Agenda

• Overview
• High Level Features
• Why Needs This Product
• Mechanical View and Dimension
• Key Part Placement
• Design Enhancement
• Design Files Contribution
• OCP Tenets/Principles
• Summary
Overview

• Introduction
  - “QCT Rackgo X OCP AVA-4 M.2 Carrier Card” is storage extension card with Full Height Half length (FHHL) form factor. That supports up to 4x NVMe M.2 form factor SSD. M.2 supported type could be either 110mm (Type 22110) or 80mm (Type 2280) dual sided M.2 modules.

• Contributions
  - Design package
  - Product submission to OCP Marketplace
    - Product Recognition: Accepted level

• Specification Reference
  - Facebook M.2 carrier card v1.0 spec
## High Level Features

<table>
<thead>
<tr>
<th>Product Description</th>
<th>QCT Rackgo X OCP AVA-4 M.2 Carrier Card</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form Factor</td>
<td>Full Height Half Length (FHHL)</td>
</tr>
<tr>
<td>Interface</td>
<td>PCIe 3.0 x16 for driving 4x NVMe M.2 SSD</td>
</tr>
<tr>
<td>SSD Support Type</td>
<td>Up to 4x 110mm (Type 22110) or 80mm (Type 22080) dual sided M.2 SSD</td>
</tr>
</tbody>
</table>

### Environmental Requirements

- Gaseous contamination: Severity Level G1 per ANSI/ISA 71.04-1985
- Ambient operating temperature range: -5°C to +45°C
- Storage temperature range: -40°C to +70°C (long-term storage)
- Transportation temperature range: -55°C to +85°C (short-term storage)
- Operating and storage relative humidity: 10% to 90% (non-condensing)
- Operating altitude with no de-rating to 2,000m (6,600 feet)
Why Needs This Product

QCT Rackgo X Tioga Pass

- Difficulty of scale-up upgrade in existing environment. When you are planning to expand your high bandwidth SSD for cache use or storage pool use, but the 2.5” SSD slots are full already.

- This product intend to utilize the standard form factor for extra storage demand and enrich the use case of full height PCIe expansion slot for more possibilities over than NIC/GPGPU.

Note: This card only works with compatible system, like QCT Rackgo X Tioga Pass.
Mechanical View and Dimension

Separated heatsink

167.65mm

111.15mm
Key Part Placement

- 4xM.2 Conn
- PCIe x16
- Golden Finger
PCIE X 16 GOLD FINGER

Clock Buffer
DC Address: 0x8C

GPIO Expander (PWR)
DC Address: 0x40

GPIO Expander (LED)
DC Address: 0x42

I2C MUX
DC Address: 0x65

FRUAD EEPROM
DC Address: 0x80

POWER MONITOR
DC Address: 0xA4

Real Temp Sensor X2
DC Address: 0x80
DC Address: 0x82

PWR Circuit

LED
RED
BLUE

LED
LED
SSD_PWR_FAULT_N

CLK_100M_NGFF_PIN
P3E_NGFF_PCIE_TX_ON/DP
P3E_NGFF_PCIE_RX_ON/DP

PCIE_RST_BUF_N

SMB_PCIE_DV_CLKDAT

GOLD_RST
PCIE_CLK
P3E_PCIE_PSRST
SMB_PCIE_DV_CLKDAT

SMB_PCIE_DV_CLKDAT

SMB_PCIE_DV_CLKDAT
Easy Changeable Operation of Heatsink & M.2 SSD
Compatible Components List & User Guide

• PCIe Bifurcation Requirement:
  – Please be noted that this card only works with the compatible system, like “QCT Rackgo X Tioga Pass”.
  – If you plan to adopt or use this card on your own systems directly, please check with your system solution provider to ensure the PCle16 lanes for standard PCIe add-in card can be configured or bifurcated to 4x4 for the four M.2 devices which are installed on the AVA-4 M.2 carrier card.

• No supports hot-plug
• PCIe protocol only, no SATA interface support
Design Enhancement

• Double side heatsink
  – Dissipate the heat from the M.2 module to allow the M.2 carrier card could withstand in harsher environment (up to +45°C)

• Power monitor
  – Real time monitor the main power: 12V to take the protective action timely
Design Files Contribution - 01_Electricals

- 01_Full System Board Layout
  - DA0F08PC8A0_f08_pcie_ssd_adapter_board_ava_a_brd_071217.ocp_update.zip

- 02_Full System Schematic CAD
  - AVA_M2_SSD_ADAPTER_BOARD_20170712.rar
Design Files Contribution - 01_Electricals

➢ 03_Full System Component BOM

- AVA_PCBA__main_BOM_1214.xlsx

➢ 04_Manufacturing Files

- Board Component placement map
  - ssb.pdf
  - sst.pdf

- Gerber file
  - DA0F08PCB8A0_f08_pcie_ssd_adapter_board_ava_a Gerber_071217_ocp_rs274.zip

- Pick and Place
  - T2-A12-3LS1UP0000-A3A-1-C
  - T2-A12-4LS1UC0000-A3A-1-C

- Stackup
  - (Stackup)_S1U_AVA_8L_1p6mm_IT-170GRA1_Rev0p2_20160603.xls

- Test Point Coordinates and Information
  - tp_dist_rpt.txt
Design Files Contribution-
02_Mechanicals

➢ Mechanical files

- BOM
  - AVA BOM.zip

- Solidworks
  - 00 – AVA MODULE ASSEMBLY 20171122.zip

- STEP
  - 00 – AVA MODULE ASSEMBLY.zip
Design Files Contribution-03_Software

- NA, no firmware/software design
OCP Tenets/Principles

➢ Efficiency
  ➢ Up to scalable 4x M.2 modules with double side heatsink could be used in the environment-friendly data center and cut the TCO (Total Cost of Ownership)

➢ Scalability
  ➢ Design with full height dimension which meets PCI SIG CEM standard to be easily adopted for deployment of compute node with storage

➢ Openness
  ➢ Design with full height dimension which meets PCI SIG CEM standard, with limited design effort on compute node

➢ Impact
  ➢ Easily expand the storage pool with existing compute node, reduce the design effort and reserve more space for baseboard design
Thanks!!!