

BCM957412M4122C

Single-Port 25 Gb/s SFP28 Ethernet PCI Express 3.0 x8 OCP 2.0 Mezzanine Card

General Description

The Broadcom[®] BCM957412M4122C is a single-port 25 Gb/s PCI Express 3.0 x8 Mezzanine Card designed to the Open Compute Project (OCP) Mezzanine Card 2.0 Design Specification with a SFP28 network connector as a Type 1 adapter, with the board outline adhering to a form factor called out in v0.5 of the specification. The adapter supports both SFP28/SFP+ optical modules and copper direct-attach cables. The card uses the Broadcom BCM57412 25GbE MAC controller with an integrated single-channel 25GbE SFI transceiver.

Features

- Single-port pluggable media interface, which may be equipped with 25G SFP28 or 10G SFP+ optical transceiver or with a copper direct-attach cable.
- Fully compliant with the SFF-8402 standard.
- x8 PCI Express 3.0 compliant.
- SR-IOV with up to 128 virtual functions (VFs).
- Function-Level Reset (FLR) support.
- TruFlow[™] flow processing engine.
- Virtual Network Termination—VXLAN, NVGRE, Geneve, GRE encap/decap.
- vSwitch acceleration.
- Tunnel-aware stateless offloads.
- DCB support: PFC, ETS, QCN, DCBx.
- RDMA over Converged Ethernet (RoCE)
- Network Controller Sideband Interface (NCSI).
- SMBus 2.0.
- MCTP over SMBus.
- PCIe-based UART and KCS.
- Jumbo frames up to 9 KB.
- Advanced Congestion Avoidance.
- Multiqueue, NetQueue, and VMQ.
- IPv4 and IPv6 offloads.
- TCP, UDP, and IP checksum offloads.
- Large Send Offload (LSO).
- Large Receive Offload (LRO).

- TCP Segmentation Offload (TSO).
- Receive-side Scaling (RSS).
- Transmit-side Scaling (TSS).
- VLAN insertion/removal.
- Interrupt coalescing.
- Network boot—PXE, UEFI.
- iSCSI boot.
- Wake-on-LAN (WOL).
- MSI and MSI.X.
- Conforms to the OCP Mezzanine Card 2.0 Design Specification Type 1 vertical stack.

Applications

Single-Port 25-Gigabit Ethernet adapter for Open Compute Platform systems.

Figure 1: BCM957412M4122C OCP 2.0 Mezzanine Card



NOTE: The surface markings of the component may not reflect the product received. Broadcom reserves the right to change any component on the printed circuit board with the same functionality.

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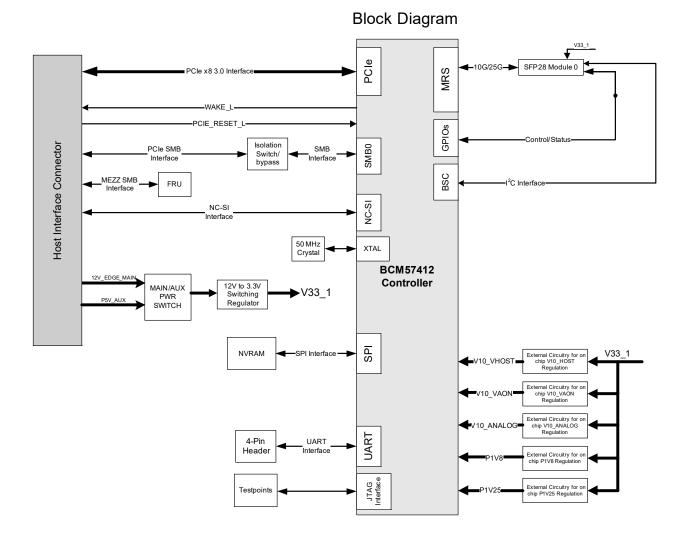
1 Functional Description

This section provides the functional description of the BCM957412M4122C OCP 2.0 mezzanine card.

1.1 Block Diagram

Figure 2 shows the main functional blocks on the BCM957412M4122C OCP 2.0 mezzanine card.

Figure 2: BCM957412M4122C Block Diagram



1.2 Host Interface Connector

The BCM957412M4122C OCP 2.0 mezzanine card interfaces with the system baseboard via a vertical-stacked card-to-card connector, FCI/61083-124402LF. The PCIe bus, NC-SI bus, SMBus interface, various other sideband signals, and power are assigned to this connector. The connector pinout complies with that of Connector A as described in the OCP Mezzanine Card 2.0 Design Specification. Table 1 shows the signal pinout. Definitions of the signals at this connector are provided in the OCP Mezzanine Card 2.0 Design Specification.

