

Readiness report — ZombieVerter EV Conversion VCU

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Readiness: ZombieVerter EV Conversion VCU

Verdict: At risk · 2026-09-03 · est. parts cost \$125–\$160 for the board's components at single-unit prices (excludes PCB fabrication and the enclosure, whose price could not be verified) **Cybersecurity — software & network: Do not place on an open network**

This is the cold check for this lab — it establishes the baseline, so every part's current price, stock and lifecycle status is recorded here for the next check to measure against. Most of the board is cheap and plentiful, but four of the exact part numbers in the bill of materials cannot be bought today from an authorized distributor: the single-wire CAN transceiver NCV7356D1G is obsolete with zero stock at DigiKey, Mouser and RS; the common-mode choke DLP11SA900HL2L is obsolete with a 23-week lead; the buck regulator XL1509-5.0E1 is listed by no authorized distributor at all; and the 47 μ H inductor's part number is listed by nobody. Two more parts, TJA1055T/3/C,518 and TJA1020T/CM,118, are on Last Time Buy with healthy stock — buy them now or lose them. Footprint-verified, in-stock replacements were found for the choke, the buck regulator, the 47 μ H inductor, the 100 μ F 1206 capacitor and the 3.3 V CAN transceivers, so a builder can populate almost the whole board today. What stops it being merely "Ready with caveats" is the enclosure: the board outline and its right-angle 56-pin header are designed around one AliExpress listing that could not be verified this run, and no equivalent housing turned up.

Action required

Part	Problem	Recommended action
NCV7356D1G (IC19)	Obsolete; zero stock at DigiKey, Mouser and RS; ECIA lifecycle risk High	Substitute TH8056KDC-AAA-008-RE (\$1.78, stock 2357) after confirming SAE J2411 compatibility against its datasheet — or omit the single-wire CAN channel if the target vehicle is not GM/Opel
DLP11SA900HL2L (L4, L5)	Obsolete; zero stock, 23-week factory lead; whole DLP11S family end-of-life	Substitute EXC-24CE900U (\$0.40, stock 57,332) — identical package, size, impedance and DCR
XL1509-5.0E1 (IC11)	No ECIA-authorized distributor lists this part number; retail only	Order XL1509-5.0-EV (\$0.93, stock 3769; 4.5–40 V in, 5 V, 3 A, 8-SOIC) or buy the original from a retail seller at \$0.28–\$2.59

Part	Problem	Recommended action
47 μ H 0805 inductor (L6)	The specified MLZ2012N470LT000 is listed by no distributor	Substitute MLZ2012M470WT000 (\$0.10, stock 34,900) — 47 μ H, 0805, 170 mA
TJA1055T/3/C,518 (IC20)	Last Time Buy; ECIA lifecycle risk High	Buy now (11,100 in stock at DigiKey) and stock spares; TJA1055T/3/2Z is still Active
TJA1020T/CM,118 (IC14)	Last Time Buy; ECIA lifecycle risk High	Buy now — 18,715 at DigiKey, 21,086 at Rochester, 15,000 at Future
SN65HVD230QDR (IC9, IC13, IC15–IC18)	Active but DigiKey stock 0, 16-week factory lead; six pieces needed	Order at Mouser (3871 in stock, \$3.97) or substitute TCAN330DR (\$2.73, stock 3502)
100 μ F 1206 MLCC (C17, C21)	CL31A107MQHNNNE Active but DigiKey stock 0	Substitute CL31A107MQHNNWE (\$0.52, stock 287,516) — identical parametrics
500 mA fuse (F1)	The specified 0466.500NR is a 1206 part (3.18 $\times$ 1.52 mm); the board footprint is 2410 (6.1 $\times$ 2.5 mm)	Use 0454.500MR (\$2.71, 6.10 $\times$ 2.69 mm) and check the land pattern; confirm the slow-blow characteristic on the datasheet
56-way sealed enclosure	AliExpress listing 32857771975 could not be fetched (site blocks automated requests); no equivalent 56-way housing found in a shopping search	Verify the listing manually before ordering PCBs — the board outline depends on it
56-way harness pigtail	AliExpress listing 4001213569338 could not be fetched; shopping alternatives unverified	Confirm mating with the enclosure header before buying a generic 56-way ECU plug

Cybersecurity — software & network

Do not place on an open network — With the optional ESP8266 adapter fitted the board serves an unauthenticated web interface that both tunes drivetrain parameters and accepts firmware uploads, and the project offers no authentication to turn on.

