http://www.cubesatkit.com/

CubeSat Kit™ I/O LED Module

Hardware Revision: B

LED Display Module for Digital I/O Signals

Applications

- CubeSat Kit debugging & testing

Features

- Displays digital status of I/O lines via LEDs
- Provides buffered digital I/O test points
- Maps all 48 CubeSat Kit I/O signals
- Active, buffered circuit design
- Zero-power design via ON/OFF switch
- PC/104-size footprint, with +5V and GND on PC/104 J1/J2 connectors
- 2-layer green-soldermask PCB

ORDERING INFORMATION

Pumpkin P/N 710-00521

Option Code	Configuration
/00 (standard)	standard

Contact factory for availability of optional configurations.

CHANGELOG

Rev.	Date	Author	Comments
I	20100604	AEK	Initial Release

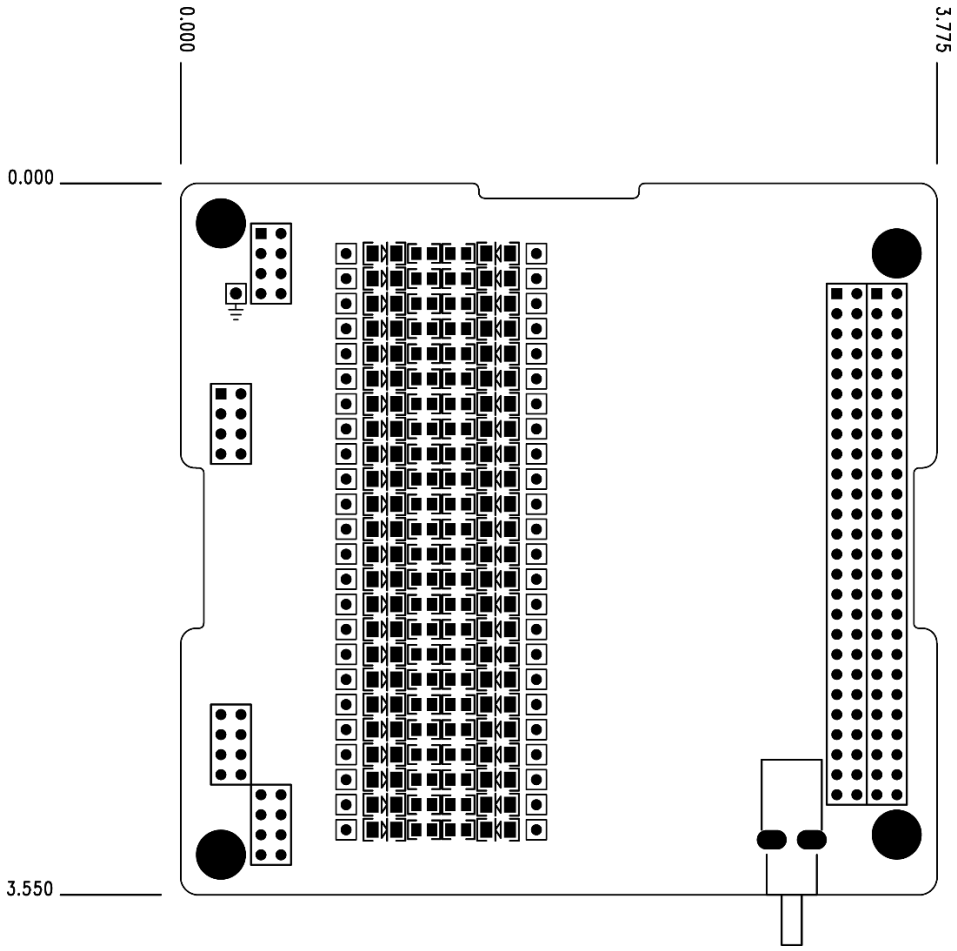
ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Units
Operating temperature	T_A	-40 to +85	ºC
Operating voltage	V_{CC_MAX}	7	V

PHYSICAL CHARACTERISTICS

Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Units
Mass	With vertical boxed headers			51		g
Height of components above PCB	With vertical boxed headers				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]