A1 MEZZ_PRSNTAL N BASEBOARD ALD A35 MEZZ_RX_DN A70 P3V3 A106 GND A2 PSV_AUX A36 GND A71 P3V3 A106 GND A3 PSV_AUX A36 GND A71 P3V3 A106 GND A3 PSV_AUX A36 GND A71 P3V3 A106 GND A4 PSV_AUX A37 GND A73 GND A106 MEZZ_TX_DP_C<5> A5 GND A40 GND A74 LAN_3V3STB_ALERT, N A109 MEZZ_TX_DP_C<5> A6 GND A41 GND A76 SMB_LAN_3V3STB_DAT A111 GND A11 P3V3 A44 GND A76 GND A111 GND A111 GND A11 P3V3 A44 GND A80 NCSL_RZER A113 MEZZ_TX_DP_C<5 A83 GND A81 NCSL_RZE A111 GND A141 NCSL_RZE_RX_DN<	Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A2 PSV_AUX A3 OND A37 OND A37 OND A3 PSV_AUX A38 MEZZ_RX_DP<2> A73 GND A73 GND A4 PSV_AUX A38 MEZZ_RX_DP<2> A73 GND A74 LAN_3V3STB_ALERT_N A108 MEZZ_TX_DP_C<5> A6 GND A40 GND A75 SMB_LAN_3V3STB_ALERT_N A100 GND A7 P3V3_AUX A41 GND A76 SMB_LAN_3V3STB_ALERT_N A110 GND A7 P3V3_AUX A42 MEZZ_RX_DP<3> A77 PCIE_WAKE_N A111 MEZZ_TX_D_C<6> A8 GND A44 GND A78 NCSI_TXDD A112 MEZZ_TX_D_D_C<6> A10 P3V3 A44 GND A80 NCSI_TXDD A116 MCZ_TX_D_D_C<7> A11 P3V3 A44 GND A81 NCSI_TXDD A116 MEZZ_TX_D_D_C<7> A12 P3V3 A44 GND A82 <td< td=""><td>A1</td><td></td><td>A35</td><td>MEZZ_RX_DN<1></td><td>A70</td><td>P3V3</td><td>A105</td><td>MEZZ_TX_DN_C<4></td></td<>	A1		A35	MEZZ_RX_DN<1>	A70	P3V3	A105	MEZZ_TX_DN_C<4>
A3 PSV_AUX A3 GRD A10 MEZZ_RX_DP<2> A73 GRD A4 PSV_AUX A3 MEZZ_RX_DN<2> A74 LAN_3V3STB_ALERT_N A5 GND A40 GND A75 SMB_LAN_3V3STB_CLK A6 GND A41 GND A76 SMB_LAN_3V3STB_CLK A7 P3V3_AUX A42 GND A77 PGIE_WAKE_N A10 P3V3 A44 GND A77 PGIE_WAKE_N A11 GND A43 MEZZ_RX_DP<3> A78 NCSI_RXER A11 P3V3 A44 GND A79 GND A111 A11 P3V3 A44 GND A79 GND A111 A11 P3V3 A44 GND A79 GND A111 A11 P3V3 A46 MEZZ_RX_DP<4> A81 NCSI_TXD1 A116 A11 P3V3 A48 GND A83 GND A117 MEZZ_TX_DP_C<7> A13 PSIC_KCLK A60 MEZZ_RX_DP A82 GND A116 MEZZ_TX_DN_C<7> A14 NCSI_RCLK A51 MEZZ_RX_DP A86 GND A118 MEZZ_RX_DN <t< td=""><td></td><td></td><td>A36</td><td>GND</td><td>A71</td><td>P3V3</td><td>A106</td><td>GND</td></t<>			A36	GND	A71	P3V3	A106	GND
			A37	GND	A72	P3V3	A107	GND
A39 MEZZ_RZ_DR_UN62* A74 LRG3V3SER_LERT_M A100 MEZZ_R_DU63* A6 GND A40 GND A75 SMB_LAN_3V3STB_CLK A110 GND A7 P3V3_AUX A41 GND A76 SMB_LAN_3V3STB_CLK A110 GND A8 GND A41 GND A77 PCIE_WAKE_N A111 GND A110 P3V3 A44 GND A60 NCSI_TXD0 A113 MEZZ_TX_DP_C<6> A11 P3V3 A44 GND A80 NCSI_TXD0 A111 GND A11 P3V3 A46 MEZZ_RX_DP A81 NCSI_TXD1 A116 MEZZ_TX_DP_C<7> A13 P3V3 A46 MEZZ_RX_DP A82 GND A111 MEZZ_TX_DP_C<7> A13 P3V3 A46 MEZZ_RX_DP A82 GND A118 IN17 MEZZ_TX_DD_C<7> A118 MCZ_TXEN A51 MEZZ_RX_DP A85 CLK_100M_MEZZ_DP A1119 GND			A38	MEZZ_RX_DP<2>	A73	GND	A108	MEZZ_TX_DP_C<5>
A40 GND A41 GND A75 SMB_LAR_3V3S B_LCLR A110 GND A7 P3V3_AUX A41 GND A76 SMB_LAN_3V3S B_LCLR A110 GND A8 GND A41 GND A77 PCIEWAKE_N A111 GND A9 GND A44 GND A77 PCIEWAKE_N A111 MEZZ_TX_DP_C<6> A11 P3V3 A44 GND A79 GND A114 GND A11 P3V3 A46 MEZZ_RX_DP A80 NCSI_TXD0 A116 MEZZ_TX_DP_C<6> A12 P3V3 A46 MEZZ_RX_DP A81 NCSI_TXD0 A116 MEZZ_TX_DP_C<7> A13 NCSI_RCDV A46 MEZZ_RX_DP A83 GND A111 MEZZ_TX_DD_C<7> A118 MEZZ_TX_DD_C<7> A15 MCSI_RCLK A51 MEZZ_RX_DP A86 GND A119 MEZZ_TX_DD_C<0> A16 MEZZ_SMDATA A54 MEZZ_RX_DP A89			A39	MEZZ_RX_DN<2>	A74	LAN_3V3STB_ALERT_N	A109	MEZZ_TX_DN_C<5>
