

BCM957414M4143C

Single-Port 50 Gb/s QSFP28 Ethernet PCI Express 3.0 x8 OCP 2.0 Mezzanine Card

General Description

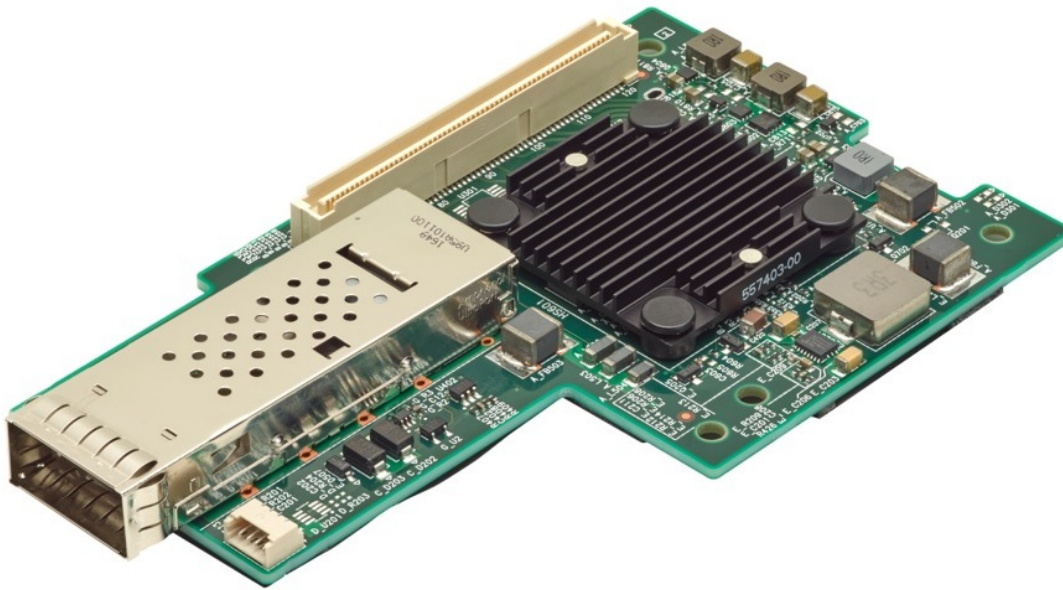
The Broadcom[®] BCM957414M4143C is a single-port 50 Gb/s, PCI Express 3.0 x8 Mezzanine Card, designed to the Open Compute Project (OCP) Mezzanine Card 2.0 Design Specification with a QSFP28 network connector as a Type 1 adapter with the board outline adhering to the original v0.5 dimensions. The adapter supports both QSFP28 optical modules and copper direct-attach cables. The card uses the Broadcom BCM57414 50GbE MAC controller with an integrated single-channel 50GbE SFI transceiver.

Features

- Single-port pluggable media interface, which may be equipped with 50 Gb/s QSFP28 optical transceiver or with copper direct-attach cable
- Fully compliant with the SFF-8665 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 encaps/decap
- vSwitch acceleration
- Tunnel-aware stateless offloads
- DCB support: PFC, ETS, QCN, DCBx
- RDMA over Converged Ethernet (RoCE)
- Network Controller Sideband Interface (NC-SI)
- 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 50-Gigabit Ethernet adapter for Open Compute Platform systems

Figure 1: BCM957414M4143C 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.

