



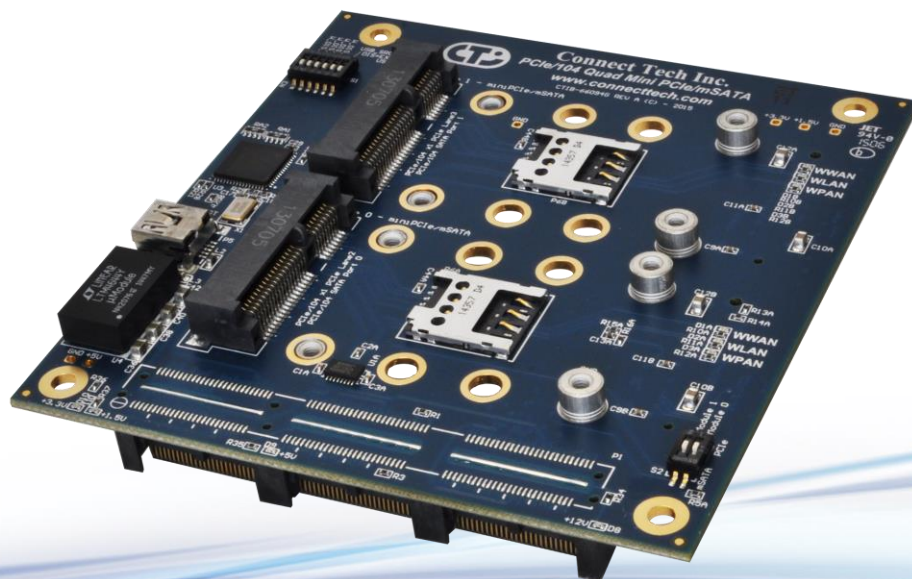
Connect Tech Inc.

Embedded Computing Experts

www.connecttech.com

USERS GUIDE

PCIe/104 Quad Mini PCIe/mSATA Carrier Users Guide



Connect Tech Inc.

42 Arrow Road
Guelph, Ontario
N1K 1S6

www.connecttech.com

Tel: **519-836-1291**
Toll: **800-426-8979** (North America only)
Fax: 519-836-4878
Email: sales@connecttech.com
support@connecttech.com

Table of Contents

Table of Contents.....	2
Preface.....	3
Disclaimer	3
Customer Support Overview	3
Contact Information	3
Limited PCIe/104 Quad Mini PCIe/mSATA Carrier Warranty	4
Copyright Notice	4
Trademark Acknowledgment	4
ESD Warning	5
Revision History	5
Introduction.....	6
Product Features and Specifications	6
Part Numbers / Ordering Information	6
Product Overview	7
Block Diagrams	7
Connector Summary & Locations	8
ADG078 and ADG080	8
ADG087	9
Hardware Installation.....	10
Standoff and Screw Assembly Details For “Half” Mini Form Factor	10
Interface Descriptions	11
PCIe/104 Connectors.....	11
Mini PCIe /mSATA Slots.....	12
PCIe/mSATA DIP Switch Select	13
SIM Sockets	14
External USB Connector	14
W_DISABLE# and USB Source Select DIP Switch.....	15
On-board Indicator LEDs	15

Preface

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: www.connecttech.com/sub/support/support.asp. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

Mail/Courier

Connect Tech Inc.
Technical Support
42 Arrow Road
Guelph, Ontario
Canada N1K 1S6

Email/Internet

sales@connecttech.com
support@connecttech.com
www.connecttech.com

Note:

Please go to the [Download Zone](#) or the [Knowledge Database](#) in the [Support Center](#) on the Connect Tech website for product manuals, installation guides, device driver software and technical tips. Submit your technical support questions to our customer support engineers via the [Support Center](#) on the Connect Tech website.

Telephone/Facsimile

Technical Support representatives are ready to answer your call Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time. Our numbers for calls are:

Toll Free: 800-426-8979 (North America only)

Telephone: 519-836-1291 (Live assistance available 8:30 a.m. to 5:00 p.m. EST, Monday to Friday)

Facsimile: 519-836-4878 (on-line 24 hours)

Limited PCIe/104 Quad Mini PCIe/mSATA Carrier Warranty

Connect Tech Inc. provides a 2-Year Warranty for the PCIe/104 Quad Mini PCIe/mSATA Carrier. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.

You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. 2-Year Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the 2-Year Warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

Copyright Notice

The information contained in this document is subject to change without notice. Connect Tech Inc. shall not be liable for errors contained herein or for incidental consequential damages in connection with the furnishing, performance, or use of this material. This document contains proprietary information that is protected by copyright. All rights are reserved. No part of this document may be photocopied, reproduced, or translated to another language without the prior written consent of Connect Tech, Inc.

Copyright © 2017 by Connect Tech, Inc.

Trademark Acknowledgment

Connect Tech, Inc. acknowledges all trademarks, registered trademarks and/or copyrights referred to in this document as the property of their respective owners. Not listing all possible trademarks or copyright acknowledgments does not constitute a lack of acknowledgment to the rightful owners of the trademarks and copyrights mentioned in this document.

