S-PLANE

X-CUBE
Flight Control Unit

Features

Overview

- Redundant Flight Control Units (FCU)
- Supports Self-Checking Pair (SCP) in a Dual (DMR) or Triple (TMR) Modular Redundancy architecture as well as dual and triple internal redundancy
- Available with dual redundant Power Distribution Units
- High-capacity I/O concentration
- SWaP optimised
- High Design Assurance Equipment for safety-critical applications
- Conduction cooling, with forced convection cooling for lab use
- Certification-ready for safety-critical applications
- Developed according to RTCA DO-254 and DO-178

Applications

- Fixed-wing, rotary-wing and multi-rotor aircraft
- > 400 kg GMTOW
- MALE & HALE UAS
- OPS & AAM
- SWaP sensitive unmanned systems

Overview

The X-CUBE is a rugged, high-reliability avionics unit that combines high-performance redundant flight control computers, power distribution and data concentration into a single device. It offers a certification-ready automation solution for managing all safety-critical functions on MALE and HALE UAS, as well as on OPS and AAM aircraft. With dual and triple internal redundancy and the support of COM/MON configurations for dual and triple modular redundancy, the X-CUBE delivers the fault tolerance and system integrity required for certified autonomous aircraft systems.

As a core component of the X-KIT, the X-CUBE works seamlessly with S-PLANE's and third-party modular automation and mission systems. The X-KIT delivers a complete set of capabilities for flight control and automation, payload and communications management, and integration with ground control and simulation environments. The X-CUBE is the hardware backbone of this ecosystem, hosting unparalleled I/O diversity, flexibility, and quantity, along with data concentration and high-performance multi-core computing power required for comprehensive aircraft automation and fly-by-wire control, to execute advanced autonomous operations.

The X-CUBE reduces integration complexity while meeting rigorous operational demands. Its rugged design and SWaP optimised configuration make it well-suited for both new builds and upgrades, offering a straightforward and rapid path to evolve a manned or optionally piloted system into a fully autonomous system. The X-CUBE is available as target hardware that supports customer and third-party software, as a complete appliance with S-PLANE's proven safety-critical software, and as target appliance that supports a combination of S-PLANE's proven safety-critical software as well customer software, allowing customers to focus on rapid development of their aircraft-specific software.

X-CUBE

Technical Specifications

Versatile | Proven | State-of-the-art | Certification-ready

INPUT / OUTPUT	
Software-configurable multi-protocol serial ports	24x
GPIO	40x
GPO	32x
ADC	8x
CAN	2x
ARINC 429 Transmit	6x
ARINC 429 Receive	16x
28V redundant distributed power channel	22x
28V single source distributed power channel	24x (12x PDU-A and 12x PDU-B)
AVV redundant distributed power channel	4x
AVV single source distributed power channel	12x (6x PDU-A and 6x PDU-B)
Dedicated HILS Support	Yes
Ethernet	One per FCU Gigabit Ethernet (1000BASE-T)
MECHANICAL AND ELECTRICAL	
Dimensions H x W x D	180 x 284 x 271 mm (incl. connectors)
Mass	Build Options F3P2: 13.1 kg Build Options F2P2: 11.8 kg Build Options F2P0: 10.2 kg
Input voltage	9-32.2 V
Nominal Power Draw	± 35 W per FCU installed ± 15 W per PDU installed
Max Power Draw	150 W (Excludes power distribution capabilities and is build variant dependant)
Max Current Draw	90 A (Includes power distribution capabilities)
Operating System	Pike OS, Linux
Processor	Intel Atom x6212RE 1.2 GHz Dual Core
RAM	Up to 4GB LPDDR4 RAM with ECC per FCU
Data Storage	32 GB SATA SSD Storage per FCU

ENVIRONMENTAL QUALIFICATION	
Operational Temperature	DO-160G, Section 4 -55°C to +70°C (Normal Operation)
Storage Temperature	DO-160G, Section 4 -55°C to +85°C (Ground Survival)
Operational Shock	DO-160G, Section 7 6 g /11ms, 3 shocks in 6 directions
Operational Vibration	DO-160G, Section 8, Categories S and R: Fixed wing Standard vibration (S) and Fixed wing robust vibration (R). 1. For S; 1 h/axis sine sweep: a. [2] Curve M, 1.5 g peak, 5 - 500 Hz 2. For R; random on sine: a. [2] Curve C 3 h/axis, 4.13 gRMS, 10 – 2000 Hz b. [2] Curve C1 10 min/axis, 5.85 gRMS, 10 – 2000 Hz

X-KIT Key Equipment

X-CUBE

- The X-CUBE is the core avionics unit of the X-KIT for UAS/OPS conversion
- Function: Flight Control Unit (FCU), Power Distribution Unit (PDU) and Input/Output (IO) Concentrator
- Support SCP, DMR and TMR internal redundancy with dedicated voting
- Further supports dual X-CUBE external redundancy with failover architecture

X-ADT

- Airborne Data Terminal (ADT)
- Function: Mission Computer, IO Concentrator, HD-SDI Video Encoder, Data Storage, Ethernet Switch
- Supports S-PLANE's mission software and third-party or custom containerised software
- Interfaces with and manages and controls mission payloads (RADAR, EO/IR, SIGINT, AIS and Direction Finder)

X-RPU

- Remote Piloting Unit (RPU)
- Function: Safety-critical Command & Control Computer, and IO Concentrator
- Interfaces to Primary Flight Controls (PFC), GCC MFD, Hard IO (buttons and switches with parallel redundancy) and to data links/tracker

TRACKER+

- Stand-alone GNSS-based antenna tracker for UHF, L-, S- and C-bands
- Function: Long-range Line of Sight Communication (LOSCom) between aircraft and Ground Control Stations (GCS)
- Mesh network enabled

GCC and Paragon

- Ground Control Console (GCC)
- Configured as a Remote Piloting Station, Payload Operating Station, or Engineering Station
- Function: HMI for ParagonC2/ISR, PFD with HUD, and MFD (touch display) for Remote Piloting

Equipment Chains & Products

	AIRBORNE CONTROL	GROUND CONTROL	COMMUNICATION	SIMULATION
NX-FCU	Automation & Mission		Automation & Mission	
X-CUBE	Automation		Automation	
X-ADT	Mission		Mission	
X-RPU		Automation		
GCC		Automation & Mission		
ParagonC2		Automation		
ParagonISR	Mission			
X-GDT		Mission	Automation & Mission	
TRACKER+			Automation & Mission	
XSIM-HILS				Automation & Mission
XSIM-Workbench				Automation & Mission
XSIM-Video				Automation & Mission

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