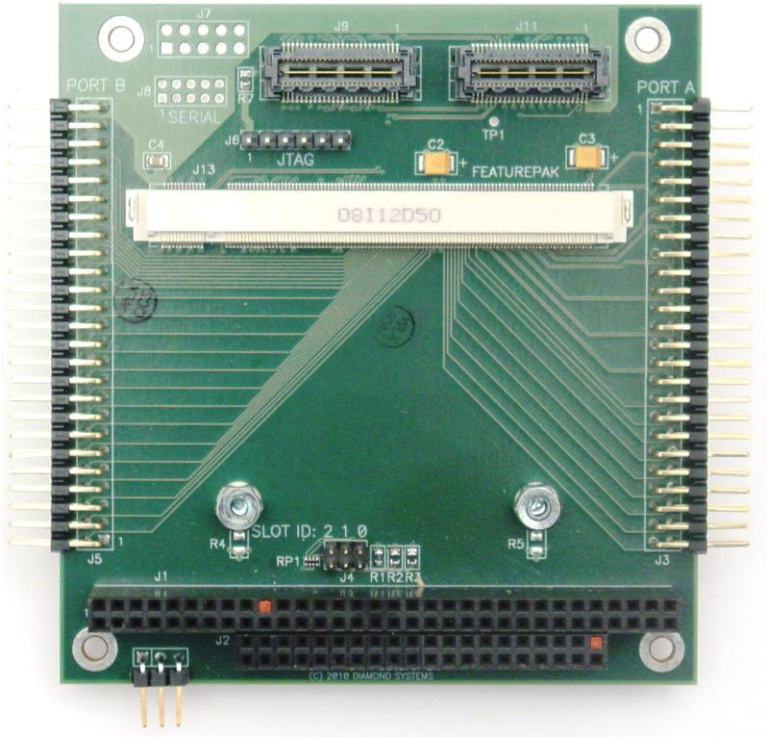
SUMIT-ISM / FEATUREPAK ADAPTER MODULE

User Manual

Revision A April 2011



Revision	Date	Comment
A	4/25/11	Initial Release

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CONTENTS

IMPORTANT SAFE-HANDLING INFORMATION

WARNING: ESD-Sensitive Electronic Equipment!

Observe ESD-safe handling procedures when working with this product.

Always use this product in a properly grounded work area and wear appropriate ESD-preventive clothing and/or accessories.

Always store this product in ESD-protective packaging when not in use.

Safe Handling Precautions

Aurora contains numerous I/O connectors that connect to sensitive electronic components. This creates many opportunities for accidental damage during handling, installation and connection to other equipment. The list here describes common causes of failure found on boards returned to Diamond Systems for repair. This information is provided as a source of advice to help you prevent damaging your Diamond (or any vendor's) embedded computer boards.

ESD damage – This type of damage is almost impossible to detect, because there is no visual sign of failure or damage. The symptom is that the board simply stops working, because some component becomes defective. Usually the failure can be identified and the chip can be replaced.

To prevent ESD damage, always follow proper ESD-prevention practices when handling computer boards.

Damage during handling or storage – On some boards we have noticed physical damage from mishandling. A common observation is that a screwdriver slipped while installing the board, causing a gouge in the PCB surface and cutting signal traces or damaging components.

Another common observation is damaged board corners, indicating the board was dropped. This may or may not cause damage to the circuitry, depending on what is near the corner. Most of our boards are designed with at least 25 mils clearance between the board edge and any component pad, and ground / power planes are at least 20 mils from the edge to avoid possible shorting from this type of damage. However these design rules are not sufficient to prevent damage in all situations.

A third cause of failure is when a metal screwdriver tip slips, or a screw drops onto the board while it is powered on, causing a short between a power pin and a signal pin on a component. This can cause overvoltage / power supply problems described below. To avoid this type of failure, only perform assembly operations when the system is powered off.

