

***Squid* PCIe Gen3 Carrier Board™ for two M.2 / NGSFF(NF1) SSD modules (SKU-086-32e)**

Hardware Manual

May 5, 2020
Revision 1.0

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1 About this Document

1.1 Purpose

This document describes hardware installation, features, specification and operation of the *Squid* PCI Express Gen 3 Carrier Board™ for two M.2/NGSFF(NF1) SSD modules from AMFELTEC Corporation.

1.2 Feedback

AMFELTEC Corp. makes every effort to ensure that the information contained in this document is accurate and complete at time of release. Please contact AMFELTEC Corp. if you find any errors, inconsistency or have trouble understanding any part of this document.

To provide your feedback, please send an email to support@amfeltec.com

Your comments or corrections are greatly valued in our effort for excellence and continued improvement.

1.3 Revision History

Rev. No.	Description	Rev. Date
1.0	Initial Release.	May 5, 2020

2 General Description

2.1 Introduction

Squid PCI Express family is a series of PCI Express Carrier Boards designed for storage expansion of any desktop computer or embedded appliance. *Squid* family expands a motherboard's PCI Express with multiple full/half size MiniPCI Express or multiple M.2/NGSFF(NF1) PCI Express SSD modules.

The carrier board is a half-height PCIe board, and occupies the space equal to a standard one-slot wide PCIe board, as defined by the PCIe Specification. It is located in the middle of motherboard's PCIe slot, and connects to the motherboard via exchangeable x8 or x4 PCIe upstream adapters. This unique PCI Express structure (US. Pat #9,996,495) allows for allocating of multiple PCIe M2/NGSFF(NF1) modules on the top and bottom sides of the carrier board without violation PCI Express Specification.

This carrier board has two M.2 (M-key) circuits. One circuit are placed on the top (component) side of the board, and another circuit is placed on the bottom (soldering) side of the board. Each circuit support any M.2/NGSFF(NF1) PCI express module (M-key) with a standard length of 30, 42, 60, 80 mm and 110 mm (xx30/xx42/xx60/xx80 and xx110) and width up to 32 mm.

This board has real-time performance and temperature monitoring via USB port.

2.2 Package Contents

PCI Express Gen 3 Carrier Board for 2 M.2 SSD modules package (depending on the SKU part number) includes the following parts:

1. PCI Express Gen 3 Carrier Board for 2 M.2 modules (Figure 1,2,3)
2. x4 or x8 PCI Express Adapters
3. Full or half size PCI Express bracket
4. USB terminal cable SKU-043-37 (optional)