Ar1 GND Ar3 GND Ar3 GND Ar3 MCU Ar3 <td></td> <td></td> <td>A40</td> <td>GND</td> <td>A75</td> <td>SMB_LAN_3V3STB_CLK</td> <td>A110</td> <td>GND</td>			A40	GND	A75	SMB_LAN_3V3STB_CLK	A110	GND
A8 GND A42 MEZ2_RX_DV<3> A77 PCIE_WRAE_N A112 MEZ2_TX_DP_COD A9 GND A43 MEZ2_RX_DN<3> A78 NCSI_RXER A113 MEZZ_TX_DD_COD A10 P3V3 A44 GND A78 NCSI_RXER A114 MEZZ_TX_DD_COD A11 P3V3 A46 MEZZ_RX_DP<4> A81 NCSI_TXD0 A114 GND A14 NCSI_RXEN A46 MEZZ_RX_DP<4> A81 NCSI_TXD1 A116 MEZZ_TX_DP_C<7> A13 P3V3 A46 MEZZ_RX_DP<4> A83 GND A118 GND A14 NCSI_RCSDV A48 GND A83 GND A118 GND A15 NCSI_RXEN A51 MEZZ_RX_DP<5> A86 GND A118 GND A16 NEZZ_SMCLK A55 MEZZ_RX_DP<6> A89 MEZZ_TX_DD_C<0> A89 A120 MEZZ_PRSNTA2_N A11 MEZZ_RX_DD A55 MEZZ_RX_DP<6> A89 MEZZ_TX_DD_C<0> A89 MEZZ_TX_DD_C<0> A20 GND A			A41	GND	A76	SMB_LAN_3V3STB_DAT	A111	GND
A9 GND A43 ME2Z_RX_DN<3> A78 NC5T_RER A113 ME2Z_RX_DN<25> A10 P3V3 A44 GND A79 GND A114 GND A11 P3V3 A44 GND A44 GND A80 NC5L_TXD0 A114 GND A12 P3V3 A44 MEZ_RX_DP<4> A80 NCSL_TXD0 A116 MEZZ_TX_DP_C<7> A13 P3V3 A46 MEZZ_RX_DP<4> A80 NCSL_TXD0 A116 MEZZ_TX_DP_C<7> A14 NCSL_RCSDV A48 GND A83 GND A117 MEZZ_RX_DN A118 GND A14 NCSL_TXEN A51 MEZZ_RX_DN A86 GND A118 GND A119 GND A18 MEZZ_SMCLK A53 GND A87 GND A88 MEZZ_TX_DP_C<0> A89 MEZZ_TX_DP_CC1> A90 GND A91 GND A92 MEZZ_TX_DP_CC1> A93 MEZZ_TX_DP_CC1> A93 MEZZ_TX_			A42	MEZZ_RX_DP<3>	A77	PCIE_WAKE_N	A112	MEZZ_TX_DP_C<6>
A10 P3V3 A44 GND A/9 GND A114 GND A11 P3V3 A45 GND A80 NCSL_TXD0 A115 GND A11 P3V3 A45 GND A81 NCSL_TXD1 A116 MEZZ_TX_DP_G<7> A13 P3V3 A46 MEZZ_RX_DN A83 GND A83 GND A116 MEZZ_TX_DP_G<7> A14 NCSL_RCSDV A48 GND A83 GND A84 CLK_100M_MEZZ0_DP A118 GND A16 NCSL_TXEN A50 MEZZ_RX_DN A86 GND A119 GND A18 MEZZ_SMCLK A53 GND A86 GND A20 MEZZ_RXDN A36 MEZZ_TX_DP_C<0> A20 GND A55 MEZZ_RX_DN A88 MEZZ_TX_DD_C<0> A88 MEZZ_TX_DD_C<1> A36 A55 MEZZ_RX_DN A90 GND A20 MEZZ_RXDN A39 MEZZ_TX_DD_C<1> A36 A56 GND		-	A43	MEZZ_RX_DN<3>	A78	NCSI_RXER	A113	MEZZ_TX_DN_C<6>
Al1 P3V3 Ad3 GND Ad3 CSL_1XDU Al15 GND A11 P3V3 Ad6 MEZZ_RX_DP A80 NCSL_1XDU A116 MEZZ_TX_DP_C<7> A13 P3V3 A46 MEZZ_RX_DN A82 GND A117 MEZZ_TX_DN_C<7> A14 NCSL_RCSDV A48 GND A82 GND A116 MEZZ_TX_DN_C<7> A16 NCSL_RCK A50 MEZZ_RX_DP<			A44	GND	A79	GND	A114	GND
A12 P3V3 A46 ME2Z_RX_DP445 A81 NCS_TXD1 A116 ME2Z_RX_DP_C475 A13 P3V3 A47 MEZZ_RX_DN44> A82 GND A117 MEZZ_TX_DD_C475 A14 NCS_RCLK A48 GND A83 GND A118 GND A15 NCS_RCLK A49 GND A84 CLK_100M_MEZZ_DN A85 CLK_100M_MEZZ_DN A16 NCS_TXEN A51 MEZZ_RX_DN455 A85 CLK_100M_MEZZ_DN A119 GND A17 PERST_N0 A51 MEZZ_RX_DN455 A86 GND A119 MEZZ_TX_DD_C<0> A16 MEZZ_SMDATA A53 GND A84 MEZZ_TX_DD_C<0> A86 GND A120 MEZZ_PRSNTA2_N A20 GND A55 MEZZ_RX_DN<6> A90 GND A22 A55 MEZZ_RX_DN A90 GND A24 A56 GND A91 GND A92 MEZZ_TX_DD_C<1> A93 MEZZ_TX_DD_C<1> A94 A94 GND A94 GND A94 GND A94 A94 GND	A10	P3V3	A45	GND	A80	NCSI_TXD0	A115	GND