Sometimes boards are stored in racks with slots that grip the edge of the board. This is a common practice for board manufacturers. However our boards are generally very dense, and if the board has components very close to the board edge, they can be damaged or even knocked off the board when the board tilts back in the rack. Diamond recommends that all our boards be stored only in individual ESD-safe packaging. If multiple boards are stored together, they should be contained in bins with dividers between boards. Do not pile boards on top of each other or cram too many boards into a small location. This can cause damage to connector pins or fragile components.

Power supply wired backwards – Our power supplies and boards are not designed to withstand a reverse power supply connection. This will destroy each IC that is connected to the power supply. In this case the board will most likely will be unrepairable and must be replaced. A chip destroyed by reverse power or by excessive power will often have a visible hole on the top or show some deformation on the top surface due to vaporization inside the package. **Check twice before applying power!**

Bent connector pins – This type of problem is often only a cosmetic issue and is easily fixed by bending the pins back to their proper shape one at a time with needle-nose pliers. This situation can occur when pulling a ribbon cable off of a pin header. Note: If the pins are bent too severely, bending them back can cause them to weaken unacceptably or even break, and the connector must be replaced.

1. DESCRIPTION

The SUMIT/FP Adapter Module allows the use of FeaturePak™ I/O expansion modules in systems that provide SUMIT-ISM™ expansion stack locations.

The FeaturePak socket on the SUMIT/FP Adapter consumes a single PCI Express x1 lane from the SUMIT-A bus connector on the SUMIT-ISM module. The adapter provides a pair of 50-pin I/O header connectors for convenient access to all FeaturePak I/O. In addition, it includes pass-through connectors for the SUMIT-ISM stack's SUMIT-B bus and PC/104™ (ISA) bus. An extended operation temperature range of -40°C to +85°C is supported.

1.1 Features

Key SUMIT/FP Adapter features include:

- Adds a FeaturePak socket to SUMIT-ISM stacks
- Conforms to SUMIT-ISM Type 1 standards
- Provides SUMIT-A and SUMIT-B bus passthrough
- Provides PC/104 (ISA) bus passthrough
- Routes 1 PCIe, 1 USB, SMBus, and power/ground from SUMIT-A to the FeaturePak socket
- Lane-shifts PCIe and USB on the SUMIT bus
- Provides 2 50-pin headers for FeaturePak user I/O
- Supports -40°C to +85°C operating temperature range

For more information about the FeaturePak specification, please refer to the FeaturePak website at http://www.featurepak.org. For more information on the SUMIT-ISM standard, please refer to www.sff-sig.org/sumit.html.