Component	Version	How known	Support status
ZombieVerter VCU application firmware (stm32-vcu)	not determined	unpinned (GitHub repository damienmaguire/Stm32-vcu; CI-build.yml builds the master branch with no release tag or commit pin (fetched .github/workflows/CI-build.yml))	—
libopencm3 (git submodule)	not determined	unpinned (.gitmodules declares the submodule URL https://github.com/jsphuebner/libopencm3 with no branch, tag or commit (fetched .gitmodules))	—
libopeninv (git submodule)	not determined	unpinned (.gitmodules declares the submodule URL https://github.com/jsphuebner/libopeninv.git with no branch, tag or commit (fetched .gitmodules))	—

Component	Version	How known	Support status
GNU Arm Embedded Toolchain (arm-none-eabi-gcc)	not determined	unpinned (installed with a bare 'apt-get install gcc-arm-none-eabi' in both fetched build files (.github/workflows/CI-build.yml and .gitpod.Dockerfile) - whatever version the OS repository currently ships)	—
Build platform (Ubuntu Linux)	not determined	not determined (CI declares only 'runs-on: ubuntu-latest' and the Gitpod image is 'gitpod/workspace-full'; no release number appears in any fetched file)	—
ESP8266 web interface firmware (optional Wi-Fi adapter)	not determined	unpinned (jsphuebner/esp8266-web-interface README (fetched) points builders at pre-compiled forum binaries or self-compilation; no release version is named)	—
Code::Blocks IDE	not determined	not determined (the lab README names the IDE without a version (snapshot))	—
updater.py firmware flashing script	not determined	not determined (referenced by the lab README as part of the OpenInverter toolset; no package manifest or version (snapshot))	—

Component	Finding	Severity	Fix available?
ESP8266 web interface firmware (optional Wi-Fi adapter)	With the optional ESP8266 adapter fitted, the board serves its own open Wi-Fi access point (default name 'ESP-xxxxx', fixed address 192.168.4.1, also announced as inverter.local) whose web interface both tunes drivetrain parameters and accepts a firmware upload at http://inverter.local/update , and no login or password step appears anywhere in the project's own instructions.	posture	Mitigation only — fit the Wi-Fi adapter only while actively tuning, keep it on an isolated bench network or its own access point, rename the default access point, and never join the board to campus or home Wi-Fi.
Firmware build inputs (libopencm3, libopeninv, arm-none-eabi-gcc)	Build inputs are unpinned: 2 of 2 submodules in .gitmodules declare no branch, tag or commit, and the ARM toolchain is installed unversioned, so two students building the same lab can end up with different firmware and no version exists that any advisory database could be asked about.	posture	Mitigation only — pin the two submodule commits and record the toolchain version that produced a known-good build, then rebuild from those pins.
In-vehicle networks (CAN, single-wire CAN, LIN)	The VCU's CAN, single-wire CAN and LIN buses carry drivetrain telemetry and control commands with no authentication or encryption stated in the lab's sources, so anything attached to the bench harness can command inverter, charger and contactor functions.	posture	Mitigation only — treat the bus harness as a trusted-only connection, keep it physically separate from any general-purpose or wireless network, and supervise students whenever the drivetrain is energised.

