

# 10GbE SFP+ Card

## User's Manual

COM Express Type 7 10GbE Optical Fiber Network Adapter Card



**COM**   
**Express**®

Manual Rev.: 0.1 preliminary  
Revision Date: July 5, 2017  
Part Number: 50-1J090-1000

Preliminary

## Preface

### Copyright

Copyright 2017 ADLINK Technology, Inc. This document contains proprietary information protected by copyright. All rights are reserved. No part of this manual may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

### Disclaimer

The information in this document is subject to change without prior notice in order to improve reliability, design, and function and does not represent a commitment on the part of the manufacturer. In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

### Environmental Responsibility

ADLINK is committed to fulfill its social responsibility to global environmental preservation through compliance with the European Union's Restriction of Hazardous Substances (RoHS) directive and Waste Electrical and Electronic Equipment (WEEE) directive. Environmental protection is a top priority for ADLINK. We have enforced measures to ensure that our products, manufacturing processes, components, and raw materials have as little impact on the environment as possible. When products are at their end of life, our customers are encouraged to dispose of them in accordance with the product disposal and/or recovery programs prescribed by their nation or company.

### Trademarks

Product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

### Revision History

Revision	Description	Date	By
0.1	Preliminary release	2017-07-05	JC

## Table of Contents

<b>Preface .....</b>	<b>ii</b>
<b>List of Figures .....</b>	<b>iv</b>
<b>List of Tables .....</b>	<b>v</b>
<b>1. Introduction.....</b>	<b>1</b>
<b>2. Specifications .....</b>	<b>3</b>
2.1. Interface.....	3
2.2. 10GbE PHY .....	3
2.3. Dimensions .....	3
2.4. Operating Temperature .....	3
2.5. Specification Compliance .....	3
2.6. I/O Expander.....	4
2.7. Functional Diagram.....	5
2.8. Mechanical Drawing .....	6
<b>3. Pinouts and Signal Descriptions.....</b>	<b>7</b>
3.1. Input Interface Definitions .....	7
<b>4. Module Interfaces and Configuration .....</b>	<b>9</b>
4.1. Connector, Switch and LED Locations .....	9
4.2. 10GbE Adapter Card Installation .....	10
4.3. SFP+ Cage and Connector .....	11
4.4. LED Indicators .....	12
<b>Getting Service.....</b>	<b>13</b>

## List of Figures

Figure 1: 10GbE SFP+ Card Functional Block Diagram.....	5
Figure 2: 10GbE SFP+ Card Mechanical Drawing.....	6
Figure 3: 10GbE SFP+ Card Connector and LED Locations .....	9
Figure 4: 10GbE Adapter Card Installed on Express-BASE7 with Type 7 COM Express Module .....	10

## List of Tables

Table 1: I2C Data Mapping to Carrier Board Based PCA9539 I/O Expander.....	4
Table 2: SFP+ Card Pin Definitions.....	7
Table 3: LED Descriptions.....	12

This page intentionally left blank.

## 1. Introduction

The ADLINK 10GbE SFP+ Card is a 10GbE optical fiber network adapter card that delivers fast 10Gbps network access. It converts up to four 10GBASE-KR interfaces & related sideband signals to four 10GbE optical fiber interfaces and SFP+ transceivers, through up to two 10GbE optical fiber PHY.

The SFP+ Card can only be used on products that are PICMG COM Express (COM.0 Rev. 3.0, Type7) compliant.

By using the 10GbE SFP+ Card with a Express-BASE7 reference carrier board and COM Express Type 7 module (with 10GbE controller supporting optical fiber mode), customers can quickly emulate the functionality of their end product for software development and hardware verification. Applications include entry level cloud storage platforms and communications servers.

This page intentionally left blank.

