http://www.cubesatkit.com/

CubeSat Kit™ Protoboard

Hardware Revision: B

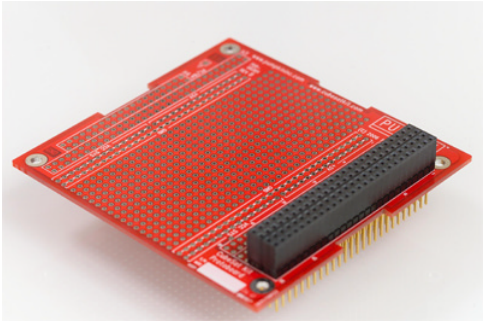
Prototyping / Breadboard Module

Applications

- CubeSat Kit prototyping & breadboarding

Features

- 16 x 33 hole grid on 0.100" centers for through-hole components
- GND, +5V_SYS and VCC_SYS power busses
- Entire CubeSat Kit Bus connector (H1, H2) is duplicated (H5, H6) to ease making connections between the CubeSat Kit Bus and the hole grid
- Suitable for soldered and wire-wrapped connections
- Passive circuit design
- PC/104-size footprint, with +5V and GND on PC/104 J1/J2 connectors
- 2-layer red-soldermask PCB



ORDERING INFORMATION

Pumpkin P/N 711-00303

Option Code	Configuration
/00 (standard)	standard

Contact factory for availability of optional configurations.

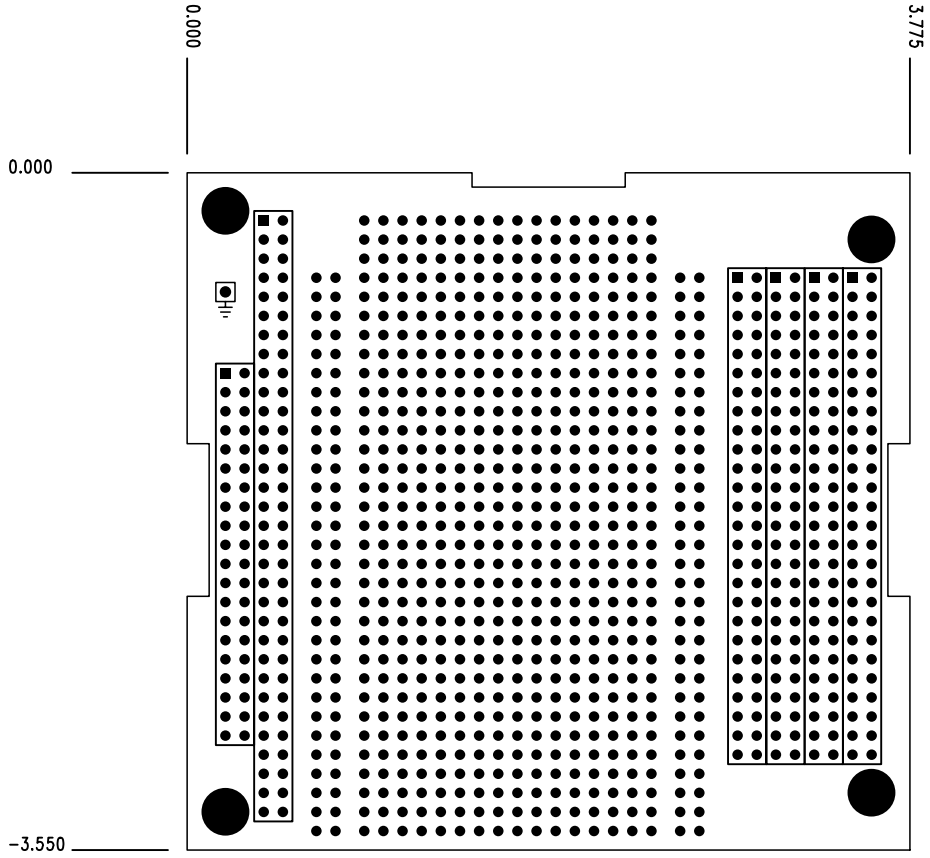
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Units
Operating temperature	T_A	-40 to +85	ºC