A13 P3V3 A47 ME22_RX_DIX432 A22 GND A118 MEZ2_RX_DIX432 A23 GND A14 NCSI_RCLK A48 GND A33 GND A34 CLK_100M_MEZZ0_DP A118 GND A17 PERST_NO A51 MEZZ_RX_DP<5> A66 GND A35 CLK_100M_MEZZ0_DP A118 GND A118 MEZZ_SMCLK A51 MEZZ_RX_DP<6> A86 GND A119 GND A19 MEZZ_SMDATA A54 MEZZ_RX_DP<6> A89 MEZZ_TX_DP_C<0> A89 MEZZ_TX_DP_C<0> A20 GND A55 MEZZ_RX_DP<6> A89 MEZZ_TX_DP_C<0> A90 GND A21 GND A56 GND A57 GND A91 GND A91 GND A22 NCSI_RXD1 A58 MEZZ_RX_DP<7> A93 MEZZ_TX_DP_C<1> A93 MEZZ_TX_DP_CC A93 MEZZ_TX_DP_CC A94 GND A24 GND A61 P12V_AUX/P12V A96 MEZZ_TX_DP_CC A96 MEZZ_TX_DP_CC A97 MEZZ_TX_DP_C	A11		A46	MEZZ_RX_DP<4>	A81	NCSI_TXD1	A116	MEZZ_TX_DP_C<7>
A14 NCSI_RCSDV A48 GND A83 GND A118 GND A15 NCSI_RCLK A49 GND A84 CLK_100M_MEZZO_DP A119 A120 MEZZ_PRSNTA2_N A16 NCSI_TXEN A51 MEZZ_RX_DP<5> A86 GND A119 MEZZ_DNO A118 MEZZ_SMCLK A53 GND A87 GND A120 MEZZ_PRSNTA2_N A19 MEZZ_SMDATA A54 MEZZ_RX_DP<6> A89 MEZZ_TX_DP_C<0> A89 MEZZ_TX_DD_C<0> A21 GND A55 MEZZ_RX_DP<6> A89 MEZZ_TX_DD_C<0> A90 GND A22 NCSI_RXD1 A56 GND A57 GND A92 MEZZ_TX_DN_C<1> A24 GND A58 MEZZ_RX_DN<7> A60 GND A93 MEZZ_TX_DN_C<1> A22 NCSI_RXD1 A66 GND A61 P12V_AUX/P12V A96 MEZZ_TX_DN_C<1> A24 GND A61 P12V_AUX/P12V A96 MEZZ_TX_DN_C<2> A97 MEZZ_TX_DN_C<2> A25 GND A64 <td< td=""><td>A12</td><td></td><td>A47</td><td>MEZZ_RX_DN<4></td><td>A82</td><td>GND</td><td>A117</td><td>MEZZ_TX_DN_C<7></td></td<>	A12		A47	MEZZ_RX_DN<4>	A82	GND	A117	MEZZ_TX_DN_C<7>
	A13	P3V3	A48	GND	A83	GND	A118	GND
A16 NCSL_TXEN A50 MEZZ_RX_DP<5> A83 CLR_1000_MEZ20_DN A120 MEZZ_PRSN1A2_N A17 PERST_N0 A51 MEZZ_RX_DN<5> A52 GND A86 GND A18 MEZZ_SMCLK A53 GND A88 MEZZ_TX_DP_C<0> A88 MEZZ_TX_DD_C<0> A20 GND A54 MEZZ_RX_DP<6> A89 MEZZ_TX_DD_C<0> A21 GND A56 GND A90 GND A22 NCSL_RXD0 A56 GND A91 GND A22 NCSL_RXD1 A58 MEZZ_RX_DP<7> A93 MEZZ_TX_DD_C<1> A24 GND A61 P12V_AUX/P12V A94 GND A95 GND A22 CLK_100M_MEZZ1_DN A64 GND A99 GND A96 MEZZ_TX_DD_C<1> A24 GND A64 GND A64 GND A96 MEZZ_TX_DD_C<2> A25 GND A64 GND A64 GND A99	A14	NCSI_RCSDV	A49	GND	A84	CLK_100M_MEZZ0_DP	A119	GND
A17 PERST_N0 A18 MEZZ_SMCLK A19 MEZZ_SMDATA A20 GND A21 GND A22 NCSL_RXD0 A23 NCSL_RXD1 A56 GND A22 GND A23 NCSL_RXD1 A58 MEZZ_RX_DP<6> A59 MEZZ_RX_DD<	A15	NCSI_RCLK	A50	MEZZ_RX_DP<5>	A85	CLK_100M_MEZZ0_DN	A120	MEZZ_PRSNTA2_N
A18 MEZZ_SMCLK A32 GND A19 MEZZ_SMDATA A53 GND A20 GND A54 MEZZ_RX_DP<6> A21 GND A55 MEZZ_RX_DN<6> A22 NCSI_RXD0 A56 GND A23 NCSI_RXD1 A56 GND A24 GND A57 GND A25 GND A59 MEZZ_RX_DN<7> A26 CLK_100M_MEZZ1_DP A61 P12V_AUX/P12V A28 GND A63 P12V_AUX/P12V A29 GND A64 GND A31 MEZZ_RX_DN<0> A66 P3V3_AUX A32 GND A68 GND A33 GND A68 GND A33 GND A68 GND	A16	NCSI_TXEN	A51	MEZZ_RX_DN<5>	A86	GND		
A19 MEZZ_SMDATA A19 MEZZ_SMDATA A20 GND A21 GND A21 GND A22 NCSI_RXD0 A23 NCSI_RXD1 A24 GND A25 GND A26 CLK_100M_MEZZ1_DP A27 CLK_100M_MEZZ1_DN A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A31 MEZZ_RX_DN<0> A33 GND A33 GND	A17	PERST_N0	A52	GND	A87	GND		
