UPD301C PIM Source Lite Demo Read Me

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REV	DATE	DESCRIPTION OF CHANGE
0.99	16-June-21	Initial version

Table of Contents

1 Software License Agreement

2 Terms and Abbreviations

Term	Definition
PSF	Universal Serial Bus Power Delivery Software Framework
EVB	Evaluation Board
PD	Power Delivery
IDE	Integrated Development Environment
PDO	Power Data Object
PM-PD	Power Module-USB Power Delivery
LED	Light Emitting Diode
GPIO	General Purpose Input Output
PIM	Plug In Module

3 Introduction

Microchip's USB Power Delivery Software Framework (PSF) is a configurable USB PD solution that is compliant to USB-PD 3.0 specification.

PSF Source Lite application includes PD Source functionality with the support for Boot time configuration parameters and GPIO based DC-DC controller for port power control. This document is intended to guide a user on setting up the USB Power Delivery Software Framework Evaluation kit with part number EV65D44A with EV71C90A PIM to work properly with Source Lite version of PSF along with a demonstration of a PD device attached to EVB - PSF. The EVB-PSF comes along with two vertical mount One-Hot PM-PDs (PMPD-VM-HOT) in the kit.

4 Prerequisites

Hardware:

1) USB Power Delivery Software Framework Evaluation kit with part number EV65D44A (EVB-PSF)