ESD Warning



Electronic components and circuits are sensitive to Electrostatic Discharge (ESD). When handling any circuit board assemblies including Connect Tech COM Express carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

Revision History

Revision	Date	Changes
0.00	2015-02-25	Document Created
0.01	2016-08-07	Added ADG087 and ADG088
0.02	2017-11-29	Updated product family information

Introduction

Connect Tech's Quad Mini PCIe/mSATA board supports up to four mini PCIe modules simultaneously for applications in the PCIe-104 small form factor embedded market place.

This product is ideal for a wide array of applications as it supports any "Half" or "Full" Mini PCIe/mSATA product on the market. This allows for maximum flexibility while keeping the PCIe/104 stack as small as possible.

Product Features and Specifications

Specifications	
Form factor	PCIe104
Mini PCIe Compatibility	Supports four "Full" or "Half" sized Mini PCIe modules
PCIe	Support for PCIe to all four Mini PCIe sockets
SATA	Support for mSATA at two Mini PCIe sockets
USB	USB support at all four Mini PCIe sockets
SMBus	SMBus support for all four Mini PCIe sockets
Power Source	PCIe/104 Bus
Power	Onboard power supply for Mini PCIe sockets
Dimensions	Fully PCIe-104 compliant: 3.775" x 3.550"
Environmental	-40° C to +85° C
Warranty and Support	2 Years

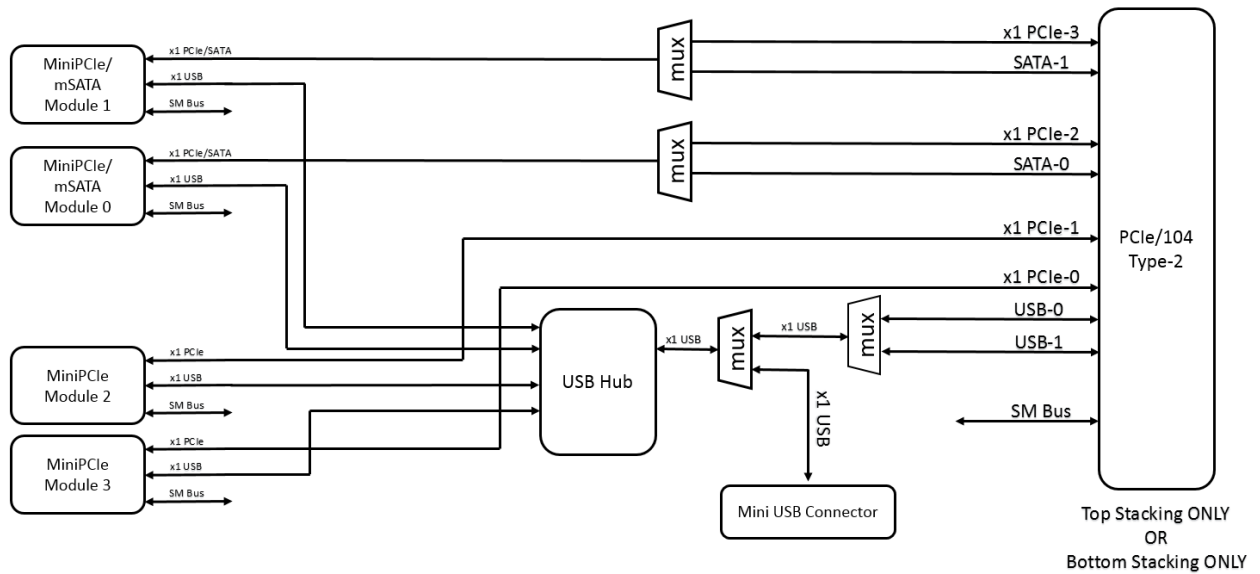
Part Numbers / Ordering Information

Ordering Information	
ADG078	Top Stacking Model, uses all four PCIe x1 Lanes
ADG080	Bottom Stacking Model, uses all four PCIe x1 Lanes
ADG087	Top Stacking Model, uses only one PCIe x1 Lane with onboard PCIe switch

