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SATA34106
SATA Drive Carrier



User's Manual

BDM-610020085 Revision B

www.rtd.com

ISO9001 and AS9100 Certified

"Accessing the Analog World"®

SATA Drive Carrier User's Manual

RTD Document Number: BDM-610020085 Revision B

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Contents and specifications within this manual are subject to change without notice.

Revision History

Revision	Date	Reason for Change
A	9/30/10	Initial Release
B	10/4/12	Changed bus name to PCIe/104 Type 2

SATA34106
SATA Drive Carrier

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Chapter 1 Introduction

This manual provides comprehensive hardware information on the SATA34106.

This manual is organized as follows:

Chapter 1 ***Introduction***
introduces product variations and their main features and specifications

Chapter 2 ***Connecting the SATA Drive Carrier***
provides information on installing the SATA drive carrier in a system

Appendix 1 ***IDAN™ Dimensions and Pinout***
provides connector pinouts and locations for variations of SATA drive carriers installed in an RTD Intelligent Data Acquisition Node (IDAN™) frame

Appendix 2 ***Limited Warranty***

SATA34106 SATA Drive Carriers

The SATA34106 SATA drive carrier modules provide a mechanism to utilize the SATA links on the PCIe/104 Type 2 bus connector on select RTD's PCI Express cpuModules. The onboard drive utilizes the first SATA link on the connector, while the other SATA link is lane-shifted up the stack, to permit stacking multiple SATA drive carrier modules within one system.

The SATA34106 drive carrier provides power to the SATA drive, sourcing the power from the cpuModule's onboard connector, and thus eliminates the need for external out-of-stack cabling.

This manual provides instructions on how to install a 2.5" SATA drive in the SATA34106, and how to install the SATA34106 module into a PCI/104-Express or PCIe/104 system. It will help you get the SATA drive carrier module up and running quickly, and will also provide enough detail about the board and its functions so you can get maximum use of its features in the most demanding applications.

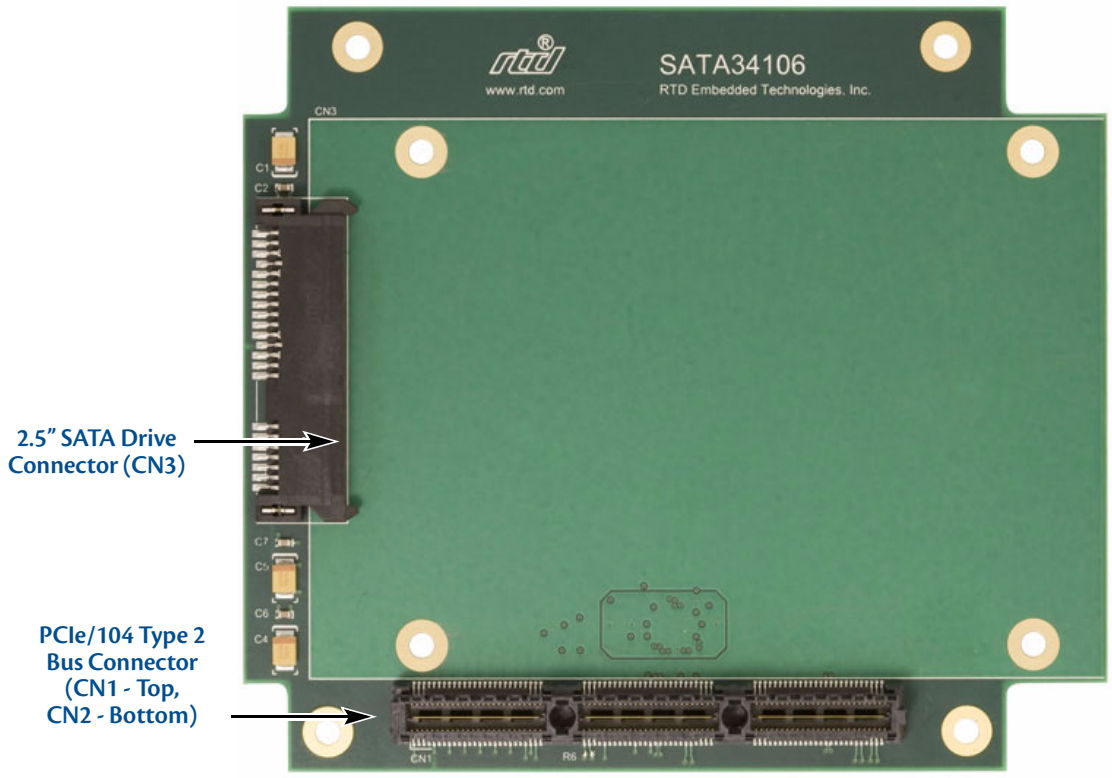


Figure 1 SATA34106 SATA Drive Carrier (top view)

Ordering Information

There are several versions of the SATA drive carrier module, some of which are designed for specific usage in an IDAN frame.