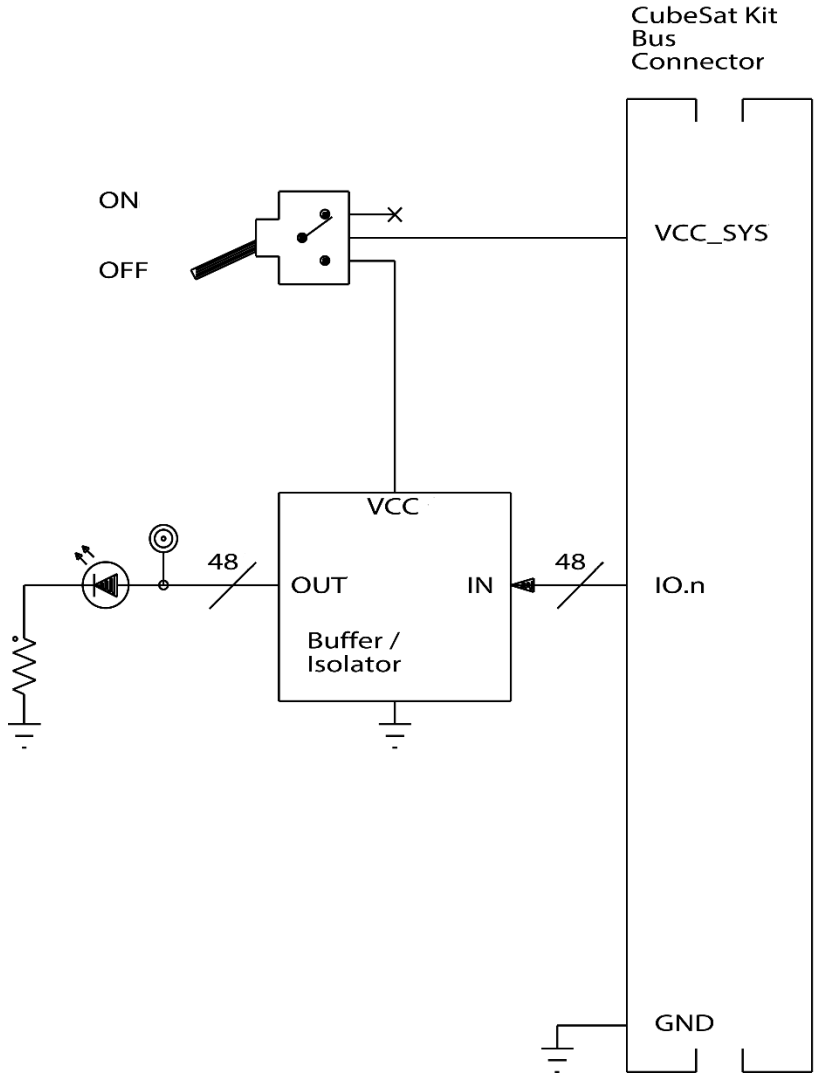
[1] Does not include length of PC/104 stackthrough header pins (H1 & H2) of 10.4mm.
[2] Dimensions in inches.

ELECTRICAL CHARACTERISTICS

(T = 25ºC, +5V bus = +5V unless otherwise noted)

Parameter	Conditions / Notes	Symbol	Min	Typ	Max	Units
Operating voltage	From **vcc_sys**	V_{CC}	2		5.5	V
Operating current	Per LED illuminated, dc	I_{OP}		8		mA
	Power switch in down / OFF position	I_{OFF}			1	µA

