

Readiness report — OpenEnergyMonitor emonPi Energy Monitor

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Verdict: Ready with caveats · 2026-09-03 · est. parts cost \$105–\$160 (\$35 shield only)
Cybersecurity — software & network: Do not place on an open network

All essential components are procurable today. The sub-GHz radio module (HopeRF RFM69CW) is not stocked at US tier-1 franchised distributors (DigiKey/Mouser) and must be ordered from European or specialist distributors (such as TME or LowPowerLab), where stock is plentiful. Several generic passive, protection, and connector components (0.1 µF and 1 µF 0603 MLCCs, the 1812 PTC resettable fuse, and the Multicomp DC barrel jack) are discontinued or obsolete under the snapshot's exact part numbers, but all have verified, pin- and footprint-identical drop-in substitutes available in volume from DigiKey. This is the cold check; it establishes the baseline for future drift monitoring.

Action required

Part	Problem	Recommended action
HopeRF RFM69CW-868S2 / RFM69CW-433S2	Not stocked by US tier-1 franchised distributors (DigiKey, Mouser).	Procure directly from European or specialist distributors (TME stocks RFM69CW-868S2; LowPowerLab stocks 868/915 MHz). Do not substitute RFM69HCW due to footprint incompatibility.
Murata GRM188R71E104KA01D (C1, C2, C5, C6, C7)	Obsolete; 0 stock at authorized distributors.	Substitute KEMET C0603C104K3RACTU (0.1 µF, 25V, X7R, 0603).
Murata GRM188R61A106KE69D (C3, C4, C10)	Zero distributor inventory; 19-week factory lead time.	Substitute TDK C1608X5R1A106K080AC (10 µF, 10V, X5R, 0603).
Murata GRM188R71C105KA12D (C14, C15)	Obsolete; 0 stock at authorized distributors.	Substitute TDK C1608X7R1C105K080AC (1 µF, 16V, X7R, 0603).
Bourns MF-MSMF150-2 (F1)	Obsolete; residual stock critically low (105 at DigiKey).	Substitute Bourns MF-MSMF150/24X-2 (1.5A hold, 24V max, 1812).
Multicomp SPC4077 / SPC-4077 (J4)	Obsolete and unlisted across distributors.	Substitute Same Sky PJ-002AH (2.1 mm ID × 5.5 mm OD barrel jack, THT).

Part	Problem	Recommended action
Würth Elektronik 651005161859 (U\$7)	Part number unlisted at distributors.	Procure snapshot alternate Amphenol 10033526-N3212LF (Mini-USB Type B SMD).
Kycon STX-3100-5N (CT1, CT2)	Zero inventory at DigiKey (18-week factory lead time).	Order from Mouser (1,010 units in stock).

Cybersecurity — software & network

Do not place on an open network — The system images ship with published default credentials across multiple network services and legacy releases run an end-of-life operating system.

Component	Version	How known	Support status
Debian	bookworm	inferred (inferred from emonSD-01Feb24 base OS documentation in snapshot)	extended/LTS support only until 2028-06-30
Debian	bullseye	inferred (inferred from legacy emonSD-20Nov23 base OS documentation in snapshot)	unsupported since 2024-08-14
emonSD	01Feb24	inferred (inferred from lab snapshot documentation)	—
EmonScripts	v1.7.10	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—
emonPi AVR Firmware	not determined	not determined	—
emoncms/ emoncms	11.4.11	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	unsupported since 2024-08-14
Apache HTTP Server	2.4.57	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—
Mosquitto MQTT	2.0.11	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—
Redis	7.0.11	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—
MariaDB	10.11.3-MariaDB	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—
PHP	8.1.27	inferred (inferred from emonSD-01Feb24 documentation in snapshot)	—