## 2. Specifications

### 2.1. Interface

<b>Input</b>	Up to four 10GBASE-KR & related sideband signals from COM Express Type7 module through 164-pin edge connector (PCIe x16 slot PCIEKR on Express-BASE7)
<b>Output</b>	Up to four 10GbE optical fiber signals (10GBASE-SR, 10GBASE-LR) through SFP+ connectors to connect to SFP+ transceivers

**Note:** Number of 10GbE ports dependent on the selection of PHY, entry level PHY is selected as default to support two 10GbE ports

### 2.2. 10GbE PHY

<b>PHY</b>	Inphi CS4227 Optical Fiber PHY (two 10GbE ports, default BOM configuration) Converts 10GBASE-KR and sideband signals to 10GBASE-SR, 10GBASE-LR.  <b>Note:</b> Inphi CS4223 Optical Fiber PHY is available as a build option to support four 10GbE ports (pin-to-pin compatible with CS4227)
<b>EEPROM</b>	Dedicated EEPROM for PHY firmware  <b>Note:</b> Different firmware is required for the CS4227 (two ports) and CS4223 (four ports)

### 2.3. Dimensions

- 168 mm x 107 mm (PCB only, including edge connector)

### 2.4. Operating Temperature

<b>Standard Operating Temperature</b>	0°C to +60°C
---------------------------------------	--------------

### 2.5. Specification Compliance

- PICMG COM.0: Rev 3.0 Type 7

## 2.6. I/O Expander

<b>Chip</b>	TI PCA9539 I/O Expander
<b>Function</b>	<p>A two wire I2C bus (designated 10G_LED_SDA and 10G_LED_SCL on COM Express Type 7 module) is defined to serialize the outbound (module - to-carrier) MAC LED. The PCA9539 is mapped to I2C address 1110 100x (x=R/W bit). The table below defines the port pin mapping for the I/O expander.</p> <p><b>Note:</b> In this case, The PCA9539 is located on the 10GbE SFP+ Card.</p>

**Table 1: I2C Data Mapping to Carrier Board Based PCA9539 I/O Expander**

Port Pin	Signal Name	Signal Function
P0_0	10G_KR_LED0_0#	PHY 0, LED 0 -STATUS/ACT
P0_1	10G_KR_LED0_1#	PHY 0, LED 1 -LINK SPEED MAX
P0_2	10G_KR_LED0_2#	PHY 0, LED 2 -LINK SPEED
P0_3	10G_KR_LED1_0#	PHY 1, LED 0 -STATUS/ACTIVITY
P0_4	10G_KR_LED1_1#	PHY 1, LED 1 -LINK SPEED MAX
P0_5	10G_KR_LED1_2#	PHY 1, LED 2 -LINK SPEED
P0_6	10G_KR_STRAP01	PHY 0-1, 0 = PHY to use I2C, 1 = PHY to use MDIO
P0_7	10G_KR_STRAP23	PHY 2-3, 0 = PHY to use I2C, 1 = PHY to use MDIO
P1_0	10G_KR_LED2_0#	PHY 2, LED 0 -STATUS/ACT
P1_1	10G_KR_LED2_1#	PHY 2, LED 1 -LINK SPEED MAX
P1_2	10G_KR_LED2_2#	PHY 2, LED 2 -LINK SPEED
P1_3	10G_KR_LED3_0#	PHY 3, LED 0 -STATUS/ACT
P1_4	10G_KR_LED3_1#	PHY 3, LED 1 -LINK SPEED MAX
P1_5	10G_KR_LED3_2#	PHY 3, LED 2 -LINK SPEED
P1_6	RSVD	TBD
P1_7	RSVD	TBD