Figure 1: PCI Express Gen 3 Carrier Board for 2 M.2/NGSFF(NF1) SSD modules

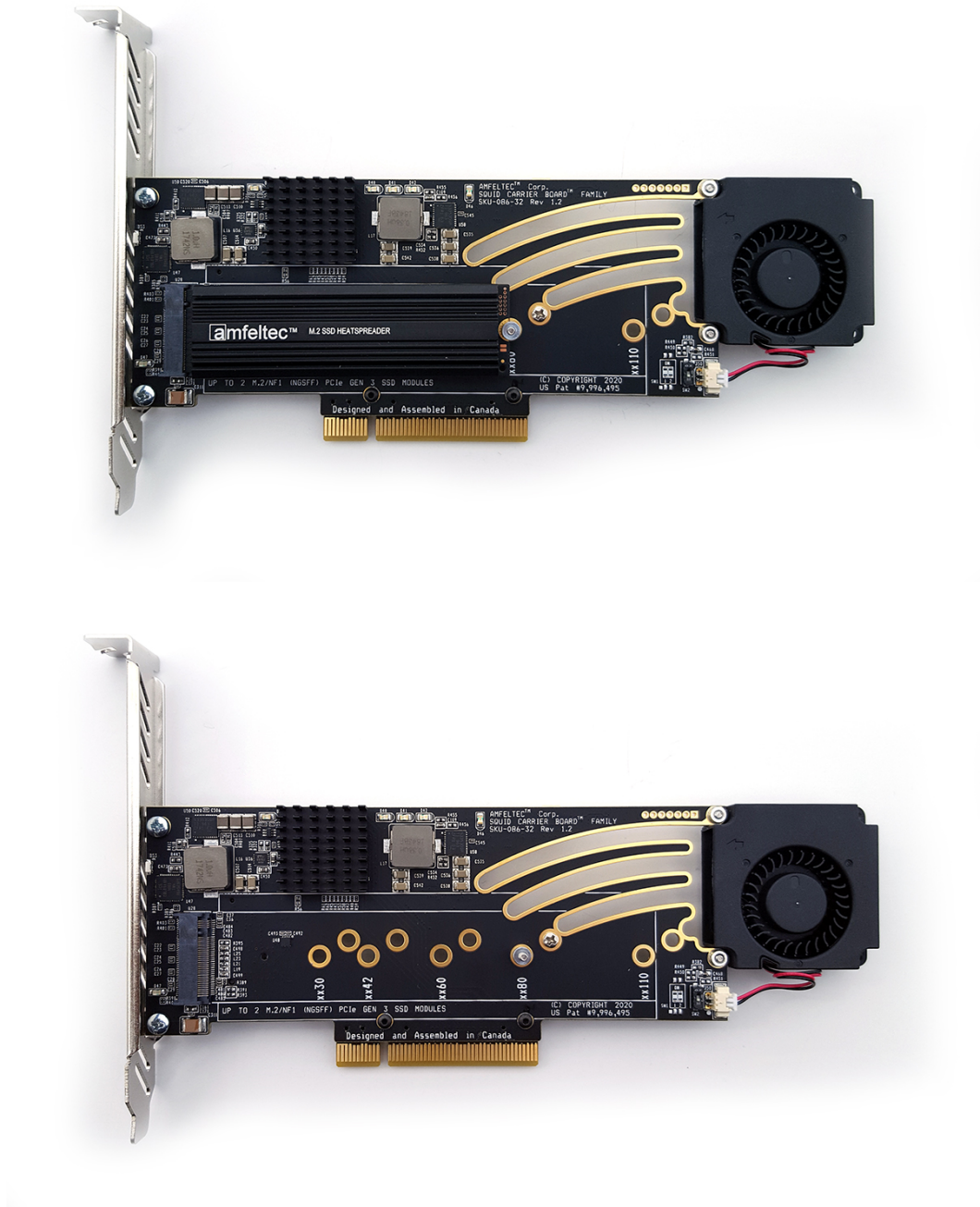


Figure 2: PCI Express Gen 3 Carrier Board for 2 M.2/NGSFF(NF1) SSD modules (top).

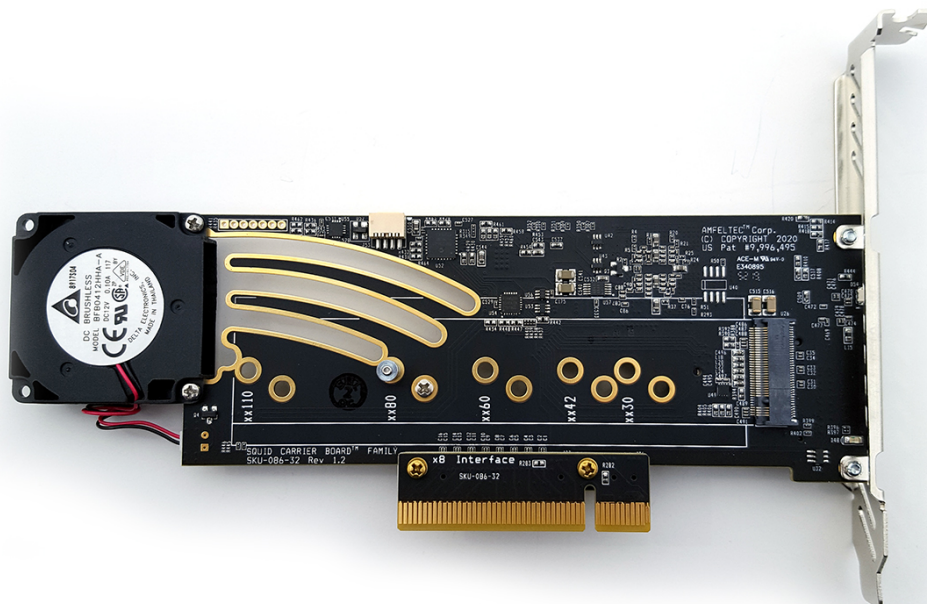


Figure 3: PCI Express Gen 3 Carrier Board for 2 M.2/NGSFF(NF1) SSD modules (bottom).