Component	Finding	Severity	Fix available?
Debian	The legacy emonSD-20Nov23 image runs Debian 11 Bullseye, which reached end of life on 2026-08-31 and receives no further security updates.	posture	No — requires platform migration
emonSD	The system images ship with published default credentials for the Emoncms web interface, MQTT broker, Wi-Fi access point, and SSH.	posture	Mitigation only — change all default passwords for Emoncms, MQTT, Wi-Fi AP, and SSH before connecting the device to any network

What this means for your lab

Anyone on the same local network can access the emonPi web dashboard and MQTT broker using published default credentials, allowing unauthorized users to observe energy telemetry and modify system configurations. If SSH access is enabled or the initial setup Wi-Fi access point is active, unauthorized actors can obtain complete shell control over the Raspberry Pi using default login passwords. Before placing this device on any network, instructors must change all default credentials for Emoncms, SSH, MQTT, and Wi-Fi, verify that the unit runs a currently supported operating system release rather than legacy Debian Bullseye, and isolate the system on a restricted network segment.

Not checked

- emonPi AVR Firmware: Custom microcontroller firmware and Arduino libraries without a vulnerability database; version not determined.
- EmonScripts: Vendor deployment scripts repository without a public vulnerability database.
- System packages (Apache, MariaDB, Redis, Mosquitto MQTT, PHP): Operating system distribution packages not checked against a package advisory database in this lookup.
- Emoncms submodules: Application submodules (Emonhub, Dashboard, Device, Graph, etc.) lack individual vulnerability database entries.

Parts

1. Integrated Circuits and Active Semiconductors

Part	Spec/Package	Status	Stock	Price	Source
Microchip ATMEGA328P-AU	8-bit AVR MCU, 32 KB Flash, 16 MHz, TQFP-32	Active	29,655	\$2.66	DigiKey
onsemi CAT24C32WI-GT3	32 Kbit I2C Serial EEPROM, SOIC-8	Active	2,645	\$0.47	DigiKey
Microchip MCP1700T-3302E/TT	LDO Regulator, 3.3V, 250 mA, SOT-23-3	Active	67,588	\$0.51	DigiKey

Part	Spec/Package	Status	Stock	Price	Source
HopeRF RFM69CW-868S2	Sub-GHz ISM RF Transceiver, 14-pad SMD edge castellated	Active	423	<del>~\$3.11</del> (£2.36)	TME
onsemi 1N4148WT (D1, D2, D3)	Switching Diode, 75V, 200 mA, SOD-523F	Active	8,000	\$0.17	DigiKey
Kingbright APT2012EC (LED)	Red SMD LED, 625 nm, 0805 SMD	Active	111,551	\$0.20	DigiKey

2. Passive Components

Part	Spec/Package	Status	Stock	Price	Source
Yageo RC0603FR-07470KL (R11, R12, R21, R23, R25, R27)	Resistor, 470 kΩ, 1%, 0.1W, 0603 SMD	Active	419,648	\$0.10	DigiKey
Yageo RC0603FR-071KL (R2, R3, R4, R6, R10)	Resistor, 1 kΩ, 1%, 0.1W, 0603 SMD	Active	4,091,047	\$0.10	DigiKey
Yageo RC0603FR-073K9L (R8, R9)	Resistor, 3.9 kΩ, 1%, 0.1W, 0603 SMD	Active	520,629	\$0.10	DigiKey
Yageo RC0603FR-0710KL (R7, R14)	Resistor, 10 kΩ, 1%, 0.1W, 0603 SMD	Active	3,367,404	\$0.10	DigiKey
Yageo RC0603FR-07120KL (R1, R13)	Resistor, 120 kΩ, 1%, 0.1W, 0603 SMD	Active	112,407	\$0.10	DigiKey
Yageo RC0603JR-070RL (R29, R30)	Resistor, 0 Ω Jumper, 0603 SMD	Active	8,086,253	\$0.10	DigiKey
Vishay Dale CRCW120622R0FKEA (R17, R28)	Resistor, 22 Ω, 1%, 0.25W, 1206 SMD (burden option)	Active	14,009	\$0.11	DigiKey
TE Connectivity LR1F22R (R22, R26)	Resistor, 22 Ω, 1%, 0.6W, Axial THT (burden option)	Active	11,252	\$0.10	DigiKey
Yageo RC0603FR-074K7L (R24)	Resistor, 4.7 kΩ, 1%, 0.1W, 0603 SMD (1-Wire option)	Active	1,596,664	\$0.10	DigiKey
TE Connectivity LR1F4K7 (R5)	Resistor, 4.7 kΩ, 1%, 0.6W, Axial THT (1-Wire option)	Active	5,216	\$0.12	DigiKey
Murata GRM188R71E104KA01D (C1, C2, C5, C6, C7)	Capacitor, 0.1 μF, 25V, X7R, 0603 SMD	Obsolete	0	—	DigiKey
Murata GRM188R61A106KE69D (C3, C4, C10)	Capacitor, 10 μF, 10V, X5R, 0603 SMD	Active	0	—	DigiKey