## 2.7. Functional Diagram

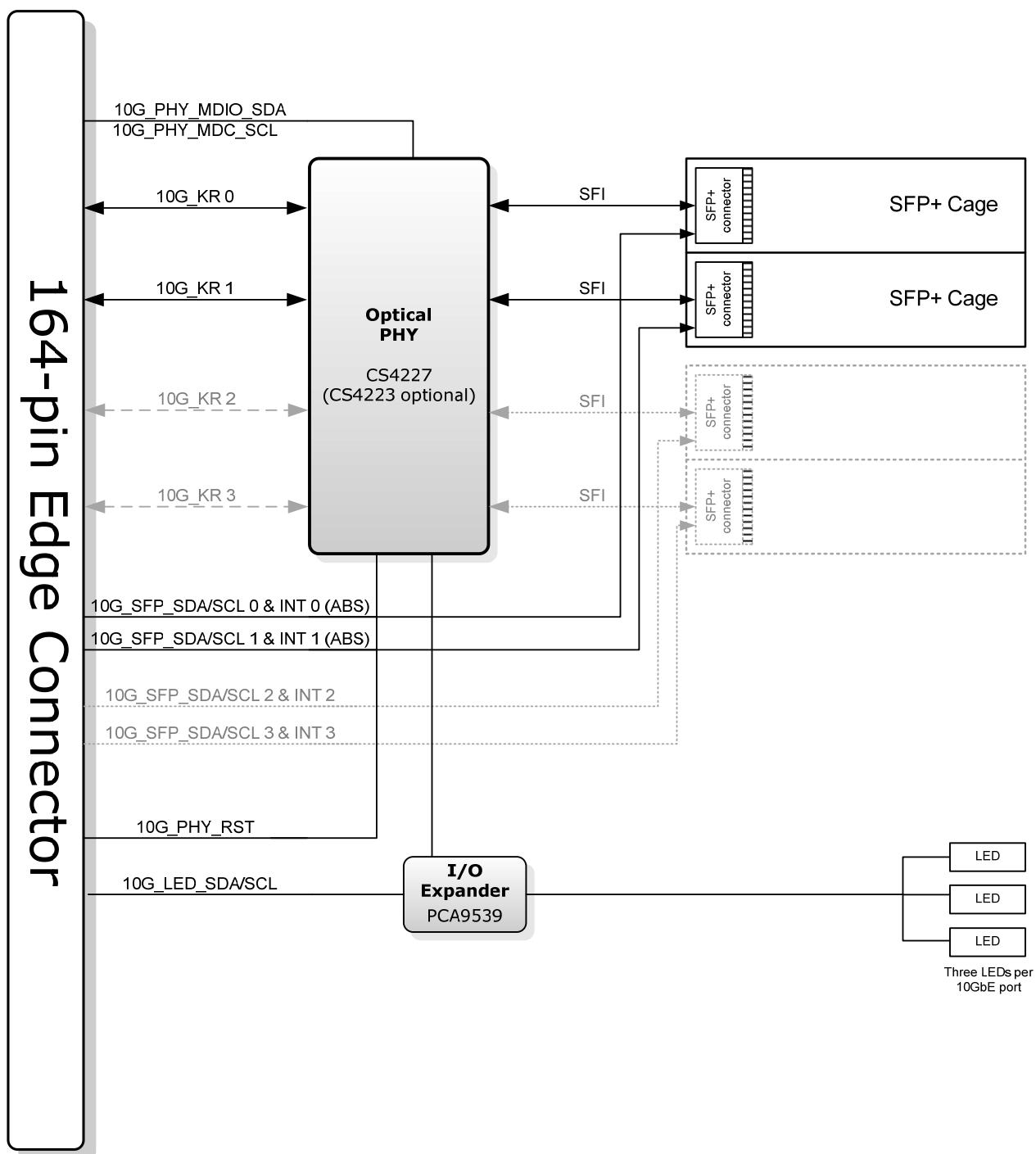