3 Features

3.1 Features

- Easy ‘Plug and Play’ installation. No drivers needed. Transparent to the operation system.
- Compatible to any motherboard.
- Supports up to two M.2 or NGSFF(NF1) PCI Express SSD modules (M-key)
- Supports any modules with 30, 42, 60, 80 mm and 110 mm length, and up to 32 mm in width.
- x4 PCIe Gen 3 (8.0 Gbps) downstream connection to each M.2 circuit.
- x8 or x4 PCIe Gen 3 (8.0 Gbps) upstream motherboard connection via exchangeable x8 or x4 PCI Express upstream Adapter.
- Occupies space equal to standard one-slot wide PCIe board defined by PCIe Specification.
- Easily removable cooling fan.
- Performance and temperature monitoring during operation; cooling fan speed control.
- Real-time transmission of carrier board & modules’ status to host computer via USB connection. (optional)
- Meets PCIe 3.0 and M.2 1.1 Specifications.
- Dimension:
 - Without Cooling Fans - 67 x 145 mm
 - With Cooling Fans - 67 x 180 mm.
- RoHS compliant.

3.2 PCI Express Carrier board for 2 M.2 SSD modules interfaces connection.

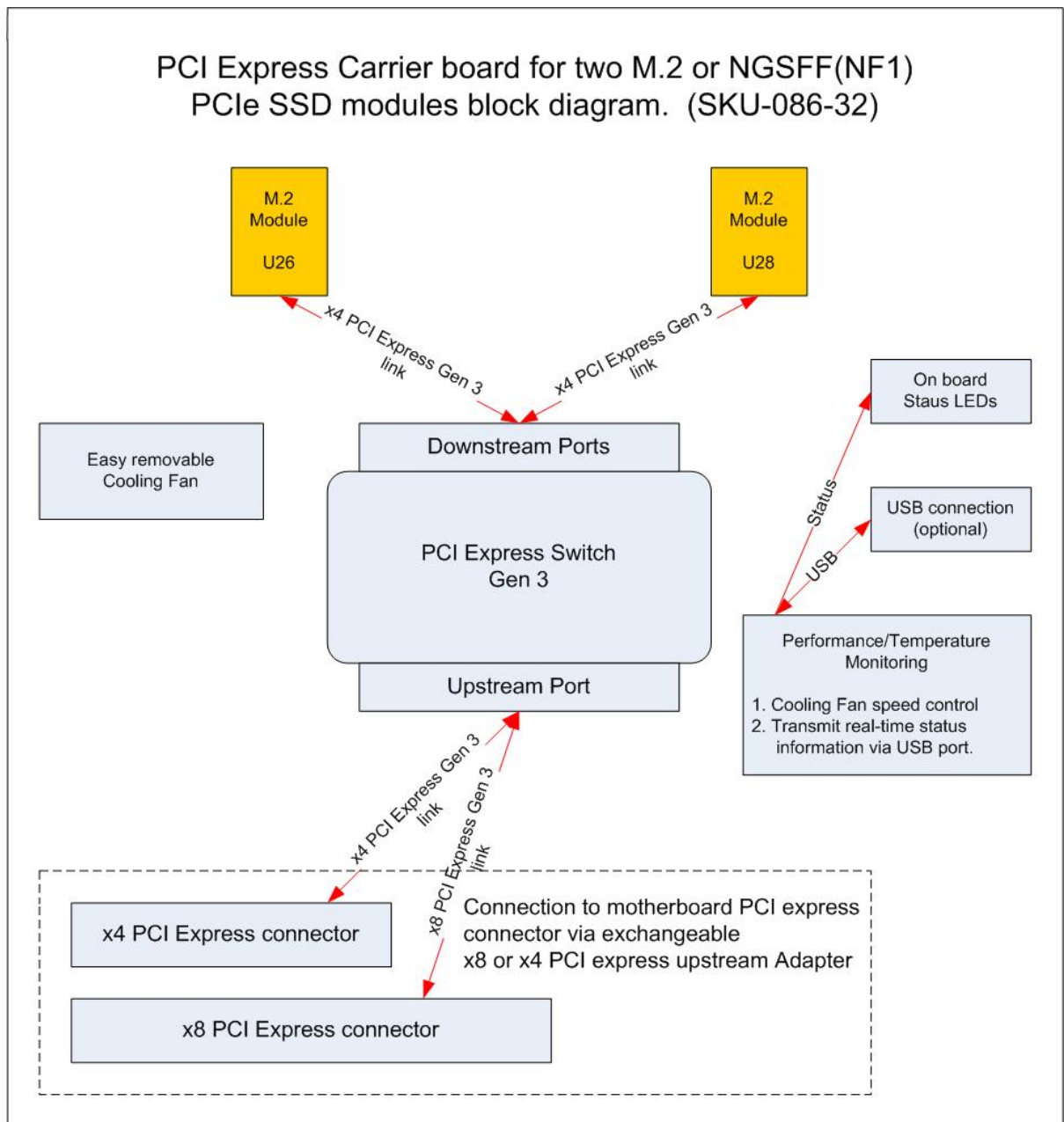


Figure 4: Carrier board PCI Express connection.

4 Installation

4.1 Carrier board installation

Following steps provide the exact sequence that needs to be followed in order to properly install the Amfeltec PCIe Carrier Board:

- Turn OFF computer before installation.
- Remove the chassis cover from the computer.
- Locate an unused PCI express slot and remove the corresponding slot cover from computer chassis. For maximum performance, it is preferable to use x16 PCI express slot that has a direct connection to CPU.
- Insert the carrier board into the appropriate PCI express slot, and attach its bracket to the computer chassis with a screw.
- (optionally) install USB monitoring cable SKU-043-37. (Connector J53 on the board and the 10-pin USB connector on the motherboard)
- Put the chassis cover back on the computer.
- Turn ON the computer.

4.2 Carrier board Power ON

During power ON, the Carrier board runs self-test that include:

- Upstream and downstream PCI express connection verification
- Checking status LEDs
- Cooling fans operation

After power ON the operation status test result is shown on D53(red) and D54(green) LEDs:

D53 is solid ON	Power ON Carrier Board verification status
D54 is solid ON	Power ON Carrier Board verification status

