This user’s guide provides an overview and operating instructions for TI’s USB Type-C Mini Dock EVM. A quick-start guide section and schematics are also included in the document. Throughout this document, the abbreviations dock, EVM, EVM board, and the term evaluation module are synonymous with USB Type-C Mini Dock EVM, unless otherwise noted.

Contents
1 What is the TI USB Type-C Dock? ........................................................................................................... 2
2 TI USB Type-C Mini Dock Features ........................................................................................................ 3
3 USB Type-C Mini Dock Quick-Start Guide .......................................................................................... 4
4 Schematics .............................................................................................................................................. 6

List of Figures
1 USB Type-C Mini Dock Block Diagram ................................................................................................. 2
2 USB Type-C Mini Dock EVM .................................................................................................................. 3
3 USB Type-C Dock Example Setup ......................................................................................................... 4
4 USB Type-C Dock Example Setup ......................................................................................................... 5
5 USB Type-C Dock Example Setup ......................................................................................................... 5
6 EVM Board Power Schematic ................................................................................................................ 6
7 EVM Board Power 2 Schematic ............................................................................................................. 7
8 USB Type-C Front End Schematic ......................................................................................................... 8
9 TPS65986 Schematic ............................................................................................................................... 9
10 TUSB8041 Schematic ............................................................................................................................ 10
11 Port 1 Downstream USB Schematic ...................................................................................................... 11
12 Port 2 Downstream USB Type-C Schematic ....................................................................................... 12
13 Port 2 USB Type-C Schematic ............................................................................................................ 13
14 Port 3 USB Audio Schematic ................................................................................................................ 14
15 Port 4 USB Type-C Charging Schematic .............................................................................................. 15
16 Port 4 USB Type-C Connector Schematic ........................................................................................... 16
17 DP4320 Schematic ................................................................................................................................ 17
18 DP4320 Power Schematic .................................................................................................................... 18
19 DP4320 Bootstrap Schematic .............................................................................................................. 19
20 EVM Display Port Schematic .............................................................................................................. 20
21 DP to HDMI Schematic ....................................................................................................................... 21
22 EVM HDMI Connector Schematic ...................................................................................................... 22
23 Debug Board Schematic ...................................................................................................................... 23
24 EVM Schematic Fab Notes .................................................................................................................. 24

List of Tables
1 LEDs for Debug ..................................................................................................................................... 4
1 **What is the TI USB Type-C Dock?**

The USB Type-C and Power Delivery (PD) mini-dock evaluation module (EVM) provides a complete reference solution for a USB Type-C dock including audio, USB data, power, and video. The EVM has a small 2 in × 4 in form factor and supports both source and sink power capabilities over the primary USB Type-C PD port. Video output capabilities include both DisplayPort and HDMI.

![Figure 1. USB Type-C Mini Dock Block Diagram](image-url)
2 TI USB Type-C Mini Dock Features

This section lists and details supported features of the EVM:

- **Power**
  This EVM has the following bi-directional power capabilities:
  - Externally powered by 20-V DC barrel jack (J31). Upon successful power contract negotiation, the dock can source up to 20 V at 3 A.
  - Externally powered by a USB Type-C Charger (J30). Upon successful power contract negotiation, the dock can source 5 V at 3 A or 12–20 V at 5 A.
  - Bus-powered from USB Type-C laptop. Upon successful power contract negotiation, the dock can sink 5 V at 3 A or 12–20 V at 3 A.

  D823 or D822 blue LED turns on to indicate if a 20-V or 5-V power input is connected.

- **DRP Full-Featured USB-C and PD Port**
  - TUSB8041 HUB with upstream connection via HD3SS460 alternate mode switch
  - USB-C DFP using TUSB321 and HD3SS3212
  - USB Type-A DFP
  - 3.5-mm audio jack

- **Dual Video (up to 4K) via HDMI or miniDP**
- **Flash Update Over USB Type-C via USB 2.0 Endpoint**
• LEDs
  – Table 1 lists the LEDs provided for easier debug purposes.