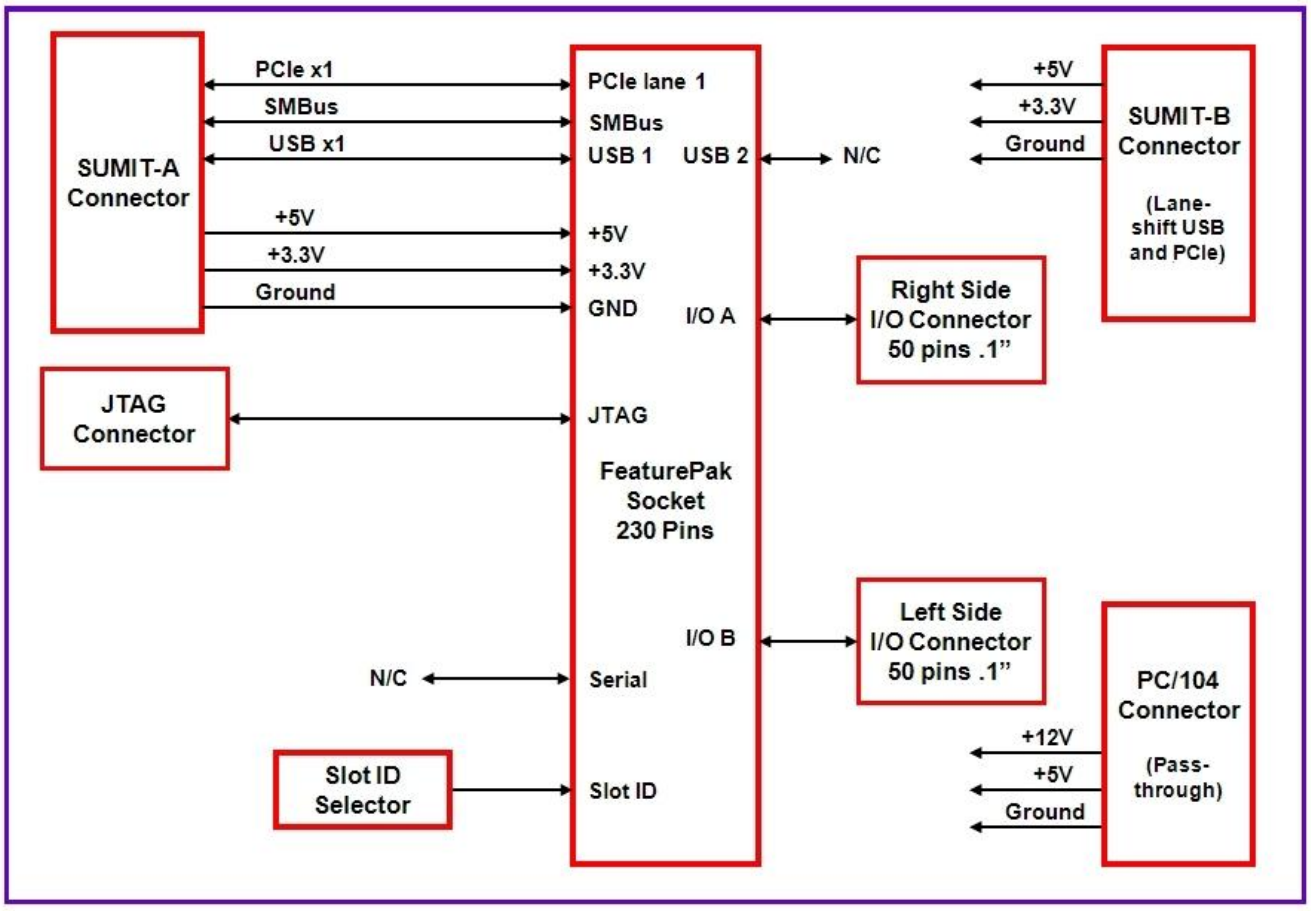
1.2 SUMIT and FeaturePak Resources

The SUMIT/FP Adapter uses the SUMIT and FeaturePak resources indicated in the tables below.

SUMIT Resources		
Company:	Diamond Systems Corp.	
Product:	SUMIT/FP Adapter	
Form-factor:	SUMIT-ISM I/O module	
	SUMIT A	**SUMIT B**
PCIe x1	1 (1)	–
PCIe x4		–
USB	1 (1)	
ExpressCard	–	
LPC	–	
SPI /uWire	–	
SMBus/ I2C	opt. (1)	
+12V	–	
+5V	√	√
+5Vsb	–	–
+3.3V	√	√
Notes: (1) SUMIT resource consumption depends on installed FeaturePak module. www.sff-sig.org/sumitlabel.html		

FeaturePak™ Socket Resources	
Company: Diamond Systems Corp.	
Product: SUMIT/FP Adapter	
Host Interface Resources Supported	
PCIe x1 links	1 (1)
USB channels	1 USB 2.0 (1)
Serial port	√
SMBus	√
PCIe Reset	√
Sys Reset	–
JTAG	√
+3.3V	√
+5V	√
+12V	opt
Notes: (1) Depends on host SUMIT stack. www.featurepak.org/label	