PHYSICAL CHARACTERISTICS

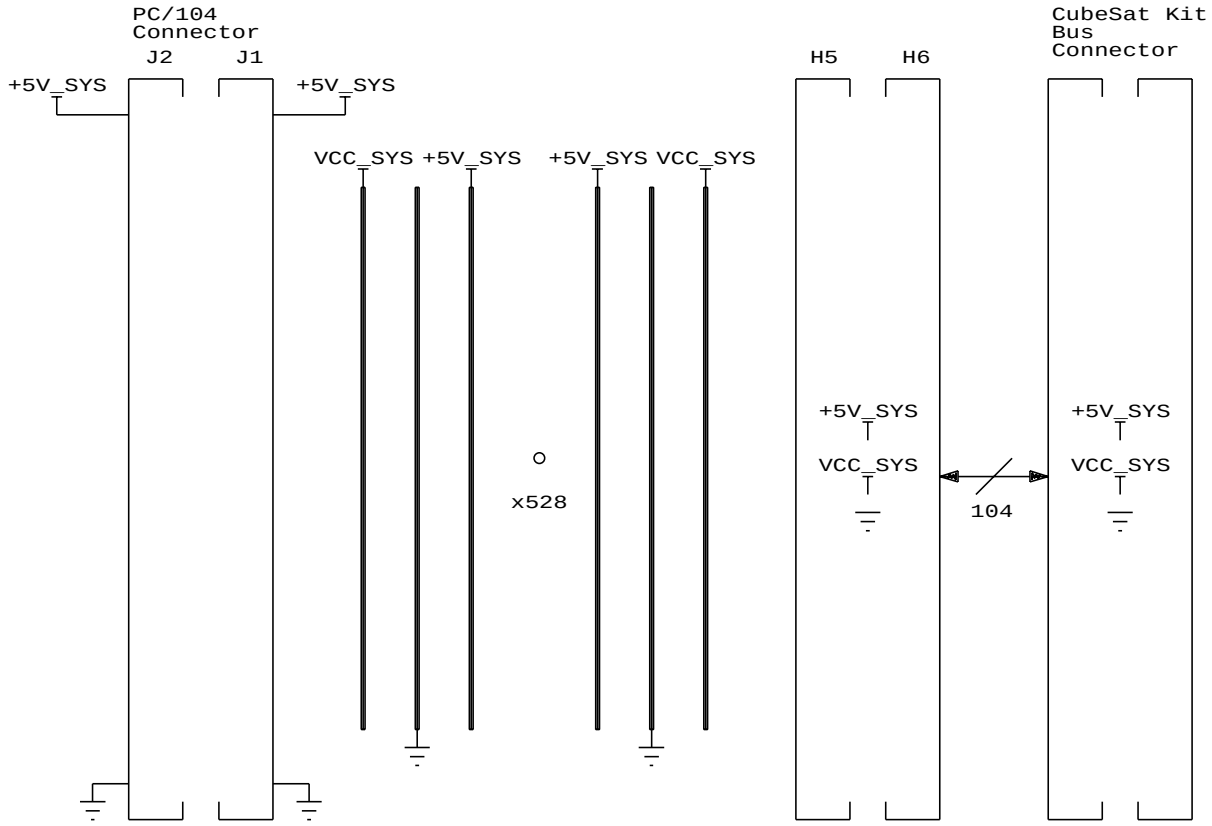
Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Units
Mass	PCB + H1 & H2 connectors			43		g
Height of components above PCB					11	mm
Height of components below PCB [1]					2	mm
PCB width	Corner hole pattern matches PC/104			96		mm
PCB length				90		mm
PCB thickness				1.6		mm

SIMPLIFIED MECHANICAL LAYOUT [2]

