



# 050-344

## DATA SHEET

FMC CONNECTIVITY CARD

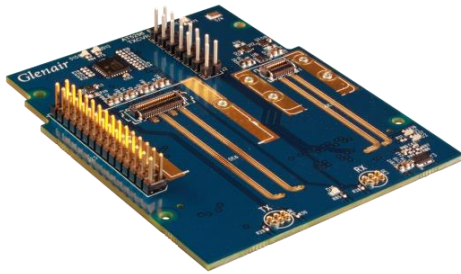
FOR GLENAIR PCB MOUNT OPTO-ELECTRONIC CONVERTERS  
TRANSCEIVERS, TRANSMITTERS AND RECEIVERS

REV	DESCRIPTION	DATE	APPROVED
A	Initial Release	3/14/2016	BD

14U2-7544

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**FMC CONNECTIVITY CARD****For Glenair PCB Mount Opto-Electronic Converters**

Glenair 050-344 FPGA Mezzanine Card (FMC) Connectivity Card provides a convenient method to easily incorporate a wide range of Glenair Harsh Environment PCB Mount Transceiver, Transmitter and Receiver products as well as Glenair size 8 Opto-electronic transmitter and receiver contacts into FPGA based systems. It is compatible with Xilinx® evaluation boards with FMC connector(s) board and uses the High Pin Count (HPC) version of the FMC connector.

This FMC card is offered in three configurations, see how to order information, to support all categories of Glenair PCB Mount devices. Electrical connections to PCB Mount Opto-electronic devices are through high speed Samtec connector mounted on the 050-344 card. The card has an FMC High Pin Count (HPC) connector to mate to the Host FPGA carrier board which interface with four high-speed serial transceivers on the FPGA carrier board. It is compatible with either HPC or Low Pin Count (LPC) connector (restricted to single high-speed serial transceiver for LPC) on the host board. The 050-344 card also incorporates LEDs for RX LOS indications as well as a low-jitter 156.25MHz oscillator for use as a clock source for the high-speed serial transceivers. The board also incorporates I<sup>2</sup>C current monitor IC and an I<sup>2</sup>C GPIO IC so each DUT can be monitored. 22 GPIO pins are also made available for the user.

**KEY FEATURES/BENEFITS**

- Industry standard, modular FPGA I/O in FMC (VITA 57.1) module
- Supports large variety of Opto-Electronic devices suitable for Harsh Environment (Wide temperature ranges and Extremely High Vibration)
  - 10 Mbps to 12.5 Gbps
- Direct connections between Glenair PCB Mount transceivers and host FPGA ensures maximum throughput and minimum latency
- HPC – High Pin Count FMC
  - Provides access to 4 high speed transceivers
  - Compatible with LPC Host board connectors as well but then restricted to single high-speed transceiver (DP0)

- Low-jitter 156.25 MHz Clock source available on-board
- SFF 8472 Digital Diagnostic Monitoring (DMI) can be accessed from host board via I<sup>2</sup>C or via connector Header
- I<sup>2</sup>C GPIO for current monitoring, RX\_LOS, TX\_FAULT, TX\_DISABLE control and signaling

**APPLICATIONS**

- As an evaluation tool for Glenair Opto-electronic modules which are suited to Harsh Environment Applications such as: Airborne, Tactical Military, Oil and Gas, Railway and Shipboard
  - Ethernet, Fibre Channel, 1x, 2x, 4x, 8x, SFPDP, Aurora
  - Video (DVI, SMPTE, ARINC818, etc)

**HOW TO ORDER**

Part Number	Description of Products to be tested	Glenair Opto-Electronic Existing and Planned Products supported:
050-344-A	Transceivers,	050-315, 050-318, 050-321, 050-324, 050-327, 050-340, 050-341, 050-342, 050-343, 050-352, 050-354, 050-356, 050-357, 050-362, 050-361, 050-369
	Dual-Transceivers	050-333
	Size 8 TX & RX OE Contacts	050-301, 050-307
050-344-B	Dual-Transmitters	050-316, 050-319, 050-325, 050-331,
	Dual-Receivers	050-317, 050-320, 050-326, 050-332
050-344-C	Quad-Transmitters	050-336, 050-363, 050-374,
	Quad-Receivers	050-337, 050-364, 050-375

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**FMC CONNECTIVITY CARD****For Glenair PCB Mount Opto-Electronic Converters****What is included with 050-344:**

- FMC Connectivity Card (050-344)
- 050-344 Datasheet

**Opto-Electronic Devices and Test cables sold separately: Many options can be supported.**

- Glenair PCB Mount devices Selection Guide
  - [http://www.glenair.com/opto\\_electronic/b.htm](http://www.glenair.com/opto_electronic/b.htm)
- Fiber Optic Test cables as required:
  - MMF & SMF test cables can be configured to support all Glenair Opto-electronic components
  - FA03216: [http://www.glenair.com/opto\\_electronic/pdf/b/fa03216.pdf](http://www.glenair.com/opto_electronic/pdf/b/fa03216.pdf)