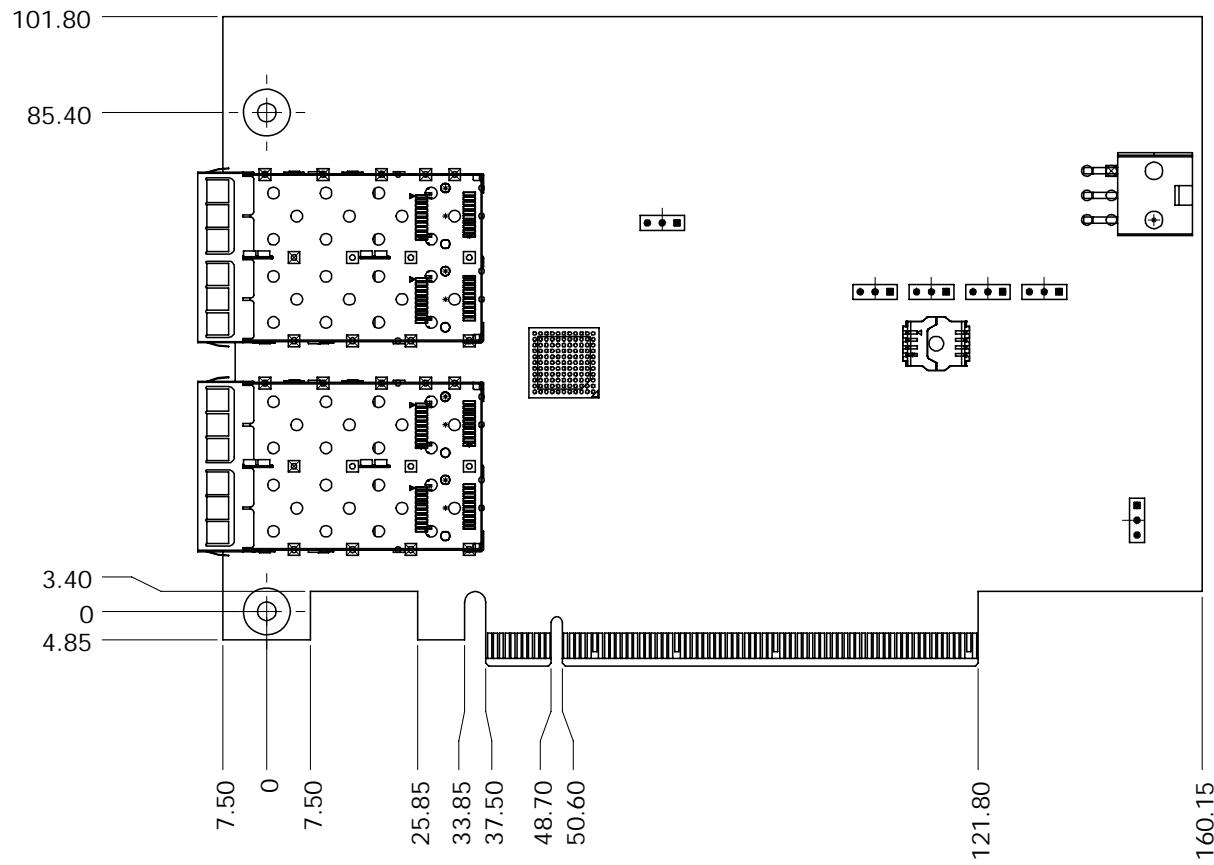