A19 MEZZ_SMDATA A54 MEZZ_RX_DP<6> A20 GND A55 MEZZ_RX_DN<6> A21 GND A56 GND A22 NCSI_RXD0 A56 GND A23 NCSI_RXD1 A58 MEZZ_RX_DP<7> A24 GND A59 MEZZ_RX_DP<7> A25 GND A60 GND A26 CLK_100M_MEZZ1_DP A60 GND A27 CLK_100M_MEZZ1_DN A61 P12V_AUX/P12V A28 GND A63 P12V_AUX/P12V A29 GND A64 GND A30 MEZZ_RX_DN<0> A66 GND A31 MEZZ_RX_DN<0> A66 F3V3_AUX A33 GND A67 GND A33 GND A68 GND	A18	MEZZ_SMCLK	A53	GND	A88	MEZZ_TX_DP_C<0>		
A21 GND A55 ME2Z_RX_DN A90 GND A22 NCSI_RXD0 A56 GND A91 GND A23 NCSI_RXD1 A56 GND A93 MEZZ_TX_DP_C<1> A24 GND A58 MEZZ_RX_DP<7> A94 GND A25 GND A60 GND A93 MEZZ_TX_DP_C<1> A26 CLK_100M_MEZZ1_DP A60 GND A96 MEZZ_TX_DP_C<2> A27 CLK_100M_MEZZ1_DN A62 P12V_AUX/P12V A96 MEZZ_TX_DP_C<2> A28 GND A64 GND A99 GND A30 MEZZ_RX_DP<0> A64 GND A99 GND A31 MEZZ_RX_DN<0> A66 P3V3_AUX A67 GND A33 GND A68 GND A101 MEZZ_TX_DN_C<3> A33 GND A68 GND A102 GND	A19	MEZZ_SMDATA	A54	MEZZ_RX_DP<6>	A89			
A22 NCSI_RXD0 A56 GND A91 GND A23 NCSI_RXD1 A57 GND A92 MEZZ_TX_DP_C<1> A24 GND A58 MEZZ_RX_DP<7> A93 MEZZ_TX_DN_C<1> A25 GND A60 GND A94 GND A26 CLK_100M_MEZZ1_DP A61 P12V_AUX/P12V A96 MEZZ_TX_DP_C<2> A27 CLK_100M_MEZZ1_DN A62 P12V_AUX/P12V A96 MEZZ_TX_DN_C<2> A28 GND A63 P12V_AUX/P12V A98 GND A30 MEZZ_RX_DP<0> A65 GND A99 GND A31 MEZZ_RX_DN<0> A66 P3V3_AUX A101 MEZZ_TX_DN_C<3> A32 GND A68 GND A102 GND A34 MEZZ_RX_DR A67 GND A102 GND	A20	GND	A55	MEZZ_RX_DN<6>	A90	GND		
A23 NCSI_RXD1 A57 GND A92 MEZZ_TX_DP_C<1> A24 GND A58 MEZZ_RX_DP<7> A93 MEZZ_TX_DN_C<1> A25 GND A59 MEZZ_RX_DN<7> A60 GND A95 GND A26 CLK_100M_MEZZ1_DP A61 P12V_AUX/P12V A96 MEZZ_TX_DP_C<2> A27 CLK_100M_MEZZ1_DN A62 P12V_AUX/P12V A96 MEZZ_TX_DD_C<2> A28 GND A64 GND A99 GND A30 MEZZ_RX_DP<0> A66 P3V3_AUX A99 GND A31 MEZZ_RX_DN<0> A66 P3V3_AUX A101 MEZZ_TX_DN_C<3> A33 GND A68 GND A102 GND A34 MEZZ_R PX_DP<1> A68 GND A103 GND	A21	GND	A56	GND	A91	GND		
A24 GND A24 GND A25 GND A26 CLK_100M_MEZZ1_DP A27 CLK_100M_MEZZ1_DN A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DP<0> A32 GND A33 GND A34 MEZZ_RX_DD	A22	NCSI_RXD0	A57	GND	A92	MEZZ_TX_DP_C<1>		
A25 GND A26 CLK_100M_MEZZ1_DP A27 CLK_100M_MEZZ1_DN A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A23	NCSI_RXD1	A58	MEZZ_RX_DP<7>	A93	MEZZ_TX_DN_C<1>		
A26 CLK_100M_MEZZ1_DP A27 CLK_100M_MEZZ1_DN A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A24	GND	A59	MEZZ RX DN<7>	A94	GND		
A27 CLK_100M_MEZZ1_DN A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A25	GND	A60	GND	A95	GND		
A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A26	CLK_100M_MEZZ1_DP	A61	P12V_AUX/P12V	A96	MEZZ_TX_DP_C<2>		
A28 GND A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A27	CLK_100M_MEZZ1_DN	A62	P12V AUX/P12V	A97	MEZZ TX DN C<2>		
A29 GND A30 MEZZ_RX_DP<0> A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DP<1>	A28	GND	A63	P12V AUX/P12V		GND		
A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DR<1>	A29	GND	A64		A99	GND		
A31 MEZZ_RX_DN<0> A32 GND A33 GND A34 MEZZ_RX_DR<1>	A30	MEZZ_RX_DP<0>	A65	GND	A100	MEZZ TX DP C<3>		
A32 GND A67 GND A102 GND A33 GND A68 GND A103 GND A34 MEZZ BX DB<1> A68 GND A103 GND	A31	MEZZ_RX_DN<0>	A66	P3V3 AUX	A101			
A33 GND A68 GND A103 GND	A32	GND						
	A33	GND						
	A34	MEZZ_RX_DP<1>	A69	P3V3	A104	MEZZ_TX_DP_C<4>		