What this means for your lab

Nothing in this lab was found to carry a known published vulnerability, but that is because none of its software can be checked, not because it was cleared. The part that matters for a classroom is the optional ESP8266 Wi-Fi adapter: with it fitted, the controller puts up its own Wi-Fi network with a predictable name and no password step in the instructions, and anyone who joins it can open the tuning page, change how the motor, charger and contactors behave, and upload replacement firmware to the board. Treat a running conversion as a machine that anyone within Wi-Fi range could take over: fit the adapter only while you are actively tuning, keep it on an isolated bench network rather than campus Wi-Fi, and rename the access point from its default. The CAN and LIN wiring has no authentication either, so anything plugged into the harness can issue drivetrain commands - keep that harness on the bench and off any general-purpose network. Finally, the firmware and its two libraries are built from whatever the repositories hold on the day, so record the exact commits and toolchain version you used, or you will not be able to rebuild the firmware a student actually ran.

Not checked

- ZombieVerter VCU firmware (stm32-vcu): Custom open-source vehicle-control firmware: no advisory database covers it, and the project pins no release to check.
- libopencm3: Embedded hardware-abstraction library with no vulnerability database, and the submodule declares no commit to check.
- libopeninv: Embedded OpenInverter library with no vulnerability database, and the submodule declares no commit to check.
- GNU Arm Embedded Toolchain (arm-none-eabi-gcc): Installed unversioned from the OS repository; there is no version to look up.
- Build platform (Ubuntu Linux): Only 'ubuntu-latest' is declared, so no release could be bound to an endoflife.date cycle - support status unknown.
- ESP8266 web interface firmware: No release version is pinned and no advisory database covers Arduino/ESP8266 project firmware.
- Code::Blocks IDE: Version not stated in the lab's sources.
- updater.py firmware flashing script: Standalone script with no package manifest and no version.

Parts

Microcontroller and power management

Part	Spec/Package	Status	Stock	Price	Source
STM32F107VCT6 (IC8)	LQFP-100, 2-3.6 V, 72 MHz	Active — readily available	1482 (DigiKey), 23,310 (Newark)	\$12.68	DigiKey; Newark \$10.85, Arrow \$4.64
XL1509-5.0E1 (IC11)	SOP-8, 40 V in, 5 V, 2 A	Hard to obtain — no authorized distributor	0 authorized	\$0.28 retail (JAK Electronics)	Retail only; see Substitutes
AMS1117-3.3 (IC4)	SOT-223, 3.3 V, 1 A	Active — readily available	26,946 / 16,860	\$0.10	DigiKey (Silkormicro \$0.10, UMW \$0.30)

Vehicle bus transceivers and communications

Part	Spec/Package	Status	Stock	Price	Source
MCP25625T-E/ML (IC10)	QFN-28 6×6 mm, 4.5–5.5 V	Active — readily available	3524 (DigiKey), 7943 (Mouser)	\$3.38	DigiKey
SN65HVD230QDR (IC9, IC13, IC15–IC18) ×6	SOIC-8, 3–3.6 V	Active — out of stock at DigiKey (16-week lead)	0 (DigiKey), 3871 (Mouser)	\$3.81 DigiKey; \$3.97 Mouser	Mouser, or substitute
NCV7356D1G (IC19)	SOIC-8, 5–27 V, SAE J2411	Obsolete — unobtainable	0 everywhere (DigiKey, Mouser, RS)	—	None; see Substitutes
TJA1055T/3/C,518 (IC20)	SOIC-14, 4.75–5.25 V	Last Time Buy	11,100 (DigiKey), 3037 (Newark)	\$3.25	DigiKey; Arrow \$1.79
TJA1020T/CM,118 (IC14)	SOIC-8, LIN 2.0	Last Time Buy	18,715 (DigiKey), 21,086 (Rochester)	\$2.40	DigiKey; Future \$1.07
MAX3221ECPWR (IC30)	TSSOP-16, 3–5.5 V	Active — readily available	28,682	\$2.31	DigiKey