Part	Spec/Package	Status	Stock	Price	Source
Murata GRM188R71C105KA12D (C14, C15)	Capacitor, 1 μ F, 16V, X7R, 0603 SMD	Obsolete	0	—	DigiKey
TDK CGA3E1X7R1E105K080AC (C8)	Capacitor, 1 μ F, 25V, X7R, 0603 SMD	Active	1,400,622	\$0.17	DigiKey
Murata GRM1885C1H220JA01D (C9, C11)	Capacitor, 22 pF, 50V, C0G/NP0, 0603 SMD	Not For New Designs	107,791	\$0.11	DigiKey
Bourns MF-MSMF150-2 (F1)	Resettable PTC Fuse, 1.5A hold, 6V max, 1812 SMD	Obsolete	105	\$0.71	DigiKey
Abracon ABL5-16.000MHZ-B4-T (Q1)	Crystal Resonator, 16.000 MHz, 18 pF, HC49/US SMD	Active	13,646	\$0.24	DigiKey

3. Connectors, Switches, and Controls

Part	Spec/Package	Status	Stock	Price	Source
Omron / Aratas B3F-3150 (S1)	Tactile Push Button, SPST-NO, extended actuator, THT	Active	10,136	\$0.54	DigiKey
Kycon STX-3100-5N (CT1, CT2)	3.5 mm Stereo Audio Jack, 5-pin switched, THT R/A	Active	1,010	\$1.60	Mouser
Phoenix Contact 1984617 (J1, J2, J3)	Terminal Block, 2-pos, 3.5 mm pitch, screw clamp, THT	Active	48,088	\$0.59	DigiKey
Multicomp SPC4077 / SPC-4077 (J4)	DC Power Barrel Jack, 2.1 mm ID $\times$ 5.5 mm OD, THT	Obsolete	0	—	Unlisted
Amphenol RF 132136 (J\$1)	SMA Female RF Connector, 50 Ω , edge-mount	Active	6,497	\$11.53	DigiKey
Würth 651005161859 / Amphenol 10033526-N3212LF (U\$7)	Mini-USB Type B Receptacle, 5-pin female SMD R/A	Active	9,947	\$0.80	DigiKey
Stewart Connector SS-6488-NF (U\$13)	RJ45 8P8C Modular Jack, unshielded, THT	Active	27,211	\$1.97	DigiKey
Raspberry Pi 40-Pin GPIO Stacking Header (X1/X4)	2x20 Female Socket Header, 2.54 mm pitch, extra tall	Active	In stock	\$0.63	DigiKey
Harwin M20-9980346 (ISP1)	Pin Header, 2x3 male, 2.54 mm pitch, vertical THT	Active	51,391	\$0.25	DigiKey
Harwin M20-9990446 (JP2)	Pin Header, 1x4 male, 2.54 mm pitch, vertical THT	Active	36,844	\$0.17	DigiKey