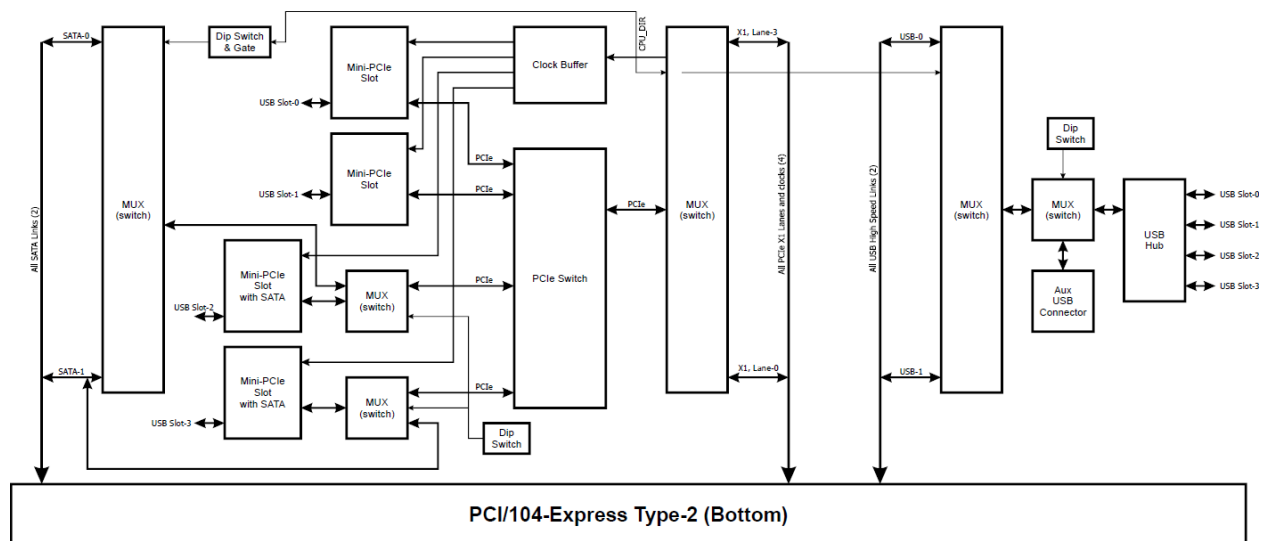
Product Overview

Block Diagrams

ADG078 and ADG080 – these two variants use all four PCIe x1 links from the PCIe/104 bus.



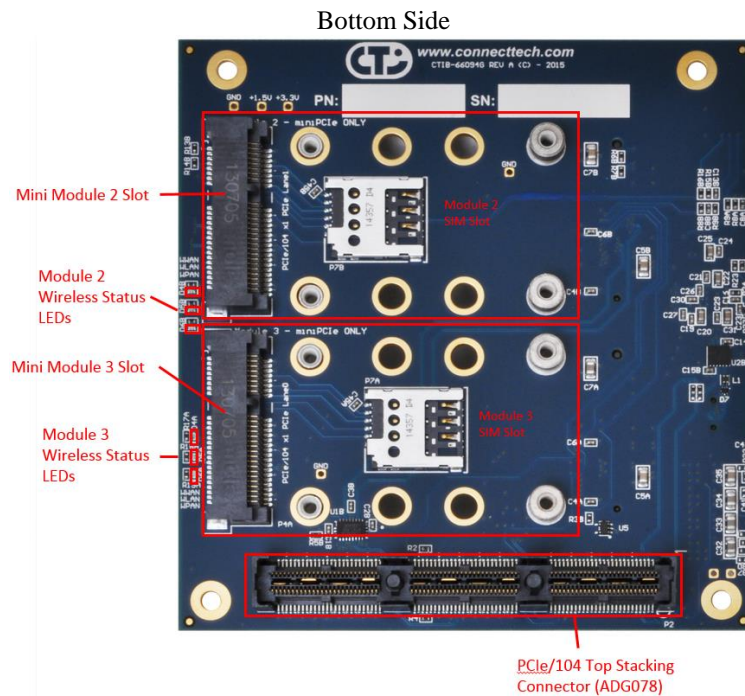
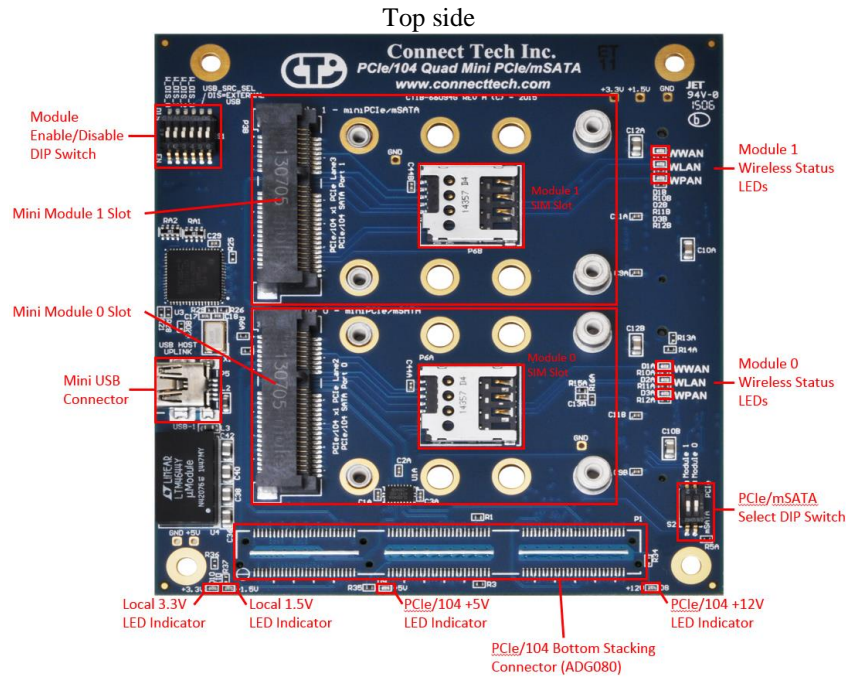
ADG087 – this variant uses only one PCIe x1 link from the PCIe/104 bus and has an onboard PCIe switch which connects to each of the four Mini-PCIe slots.



Note: None of the PCIe-Lanes, USB Links or SATA Links are "shifted" from the Top to Bottom PCI/104-Express connector, since this board is intended for Top-Most stack position.