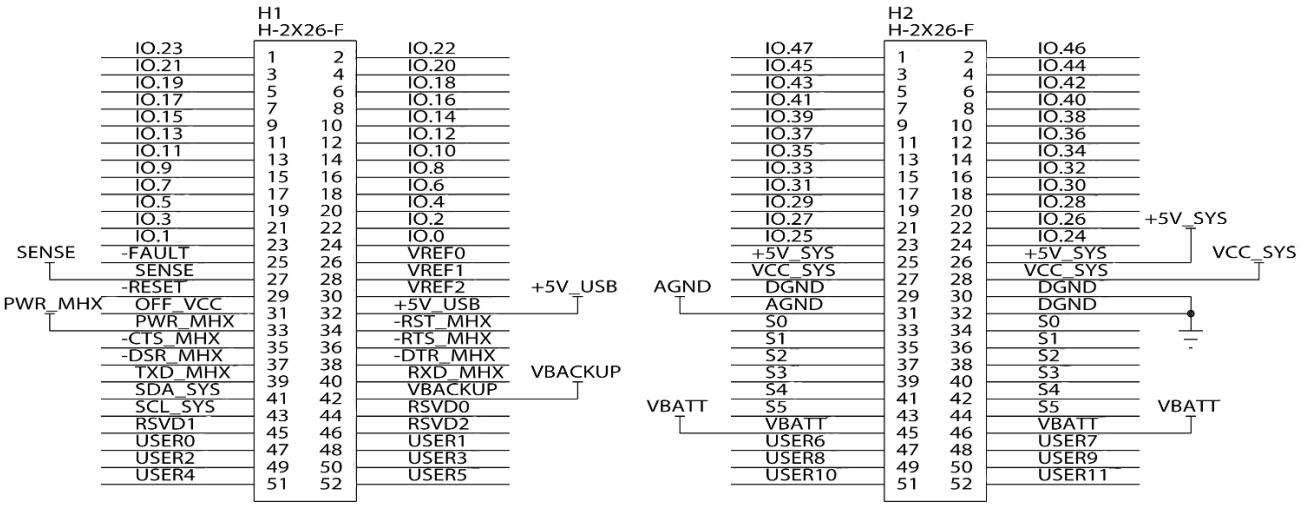
BLOCK DIAGRAM



CubeSat Kit Bus PIN DESCRIPTIONS

The I/O LED Module maps all 48 of the CubeSat Kit's I/O lines **IO.[47..0]** to individual LEDs. Depending on the Flight Processor used, these signals will map to commonly assigned signals (e.g., **UTX0** & **URX0**) or to customer-specific signals.