Drivers, amplifiers, memory, and control ICs

Part	Spec/Package	Status	Stock	Price	Source
NCV8402ASTT1G (IC1, IC3, IC5-IC7, IC24-IC26) ×8	SOT-223, 42 V clamp, 2 A	Active — readily available	72,891 (DigiKey), 375,000 (Avnet)	\$0.84	DigiKey; Avnet \$0.34
NCV8461DR2G (IC12)	SOIC-8 high-side switch	Active — readily available	1681	\$1.67	DigiKey
FAN3122TMX (IC27-IC29) ×3	SOIC-8, 4.5–18 V, 10.6 A peak	Active — readily available	593 (DigiKey), 5288 (Newark)	\$1.87	DigiKey
AD5160BRJZ10-RL7 (IC21, IC22) ×2	SOT-23-8, 10 kΩ, 2.7–5.5 V	Active — readily available	28,279	\$2.93	DigiKey; Newark \$1.76
M24M02-DRMN6TP (IC2)	SOIC-8, 2 Mbit I2C EEPROM	Active — readily available	2699	\$3.44	DigiKey
TDA2822D013TR (IC23)	SOIC-8, 1.8–15 V	Active — readily available	4141 (DigiKey), 15,322 (Newark)	\$1.88	DigiKey

Discrete semiconductors

Part	Spec/Package	Status	Stock	Price	Source
MMBT3904 (TR1, TR2) ×2	SOT-23-3, 40 V, 200 mA	Active — readily available	203,957	\$0.12	DigiKey (Diode); MCC \$0.11
SS54 (D1, D5) ×2	SMA (DO-214AC), 5 A, 40 V	Active — available, not at DigiKey	32,847 (Newark)	\$0.371	Newark (Multicomp SS54)
1N4148WS (D2-D4, D6-D11) ×9	SOD-323F, 75 V, 150 mA	Active — readily available	1,405,405	\$0.18	DigiKey
Red LED, 0805 (LED1, LED2) ×2	0805, VF 2 V @ 20 mA	Active — readily available	111,501	\$0.20	DigiKey (APT2012EC)

Passives: inductors, beads, crystals, and fuse

Part	Spec/Package	Status	Stock	Price	Source
DLP11SA900HL2L (L4, L5) ×2	0504 (1210 metric) 4-lead, 90 Ω @ 100 MHz	Obsolete — 23-week lead	0 (DigiKey and Mouser)	\$0.43 ref	None; see Substitutes

Part	Spec/Package	Status	Stock	Price	Source
MH2029-300Y (L1, L2) ×2	0805, 30 Ω @ 100 MHz, 3 A	Active — readily available	76,529	\$0.10	DigiKey
68 μH power inductor (L3)	12.5 × 12.5 mm, Isat ≥ 2 A	Active — available, not at DigiKey	2747 (Mouser)	\$2.32	Mouser (MSS1278-683MLD)
47 μH inductor (L6)	0805, ≥ 50 mA	Specified part not listed by any distributor	0	—	See Substitutes
8.000 MHz crystal (X1)	5.0 × 3.2 mm, 2-pad	Active — readily available	12,697	\$0.25	DigiKey (ABLS-8.000MHZ-B4-T)
16.000 MHz crystal (X2)	3.2 × 2.5 mm, 4-pad	Active — readily available	2667	\$1.05	DigiKey (FA-238 16.0000MB-C3)
Fuse 500 mA slow blow (F1)	Board footprint 2410 (6.1 × 2.5 mm)	Active — but the specified part is 1206, not 2410	15,749	\$1.25	DigiKey; see Substitutes for the 2410 part

