050-344

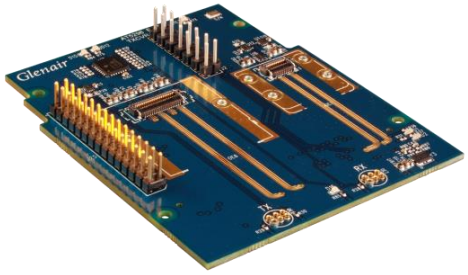
DATA SHEET

FMC CONNECTIVITY CARD
FOR GLENAIR PCB MOUNT OPTO-ELECTRONIC
TRANSCEIVERS, TRANSMITTERS AND RECEIVERS

REV	DESCRIPTION	DATE	APPROVED
A	Initial Release	03/14/2016	BD
B	Per DCN 60989; Add new 050-344 BOMs with jumpers included. Add ECCN	07/18/2016	GC, RAS
C	Per DCN 63527; Remove ECCN Information	01/19/2017	RAS/GC
D	Per DCN 64942; Add new p/n's to what the evalboard can test	05/01/2017	RAS/GC
E	Per DCN 64974; Clarify VITA 57.1 applicability	05/03/2017	RAS
F	Per DCN 70008; Add 050-344-D P/N that allows FMC card to evaluate 050-346	04/12/2018	SZ/GC

BF14U2-7544

050-344 DATASHEET
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 uses the High Pin Count (HPC) connector and is compatible with FPGA evaluation boards that are compliant with the VITA 57.1 Specification.

This FMC card is offered in four configurations to support all categories of Glenair PCB Mount devices (see how to order information). Electrical connections to PCB Mount Opto-Electronic devices are through a high-speed Samtec connector mounted on the 050-344 card. The card has an FMC High Pin Count (HPC) connector to mate to a VITA 57.1 compliant Host FPGA carrier board which interfaces 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^2C current monitor IC and an I^2C 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^2C or via connector Header
- I^2C 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 Products supported:	Test Cables included:
050-344-A	Transceivers, Dual-Transceivers, Size 8 TX & RX OE Contacts	050-315, 050-318, 050-321, 050-324, 050-327, 050-328, 050-333, 050-340, 050-341, 050-342, 050-343, 050-352, 050-354, 050-379, 050-348, 050-373, 050-389	No
050-344-A-2SMF09GC	*Single Mode Fiber* Transceivers	050-318, 050-324, 050-328, 050-340, 050-341, 050-342, 050-343, 050-352, 050-354, 050-379	Yes
050-344-A-2MMF50GC **050-344-A-2MMF62GC**	*Multi Mode Fiber* Transceivers	050-315, 050-321, 050-327, 050-348, 050-389	Yes
050-344-A-4MMF50ARINC **050-344-A-4MMF62ARINC**	*Multi Mode Fiber* Dual Transceivers	050-333, 050-373	Yes
050-344-B	*Dual-Transmitters Dual-Receivers*	050-316, 050-317, 050-319, 050-320, 050-331, 050-332, 050-356, 050-357, 050-376, 050-386	No
050-344-B-2SMF09GC	*Single Mode Fiber* Dual-Transmitters	050-319, 050-356, 050-376	Yes
	Single Mode Fiber Dual-Receivers	050-320, 050-357	Yes
050-344-B-2MMF50GC **050-344-B-2MMF62GC**	*Multi Mode Fiber* Dual-Transmitters	050-316, 050-331, 050-386	Yes
	Multi Mode Fiber Dual-Receivers	050-317, 050-332	Yes
050-344-C	*Quad Transmitters Quad Receivers*	050-336, 050-337, 050-374, 050-375	No
050-344-C-4MMF50ARINC	*Quad-Transmitters*	050-336, 050-374	Yes
050-344-C-4MMF62ARINC	*Quad-Receivers*	050-337, 050-375	Yes
050-344-D	*4 X10 Gbps Parallel Fiber-Optic Transceiver*	050-346	No
050-344-D-1MMF50MTP	*4X10 Gbps Parallel Fiber-Optics Transceiver*	050-346	Yes

What is included with 050-344-A:

- The 050-344-A Evaluation board includes the following
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - No Fiber Test Jumper Cables included

- The 050-344-A-2SMF09GC kit includes the following:
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - 2 Fiber Optic SMF test jumper cables (1-2m, 9µm/125µm, GC Connector to LC Connector)

050-344-A-2SMF09GC	USED TO TEST THE FOLLOWING: 050-318, 050-324, 050-328, 050-340, 050-341, 050-342, 050-343, 050-352, 050-354, 050-379

- The 050-344-A-2MMF50GC kit includes the following:
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - 2 Fiber Optic MMF test jumper cables (1-2m, 50µm/125µm, GC Connector to LC Connector)

050-344-A-2MMF50GC	USED TO TEST THE FOLLOWING: 050-315, 050-321, 050-327, 050-348, 050-389

- The 050-344-A-2MMF62GC kit includes the following:
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - 2 Fiber Optic MMF test jumper cables (1-2m, 62µm/125µm, GC Connector to LC Connector)

050-344-A-2MMF62GC	USED TO TEST THE FOLLOWING: 050-315, 050-321, 050-327, 050-348, 050-389

- The 050-344-A-4MMF50ARINC kit includes the following:
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - 4 Fiber Optic MMF test jumper cables (1-2m, 50µm/125µm, ARINC801 Connector to LC Connector)

050-344-A-4MMF50ARINC	USED TO TEST THE FOLLOWING: 050-333, 050-373

- The 050-344-A-4MMF62ARINC kit includes the following:
  - FMC Connectivity Card (050-344-A)
  - 050-344 Datasheet
  - 4 Fiber Optic MMF test jumper cables (1-2m, 62µm/125µm, ARINC801 Connector to LC Connector)

050-344-A-4MMF62ARINC	USED TO TEST THE FOLLOWING: 050-333, 050-373

What is included with 050-344-B:

- The 050-344-B Evaluation board includes the following
  - FMC Connectivity Card (050-344-B)
  - 050-344 Datasheet
  - No Fiber Test Jumper Cables included

- The 050-344-B-2SMF09GC kit includes the following:
  - FMC Connectivity Card (050-344-B)
  - 050-344 Datasheet
  - 2 Fiber Optic SMF test jumper cables (1-2m, 9µm/125µm, GC Connector to LC Connector)

050-344-B-2SMF09GC	USED TO TEST THE FOLLOWING: 050-319, 050-320, 050-325, 050-356, 050-357, 050-376

- The 050-344-B-2MMF50GC kit includes the following:
  - FMC Connectivity Card (050-344-B)
  - 050-344 Datasheet
  - 2 Fiber Optic MMF test jumper cables (1-2m, 50µm/125µm, GC Connector to LC Connector)

050-344-B-2MMF50GC	USED TO TEST THE FOLLOWING: 050-316, 050-317, 050-331, 050-386

- The 050-344-B-2MMF62GC kit includes the following:
  - FMC Connectivity Card (050-344-B)
  - 050-344 Datasheet
  - 2 Fiber Optic MMF test jumper cables (1-2m, 62µm/125µm, GC Connector to LC Connector)

050-344-B-2SMF62GC	USED TO TEST THE FOLLOWING: 050-316, 050-317, 050-331, 050-386

What is included with 050-344-C:

- The 050-344-C Evaluation board includes the following
  - FMC Connectivity Card (050-344-C)
  - 050-344 Datasheet
  - No Fiber Test Jumper Cables included

- The 050-344-C-4MMF50ARINC kit includes the following:
  - FMC Connectivity Card (050-344-C)
  - 050-344 Datasheet
  - 4 Fiber Optic MMF test jumper cables (1-2m, 50µm/125µm, ARINC801 Connector to LC Connector)

050-344-C-4MMF50ARINC	USED TO TEST THE FOLLOWING: 050-336, 050-337, 050-374, 050-375

- The 050-344-C-4MMF62ARINC kit includes the following:
  - FMC Connectivity Card (050-344-C)
  - 050-344 Datasheet
  - 4 Fiber Optic MMF test jumper cables (1-2m, 62µm/125µm, ARINC801 Connector to LC Connector)

050-344-C-4MMF62ARINC	USED TO TEST THE FOLLOWING: 050-336, 050-337, 050-374, 050-375

What is included with 050-344-D:

- The 050-344-D Evaluation board includes the following
  - FMC Connectivity Card (050-344-D)
  - 050-344-D Datasheet
  - No Fiber Test Jumper Cables included

- The 050-344-D-1MMF50MTP kit includes the following:
  - FMC Connectivity Card (050-344-C)
  - 050-344 Datasheet
  - 1 Fiber Optic MMF test jumper cables (1-2m, 50µm/125µm, MTP Connector to LC Connector)

050-344-D-1MMF50MTP	USED TO TEST THE FOLLOWING: 050-346

Opto-Electronic Devices sold separately: Many options can be supported.

