Solar Logger + AA Charger — Bill of Materials

Section	Item	Qty	Notes
Required	EF EcoFlow 175 W solar panel (existing)	1	~18–22 V, ~10 A max (provided by user)
Required	MC4 inline fuse holder + 10 A fuse	1 + spares	Install on PV+ near entry; spare fuses reco
Required	50 A / 75 mV shunt resistor (0.0015 Ω)	1	Bolt-down style; ring terminals on power pa
Required	INA226 current/voltage sensor breakout	1	I²C interface; connect VIN+/VIN– across sh
Required	ESP32 DevKit (Wi■Fi)	1	DOIT/NodeMCU style; USB power for dev
Required	microSD card module (SPI)	1	CS=GPIO5, MOSI=23, MISO=19, SCK=18
Required	microSD card (8–32 GB, FAT32)	1	Holds CSV logs
Required	DC■DC buck converter, 6–36 V → 5 V, ≥5 A (USB■A out preferred)	1	Waterproof/rugged module recommended f
Required	USB NiMH AA/AAA smart charger (e.g., Tenergy TN480U)	1	USB■powered; independent channels, ΔV
Required	AA NiMH cells, low■self■discharge (2000–2500 mAh)	4–8	Eneloop■class recommended for best resu
Required	MC4 to bare■wire adapters or MC4 extension leads	As needed	For bringing PV into enclosure
Required	PV cable (10–12 AWG) for panel run	As needed	Size to keep <5–8% voltage drop
Required	22–24 AWG twisted pair (sense wires)	2–3 m	From shunt screws to INA226 VIN+/VIN–
Required	Jumper wires / Dupont leads	Assorted	ESP32 ↔ INA226/microSD
Required	Ring terminals sized to shunt screws and cable gauge	4	Two for power path; extras for spares
Required	USB■A to micro■USB cable (or as needed by charger)	1	Buck USB■A → Charger input
Required	Electronics enclosure (vented)	1	Holds ESP32, INA226, SD, buck; keep dry
Required	Heat■shrink tubing & electrical tape	Assorted	Insulate shunt lugs and terminations
Required	Cable glands / strain relief	2–4	Entry points for PV and low■voltage wiring
Required	Small terminal blocks or perfboard	1	For tidy internal connections
Optional	DC disconnect / breaker (10–15 A) for PV+	1	Convenient indoor shutoff
Optional	TVS diode (SMBJ33A) across PV+ ↔ PV–	1	Transient suppression near entry
Optional	USB wall adapter to power ESP32 during development	1	Lets you test logger independent of sun
Optional	Standoffs, screws, adhesive mounts, zip ties	Assorted	Mechanical mounting and cable manageme