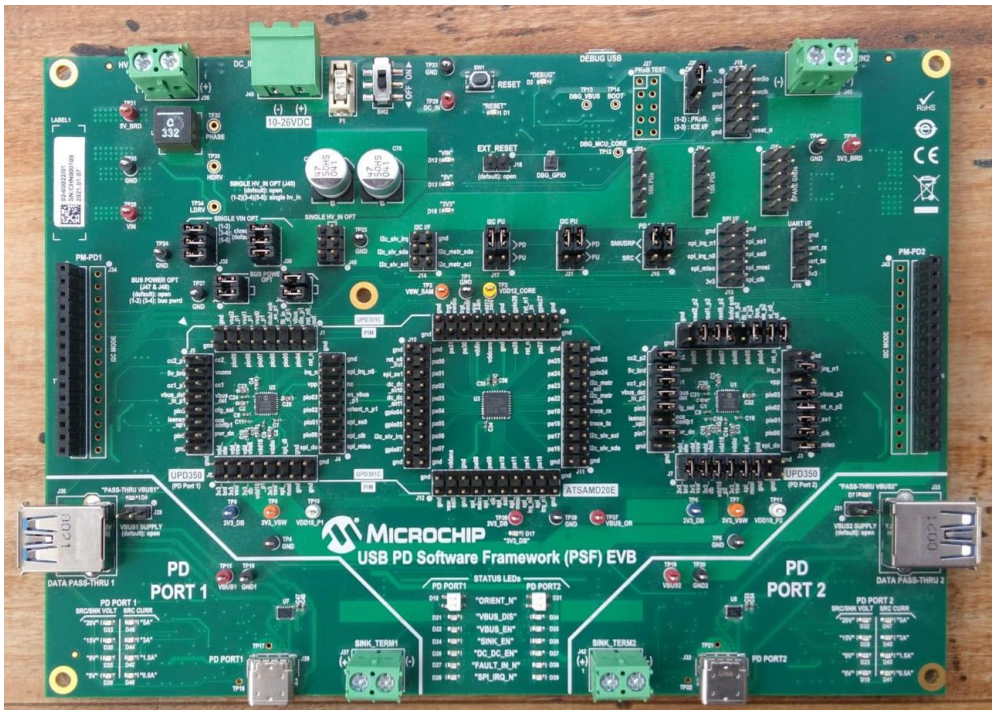

Figure 4.1 Microchip PSF Evaluation Board

1) 2 Microchip UNG 8122 Rev D PM-PD Cards – 1 per port

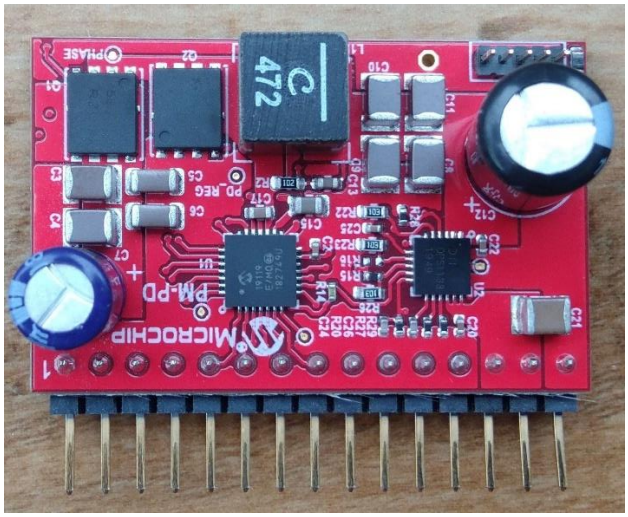

Figure 4.2 Microchip UNG 8122 Rev D PM-PD Card

2) Microchip UPD301C Plug-In Module

Figure 4.3 UPD301C Plug-In Module

3) 150W Power Adapter with 24V, 6.25A output

Figure 4.4 Power Adapter with 24V, 6.25A output capacity

4) USB-C to USB-C cable

5) Atmel ICE Debugger kit

Figure 4.5 Atmel-ICE Debugger Kit

6) USB Power Delivery capable Phones or Laptops

5 Setting up the EVB-PSF board for “UPD301C_PIM_Source_Lite”

1. Connect PM-PD cards to J35 and J44 of the EVB-PSF in correct orientation as shown in Figure 5.1

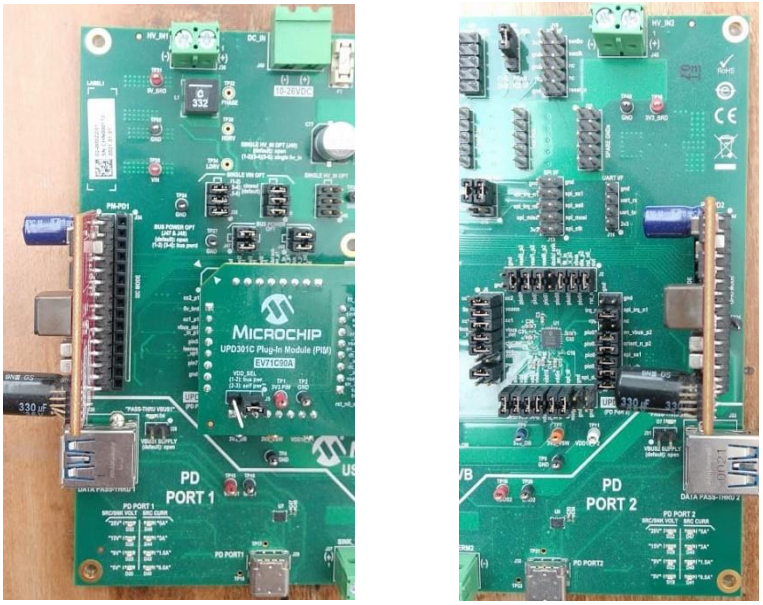

Figure 5.1 PM-PD Orientation

2. Connect the PIM according to the silk label marking on PSF EVB as shown in the Figure 5.2

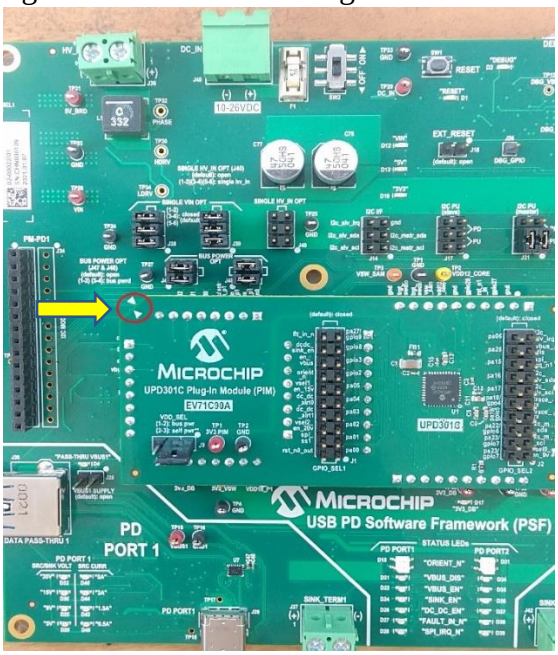

Figure 5.2 PIM Connection

3. Ensure the following jumpers are connected in EVB-PSF before proceeding to next step. An image of EVB-PSF with all the required jumper connections highlighted is shown in Figure 5.3.