- Glenair PCB Mount devices Selection Guide
  - http://www.glenair.com/opto_electronic/b.htm

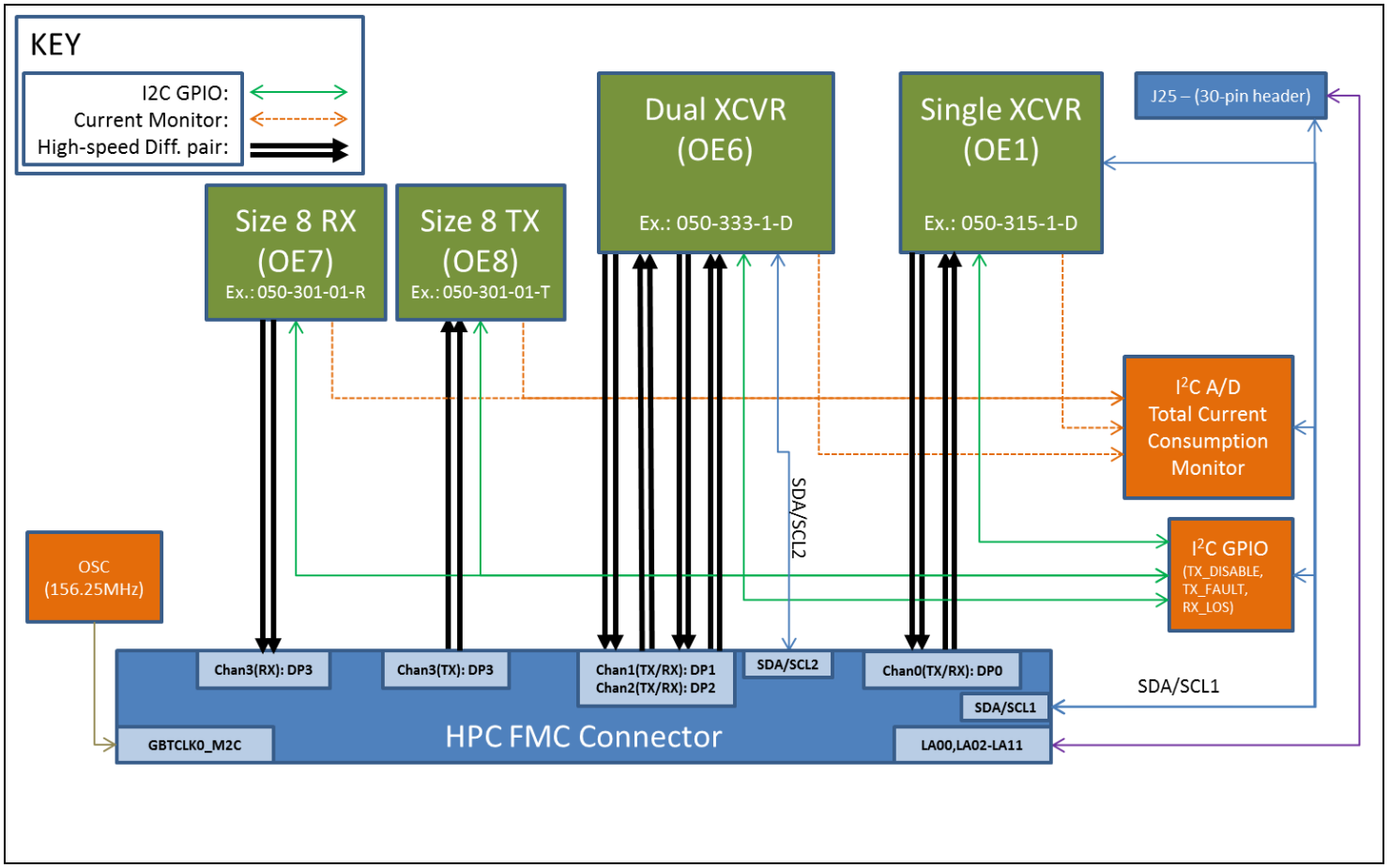
- Fiber Optic Test cables as required:
  - MMF & SMF test cables can be configured to support all Glenair Opto-electronic components
  - FA03216: http://www.glenair.com/opto_electronic/pdf/b/fa03216.pdf

FMC I/O PINOUT

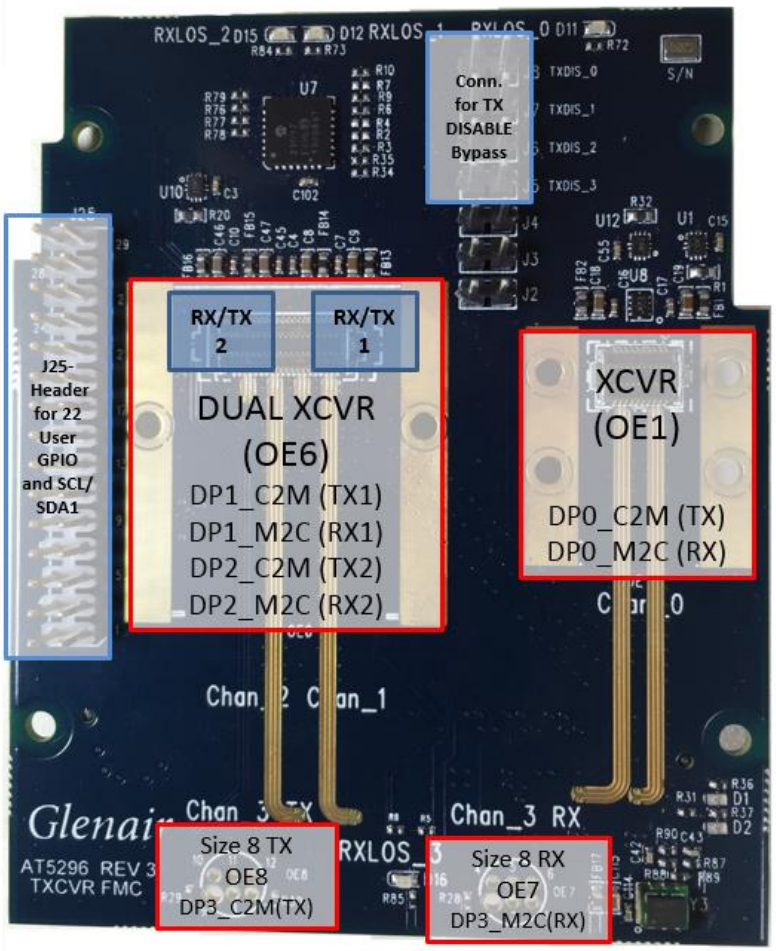
FMC HPC SAMTEC P/N:(ASP-134488-01)

	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

Functional Block Diagram (050-344-A)



