Flat Satellite Development Kit

- Fast integration of your existing products and subsystems
- Lower your satellite development costs with Rapid Integration Architecture™
- Rapid prototyping of distributed avionics architectures
- Includes integrated sensors and example software
- 'SPAready' - fully compatible with Space Plug-and-Play Avionics (SPA) protocol
- Supports Modular Open Network Architecture (MONARCH) protocol

Powerful development tool

Flat Satellite Development Kit (Fig. 1) is a powerful and effective tool for designing new embedded systems. Built around ÅAC Microtec's standard products in the Rapid Integration Architecture™ (RIA) family, it includes an on-board computer (OBC), Remote Terminal Units (RTUs) and Distributed Power Control Units (DPCUs) that allow fast and easy integration of payloads, sensors and sub-systems on complex systems like spacecraft, unmanned aerial vehicles and robotics. Note that OBC lite is future-safe; it supports Satellite Data Model (SDM) middleware as well as the new Satellite System Manager (SSM) replacement.

Easy system access

As shown in Figure 1, system hardware can be easily accessed through the Flat Satellite Development Kit front panel. The design also allows hardware access from above, ensuring that the interfaces available on the assembled boards are easy to utilize.

FIG. 1. Flat Satellite Development Kit products are assembled on top of the carrier board and connected to front panel interfaces for easy user access and operation.

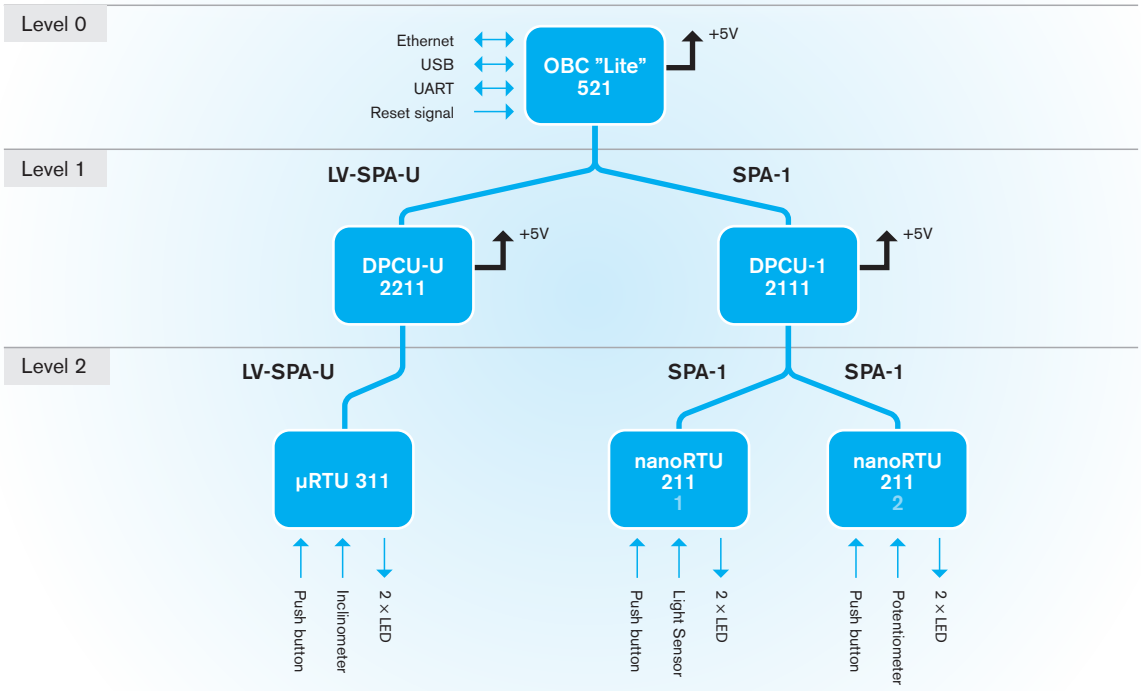

FIG. 2. Default architecture of the Flat Satellite Development Kit. A possible plug-and-play compatible power hierarchy and data network architecture is also illustrated.