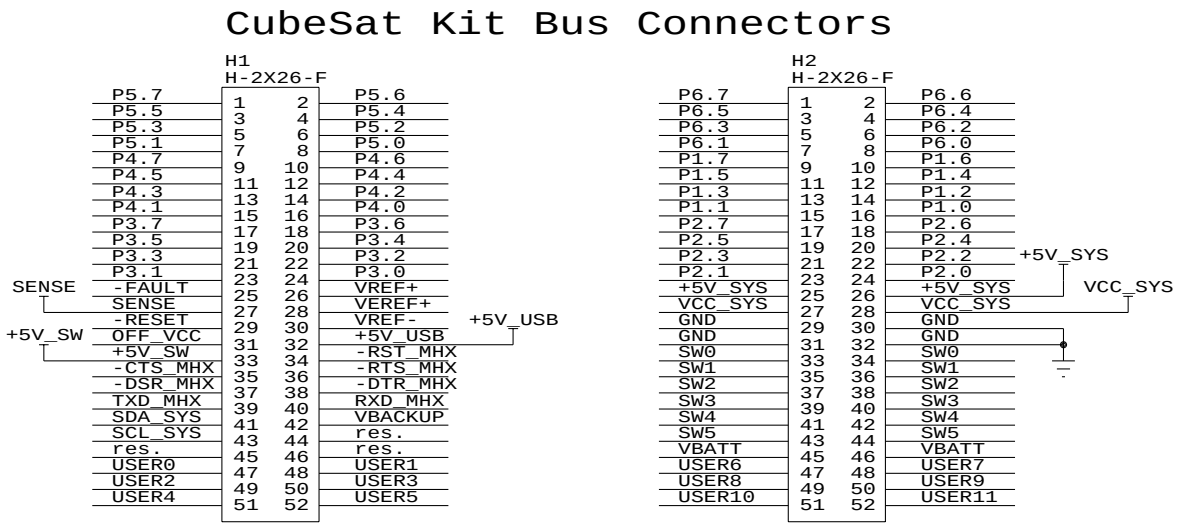


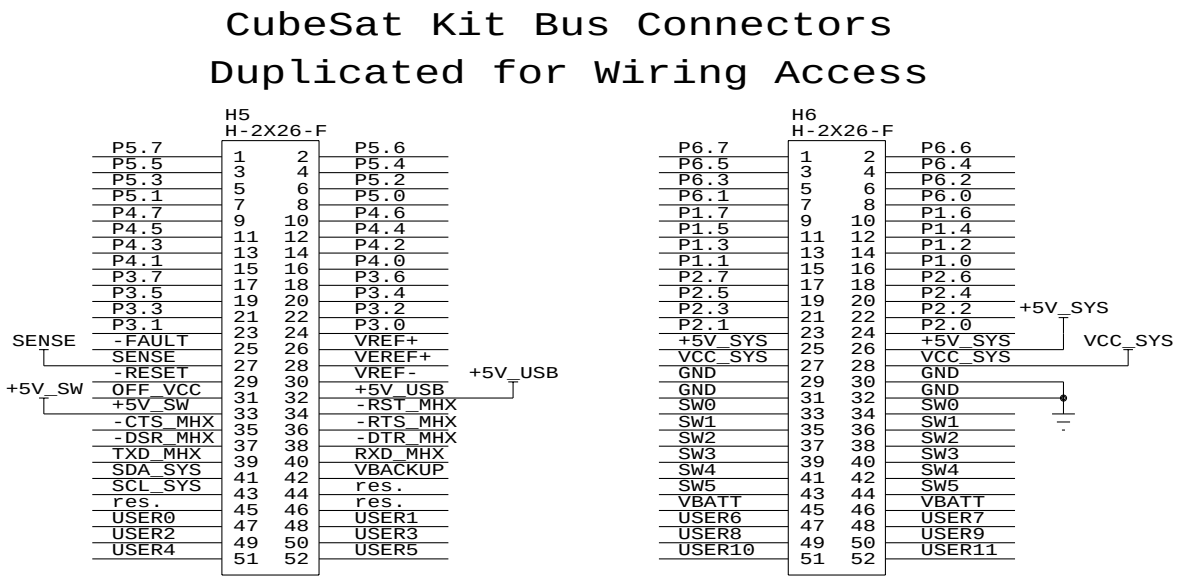
[1] Does not include length of PC/104 stackthrough header pins (H1 & H2) of 10.4mm.
[2] Dimensions in inches.

BLOCK DIAGRAM



CubeSat Kit Bus PIN DESCRIPTIONS





CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 1

Name	Pin	I/O	Description
P1.0	H2.16		Connected to H6.16.
P1.1	H2.15		Connected to H6.15.
P1.2	H2.14		Connected to H6.14.
P1.3	H2.13		Connected to H6.13.
P1.4	H2.12		Connected to H6.12.
P1.5	H2.11		Connected to H6.11.
P1.6	H2.10		Connected to H6.10.
P1.7	H2.9		Connected to H6.9.

CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 2

Name	Pin	I/O	Description
P2.0	H2.24		Connected to H6.24.
P2.1	H2.23		Connected to H6.23.
P2.2	H2.22		Connected to H6.22.
P2.3	H2.21		Connected to H6.21.
P2.4	H2.20		Connected to H6.20.
P2.5	H2.19		Connected to H6.19.
P2.6	H2.18		Connected to H6.18.
P2.7	H2.17		Connected to H6.17.

CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 3

Name	Pin	I/O	Description
P3.0	H1.24		Connected to H5.24.
P3.1	H1.23		Connected to H5.23.
P3.2	H1.22		Connected to H5.22.
P3.3	H1.21		Connected to H5.21.
P3.4	H1.20		Connected to H5.20.
P3.5	H1.19		Connected to H5.19.
P3.6	H1.18		Connected to H5.18.
P3.7	H1.17		Connected to H5.17.

CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 4

Name	Pin	I/O	Description
P4.0	H1.16		Connected to H5.16.
P4.1	H1.15		Connected to H5.15.
P4.2	H1.14		Connected to H5.14.
P4.3	H1.13		Connected to H5.13.
P4.4	H1.12		Connected to H5.12.
P4.5	H1.11		Connected to H5.11.
P4.6	H1.10		Connected to H5.10.
P4.7	H1.9		Connected to H5.9.

CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 5

Name	Pin	I/O	Description
P5.0	H1.8		Connected to H5.8.
P5.1	H1.7		Connected to H5.7.
P5.2	H1.6		Connected to H5.6.
P5.3	H1.5		Connected to H5.5.
P5.4	H1.4		Connected to H5.4.
P5.5	H1.3		Connected to H5.3.
P5.6	H1.2		Connected to H5.2.
P5.7	H1.1		Connected to H5.1.

CubeSat Kit Bus PIN DESCRIPTIONS – MSP430 I/O Port 6

Name	Pin	I/O	Description
P6.0	H2.8		Connected to H6.8.
P6.1	H2.7		Connected to H6.7.
P6.2	H2.6		Connected to H6.6.
P6.3	H2.5		Connected to H6.5.
P6.4	H2.4		Connected to H6.4.
P6.5	H2.3		Connected to H6.3.
P6.6	H2.2		Connected to H6.2.
P6.7	H2.1		Connected to H6.1.

CubeSat Kit Bus PIN DESCRIPTIONS – Analog References

Name	Pin	I/O	Description
VREF+	H1.26		Connected to H5.26.
VREF-	H1.30		Connected to H5.30.
VEREF+	H1.28		Connected to H5.28.

CubeSat Kit Bus PIN DESCRIPTIONS – I2C Bus

Name	Pin	I/O	Description
SDA_SYS	H1.41		Connected to H5.41.
SCL_SYS	H1.43		Connected to H5.43.

CubeSat Kit Bus PIN DESCRIPTIONS – Control & Status

Name	Pin	I/O	Description
-FAULT	H1.25		Connected to H5.25.
SENSE	H1.27		Connected to H5.27.
-RESET	H1.29		Connected to H5.29.
OFF_VCC	H1.31		Connected to H5.31.

CubeSat Kit Bus PIN DESCRIPTIONS – RBF and Launch Switches

Name	Pin	I/O	Description
S0	H2.33 H2.34		Connected to H6.33. Connected to H6.34.
S1	H2.35 H2.36		Connected to H6.35. Connected to H6.36.
S2	H2.37 H2.38		Connected to H6.37. Connected to H6.38.
S3	H2.39 H2.40		Connected to H6.39. Connected to H6.40.
S4	H2.41 H2.42		Connected to H6.41. Connected to H6.42.
S5	H2.43 H2.44		Connected to H6.43. Connected to H6.44.

CubeSat Kit Bus PIN DESCRIPTIONS – Power

Name	Pin	I/O	Description
VBATT	H2.45 H2.46		Connected to H6.45. Connected to H6.45.
+5V_USB	H1.32		Connected to H5.32.
+5V_SYS	H2.25 H2.26		Connected to H6.25 and to **+5V_SYS** busses[3] on sides of hole grid. Connected to H6.26 and to **+5V_SYS** busses[4] on sides of hole grid.
+5V_SW	H1.33		Connected to H5.33.
VBACKUP	H1.42		Connected to H5.42.
VCC_SYS	H2.27 H2.28		Connected to H6.27 and to **VCC_SYS** busses on sides of hole grid. Connected to H6.28 and to **VCC_SYS** busses on sides of hole grid.
GND[5]	H2.29 H2.30 H2.31 H2.32		Connected to H6.29 and to **GND** busses on sides of hole grid. Connected to H6.30 and to **GND** busses on sides of hole grid. Connected to H6.31 and to **GND** busses on sides of hole grid. Connected to H6.32 and to **GND** busses on sides of hole grid.

CubeSat Kit Bus PIN DESCRIPTIONS – Transceiver Interface

Name	Pin	I/O	Description
-RST_MHX	H1.34		Connected to H5.34.
-CTS_MHX	H1.35		Connected to H5.35.
-RTS_MHX	H1.36		Connected to H5.36.
-DSR_MHX	H1.37		Connected to H5.37.
-DTR_MHX	H1.38		Connected to H5.38.
TXD_MHX	H1.39		Connected to H5.39.
RXD_MHX	H1.40		Connected to H5.40.