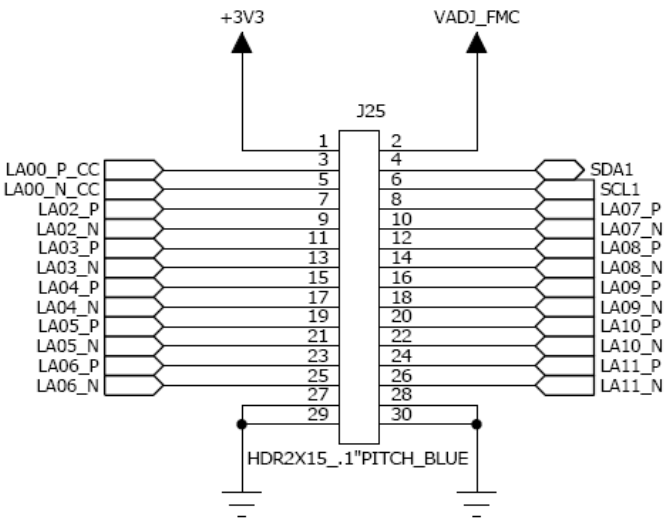
Pictorial Block Diagram (050-344-A)



Pictorial Overview of the FMC card

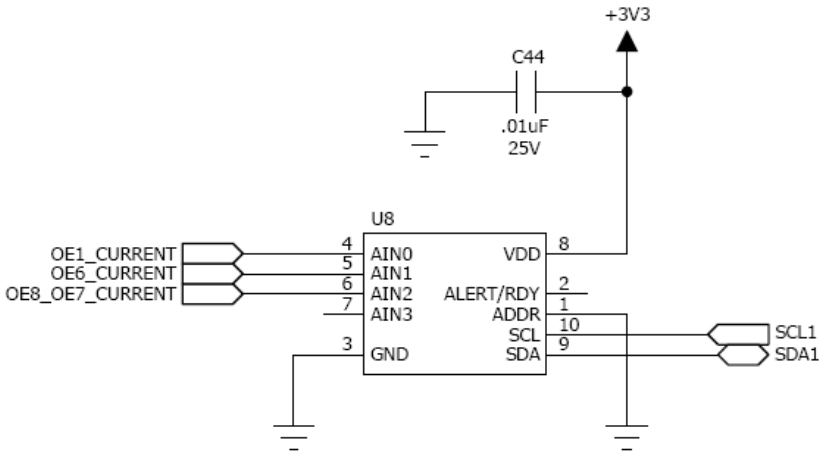
Schematic User interface Blocks (050-344-A)

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 I²C bus SDA/SCL1 is pulled out here for attachment to an external I²C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

U8 Current Monitor (I²C A/D)



This is an I²C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

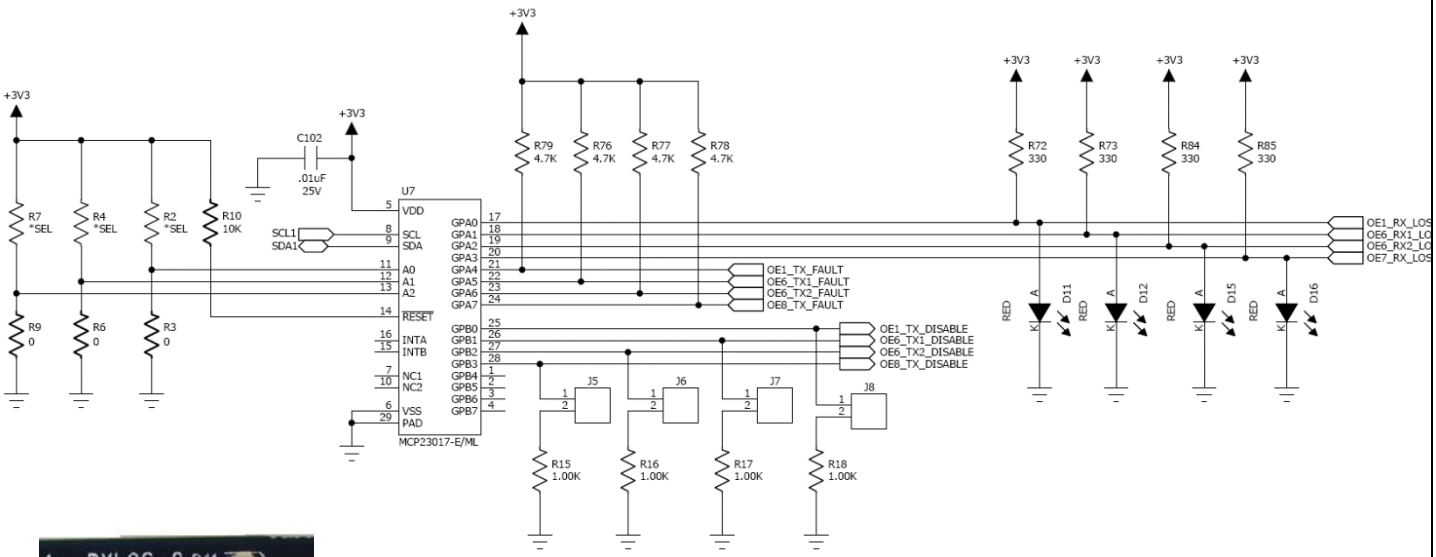
IC P/N: ADS1015IRUGT (Texas Instruments)
I²C Address:1001000X

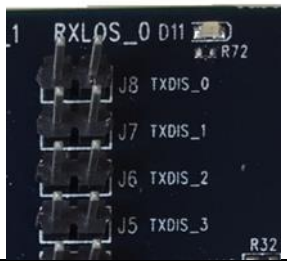
Schematic User interface Blocks (050-344-A) continued

U7 I²C 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 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.

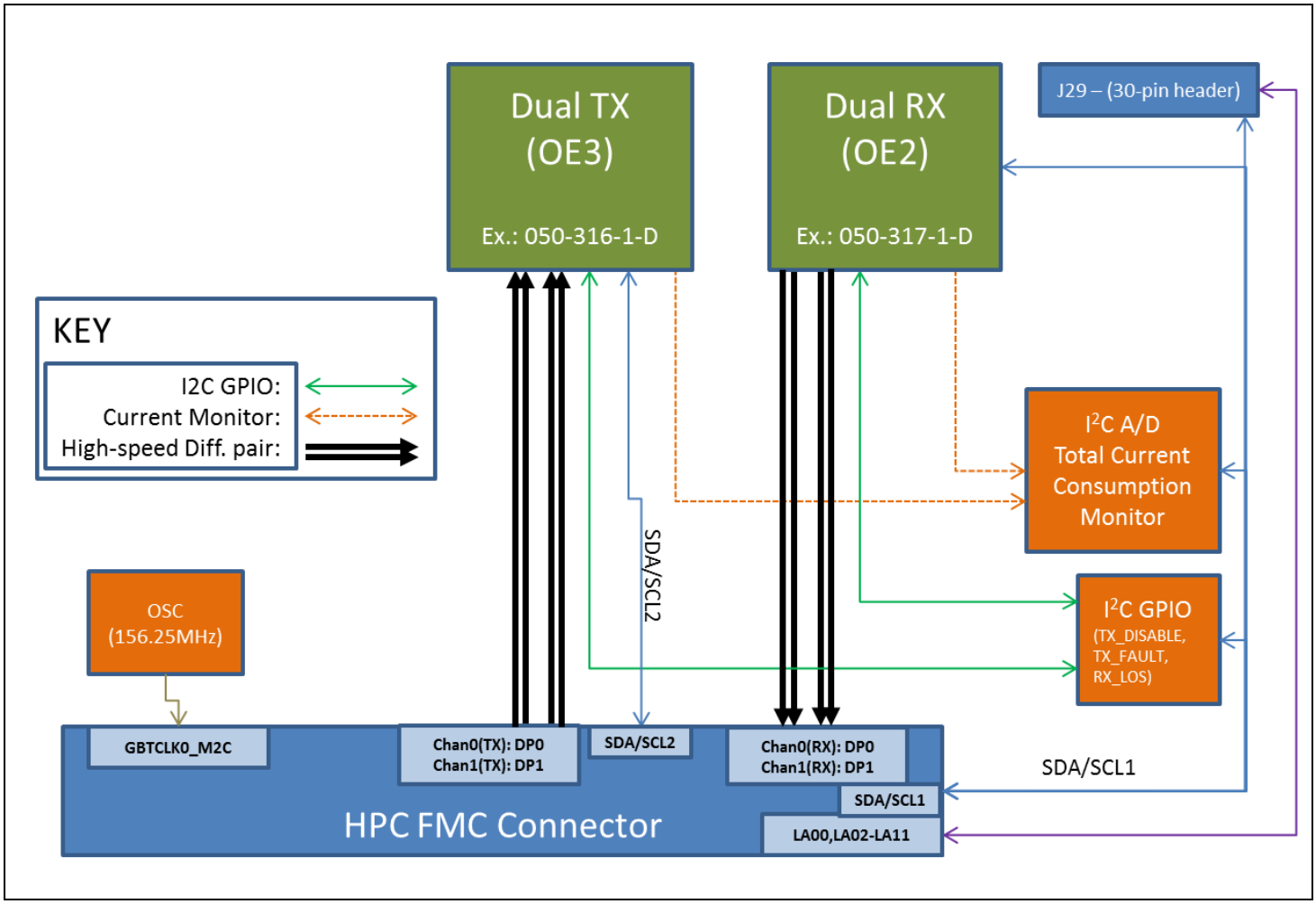
IC P/N: MCP23017-E/ML (Microchip)
I2C address: 0100000X