Stand Alone Models

The base design variant, intended for use without an RTD system enclosure, may be ordered with the following model number:

- **SATA34106:** 2.5" SATA drive carrier for use with a standalone cpuModule

IDAN Models

The SATA drive carrier can be purchased as part of an Intelligent Data Acquisition Node (IDAN™) building block, which consists of the SATA Drive Carrier module, and a milled aluminum IDAN frame. The IDAN building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged PCI/104-Express or PCIe/104 stack. (for more information refer to Appendix 1).

Design variants of the SATA drive carrier module installed in an IDAN frame can be ordered with the following model numbers:

- **IDAN-SATA34106HRS:** 2.5" SATA drive carrier for use in an IDAN system
- **IDAN-RSATA-SYS104:** 2.5" SATA drive carrier with removable-drive access for use in an IDAN system

The SATA drive carrier can also be purchased as part of a custom-built RTD HiDAN™ or HiDAN*plus* High Reliability Intelligent Data Acquisition Node. Contact RTD for more information on its high reliability PC/PCI-104, PCI/104-Express, and PCIe/104 systems.

Each SATA drive carrier module package contains the following items:

- SATA34106 SATA drive carrier module
- Companion CD containing documentation

Features

Some of the key features of the SATA drive carrier include:

- Adds one 2.5" SATA (Serial ATA) drive to a system using the PCIe/104 Type 2 bus interface on select RTD cpuModules
  - Stack up to 2x SATA drive carrier modules in one system
    - Useful for RAID configurations
- Benefits of SATA over PATA (Parallel ATA)
  - Transfer rates up to 3.0 Gbits per second is faster and more efficient than PATA
  - Dedicated SATA links for each drive in the system eliminate master/slave addressing jumpers
  - Backwards compatibility with PATA permits use of Legacy Mode
- Stackable PCIe/104 Type 2 Expansion Bus
  - Permits system expandability by passing unused SATA links, PCI-Express links, and USB ports from the cpuModule to the next expansion module in the system
- Physical and environmental characteristics
  - Supports 2.5" SATA rotating or flash drives
  - –40 to +85°C operating temperature[1]
  - RTD IDAN™ compatible (see Appendix 1, *IDAN™ Dimensions and Pinout*)

Specifications

Connectors

• PCIe/104 Type 2 Bus	156-pin Surface Mount (Top & Bottom)
• SATA Connector	2.5" SATA drive

Operating Temperature Range

Standard	–40 to +85°C

1. Operating temperature range may be limited by the rating of the SATA drive installed in the SATA drive carrier module

For More Information

Contact RTD if you need further assistance.

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Chapter 2 Connecting the SATA Drive Carrier

The SATA34106 SATA drive carrier module interfaces easily to PCI/104-Express and PCIe/104 systems via the PCIe/104 Type 2 bus connector. This chapter provides general installation guidelines for the SATA34106 as well as information on all connectors.

Installation Considerations — page 14

Proper Grounding Techniques — page 14

SATA Drive Carrier Installation — page 14

SATA34106 Connector Locations — page 15

PCIe/104 Type 2 Bus (CN1 & CN2) — page 16

2.5" SATA Drive Connector (CN3) — page 20

Installation Considerations

The SATA34106 is a module with an PCIe/104 Type 2 bus. Therefore, the SATA34106 should only be installed on a cpuModule which has an PCIe/104 Type 2 bus connector.



CAUTION *The PCIe/104 Type 2 connector is the same physical connector as the PCIe/104 Type 1 connector, but has a different pinout. Though it is physically possible to connect the SATA34106 directly to a PCIe/104 Type 1 bus, doing so could harm the module and other boards in the system.*

Proper Grounding Techniques

Before removing the SATA34106 from its static bag, proper grounding techniques must be used to prevent electrostatic discharge (ESD) damage to the module. Common grounding procedures include an anti-static mat on a workbench, which may connect to an anti-static wrist strap (also known as an ESD wrist strap) on the wrist of the technician or engineer.

