FMC-QSFP+

V1.1 2/12/17

FMC Module with Dual QSFP+ Ports

FEATURES

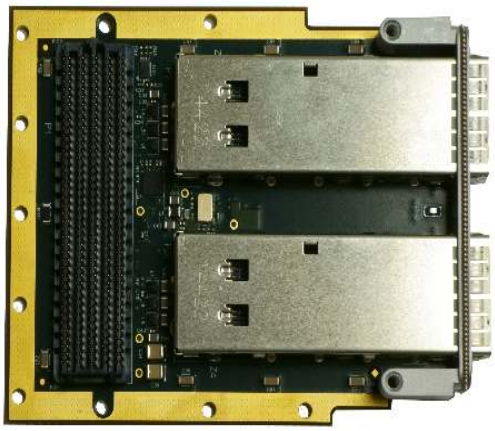
- Two QSFP+ ports
- Up to 40 Gbps per port (IEEE 802.3ba)
- 2-wire I2C communication interface and other low-speed electrical interface compliant to SFF 8436 and QSFP Multisource Agreement (MSA)
- Programmable low jitter clock supports 0.16 to 350 MHz range with 1PPM step
- Spread-spectrum clock support
- 10 MHz, 0.5 PPM reference
- FMC (ANSI/VITA57) Module

APPLICATIONS

- Remote Radio Head receiver
- OBSAI and CPRI interface
- Serial FPDP and SRIO fiber optic ports

SOFTWARE

- VHDL FrameWork Logic
- C++ Libraries and example code
- Examples for Innovative Integration cards for Windows and Linux.



DESCRIPTION

FMC-QSFP+ provides two QSFP+ ports on a standard FMC module with programmable clock and support features. Fiber optic links to remote IO, such as Remote Radio Head applications, from host processing and FPGA cards support up to 40 Gbps bit rates.

The QSFP+ ports are compatible with SFF-8436 transceivers, supporting both copper and fiber optic links. The two ports are fully independent on the module. QSFP+ control and monitoring signals are mapped to the FMC interface for I2C control port, power mode, reset, presence of cable, and Interrupt events.

A flexible reference clock for on the FMC-QSFP+ is fully programmable over the 0.16 to 350 MHz range. The clock can be programmed for all common rates for standards such as OC-12, OBSAI, CPRI, GbE, sFPDP and SONET. The clock has jitter performance of less than 1 ps RMS max, allowing it to meet the most stringent requirements for these applications. An on-card 10MHz Oscillator with 0.5 PPM stability is used as the PLL reference.

The FMC-QSFP+ is fully electrically compatible with FMC (ANSI/VITA 57) specifications for IO module. Mechanically, the module will fit FMC sites, however the QSFP+ connectors protrude slightly past the face of the bezel. The module is compatible with FMC HPC sites. The module consumes <750 mW exclusive of QSFP+ modules.

The FMC is provided with VHDL code illustrating the interfaces. Specific FPGA and platform support is provided for Innovative's VPX-COP and PEX-COP FPGA cards.

Software libraries and examples for C++ host development are provided. Application examples demonstrating the module features are provided for Innovative Integration platforms in for Windows, Linux and VxWorks.

FMC-QSFP+

ORDERING INFORMATION

Product	Part No.	Description
FMC-QSFP+	80289-0-<ER>	FMC module with two QSFP+ ports, programmable clock, and high stability reference <ER> is environmental rating.
Logic Development Package		
FMC-QSFP+ Logic Support	55041	SBC/ePC-K7 FrameWork Logic board support package for RTL. One year technical support
	55044	Mini-K7 FrameWork Logic board support package for RTL. One year technical support
	55038	PEX6-COP FrameWork Logic board support package for RTL. One year technical support
Host Cards		
PEX-COP	80284	FPGA co-processor with FMC site for PCI Express desktop/rackmount applications.
ePC-K7	90502	Conduction cooled, Kintex 7 FPGA with i7 quad-core CPU and 16 GB RAM via type 6 COM-Express. HPC and LPC FMC sites. Optional RF receiver bay. Available rated for wide-temperature and vibration/shock with conduction-cooling.
Mini-K7	90600	Conduction cooled, Kintex 7 FPGA with Atom dual-core CPU and 8 GB RAM via type 6 COM-Express. HPC FMC site. Optional RF receiver bay and touch screen LCD. Available rated for wide-temperature and vibration/shock with conduction-cooling.