<table>
<thead>
<tr>
<th>Reference Designator</th>
<th>LED Name</th>
<th>Description</th>
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<tbody>
<tr>
<td>D820</td>
<td>DP Mode</td>
<td></td>
</tr>
<tr>
<td>D822</td>
<td>5V</td>
<td>Illuminates when 5-V input is present</td>
</tr>
<tr>
<td>D823</td>
<td>20V</td>
<td>Illuminates when 20-V input is present</td>
</tr>
<tr>
<td>D824</td>
<td>DFP1</td>
<td>Illuminates when Port 1 (J10) is enabled</td>
</tr>
<tr>
<td>D825</td>
<td>DFP2</td>
<td></td>
</tr>
<tr>
<td>D826</td>
<td>DFP2</td>
<td></td>
</tr>
<tr>
<td>D827</td>
<td>MS TMD</td>
<td></td>
</tr>
<tr>
<td>D828</td>
<td>MS TMD</td>
<td></td>
</tr>
<tr>
<td>D829</td>
<td>DP MD</td>
<td></td>
</tr>
<tr>
<td>D830</td>
<td>DP MD</td>
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</table>

• Firmware (FW) Update
  – Contact Texas Instruments for details on FW updates and see the **USB Type-C Mini Dock Quick-Start Guide** section.

3 **USB Type-C Mini Dock Quick-Start Guide**

The following steps are provided for a quick-start using the EVM:

- **Step 1.** Connect the *USB Type-C Enabler Board* to the PC with a USB Type-A to USB-B cable and a DisplayPort Cable.

- **Step 2.** Connect the *USB Type-C Enabler Board* to the *USB Type-C Mini Dock EVM* with a USB Type-C cable.

![Figure 3. USB Type-C Dock Example Setup](image)

- **Step 3.** Confirm that D822, D826, D824, D827, D820, D829 are lit.
Step 4. Connect the Dell power adapter and confirm that the D823, D825, D824, D827, D820, D829 are lit.

Step 5. Connect a USB flash drive to the USB Type-C Mini Dock EVM and confirm that data can be transferred to and from the USB flash drive.

Step 6. Connect the HDMI cable to the USB Type-C Mini Dock EVM and to a monitor, confirm PC video is displayed on the monitor.

Step 7. Disconnect the HDMI cable and connect a miniDP cable to the USB Type-C Mini Dock EVM and to a monitor, confirm PC video is displayed on the monitor.
Figure 6 through Figure 24 illustrate the EVM schematics.

**Figure 6. EVM Board Power Schematic**
Figure 7. EVM Board Power 2 Schematic
Figure 8. USB Type-C Front End Schematic
Figure 9. TPS65986 Schematic
Figure 10. TUSB8041 Schematic
Figure 11. Port 1 Downstream USB Schematic
Figure 12. Port 2 Downstream USB Type-C Schematic
Figure 13. Port 2 USB Type-C Schematic
Figure 14. Port 3 USB Audio Schematic
Figure 15. Port 4 USB Type-C Charging Schematic
PORT 4 - TYPE C PD
ONLY USED TO SUPPLY POWER

NOTE #10
NOTE #3
NOTE #7

Figure 16. Port 4 USB Type-C Connector Schematic
Figure 17. DP4320 Schematic
Figure 18. DP4320 Power Schematic
STDP4320 BOOTSTRAPS

Figure 19. DP4320 Bootstrap Schematic
Figure 20. EVM Display Port Schematic
Figure 21. DP to HDMI Schematic
Figure 22. EVM HDMI Connector Schematic
Figure 23. Debug Board Schematic
1- PLACE C916 C917 ANY WHERE ON THE BOARD
2- KEEP C2, C3, C7, C8 CAPS CLOSE TO CONNECTOR LET RESISTORS SHARE PADS
3- KEEP ESD CLOSE TO CONNECTOR
4- THESE CONNECTIONS ARE FOR FLOW THROUGH ROUTING
5- DP MODE LED PLACE NEAR DP/HDMI
6- KEEP C340, C341, C342, C343 CAPS CLOSE TO CONNECTOR LET RESISTORS SHARE PADS
7- THESE CONNECTIONS ARE FOR FLOW THROUGH ROUTING
8- C291 AND C192 MUST BE 5.4mm TALL
9- PAD SHARING R1058 AND R1114, R1059 AND R1113
10- Place R1077 and R1078 as close as possible to R1060 and R1061
11- PAD SHARING R873 AND R875, R874 AND 876
12- Pad sharing with R1060 and R1061 on page 12

Figure 24. EVM Schematic Fab Notes
# Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

<table>
<thead>
<tr>
<th>Changes from A Revision (August 2016) to B Revision</th>
<th>Page</th>
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<td>• Changed description of USB Type-C Dock.</td>
<td>2</td>
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