**FMC I/O PINOUT****FMC HPC SAMTEC P/N:(ASP-134488-01)**

	A	B	C	D	E	F	G	H	I	J
1	GND	RES1	GND	PG_C2M	GND	NC	GND	NC	GND	NC
2	DP1_M2C_P	GND	DP0_C2M_P	GND	NC	GND	NC	NC	NC	GND
3	DP1_M2C_N	GND	DP0_C2M_N	GND	NC	GND	NC	GND	NC	GND
4	GND	NC	GND	GBTCLK0_M2C_P	GND	NC	GND	NC	GND	NC
5	GND	NC	GND	GBTCLK0_M2C_N	GND	NC	GND	NC	GND	NC
6	DP2_M2C_P	GND	DP0_M2C_P	GND	NC	GND	LA00_P_CC	GND	NC	GND
7	DP2_M2C_N	GND	DP0_M2C_N	GND	NC	NC	LA00_N_CC	LA02_P	NC	NC
8	GND	NC	GND	SCL1	GND	NC	GND	LA02_N	GND	NC
9	GND	NC	GND	SDA1	NC	GND	LA03_P	GND	NC	GND
10	DP3_M2C_P	GND	LA06_P	GND	NC	NC	LA03_N	LA04_P	NC	NC
11	DP3_M2C_N	GND	LA06_N	LA05_P	GND	NC	GND	LA04_N	GND	NC
12	GND	NC	GND	LA05_N	NC	GND	LA08_P	GND	NC	GND
13	GND	NC	GND	GND	NC	NC	LA08_N	LA07_P	NC	NC
14	NC	GND	LA10_P	LA09_P	GND	NC	GND	LA07_N	GND	NC
15	NC	GND	LA10_N	LA09_N	NC	GND	SDA2	GND	NC	GND
16	GND	NC	GND	GND	NC	NC	SCL2	LA11_P	NC	NC
17	GND	NC	GND	NC	GND	NC	GND	LA11_N	GND	NC
18	NC	GND	NC	NC	NC	GND	NC	GND	NC	GND
19	NC	GND	NC	GND	NC	NC	NC	NC	NC	NC
20	GND	NC	GND	NC	GND	NC	GND	NC	GND	NC
21	GND	NC	GND	NC	NC	GND	NC	GND	NC	GND
22	DP1_C2M_P	GND	NC	GND	NC	NC	NC	NC	NC	NC
23	DP1_C2M_N	GND	NC	NC	GND	NC	GND	NC	GND	NC
24	GND	NC	GND	NC	NC	GND	NC	GND	NC	GND
25	GND	NC	GND	GND	NC	NC	NC	NC	NC	NC
26	DP2_C2M_P	GND	NC	NC	GND	NC	GND	NC	GND	NC
27	DP2_C2M_N	GND	NC	NC	NC	GND	NC	GND	NC	GND
28	GND	NC	GND	GND	NC	NC	NC	NC	NC	NC
29	GND	NC	GND	NC	GND	NC	GND	NC	GND	NC
30	DP3_C2M_P	GND	NC	TDI/TDO_LOOP	NC	GND	NC	GND	NC	GND
31	DP3_C2M_N	GND	NC	TDO/TDI_LOOP	NC	NC	NC	NC	NC	NC
32	GND	NC	GND	NC	GND	NC	GND	NC	GND	NC
33	GND	NC	GND	NC	NC	GND	NC	GND	NC	GND
34	NC	GND	NC	NC	NC	NC	NC	NC	NC	NC
35	NC	GND	NC	NC	GND	NC	GND	NC	GND	NC
36	GND	NC	GND	3P3V	NC	GND	NC	GND	NC	GND
37	GND	NC	NC	GND	NC	NC	NC	NC	NC	NC
38	NC	GND	GND	3P3V	GND	NC	GND	NC	GND	NC
39	NC	GND	3P3V	GND	VADJ	GND	NC	GND	NC	GND
40	GND	NC	GND	3P3V	GND	NC	GND	NC	GND	NC

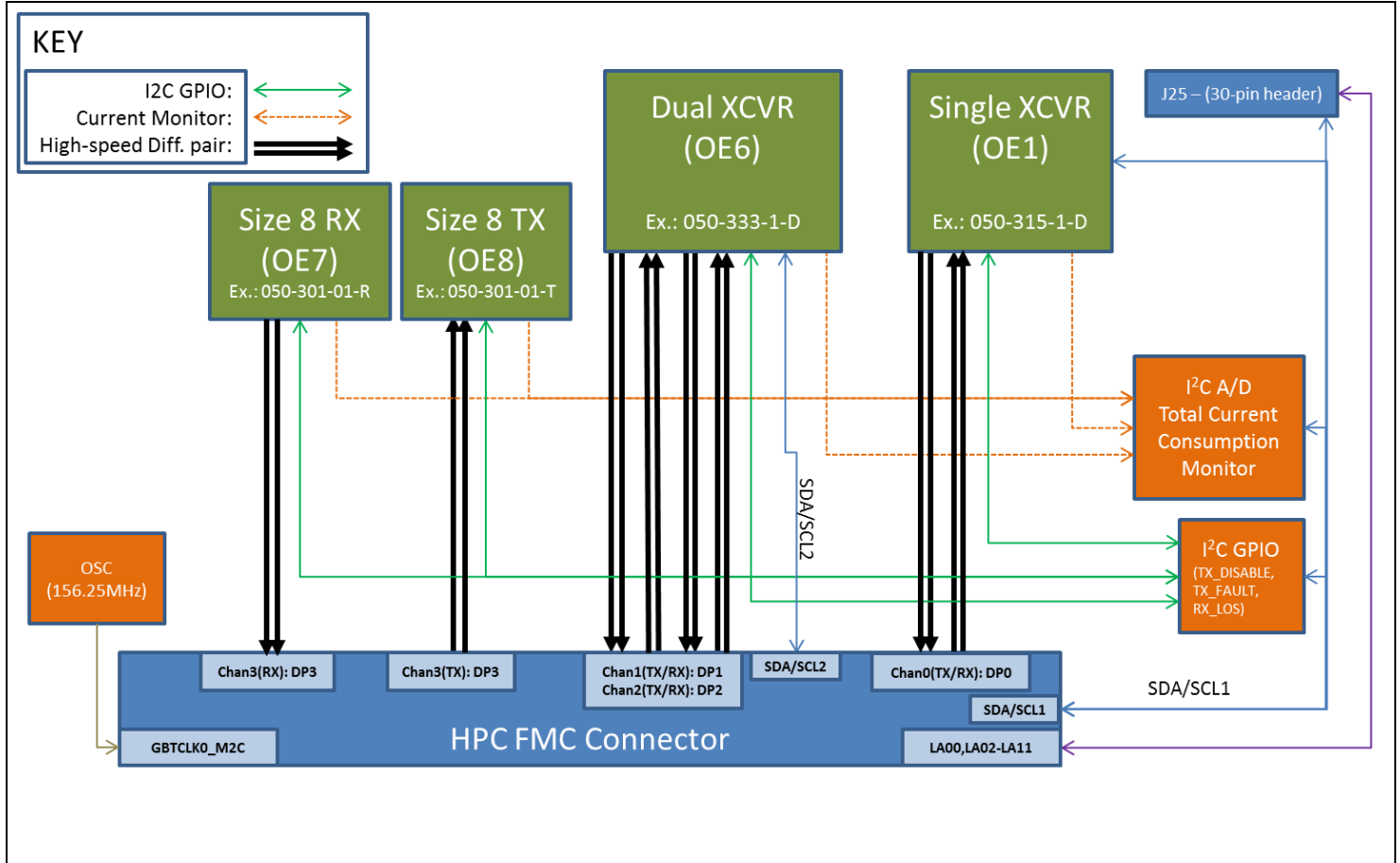
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# FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters



## Functional Block Diagram (050-344-A)



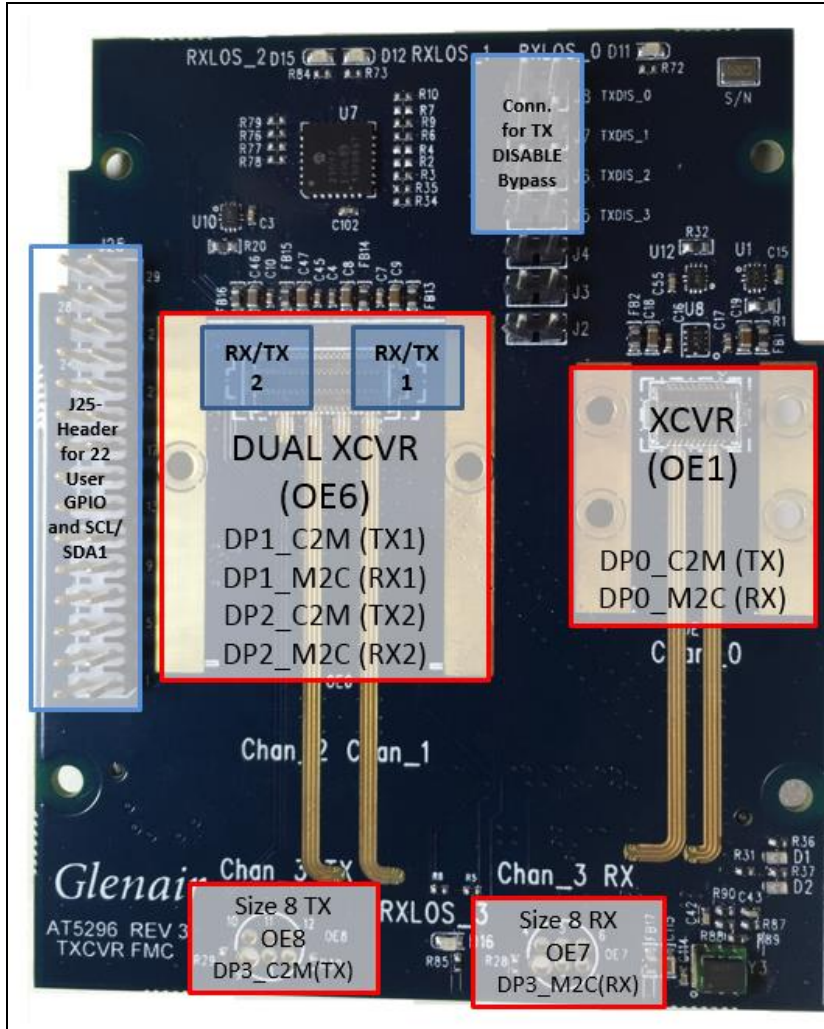
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## FMC CONNECTIVITY CARD

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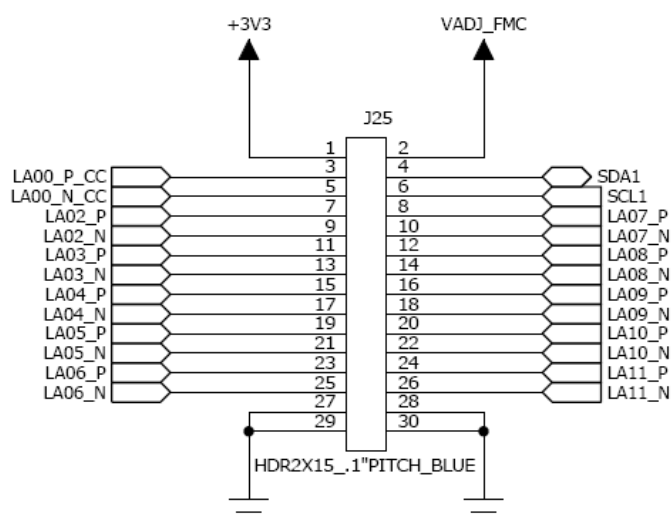


### Pictorial Block Diagram (050-344-A)

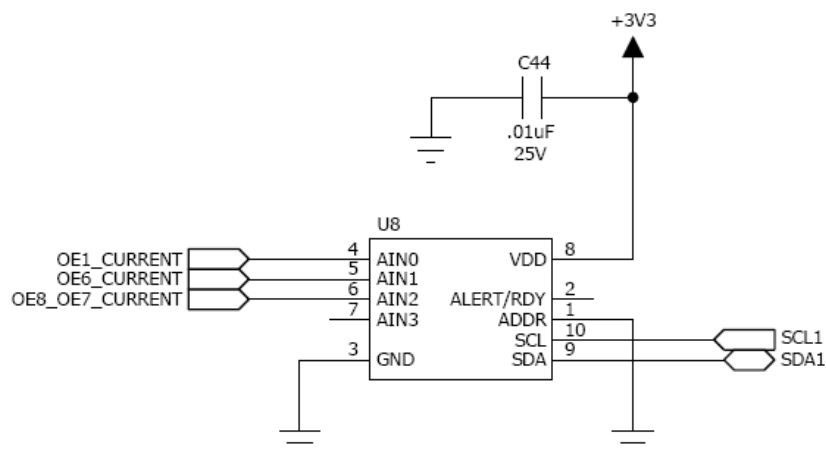


Pictorial Overview of the FMC card

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**FMC CONNECTIVITY CARD****For Glenair PCB Mount Opto-Electronic Converters****Schematic User interface Blocks (050-344-A)****J25 Header pinout**

This shows the J25 .1" header pinout. LA00, LA02-LA11 are all user GPIO that routes directly to the FMC connector. The I<sup>2</sup>C bus SDA/SCL1 is pulled out here for attachment to an external I<sup>2</sup>C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

**U8 Current Monitor (I<sup>2</sup>C A/D)**

This is an I<sup>2</sup>C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

IC P/N: ADS1015IRUGT (Texas Instruments)  
I<sup>2</sup>C Address: 1001000X



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## FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters

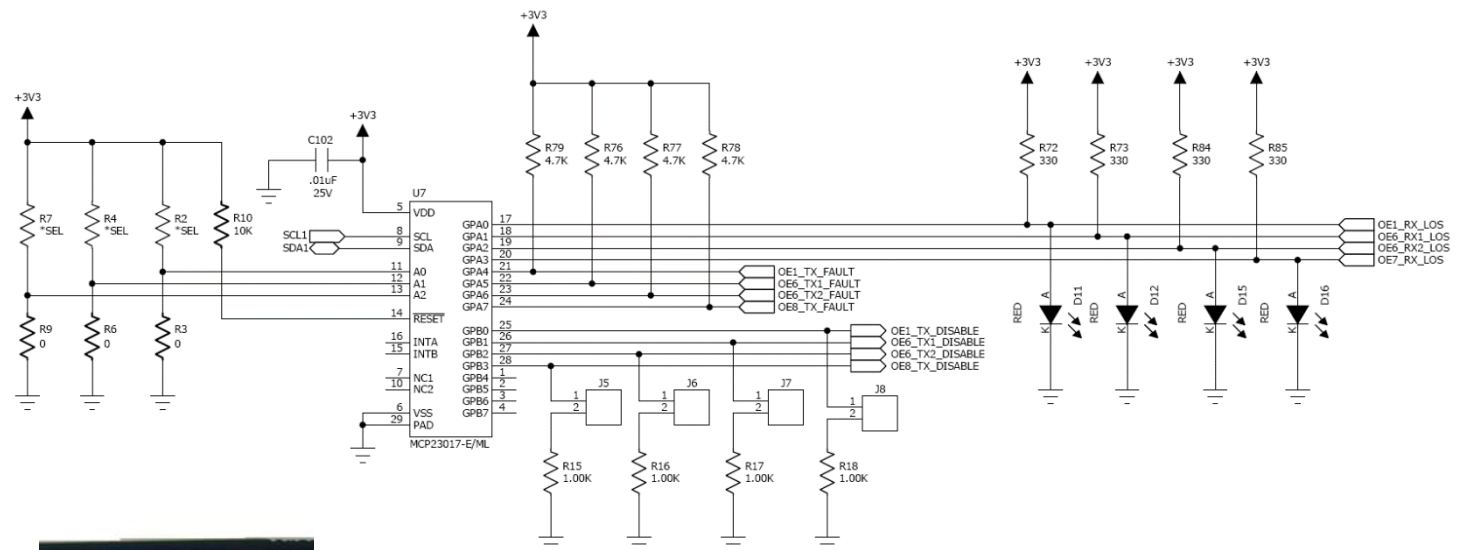


## Schematic User interface Blocks (050-344-A) continued

U7 I<sup>2</sup>C GPIO

This is an I<sup>2</sup>C controlled GPIO device that can be used to read the RX\_LOS signal and TX\_FAULT status of each transceiver as well as set the TX\_DISABLE lines to disable the transmitter output. If control of this is not desired the user can use a jumper on the J5, J6, J7 and J8 headers to manually enable the transmitter output. The headers are also marked on the board as TXDIS\_0 for channel 0 (single XCVR) TXDIS\_1 for channel 1 (Dual XCVR first chan.) and so on.

IC P/N: MCP23017-E/ML (Microchip)  
I<sup>2</sup>C address: 0100000X



← Headers to manually enable the transmitters

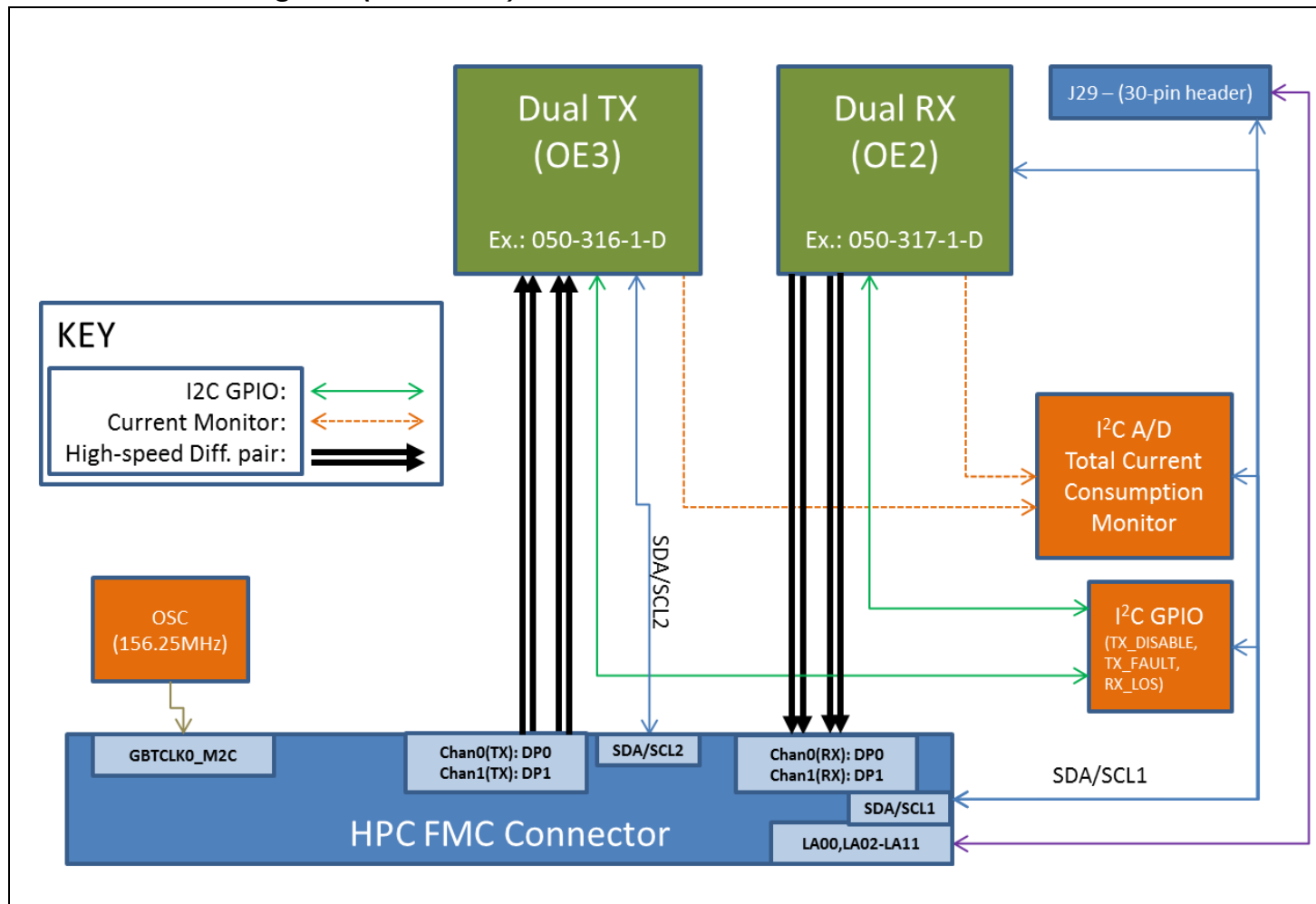
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# FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters



## Functional Block Diagram (050-344-B)





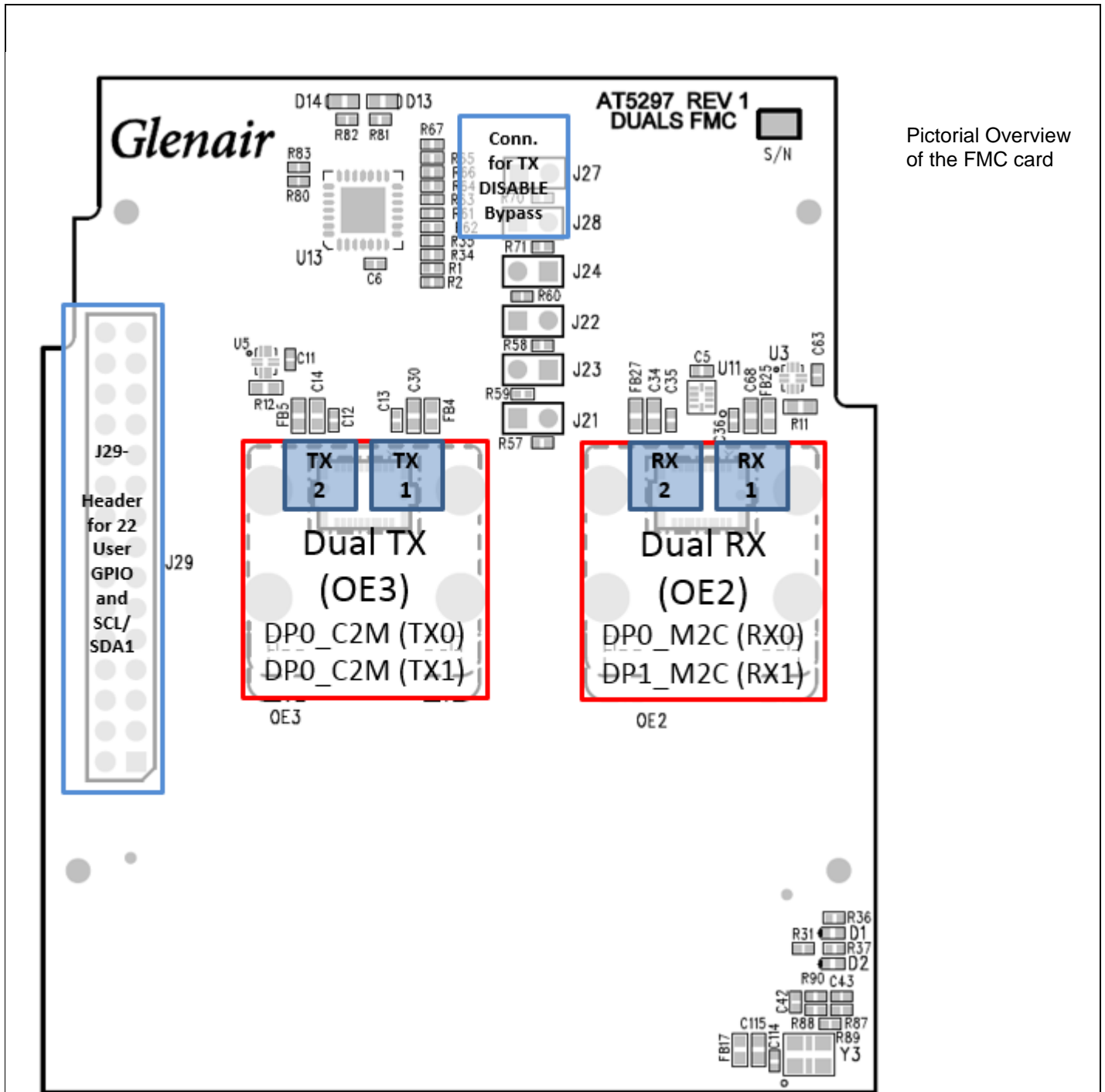
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# FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters

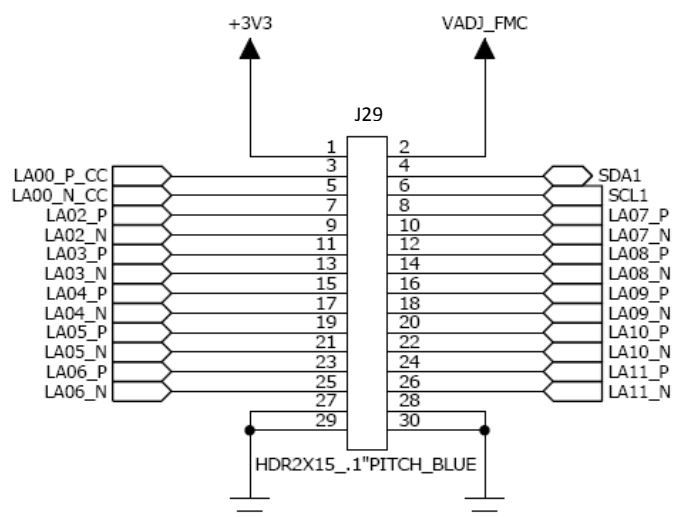


## Pictorial Block Diagram (050-344-B)

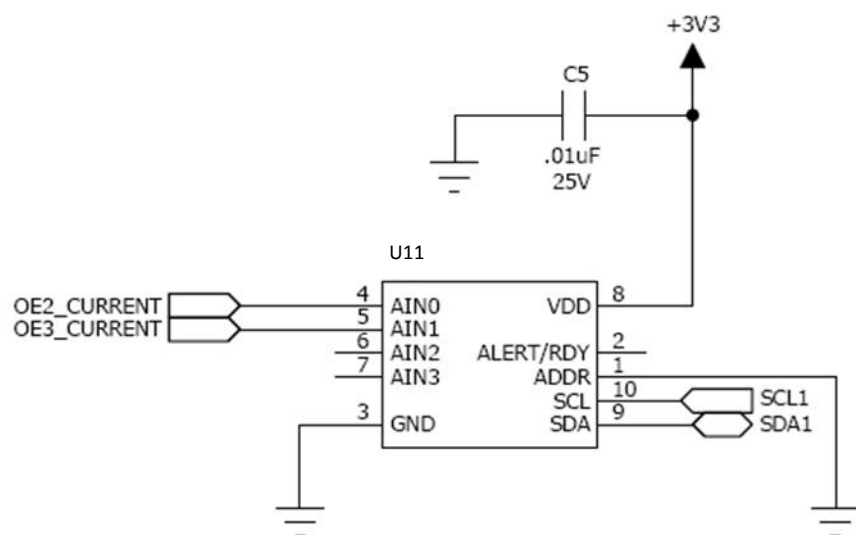


Pictorial Overview of the FMC card

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**FMC CONNECTIVITY CARD****For Glenair PCB Mount Opto-Electronic Converters****Schematic User interface Blocks (050-344-B)****J29 Header pinout**