Figure 1: 10GbE SFP+ Card Functional Block Diagram

## 2.8. Mechanical Drawing



All dimensions are shown in millimeters. Tolerances should be  $\pm 0.25\text{mm}$ , unless otherwise noted.  
The tolerances of the holes (dimensions [0, 0] and [0, 85.40]) should be  $\pm 0.10\text{mm}$ .

**Figure 2: 10GbE SFP+ Card Mechanical Drawing**

### 3. Pinouts and Signal Descriptions

#### 3.1. Input Interface Definitions

The SFP+ Card is a COM Express Type 7 compliant 10GbE adapter card that receives 10GBASE-KR and sideband signals from the COM Express Type7 module and converts them to 10GbE optical fiber signals.



**Table 2: SFP+ Card Pin Definitions**

Row B		Row A	
Pin	Name	Pin	Name
B1	12V	A1	NC
B2	12V	A2	12V
B3	12V	A3	12V
B4	GND	A4	GND
B5	10G_SFP_SDA2	A5	10G_SFP_SDA3
B6	10G_SFP_SCL2	A6	10G_SFP_SCL3
B7	GND	A7	GND
B8	10G_SFP_SDA0	A8	10G_SFP_SDA1
B9	10G_SFP_SCL0	A9	10G_SFP_SCL1
B10	3V3SB	A10	GND
B11	3V3SB	A11	NC
B12	NC	A12	GND
B13	NC	A13	NC
B14	NC	A14	NC
B15	NC	A15	GND
B16	10G_INT1	A16	10G_INT3
B17	10G_INT0	A17	10G_INT2
B18	GND	A18	GND
B19	NC	A19	NC
B20	NC	A20	GND
B21	GND	A21	NC
B22	GND	A22	NC
B23	10G_KR_RX3+	A23	GND
B24	10G_KR_RX3-	A24	GND
B25	GND	A25	10G_KR_TX3+