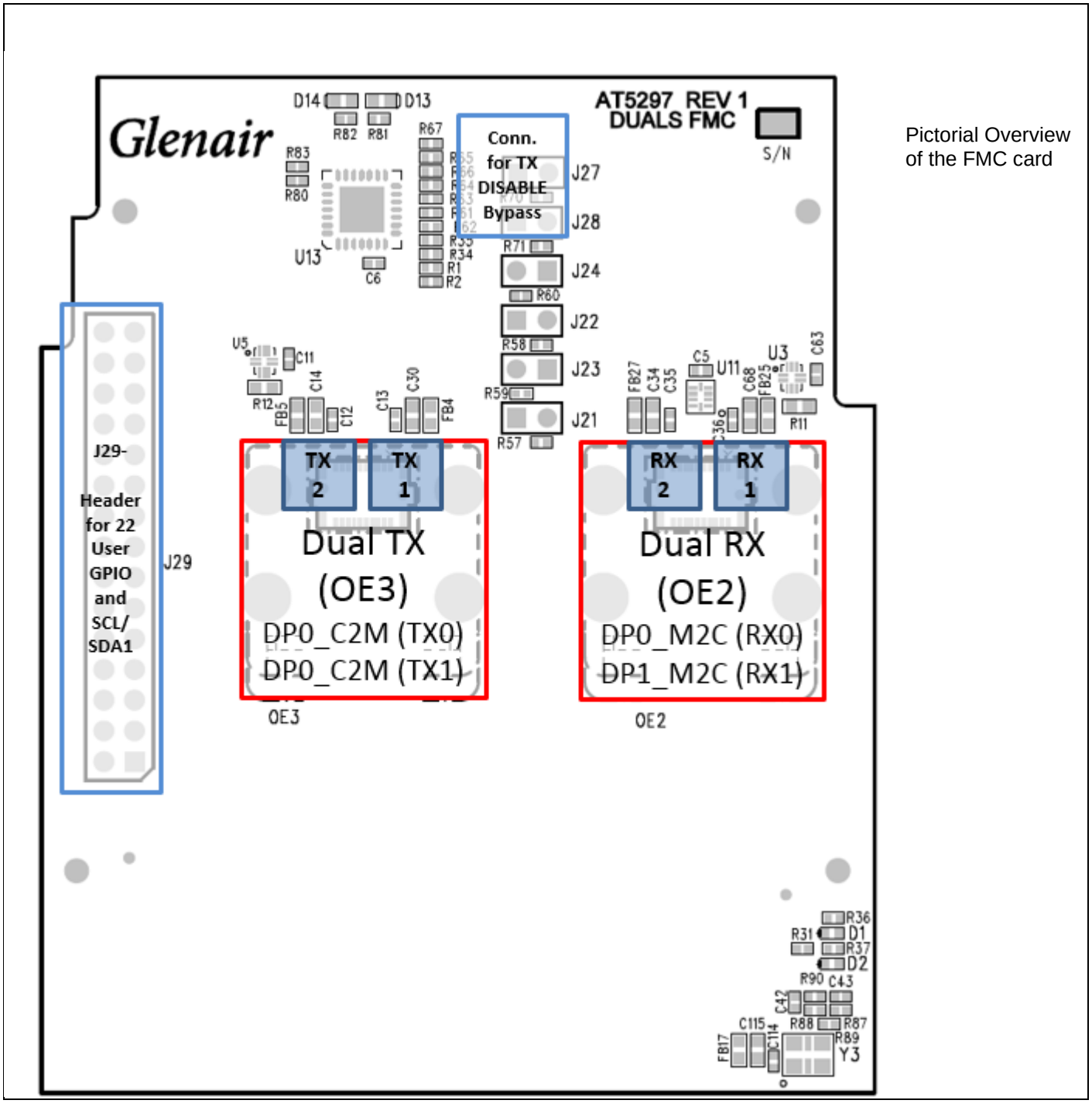


←Headers to manually enable the transmitters

Functional Block Diagram (050-344-B)



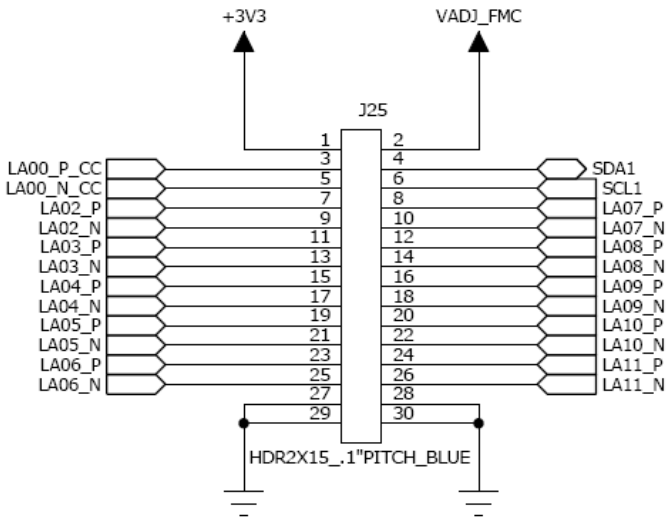
Pictorial Block Diagram (050-344-B)



Pictorial Overview of the FMC card

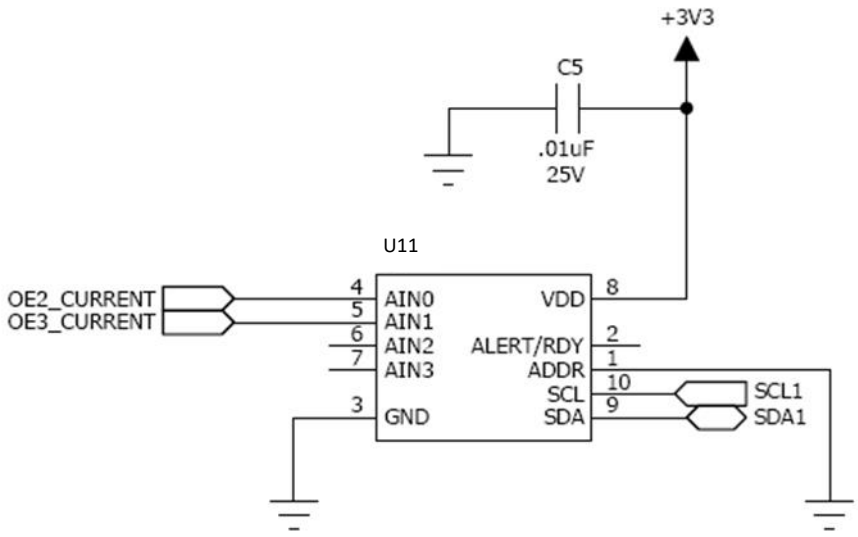
Schematic User interface Blocks (050-344-B)