1.3 BCM57412

The BCM57412 Ethernet Controller is configured as single-port 25 Gb/s MAC with integrated SFP28 interface to the line side and x8 PCI Express 3.0 interface to the system host.

1.4 PCI Express Interface

PCIe is a high-bandwidth serial bus providing a low pin-count interface as an alternative to parallel PCI. It is part of the Host Interface Connector. The BCM57412 complies with the PCI Express Base Specification Revision 3.0, and supports an 8-lane PCIe 3.0 interface via the host interface connector.

1.5 NC-SI Interface

The BCM57412 Ethernet Controller supports the Network Controller Sideband Interface (NC-SI) Specification version 1.1.0. The NC-SI provides a standardized interface between the system Baseboard Management Controller (BMC) and the integrated NC-SI module of the BCM57412.

1.6 SMBus Interface

The BCM57412 Ethernet Controller SMB0 interface supports serial communications between BCM57412 and the system. The interface allows the Ethernet Controller to act as a SMBus primary or a secondary device.

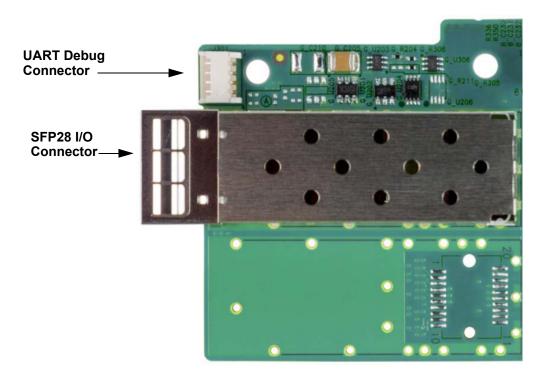
1.7 UART Interface

The BCM57412 Ethernet Controller has an integrated UART interface that supports external access to its registers. The UART signals are brought out to the 4-pin header for connecting a remote access host. The UART debug connector is placed near the I/O connector to be accessible from outside, for ease of in-system debug.

Table 2: UART Connector Pinout

Pin	Signal
1	UART_TXD
2	UART_RXD
3	V33
4	GND

Figure 3: UART Debug Connector



1.8 Nonvolatile RAM

The BCM57412 Ethernet Controller requires a nonvolatile serial flash memory (NVRAM) to store the device firmware, PCI Configuration space settings (for example, Device ID, Vendor ID), MAC address, and so on. After power-up, the firmware is downloaded into the device memory and executed by the on-chip processor.

