

Readiness report — AMSAT CubeSatSim — CubeSat Simulator (hardware v2.1.0)

Checked 2026-09-02 19:07 · 34 searches, 7 pages fetched, est. \$0.37

Readiness: AMSAT CubeSatSim — CubeSat Simulator (hardware v2.1.0)

Verdict: Ready with caveats · 2026-09-02 · est. parts cost insufficient pricing
Cybersecurity — software & network: Do not place on an open network

This is a cold check establishing the initial baseline for future drift tracking. The vast majority of components (Raspberry Pi Pico, INA219 monitors, BME280 and MPU6050 breakout modules, rectifiers, fuses, chip ferrites, switches, connectors, and Keystone battery clips) are active, in stock, and readily available from authorized catalog distributors and major retail outlets. However, the RF transceiver section relies on specialty modules—the UHF module U6 (SR105U) and its VHF alternative U7 (Dorji DRA818V)—that are completely absent from ECIA-authorized distributors. These transceivers must be procured through maker marketplaces (such as Tindie), direct vendor storefronts, or international sellers, introducing lead-time and procurement channel variability.

Action required

Part	Problem	Recommended action
SR105U (U6 - Main Board)	Not stocked by authorized catalog distributors; specialty sourcing required.	Procure from Tindie storefront "sunrise" (\$7.50–\$8.00), direct vendor OdIstore (\$22.50), or AliExpress. Alternatively, use earlier drop-in variant SR_0W5U / SR-FRS-0W5.
Dorji DRA818V (U7 - Main Board)	Not stocked by authorized catalog distributors; specialty sourcing required.	Procure via Tindie DORJI official store (\$8.98) or AliExpress (\$11.67) if building the VHF configuration.

Parts

1. Integrated Circuits and Proprietary Modules

Part	Spec/Package	Status	Stock	Price	Source
Raspberry Pi Pico (U1)	Microcontroller board, 3.3V logic	Readily available	In stock	\$2.99	Micro Center
SR105U (U6)	0.5W UHF FM module, footprint SR_FRS_0W5	Hard to obtain	In stock	\$7.50	Tindie (store sunrise)

Part	Spec/Package	Status	Stock	Price	Source
Dorji DRA818V (U7)	VHF FM module, footprint DORJI_DRA818V	Hard to obtain	In stock	\$8.98	Tindie (DORJI store)
INA219AIDR (U2, U10-U14 Solar; U2 Battery)	Digital Current/Power Monitor, SOIC-8	Readily available	29,736	\$2.12	DigiKey
INA219 "Purple Board" (U1 Battery; U3-U8 Solar)	Sensor breakout module	Readily available	In stock	\$6.90	DigiKey
MPU6050 Module (J4)	6-DOF IMU breakout board	Readily available	In stock	\$12.99	Micro Center
BME280 Module (J5)	Environmental sensor breakout board	Readily available	In stock	\$9.00	Newark

2. Diodes and Protection

Part	Spec/Package	Status	Stock	Price	Source
BYW27-400 (D1)	Avalanche rectifier, 400V 1A, DO-41 axial	Readily available	4,835	\$0.43	DigiKey
1N5817 (D2, D10 Main; D1-D6 Solar)	Schottky rectifier, 20V 1A, DO-41 axial	Readily available	8,866	\$0.29	DigiKey
1N4148 (D3)	Small signal diode, 100V 200mA, DO-35 axial	Readily available	1,488,004	\$0.10	DigiKey
BAT20J (D7-D12 Solar)	Schottky diode, 23V 1A, SOD-323	Readily available	39	\$0.62	DigiKey
RHEF100-2 (F1 Main)	PTC resettable fuse, 30V 1A, radial PTH	Readily available	11,412	\$0.84	DigiKey
MF-R010 (F1 Battery representative)	PTC resettable fuse, radial PTH	Readily available	12,053	\$0.40	DigiKey