Jumper	**Pins**
J38	1-2, 3-4, 5-6
J39	1-2, 3-4, 5-6
J21	1-3, 2-4
J15	1-3, 2-4
J47	1-2, 3-4
J48	1-2, 3-4
J20	1-2
J2	1-2 3-4 5-6 7-8 9-10 11-12 13-14
J3	1-2 3-4 5-6 7-8 9-10 13-14

J6	1-2 3-4 5-6 7-8 9-10 13-14
J7	1-2 3-4 5-6 7-8 9-10 11-12
J9 on PIM	1-2
GPIO_SEL1 on PIM	1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20
GPIO_SEL2 on PIM	1-2 3-4 5-6 7-8 9-10 11-12 13-14 15-16 17-18 19-20

Table 5.1 EVB-PSF Jumper Connections

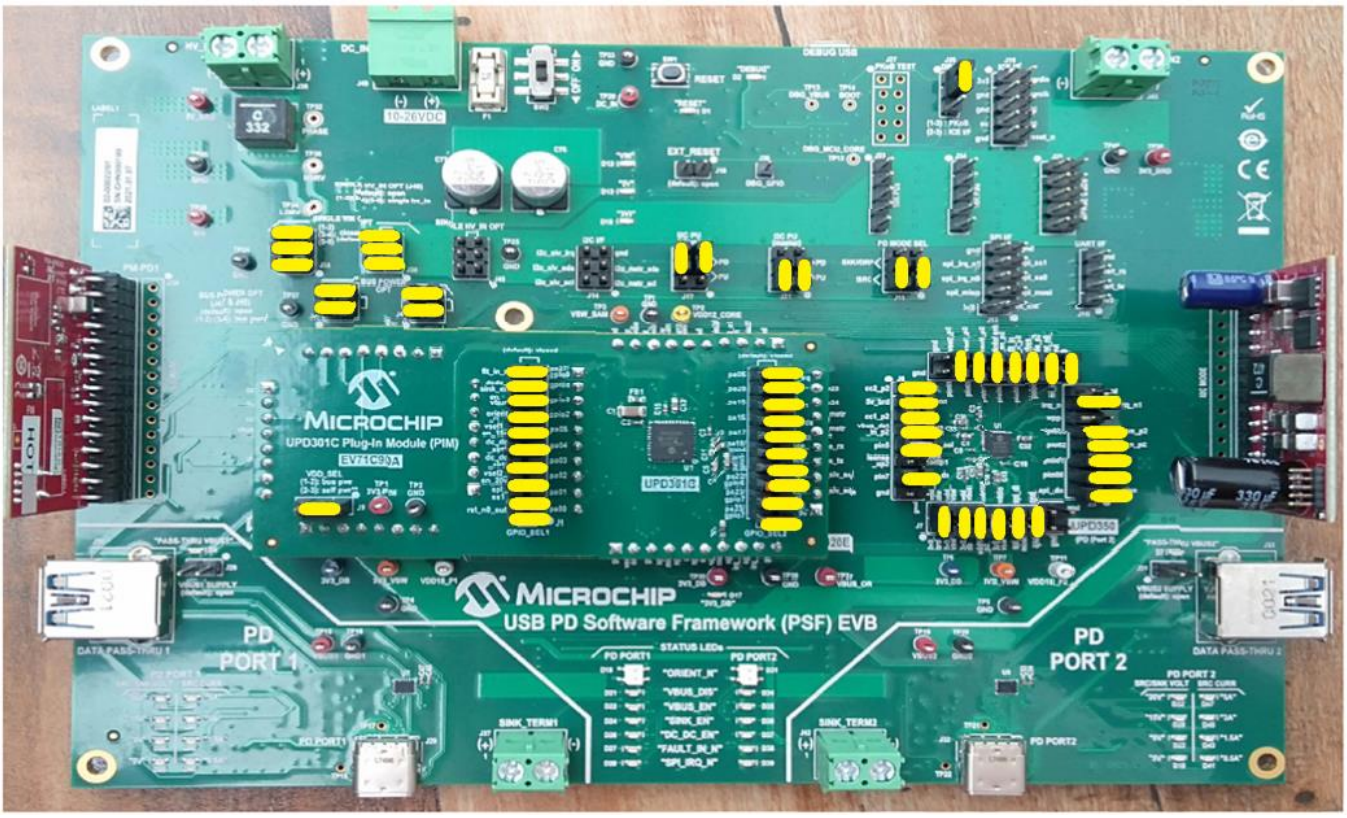

Figure 5.3 EVB-PSF with jumper connections highlighted

4. Connect 150W power adapter to J49 of the EVB-PSF

5. Connect a USB Micro-B cable to “DEBUG USB” which on the top of the board as shown in the figure 5.4 and connect the other end USB Type-A to the laptop for using the on-board debugger for programming