SATA Drive Carrier Installation

1. Turn off power to your PCI/104-Express or PCIe/104 system and unplug the cord.
2. Ground yourself with an anti-static strap.
3. Line up the pins of the SATA34106's bottom side connector with the PCIe/104 Type 2 bus of the stack and gently press the module onto the stack.



CAUTION *The SATA34106 should slide into the connectors on the matching PCI/104-Express or PCIe/104 system easily. Do not force the connection. Doing so might damage pins on the connectors.*

4. If any modules are to be installed on the PCIe/104 Type 2 bus above the SATA34106, install them.
5. Attach any necessary cables to the stack.
6. Reconnect the power cord and apply power to the stack.
7. Boot the system and verify that all of the hardware is working properly.

SATA34106 Connector Locations

Figure 2 shows the connectors of the SATA driver carrier module.

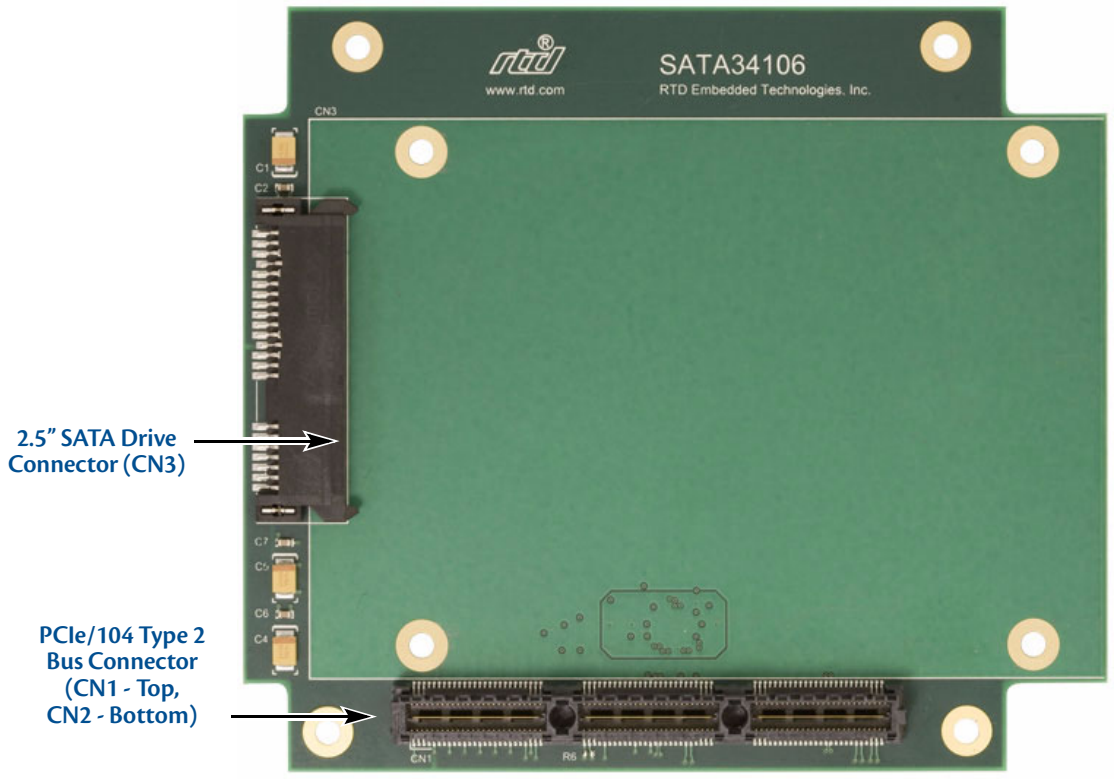


Figure 2 SATA34106 Connector Locations

Note *Pin 1 of the PCIe/104 Type 2 bus connectors is indicated by a silk screen border at the corner of each connector on the top and bottom of the board. Pin 1 of each connector matches when stacking with other PCIe/104 Type 2 modules.*

Table 1 SATA34106 Connectors

Connector	Function	Size
CN1	PCIe/104 Type 2 Bus (top)	156-pin
CN2	PCIe/104 Type 2 Bus (bottom)	156-pin
CN3	2.5" SATA Drive Connector	7-pin (data segment), 14-pin (power segment)

PCIe/104 Type 2 Bus (CN1 & CN2)

PCIe/104 Type 2 Compatibility

The PCIe/104 Type 2 bus is compatible with any PCI/104-Express or PCIe/104 peripheral module that does not use the x16 Link. This includes any card that uses the PCIe x1 links, USB, or a power supply.