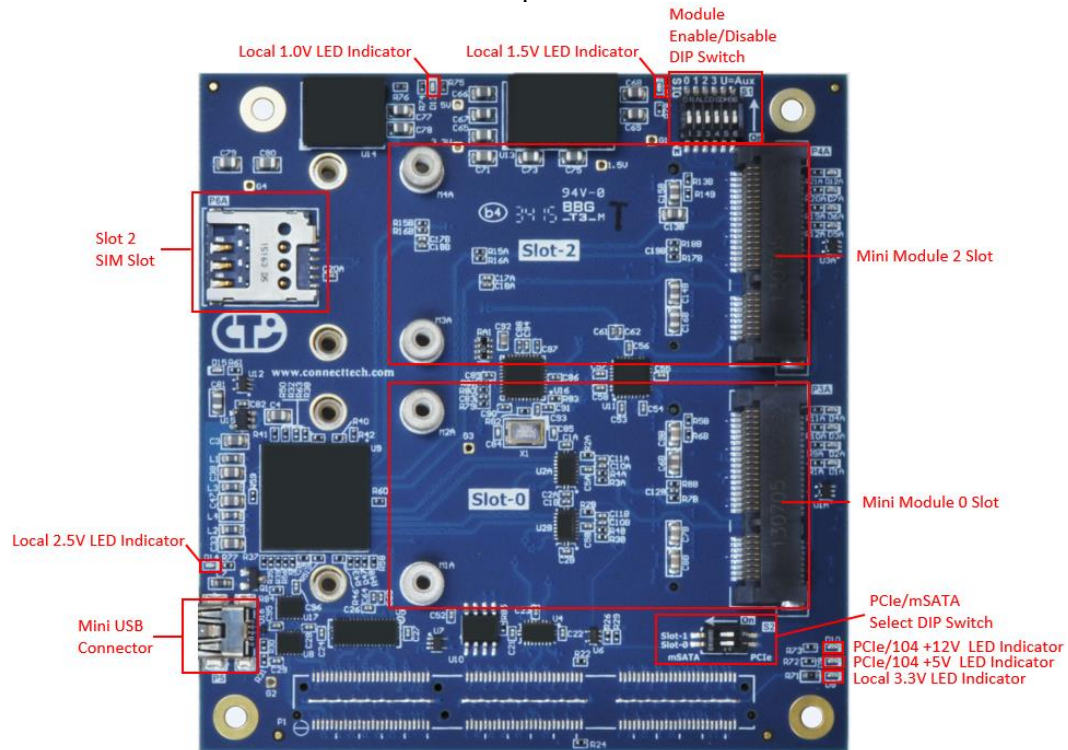
Connector Summary & Locations

ADG078 and ADG080

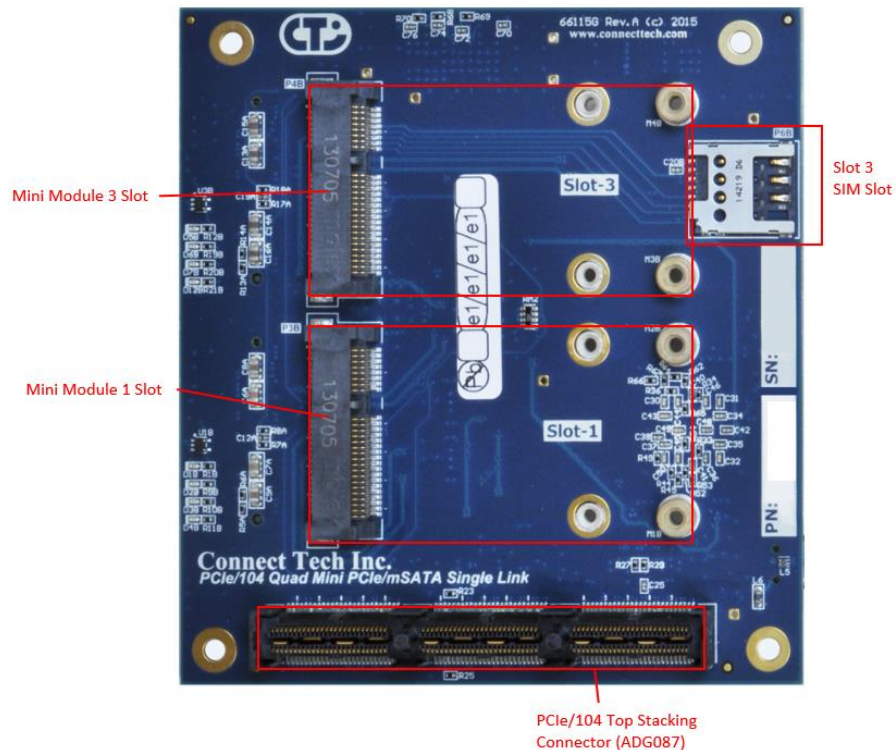


ADG087

Top side

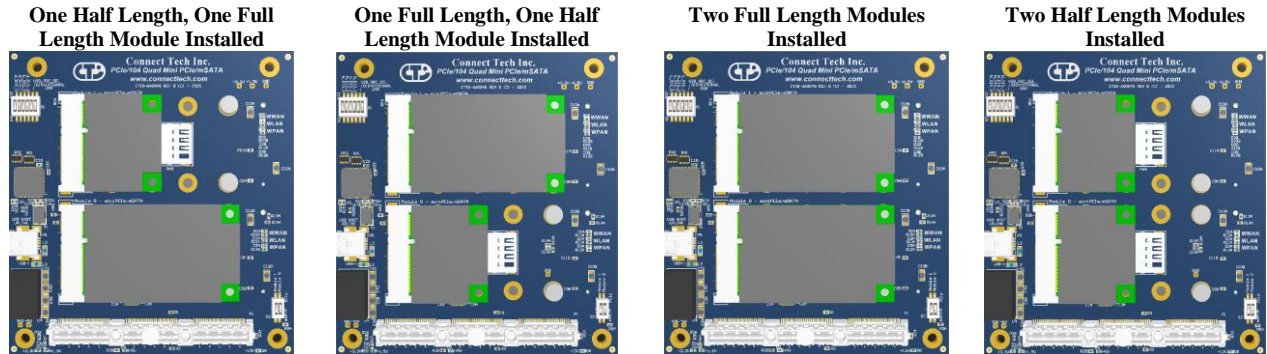


Bottom Side



Hardware Installation

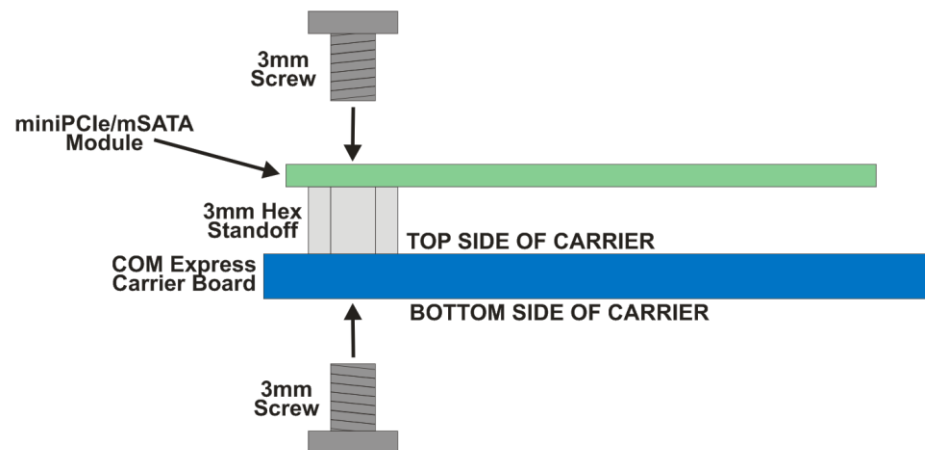
The mini PCIe / mSATA slots are designed for easy ruggedized selection between full and half-length modules. For Full Length modules, the product comes shipped with stand-offs installed. Half Length modules will require stand-offs and screws to be installed manually. Standoffs and screws are provided with the shipping configuration of the carrier board. Below are some examples of how the various modules sizes can be installed. There is no limitation on the form factor size and where it is installed on the carrier. All four slots support both Full Length and Half Length form factors.



NOTE: ADG087 only supports Full Length Modules.

Standoff and Screw Assembly Details For “Half” Mini Form Factor

Below is a diagram of how the standoffs and mounting hardware should be installed for any Half Length modules that will be present.

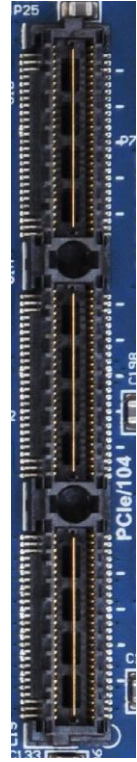


NOTE: ADG087 only supports Full Length Modules.

Interface Descriptions

PCIe/104 Connectors