FMC-QSFP+

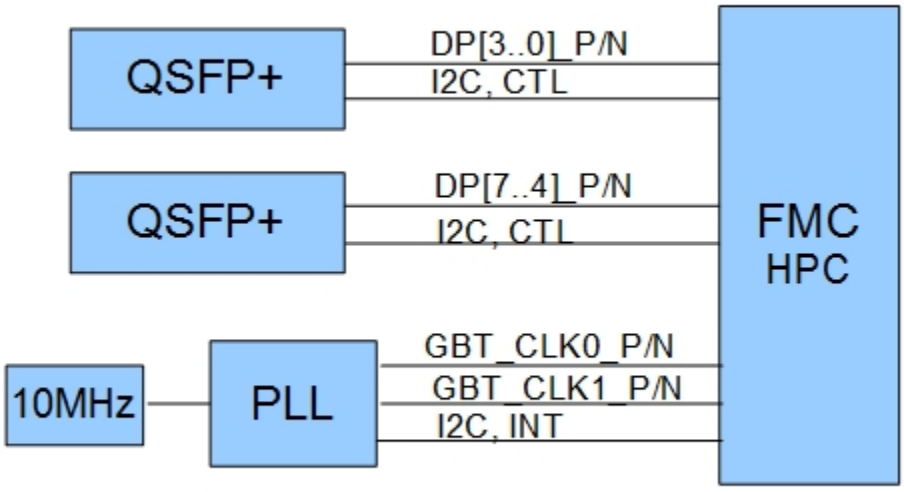
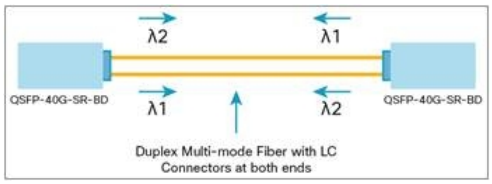
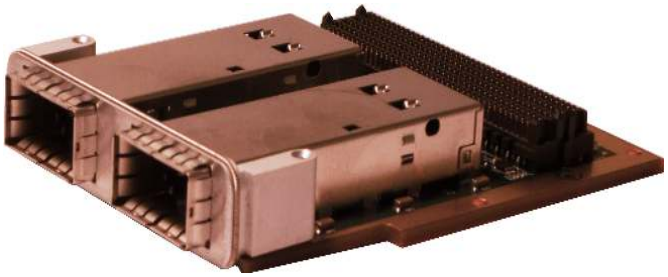


Illustration 1: FMC-QSFP+ Block Diagram





FMC-QSFP+

Operating Environment Ratings

X6 modules rated for operating environment temperature, shock and vibration are offered. The modules are qualified for wide temperature, vibration and shock to suit a variety of applications in each of the environmental ratings L0 through L4 and 100% tested for compliance.

Environment Rating <ER>		**L0**	**L1**	**L2**	**L3**	**L4**
Environment		Office, controlled lab	Outdoor, stationary	Industrial	Vehicles	Military and heavy industry
Applications		Lab instruments, research	Outdoor monitoring and controls	Industrial applications with moderate vibration	Manned vehicles	Unmanned vehicles, missiles, oil and gas exploration
Cooling		Forced Air 2 CFM	Forced Air 2 CFM	Conduction	Conduction	Conduction
Operating Temperature		0 to +50C	-40 to +85C	-20 to +65C	-40 to +70C	-40 to +85C
Storage Temperature		-20 to +90C	-40 to +100C	-40 to +100C	-40 to +100C	-50 to +100C
Vibration	Sine	-	-	2g 20-500 Hz	5g 20-2000 Hz	10g 20-2000 Hz
	Random	-	-	0.04 g^2/Hz 20-2000 Hz	0.1 g^2/Hz 20-2000 Hz	0.1 g^2/Hz 20-2000 Hz
Shock		-	-	20g, 11 ms	30g, 11 ms	40g, 11 ms
Humidity		0 to 95%, non-condensing	0 to 100%	0 to 100%	0 to 100%	0 to 100%
Conformal coating			Conformal coating	Conformal coating, extended temperature range devices	Conformal coating, extended temperature range devices, Thermal conduction assembly	Conformal coating, extended temperature range devices, Thermal conduction assembly, Epoxy bonding for devices
Testing		Functional, Temperature cycling	Functional, Temperature cycling, Wide temperature testing	Functional, Temperature cycling, Wide temperature testing Vibration, Shock	Functional, Temperature cycling, Wide temperature testing Vibration, Shock	Functional, Testing per MIL-STD-810G for vibration, shock, temperature, humidity

Minimum lot sizes and NRE charges may apply. Contact sales support for pricing and availability.