Pin Connections

The signals on the first bank match definitions found in the PCI/104-Express & PCIe/104 Specification Version 1.1 from the PC/104 Embedded Consortium. The signals on the second and third bank are used for SATA hard drive carrier expansion. Table 2 lists the pinout of the PCIe/104 Type 2 bus connector.

Connector **CN1** on the bottom side of the SATA34106 is the source for the signals of the cpuModule's PCIe/104 Type 2 bus. The only connections on the top-side PCIe/104 Type 2 bus connector (**CN1**) that are not directly passed through from the bottom-side connector (**CN2**) are the SATA links. Other unused features on the bus that are provided by the cpuModule are passed through the SATA34106's bus connector to the next peripheral module in the stack.

For details on how the SATA links are utilized and passed through the SATA34106, refer to *SATA Link Shifting*—page 20.



Note *Pin 1 of the PCIe/104 Type 2 bus connectors is indicated by a silk screen border at the corner of each connector on the top and bottom of the board.*

Table 2 PCIe/104 Type 2 Bus Signal Assignments[1]

Pin	Signal		Signal	Pin
1	*Pass-through*		*Pass-through*	2
3	+3.3V		+3.3V	4
5	*Pass-through*		*Pass-through*	6
7	*Pass-through*		*Pass-through*	8
9	GND		GND	10
11	*Pass-through*		*Pass-through*	12
13	*Pass-through*		*Pass-through*	14
15	GND		GND	16
17	*Pass-through*		*Pass-through*	18
19	*Pass-through*		*Pass-through*	20
21	GND		GND	22
23	*Pass-through*		*Pass-through*	24
25	*Pass-through*	+5 Volts	*Pass-through*	26
27	GND		GND	28
29	*Pass-through*		*Pass-through*	30
31	*Pass-through*		*Pass-through*	32
33	GND		GND	34
35	*Pass-through*		*Pass-through*	36
37	*Pass-through*		*Pass-through*	38
39	*Pass-through*		*Pass-through*	40
41	*Pass-through*		*Pass-through*	42
43	*Pass-through*		*Pass-through*	44
45	CPU_DIR		*Pass-through*	46
47	*Pass-through*		*Pass-through*	48
49	*Pass-through*		*Pass-through*	50
51	*Pass-through*		*Pass-through*	52

Table 2 PCIe/104 Type 2 Bus Signal Assignments[1]

Pin	Signal		Signal	Pin
53	Reserved		*Pass-through*	54
55	GND		GND	56
57	*Pass-through*		*Pass-through*	58
59	*Pass-through*		*Pass-through*	60
61	GND		GND	62
63	*Pass-through*		*Pass-through*	64
65	*Pass-through*		*Pass-through*	66
67	GND		GND	68
69	*Pass-through*		*Pass-through*	70
71	*Pass-through*		*Pass-through*	72
73	GND		GND	74
75	*Pass-through*		*Pass-through*	76
77	*Pass-through*	+5 Volts	*Pass-through*	78
79	GND		GND	80
81	SATA_1Tp[2]		SATA_0Tp[2]	82
83	SATA_1Tn[2]		SATA_0Tn[2]	84
85	GND		GND	86
87	*Pass-through*		*Pass-through*	88
89	*Pass-through*		*Pass-through*	90
91	GND		GND	92
93	*Pass-through*		*Pass-through*	94
95	*Pass-through*		*Pass-through*	96
97	GND		GND	98
99	*SATA_DET#1*[2]		*SATA_DET#0*[2]	100
101	*SATA_PWREN#1*[2]		*SATA_PWREN#0*[2]	102
103	GND		GND	104

Table 2 PCIe/104 Type 2 Bus Signal Assignments[1]