The Quad Mini PCIe/mSATA carrier allows for two configurations, stack up only or stack down only. By default, on ADG078 and ADG087 the bottom stacking connector P1 is not installed, on ADG080 the top stacking connector P2 is not installed.

Function	PCIe/104 Stack Interface	
Location	P1, P2	
Type	Samtec Fine Pitch Stacking Connector 15mm Stack Height	
Connector P/N	ADG078, ADG087 (P2, Top Stacking) - ASP-129646-03 ADG080 (P1, Bottom Stacking) - ASP-129637-03	
Pinout	<p>Refer to PCI/104-Express & PCIe/104 Specification, Rev 2.01</p> <p>*All four x1 PCIe links are routed to Mini PCIe slots on ADG078 and ADG080.</p> <p>*For type 1, the x16 PCIe links are passed through this board and are not used locally</p> <p>*For type 2, both SATA links are routed and used on this board</p> <p>*There is an option on this board to use either of the two USB 2.0 interfaces from the PCIe/104 stack</p> <p>*The SMBus is routed to each mini PCIe slot on this board</p> <p>*This product does not require +12V to function properly.</p> <p>*See block diagram for interface mapping</p>	

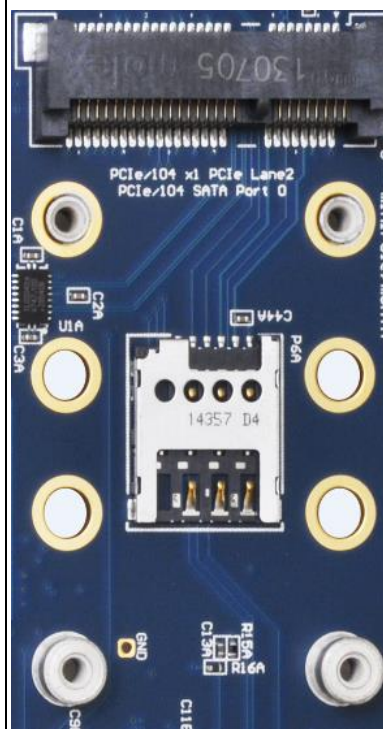
Mini PCIe /mSATA Slots

The PCIe/104 Quad Mini PCIe/mSATA Carrier pin-out is compliant to the PCI Express Mini Card Electromechanical Specification Rev. 2.0.

