

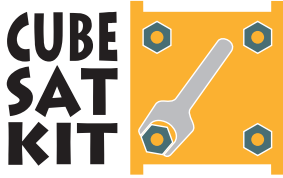
Salvo™ Real-Time Operating System



Part Number	Product	MSRP \$
Salvo RTOS ¹⁴		
709-00239	Salvo 4 Lite for 8051 family	free download
709-00206	Salvo 4 LE for 8051 family	900.00
709-00204	Salvo 4 Pro for 8051 family	1,500.00
709-00232	Salvo Lite for ARClite™ microRISC	free download
709-00233	Salvo LE for ARClite™ microRISC	1,000.00
709-00234	Salvo Pro for ARClite™ microRISC	1,500.00
709-00308	Salvo 4 Lite for ARM®	free download
709-00309	Salvo 4 LE for ARM®	900.00
709-00310	Salvo 4 Pro for ARM®	1,500.00
709-00232	Salvo 4 Lite for AVR and MegaAVR	free download
709-00233	Salvo 4 LE for AVR and MegaAVR	900.00
709-00234	Salvo 4 Pro for AVR and MegaAVR	1,500.00
709-00218	Salvo Lite for M68HCxx	free download
709-00219	Salvo LE for M68HCxx	750.00
709-00220	Salvo Pro for M68HCxx	1,250.00
709-00240	Salvo 4 Lite for TI's MSP430	free download
709-00216	Salvo 4 LE for TI's MSP430	900.00
709-00217	Salvo 4 Pro for TI's MSP430	1,500.00
709-00198	Salvo Lite for PICmicro® MCUs	free download
709-00207	Salvo LE for PICmicro® MCUs	750.00
709-00199	Salvo Pro for PICmicro® MCUs	1,250.00
709-00361	Salvo 4 Lite for PIC24 MCUs and dsPIC® DSCs	free download
709-00362	Salvo 4 LE for PIC24 MCUs and dsPIC® DSCs	900.00
709-00363	Salvo 4 Pro for PIC24 MCUs and dsPIC® DSCs	1,500.00
709-00437	Salvo 4 Lite for PIC32™ MCUs	free download
709-00438	Salvo 4 LE for PIC32™ MCUs	900.00
709-00439	Salvo 4 Pro for PIC32™ MCUs	1,500.00
709-00224	Salvo Lite for TI's TMS320C2000 DSPs	free download
709-00225	Salvo LE for TI's TMS320C2000 DSPs	750.00
709-00226	Salvo Pro for TI's TMS320C2000 DSPs	1,250.00
709-00427	Salvo 4 Lite for EPSON S1C17	free download
709-00428	Salvo 4 LE for EPSON S1C17	900.00
709-00429	Salvo 4 Pro for EPSON S1C17	1,500.00

Salvo Upgrades and Renewals		
713-00210	Salvo LE Renewal	350.00
713-00211	Salvo Pro Renewal	600.00
712-00209	Salvo LE-to-Pro Upgrade	600.00

CubeSat Kits™



A complete CubeSat Kit contains of two groups of components – the *processor-independent* components, and the *processor-specific* components.

The processor-independent components included in each complete CubeSat Kit are:

- A complete CubeSat mechanical structure (i.e., the chassis), consisting of a Base Plate Assembly, a Chassis Wall Assembly (in 0.5U, 1U, 1.5U, 2U or 3U size) and a Cover Plate Assembly. Each kit contains either skeletonized or solid-wall versions of these assemblies. E.g., 711-00282 contains one each of 710-00294, 703-00289 and 710-00296.
- 710-00297 CubeSat Kit Development Board (DB) for in-lab development, debugging and testing. The Development Board implements the current CubeSat Kit electronic architecture, plus two low-power linear power supplies and an RS232 port.
- 710-00484 CubeSat Kit Motherboard (MB) for use inside the CubeSat Kit structure. The Motherboard implements the current CubeSat Kit electronic architecture, without the Development Board's two low-power linear power supplies and its RS232 port.
- 632-00298 external universal +5Vdc 4A switching power supply.
- 632-00413 external universal 6-12Vdc switching power supply.
- 711-00303 Protoboard Kit.
- 615-00364 USB cable.
- Tools:
 - 618-00403: Phillips #1 screwdriver
 - 618-00377: ¼" offset wrench
 - 618-00404: 9/64" Allen wrench
- 710-00300 Remove-Before-Flight Pin and lanyard.
- Miscellaneous fasteners / mounting hardware.

