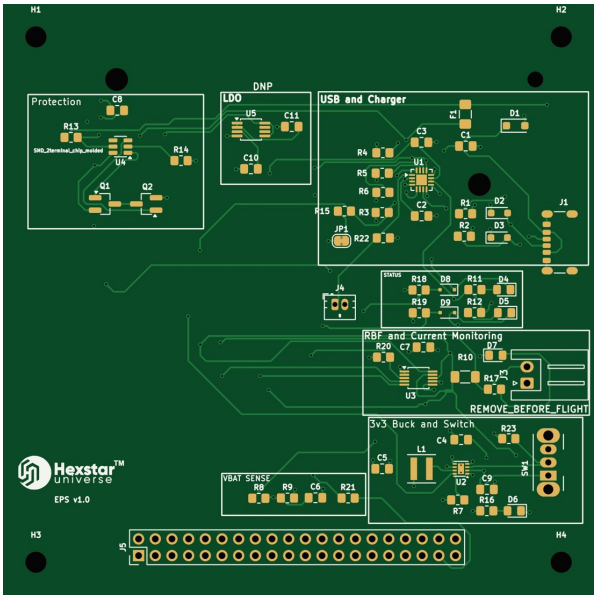
EPS · Electrical Power System

Charges, protects and measures every milliwatt

Overview

The EPS is the bottom board of the Hexstar 1U stack. It holds the single 18650 Li-ion cell, charges it from USB-C with power-path management, protects it against over-charge, over-discharge and short circuit, and generates the regulated 3.3 V rail for every board above. An INA226 monitor reports bus voltage, current and power over I²C, so every milliwatt is in your telemetry.



Key features

- BQ24074 1 A linear charger with power-path: run from USB while charging
- DW01A + dual AO3400A cell protection, 1.5 A resettable PTC fuse
- TPS62162 1 A synchronous buck converter for the 3V3 bus
- INA226 current / voltage / power monitor with a 50 mΩ shunt
- Remove-before-flight (RBF) key and an external slide switch
- Charge, power-good, 3V3 and safety-live status LEDs
- Keystone 1042 SMT 18650 holder on the underside

Specifications

Cell	1 × 18650 Li-ion, 3.6 V nominal
Charge input	USB-C, 5 V, up to 1 A
Output rail	3.3 V, 1 A
Telemetry	INA226 over I²C
Board	90 × 90 mm, 1.6 mm FR4, 2-layer
Stack	2 × 20 female socket (bottom of stack)

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Bill of materials

Fitted parts only. Do-not-populate (DNP) options are omitted.

Ref	Qty	Value	Description	Package	Manufacturer · MPN
U1	1	BQ24074	1S Li-ion linear charger with power path, USB input	VQFN-16 3x3 mm	Texas Instruments BQ24074RGTR
U2	1	TPS62162	1 A step-down converter, fixed 3.3 V, 3-17 V in	WSON-8 2x2 mm	Texas Instruments TPS62162DSGR
U3	1	INA226	I2C current and power monitor, 36 V, 16-bit	VSSOP-10	Texas Instruments INA226AIDGSR
U4	1	DW01A	1S Li-ion protection IC (OV, UV, OC, short)	SOT-23-6	Fortune Semi DW01A
Q1, Q2	2	AO3400A	N-MOSFET 30 V 5.7 A, back-to-back cell protection switch	SOT-23	Alpha & Omega AO3400A
D1	1	SMF5.0CA	TVS 5.0 V standoff, 200 W, bidirectional, VBUS clamp	SOD-123F	Littelfuse SMF5.0CA
D2, D3	2	PESD5V0S1BA	ESD diode 5 V bidirectional, CC1 and CC2	SOD-323	Nexperia PESD5V0S1BA,115
D8, D9	2	BAT54J	Schottky 30 V 200 mA, isolates CHG and PGOOD to OBC	SOD-323F	Nexperia BAT54J,115
F1	1	1206L150THWR	PTC resettable fuse, 1.5 A hold, 6 V	1206	Littelfuse 1206L150THWR
L1	1	2.2 uH	TPS62162 buck inductor, shielded	4.0 x 4.0 mm (XxL4020)	Coilcraft XFL4020-222MEB
C1	1	4.7 uF	USB input decoupling at BQ24074 IN	0805 X5R 25 V	Samsung CL21A475KAQNNNE
C2, C3, C4, C9	4	10 uF	VBAT, CHG_OUT and SYS_RAW bulk	0805 X5R 25 V	Samsung CL21A106KAYNNNE
C5	1	22 uF	+3V3 buck output	0805 X5R 25 V	Samsung CL21A226MAQNNNE
C6, C7, C8	3	100 nF	VBAT_SENSE filter, +3V3 local, DW01A VCC filter	0805 X7R 50 V	YAGEO CC0805KRX7R9BB104
R21	1	0R	USB 5V to stack 5V_SYS link	0805	YAGEO RC0805JR-070RL
R13	1	100R	DW01A VCC filter	0805 1%	YAGEO RC0805FR-07100RL
R14	1	1k	DW01A CS sense	0805 1%	YAGEO RC0805FR-071KL
R5	1	1.18k	BQ24074 ITERM program	0805 1%	YAGEO RC0805FR-071K18L
R11, R12, R16, R17	4	1.5k	LED series resistors	0805 1%	YAGEO RC0805FR-071K5L
R3, R4, R15	3	1.78k	ISET (R3), ILIM (R4), ISET boost via JP1 (R15)	0805 1%	YAGEO RC0805FR-071K78L
R1, R2	2	5.1k	USB-C CC pull-downs (sink Rd)	0805 1%	YAGEO RC0805FR-075K1L
R7, R18, R19, R20	4	10k	Pull-ups: 3V3_PGOOD, CHG_STAT, PG_STAT, INA226_ALERT	0805 1%	YAGEO RC0805FR-0710KL
R23	1	100k	3V3_EN pull-down (buck off while SW1 moves)	0805 1%	YAGEO RC0805FR-07100KL
R22	1	10k	BQ24074 TS fixed bias (no NTC)	0805 1%	YAGEO RC0805FR-0710KL

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Ref	Qty	Value	Description	Package	Manufacturer · MPN
R6	1	64.9k	BQ24074 safety timer	0805 1%	YAGEO RC0805FR-0764K9L
R8, R9	2	1M	VBAT_SENSE divider (1/2)	0805 1%	YAGEO RC0805FR-071ML
R10	1	50 mR	INA226 current shunt	1206 1%	Vishay Dale WSL1206R0500FEA
D4, D7	2	Red LED	Charging (D4), SAFETY_OUT live (D7)	0805	Lite-On LTST-C170KRKT
D5	1	Green LED	Input power good (PGOOD)	0805	Lite-On LTST-C170KGKT
D6	1	Yellow LED	+3V3 rail on	0805	Lite-On LTST-C170KSKT
SW1	1	Slide switch	SPDT slide switch, 3V3 buck enable	THT right angle	C&K; OS102011MA1QS1
J1	1	USB-C	USB-C receptacle, 6P power only, sink	SMT horizontal	GCT USB4125-GF-A-0190
J2	1	18650 holder	Single 18650 cell holder	SMT	Keystone 1042
J3	1	JST XH 2P RA	REMOVE_BEFORE_FLIGHT link, CHG_OUT to SAFETY_OUT	2.50 mm right-angle THT	JST S2B-XH-A(LF)(SN)
J5	1	2x20 socket	MAIN STACK connector, 2x20 2.54 mm female socket, 8.5 mm body	2x20 THT 2.54 mm	Sullins PPTC202LFBN-RC

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