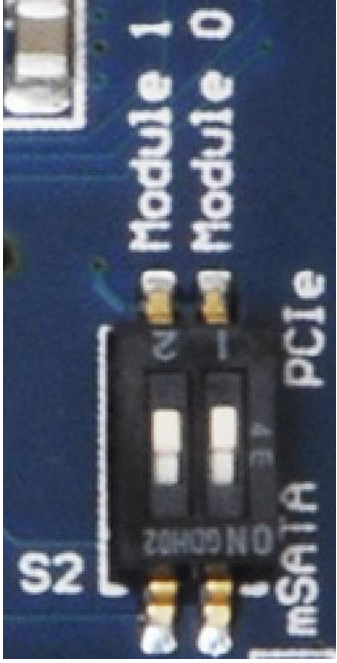
Module 0 and Module 1 support either PCIe or mSATA through a DIP switch configuration. Module 2 and Module 3 support only Mini PCIe.

Each module is clearly labelled on the PCB silkscreen.

Function	Mini-PCIe/mSATA Slots																																																																																																																																																																	
Location	P3A, P3B, P4A, P4B NOTE: P4A and P4B do not support mSATA, supports PCIe/USB only																																																																																																																																																																	
Type	Molex Edge Card Connector																																																																																																																																																																	
P/N	48338-0085																																																																																																																																																																	
Pinout	<table><tr><th>Pin</th><th>Mini-PCIe Description</th><th>mSATA Description</th></tr><tr><td>1</td><td>-</td><td>-</td></tr><tr><td>2</td><td>+3.3V</td><td>+3.3V</td></tr><tr><td>3</td><td>-</td><td>-</td></tr><tr><td>4</td><td>GND</td><td>GND</td></tr><tr><td>5</td><td>-</td><td>-</td></tr><tr><td>6</td><td>+1.5V</td><td>+1.5V</td></tr><tr><td>7</td><td>-</td><td>-</td></tr><tr><td>8</td><td>UIM_PWR</td><td>-</td></tr><tr><td>9</td><td>GND</td><td>GND</td></tr><tr><td>10</td><td>UIM_DATA</td><td>-</td></tr><tr><td>11</td><td>PCIe CLK-</td><td>PCIe CLK-</td></tr><tr><td>12</td><td>UIM_CLK</td><td>-</td></tr><tr><td>13</td><td>PCIe CLK+</td><td>PCIe CLK+</td></tr><tr><td>14</td><td>UIM_RESET</td><td>-</td></tr><tr><td>15</td><td>GND</td><td>GND</td></tr><tr><td>16</td><td>UIM_VPP</td><td>-</td></tr><tr><td>17</td><td>-</td><td>-</td></tr><tr><td>18</td><td>GND</td><td>GND</td></tr><tr><td>19</td><td>-</td><td>-</td></tr><tr><td>20</td><td>W_DISABLE#</td><td>W_DISABLE#</td></tr><tr><td>21</td><td>GND</td><td>GND</td></tr><tr><td>22</td><td>PERST#</td><td>RESET</td></tr><tr><td>23</td><td>PCIe RX-</td><td>SATA TX+</td></tr><tr><td>24</td><td>+3.3V</td><td>+3.3V</td></tr><tr><td>25</td><td>PCIe RX+</td><td>SATA TX-</td></tr><tr><td>26</td><td>GND</td><td>GND</td></tr><tr><td>27</td><td>GND</td><td>GND</td></tr><tr><td>28</td><td>+1.5V</td><td>+1.5V</td></tr><tr><td>29</td><td>GND</td><td>GND</td></tr><tr><td>30</td><td>SMB_CLK</td><td>SMB_CLK</td></tr><tr><td>31</td><td>PCIe TX-</td><td>SATA RX-</td></tr><tr><td>32</td><td>SMB_DATA</td><td>SMB_DATA</td></tr><tr><td>33</td><td>PCIe TX+</td><td>SATA RX+</td></tr><tr><td>34</td><td>GND</td><td>GND</td></tr><tr><td>35</td><td>GND</td><td>GND</td></tr><tr><td>36</td><td>USB D-</td><td>USB D-</td></tr><tr><td>37</td><td>GND</td><td>GND</td></tr><tr><td>38</td><td>USB D+</td><td>USB D+</td></tr><tr><td>39</td><td>+3.3V</td><td>+3.3V</td></tr><tr><td>40</td><td>GND</td><td>GND</td></tr><tr><td>41</td><td>+3.3V</td><td>+3.3V</td></tr><tr><td>42</td><td>LED_WWAN#</td><td>LED_WWAN#</td></tr><tr><td>43</td><td>GND</td><td>GND</td></tr><tr><td>44</td><td>LED_WLAN#</td><td>LED_WLAN#</td></tr><tr><td>45</td><td>-</td><td>-</td></tr><tr><td>46</td><td>LED_WPAN#</td><td>LED_WPAN#</td></tr><tr><td>47</td><td>-</td><td>-</td></tr><tr><td>48</td><td>+1.5V</td><td>+1.5V</td></tr><tr><td>49</td><td>-</td><td>-</td></tr><tr><td>50</td><td>GND</td><td>GND</td></tr><tr><td>51</td><td>-</td><td>-</td></tr><tr><td>52</td><td>+3.3V</td><td>+3.3V</td></tr></table>			Pin	Mini-PCIe Description	mSATA Description	1	-	-	2	+3.3V	+3.3V	3	-	-	4	GND	GND	5	-	-	6	+1.5V	+1.5V	7	-	-	8	UIM_PWR	-	9	GND	GND	10	UIM_DATA	-	11	PCIe CLK-	PCIe CLK-	12	UIM_CLK	-	13	PCIe CLK+	PCIe CLK+	14	UIM_RESET	-	15	GND	GND	16	UIM_VPP	-	17	-	-	18	GND	GND	19	-	-	20	W_DISABLE#	W_DISABLE#	21	GND	GND	22	PERST#	RESET	23	PCIe RX-	SATA TX+	24	+3.3V	+3.3V	25	PCIe RX+	SATA TX-	26	GND	GND	27	GND	GND	28	+1.5V	+1.5V	29	GND	GND	30	SMB_CLK	SMB_CLK	31	PCIe TX-	SATA RX-	32	SMB_DATA	SMB_DATA	33	PCIe TX+	SATA RX+	34	GND	GND	35	GND	GND	36	USB D-	USB D-	37	GND	GND	38	USB D+	USB D+	39	+3.3V	+3.3V	40	GND	GND	41	+3.3V	+3.3V	42	LED_WWAN#	LED_WWAN#	43	GND	GND	44	LED_WLAN#	LED_WLAN#	45	-	-	46	LED_WPAN#	LED_WPAN#	47	-	-	48	+1.5V	+1.5V	49	-	-	50	GND	GND	51	-	-	52	+3.3V	+3.3V
Pin	Mini-PCIe Description	mSATA Description																																																																																																																																																																
1	-	-																																																																																																																																																																
2	+3.3V	+3.3V																																																																																																																																																																
3	-	-																																																																																																																																																																
4	GND	GND																																																																																																																																																																
5	-	-																																																																																																																																																																
6	+1.5V	+1.5V																																																																																																																																																																
7	-	-																																																																																																																																																																
8	UIM_PWR	-																																																																																																																																																																
9	GND	GND																																																																																																																																																																
10	UIM_DATA	-																																																																																																																																																																
11	PCIe CLK-	PCIe CLK-																																																																																																																																																																
12	UIM_CLK	-																																																																																																																																																																
13	PCIe CLK+	PCIe CLK+																																																																																																																																																																