The processor-specific components included in each complete CubeSat Kit are:

- A Pluggable Processor Module (PPM) for use on the Motherboard (MB).
- An additional Pluggable Processor Module for use on the Development Board (DB), or a processor of the same type on a socketed adapter board attached to the Development Board. CubeSat Kit contents depend on the CubeSat Kit chosen.
- A USB programmer / debugger specific compatible with the PPM's processor, with necessary cables.
- A programming adapter to connect the programmer / debugger to the PPM via a Flexible Printed Circuit (FPC) connector.
- Access to the customer download area on the CubeSat Kit website for the following processor-specific software for the CubeSat Kit:
 - Pumpkin Salvo Pro RTOS. ¹⁹
 - Pumpkin CubeSat Kit software. ⁵
 - HCC-Embedded EFFS-THIN SD Card Library.

Additionally, a compatible compiler / IDE / software development toolset is required and is *not* included in each CubeSat Kit. Customers *must* purchase a compatible toolset for the processor family they have chosen for their CubeSat Kit. The following toolsets are compatible with the CubeSat Kit. Educational discounts are often available – contact the tools vendor directly.

For TI's MSP430:

- CrossWorks for MSP430 software development environment (IDE) from Rowley Associates, <http://www.rowley.co.uk/>.

For the 8051 family:

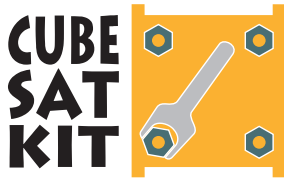
- Keil C51 software development environment (IDE) from Keil, <http://www.keil.com/>.

N.B. CubeSat Kit items that contain or interface to programmable electronics (e.g., the Development Board, Motherboard and Pluggable Processor Modules) may only be ordered "a la carte" *once a customer has purchased a complete CubeSat Kit*. This allows Pumpkin to provide CubeSat Kit components, associated software and technical support at low prices.

The purchase of a CubeSat Kit entitles the end-user to direct technical support for hardware and software issues involving the CubeSat Kit for a period of one year.

For more information on the various CubeSat Kit components available from Pumpkin see related datasheets and the CubeSat Kit System Chart available at <http://www.cubesatkit.com/>.

Complete CubeSat Kits™ for use with TI's MSP430

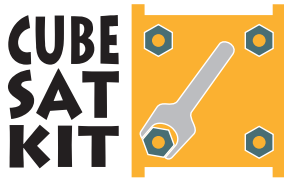


Part Number	Product	MSRP \$
Complete CubeSat Kits for use with TI's MSP430²		
711-00281	CubeSat Kit – skeletonized, 0.5 U	7,500.00
711-00282	CubeSat Kit – skeletonized, 1 U	7,500.00
711-00283	CubeSat Kit – skeletonized, 1.5 U	8,000.00
711-00284	CubeSat Kit – skeletonized, 2 U	8,375.00
711-00285	CubeSat Kit – skeletonized, 3 U	8,750.00
711-00279	CubeSat Kit ³ – solid-wall, 0.5 U	7,500.00
711-00227	CubeSat Kit ³ – solid-wall, 1 U	7,500.00
711-00280	CubeSat Kit ³ – solid-wall, 1.5 U	8,000.00
711-00241	CubeSat Kit ³ – solid-wall, 2 U	8,375.00
711-00242	CubeSat Kit ³ – solid-wall, 3 U	8,750.00

The processor-specific components of each complete CubeSat Kit for use with TI's MSP430 are:

- 709-00217 Salvo Pro for TI's MSP430
- 709-00332 MSP430 CubeSat Kit Software
- 709-00371 MSP430 EFFS-THIN SD Card Library
- 634-00334 JFPC-MSP430 Programming Adapter
- 633-00299 TI MSP430 USB Flash Emulation Tool
- 710-00509 MSP-TS430PM64 Adapter with TI MSP-TS430PM64 socketed adapter board
- 710-00485 (PPM A1), standard. Optionally, customers can request 710-00486 (PPM A2) or 710-00516 (PPM A3), subject to availability.