Table of Contents

| | |
|---|-----------|
| Chapter 1: Functional Description | 4 |
| 1.1 Block Diagram | 4 |
| 1.2 Host Interface Connector | 5 |
| 1.3 BCM57414 | 6 |
| 1.4 PCI Express Interface | 6 |
| 1.5 NC-SI Interface | 6 |
| 1.6 SMBus Interface | 6 |
| 1.7 UART Interface | 7 |
| 1.8 Non-volatile RAM | 8 |
| 1.9 Heat Sink | 8 |
| 1.10 DC/DC Regulators | 8 |
| 1.11 Power Supplies | 8 |
| 1.12 LED Functions and Locations | 8 |
| Chapter 2: Regulatory and Safety Approvals | 10 |
| 2.1 Regulatory | 10 |
| 2.2 Safety | 10 |
| 2.3 Electromagnetic Compatibility (EMC) | 10 |
| 2.4 Electrostatic Discharge (ESD) Compliance | 11 |
| 2.5 FCC Statement | 11 |
| 2.6 Board Power Consumption | 11 |
| 2.7 Airflow Requirements | 11 |
| 2.8 Package Weight | 12 |
| Chapter 3: Physical and Environmental Specifications | 13 |
| 3.1 Board Physical Dimensions | 13 |
| 3.2 Environment Specifications | 14 |
| 3.3 Label Information | 14 |
| 3.3.1 MAC Address Label | 15 |
| Chapter 4: Ordering Information | 16 |
| Appendix A: Acronyms and Abbreviations | 17 |
| Revision History | 18 |