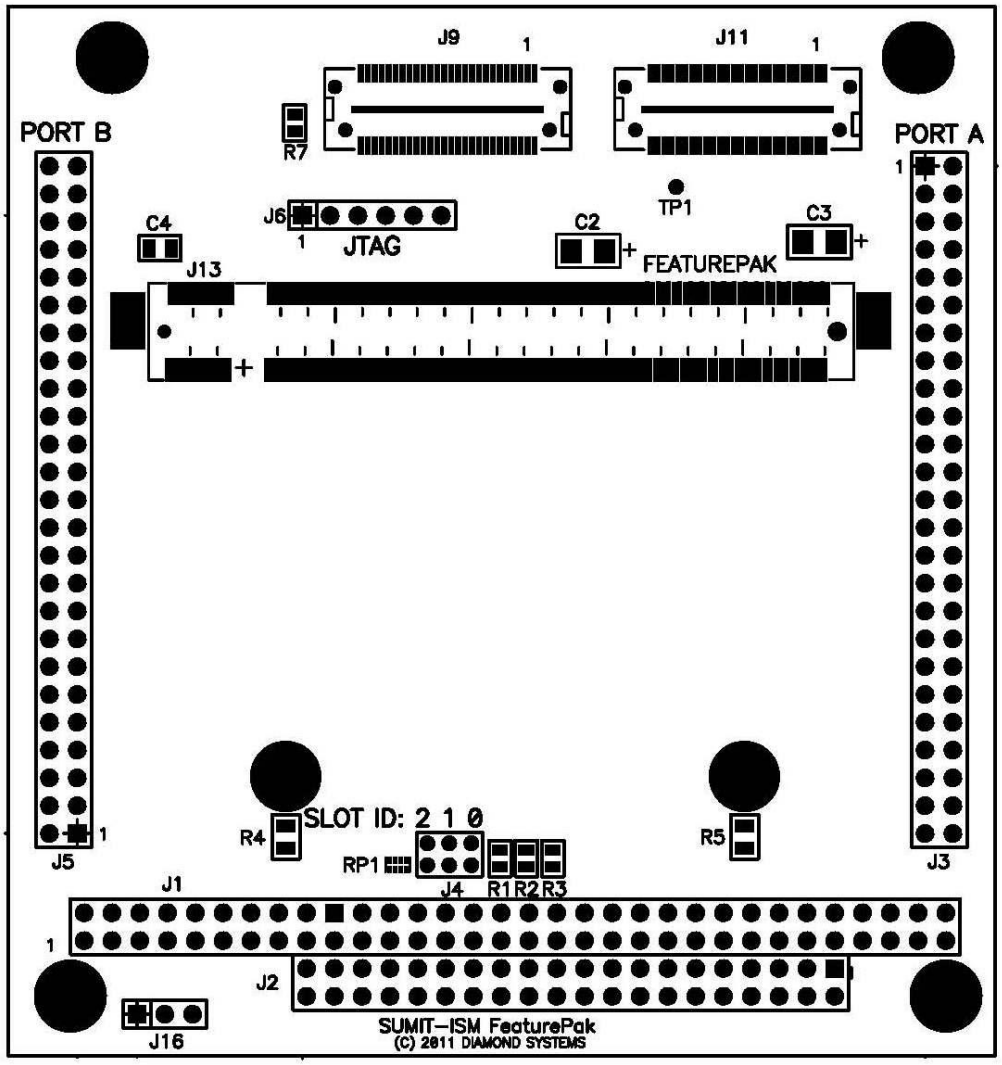
2. BLOCK DIAGRAM



3. MECHANICAL DRAWING

The SUMIT/FP Adapter Module complies with the SUMIT-ISM Specification v1.0.

All I/O connectors are located on the board so that there is sufficient room to install all connectors without interference from any other connector or mounting hole. There are two mounting holes to secure the FeaturePak module to the SUMIT/FP Adapter Module.



4. FUNCTIONAL DESCRIPTION

The SUMIT/FP Adapter Module is a FeaturePak baseboard in the SUMIT-ISM Type I form factor. It contains a FeaturePak MXM socket, a JTAG header, and two 50-pin I/O connectors. Power is provided through both the SUMIT and PC/104 (ISA) bus connectors.