14	UIM_RESET	-																																																																																																																																																																
15	GND	GND																																																																																																																																																																
16	UIM_VPP	-																																																																																																																																																																
17	-	-																																																																																																																																																																
18	GND	GND																																																																																																																																																																
19	-	-																																																																																																																																																																
20	W_DISABLE#	W_DISABLE#																																																																																																																																																																
21	GND	GND																																																																																																																																																																
22	PERST#	RESET																																																																																																																																																																
23	PCIe RX-	SATA TX+																																																																																																																																																																
24	+3.3V	+3.3V																																																																																																																																																																
25	PCIe RX+	SATA TX-																																																																																																																																																																
26	GND	GND																																																																																																																																																																
27	GND	GND																																																																																																																																																																
28	+1.5V	+1.5V																																																																																																																																																																
29	GND	GND																																																																																																																																																																
30	SMB_CLK	SMB_CLK																																																																																																																																																																
31	PCIe TX-	SATA RX-																																																																																																																																																																
32	SMB_DATA	SMB_DATA																																																																																																																																																																
33	PCIe TX+	SATA RX+																																																																																																																																																																
34	GND	GND																																																																																																																																																																
35	GND	GND																																																																																																																																																																
36	USB D-	USB D-																																																																																																																																																																
37	GND	GND																																																																																																																																																																
38	USB D+	USB D+																																																																																																																																																																
39	+3.3V	+3.3V																																																																																																																																																																
40	GND	GND																																																																																																																																																																
41	+3.3V	+3.3V																																																																																																																																																																
42	LED_WWAN#	LED_WWAN#																																																																																																																																																																
43	GND	GND																																																																																																																																																																
44	LED_WLAN#	LED_WLAN#																																																																																																																																																																
45	-	-																																																																																																																																																																
46	LED_WPAN#	LED_WPAN#																																																																																																																																																																
47	-	-																																																																																																																																																																
48	+1.5V	+1.5V																																																																																																																																																																
49	-	-																																																																																																																																																																
50	GND	GND																																																																																																																																																																
51	-	-																																																																																																																																																																
52	+3.3V	+3.3V																																																																																																																																																																