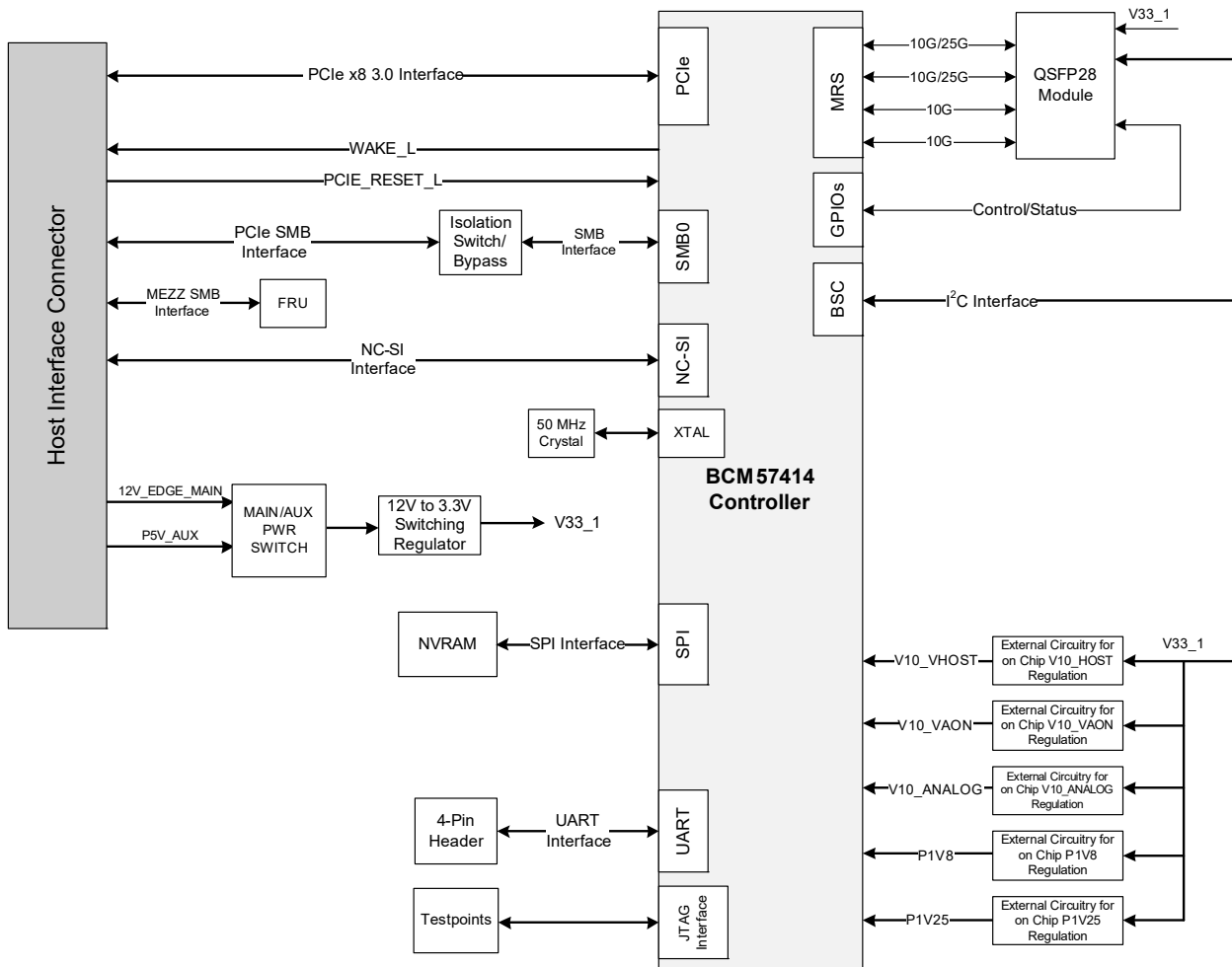
Chapter 1: Functional Description

This section provides the functional description of the BCM957414M4143C OCP 2.0 mezzanine card.

1.1 Block Diagram

Figure 2 shows the main functional blocks on the BCM957414M4143C OCP 2.0 mezzanine card.

Figure 2: BCM957414M4143C Block Diagram



1.2 Host Interface Connector

The BCM957414M4143C 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.

Table 1: Host Interface Connector Signal Pinout

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|-----|------------------------------------|-----|---------------|------|------------------------|------|-----------------|
| A1 | MEZZ_PRSENTA1_N/ BASEBOARD_A_ID | A34 | MEZZ_RX_DP<1> | A69 | P3V3 | A101 | MEZZ_TX_DN_C<3> |
| A2 | P5V_AUX | A35 | MEZZ_RX_DN<1> | A70 | P3V3 | A102 | GND |
| A3 | P5V_AUX | A36 | GND | A71 | P3V3 | A103 | GND |
| A4 | P5V_AUX | A37 | GND | A72 | P3V3 | A104 | MEZZ_TX_DP_C<4> |
| A5 | GND | A38 | MEZZ_RX_DP<2> | A73 | GND | A105 | MEZZ_TX_DN_C<4> |
| A6 | GND | A39 | MEZZ_RX_DN<2> | A74 | LAN_3V3STB_ALERT _N | A106 | GND |
| A7 | P3V3_AUX | A40 | GND | A75 | SMB_LAN_3V3STB_C LK | A107 | GND |
| A8 | GND | A41 | GND | A76 | SMB_LAN_3V3STB_D AT | A108 | MEZZ_TX_DP_C<5> |
| A9 | GND | A42 | MEZZ_RX_DP<3> | A77 | PCIE_WAKE_N | A109 | MEZZ_TX_DN_C<5> |
| A10 | P3V3 | A43 | MEZZ_RX_DN<3> | A78 | NCSI_RXER | A110 | GND |
| A11 | P3V3 | A44 | GND | A79 | GND | A111 | GND |
| A12 | P3V3 | A45 | GND | A80 | NCSI_TXD0 | A112 | MEZZ_TX_DP_C<6> |
| A13 | P3V3 | A46 | MEZZ_RX_DP<4> | A81 | NCSI_TXD1 | A113 | MEZZ_TX_DN_C<6> |
| A14 | NCSI_RCSDV | A47 | MEZZ_RX_DN<4> | A82 | GND | A114 | GND |
| A15 | NCSI_RCLK | A48 | GND | A83 | GND | A115 | GND |
| A16 | NCSI_TXEN | A49 | GND | A84 | CLK_100M_MEZZ0_D P | A116 | MEZZ_TX_DP_C<7> |
| A17 | PERST_N0 | A50 | MEZZ_RX_DP<5> | A85 | CLK_100M_MEZZ0_D N | A117 | MEZZ_TX_DN_C<7> |
| A18 | MEZZ_SMCLK | A51 | MEZZ_RX_DN<5> | A86 | GND | A118 | GND |
| A19 | MEZZ_SMDATA | A52 | GND | A87 | GND | A119 | GND |
| A20 | GND | A53 | GND | A88 | MEZZ_TX_DP_C<0> | A120 | MEZZ_PRSENTA2_N |
| A21 | GND | A54 | MEZZ_RX_DP<6> | A89 | MEZZ_TX_DN_C<0> | | |
| A22 | NCSI_RXD0 | A55 | MEZZ_RX_DN<6> | A90 | GND | | |
| A23 | NCSI_RXD1 | A56 | GND | A91 | GND | | |
| A24 | GND | A57 | GND | A92 | MEZZ_TX_DP_C<1> | | |
| A25 | GND | A58 | MEZZ_RX_DP<7> | A93 | MEZZ_TX_DN_C<1> | | |
| A26 | CLK_100M_MEZZ1_D P | A59 | MEZZ_RX_DN<7> | A94 | GND | | |
| A27 | CLK_100M_MEZZ1_D N | A60 | GND | A95 | GND | | |
| A28 | GND | A61 | P12V_AUX/P12V | A96 | MEZZ_TX_DP_C<2> | | |
| A29 | GND | A62 | P12V_AUX/P12V | A97 | MEZZ_TX_DN_C<2> | | |
| A30 | MEZZ_RX_DP<0> | A63 | P12V_AUX/P12V | A98 | GND | | |
| A31 | MEZZ_RX_DN<0> | A64 | GND | A99 | GND | | |
| A32 | GND | A65 | GND | A100 | MEZZ_TX_DP_C<3> | | |
| A33 | GND | A66 | P3V3_AUX | | | | |
| | | A67 | GND | | | | |
| | | A68 | GND | | | | |