Complete CubeSat Kits™ for use with Silicon Labs' C8051

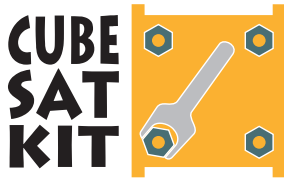


Part Number	Product	MSRP \$
Complete CubeSat Kits for use with Silicon Labs' C8051 ²		
711-00490	CubeSat Kit – skeletonized, 0.5 U	7,500.00
711-00491	CubeSat Kit – skeletonized, 1 U	7,500.00
711-00492	CubeSat Kit – skeletonized, 1.5 U	8,000.00
711-00493	CubeSat Kit – skeletonized, 2 U	8,375.00
711-00494	CubeSat Kit – skeletonized, 3 U	8,750.00
711-00495	CubeSat Kit ³ – solid-wall, 0.5 U	7,500.00
711-00496	CubeSat Kit ³ – solid-wall, 1 U	7,500.00
711-00497	CubeSat Kit ³ – solid-wall, 1.5 U	8,000.00
711-00498	CubeSat Kit ³ – solid-wall, 2 U	8,375.00
711-00499	CubeSat Kit ³ – solid-wall, 3 U	8,750.00

The processor-specific components of each complete CubeSat Kit for use with Silicon Labs' C8051 are:

- 709-00204 Salvo Pro for 8051 family
- 709-00500 8051 CubeSat Kit Software
- 709-00501 8051 EFFS-THIN SD Card Library
- 634-00488 JFPC-C8051 Programming Adapter
- 633-00490 Silicon Labs USB Debug Adapter
- 710-00487 Pluggable Processor Module B1 (PPM B1) – 2 pieces

CubeSat Kit™ Components & Accessories

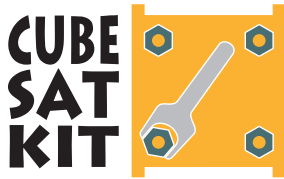


Part Number	Product	MSRP \$
CubeSat Kit Structural Components ⁴		
710-00296	Cover Plate Assembly – skeletonized	375.00
703-00288	Chassis Walls ¹³ – skeletonized, 0.5 U	925.00
703-00289	Chassis Walls ¹³ – skeletonized, 1 U	925.00
703-00290	Chassis Walls ¹³ – skeletonized, 1.5 U	1,450.00
703-00291	Chassis Walls ¹³ – skeletonized, 2 U	1,625.00
703-00292	Chassis Walls ¹³ – skeletonized, 3 U	2,250.00
710-00294	Base Plate Assembly – skeletonized	425.00
710-00295	Cover Plate Assembly – solid-wall	375.00
703-00286	Chassis Walls ^{3, 13} – solid-wall, 0.5 U	925.00
703-00243	Chassis Walls ^{3, 13} – solid-wall, 1 U	925.00
703-00287	Chassis Walls ^{3, 13} – solid-wall, 1.5 U	1,450.00
703-00244	Chassis Walls ^{3, 13} – solid-wall, 2 U	1,625.00
703-00245	Chassis Walls ^{3, 13} – solid-wall, 3 U	2,250.00
710-00293	Base Plate Assembly ³ – solid-wall	425.00
711-00330	Remove-Before-Flight Bracket Kit	125.00
711-00331	Midplane Standoff Kit	150.00
711-00335	Motherboard Remote Mount Kit	225.00
711-00346	Solar Panel Clips Set	450.00
703-00398	Payload Adapter Plate	275.00
710-00407	Payload Cover Plate Assembly	375.00

