

Readiness report — IV Curve Tracer (Solar Cell)

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Readiness: IV Curve Tracer (Solar Cell)

Verdict: Ready with caveats · 2026-07-19 · est. parts cost \$175-\$210

The lab is implementable, but requires sourcing two critical components (the power shunt and a precision resistor) from secondary distributors as they are out of stock at DigiKey. Most significantly, the primary project archive is missing the PC-side visualization software (`Installer.zip`); however, research indicates these files are likely available on the project's Instructables page. The primary relay is obsolete and requires a substitute. This is a cold-check baseline report.

Action required

Part	Problem	Recommended action
1461067-7	Obsolete; 0 stock at distributors.	Use identified Omron substitute; verify footprint against PCB before ordering.
HS50 R82 J	Out of stock at DigiKey.	Purchase from Arrow (200 units) or Mouser (186 units).
MF1/4DCT52R2002F	Out of stock at DigiKey.	Use identified Yageo substitute (in stock).
FK20X7S1H106K	Not For New Designs (NFND).	Use identified TDK substitute (in stock).
FK18X7R1H104K	Not For New Designs (NFND).	Use identified Vishay substitute (in stock).

Parts

Integrated Circuits and Semiconductors

Part	Spec/Package	Status	Stock	Price	Source
OPA549S	8A Op-Amp / TO-220-11	Active	188	\$34.44	DigiKey
MCP4921-E/P	12-Bit DAC / DIP-8	Active	487	\$2.81	DigiKey
2N3904BU	NPN Transistor / TO-92	Active	231,511	\$0.28	DigiKey
1N4004	Gen Purp Diode / DO-41	Active	178,689	\$0.14	DigiKey

Resistors

Part	Spec/Package	Status	Stock	Price	Source
HS50 R82 J	0.82 Ω , 50 W / Chassis	Out of Stock	0	\$5.20	Arrow
MF1/4DCT52R1001F	1 k Ω 1% / Axial	Active	79,993	\$0.10	DigiKey
MF1/4DCT52R3161F	3.16 k Ω 1% / Axial	Active	4,560	\$0.10	DigiKey
MF1/4DCT52R2002F	20 k Ω 1% / Axial	Out of Stock	0	—	DigiKey
MF1/4DCT52R1003F	100 k Ω 1% / Axial	Active	9,933	\$0.10	DigiKey
MF1/4DCT52R3163F	316 k Ω 1% / Axial	Active	4,873	\$0.10	DigiKey

Capacitors

Part	Spec/Package	Status	Stock	Price	Source
UPW1J101MPD	100 μ F, 50V / Radial	Active	5,178	\$0.74	DigiKey
FK20X7S1H106K	10 μ F, 50V / Radial	NFND	141,750	\$1.24	DigiKey
FK18X7R1H104K	100 nF, 50V / Radial	NFND	40,230	\$0.28	DigiKey
FG18C0G1H100DNT06	10 pF, 50V / Radial	Active	4,525	\$0.23	DigiKey

Electromechanical and Hardware

Part	Spec/Package	Status	Stock	Price	Source
1461067-7	Relay 24VDC 10A / 5-pin	Obsolete	0	—	DigiKey
RA-T2X-64E	Heatsink / TO-220-11	Active	1,338	\$6.05	DigiKey
LRS-200-24	24V 8.8A PSU / Enclosed	Active	945	\$24.50	DigiKey
OD9225-24HSS	24V Fan / 92mm	Active	161	\$9.97	DigiKey
Arduino Uno R3	MCU Board	Active	Yes	\$26.30	Arduino.cc
PRT-00553	0.1" Male Headers	Active	Yes	\$0.30	SparkFun
1581-0	Banana Jack (Black)	Active	18,687	\$3.10	DigiKey
1581-2	Banana Jack (Red)	Active	8,740	\$3.10	DigiKey
PG9 Gland	Cable Relief / Plastic	Active	Yes	\$0.20	Pixel Paradise
Clear Box	6.5 Qt Shoe Box	Active	Yes	\$5.97	Walmart
M3/M4 Hardware	Assorted Fasteners	Active	Yes	~\$15.00	General

Substitutes

For part	Substitute	Differences	Verified	Judgment
1461067-7	G5LE-14 DC24	Electrically identical (SPDT, 10A, 24VDC coil).	SPDT, 10A, 24VDC coil	Footprint match likely (standard sugar cube 19x15.5mm) but not verified.
MF1/4DCT52R2002F	MFR-25FBF52-20K	Parametric match.	20 kΩ, 1%, 1/4W, Axial	Exact equivalent.
FK20X7S1H106K	FG20X7S1H106KRT06	Parametric match.	10 μF, 50V, X7S, Radial, 5.0mm lead spacing	Exact equivalent.
FK18X7R1H104K	K104K15X7RF5TL2	Parametric match.	100 nF, 50V, X7R, Radial, 2.5mm lead spacing	Exact equivalent.

Instructors should verify any substitute against its datasheet before ordering.

Other dependencies

- **PCB Fabrication:** 2-layer board (approx. 69mm x 53mm). Gerber files (REVB) are provided and ready for manufacture.
- **Firmware:** `IVCurve4_27.ino` is not in the archive but is available on the project's Instructables page.
- **Software:** PC-side visualization app (`Installer.zip`) and source code (`VSPProject.zip`) are missing from the primary archive. These must be retrieved from the project's Instructables (Step 12).
- **Libraries:** `SPI.h` (Standard) and `DAC_MCP49xx` (available via Arduino Library Manager) are required.

Watch list

- **Relay K1:** Footprint for the G5LE-14 substitute needs verification against the board file before bulk purchasing.
- **Software Retrieval:** Successful download and execution of the missing software from Instructables is the highest priority risk.
- **Thermal Management:** The OPA549S and HS50 resistor generate significant heat; thermal compound (Arctic Silver 5) application is critical.