SUMIT-A and SUMIT-B connectors are present on both the top and bottom side of the board, forming a stacking high-speed bus with good signal integrity and EMI properties. USB ports and PCIe lanes from the SUMIT-A and SUMIT-B connectors that are not used by the FeaturePak connector are lane-shifted according to the figures in the SUMIT Specification v1.5 or later. All other unused signals are passed directly from the bottom side of the SUMIT-A and –B connectors to the identical pin numbers of the top side connectors. Multi-drop buses like LPC and SMBus are routed to the top and bottom side of the SUMIT connectors, and to the FeaturePak socket. The SUMIT/FP Adapter consumes one PCIe lane and one USB port.

5. CONNECTORS AND JUMPERS

All of the following connectors are on the top side of the board. Connector and pinout information is provided in the following sections.

5.1 FeaturePak Connector, J13

The SUMIT/FP Adapter Module typically comes with a FeaturePak module installed in the FeaturePak connector. The inserted FeaturePak module defines the signals that are provided to the user. The FeaturePak connector, J13, is a compact MXM connector that provides 230 contacts organized into two rows of 115 contacts, with 0.5mm pitch. The connector is rated for 2.5Gbps operation, making it suitable for PCI Express, USB, and other high speed signals. It contains an alignment pin to ensure proper orientation of the FeaturePak module during insertion. The alignment pin is the primary reference point for the relative position of the module and the connector.

FeaturePak Connector Pinout

+3.3V	1	2	+12V
+3.3V	3	4	PS-Current
Ground	5	6	Ground
PCIe-TX1+	7	8	PCIe-RX1+
PCIe-TX1-	9	10	PCIe-RX1-
Ground	11	12	Ground
PCIe-CLK1+	13	14	PCIe-CLK2+
PCIe-CLK1-	15	16	PCIe-CLK2-
Ground	17	18	Ground
PCIe-TX2+	19	20	PCIe-RX2+
PCIe-TX2-	21	22	PCIe-RX2-
Ground	23	24	Ground
PCIe-Reset-	25	26	LPC-CLK
LPC-SERIRQ	27	28	LPC-DRQ
LPC-Reset-	29	30	LPC-Frame-
LPC-AD3	31	32	LPC-AD2
LPC-AD1	33	34	LPC-AD0
Ground	35	36	Ground
USB-Ch1+	37	38	USB-Ch2+
USB-Ch1-	39	40	USB-Ch2-
Ground	41	42	Ground
+3.3V	43	44	USB-OC1/2-
+3.3V	45	46	Serial-RX1
Serial-TX1	47	48	Serial-CTS1
Serial-RTS1	49	50	SMBclk
SMBalert#	51	52	SMBdata
Slot ID 2	53	54	Slot ID 1
Slot ID 0	55	56	Present-
JTAG-TDI	57	58	JTAG-TDO
JTAG-CLK	59	60	JTAG-TMS
Sys-Reset-	61	62	Reserved
+3.3V	63	64	Ground
+3.3V	65	66	Ground
Reserved	67	68	Reserved
Reserved	69	70	Reserved
+3.3V	71	72	Ground
Reserved	73	74	Reserved
Reserved	75	76	Reserved
+3.3V	77	78	Ground
Reserved	79	80	Reserved
Reserved	81	82	Reserved
Reserved	83	84	Reserved
Reserved	85	86	Reserved