Passives: capacitors

Part	Spec/Package	Status	Stock	Price	Source
0805 MLCC group (66 pcs: 22 pF – 10 μF)	0805, X7R/X5R/C0G, ≥ 16–50 V	Active — commodity, readily available	2,049,437 (representative)	\$0.14	DigiKey; representative part CC0805KRX7R9BB104 (0.1 μF 50 V X7R), individual values not each checked
100 μF 1206 MLCC (C17, C21) ×2	1206, 100 μF, 6.3 V, X5R	Active — DigiKey stock 0	0 (DigiKey), 24,000 (Newark)	\$0.67	Newark \$0.212, or substitute
Tantalum 100 μF 6.3 V (C13, C20, C23) ×3	EIA 3528 Case B	Active — readily available	3232	\$1.72	DigiKey (T491B107M006AT)
SMD electrolytic 470 μF 25 V (C29, C69) ×2	10 × 10 mm can	Active — readily available	10,685	\$1.28	DigiKey (EEE-FK1E471P)

Passives: resistors

Part	Spec/ Package	Status	Stock	Price	Source
0805 thick-film group (68 pcs, 4.7 Ω – 18 k Ω , 1%)	0805, 1%, ≥ 0.1 W	Active — commodity, readily available	933,700 (representative)	\$0.10	DigiKey; representative part RC0805FR-071KL (1 k Ω 1%), individual values not each checked

Enclosure, connectors, and support hardware

Part	Spec/Package	Status	Stock	Price	Source
Automotive sealed enclosure, 56-way header	Right-angle 56-pin automotive ECU housing	Not verified — listing could not be fetched	—	—	AliExpress item 32857771975 (blocked)
56-way wiring harness pigtail	Mating 56-pin plug with pigtails	Not verified — listing could not be fetched	—	\$12.80–\$24.99 for generic 56-way plugs	AliExpress item 4001213569338 (blocked); shopping alternatives unverified
ESP8266 Wi-Fi module (optional)	ESP-01 / ESP-12, 3.3 V UART	Readily available (retail)	—	\$2.11–\$9.99	Google Shopping listings; no product page fetched

Substitutes

For part	Substitute	Differences	Verified	Judgment
XL1509-5.0E1 (IC11)	XL1509-5.0-EV (EVVO, \$0.93, stock 3769)	Input 4.5–40 V meets the 40 V requirement; 5.0 V fixed output matches; 3 A output exceeds the required ≥ 2 A; 150 kHz matches; 8-SOIC / 8-SOP matches SOP-8	verified: package/case, input voltage range, output voltage, output current, switching frequency (DigiKey parametrics on the substitute, compared against the snapshot's requirements — the original is carried by no distributor); not verified: pin-for-pin pinout, silicon equivalence to XLSEMI	Acceptable — check the pinout against the datasheet before ordering

For part	Substitute	Differences	Verified	Judgment
XL1509-5.0E1 (IC11)	AP1509-50SG-13 (Diodes, \$1.57, stock 34,906)	Input maximum 22 V against the required ≥ 40 V — falls short; 5 V / 2 A / 150 kHz / 8-SOIC otherwise match	verified: package/case, input voltage range, output current (DigiKey parametrics)	Rejected — supply-range hard stop; a 12 V automotive rail with load dump exceeds 22 V
NCV7356D1G (IC19)	TH8056KDC-AAA-008-RE (Melexis, \$1.78, stock 2357)	Package 8-SOIC matches; supply 6–18 V covers the 9–16 V battery window but is narrower than the original's 5–27 V, so it has less load-dump headroom; DigiKey lists it as a substitute for the original	verified: package/case and supply-voltage range (DigiKey parametrics on both parts); not verified: SAE J2411 single-wire CAN protocol and pinout — the Melexis product page could not be fetched this run	Plausible, unverified — confirm J2411 compatibility on the datasheet before committing
NCV7356D1G (IC19)	MC33897CTEF (NXP, \$4.21, stock 4141)	14-SOIC against the board's SOIC-8 footprint; part is itself Obsolete with ECIA lifecycle risk High	verified: package/case (DigiKey parametrics on both parts)	Rejected — footprint hard stop, and obsolete; the snapshot's pin-compatibility note is contradicted by the distributor data
SN65HVD230QDR (×6)	TCAN330DR (TI, \$2.73, stock 3502)	Supply 3–3.6 V matches; 8-SOIC (3.90 mm) matches; –40 to +125 °C exceeds the original's –40 to +85 °C; named as acceptable latitude in the lab's own snapshot	verified: package/case and supply-voltage range (DigiKey parametrics on both parts); not verified: pinout	Acceptable — different device family, so check the pinout before ordering six