1.3 BCM57414

The BCM57414 Ethernet Controller is configured as a single-port 50 Gb/s MAC with integrated QSFP28 optical 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 BCM57414 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 BCM57414 Ethernet Controller supports the NC-SI specification, version 1.1.0. The NC-SI provides a standardized interface between the system BMC and the integrated NC-SI module of the BCM57414.

1.6 SMBus Interface

The BCM57414 Ethernet Controller SMB0 interface supports serial communications between the BCM57414 and the system. The interface allows the Ethernet Controller to act as a SMBus primary or a secondary device.

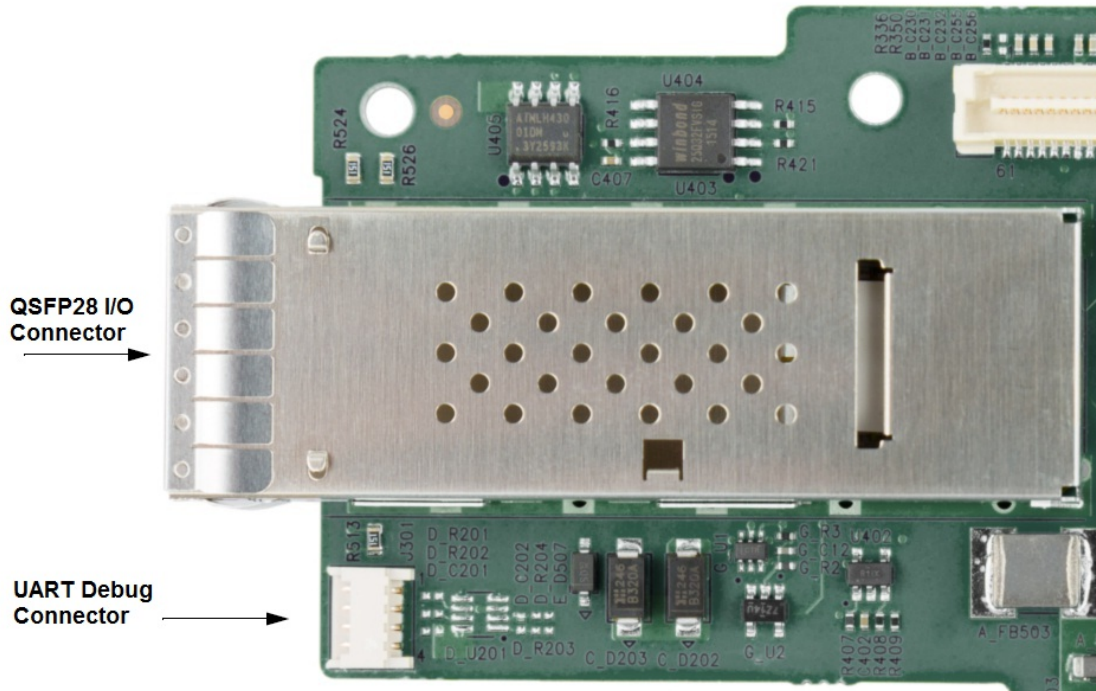
1.7 UART Interface

The BCM57414 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 Non-volatile RAM