+5V	87	88	Ground
+5V	89	90	Ground
I/OB-50	91	92	I/OB-49
I/OB-48	93	94	I/OB-47
I/OB-46	95	96	I/OB-45
I/OB-44	97	98	I/OB-43
I/OB-42	99	100	I/OB-41
I/OB-40	101	102	I/OB-39
I/OB-38	103	104	I/OB-37
I/OB-36	105	106	I/OB-35
I/OB-34	107	108	I/OB-33
I/OB-32	109	110	I/OB-31
I/OB-30	111	112	I/OB-29
I/OB-28	113	114	I/OB-27
I/OB-26	115	116	I/OB-25
I/OB-24	117	118	I/OB-23
I/OB-22	119	120	I/OB-21
I/OB-20	121	122	I/OB-19
I/OB-18	123	124	I/OB-17
I/OB-16	125	126	I/OB-15
I/OB-14	127	128	I/OB-13
I/OB-12	129	130	I/OB-11
I/OB-10	131	132	I/OB-9
I/OB-8	133	134	I/OB-7
I/OB-6	135	136	I/OB-5
I/OB-4	137	138	I/OB-3
I/OB-2	139	140	I/OB-1

+5V	141	142	Ground
+5V	143	144	Ground
+5V	145	146	Ground
I/OA-50	147	148	I/OA-49
I/OA-48	149	150	I/OA-47
I/OA-46	151	152	I/OA-45
I/OA-44	153	154	I/OA-43
I/OA-42	155	156	I/OA-41
I/OA-40	157	158	I/OA-39
I/OA-38	159	160	I/OA-37
I/OA-36	161	162	I/OA-35
(NC)	163	164	(NC)
I/OA-34	165	166	I/OA-33
(NC)	167	168	(NC)
I/OA-32	169	170	I/OA-31
(NC)	171	172	(NC)
I/OA-30	173	174	I/OA-29
(NC)	175	176	(NC)
I/OA-28	177	178	I/OA-27
(NC)	179	180	(NC)
I/OA-26	181	182	I/OA-25
(NC)	183	184	(NC)
I/OA-24	185	186	I/OA-23
(NC)	187	188	(NC)
I/OA-22	189	190	I/OA-21
(NC)	191	192	(NC)
I/OA-20	193	194	I/OA-19
(NC)	195	196	(NC)
I/OA-18	197	198	I/OA-17
(NC)	199	200	(NC)
I/OA-16	201	202	I/OA-15
(NC)	203	204	(NC)
I/OA-14	205	206	I/OA-13
(NC)	207	208	(NC)
I/OA-12	209	210	I/OA-11
(NC)	211	212	(NC)
I/OA-10	213	214	I/OA-9
(NC)	215	216	(NC)
I/OA-8	217	218	I/OA-7
(NC)	219	220	(NC)
I/OA-6	221	222	I/OA-5
(NC)	223	224	(NC)
I/OA-4	225	226	I/OA-3
(NC)	227	228	(NC)
I/OA-2	229	230	I/OA-1

5.2 I/O Connectors, J3 and J5

The FeaturePak I/O signals are brought out to two connectors: Port A and Port B. Port A is labeled as J3 on the PBC, and Port B is labeled as J5. Each port I/O connector is a .1" dual row 50-pin male right angle connector. The pins from the FeaturePak connector are brought out to the Port A and Port B connectors as defined in the following table.

FeaturePak Connector Pin	Port A Pin		FeaturePak Connector Pin
230	**1**	**2**	229
226	**3**	**4**	225
222	**5**	**6**	221
218	**7**	**8**	217
214	**9**	**10**	213
210	**11**	**12**	209
206	**13**	**14**	205
202	**15**	**16**	201
198	**17**	**18**	197
194	**19**	**20**	193
190	**21**	**22**	189
186	**23**	**24**	185
182	**25**	**26**	181
178	**27**	**28**	177
174	**29**	**30**	173
170	**31**	**32**	169
166	**33**	**34**	165
162	**35**	**36**	161
160	**37**	**38**	159
158	**39**	**40**	157
156	**41**	**42**	155
154	**43**	**44**	153
152	**45**	**46**	151
150	**47**	**48**	149
148	**49**	**50**	147