B26	GND	A26	10G_KR_TX3-
B27	10G_KR_RX2+	A27	GND
B28	10G_KR_RX2-	A28	GND
B29	GND	A29	10G_KR_TX2+
B30	10G_PHY_RST_23	A30	10G_KR_TX2-
B31	10G_PHY_RST_01	A31	GND
B32	GND	A32	10G_LED_SDA
B33	10G_KR_RX1+	A33	10G_LED_SCL
B34	10G_KR_RX1-	A34	GND
B35	GND	A35	10G_KR_TX1+

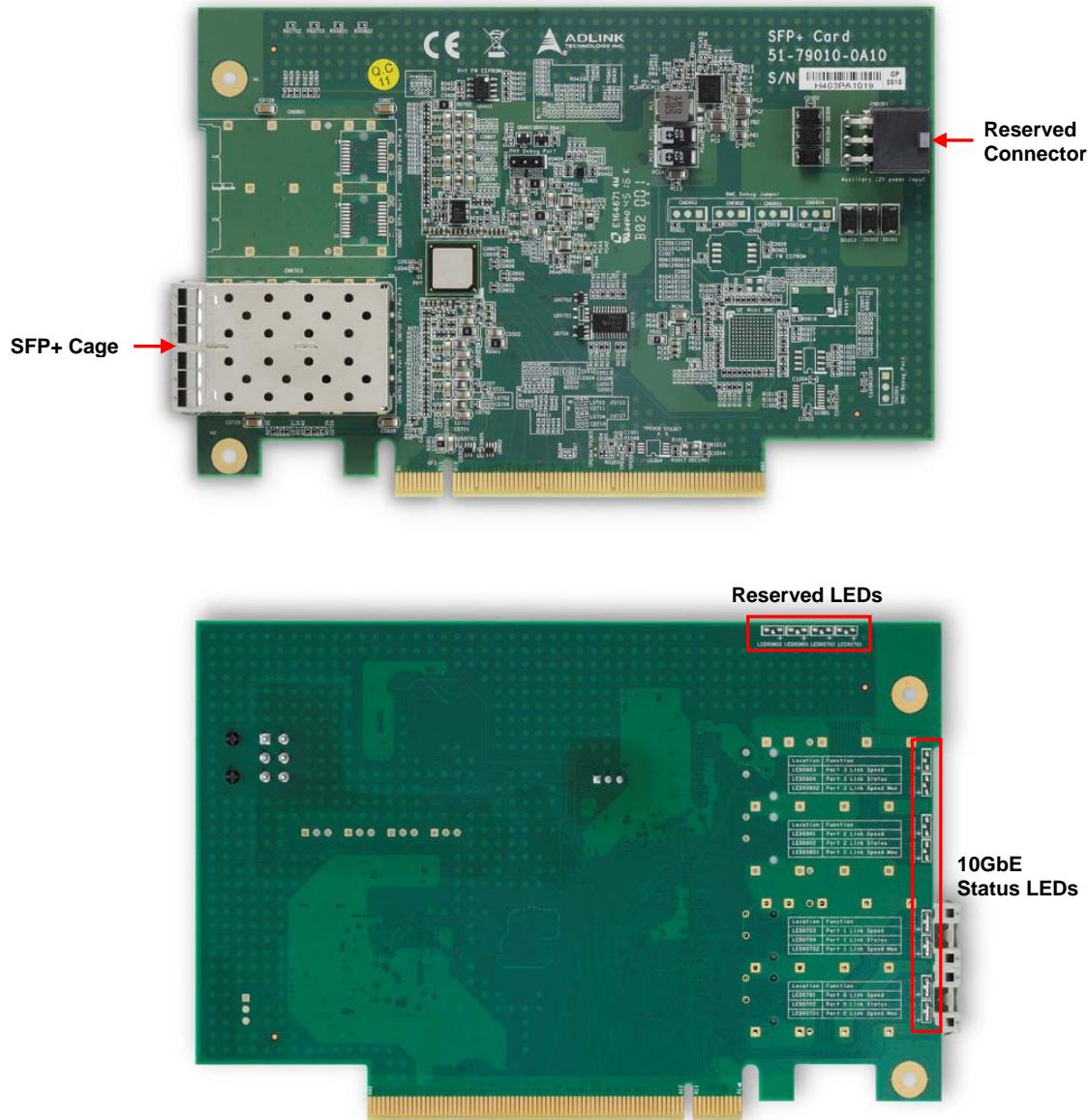
Row B		Row A	
Pin	Name	Pin	Name
B36	GND	A36	10G_KR_TX1-
B37	NC	A37	GND
B38	NC	A38	GND
B39	GND	A39	10G_PHY_MDIO_SDA0
B40	GND	A40	10G_PHY_MDC_SCL0
B41	10G_KR_RX0+	A41	GND
B42	10G_KR_RX0-	A42	GND
B43	GND	A43	10G_KR_TX0+
B44	GND	A44	10G_KR_TX0-
B45	10G_SDP3	A45	GND
B46	10G_SDP2	A46	GND
B47	GND	A47	10G_PHY_CAP_23
B48	10G_SDP1	A48	10G_PHY_CAP_01
B49	GND	A49	GND
B50	NC	A50	10G_SDP0
B51	NC	A51	GND
B52	GND	A52	NC
B53	GND	A53	NC
B54	NC	A54	GND
B55	NC	A55	GND
B56	GND	A56	NC
B57	GND	A57	NC
B58	NC	A58	GND
B59	NC	A59	GND
B60	GND	A60	NC
B61	GND	A61	NC
B62	NC	A62	GND
B63	NC	A63	GND
B64	GND	A64	NC
B65	GND	A65	NC
B66	NC	A66	GND
B67	NC	A67	GND
B68	GND	A68	NC
B69	GND	A69	NC
B70	NC	A70	GND
B71	NC	A71	GND
B72	GND	A72	NC
B73	GND	A73	NC
B74	NC	A74	GND
B75	NC	A75	GND
B76	GND	A76	NC
B77	GND	A77	NC
B78	NC	A78	GND
B79	NC	A79	GND
B80	GND	A80	NC
B81	NC	A81	NC
B82	NC	A82	GND

