Package	Status	Stock	Price	Source
Ceramic Resonator (X1): CSTLS16M0X53-B0	16 MHz, 3-pin radial, 2.50 mm pitch	NFND	13,806	\$0.34	DigiKey

Connectors & Hardware

Part	Spec/Package	Status	Stock	Price	Source
BNC Connectors (J1, J2): 112408	BNC female straight PCB	Active	152	\$5.45	DigiKey
USB Interface Board (J_USB): ShillehTek FT232RL	6-pin 0.1" header, 5 V TTL, Mini-B	Active	In stock	\$6.99 (2-pack)	ShillehTek
IC Sockets (28-pin): 4828-3000-CP	28-pin DIP 300 mil	Obsolete	0	—	DigiKey
IC Sockets (8-pin x3, 14-pin x1): DIP sockets	300 mil width	not checked	—	—	—
Enclosure: Serpac A21,BK	ABS black, 4.25" x 2.60" x 1.12"	Active	298	\$12.79	DigiKey
Rubber Feet: Self-adhesive standoffs	4x 5 mm dia.	not checked	—	—	—
Jumper (JP_CAL): Shorting block	2-pin 0.1" pitch	not checked	—	—	—
Probe Cables: BNC-to-Microhook / scope probes	Standard BNC male	not checked	—	—	—
USB Cable: Monoprice USB-A to Mini-B 2.0 Cable	5-pin Mini-B, 28/24 AWG data cable	Active	In stock	\$1.89	Monoprice

Substitutes

For part	Substitute	Differences	Verified	Judgment
dsPIC30F2020-E/P	Microchip DSPIC30F2020-20E/SP	Corrects invalid /P suffix to 28-SPDIP (0.300", 7.62 mm pitch); 20 MIPS, -40°C to +125°C extended temperature rating.	Package + lead spacing/width (28-DIP 0.300" / 7.62 mm via DigiKey parametrics), supply rail (5 V logic), core architecture (dsPIC30F2020)	Acceptable drop-in replacement (exact physical/ electrical component intended).

For part	Substitute	Differences	Verified	Judgment
dsPIC30F2020-E/P	Microchip DSPIC30F2020-30I/SP	Corrects invalid /P suffix to 28-SPDIP (0.300", 7.62 mm pitch); 30 MIPS (exceeds 20 MIPS), -40°C to +85°C industrial temperature rating.	Package + lead spacing/width (28-DIP 0.300" / 7.62 mm via DigiKey parametrics), supply rail (5 V logic), core architecture (dsPIC30F2020)	Acceptable drop-in replacement.
RNMF14FTC249K	Stackpole RNF14FTD249K	Standard Axial 0207 body (2.35 mm Dia x 6.35 mm L vs 1.78 mm x 3.30 mm mini); identical 249 kΩ, 0.25 W, 1%.	Package (Axial 0207 equivalent), resistance (249 kΩ), tolerance (1%), power (0.25 W) via DigiKey parametrics	Acceptable drop-in replacement.
RNMF14FTC249K	Yageo MFR-25FTE52-249K	Standard Axial 0207 body (2.40 mm Dia x 6.30 mm L); identical 249 kΩ, 0.25 W, 1%.	Package (Axial 0207 equivalent), resistance (249 kΩ), tolerance (1%), power (0.25 W) via DigiKey parametrics	Acceptable drop-in replacement.
TZ03Z500E169B00	EW Electronics GKG50015	10 ~ 50 pF tuning range (covers target range; original was 6 ~ 50 pF); 100 V rating (exceeds 50 V rating); 6.00 mm diameter matches original; height 5.00 mm (vs 5.30 mm).	Mounting type (through-hole), diameter (6.00 mm), height (5.00 mm), capacitance range (10–50 pF), voltage rating (100 V) via DigiKey parametrics; lead pitch not stated in DigiKey parameters	Acceptable replacement.
4828-3000-CP	Mill-Max 110-44-328-41-001000	Standard 28-position through-hole DIP socket, 0.100" (2.54 mm) mating and post pitch, 300 mil row spacing.	Package/case (28-DIP 300 mil), mating pitch (0.100" / 2.54 mm), post pitch (0.100"), mounting (through-hole) via DigiKey parametrics	Acceptable drop-in replacement.

Instructors should verify any substitute against its datasheet before ordering.

Cybersecurity — software & network

Software dependencies were not recorded in this lab's snapshot (it predates the software section). Re-ingest the lab to check them.

Other dependencies

- Project Documentation and Download Repository: Project website (<http://www.dpscope.com>) hosting build documentation, schematics, and configuration files. Status: not checked.
- PCB Fabrication Data: Gerber files for 2-layer PCB sized to fit the Serpac A-21 enclosure (~4.25" x 2.25"). Status: not checked.
- FTDI EEPROM Configuration Files: MPROG template file required to program the hardware serial identifier (FTE0ZZ3K) into generic FT232R breakout boards. Status: not checked.

Watch list

- **Murata CSTLS16M0X53-B0 Resonator:** Flagged as Not For New Designs (NFND). While authorized distributor inventory currently exceeds 30,000 units, Murata has ceased recommendation for new production. Future builds will eventually require migrating to an SMD resonator or a crystal oscillator with discrete capacitors.
- **Microchip MCP6S22-I/P Programmable Gain Amplifier:** Factory stock at primary distributors is low (DigiKey has 25 units in stock, though broader distributors hold healthy secondary inventory). Sibling variant MCP6S92-I/P is completely unavailable across authorized distribution.
- **Through-Hole Trimmer Capacitors:** Major manufacturers (including Murata) have discontinued through-hole ceramic trimmer capacitor lines. Inventory for through-hole variants (such as EW Electronics GKG series) should be monitored before running large lab sections.
- **USB Interface Hardware:** Mini-B USB cables and breakout modules are becoming less prevalent as USB-C predominates. Ensure replacement USB boards maintain 5 V logic levels with identical 6-pin pinouts (DTR, RX, TX, VCC, CTS, GND) and cables carry 28/24 AWG data conductors rather than power-only wiring.