For part	Substitute	Differences	Verified	Judgment
TJA1055T/3/C,518 (IC20)	TJA1055T/3/2Z (NXP, \$2.83, stock 2117)	Same TJA1055T/3 device with a different ordering/packing code; Active rather than Last Time Buy; 14-SOIC and 4.75–5.25 V identical	verified: package/case and supply-voltage range (DigiKey parametrics on both parts); not verified (assumed): that the "/3" code still denotes the 3.3 V-compatible VIO variant — no I/O-level field exists in the parametrics	Acceptable — the safer order code once the ",518" stock runs out
TJA1020T/CM,118 (IC14)	TJA1421AT/0Z (NXP, \$0.80, stock 2443)	8-SOIC matches the board footprint; supply 5.4–28 V covers the 12 V rail; a newer LIN transceiver family	verified: package/case and supply-voltage range (DigiKey parametrics on the substitute; the original's parametrics are blank at DigiKey, so no like-for-like comparison was possible); not verified: 3.3 V logic-interface compatibility and LIN pinout	Plausible, unverified — only reach for it if TJA1020 stock dries up
DLP11SA900HL2L (L4, L5)	EXC-24CE900U (Panasonic, \$0.40, stock 57,332)	Impedance 90 Ω @ 100 MHz, package 0504 (1210 metric) 4-lead, body 1.25 $\times$ 1.00 mm, DCR 1.75 Ω max and 5 V DC rating are all identical to the original; 160 mA exceeds the original's 150 mA; 0.60 mm height is lower	verified: package/case, body size, impedance at frequency, DCR and voltage rating (DigiKey parametrics on both parts); not verified: land pattern, and the snapshot's 330 mA current figure, which no distributor data supports (DigiKey lists 150 mA for the original)	Acceptable — the closest thing to a drop-in on this board
DLP11SA900HL2L (L4, L5)	DLM0NSM900HY2D (Murata, \$0.10, stock 242,613)	0302 (0806 metric), 0.85 $\times$ 0.65 mm against the original's 1.25 $\times$ 1.00 mm; 100 mA against 150 mA	verified: package/case, body size and current rating (DigiKey parametrics on both parts)	Rejected — footprint hard stop, despite being DigiKey's own suggestion

For part	Substitute	Differences	Verified	Judgment
68 μ H inductor (L3)	744771168 (Würth, \$2.26, stock 5512)	68 μ H $\pm$ 20% matches; Isat 2.19 A exceeds the required $\geq$ 2.0 A; IRMS 1.91 A falls $\sim$ 5% short of the required $\geq$ 2.0 A; DCR 120 m Ω better than the required $\leq$ 150 m Ω ; body 12.0 $\times$ 12.0 mm fits the 12.5 mm envelope	verified: inductance, saturation current, RMS current, DCR and body size (DigiKey parametrics); not verified: pad geometry against the board's 2.9 $\times$ 5.4 mm pads	Acceptable with caveat — only if the 5 V rail's continuous draw stays under about 1.9 A; otherwise order the original from Mouser
47 μ H inductor (L6)	MLZ2012M470WT000 (TDK, \$0.10, stock 34,900)	47 μ H $\pm$ 20% matches; 0805 (2012 metric), 2.00 $\times$ 1.25 mm matches the board footprint; Isat 50 mA meets the required $\geq$ 50 mA and the 170 mA rated current exceeds it	verified: inductance, package/case, body size and current ratings (DigiKey parametrics); the specified original is carried by no distributor, so this is a spec match to the snapshot rather than a part-to-part comparison	Acceptable
100 μ F 1206 MLCC (C17, C21)	CL31A107MQHNNWE (Samsung, \$0.52, stock 287,516)	100 μ F $\pm$ 20%, 6.3 V, X5R, 1206 (3216 metric), 3.20 $\times$ 1.60 mm — identical on every parametric DigiKey publishes; differs only in packaging code. Both are 6.3 V, meeting the snapshot's minimum but not its "preferably $\geq$ 10 V"	verified: capacitance, tolerance, voltage rating, dielectric, package/case and body size (DigiKey parametrics on both parts)	Acceptable

