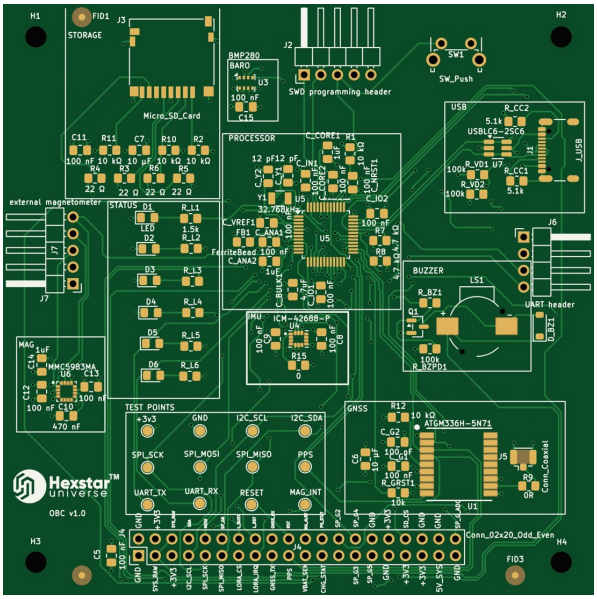
OBC · On-Board Computer

Runs your code, reads every sensor, logs the mission

Overview

The OBC is the brain of the satellite. An ATSAMD21 Cortex-M0+ microcontroller (Arduino Zero compatible) reads a 6-axis IMU, a 3-axis magnetometer, a barometer and a GNSS receiver, timestamps everything with the GNSS PPS pulse and logs it to microSD. It drives the LoRa radio above it over the stack bus.



Key features

- ATSAMD21G18A, 48 MHz Arm Cortex-M0+, 256 KB flash, 32 KB RAM
- ICM-42688-P 6-axis IMU (gyro + accelerometer)
- MMC5983MA 3-axis magnetometer
- BMP280 pressure and temperature sensor
- ATGM336H GPS + BeiDou receiver with a U.FL patch-antenna input
- Push-push microSD logger, magnetic buzzer beacon
- USB-C programming with ESD protection, 5-pin SWD debug header
- UART and external-magnetometer expansion headers

Specifications

MCU	ATSAMD21G18A @ 48 MHz
Sensors	IMU, magnetometer, barometer, GNSS
Storage	microSD (SPI)
Programming	USB-C (UF2 / Arduino) and SWD
Board	90 × 90 mm, 1.6 mm FR4
Stack	2 × 20 stacking header

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Bill of materials

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

Ref	Qty	Value	Description	Package	Manufacturer · MPN
U5	1	ATSAMD21G18A	MCU, Cortex-M0+ 48 MHz, 256 KB flash, 32 KB RAM, native USB	TQFP-48 7x7 mm	Microchip ATSAMD21G18A-AU
U4	1	ICM-42688-P	6-axis IMU, I2C address 0x69	LGA-14 2.5x3 mm	TDK InvenSense ICM-42688-P
U6	1	MMC5983MA	3-axis magnetometer, I2C address 0x30	LGA-16 3x3 mm	Memsic MMC5983MA
U3	1	BMP280	Barometric pressure sensor, I2C address 0x76	LGA-8 2x2.5 mm	Bosch Sensortec BMP280
U1	1	ATGM336H-5N71	GNSS receiver module, UART, PPS	LCC-18 10.1x9.7 mm	Zhongke Microelectronics ATGM336H-5N71
U7	1	USBLC6-2SC6	USB ESD protection, 2 lines + VBUS	SOT-23-6	STMicroelectronics USBLC6-2SC6
Q1	1	AO3400A	N-MOSFET 30 V, logic level, buzzer driver	SOT-23	Alpha & Omega AO3400A
D_BZ1	1	1N4148W	Flyback diode across buzzer coil	SOD-123	Diodes Inc. 1N4148W-7-F
Y1	1	32.768 kHz	Crystal 32.768 kHz, 9 pF load, 20 ppm	3.2x1.5 mm 2-SMD	Abracon ABS07-32.768KHZ-9-T
FB1	1	220R @100 MHz	VDDANA filter ferrite bead	0805	Murata BLM21PG221SN1D
C_Y1, C_Y2	2	12 pF	32.768 kHz crystal load caps	0805 C0G 50 V	YAGEO CC0805JRNPO9BN120
C5, C8, C9, C11, C12, C13, C15, C_ANA1, C_CORE2, C_G1, C_G2, C_IN1, C_IO1, C_IO2, C_NRST1, C_VREF1	16	100 nF	Local decoupling: MCU, sensors, GNSS, SD, RESET, VREF	0805 X7R 50 V	YAGEO CC0805KRX7R9BB104
C10	1	470 nF	MMC5983MA SET/RESET CAP pin	0805 X7R 25 V	YAGEO CC0805KKX7R8BB474
C14, C_ANA2, C_CORE1	3	1 uF	Bulk: magnetometer VDD, VDDANA, VDDCORE	0805 X7R 25 V	YAGEO CC0805KKX7R8BB105
C_BULK1	1	4.7 uF	MCU 3V3 bulk	0805 X5R 25 V	YAGEO CC0805KKX5R8BB475
C6, C7	2	10 uF	Bulk: GNSS VCC and microSD VDD	0805 X5R 25 V	Samsung CL21A106KAYNNNE
R1, R2, R10, R11, R_GRST1	5	10k	Pull-ups: RESET, SD DAT2, SD CS, SD DAT1, GNSS NRESET	0805 1%	YAGEO RC0805FR-0710KL
R3, R4, R5, R6	4	22R	microSD SPI series resistors	0805 1%	YAGEO RC0805FR-0722RL
R7, R8	2	4.7k	I2C pull-ups (SCL, SDA)	0805 1%	YAGEO RC0805FR-074K7L