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 I²C bus SDA/SCL1 is pulled out here for attachment to an external I²C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

U11 Current Monitor (I²C A/D)



This is an I²C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

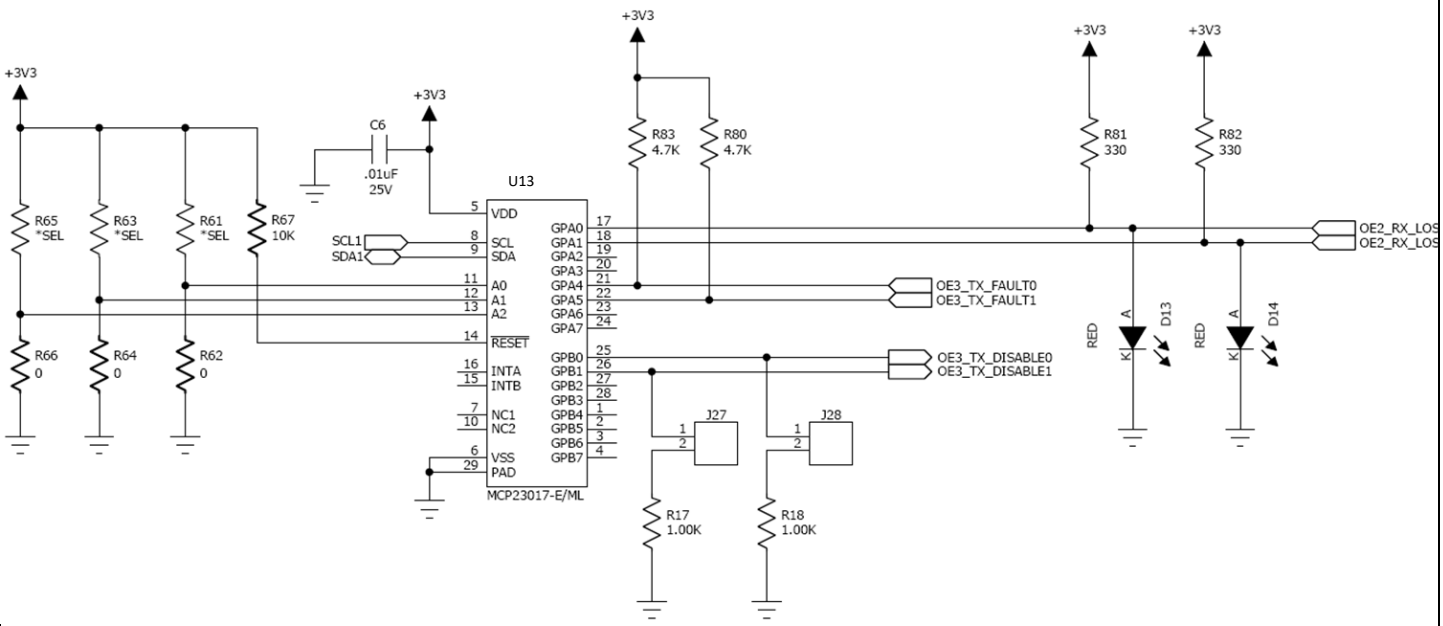
IC P/N: ADS1015IRUGT (Texas Instruments)
I²C Address:1001000X

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

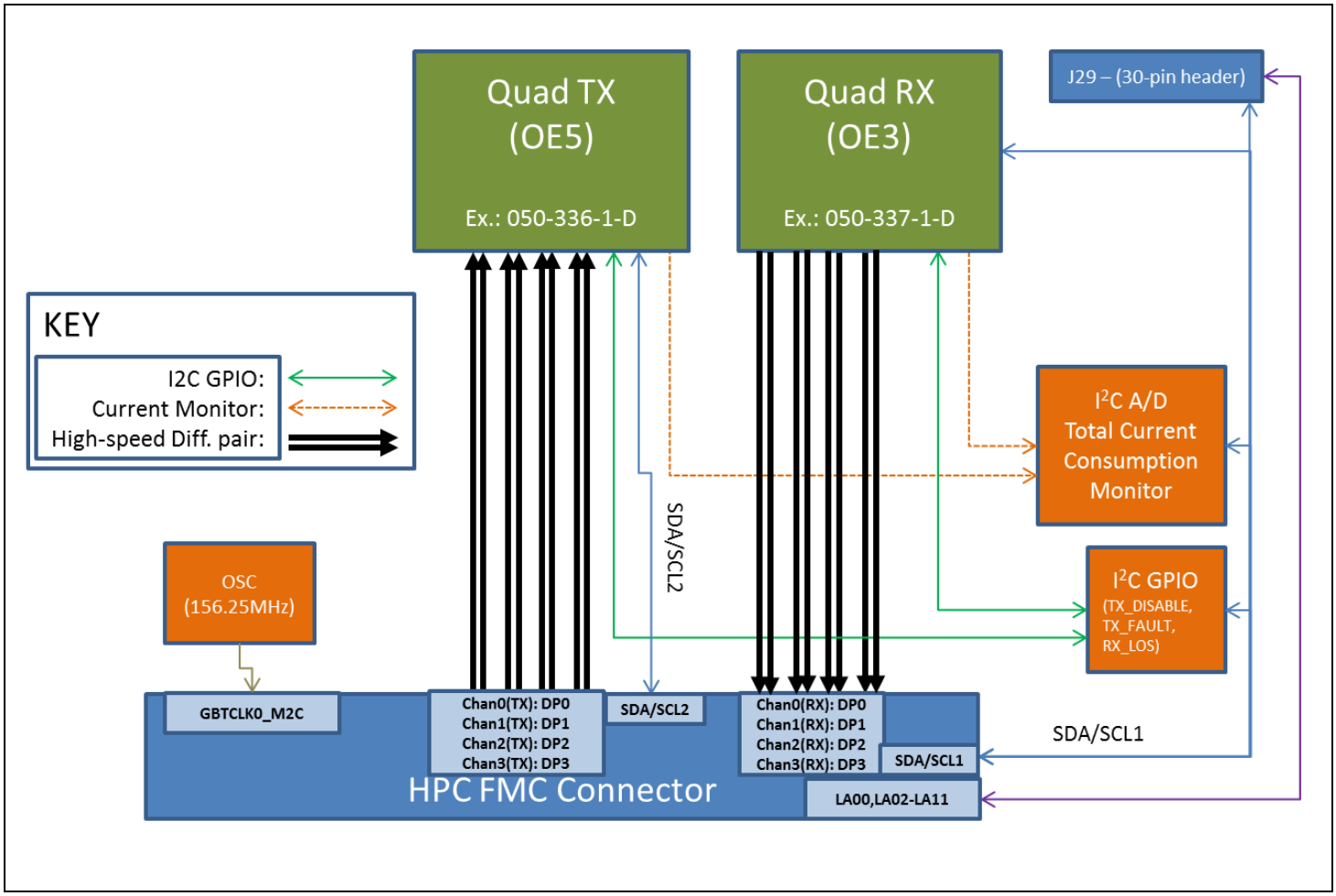
U13 I²C GPIO

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.