Figure 5.4 Programming using On-board debugger

6. Optionally, Atmel ICE can also be used for programming the board by connecting it to J19 as shown in the figure 5.4. Please ensure the jumper is switched to 2-3 on J20 while using Atmel ICE.

Figure 5.5 Programming using Atmel ICE (Optional)

7. The whole connection looks like,

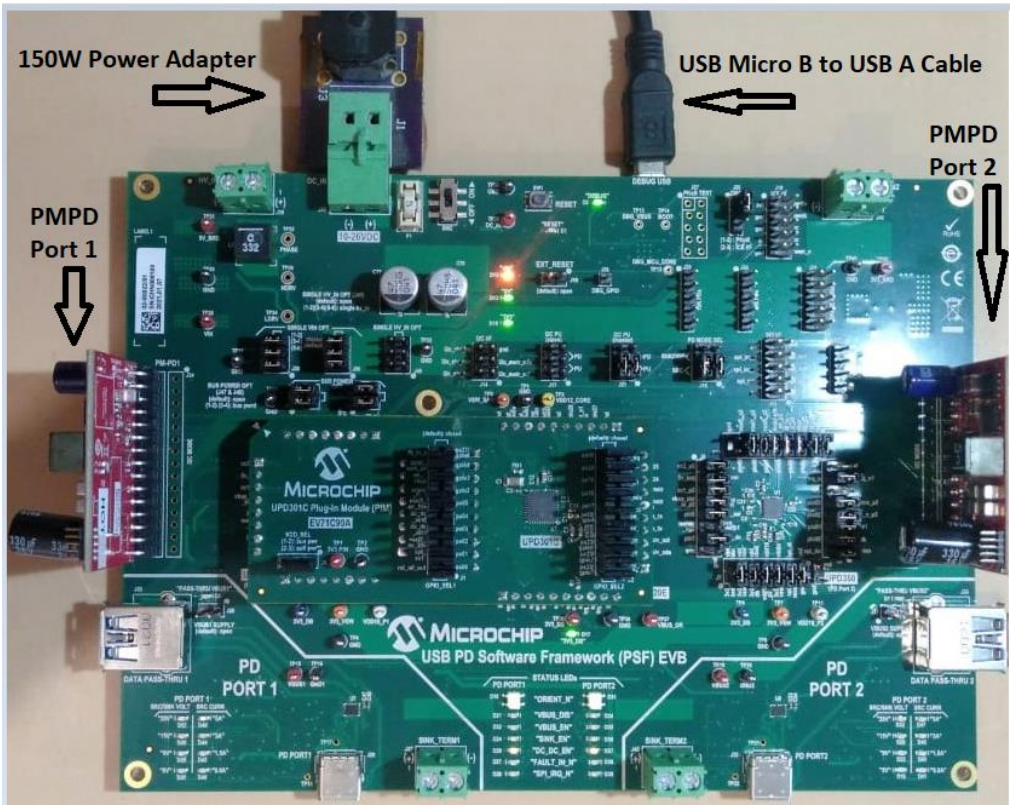

Figure 5.6 EVB-PSF Full Setup

6 Running the demo

Refer Getting Started with PSF document for the detailed steps on setting up the build environment, building the Source Lite PSF project and programming the hex file in the EVB-PSF.