This shows the J29 .1" header pinout. LA00,LA02-LA11 are all user GPIO that routes directly to the FMC connector. The I<sup>2</sup>C bus SDA/SCL1 is pulled out here for attachment to an external I<sup>2</sup>C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

**U11 Current Monitor (I<sup>2</sup>C A/D)**

This is an I<sup>2</sup>C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

IC P/N: ADS1015IRUGT (Texas Instruments)  
I<sup>2</sup>C Address:1001000X

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## FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters



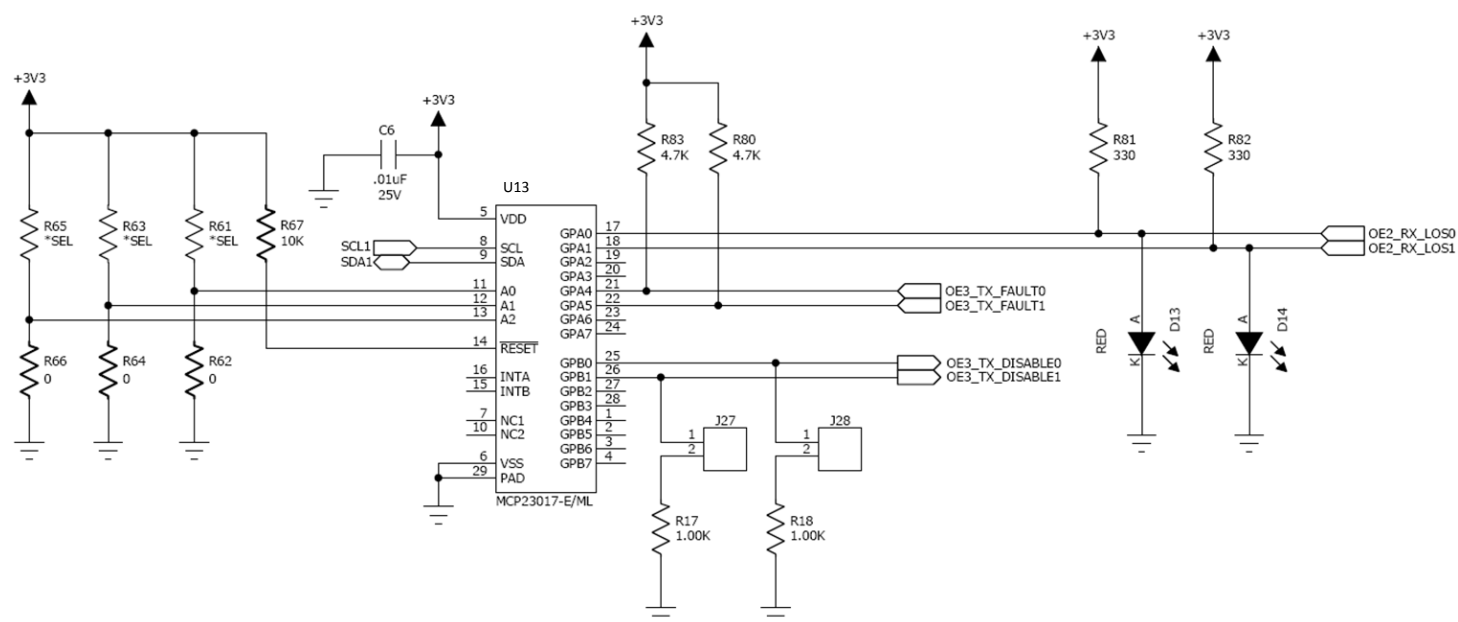
## Schematic User interface Blocks (050-344-B) continued

U13 I<sup>2</sup>C GPIO

This is an I2C controlled GPIO device that can be used to read the RX\_LOS signal and TX\_FAULT status of each transceiver as well as set the TX\_DISABLE lines to disable the transmitter output. If control of this is not desired the user can use a jumper on the J27 and J28 headers to manually enable the transmitter output. The headers are also marked on the board as TXDIS\_0 for channel 0 (single XCVR) TXDIS\_1 for channel 1 (Dual XCVR first chan.) and so on.

IC P/N: MCP23017-E/ML (Microchip)

I2C address: 0100000X



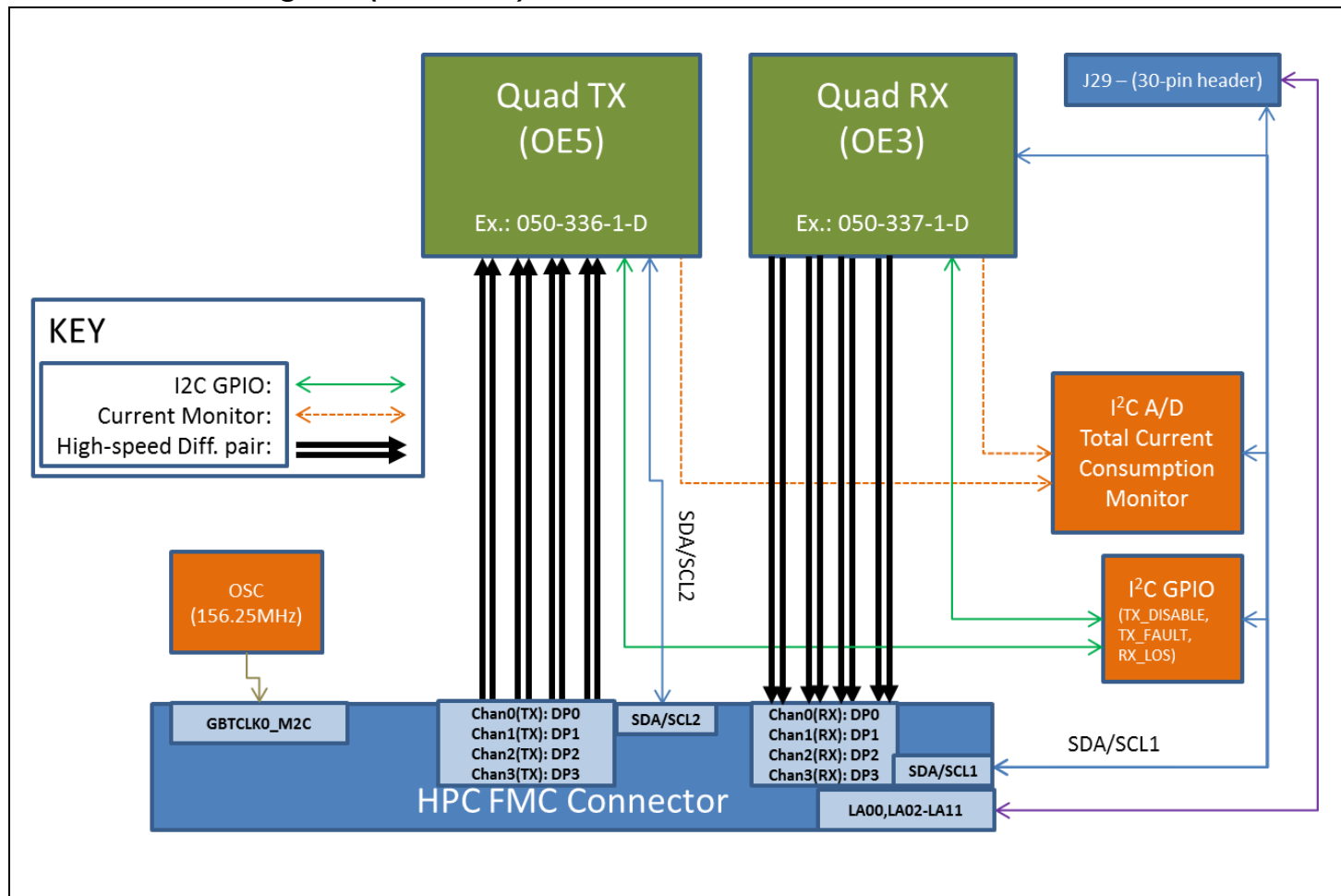
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# FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters



## Functional Block Diagram (050-344-C)



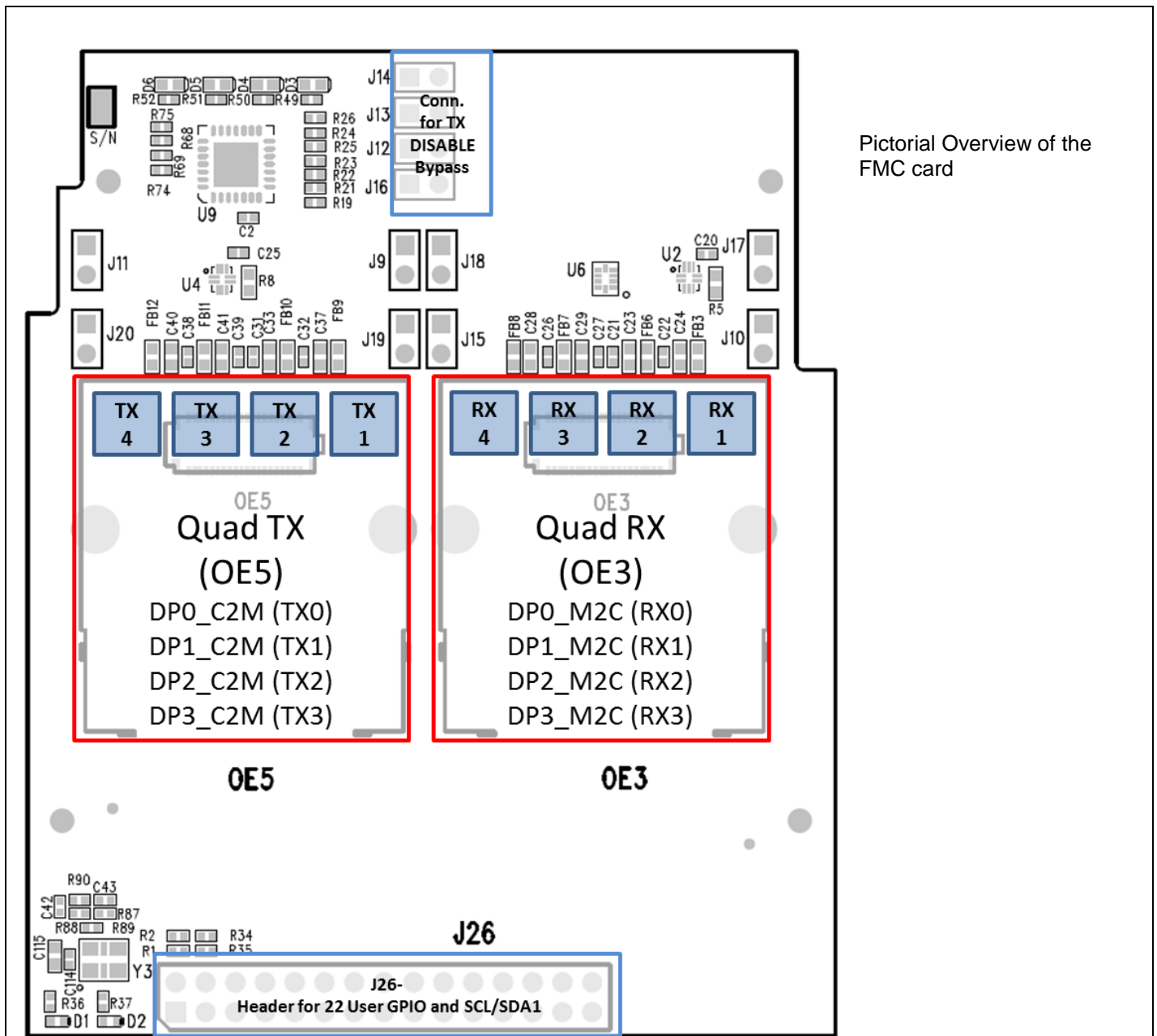
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# FMC CONNECTIVITY CARD

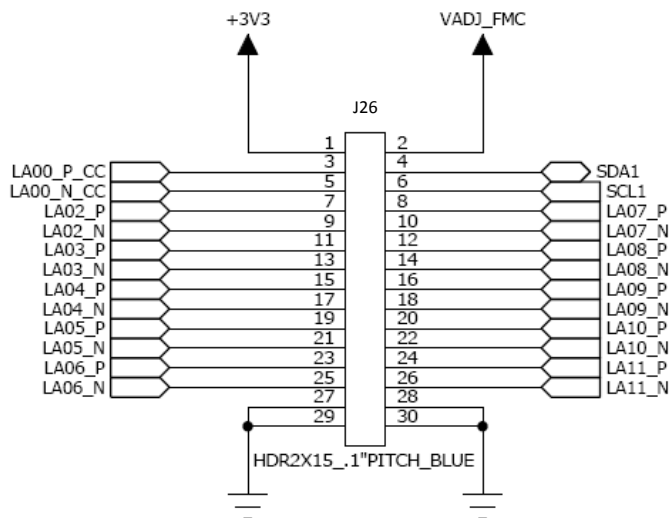
For Glenair PCB Mount Opto-Electronic Converters