Pin	Signal		Signal	Pin
105	*Pass-through*		*Pass-through*	106
107	GND		GND	108
109	*Pass-through*		*Pass-through*	110
111	*Pass-through*		*Pass-through*	112
113	GND		GND	114
115	*Pass-through*		*Pass-through*	116
117	*Pass-through*		*Pass-through*	118
119	GND		GND	120
121	*Pass-through*		*Pass-through*	122
123	*Pass-through*		*Pass-through*	124
125	GND		GND	126
127	*Pass-through*		*Pass-through*	128
129	*Pass-through*	+12 Volts	*Pass-through*	130
131	GND		GND	132
133	SATA_1Rp[2]		SATA_0Rp[2]	134
135	SATA_1Rn[2]		SATA_0Rn[2]	136
137	GND		GND	138
139	*Pass-through*		*Pass-through*	140
141	*Pass-through*		*Pass-through*	142
143	GND		GND	144
145	*Pass-through*		*Pass-through*	146
147	*Pass-through*		*Pass-through*	148
149	GND		GND	150
151	*Pass-through*		*Pass-through*	152
153	*Pass-through*		*Pass-through*	154
155	GND		GND	156

1.Signals marked with (#) are active low.
2.For a description of SATA lane usage on the SATA34106, refer to *SATA Link Shifting* — page 20.

2.5” SATA Drive Connector (CN3)

The 2.5” SATA drive connector on the SATA34106 provides a convenient interface to the first SATA link on the PCIe/104 Type 2 bus on RTD’s PCI Express cpuModules.

SATA Link Shifting

The SATA34106’s 2.5” SATA Drive Connector (**CN3**) utilizes the first SATA link on the PCIe/104 Type 2 bus. As a result, the unused SATA link on the bus is shifted from the bottom-side PCIe/104 Type 2 connector (**CN2**) to the top-side (**CN1**). Shifting the remaining link allows a second SATA34106 (or other SATA drive carrier) to be installed upwards in the stack.

Figure 3 shows a block diagram of the SATA drive carrier module and how it interfaces to the cpuModule.

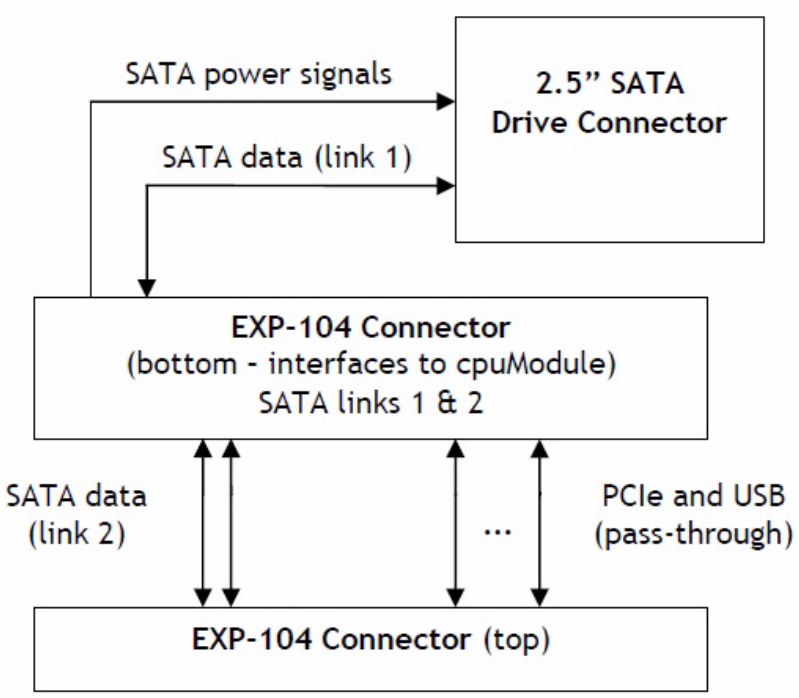
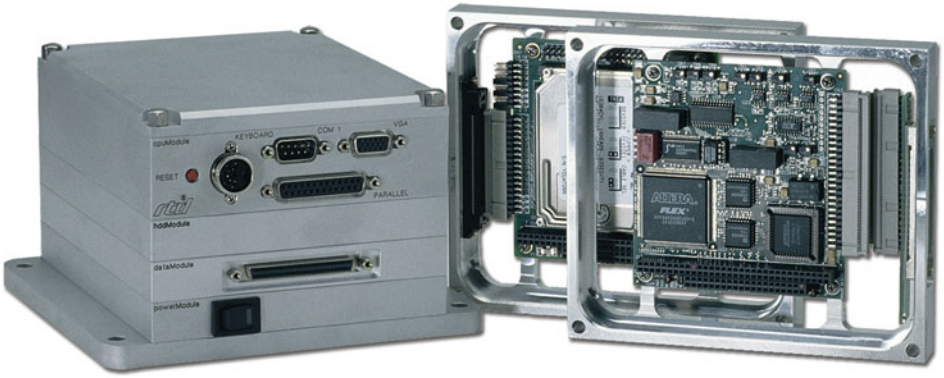