CubeSat Kit Bus PIN DESCRIPTIONS – User-defined

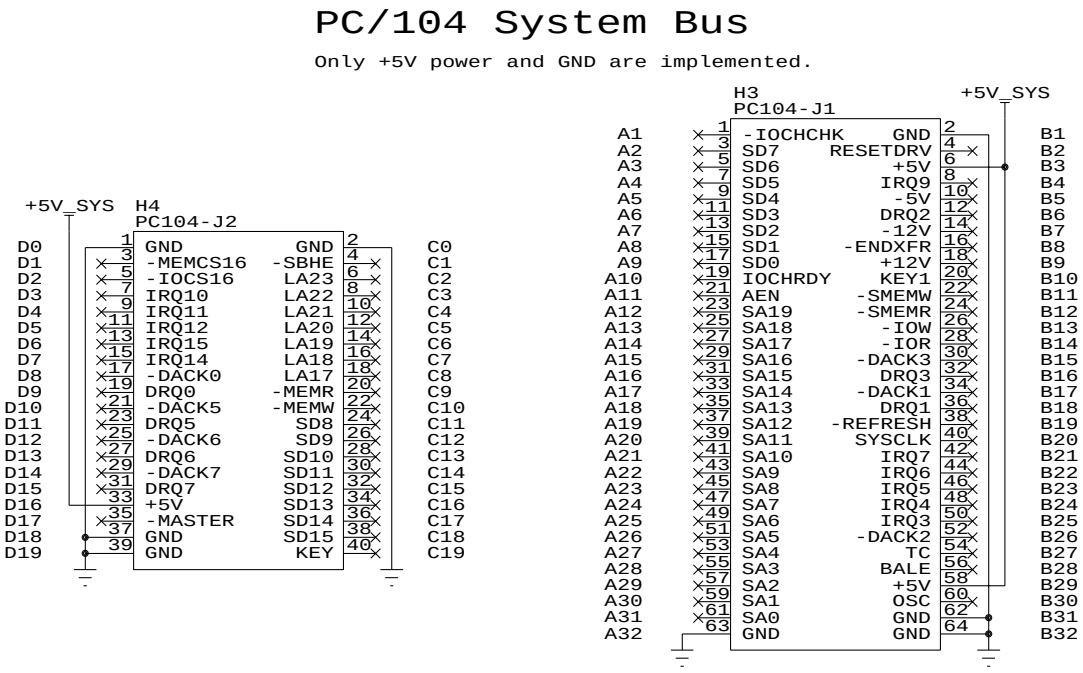
Name	Pin	I/O	Description
USER0	H1.47		Connected to H5.47.
USER1	H1.48		Connected to H5.48.
USER2	H1.49		Connected to H5.49.
USER3	H1.50		Connected to H5.50.
USER4	H1.51		Connected to H5.51.
USER5	H1.52		Connected to H5.52.
USER6	H2.47		Connected to H6.47.
USER7	H2.48		Connected to H6.48.
USER8	H2.49		Connected to H6.49.
USER9	H2.50		Connected to H6.50.
USER10	H2.51		Connected to H6.51.
USER11	H2.52		Connected to H6.52.

CubeSat Kit Bus PIN DESCRIPTIONS – Reserved

Name	Pin	I/O	Description
res.	H1.44		Connected to H5.44.
res.	H1.45		Connected to H5.45.
res.	H1.46		Connected to H5.46.

[3] Labeled as **+5V** on PCB.
[4] Ditto.
[5] Note that unlike Rev C of the CubeSat Kit electronics (e.g. see Rev C FM430 datasheet), there is no explicit **AGND** signal. All four **GND** pins are connected together. Future revisions of the protoboard will separate **AGND** from **GND**.

PC/104 System Bus PIN DESCRIPTIONS



The Protoboard implements a subset of the PC/104 specification in the form of two connectors J1 & J2 that provide only +5V (from +5V_SYS) and GND for PC/104 modules. All 104 pins are implemented, but only +5V and GND are connected. No other connections between the PC/104 bus and the CubeSat Kit Bus are provided. By adding standard PC/104 connectors to the Breakout Board, PC/104 modules can be plugged directly into the Breakout Board to obtain +5V power and GND.

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744 Naples Street
San Francisco, CA 94112 USA
tel: (415) 584-6360
fax: (415) 585-7948

web: http://www.pumpkininc.com/
email: info@pumpkininc.com

web: http://www.cubesatkit.com/
email: info@cubesatkit.com