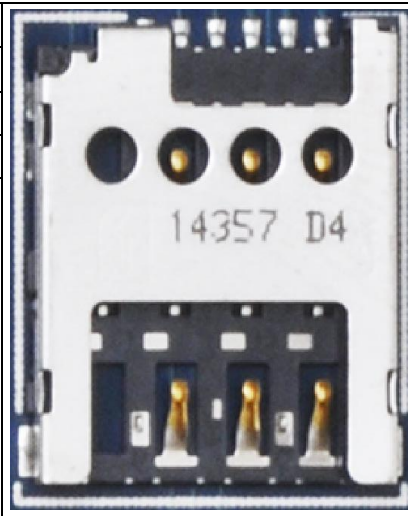


PCIe/mSATA DIP Switch Select

Function	Mini PCIe/mSATA Select	
Location	S2	
Description	<p>This DIP switch allows the bus type selection of Module 0 and Module 1. The silkscreen on the PCB clearly labels which switch represents Module 0 and Module 1, as well as the function of the switch location (PCIe or mSATA). The image at right shows PCIe selected for both modules.</p> <p>Module 2 and Module 3 use only PCIe. There is no mSATA support at Module 2 and Module 3.</p>	

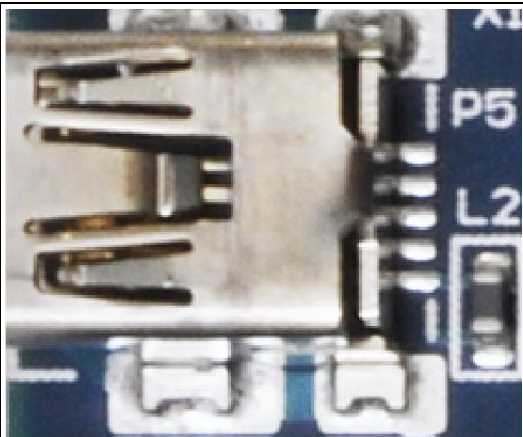
SIM Sockets

Function	SIM Socket		
Location	P6A, P6B		
Type	Molex Micro SIM Push-Pull Socket		
Connector PN	786463001		
Pinout		Pin	Description
		1	UIM_PWR
		2	UIM_RST
		3	UIM_CLK
		4	-
		5	GND
		6	UIM_VPP
		7	UIM_DATA
		8	SHELL



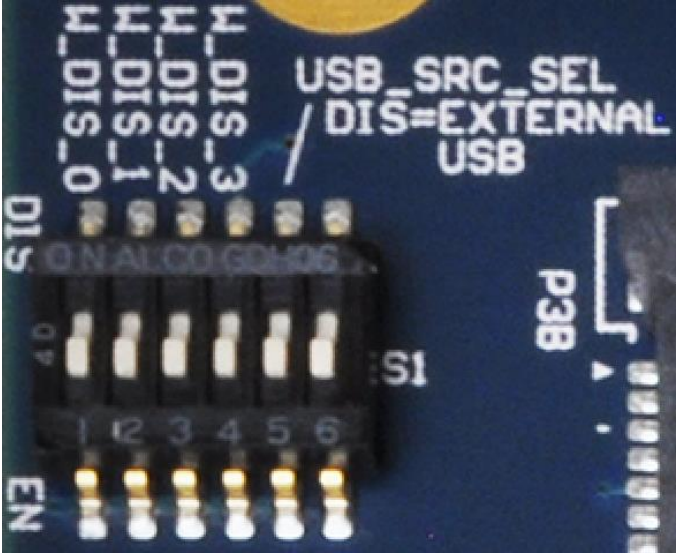
External USB Connector

Function	External USB Connector		
Location	P5		
Type	Molex Mini USB Type B Connector		
Connector PN	675031020		
Pinout		Pin	Description
		1	-
		2	D-
		3	D+
		4	-
		5	GND
		6	Shield
		7	Shield
		8	Shield
		9	Shield



Note: This connector is only used when switch position 5 on S1 is in the “DIS” position. See W_DISABLE# and USB Source Select DIP Switch for more details.

W_DISABLE# and USB Source Select DIP Switch

Function	W_DISABLE# and USB Source Select	
Location	S1	
Description	<p>This DIP switch allows each module to be individually enabled or disabled, as well as selects the USB uplink source.</p> <p>The PCB silkscreen clearly labels the function of each switch, and the purpose of the switch location.</p> <p>W_DISABLE_x represents the specific mini PCIe/mSATA slot</p> <p>The 5th position switch represents the USB uplink source select.</p> <p>DIS position: disable module, use external USB connector (P5) for USB uplink</p> <p>EN position: enable module, use PCIe/104 USB port for USB uplink</p> <p>The 6th switch is not connected.</p>	

On-board Indicator LEDs

LED	Description
WWAN	One for each Mini PCIe/mSATA slot. Wireless Wide Area Network communication status LED.
WLAN	One for each Mini PCIe/mSATA slot. Wireless Local Area Network communication status LED.
WPAN	One for each Mini PCIe/mSATA slot. Wireless Personal Area Network communication status LED.
D8	+12V status indicator. ON indicates +12V from PCIe/104 connector is present.
D9	+5.0V status indicator. ON indicates +5.0V from PCIe/104 connector is present.
D10	+3.3V status indicator. ON indicates the local +3.3V supply is regulated and functioning normally.
D11	+1.5V status indicator. ON indicates the local +1.5V supply is regulated and functioning normally.
D13	+1.0V status indicator. ON indicates the local +1.0V supply is regulated and functioning normally.
D14	+2.5V status indicator. ON indicates the local +2.5V supply is regulated and functioning normally.
D5	mSATA Link Status LED indicator. ON indicates SATA link active, flashing indicates SATA traffic transferring