Figure 3 SATA34106 - Block Diagram

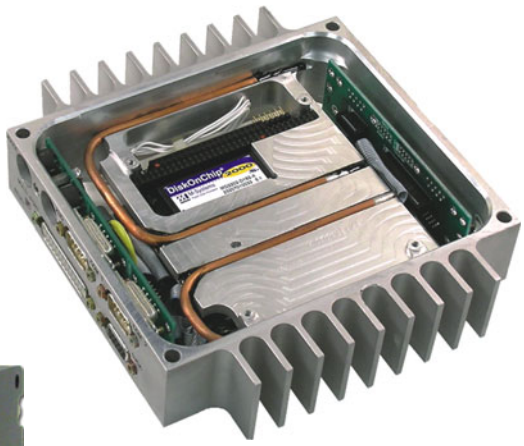
Appendix 1 IDAN™ Dimensions and Pinout

SATA Drive Carrier modules, like all other RTD PC/PCI-104, PCI/104-Express, and PCIe/104 modules, can be packaged in Intelligent Data Acquisition Node (IDAN) frames, which are milled aluminum frames with integrated heat sinks and heat pipes for fanless operation. RTD modules installed in IDAN frames are called building blocks. IDAN building blocks maintain the simple but rugged PC/104 stacking concept. Each RTD module is mounted in its own IDAN frame and all I/O connections are brought to the walls of each frame using standard PC connectors. No connections are made from module to module internal to the system other than through the PC/104 and PC/104-*Plus* bus, enabling quick interchangeability and system expansion without hours of rewiring and board redesign.

The SATA34106 SATA Drive Carrier can also be purchased as part of a custom-built RTD HiDAN™ or HiDAN*plus*™ High Reliability Intelligent Data Acquisition Node. This appendix provides the dimensions and pinouts of the SATA34106 installed in an IDAN frame. Contact RTD for more information on high reliability IDAN, HiDAN, and HiDAN*plus* PC/PCI-104, PCI/104-Express, and PCIe/104 systems.



IDAN—Adhering to the PC/104 stacking concept, IDAN allows you to build a customized system with any combination of RTD modules.



IDAN Heat Pipes—Advanced heat pipe technology maximizes heat transfer to heat sink fins.



HiDAN*plus*—Integrating the modularity of IDAN with the ruggedization of HiDAN, HiDAN*plus* enables connectors on all system frames, with signals running between frames through a dedicated stack-through raceway.

IDAN-SATA34106

The IDAN-SATA34106 is a SATA34106 SATA Drive Carrier packaged in an IDAN frame which permits easy removal of data from a PCI/104-Express or PCIe/104 system.

Note *Photographs not to scale.*

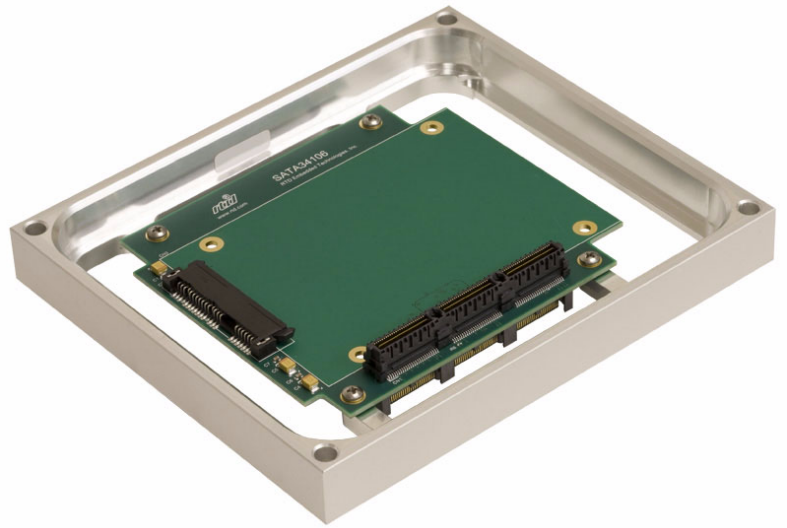


Figure 4 IDAN-SATA34106



Figure 5 IDAN-SATA34106, Example Configurations



Appendix 2 Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, Inc. This warranty is limited to the original purchaser of product and is not transferable.

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This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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