Refer Appendix 8.2 of Getting Started with PSF to change any SAMD20 Harmony configuration. Refer 'Boot time Configuration' of PSF User Guide to change any configuration parameters.

1. Ensure all the jumpers are in place and Power on the EVB-PSF.

2. Program the UPD301C_PIM_Source_Lite.X.production.hex file by following the steps mentioned in section 8 of Getting Started with PSF

3. Connect a PD device to Port 1 of EVB-PSF using a USB-C to USB-C cable.

4. Connect another PD device to Port 2 of EVB-PSF using a USB-C to USB-C cable.
5. The image demonstrates a scenario where Microchip's UPD301C Basic Sink AE boards are connected to Port 1 and Port 2 of the EVB.

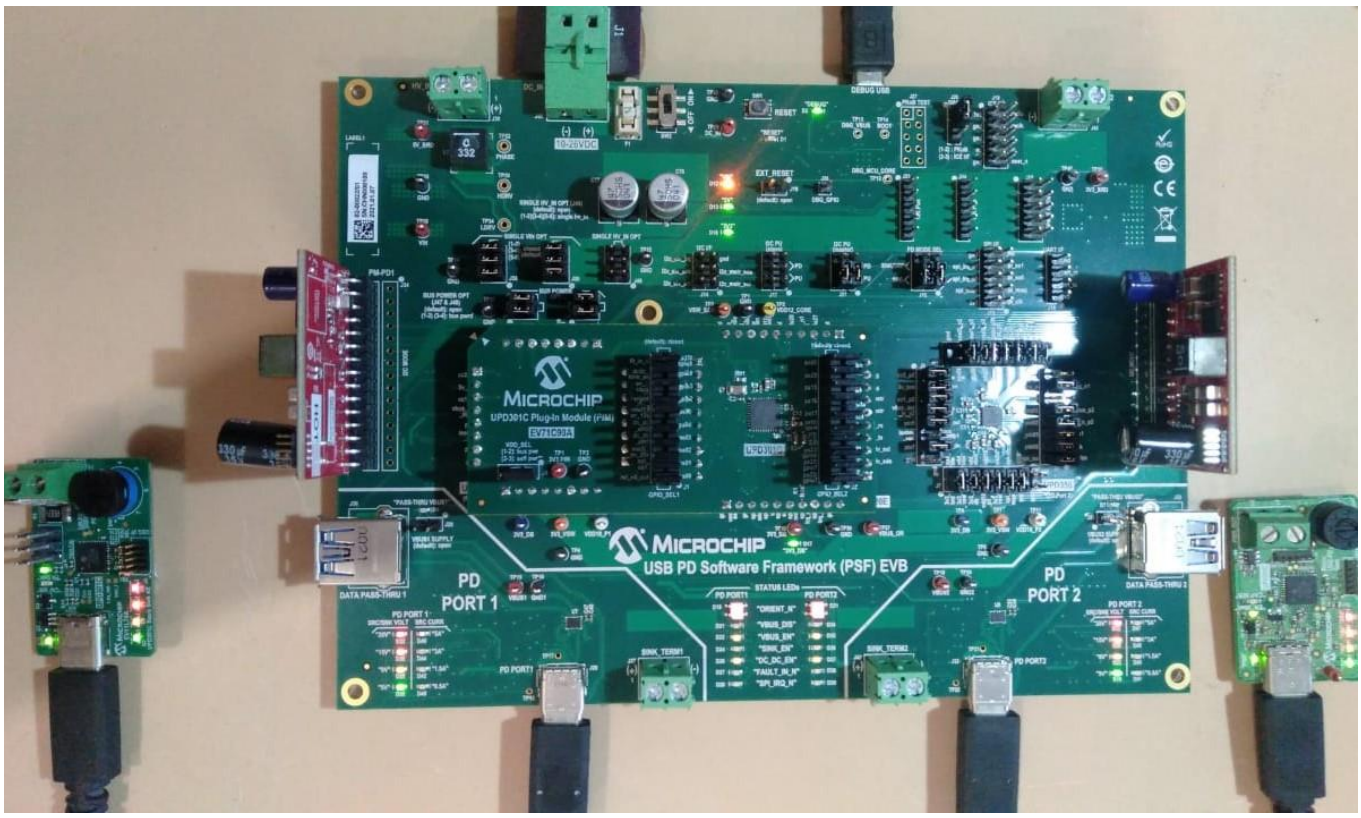

Figure 6.1 Two UPD301C Basic Sink AEs connected to each PD port

7 Expected Results