The BCM57414 Ethernet Controller requires a non-volatile 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 main power and 5V auxiliary supply from the host interface connector to derive the necessary power rails for different circuits and components on the board.

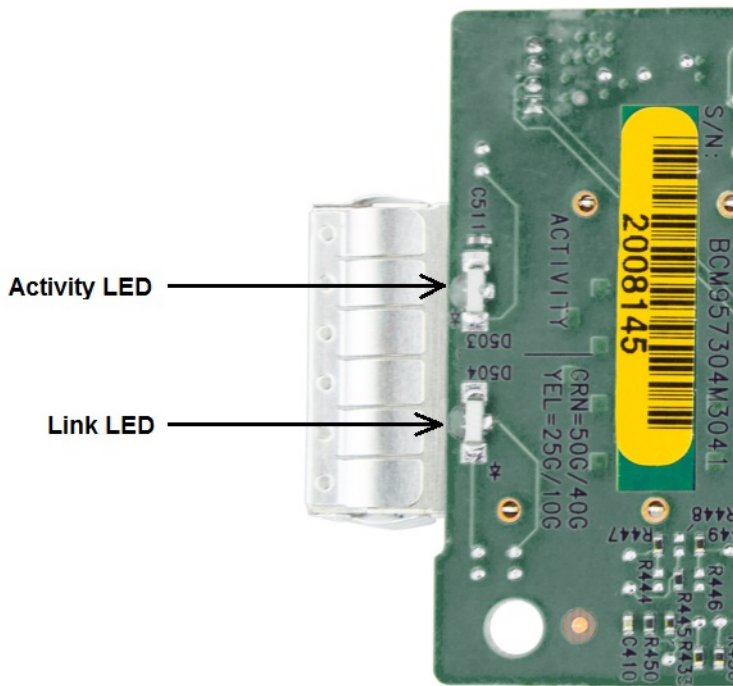
1.11 Power Supplies

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 QSFP28 port supports two LEDs to indicate traffic activities and link speed. The LEDs are visible on the bottom side as shown in [Figure 4 on page 9](#). Their locations and form factors conform to the OCP Mezzanine Card 2.0 Design Specification.

Figure 4: Activity and Link LED Locations



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

Table 3: LED Functions

| NVRAM Manufacturer | Device | Mbit |
|--------------------|----------------|--------------------------|
| Activity | Off | No activity |
| | Green blinking | Traffic flowing activity |
| Link | Off | No link |
| | Green | Linked at 50G |
| | Yellow | Linked at lower speed |

Chapter 2: Regulatory and Safety Approvals

The following sections detail the [FCC Statement](#), [Regulatory](#), [Safety](#), and [Electromagnetic Compatibility \(EMC\)](#) for the BCM957414M4143C 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 ICES 003 – Digital Device UL 1977 (connector safety) UL 796 (PCB wiring safety) UL 94 (flammability of parts) | Yes |

2.3 Electromagnetic Compatibility (EMC)

Table 6: Electromagnetic Compatibility

| Standard/Country | Certification Type | Compliance |
|----------------------------|--|--|
| CE/EU | EN 55032:2012/AC:2013 Class A EN 55024:2010 EN 61000-3-2:2014 EN 61000-3-3:2013 | CE report and CE DoC |
| 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 KN24 | Korea certificate MSIP mark |
| VCCI/Japan | VCCI V-3 | Copy of VCCI online certificate |

2.4 Electrostatic Discharge (ESD) Compliance

Table 7: ESD Compliance Summary

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

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.