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Ref	Qty	Value	Description	Package	Manufacturer · MPN
R9, R15	2	0R	GNSS RF link, IMU AD0 strap	0805	YAGEO RC0805JR-070RL
R_BZ1	1	100R	Buzzer MOSFET gate resistor	0805 1%	YAGEO RC0805FR-07100RL
R_BZPD1, R_VD1, R_VD2	3	100k	Gate pull-down, USB VBUS sense divider	0805 1%	YAGEO RC0805FR-07100KL
R_CC1, R_CC2	2	5.1k	USB-C CC sink pull-downs	0805 1%	YAGEO RC0805FR-075K1L
R_L1	1	1.5k	Heartbeat LED series resistor	0805 1%	YAGEO RC0805FR-071K5L
R_L2, R_L5, R_L6	3	1k	LED series resistors: 3V3, TX, RX	0805 1%	YAGEO RC0805FR-071KL
R_L3, R_L4	2	2.2k	LED series resistors: 5V, USB	0805 1%	YAGEO RC0805FR-072K2L
D1	1	Red LED	Heartbeat LED	0805	Lite-On LTST-C170KRKT
D2, D3	2	Green LED	3V3 and 5V power LEDs	0805	Lite-On LTST-C170KGKT
D4	1	Blue LED	USB VBUS LED	0805	Lite-On LTST-C170TBKT
D5, D6	2	Yellow LED	UART TX and RX activity LEDs	0805	Lite-On LTST-C170KSKT
LS1	1	Buzzer	Magnetic buzzer transducer, PWM driven from SYS_RAW	SMD	Same Sky (CUI) CBT-09427-SMT-TR
SW1	1	Reset	Tactile switch, right-angle, reset	THT angled	C&K; PTS645VL58-2 LFS
J1	1	USB-C	USB-C receptacle, USB 2.0, 16P	SMT + THT shell	GCT USB4105-GF-A
J3	1	microSD	microSD push-push socket	SMT	Hirose DM3D-SF
J5	1	U.FL	GNSS antenna receptacle	U.FL SMT vertical	Hirose U.FL-R-SMT-1(10)
J2	1	1x05 RA	SWD header, right-angle, 2.54 mm	1x05 THT RA 2.54 mm	Amphenol 68016-105HLF
J7	1	1x05 RA	External magnetometer header, right-angle, 2.54 mm	1x05 THT RA 2.54 mm	Amphenol 68016-105HLF
J6	1	1x04 RA	UART header, right-angle, 2.54 mm	1x04 THT RA 2.54 mm	Amphenol 68016-104HLF
J4	1	2x20 stacking	MAIN STACK, 2x20 2.54 mm stacking header: female body on top, long tail into EPS socket	2x20 THT 2.54 mm	Generic 2x20 stacking header, 8.5 mm body, >= 11 mm tail

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