FeaturePak Connector Pin	Port B Pin		FeaturePak Connector Pin
140	**1**	**2**	139
138	**3**	**4**	137
136	**5**	**6**	135
134	**7**	**8**	133
132	**9**	**10**	131
130	**11**	**12**	129
128	**13**	**14**	127
126	**15**	**16**	125
124	**17**	**18**	123
122	**19**	**20**	121
120	**21**	**22**	119
118	**23**	**24**	117
116	**25**	**26**	115
114	**27**	**28**	113
112	**29**	**30**	111
110	**31**	**32**	109
108	**33**	**34**	107
106	**35**	**36**	105
104	**37**	**38**	103
102	**39**	**40**	101
100	**41**	**42**	99
98	**43**	**44**	97
96	**45**	**46**	95
94	**47**	**48**	93
92	**49**	**50**	91

5.3 JTAG Connector, J6

The JTAG connector, J6, passes the defined signals to their equivalent on the FeaturePak connector, enabling an installed FeaturePak module to be reprogrammed. This is a standard .1" 6-pin single row straight pin header connector with gold flash plating.

+3.3V	1
Ground	2
JTAG-CLK	3
JTAG-TDO	4
JTAG-TD1	5
JTAG-TMS	6

5.4 PC/104 Connector, J1 and J2

The PC/104 bus is essentially identical to the ISA Bus except for the physical design. It specifies two pin and socket connectors for the bus signals. A 64-pin header, J1, incorporates the 62-pin 8-bit bus connector signals, and a 40-pin header, J2, incorporates the 36-pin 16-bit bus connector signals. The additional pins on the PC/104 connectors are used as ground or key pins. The female sockets on the top of the board enable stacking another PC/104 board on top of the board, while the male pins on the bottom enable the board to plug into another board below it.

In the pinout figures below, the tops correspond to the left edge of the connector when the board is viewed from the primary side (side with the female end of the PC/104 connector) and the board is oriented so that the PC/104 connectors are along the bottom edge of the board.

For more information on the PC/104 specification, visit the PC/104 Embedded Consortium website, at http://www.pc104.org.

View from Top of Board

J1, PC/104 8-bit bus connector

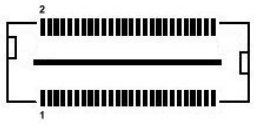
IOCHK-	A1	B1	Ground
SD7	A2	B2	RESET
SD6	A3	B3	+5V
SD5	A4	B4	IRQ9
SD4	A5	B5	-5V
SD3	A6	B6	DRQ2
SD2	A7	B7	-12V
SD1	A8	B8	OWS-
SD0	A9	B9	+12V
IOCHRDY	A10	B10	KEY
AEN	A11	B11	SMEMW-W
SA19	A12	B12	SMEMR-
SA18	A13	B13	IOW-
SA17	A14	B14	IOR-
SA16	A15	B15	DACK3-
SA15	A16	B16	DRQ3
SA14	A17	B17	DACK1-
SA13	A18	B18	DRQ1
SA12	A19	B19	REFRESH-
SA11	A20	B20	SYSCLK
SA10	A21	B21	IRQ7
SA9	A22	B22	IRQ6
SA8	A23	B23	IRQ5
SA7	A24	B24	IRQ4
SA6	A25	B25	IRQ3
SA5	A26	B26	DACK2-
SA4	A27	B27	TC
SA3	A28	B28	BALE
SA2	A29	B29	+5V
SA1	A30	B30	OSC
SA0	A31	B31	Ground
Ground	A32	B32	Ground

J2, PC/104 16-bit bus connector

Ground	C0	D0	Ground
MEMCS16	C1	D1	SBHE-
IOCS16-	C2	D2	LA23
IRQ10	C3	D3	LA22
IRQ11	C4	D4	LA21
IRQ12	C5	D5	LA20
IRQ15	C6	D6	LA19
IRQ14	C7	D7	LA18
DACK0-	C8	D8	LA17
DRQ0	C9	D9	MEMR-
DACK5-	C10	D10	MEMW-
DRQ5	C11	D11	SD8
DACK6-	C12	D12	SD9
DRQ6	C13	D13	SD10
DACK7-	C14	D14	SD11
DRQ7	C15	D15	SD12
+5V	C16	D16	SD13
MASTER-	C17	D17	SD14
Ground	C18	D18	SD15
Ground	C19	D19	KEY

5.5 SUMIT A and SUMIT B Connectors, J9 and J11

The SUMIT stackable bus consists of two 52-pin connectors; SUMIT-A, labeled J11, and SUMIT-B, labeled J9. The SUMIT/FP Adapter Module consumes one PCIe lane and one USB port.