1.9 Heat Sink

The passive heat sink is attached to the Ethernet Controller using four spring-loaded push pins that insert into four mounting holes.

1.10 DC/DC Regulators

The onboard voltage regulators use the 12V edge power or 5V auxiliary supply from the host interface connector to derive the necessary power rails for different circuits and components on the board.

1.11 Power Supplies

All power is derived from the Mezzanine Card Host Interface Connector 12V/5V supply pins. These voltage supply pins feed on-board regulators that provide the necessary power to the various components on the card. The mezzanine card has six switching power supplies that power the card's various +1.0V, +1.25V, +1.8V, and +3.3V loads.

1.12 LED Functions and Locations

The SFP28 port supports two LEDs to indicate traffic activities and link speed. The LEDs are visible on the bottom side as shown in Figure 4. Its locations and form factors conform to the OCP Mezzanine Card 2.0 Design Specification.

Figure 4: Activity and Link LED Locations

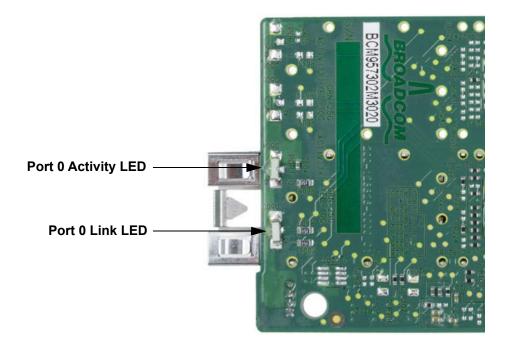


Table 3: LED Functions

LED Type	Color/Behavior	Note
Activity	Off	No Activity
	Green	Traffic Flowing Activity
Link	Off	No Link
	Green	Linked at 25 Gb/s
	Yellow	Linked at 10 Gb/s or 1 Gb/s

2 Regulatory and Safety Approvals

The following sections detail the Regulatory, Safety, Electromagnetic Compatibility (EMC), and Electrostatic Discharge (ESD) standard compliance for the BCM957412M4122C OCP 2.0 Mezzanine Card.

2.1 Regulatory

Table 4: Regulatory Approvals

Item	Applicable Standard	Approval (A)/Certificate (C)
CE/European Union	EN 62368-1:2014	CB report and certificate
UL/USA	IEC 62368-1 (ed. 2)	CB report and certificate

2.2 Safety

Table 5: Safety Approvals

Country	Certification Type/Standard	Compliance
International	CB Scheme Yes ICES 003 – Digital Device UL 1977 (connector safety)	
	UL 796 (PCB wiring safety) UL 94 (flammability of parts)	

2.3 Electromagnetic Compatibility (EMC)

Table 6: Electromagnetic Compatibility

Standard/Country	Certification Type	Compliance
CE/EU	EN 55032:2012/AC:2013 Class A	CE report and CE DoC
	EN 55024:2010	
	EN 61000-3-2:2014	
	EN 61000-3-3:2013	
FCC/USA	CFR47 Part 15 Subpart B Class A	FCC/IC DoC and EMC report referencing FCC and IC standards
IC/Canada	ICES-003 Class A	FCC/IC DoC and report referencing FCC and IC standards
ACA/Australia, New Zealand	AS/NZS CISPR 22:2009 +A1:2010	ACA certificate RCM mark
BSM/Taiwan	CNS 13438 (2006) Class A	BSMI certificate
BSMI/Taiwan	CNS 15663	BSMI certificate/RoHS table
MSIP/S. Korea	RRL KN22 Class A	Korea certificate
	KN24	MSIP mark
VCCI/Japan	VCCI-CISPR 32:2016	Copy of VCCI online certificate

2.4 Electrostatic Discharge (ESD) Compliance

Table 7: ESD Compliance Summary

Standard	Certification Type	Compliance
EN 55024:2010	Air/Direct discharge	Yes
(EN 61000-4-2)		

2.5 FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.
- **NOTE:** Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

3 Board Power and Environmental Specifications

Table 8 provides the adapter power consumption.

Table 8: Adapter Power Consumption

Adapter Power ^a	Passive DAC Cable	Optical Transceiver ^b
Typical – 50% Ethernet traffic	8.0W	8.7W
Max – 100% Ethernet traffic	8.5W	9.2W

a. Power consumption of adapter at 55°C ambient temperature.

b. Power consumption of adapter is measured using a Broadcom AFBR-735SMZ power level 1 optical transceiver. The total adapter power may vary with different optical transceivers.

Table 9 provides the adapter environmental specifications. The system designer may deploy methods to monitor the BCM57412 junction temperature (T_j) and provide sufficient airflow for keeping T_j below 105°C during normal operation. The Broadcom AFBR-735SMZ active transceiver is recommended for the application.