3. Passive Components

Part	Spec/Package	Status	Stock	Price	Source
1 k Ω (R1, R3, R7, R30 Main)	Axial 0.1 inch	not checked	—	—	—
100 Ω (R8, R19 Main)	Axial 0.1 inch	not checked	—	—	—
220 Ω (R9, R20, R29 Main)	Axial 0.1 inch	not checked	—	—	—
68 Ω (R13, R15 Main)	Axial 0.1 inch	not checked	—	—	—
180 Ω (R14 Main)	Axial 0.1 inch	not checked	—	—	—
4.7 k Ω (R23, R24 Main)	Axial 0.1 inch	not checked	—	—	—

Part	Spec/Package	Status	Stock	Price	Source
10 k Ω (R27 Main)	Axial 0.1 inch	not checked	—	—	—
10 k Ω (R2, R3 Battery)	0603 SMD	not checked	—	—	—
0.1 Ω Shunt (R1, R2, R5, R6, R9, R10 Solar)	0805 SMD, 1% tolerance	not checked	—	—	—
4.7 k Ω (R3, R4 Solar)	Axial 0.1 inch	not checked	—	—	—
18 pF (C1, C3 Main)	0603 SMD	not checked	—	—	—
16 pF (C2, C4 Main)	0603 SMD	not checked	—	—	—
100 nF (C6, C9 Main; C2-C7 Solar)	0603 SMD or PTH Small	not checked	—	—	—
47 μ F (C5 Main)	PTH Small Electrolytic/ Tantalum	not checked	—	—	—
BLM18AG121SN1D / 303030001 (L1, L2 Main)	Chip Ferrite Bead, 120 Ω @ 100 MHz, 0603 SMD	Readily available	706,451	\$0.10	DigiKey

4. Connectors and Electromechanical

Part	Spec/Package	Status	Stock	Price	Source
Stacking Header (J1 All Boards)	20x2 (40-pin) female stacking header, 0.1" pitch	Readily available	In stock	\$2.95	Adafruit Industries
ANT-916-CHP-T (E1, E2 Main)	916 MHz chip antenna, SMD	Readily available	2,656	\$3.61	DigiKey
SMA Vertical Female PTH (X2, X3 Main)	SMA jack PCB mount vertical	Readily available	In stock	\$4.49	Vetco Electronics
SJ1-2503A (J13, J14 Main)	3.5mm stereo audio jack, PTH	Readily available	24,760	\$0.75	DigiKey
SparkFun USB-C Breakout (J8 Main)	USB-C receptacle breakout board	Readily available	In stock	\$4.95	SparkFun Electronics
Micro JST 2-pin (J6, J7 Main; JP1-JP26 Solar/Battery)	JST-PH 2.0mm 2-pin vertical PTH header	Readily available	In stock	\$0.50	SparkFun Electronics
Keystone 1024 (BT1 Battery)	Single AA battery clip/holder, SMD	Readily available	1,676	\$4.92	DigiKey
Keystone 1012 (BT2 Battery)	Dual AA battery clip/holder, SMD	Readily available	12,276	\$8.02	DigiKey
RA-SPST (S1 Main)	Right-angle SPST slide switch, PTH	Readily available	In stock	\$0.15	Jameco

Part	Spec/Package	Status	Stock	Price	Source
5mm Status LEDs (LED1-LED5 Main)	5mm T1-3/4 LEDs (White, Yellow, Green, Blue, Red)	Readily available	In stock	\$2.70	Parts Express

Substitutes

For part	Substitute	Differences	Verified	Judgment
SR105U (U6)	SR_0W5U / SR-FRS-0W5	Earlier revision from same manufacturer; identical footprint (SR_FRS_0W5), pinout, AT commands, and RF specs (0.5W, 400–480 MHz UHF).	RF specifications, pinout, and supply voltage matched from manufacturer technical listing; footprint compatibility verified per snapshot note.	Acceptable drop-in alternative.
SR105U (U6)	Dorji_DRA818V	VHF band (134–174 MHz) instead of UHF; requires using dedicated co-routed footprint U7 on Main Board. Physically incompatible with U6 pads.	PCB has dedicated footprint U7 for DRA818V per snapshot.	Board-supported alternative build option; physically incompatible with U6 pad layout.
BAT20JFILM (D7-D12)	Panjit SBA130CS_R1_00001	Vr rating 30V exceeds 23V requirement; identical 1A Io rating and SOD-323 package.	Package SOD-323, current 1A, voltage 30V matched from DigiKey parametrics.	Acceptable substitute.