For part	Substitute	Differences	Verified	Judgment
Fuse 500 mA (F1)	0454.500MR (Littelfuse, \$2.71, stock 3104)	500 mA matches; body 6.10 × 2.69 × 2.69 mm matches the board's 2410 footprint (6.1 × 2.5 mm) within 0.19 mm on width, where the specified 0466.500NR is a 1206 part; 125 V AC/DC exceeds the required ≥ 32 V	verified: current rating, body dimensions and voltage rating (DigiKey parametrics on both parts); not verified: the time-lag / slow-blow characteristic and the exact pad geometry	Acceptable with caveat — confirm the slow-blow rating and land pattern before ordering

Verify any substitute against its datasheet and against your board files before ordering — the checks above rest on distributor parametrics, which do not cover pinouts or land patterns.

Other dependencies

- **Development forum thread** (<https://openinverter.org/forum/viewtopic.php?f=3&t=1277>) — live. Fetched this run: "The ZombieVerter VCU Project" by Jack Bauer, still the project's canonical build and support thread.
- **External fast-charging library repository** (<https://github.com/uhi22/ccs32clara>) — live. Fetched this run; the Clara/Foccci CCS project page is present and current.
- **Vimeo project and dyno logs** (506480876, 802405172, 824494783, 1201141543) — not checked. All four fetches returned Vimeo's automated human-verification page instead of the video page, so neither their presence nor their removal can be asserted.
- **YouTube vehicle test videos** (iwB3wxCEFo0, wjlucUWX_Ic) — not checked. Both fetches returned only site boilerplate with no video metadata.
- **Patreon 10 EUR tier for the full KiCad 9 source files** — not checked; the snapshot gives no URL. The public GitHub repository still hosts only compiled PDFs and Gerber archives, so anyone needing editable source depends on a paid tier this run could not verify.
- **PCB fabrication** (4-layer board, contoured profile, right-angle 56-pin edge header) — not checked; no fabrication quote was gathered this run. The real constraint here is the enclosure above, which dictates the board outline.
- **Procurement links** (AliExpress items 32857771975 and 4001213569338) — not verified; AliExpress bounced both fetches through a login redirect loop.

Watch list

- **NCV7356D1G** — already obsolete with zero stock anywhere; by the next check the remaining brokered inventory will likely be gone. The single-wire CAN channel needs a decision: substitute or omit.
- **DLP11SA900HL2L and the whole Murata DLP11S family** — obsolete; the sibling DLP11SN900HL2L is obsolete too. Move the board to EXC-24CE900U rather than chasing old stock.
- **TJA1055T/3/C,518 and TJA1020T/CM,118** — both Last Time Buy with ECIA lifecycle risk High. Deep stock today (11,100 and 18,715), but Last Time Buy inventory disappears without warning; these are the most likely new failures at the next check.
- **SN65HVD230QDR** — six per board, DigiKey already at zero with a 16-week lead. Mouser's 3871 pieces are the buffer; if that drops, the build shifts to TCAN330DR.
- **TDA2822D013TR** — Active and stocked, but Arrow quotes a 30-week factory lead and Avnet is out of stock; an old part worth watching.
- **The 56-way enclosure and harness** — single-source AliExpress listings that cannot be verified automatically. If either disappears, the board outline and connector footprint have no fallback.
- **XL1509-5.0E1** — outside authorized distribution entirely, so its price and availability are set by retail sellers and can move sharply.