CubeSat Kit Bus Connectors

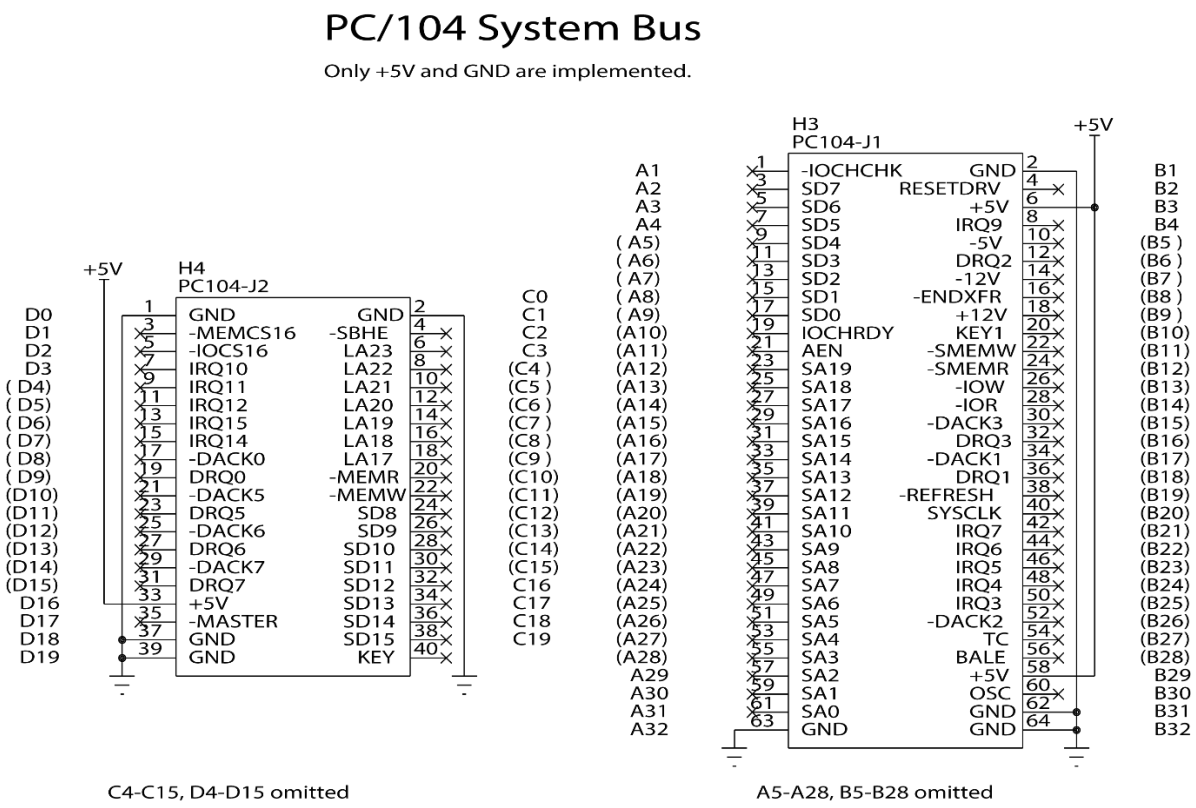


CubeSat Kit Bus PIN DESCRIPTIONS – I/O

Name	Pin	I/O	Description
IO.0	H1.24	I/O	**-CS_SD**. Controls SD Card interface.
IO.1	H1.23	I/O	**SDO0**. SPI master data out.
IO.2	H1.22	I/O	**SDI0**. SPI master data in.
IO.3	H1.21	I/O	**SCK0**. SPI clock.
IO.4	H1.20	I/O	**UTX0**. Tx0 data out.
IO.5	H1.19	I/O	**URX0**. Rx0 data in.
IO.6	H1.18	I/O	**UTX1**. Tx1 data out to MHX transceiver or USB.
IO.7	H1.17	I/O	**URX1**. Rx1 data in from MHX transceiver or USB.
IO.8	H1.16	I/O	General-purpose I/O.
IO.9	H1.15	I/O	General-purpose I/O.
IO.10	H1.14	I/O	General-purpose I/O.
IO.11	H1.13	I/O	General-purpose I/O.
IO.12	H1.12	I/O	General-purpose I/O.
IO.13	H1.11	I/O	General-purpose I/O.
IO.14	H1.10	I/O	General-purpose I/O.
IO.15	H1.9	I/O	General-purpose I/O.
IO.16	H1.8	I/O	General-purpose I/O.
IO.17	H1.7	I/O	General-purpose I/O.
IO.18	H1.6	I/O	General-purpose I/O.
IO.19	H1.5	I/O	General-purpose I/O.
IO.20	H1.4	I/O	General-purpose I/O.
IO.21	H1.3	I/O	General-purpose I/O.
IO.22	H1.2	I/O	General-purpose I/O.
IO.23	H1.1	I/O	General-purpose I/O.

IO.24	H2.24	I/O	General-purpose I/O.
IO.25	H2.23	I/O	General-purpose I/O.
IO.26	H2.22	I/O	General-purpose I/O.
IO.27	H2.21	I/O	General-purpose I/O.
IO.28	H2.20	I/O	General-purpose I/O.
IO.29	H2.19	I/O	General-purpose I/O.
IO.30	H2.18	I/O	General-purpose I/O.
IO.31	H2.17	I/O	General-purpose I/O.
IO.32	H2.16	I/O	General-purpose I/O.
IO.33	H2.15	I/O	General-purpose I/O.
IO.34	H2.14	I/O	General-purpose I/O.
IO.35	H2.13	I/O	General-purpose I/O.
IO.36	H2.12	I/O	General-purpose I/O.
IO.37	H2.11	I/O	General-purpose I/O.
IO.38	H2.10	I/O	General-purpose I/O.
IO.39	H2.9	I/O	General-purpose I/O.
IO.40	H2.8	I/O	General-purpose I/O.
IO.41	H2.7	I/O	General-purpose I/O.
IO.42	H2.6	I/O	General-purpose I/O.
IO.43	H2.5	I/O	General-purpose I/O.
IO.44	H2.4	I/O	General-purpose I/O.
IO.45	H2.3	I/O	General-purpose I/O.
IO.46	H2.2	I/O	General-purpose I/O.
IO.47	H2.1	I/O	General-purpose I/O.

PC/104 System Bus PIN DESCRIPTIONS



The I/O LED Module implements a subset of the PC/104 specification in the form of two connectors that provide only +5V and GND for PC/104 modules. Only a total of 32 pins are implemented, 16 on J1 and 16 on J2. By adding up to 4 8-pin connectors to the Breakout Board, PC/104 modules can be plugged directly into the Breakout Board to obtain +5V power and GND. No other connections between the PC/104 bus and the CubeSat Kit Bus are provided.

ZERO-POWER INTERFACE

Each LED on the I/O LED Module is driven via an isolating, non-inverting buffer with partial power-down modes. The toggle switch at the front of the I/O LED Module routes **VCC_SYS** to the buffers. When in the down / OFF position, the buffers are unpowered, and their inputs present a high impedance to the CubeSat Kit Bus I/O signals.

TEST POINTS

A labeled test point for every buffered I/O signal is provided.

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