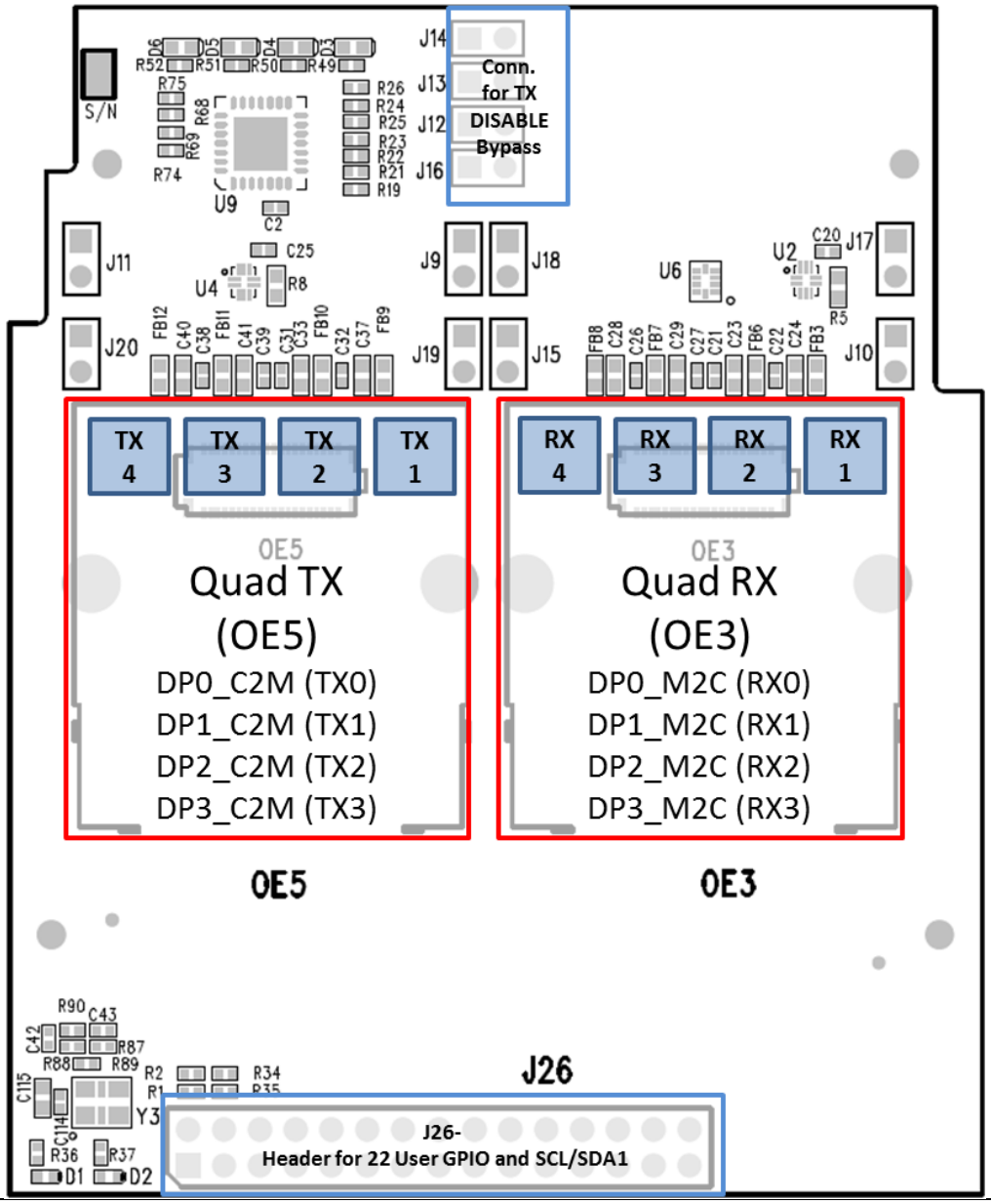
IC P/N: MCP23017-E/ML (Microchip)
I2C address: 0100000X



Functional Block Diagram (050-344-C)



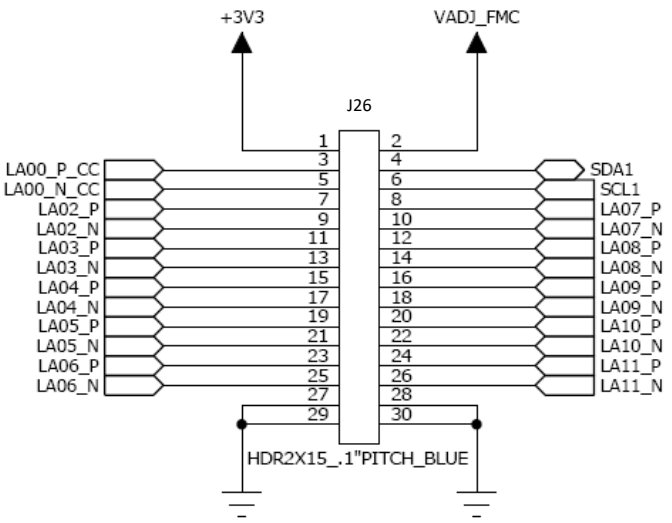
Pictorial Block Diagram (050-344-C)



Pictorial Overview of the FMC card

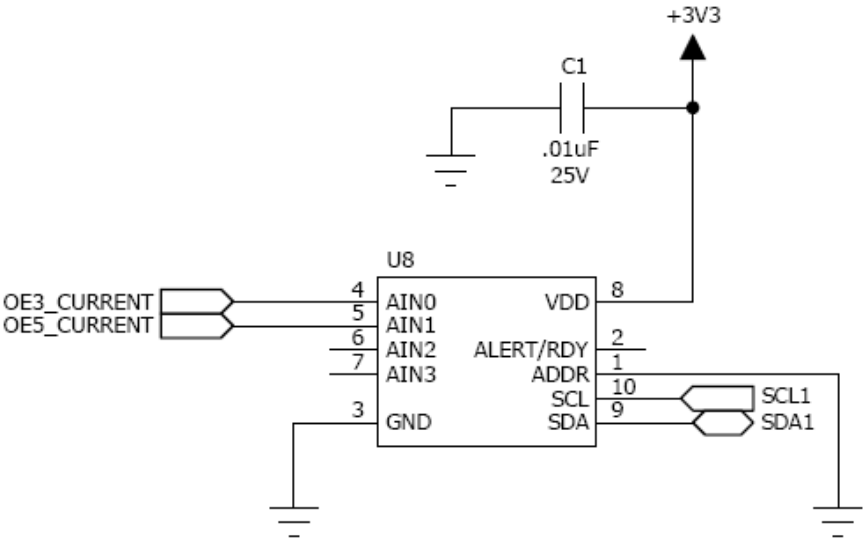
Schematic User interface Blocks (050-344-C)

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 I²C bus SDA/SCL1 is pulled out here for attachment to an external I²C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

U6 Current Monitor (I²C A/D)



This is an I²C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.

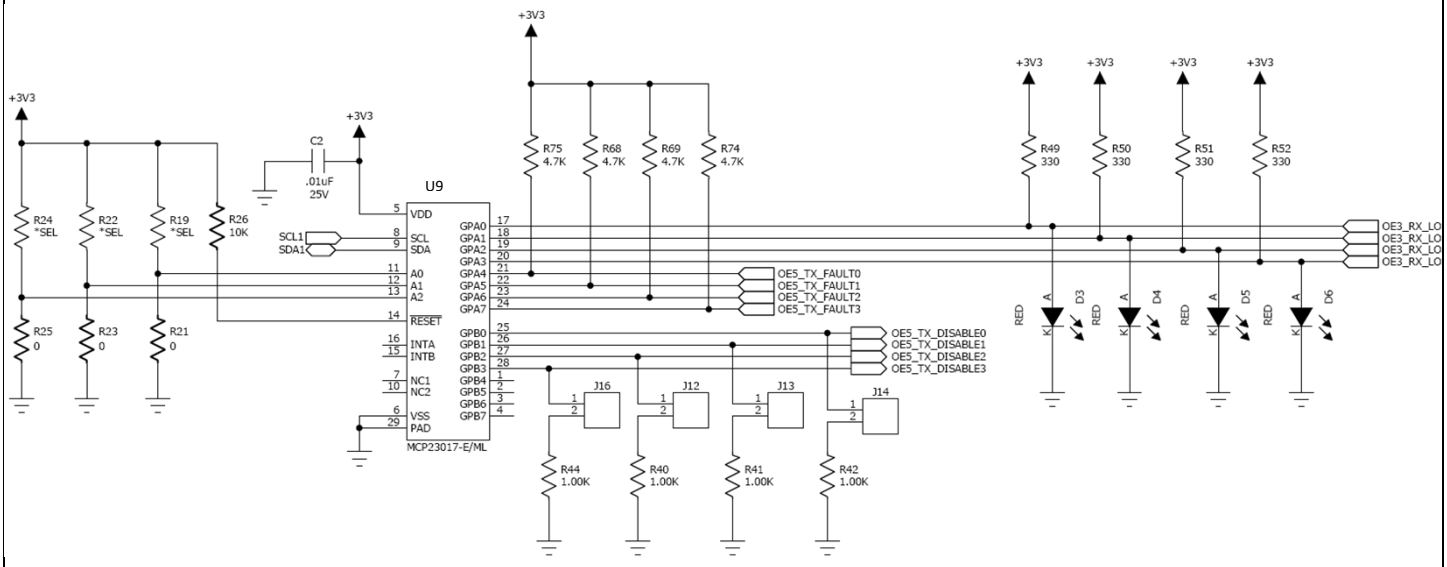
IC P/N: ADS1015IRUGT (Texas Instruments)
I²C Address:1001000X