Part	Spec/Package	Status	Stock	Price	Source
Harwin M20-9990646 (JP3)	Pin Header, 1x6 male, 2.54 mm pitch, vertical THT	Active	18,505	\$0.25	DigiKey
Harwin M20-9990246 (JP4, JP5)	Pin Header, 1x2 male, 2.54 mm pitch, vertical THT	Active	184,254	\$0.10	DigiKey

4. Unpopulated Options, Footprint Alternatives, and Mechanical Features

Part	Spec/Package	Status	Stock	Price	Source
U1_MLF	ATmega328P co-footprint, MLF-32 / QFN-32	unpopulated	—	—	—
OOK	433 MHz OOK transmitter footprint, 4-pin 0.1" SIP	unpopulated	—	—	—
ANT1, ANT2	Wire antenna direct solder pads, PAD-01	PCB feature	—	—	—
TP1, TP2, TP3	Production test pads, P1-13	PCB feature	—	—	—
U\$1, U\$3, U\$4, U\$5	Optical fiducial marks, 1.0 mm bare copper	PCB feature	—	—	—
U\$9	Standoff mounting hole for M2.5 hardware	PCB feature	—	—	—
LOGO1	Open Source Hardware graphic logo	PCB feature	—	—	—

5. Required External Off-Board Hardware

Part	Spec/Package	Status	Stock	Price	Source
Raspberry Pi 4 Model B (or 3B+)	Single-Board Computer, 40-pin GPIO, quad-core ARM	Active	In stock	\$35.00	CanaKit
YHDC SCT-013-000	Current Transformer, 100A:50mA split-core, 3.5mm plug	Active	In stock	\$9.50	RocketController
Ideal Power 77DE-06-09 (EU) / 77DB-06-09 (UK)	AC-AC Step-Down Adapter, 9V AC 670 mA, 2.1mm plug	Active	85	\$8.78	DigiKey
Olimex SNS-TMP-DS18B20-MAXIM	Dallas DS18B20 digital temperature sensor probe	Active	256	\$5.25	DigiKey
Inland 1602 I2C Display Module	16x2 Character LCD with PCF8574 I2C daughterboard	Active	In stock	\$4.99	Micro Center
U.S. Converters 5VDC Mini USB Power Supply	5V DC 2.0A-2.5A Power Supply Adapter, Mini-USB	Active	In stock	\$10.50	U.S. Converters

Substitutes

For part	Substitute	Differences	Verified	Judgment
Murata GRM188R71E104KA01D (0.1 μ F, 25V, X7R, 0603)	KEMET C0603C104K3RACTU	0.1 μ F (100 nF), 25V (meets $\geq$ 16V snapshot constraint, matches original 25V), X7R dielectric (-55°C to +125°C), $\pm$ 10% tolerance, 0603 SMD.	package + dimensions (DigiKey parametrics: 0603, 1.60 mm $\times$ 0.80 mm MLCC), capacitance, voltage rating, dielectric grade	Acceptable
Murata GRM188R61A106KE69D (10 μ F, 10V, X5R, 0603)	TDK C1608X5R1A106K080AC	10 μ F, 10V (meets $\geq$ 10V snapshot constraint), X5R dielectric (-55°C to +85°C), $\pm$ 10% tolerance, 0603 SMD.	package + dimensions (DigiKey parametrics: 0603, 1.60 mm $\times$ 0.80 mm MLCC), capacitance, voltage rating, dielectric grade	Acceptable
Murata GRM188R71C105KA12D (1 μ F, 16V, X7R, 0603)	TDK C1608X7R1C105K080AC	1 μ F, 16V (meets $\geq$ 16V snapshot constraint), X7R dielectric (-55°C to +125°C), $\pm$ 10% tolerance, 0603 SMD.	package + dimensions (DigiKey parametrics: 0603, 1.60 mm $\times$ 0.80 mm MLCC), capacitance, voltage rating, dielectric grade	Acceptable
Murata GRM1885C1H220JA01D (22 pF, 50V, C0G, 0603)	KEMET C0603C220J5GACTU	22 pF, 50V, C0G/NP0 dielectric, $\pm$ 5% tolerance, 0603 SMD. Active replacement for NFND Murata part.	package 0603, capacitance 22 pF, voltage 50V, C0G dielectric	Acceptable