The standard signal assignments of the SUMIT-A and -B connectors appear in below. For more information on the SUMIT specification, visit the SFF-SIG website at http://www.sff-sig.org.

SUMIT-A Connector (J11)

+5VSB	1	2	+12V
3.3V	3	4	SMB _DATA
3.3V	5	6	SMB_CLK
EXPCD_REQ#	7	8	SMB_ALERT#
EXPCD_PRSNT#	9	10	SPI/uWire_DO
USB_OC#	11	12	SPI/uWire_DI
RSVD	13	14	SPI/uWire_CLK
+5V	15	16	SPI/uWire_CS0#
USB3+	17	18	SPI/uWire_CS1#
USB3-	19	20	RSVD
+5V	21	22	LPC_DRQ
USB2+	23	24	LPC_AD0
USB2-	25	26	LPC_AD1
+5V	27	28	LPC_AD2
USB1+	29	30	LPC_AD3
USB1-	31	32	LPC_FRAME#
+5V	33	34	SERIRQ#
USB0+	35	36	LPC_PRSNT#/GND
USB0-	37	38	CLK_33MHz
GND	39	40	GND
A_PETp0	41	42	A_PERp0
A_PETn0	43	44	A_PERn0
GND	45	46	APRSNT#/GND
PERST#	47	48	A_CLKp
WAKE#	49	50	A_CLKn
+5V	51	52	GND

SUMIT-B Connector (J9)

GND	1	2	GND
B_PETp0	3	4	B_PERp0
B_PETn0	5	6	B_PERn0
GND	7	8	BPRSNT#/GND
C_CLKp	9	10	B_CLKp
C_CLKn	11	12	B_CLKn
CPRSNT#/GND	13	14	GND
C_PETp0	15	16	C_PERp0
C_PETn0	17	18	C_PERn0
GND	19	20	GND
C_PETp1	21	22	C_PERp1
C_PETn1	23	24	C_PERn1
GND	25	26	GND
C_PETp2	27	28	C_PERp2
C_PETn2	29	30	C_PERn2
GND	31	32	GND
C_PETp3	33	34	C_PERp3
C_PETn3	35	36	C_PERn3
GND	37	38	GND
PERST#	39	40	WAKE#
RSVD	41	42	RSVD
+5V	43	44	RSVD
+5V	45	46	3.3V
+5V	47	48	3.3V
+5V	49	50	3.3V
+5V	51	52	+5VSB

These two surface-mounted 52-pin connectors are located on the expansion side of the board. Their mechanical requirements, pin-out, and signal functionality complies with the SFF-SIG's “SUMIT” and “SUMIT-ISM” specifications, available from the SFF-SIG (http://sff-sig.org/sumit.html).

5.6 Power Connector, J16

The power connector, J16, provides a means to bring external +5VDC and +3.3VDC power to the adapter, powering the board. This is an alternate method that can be used to power the adapter as opposed to powering it through the PC/104 connector. This is a standard .1" 3-pin single row right angle pin header connector with gold flash plating.

+5V	1
+3.3V	2
Ground	3

5.7 Slot ID Selector Jumper Block, J4

The Slot ID Selector jumper block, J4, determines the slot ID of the board. The slot ID bits are identified on the board as Slot ID 2, 1, or 0. The three slot ID bits are pulled up or down through jumpers as follows: '0' = ground, '1' = +3.3V. The default Slot ID is 001 as shown in the table below.

Slot ID:	2	1	0
	O	O	
	O	O	