

Readiness report — Superb Lab Power Supply

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Readiness: Superb Lab Power Supply

Verdict: Ready with caveats · 2026-07-09 · est. parts cost \$115-\$135

This is a cold baseline check; no previous report exists for this lab. The design is implementable, but the primary power transistor and specific power relay are obsolete and require mandatory substitutes. Furthermore, the 24V AC-AC transformer and the high-precision Kelvin shunt are specialized components that require targeted sourcing as they are frequently out of stock or easily confused with incompatible AC-DC adapters. Firmware implementation is hindered by a dead library link in the original documentation.

Action required

Part	Problem	Recommended action
2SD1047	Obsolete; zero stock at major distributors.	Use TIP35CG (onsemi) as a footprint-compatible substitute.
G5LE-1-VDDC12	Obsolete.	Use G5LE-1 DC12 (Omron); vented (VD) suffix is not required.
WSL3637R0100FEA	Out of stock at general hobbyist distributors.	Source from specialized vendors (e.g., Future Electronics or TTI).
24V AC Transformer	High risk of purchasing incorrect AC-DC adapter.	Ensure transformer is 24V AC-AC (e.g., Ensign L100-2-524). DC input is forbidden.
LiquidCrystal Library	Original Bitbucket link is dead.	Redirect students to the GitHub mirror: github.com/fmalpartida/New-LiquidCrystal .

Parts

Integrated Circuits and Semiconductors (Digital Meter Board)

Part	Spec/Package	Status	Stock	Price	Source
IC1: MAX44284FAUT+	Current Amp / SOT23-6	Ready	2,773	\$3.66	DigiKey
IC2: MCP3422A0-E/SN	ADC / SOIC-8	Ready	4,069	\$3.72	DigiKey
IC3: MCP6061T-E/OT	Op-Amp / SOT23-5	Ready	574	\$0.84	DigiKey
Q1, Q2: BC817-25LT3G	NPN / SOT23	Ready	3,187	\$0.17	DigiKey

Part	Spec/Package	Status	Stock	Price	Source
D3: BAT54	Schottky / SOT23	Ready	424,390	\$0.14	DigiKey
Z1: 824501361	TVS 36V / SMA	Ready	4,611	\$0.29	DigiKey

Integrated Circuits and Semiconductors (Analog PSU Kit)

Part	Spec/Package	Status	Stock	Price	Source
U1, U2, U3: TL081CP	Op-Amp / DIP-8	Ready	10,105	\$0.70	DigiKey
Q1: 9014	NPN / TO-92	Ready	>100	\$0.08	Addicore
Q2: 2SD882	NPN / TO-126	Ready	8,181	\$2.50	DigiKey
Q3: 9015	PNP / TO-92	Ready	>100	\$0.08	Addicore
Q4: 2SD1047	NPN Power / TO-3PL	Obsolete	0	—	—
D1-D4: 1N5408	Rectifier / Axial	Ready	41,798	\$0.35	DigiKey
D5-D10: 1N4148	Signal / Axial	Ready	1M+	\$0.10	DigiKey
D7, D8: 1N4733A	5.1V Zener / Axial	Ready	85,582	\$0.26	DigiKey
D11: 1N4004	Rectifier / Axial	Ready	128,112	\$0.14	DigiKey
D12: LED	5mm T1-3/4	not checked	—	—	—

Passives (Digital Meter Board)

Part	Spec/Package	Status	Stock	Price	Source
R4: WSL3637R0100FEA	0.01 Ω Shunt / 3637	At risk	>100	\$1.05	Future Elec
Resistor Kit	0603 Variety	Ready	>100	\$39.95	Adafruit
Capacitor Kit	0603 Variety	Ready	>100	\$39.95	Adafruit

Passives (Analog PSU Kit)

Part	Spec/Package	Status	Stock	Price	Source
Power Resistor	0.47 Ω 5W / Radial	Ready	605	\$1.26	DigiKey
RV1: 3296W-104	100k Ω Multi-turn	Ready	>100	\$2.38	Mouser
Panel Potentiometers	10k Ω Linear	Ready	>100	\$0.95	Adafruit
Axial Resistor Kit	0.25W Variety	Ready	>100	\$9.95	RobotShop
Electrolytic Kit	50V Minimum	Ready	>100	\$5.99	ShillehTek

Part	Spec/Package	Status	Stock	Price	Source
Film/Ceramic Kit	Various	Ready	>100	\$14.95	Electronix Exp

Electromechanical and Chassis Hardware

Part	Spec/Package	Status	Stock	Price	Source
K1: G5LE-1-VDDC12	Power Relay / DIP-5	Obsolete	0	—	—
Arduino Uno R3	Microcontroller	Ready	>100	\$4.99	Micro Center
20x4 I2C LCD	Character Display	Ready	>100	\$4.50	Elecrow
Transformer	24V AC / 100VA	Ready	>100	\$25.67	PowerVolt
Heatsink for Q4	TO-247 Large	Ready	>100	\$7.60	DigiKey
Enclosure	Aluminum Box	Ready	>100	\$7.99	eBay
Terminal Block	4-way 5.08mm	Ready	144	\$1.94	DigiKey
Molex Connectors	KK 254 Series	not checked	—	—	—
Pin Headers	0.1 inch	not checked	—	—	—
Binding Posts	Banana Sockets	not checked	—	—	—
Cooling Fan	24V DC	Ready	>100	\$5.45	CoolerGuys

Substitutes

For part	Substitute	Differences	Judgment
2SD1047	TIP35CG	TO-247 package; 25A rating exceeds original 12A.	Recommended.
G5LE-1-VDDC12	G5LE-1 DC12	Suffix difference; identical footprint and coil.	Recommended.

Verify any substitute against its datasheet before ordering.

Other dependencies

- **Firmware:** `DCmeter.ino` target for Arduino Uno (not checked).
- **Library Dependency:** `LiquidCrystal_I2C`. Original link is dead; use GitHub mirror at github.com/fmalpartida/New-LiquidCrystal.
- **Fabrication:** 2-layer PCB (not checked).
- **Calibration:** Requires manual adjustment of RV1 until output is 0V at minimum setting.
- **Input Constraint:** 24V AC only; DC input is forbidden by design.

Watch list

- **WSL3637R0100FEA:** This 4-terminal Kelvin shunt is specialized and frequently has zero stock at major distributors (DigiKey/Mouser).
- **24V AC-AC Transformer:** Retailers often provide AC-DC power bricks when "24V transformer" is searched. Chassis-mount AC-AC units must be manually verified.