2.6 Board Power Consumption

Table 8 shows the total power consumption required on the 12V and 3.3V edge connector pins for the BCM957414M4143C network interface card.

Table 8: Board Power Consumption

| Traffic Mode | Typical (Watt) | Worst Case (Watt) |
|-----------------|----------------|-------------------|
| Single-Port 50G | 9.1 | 9.9 |

NOTE: Tested with the DAC cable.

2.7 Airflow Requirements

The maximum junction temperature (T_j) for the BCM57414 is 110°C. The system designer should deploy methods to monitor the BCM57414 T_j and provide sufficient airflow for keeping T_j below 110°C.

2.8 Package Weight

Table 9 shows the BCM957414M4143C package weight (excluding optical module).

Table 9: Package Weight

| Parameter | Symbol | Value | Unit |
|------------------------|--------|-------|------|
| BCM957414M4143C weight | g | 75 | gram |

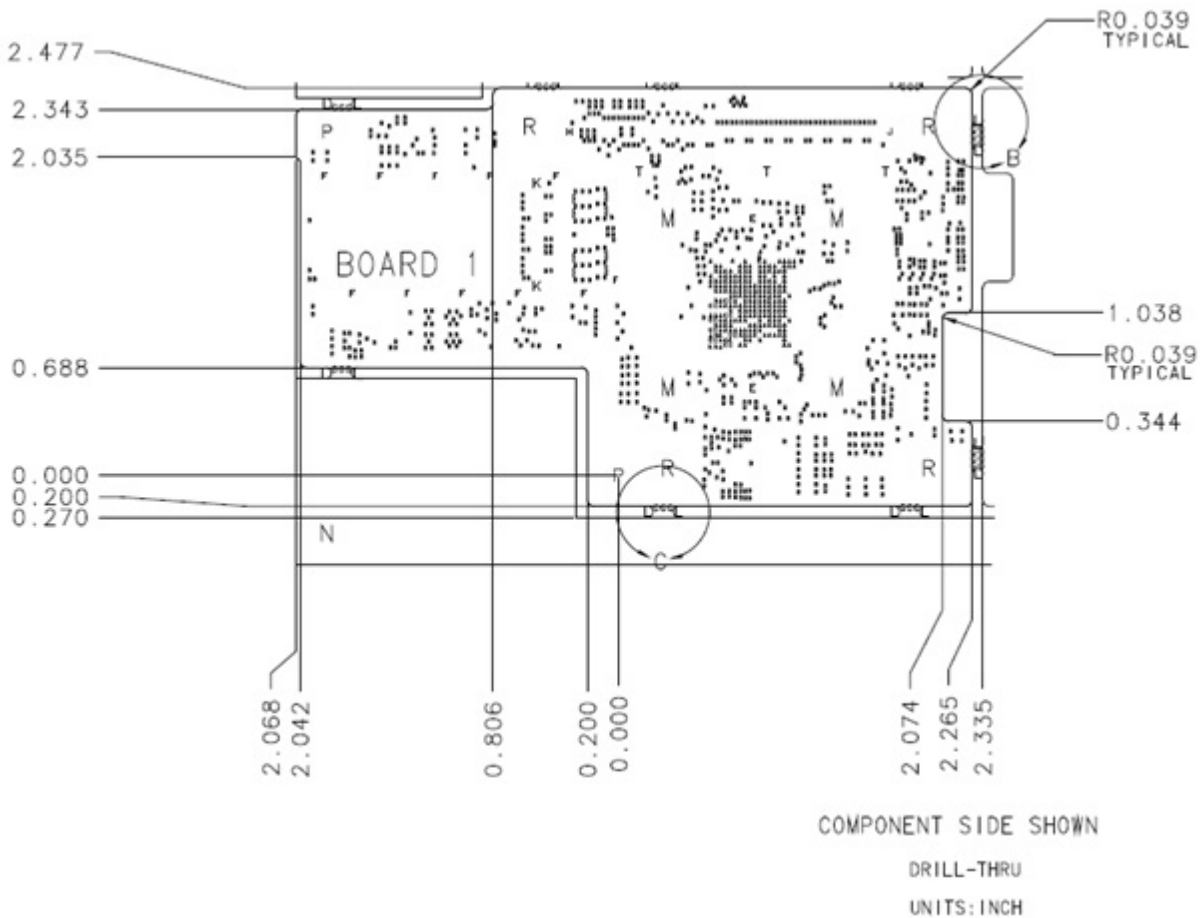
Chapter 3: Physical and Environmental Specifications

This section outlines the mechanicals of the BCM957414M4143C OCP 2.0 Mezzanine Card as well as the environmental specifications.