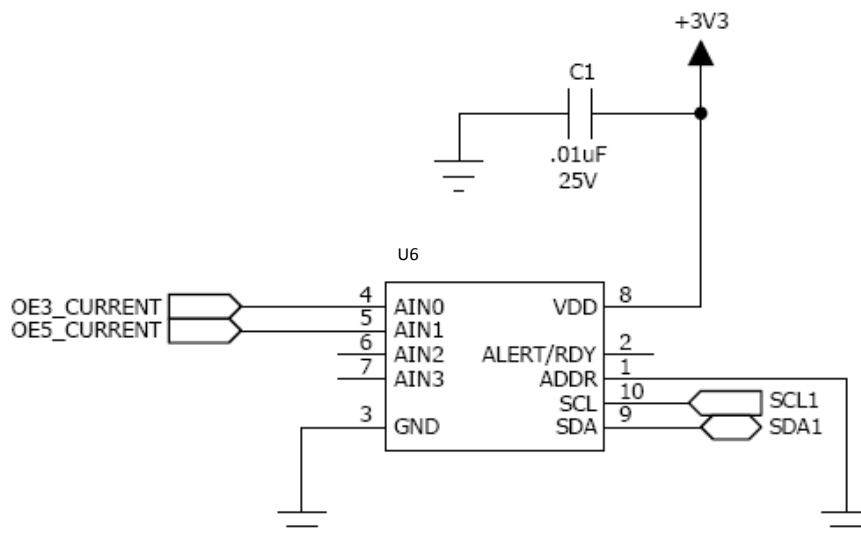
## Pictorial Block Diagram (050-344-C)



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**FMC CONNECTIVITY CARD****For Glenair PCB Mount Opto-Electronic Converters****Schematic User interface Blocks (050-344-C)****J26 Header pinout**

This shows the J26 .1" header pinout. LA00, LA02-LA11 are all user GPIO that routes directly to the FMC connector. The I<sup>2</sup>C bus SDA/SCL1 is pulled out here for attachment to an external I<sup>2</sup>C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

**U6 Current Monitor (I<sup>2</sup>C A/D)**

This is an I<sup>2</sup>C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

IC P/N: ADS1015IRUGT (Texas Instruments)  
I<sup>2</sup>C Address: 1001000X

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## FMC CONNECTIVITY CARD

For Glenair PCB Mount Opto-Electronic Converters



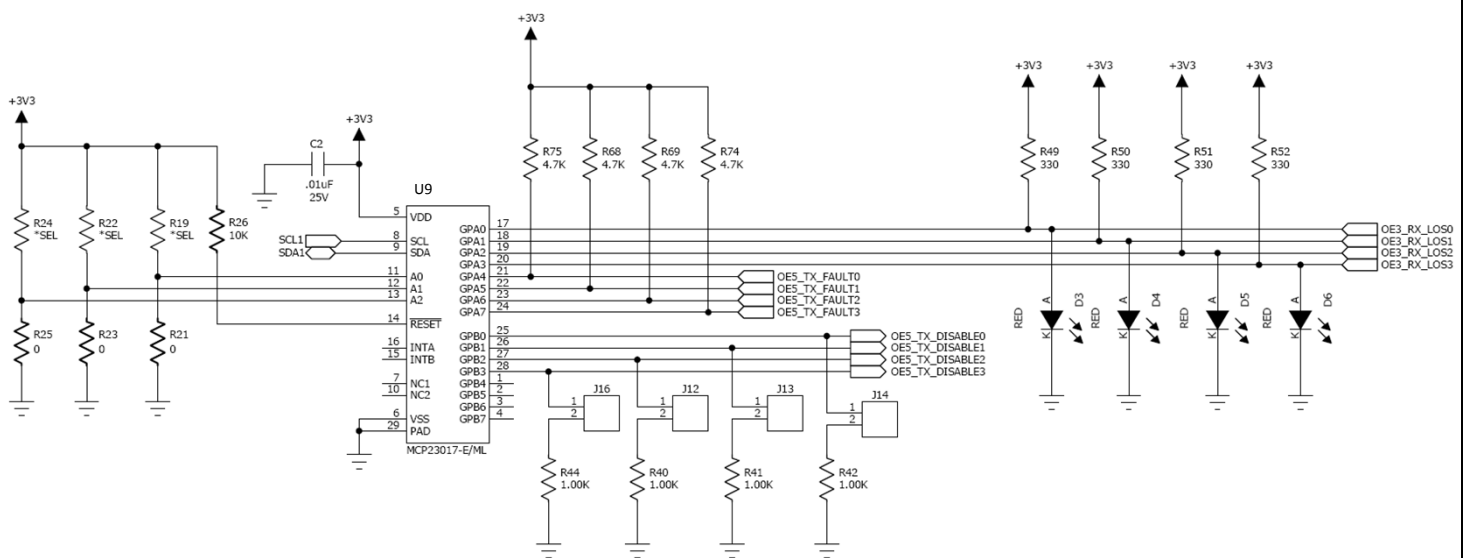
## Schematic User interface Blocks (050-344-C) continued

U9 I<sup>2</sup>C GPIO

This is an I2C controlled GPIO device that can be used to read the RX\_LOS signal and TX\_FAULT status of each transceiver as well as set the TX\_DISABLE lines to disable the transmitter output. If control of this is not desired the user can use a jumper on the J16, J12, J13 or J14 headers to manually enable the transmitter output.

IC P/N: MCP23017-E/ML (Microchip)

I2C address: 0100000X







## Supported Media

Glenair Fiber Optic Transceivers, Transmitters, Receivers from 100Mbps to 10Gbps

## FPGA Interface

- FMC High Pin Count (HPC) connector
  - Four (4) high-speed serial FMC links DP0 – DP3 differential pairs
  - 22 GPIO for user signals (LA00,LA02-LA11)
  - Two (2) I<sup>2</sup>C buses for transceiver status and control
    - I<sup>2</sup>C A/D to read transceiver current
    - I<sup>2</sup>C GPIO to control TX\_DISABLE and read TX\_FAULT and RX\_LOS status
  - Jumpers to bypass TX\_DISABLE signals
  - LED indication for Loss of Signal (RX\_LOS)

## Reference clock

- 156.25 MHz LVPECL differential Clock Oscillator input on GBTCLK0 pins [ABRACON (ASEMPLP-156.250MHZ-LR-T)]

## Host boards:

- Spartan-6 Xilinx EK-S6-SP605
- Virtex-6 Xilinx EK-V6-ML605
- Kintex-7 Xilinx EK-K7-KC705
- Virtex-7 Xilinx EK-V7-VC707
- Zynq-7000 Avnet AES-MINI-ITX-7Z045