5 Hardware Description

5.1 Board Layout

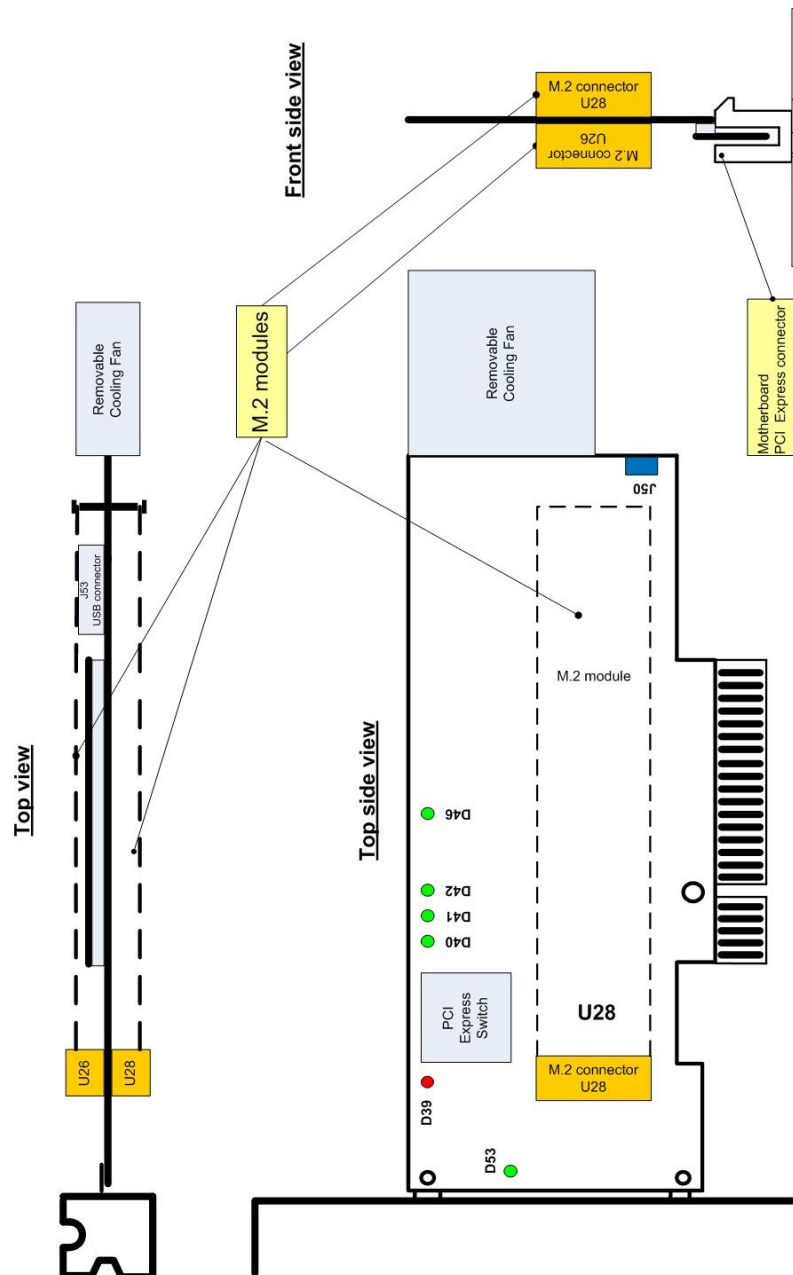


Figure 5: PCI Express Carrier Board for M.2/NGSFF(NF1) modules layout

5.2 LEDs

Name	Ref. Des.	Color	Usage
RESET	D39	RED	Global PCI Express RESET signal from motherboard
UPSTREAM	D40	GREEN	Upstream PCI Express Link status.
LINK1	D41	GREEN	Status of the downstream x4 PCIe Link to U28
LINK2	D42	GREEN	Status of the downstream x4 PCIe Link to U26

Table 1: PCI Express Carrier Board for M.2/NGSFF(NF1) SSD modules LEDs

5.3 Connectors

Ref. Des.	Type	Usage
J36, J37	Connectors	Connection to the x4 or x8 PCI Express Adapter
J50	Connector	Removable Cooling Fan Connection
U28	M.2 connectors (M key)	M.2 add-in modules connection (top side)
U26	M.2 connectors (M key)	M.2 add-in modules connection (bottom side)

Table 2: PCI Express Carrier Board for M.2/NGSFF(NF1) SSD modules connectors

6 Appendix A:

6.1 Cables



Figure 6: SKU-043-37 USB terminal cable (optional)



Figure 7: SKU-043-41 USB terminal cable (optional)

Both SKU-043-37 and SKU-043-41 Terminal cables is using to support Real-time performance and temperature monitoring option via USB connection. This monitoring option requires Silicon Labs CP2102 bridge driver installation

<https://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers>

7 Appendix B: Limited warranty

AMFELTEC Corporation does not warrant that the operation of the hardware, software or firmware products will be uninterrupted or error free. AMFELTEC products are not intended to be used as critical components in life support systems, aircraft, military systems or other systems whose failure to perform can reasonably be expected to cause significant injury to humans. AMFELTEC expressly disclaims liability for loss of profits and other consequential damages caused by the failure of any product which would cause interruption of work or loss of profits, such as shipboard or military attachment.

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