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

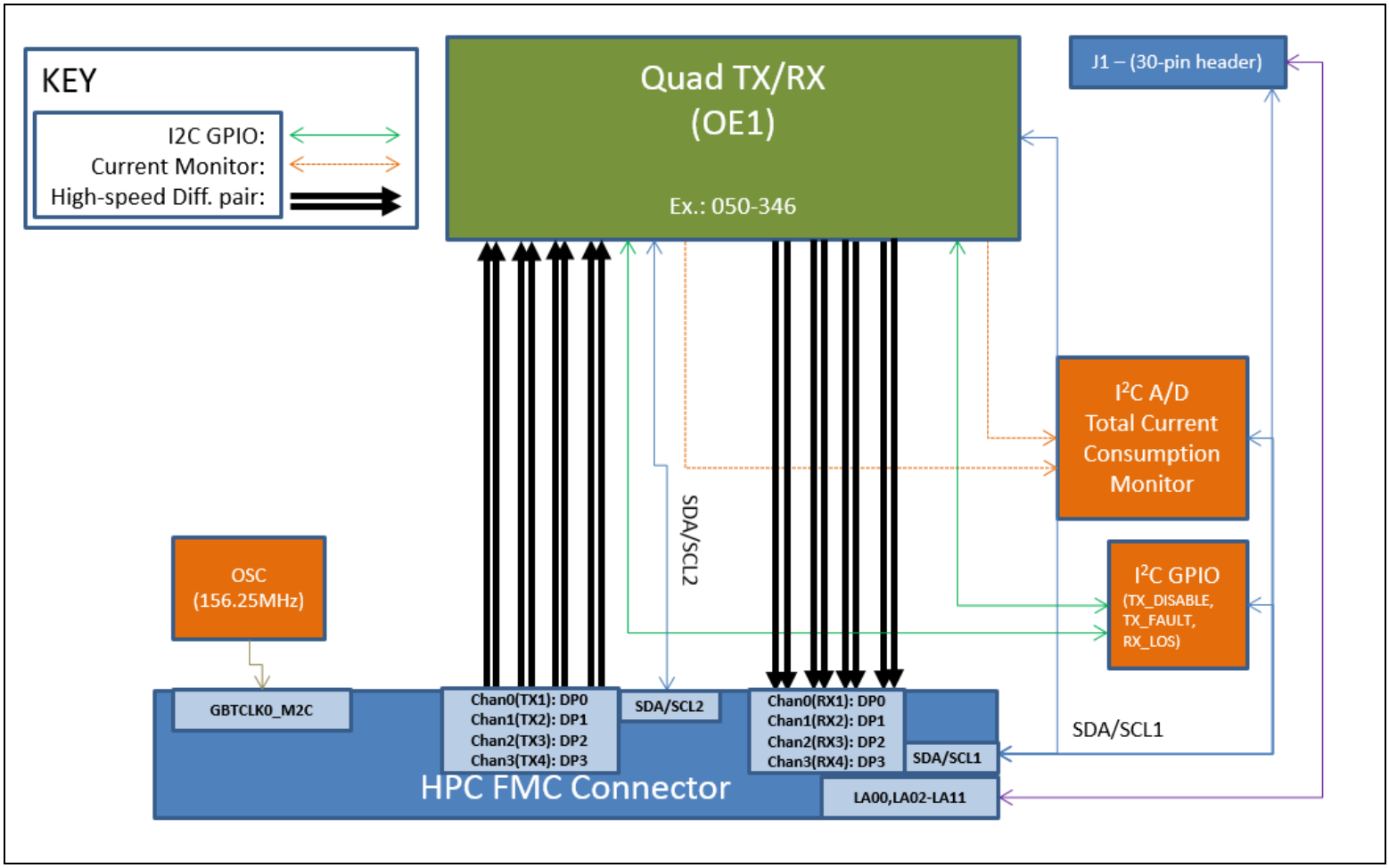
U9 I²C GPIO

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

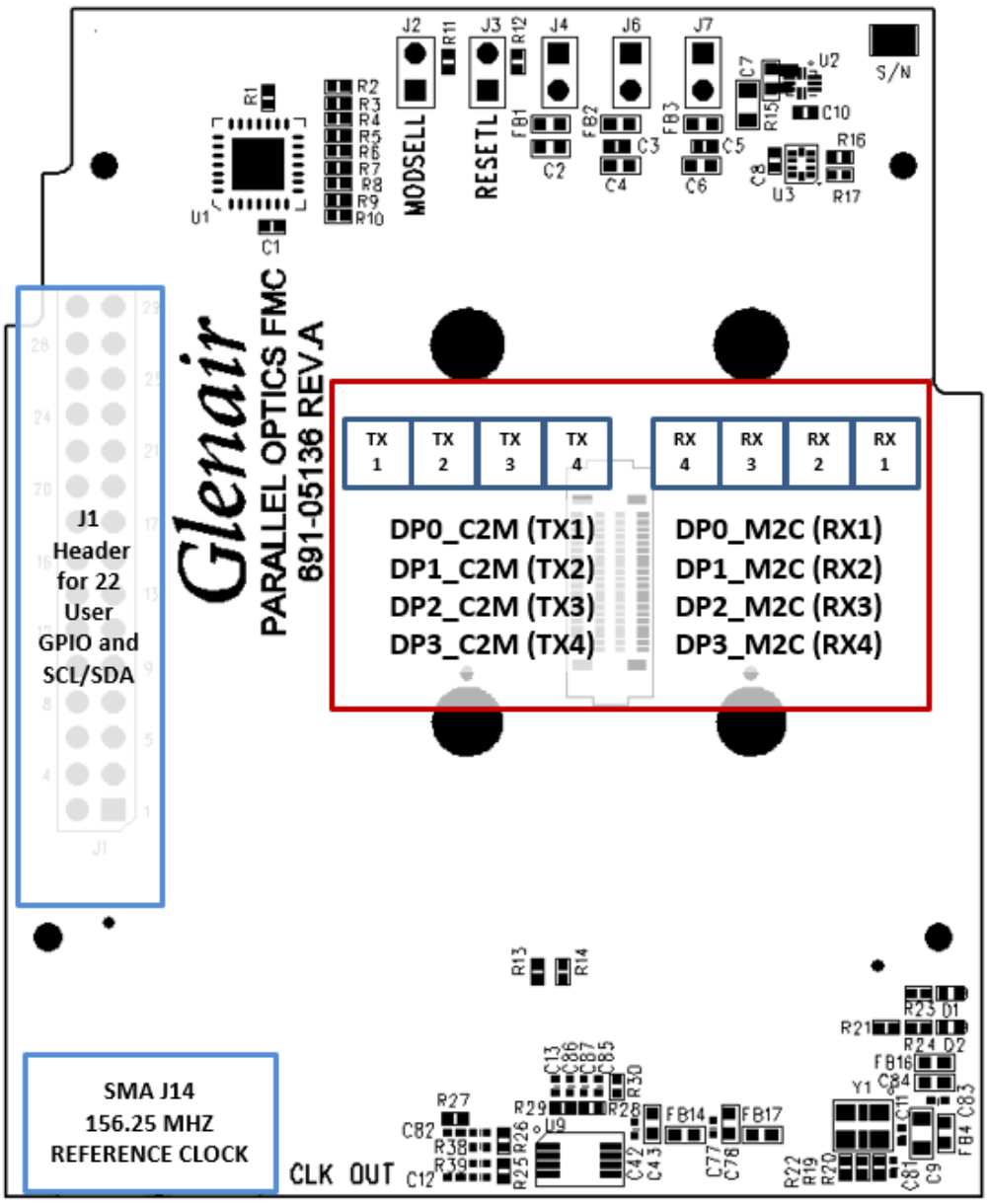


Functional Block Diagram (050-344-D)