3.1 Board Physical Dimensions

The BCM957414M4143C board dimensions are shown in Figure 5. The dimensions are in inches with a tolerance of ± 0.005 .

Figure 5: Board Physical Dimensions



3.2 Environment Specifications

The Mezzanine Card meets the same environmental requirements specified in the OCP systems.

Table 10: Environment Specifications

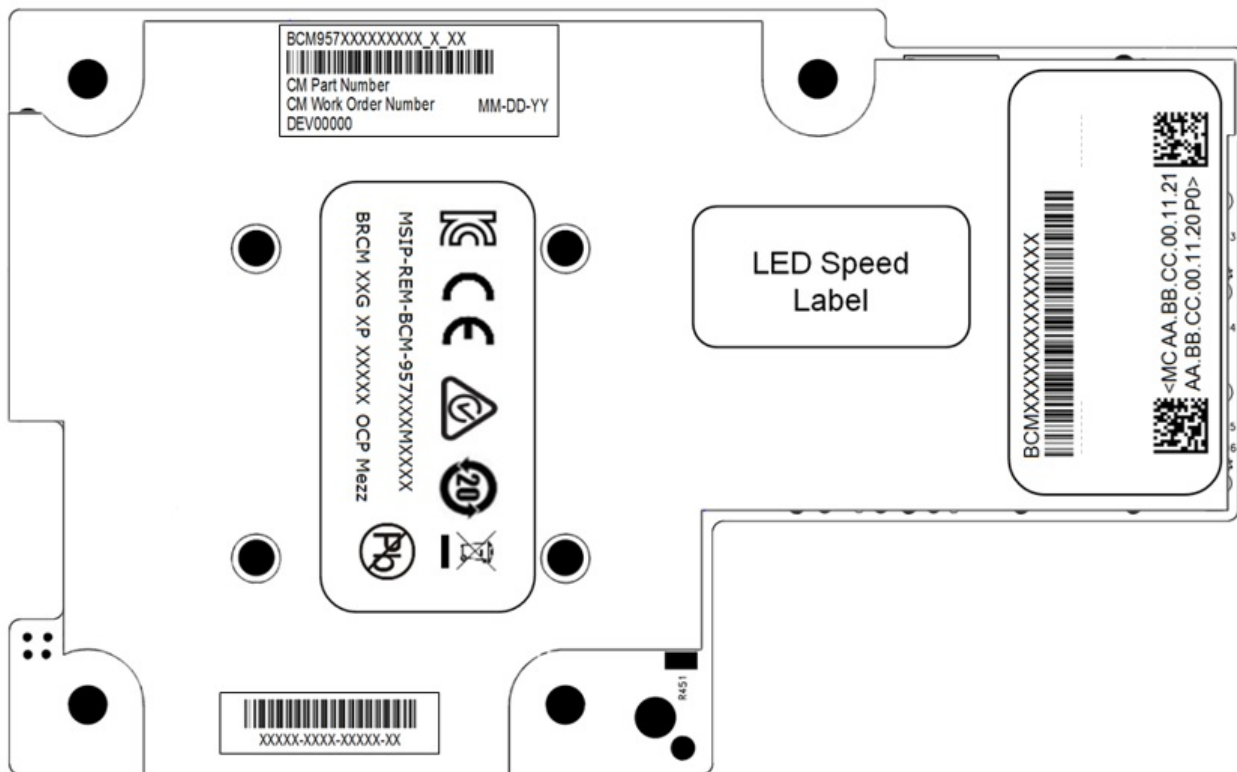
| Parameter | Condition |
|---------------------|------------------------------|
| Storage temperature | -40°C to +70°C |
| Storage humidity | 5% to 95% non-condensing |
| Vibration and shock | IEC78-2-(*) and IEC721-3-(*) |

3.3 Label Information

This section provides the label information of the BCM957414M4143C 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.