**Note:** Four 10GbE ports is supported by project basis

## 4. Module Interfaces and Configuration

This chapter describes connectors and pinouts, LEDs and switches that are used on the 10GbE adapter card.

### 4.1. Connector, Switch and LED Locations

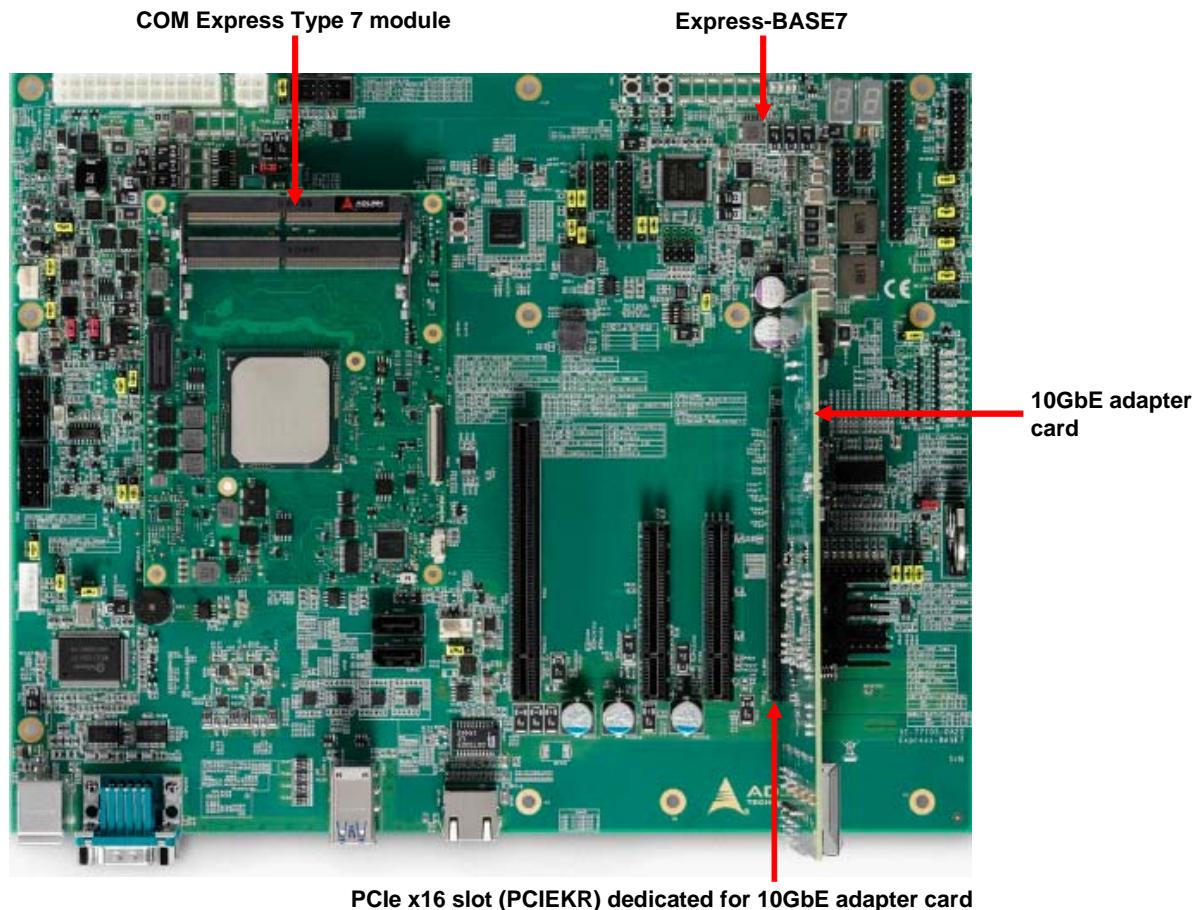


**Figure 3: 10GbE SFP+ Card Connector and LED Locations**

**Note:** See 4.4 LED Indicators for detailed 10GbE port status LED information.

## 4.2. 10GbE Adapter Card Installation

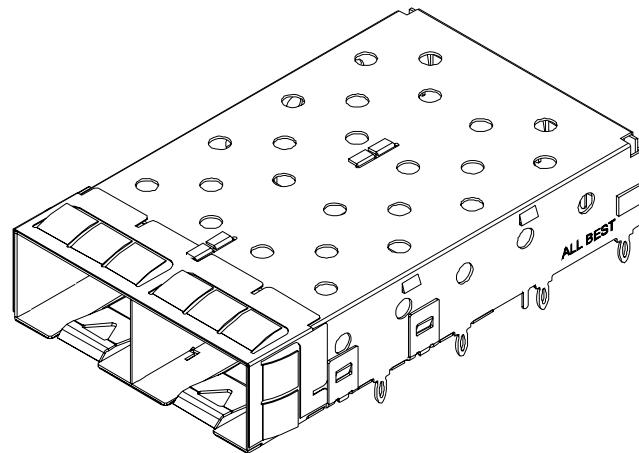
Below is an example of a 10GbE adapter card installed on the Express-BASE7 carrier board with a Type 7 COM Express Module (or illustration purposes only).