CubeSat Kit Electronic Components		
710-00297	Development Board (DB)	1,300.00
710-00484	Motherboard (MB)	1,200.00
632-00298	External Power Supply 5Vdc, 4A ¹¹	60.00
632-00413	External Power Supply 6-12Vdc ¹¹	60.00
711-00320	Motherboard Mockup	195.00

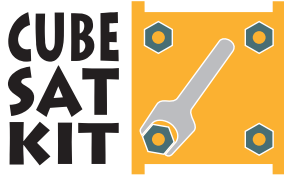
CubeSat Kit Modules		
711-00303	Protoboard Module Kit	75.00
711-00338	Linear EPS Module	745.00
711-00380	Breakout Board Module	195.00
711-00521	IO LED Module (Test Board A)	275.00

Processor-specific CubeSat Kit™ Components



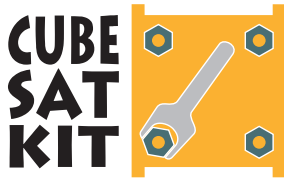
Part Number	Product	MSRP \$
MSP430-specific CubeSat Kit Components ⁴		
709-00332	MSP430 CubeSat Kit Software ⁵	5,500.00
709-00371	MSP430 EFFS-THIN SD Card Library ¹²	750.00
634-00334	JFPC-MSP430 Programming Adapter ⁸	35.00
633-00299	TI MSP430 USB Flash Emulation Tool ⁷	150.00
710-00509	MSP-TS430PM64 Adapter	250.00
710-00485	Pluggable Processor Module A1 (PPM A1), with TI's MSP430F1612IPM	500.00
710-00486	Pluggable Processor Module A2 (PPM A2), with TI's MSP430F1611IPM	500.00
710-00516	Pluggable Processor Module A3 (PPM A3), with TI's MSP430F2618TPM	500.00
8051-specific CubeSat Kit Components ⁴		
709-00500	8051 CubeSat Kit Software ⁵	5,500.00
709-00501	8051 EFFS-THIN SD Card Library ¹⁸	750.00
710-00488	JFPC-C8051 Programming Adapter ¹⁶	35.00
633-00490	Silicon Labs USB Debug Adapter ¹⁷	75.00
710-00487	Pluggable Processor Module B1 (PPM B1), with Silicon Labs C8051F120-GQ + 256KB SRAM	500.00

CubeSat Kit™ Accessories & Training



Part Number	Product	MSRP \$
CubeSat Kit Accessories		
710-00300	Remove-Before-Flight Pin	50.00
711-00307	MaxStream Serial Adapter Kit	45.00
632-00372	Pelican® Ruggedized Transport Case ¹⁰	200.00
634-00522	Total Phase™ Beagle I2C/SPI Protocol Analyzer	375.00
CubeSat Kit Training		
713-00373	Personalized Training (per hour)	250.00

CubeSat Kit™ Satellite Assemblies

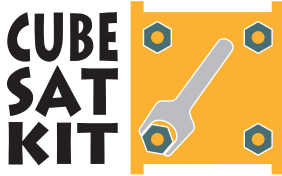


Part Number	Product	MSRP \$	
MISC Family			
715-00508	MISC 2 3U nanosatellite payload carrier with 165mm Basic Payload, Bus Extension, IMI-100 ADACS Kit, 20W DEPS, 30Wh energy storage, fixed & deployable solar panels with TJ cells, FMB, test & validation software	294,000.00	
715-00509	MISC 2 3U Engineering Model (EM)	20,000.00	
PPM options	Option /01	PPM delete	n/c
	Option /02	fitted with PPM A1	n/c
	Option /03	fitted with PPM A2	n/c
	Option /04	fitted with PPM A3	n/c
	Option /05	fitted with PPM B1	n/c

Satellites assemblies are controlled under 22 CFR 121.1, Category XV (ITAR). All sales to customers outside the United States must conform to United States export regulations.

715-00509 is identical to 715-00508 in external dimensions, with mockup solar panels (fixed & deployable). Contains no ADACS, EPS, processors, other electronics or components inside. Built from variants of standard CubeSat Kit components (e.g. Base Plate, Chassis Walls, hinges, ADACS enclosure, etc) and variants of MISC-specific components, and finished in a different color scheme. For display, fitment, modeling and similar purposes. Use of any of the included components in a flight-worthy CubeSat is strictly prohibited.