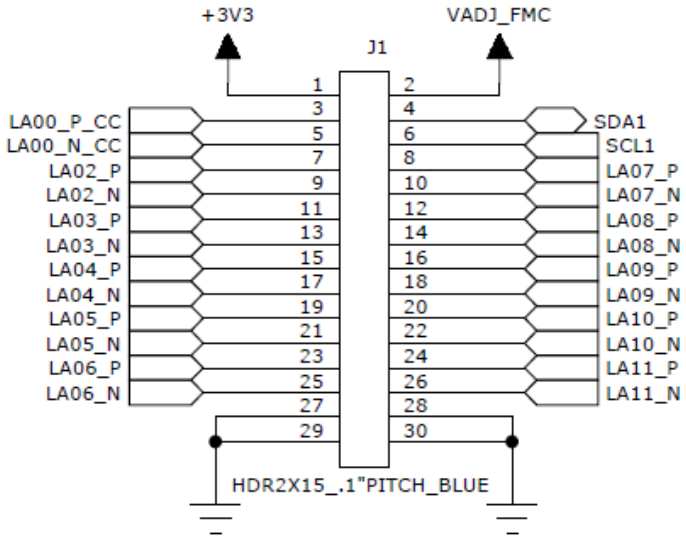
Pictorial Block Diagram (050-344-D)

Pictorial Overview of the FMC card



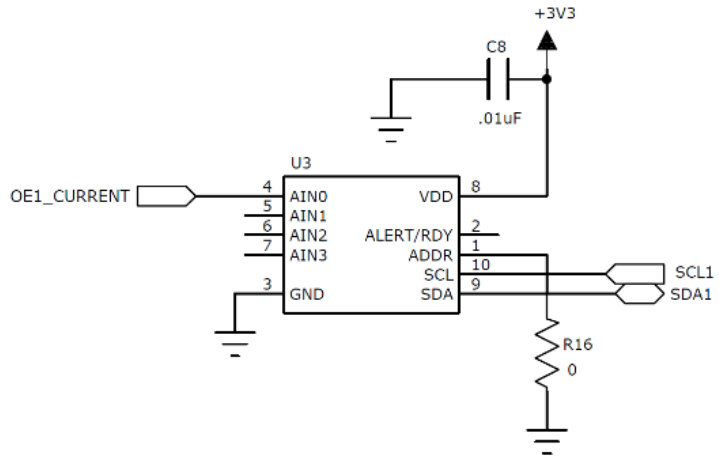
Schematic User interface Blocks (050-344-D)

J1 Header pinout



This shows the J25 .1" header pinout. LA00,LA02-LA11 are all user GPIO that routes directly to the FMC connector. The I²C bus SDA/SCL1 is pulled out here for attachment to an external I²C reader if so desired (SDA/SCL1 are also brought to the FMC connector)

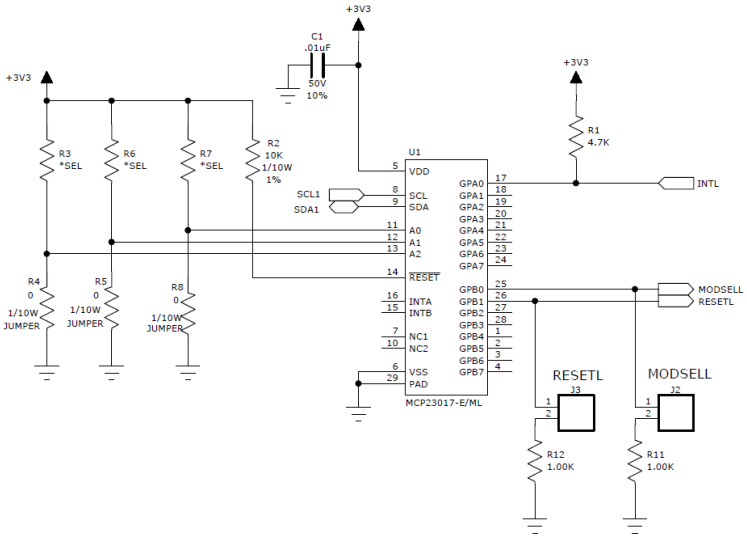
U8 Current Monitor (I²C A/D)



This is an I²C Analog to Digital converter that can be used to monitor the total current consumed by each transceiver.
IC P/N: ADS1015IRUGT (Texas Instruments)
I²C Address:1001000X

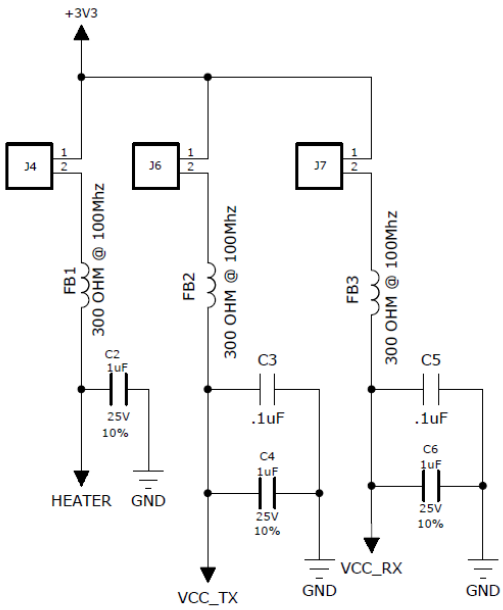
Schematic User interface Blocks (050-344-D) continued

U7 I²C GPIO



This is an I2C controlled GPIO device that can be used to read the INTL signal status of the transceiver, Select the module through MODSELL, and reset the module through RESETL. The headers are also marked on the board as:
J2 to enable MODSEL and J3 to reset the transceiver RESETL.
IC P/N: MCP23017-E/ML (Microchip)
I2C address: 0100000X

+3.3V power supply J4, J6, and J7



- Place jumper J4 to connect 3.3V to the Heater circuit of Transceiver
  Place jumper J6 to connect 3.3V to power up all the Transmitters
  Place jumper J7 to connect 3.3V to power up all the Receivers

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^2C buses for transceiver status and control
    - I^2C A/D to read transceiver current
    - I^2C 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)]

Example Host boards with VITA 57.1 compliant FMC HPC connector:

- Xilinx
  - Spartan-6 Xilinx EK-S6-SP605
  - Virtex-6 Xilinx EK-V6-ML605
  - Kintex-7 Xilinx EK-K7-KC705
  - Virtex-7 Xilinx EK-V7-VC707
- Avnet
  - Zynq-7000 Avnet AES-MINI-ITX-7Z045
- Altera
  - D4-AMC Dual Altera Stratix® IV FPGA AdvancedMC
  - S4-AMC Altera Stratix IV GX AdvancedMC board
  - S5-PCIe-F Altera Stratix V GX PCIe Board
- Microsemi
  - RTG4 FPGA
  - SmartFusion2 SoC FPGA