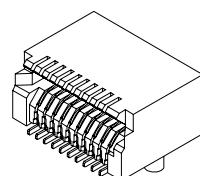
**Figure 4: 10GbE Adapter Card Installed on Express-BASE7 with Type 7 COM Express Module**

#### 4.3. SFP+ Cage and Connector

**SFP+ Cage:** 1x2 SFP+ Cage (R-SH-008040-6-F-19, All Best Electronics)

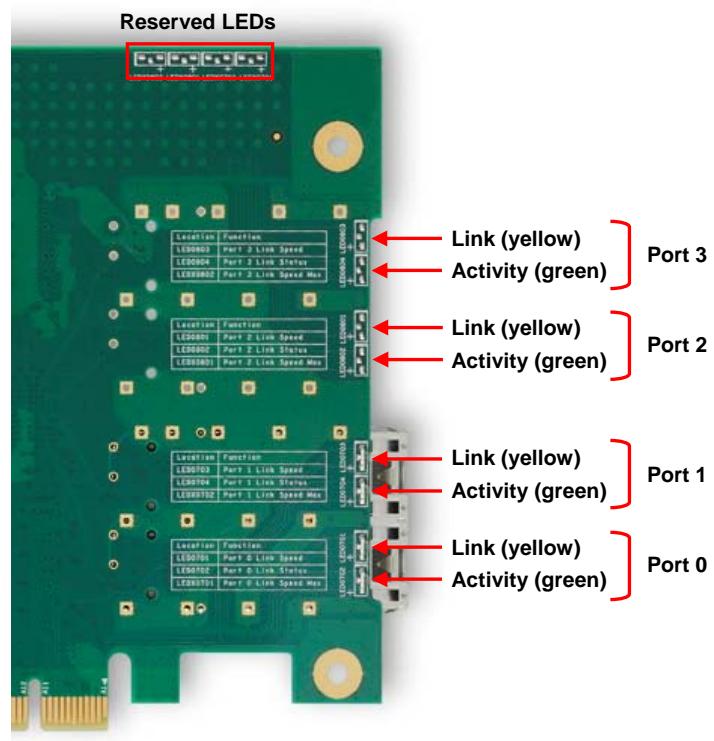


**SFP+ Connector:** SFP+ connector inside the SFP+ cage (R-SS-008020-9-N-F29, All Best Electronics)



#### 4.4. LED Indicators

There are two status LEDs for each 10GbE SFP+ port (link and activity).



Name	Color	Indication
Link	Yellow	On when linked
Activity	Green	Blinking when active
Reserved	-	Reserved for future application

**Table 3: LED Descriptions**

## Getting Service

Ask an Expert: <http://askanexpert.adlinktech.com>

### **ADLINK Technology, Inc.**

Address: 9F, No.166 Jian Yi Road, Zhonghe District  
New Taipei City 235, Taiwan  
Tel: +886-2-8226-5877  
Fax: +886-2-8226-5717  
Email: [service@adlinktech.com](mailto:service@adlinktech.com)

### **Ampro ADLINK Technology, Inc.**

Address: 5215 Hellyer Avenue, #110, San Jose, CA 95138, USA  
Tel: +1-408-360-0200  
Toll Free: +1-800-966-5200 (USA only)  
Fax: +1-408-360-0222  
Email: [info@adlinktech.com](mailto:info@adlinktech.com)

### **ADLINK Technology (China) Co., Ltd.**

Address: 300 Fang Chun Rd., Zhangjiang Hi-Tech Park, Pudong New Area  
Shanghai, 201203 China  
Tel: +86-21-5132-8988  
Fax: +86-21-5132-3588  
Email: [market@adlinktech.com](mailto:market@adlinktech.com)

### **LiPPERT ADLINK Technology GmbH**

Address: Hans-Thoma-Strasse 11, D-68163, Mannheim, Germany  
Tel: +49-621-43214-0  
Fax: +49-621 43214-30  
Email: [emea@adlinktech.com](mailto:emea@adlinktech.com)

Please visit the Contact page at [www.adlinktech.com](http://www.adlinktech.com) for information on how to contact the ADLINK regional office nearest you.