Sensors and feedback allow two-way testing

The kit includes an inclinometer, a light sensor, a trim potentiometer and three pushbuttons, thus allowing product stimulation. In return, users receive feedback via six LEDs. The OBC lite unit has a host USB connection on the front panel, as well as a reset push-button. Software to test the system with these sensors from day one of development is included.

Architecture with many connection possibilities

Flat Satellite Development Kit consists of a carrier board that is default equipped with a set of RIA products; 1 OBC lite 521, 1 DPCU 2111, 1 DPCU 2211, 2 nanoRTU 211 and 1 µRTU 311. As Figure 1 shows, vacant placeholder areas are available for additional circuit boards. The following can all be added, for example: 8 nanoRTUs or 4 µRTUs, 1 DPCU or Mass Memory unit, and 1 OBC lite or other subsystem such as a GNSS, SDR, star tracker, sun sensor or AOCS.

Figure 2 shows the default Flat Satellite Development Kit architecture. It also illustrates a possible plug-and-play compatible power hierarchy and data network architecture. The OBC lite unit, a Level 0 device, is connected to the Distributed Power Control Units (DPCUs), permitting DPCU control and Level 2 device communication. As Level 0 devices are always powered, OBC lite receives its power from the kit's +5 V. According to the SPA standard, Level 1 and 2 are switched off by default. In this set-up, Level 1 devices are always powered from the kit's +5 V since the Main Power Distributing Unit (MPDU) is highly mission-specific and therefore not included in the kit.