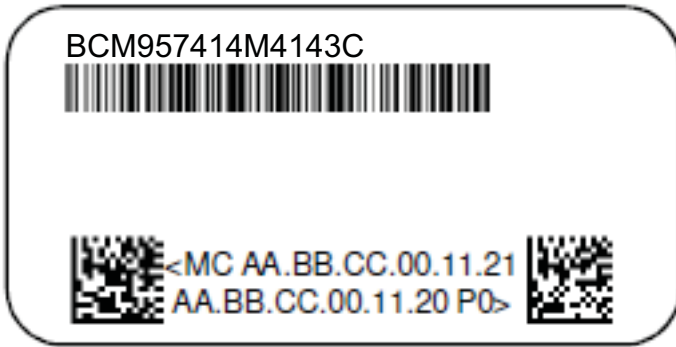
Figure 6: Label Overview



3.3.1 MAC Address Label

In the example shown in [Figure 7](#), BCM957414M4143C is the Part Number with 1D bar code, AA-BB-CC-00-11-20 is the MAC address of data network interface with 2D bar code, and AA-BB-CC-00-11-21 is the MAC address of management network interface with 2D bar code.

Figure 7: MAC Address Label



Chapter 4: Ordering Information

Table 11: Ordering Information

| Part Number | Description |
|-----------------|---|
| BCM957414M4143C | Single-port 50 Gb/s QSFP28 Ethernet x8 PCI Express OCP 2.0 Mezzanine Card; RoHS-compliant |

Appendix A: Acronyms and Abbreviations

For a more complete list of acronyms and other terms used by Broadcom documents, go to: <http://www.broadcom.com/press/glossary.php>.

Table 12: Acronyms and Abbreviations

| Term | Description |
|-------|---|
| BMC | Baseboard Management Controller |
| EMC | Electromagnetic Compatibility |
| ESD | Electrostatic Discharge |
| FLR | Function-Level Reset |
| LED | Light Emitting Diode |
| LRO | Large Receive Offload |
| LSO | Large Send Offload |
| NC-SI | Network Controller Sideband Interface |
| NVRAM | Non-volatile serial flash memory |
| OCP | Open Compute Project |
| RSS | Receive-side Scaling |
| TSO | TCP Segmentation Offload |
| TSS | Transmit-side Scaling |
| UART | Universal Asynchronous Receiver/Transmitter |
| WOL | Wake-on-LAN |

Revision History

957414M4143C-DS104; March 23, 2022

Updated:

- [SMBus Interface](#) – Updated description.

957414M4143C-DS103; June 26, 2020

Updated:

- Figure 1, BCM957414M4143C OCP 2.0 Mezzanine Card – Added note.
- Figure 6, Label Overview – Updated figure.

Added:

- Board Power Consumption
- Airflow Requirements
- Package Weight

957414M4143C-DS102; October 30, 2018

Updated:

- Table 6, Label Overview

957414M4143C-DS101; December 26, 2017

Updated:

- Regulatory and Safety Approvals

957414M4143C-DS100; September 7, 2017

Initial release.

Broadcom, the pulse logo, Connecting everything, TruFlow, TruManage, Avago Technologies, Avago, and the A logo are among the trademarks of Broadcom and/or its affiliates in the United States, certain other countries and/or the EU.

Copyright © 2017 – 2022 Broadcom. All Rights Reserved.

The term “Broadcom” refers to Broadcom Inc. and/or its subsidiaries. For more information, please visit www.broadcom.com.

Broadcom reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by Broadcom is believed to be accurate and reliable. However, Broadcom does not assume any liability arising out of the application or use of this information, nor the application or use of any product or circuit described herein, neither does it convey any license under its patent rights nor the rights of others.