FMC-QSFP+

Standard Features

QSFP+ Ports	
Ports	2 (FMC HPC required)
QType	QSFP+
Specification	SFF-8436
Bit Rate	Up to 10 Gbps (dependent on host card FPGA)
Interface	Per port : I2C bus Status feedback of cable presence and interrupt events Control for power mode and reset

Clock	
Device	Programmable PLL
References	10 MHz, 0.5 PPM Oscillator or FMC Clock 2 or 3 input
Output Range	0.16 to 350 MHz
Tuning Resolution	1 PPM
Device	Silicon Labs SI5338
Outputs	2 pairs to GBT_CLK 0 and 1 on FMC
Output Type	LVDS 2.5V

FMC Interface	
Differential Pairs	8 Tx/Rx total (4 Tx/Rx pairs for each QSFP+)
Single-ended signals	18 LVCMOS (VADJ)
Clocks	2 GBT serial reference clocks from PLL FMC clock 2 or 3 input for reference

Power	
Consumption	750mW EXCLUDES QSFP+ modules
Power Control	FMC power enable
Heat Sinking	Conduction cooling supported (VITA57 subset)

Physicals	
Form Factor	FMC with standard bezel
Size	69 x 87 mm (QSFP+ connectors protrude 3.5mm past front face of bezel)
Weight	80g
Hazardous Materials	Lead-free and RoHS compliant

FMC-QSFP+

Logic Tools

All FMC modules are supplied with example interface code (VHDL) illustrating the module interface and controls. For Innovative cards, the FMC support includes a specific design for each card.

The logic support includes example code, constraints, and a simulation testbench. Application logic uses this code as a starting point for integrating the FMC into target hardware.

Compatible Host Cards

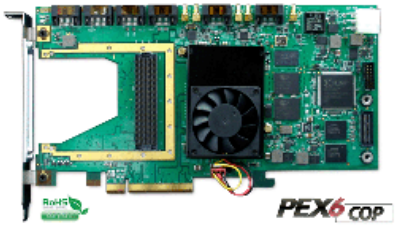
FMC IO modules are supported on a variety of IO platforms, including these Innovative cards.

VPX6-COP (80262)

3U VPX co-processor card
Virtex6 FGPA core with 2GB DRAM, 36MB SRAM
FMC site with 80 differential pairs and 8 high speed serial lanes
Supports wide-temperature and vibration with conduction cooling
VPXI Integrated timing and synchronization features

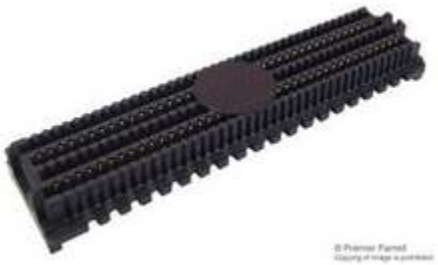
PEX6-COP (80284)

Virtex6 FGPA core with 2GB DRAM, 36MB SRAM
FMC site with 80 differential pairs and 10 high speed serial lanes
Supports wide-temperature and vibration with conduction cooling
Multi-card timing and communications support