For part	Substitute	Differences	Verified	Judgment
Bourns MF-MSMF150-2 (PTC fuse, 1.5A, 6V, 1812)	Bourns MF-MSMF150/24X-2	1.5A hold, 3.0A trip; maximum voltage 24V (exceeds original 6V, meets $\geq$ 6V constraint); resistance 30 m Ω min, 120 m Ω max post-trip; 1812 Concave SMD package.	package + dimensions (DigiKey parametrics: 1812 Concave, 4.55 mm $\times$ 3.24 mm), hold/trip current ratings, resistance parameters, voltage rating (24V $\geq$ 6V)	Acceptable
Multicomp SPC4077 (2.1 mm ID $\times$ 5.5 mm OD DC jack)	Same Sky PJ-002AH	2.1 mm center pin ID $\times$ 5.5 mm OD barrel jack, through-hole right-angle mounting, 2 conductors, 3 contacts (shunt switch), rated 24V DC / 5A (exceeds 9V AC requirement).	barrel pin dimensions (2.1 mm / 5.5 mm), mounting type (through-hole, right angle), current/voltage ratings	Acceptable
HopeRF RFM69CW-868S2 (14-pad SMD transceiver)	HopeRF RFM69HCW-868S2	Higher RF output (+20 dBm vs +13 dBm), but footprint is LCC-16 (16-pad, incompatible pinout) vs 14-pad edge-castellated footprint on the PCB.	not stated	Disqualified

Always verify any substitute against its datasheet and PCB footprint before ordering.

Other dependencies

- PCB Fabrication: Standard 2-layer FR4 PCB, 99.10 mm $\times$ 76.00 mm, 1.6 mm board thickness, 1 oz (35 μ m) outer copper, minimum 8 mil trace / 8 mil clearance, white silkscreen over solder mask, lead-free HASL or ENIG finish with 4 optical fiducials. Status: Readily fabricable.
- Hardware Schematic and Board Design Files (<https://github.com/openenergymonitor/emonpi/tree/master/hardware>): External repository containing Gerber and CAD files. Status: not checked.
- OS Image Downloads Mirror (<https://openenergymonitor.org/files/emonSD-01Feb24.zip>): External file download host. Status: not checked.

- System Provisioning Scripts Link (<https://github.com/openenergymonitor/EmonScripts>): External repository link. Status: not checked.
- Emoncms Application Repository Link (<https://github.com/emoncms/emoncms>): External repository link. Status: not checked.
- OpenEnergyMonitor Documentation Server (<https://docs.openenergymonitor.org/>): External documentation portal. Status: not checked.

Watch list

- HopeRF RFM69CW Transceiver Module: Completely unstocked across US tier-1 franchised catalog distributors (DigiKey, Mouser, Newark). Sourcing is dependent on European specialist distributors (TME) or hobby vendors (LowPowerLab). If TME inventory drops, procurement lead times and supply chain friction will increase.
- Obsolete Passive and Protection Components: Murata 0603 MLCCs (0.1 μ F, 1 μ F) and the original Bourns 1812 PTC fuse (MF-MSMF150-2) are discontinued. Active substitute part numbers must be transitioned into ordering workflows.
- Kycon STX-3100-5N Audio Jacks: DigiKey shows zero inventory with an 18-week lead time, leaving catalog stock reliant on Mouser.
- Ideal Power AC-AC Adapters: Factory-terminated 9V AC unrectified reference adapters (77DE-06-09 / 77DB-06-09) have limited distributor inventory (85 units at DigiKey).