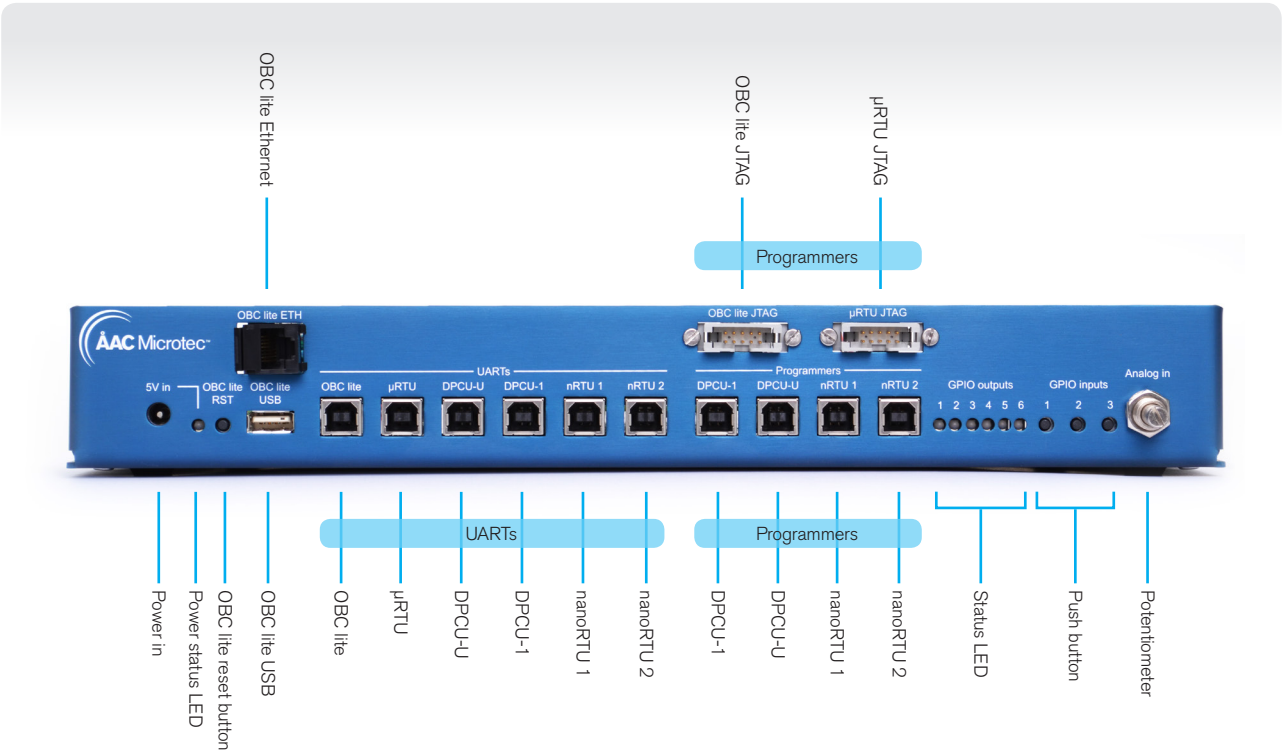

FIG. 3. Flat Satellite Development Kit front panel interfaces. UART and programmer interfaces are highlighted.

When powered, a DPCU will initiate and announce itself to Level 0, keeping all SPA user ports switched off. A Level 0 device can then command a DPCU to switch on a SPA user port. This will power up the connected SPA device, which will announce itself to the network.

A Level 1 device can switch off Level 2 in emergency situations (e.g. a short circuit, LCL protection) and any subsequent levels. However, such a device is never given the opportunity to automatically turn-on a device; only Level 0 devices are permitted this task.

Broad array of front panel interfaces

Figure 3 describes the interfaces on the front panel of the Flat Satellite Development Kit. The units in the kit are programmed via the supplied Universal boot-loader and ÅAC Microtec JTAG and UART interfaces. Firmware can also be loaded via the Ethernet, USB or serial ports.

Engineering and Flight Models

The kit is delivered with Engineering Model (EM) units for development in a lab environment only. Flight Model (FM) versions designed and qualified according to ÅAC Microtec's FM routine are also available. Comprehensive SEE/SEU hardware protection is provided on the FM units.

Technical specifications – Flat Satellite Development Kit

POWER SUPPLY	
Supply voltage	5 V
Adapter	110 V/230 V, 60 Hz/50 Hz

APPLICATION SOFTWARE / BOARD SUPPORT PACKAGE

– Application example software
– Satellite Data Model integrated on OBC lite
– Sample Plug-and-Play Application Source Code
– Drivers for integrating all supplied sensors and actuators

DIMENSIONS	
L × W × H	349 × 249 × 49 mm

COMPLIANCE

– Low Voltage SPA (LV-SPA) power subset standard (5 V), LV-SPA-U and SPA-1
– Modular Open Network Architecture (MONARCH) protocol

ORDER INFORMATION

Part number	Item	Description
104274	Flat Satellite Development Kit	Shipped with Engineering Model (EM) units

COMMUNICATION

Interfaces	OBC lite 521	µRTU 311	nanoRTU 211	DCPU 2111	DPCU 2211
Ethernet	1	0	0	0	0
SpaceWire (LV-SPA-S)	0	1	0	0	0
USB device (LV-SPA-U)	0	1	0	0	1
USB host (LV-SPA-U)	1	0	0	0	4
I2C (SPA-1)	4	4	1	4	0
SPI	2	2	1	0	0
UART (TTL)	1	1	1	1	1
UART (Debug)	1	1	1	1	1
JTAG	1	1	0	0	0
RS-422	1	1	0	0	0
RS-485	1	1	0	0	0
LVDS	0	2	0	0	0
AD/DA	4	4	4	0	0
GPIO	26	26	10	0	0

Note: Kit set-up may exclude the use of some interfaces.

For more information, please contact:

ÅAC Microtec AB
Uppsala Science Park,
SE-751 83 Uppsala, Sweden
Tel: +46 18 56 01 30
info@aacmicrotec.com
www.aacmicrotec.com

AAC Microtec North America Inc.
NASA Ames Research Park
Room 2024, M/S 19-46 N
Moffett Field, CA 94035, USA
info_us@aacmicrotec.com
www.aacmicrotec.com