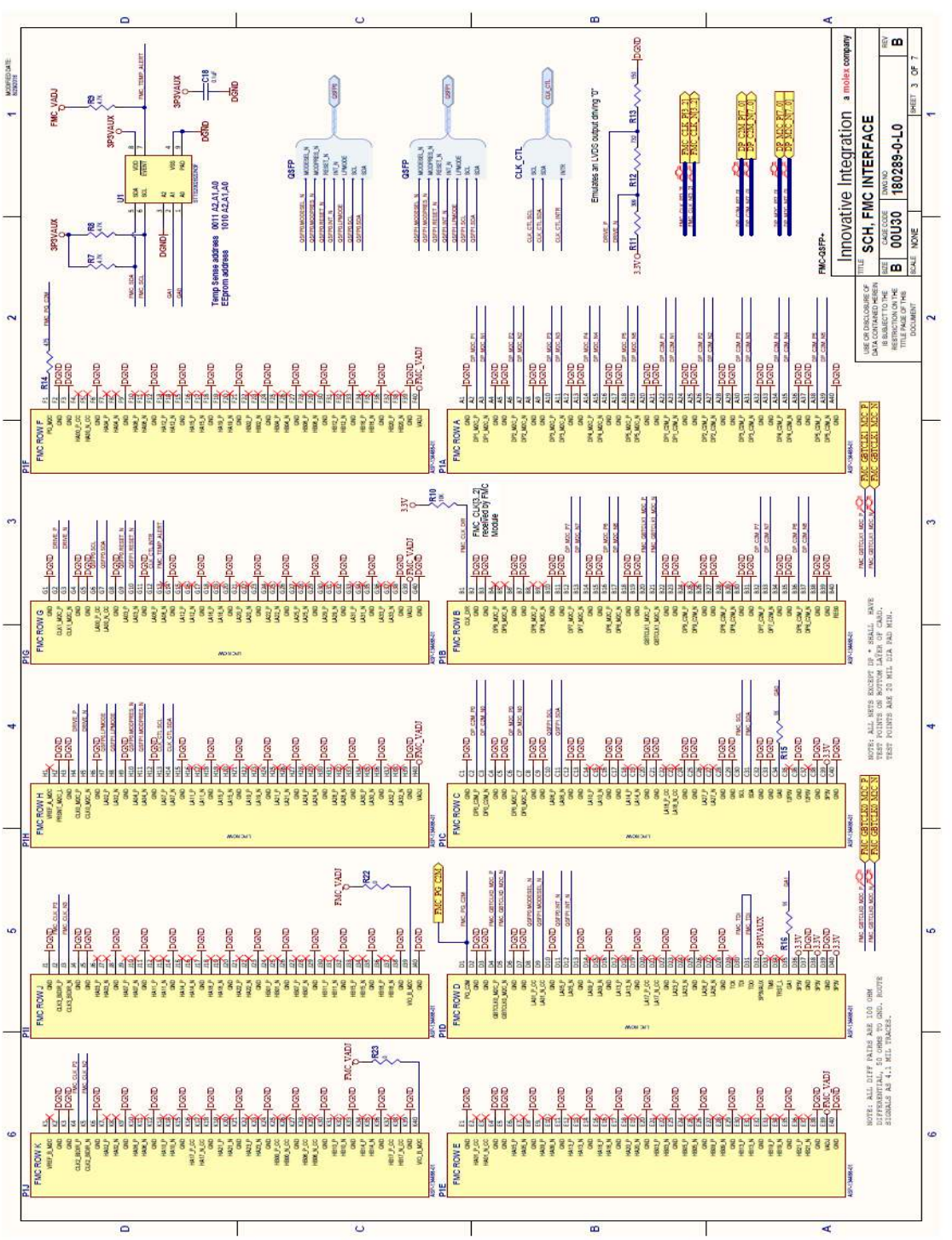
FMC-QSFP+

FMC Connector



Manufacturer: SAMTEC
Newark Part No.: 79X1313
Manufacturer Part No ASP-134488-01

FMC-QSFP+



FMC Interface

FMC-QSFP+

IMPORTANT NOTICES

Innovative Integration Incorporated reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to Innovative Integration's terms and conditions of sale supplied at the time of order acknowledgment.

Innovative Integration warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with Innovative Integration's standard warranty. Testing and other quality control techniques are used to the extent Innovative Integration deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

Innovative Integration assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using Innovative Integration products. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

Innovative Integration does not warrant or represent that any license, either express or implied, is granted under any Innovative Integration patent right, copyright, mask work right, or other Innovative Integration intellectual property right relating to any combination, machine, or process in which Innovative Integration products or services are used. Information published by Innovative Integration regarding third-party products or services does not constitute a license from Innovative Integration to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from Innovative Integration under the patents or other intellectual property of Innovative Integration.

Reproduction of information in Innovative Integration data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice.

Innovative Integration is not responsible or liable for such altered documentation. Resale of Innovative Integration products or services with statements different from or beyond the parameters stated by Innovative Integration for that product or service voids all express and any implied warranties for the associated Innovative Integration product or service and is an unfair and deceptive business practice. Innovative Integration is not responsible or liable for any such statements.

For further information on Innovative Integration products and support see our web site:

www.innovative-dsp.com

Mailing Address: Innovative Integration, Inc.

2390A Ward Avenue, Simi Valley, California 93065