Table 9: Adapter Environmental Specifications

Airflow	Ambient Temperature	Passive DAC Cable	Optical Transceiver ^a			
Hot Aisle	55°C	Tier 3, 145 LFM	Tier 4, 160 LFM			
Storage Humidity	Relative Humidity Range (Non-condensing) maximum 90% at 35°C					
Storage Temperature	–40°C to 70°C					
Operating Temperature	0°C to 55°C					

a. Airflow requirements are measured using a Broadcom AFBR-735SMZ (power level 1, commercial temp [70°C]) optical transceivers. Check the airflow requirements of the selected optical transceivers to ensure adequate cooling to the optical transceivers.

4 Package Weight

Table 10 shows the BCM957412M4122C package weight (excluding optical module, and so on).

Table 10: Package Weight

Parameter	Symbol	Value	Unit
BCM957412M4122C weight	g	75	gram

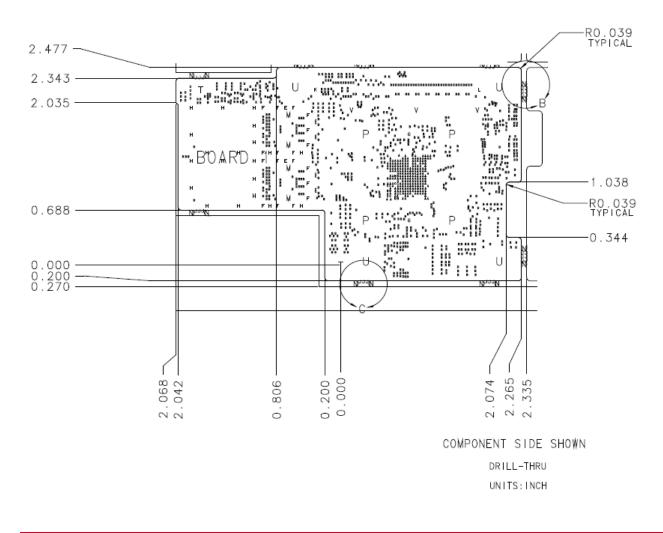
5 Physical and Environmental Specifications

This section outlines the mechanicals of the BCM957412M4122C OCP 2.0 Mezzanine Card as well as the Environmental Specifications.

5.1 Board Physical Dimensions

The BCM957412M4122C board dimensions are shown in Figure 5. The dimensions are in inches with a tolerance of ± 0.005 inches.

Figure 5: Board Physical Dimensions

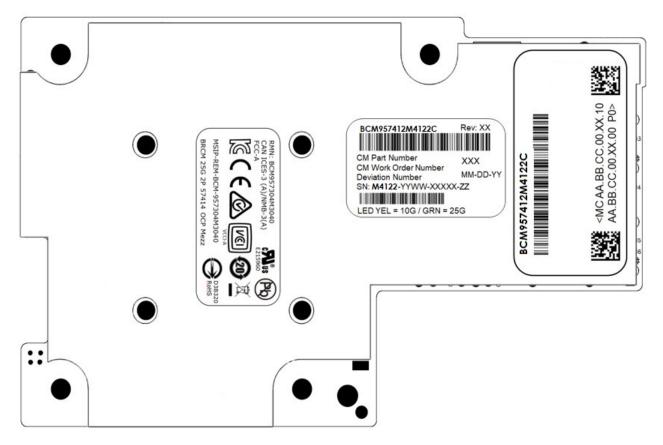


5.2 Label Information

This section provides the label information of the BCM957412M4122C OCP 2.0 Mezzanine Card. Figure 6 outlines the label and corresponding locations.

NOTE: Figure 6 is used for label locations only. The surface markings of the component may not reflect the product received. Broadcom reserves the right to change the label information on the printed circuit board with the same device functionality.

Figure 6: Labels Overview



5.2.1 MAC Address Label

In the example shown in Figure 7, BCM957412M4122C is the Part Number with 1D bar code, AA.BB.CC.00.XX.00 is the MAC address of data network interface with 2D bar code, and AA.BB.CC.00.XX.10 is the MAC address of management network interface with 2D bar code.

Figure 7: MAC Address Label



6 Ordering Information

Table 11: Ordering Information

Part Number	Description
BCM957412M4122C	Single-Port 25 Gb/s SFP28 Ethernet x8 PCI Express OCP 2.0 Mezzanine Card; RoHS- compliant

Revision History

957412M4122-DS106; March 22, 2022

Updated:

SMBus Interface – Updated description.

957412M4122-DS105; September 3, 2021

Updated:

Board Power and Environmental Specifications – Update section.

957412M4122-DS104; June 12, 2020

Updated:

- Label Information Updated the label note.
- Table 11, Ordering Information Updated ordering information description.

Added:

- Note for additional information on component surface markings in Figure 1.
- Board Power Consumption
- Airflow Requirements
- Package Weight

957412M4122-DS103; October 25, 2018

Updated:

Table 5, Labels Overview

957412M4122-DS102; December 27, 2017

Updated:

Regulatory and Safety Approvals

957412M4122-DS101; August 31, 2017

Updated:

Figure 1, BCM957412M4122C OCP Mezzanine Card

957412M4122-DS100; December 8, 2016

Initial release.

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