Always verify pinouts, footprint dimensions, and electrical ratings against component datasheets before ordering substitutes.

Cybersecurity — software & network

Do not place on an open network — The lab's installation script mandates Debian 11 Bullseye, an end-of-life operating system receiving no security patches, while all application dependencies are pulled unpinned.

Component	Version	How known	Support status
Debian	11	read from project (fetched/01-install)	unsupported since 2024-08-14
CubeSatSim software suite	not determined	unpinned (fetched/01-install)	—
Raspberry Pi Pico SDK	not determined	not determined	—

Component	Version	How known	Support status
Python packages	not determined	unpinned (fetched/01-install)	—

Component	Finding	Severity	Fix available?
Debian	Debian 11 Bullseye reached end of life on August 31, 2026 and no longer receives security updates.	posture	No — requires platform migration
Python packages	dependencies unpinned: 5 of 5 in fetched/01-install	posture	Mitigation only — pin versions / use the lockfile

What this means for your lab

If connected to a shared or campus network, anyone on the same network may be able to reach the simulator over SSH using standard Raspberry Pi credentials if they were not changed during setup. This could allow an unauthorized user to alter simulator configurations, initiate unintended radio transmissions, or access the local filesystem. In addition, the project's installation script explicitly requires Debian 11 (Bullseye), an operating system that reached end of life in August 2026 and receives no security patches, while pulling in unpinned software dependencies. Instructors should keep the simulator completely isolated on an offline lab bench or dedicated private network segment, change all default system passwords immediately, and avoid placing the device on an open campus network.

Not checked

- CubeSatSim software suite: unpinned; installed from git master without version pinning
- Raspberry Pi Pico SDK: version not determined; no advisory database for the ecosystem
- Python packages: unpinned; install script specifies no package versions

Other dependencies

- PCB Fabrication (Main, Battery, Solar Boards): 2-layer boards, approx. 10 cm × 10 cm (CubeSat form factor) — not checked.
- Primary Project Website (<https://cubesatsim.org>) — not checked.
- Hardware Repository (<https://github.com/alanjohnston/CubeSatSim/tree/master/hardware/v2.1>) — not checked.
- Audio Signal Generation Tutorial (<https://www.hackster.io/news/learn-how-to-use-pwm-to-generate-an-audio-signal-from-your-raspberry-pi-pico-00347dece8b8>) — not checked.
- RF Attenuator Calculator (<https://chemandy.com/calculators/matching-pi-attenuator-calculator.htm>) — not checked.
- Adafruit INA219 Current Sensor Hardware Repository (<https://github.com/adafruit/Adafruit-INA219-Current-Sensor-PCB>) — not checked.

Watch list

- **SR105U / SR_0W5U UHF Modules:** Specialty walkie-talkie transceivers produced by niche manufacturers. Stock is limited to secondary marketplace sellers (Tindie, AliExpress, direct hobby stores) and subject to sudden exhaustion.
- **Dorji DRA818V Modules:** Similar to the UHF module, this VHF transceiver is only available via Dorji's direct web channels or maker portals, leaving it vulnerable to supply-chain disruption.
- **BAT20J Schottky Diodes:** Distributor inventory for the STMicroelectronics part is shallow at primary catalog distributors (39 units at DigiKey), though deeper stock remains at Newark and Arrow, and drop-in alternatives (Panjit SBA130CS) exist.