CubeSat Kit™-compatible Products



Part Number	Product	MSRP \$
Attitude Determination and Control System (ADACS) Kits		
711-00416	IMI-100 ADACS Kit	57,000.00

A complete IMI-100 ADACS Kit contains:

- 634-00412 IMI-100 ADACS & external magnetometer.
- 703-00398 Payload Adapter Plate (x2).
- 703-00397 ADACS Payload Walls.
- 711-00408 ADACS Interface Module.
- Access to the customer download area on the CubeSat Kit website for the following software for the CubeSat Kit:
 - 709-00417 ADACS Software
- Tools:
 - 618-00405: 2mm Allen wrench
- Miscellaneous fasteners / mounting hardware.

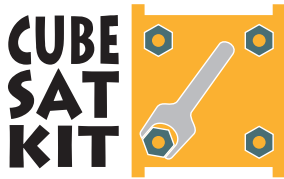
The purchase of an IMI-100 ADACS Kit entitles the end-user to direct technical support for hardware and software issues involving the CubeSat Kit for a period of one year. Support will be provided by Pumpkin and/or IMI based on the particular support issue(s).

The United States government may determine that the IMI-100 is controlled by 22 CFR 121.1, Category XV (ITAR). A request for Commodity Jurisdiction (CJ) is currently pending (Q3 2008). All sales to customers outside the United States must conform to United States export regulations.

For more information please visit <http://www.cubesatkit.com/>

Microhard® MHX Series Frequency-Hopping Spread-Spectrum Modem / Transceivers ⁹		
634-00383	MHX-920A Transceiver Module (Microhard P/N MHS102125)	695.00
634-00312	MHX-920A Development Platform (Microhard P/N MHS102210)	1,595.00
634-00384	MHX-2400 Transceiver Module obsolete (Microhard P/N MHS103100)	695.00
634-00302	MHX-2400 Development Platform obsolete (Microhard P/N MHS103200)	1,595.00
634-00385	MHX-2420 Transceiver Module (Microhard P/N MHS141500)	795.00
634-00386	MHX-2420 Development Platform (Microhard P/N MHS142000)	1,795.00
634-00430	MHX-2420-SL Transceiver Module (Microhard P/N MHS141500 + opt. 120)	995.00
634-00431	MHX-2420-SL Development Platform (Microhard P/N MHS142000 + opt. 120)	1,995.00

CubeSat Kit™-compatible Products (cont'd)



Part Number	Product	MSRP \$
Clyde Space Electrical Power System (EPS) Components ¹⁵		
634-00450	1U CubeSat Power Board (CS P/N C1-EPS-0000-CS)	2,900.00
634-00451	1U CubeSat Battery, 1.25Ah, 8.2V (CS P/N C1-BATT-0003-CS-xS)	910.00
634-00452	1U Solar Arrays (6 panels, using SpectroLab® cells) (CS P/Ns SP-L-T1U-0017-CS (x2) & SP-L-S1U-0002-CS (x4))	20,500.00
634-00453	CS documentation per complete EPS order, including: user manual, telemetry calibration spreadsheets, production test summary, SP inspection & test reports	0.00

Obsolete Pumpkin Products

Part Number	Product	MSRP \$
Miscellaneous		
711-00203	PIC17C75X Protoboard obsolete	395.00
710-00252	CubeSat Kit Flight Module (FM430) obsolete	1,200.00

Notes:

1. All prices are in US \$ and are subject to change without notice. Standard terms are Prepaid in Advance. Credit Cards are accepted on most orders. Orders of five or more identical items ordered at the same time enjoy a 15% discount. On smaller orders, Pumpkin will accept Net 30 orders from qualifying organizations within the United States. Some items may not be in stock and may incur a substantial delay between placement of order and order shipping. F.O.B. is San Francisco, California USA. Taxes, fees, customs, shipping, export, certification and other charges are not included.
United States export laws prohibit Pumpkin (a California corporation) from providing CubeSat Kit components to end-users in the following countries: Cuba, Libya, Iran, Iraq, Sudan, Syria and North Korea. Resellers, freight forwarders, etc. are also prohibited from exporting CubeSat Kit components to these countries.
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2. CubeSat Kit sizes: 0.5/1/1.5/2/3 U correspond to 5/10/15/20/30cm x 10cm x 10cm CubeSat bodies, respectively.
3. As of July 2007, solid-wall CubeSat Kits and solid-wall CubeSat Kit components (Base Plates and Chassis Walls) are deprecated and are not normally stocked. Any order for such a kit or component may incur substantial lead times and may require a minimum purchase of two or more Kits or components. All customers are advised to purchase skeletonized CubeSat Kits and skeletonized CubeSat Kit components, as they are substantially lighter in mass and are therefore better suited to achieving the mass limits imposed by the CubeSat specification.
4. Availability of individual components is subject to stock on hand. Please contact Pumpkin for details.
5. CubeSat Kit software includes CubeSat-specific code modules and projects for a particular processor family (e.g. MSP430 or 8051).
6. Minor CubeSat Kit components (e.g. M3 fasteners, feet) are not listed – please contact Pumpkin for your specific needs and pricing.
7. The supplied Flash Emulation Tool (MSP430FET) is used when debugging and programming the MSP430 microcontroller on the CubeSat Kit's Development Board and MSP430-based Pluggable Processor Modules (PPMs). It requires a PC and a USB port.
8. This adapter provides a standard 2x7 0.100" grid header for use with MSP430 FETs.
9. Pumpkin is an authorized Microhard reseller. Small quantity (1-5) unit pricing. Contact Pumpkin for quotes for larger quantities. Microhard MHX transceiver modules are plug-in compatible with the CubeSat Kit's Motherboard. Transceivers can be ordered individually or as part of a Development Kit, which includes 2 transceivers, 2 antennas, 2 development / test / serial interface boards, 2 desktop power supplies, cables and documentation. Development Kits are recommended as they allow CubeSat Kit end-users to create a simple ground station via a PC with a serial port. 900MHz and 2.4GHz MHX modules are freely available to customers throughout the world. Customers wishing to use MHX320 (310-390 MHz), MHX425 (400-450 MHz) and MHX1320 (1.30-1.45GHz) transceivers should contact Microhard directly at <http://www.microhardcorp.com>, as these cover restricted frequencies and require export licenses. Option 250 (128-AES Encryption) is available on x20 transceivers at no additional charge. Transceivers with 128-AES are export-controlled items and may not be exported beyond the USA and/or Canada with U.S. Government permission.
10. Can hold up to a 3U CubeSat Kit structure.
11. Supplied with a USA-specific IEC power cord to US customers. No IEC power cord is supplied to international customers. Power supply is 100-240VAC, 50-60Hz.
12. Includes precompiled libraries, header and source files for exclusive use with Rowley CrossWorks for MSP430.
13. A Chassis Walls must be combined with a Base Plate Assembly and a Cover Plate Assembly in order to create a complete CubeSat Kit structure. For example, a complete 2U CubeSat Kit skeletonized structure consists of 703-00291, 710-00294 and 710-00296.
14. Prices shown are for single-user Salvo licenses. For group / site / corporate licensing, please contact Pumpkin directly.
15. Pumpkin is an authorized Clyde Space reseller. 4-8 week typical lead time. Contact Pumpkin or Clyde Space for more information and full warranty terms.
16. This adapter provides a standard 2x5 0.100" grid header for use with Silicon Labs C8051 programming/debugging adapters.
17. The supplied USB Debug Adapter (DEBUGADPTR1-USB) is used when debugging and programming the Silicon Labs C8051 microcontroller on the CubeSat Kit's 8051-based Pluggable Processor Module. It requires a PC and a USB port.
18. Includes precompiled libraries, header and source files for exclusive use with Keil C51.

19. The Salvo Pro software included in each complete CubeSat Kit is licensed for exclusive use on any number of the customer's CubeSat Kits.