1. Once the hex file is programmed, the SPI_IRQ_N LEDs in both the ports flash and then turn off. DC_DC_EN LEDs turn on.

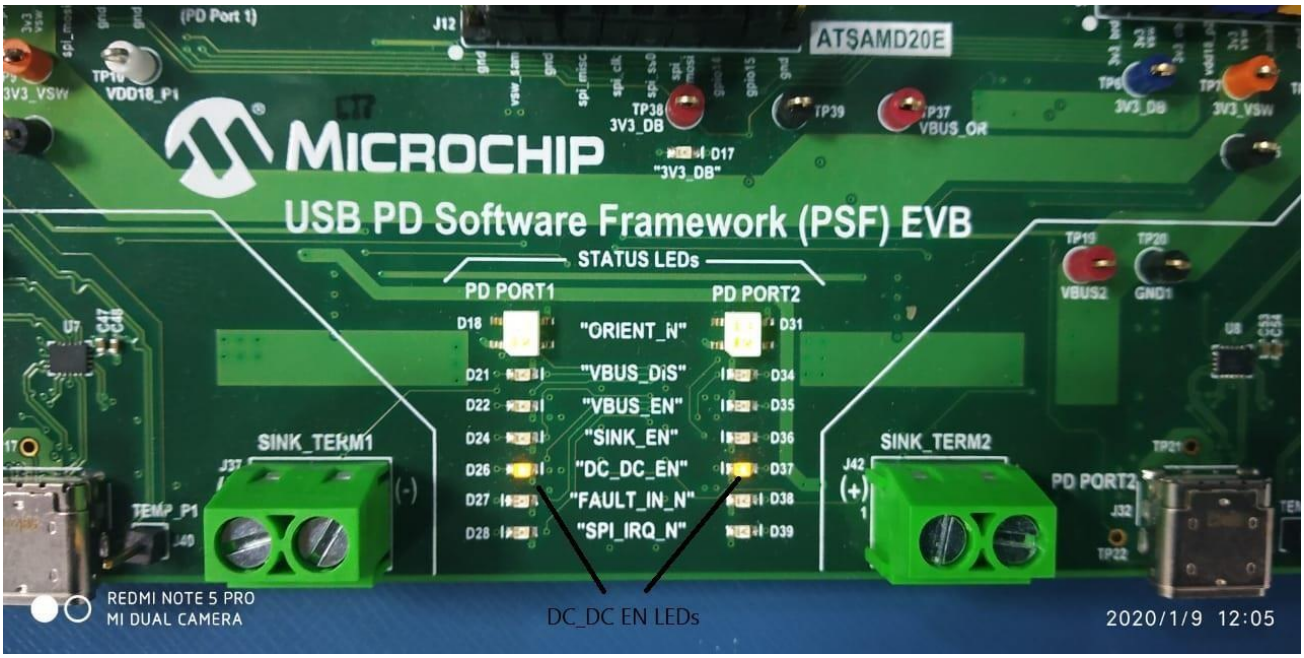

Figure 7.1 Status of DC_DC_EN LEDs after power on

2. Once a PD Device is attached to a PD port, Source capabilities will be advertised by the PSF, followed by a PDO request from the device.

3. PSF checks if the PDO requested by the device is within the range of its capabilities. If so, it accepts the request and starts driving the requested voltage in the VBUS.

4. Once an explicit power contract negotiation is in place, the device starts charging. VBUS_EN LED will turn on along with the PDO status LEDs indicating the negotiated voltage as shown in Figure 7.2

PDO	**Status LED**
5V	Port 1 – D20, Port 2 – D19
9V	Port 1 – D25, Port 2 – D23
15V	Port 1 – D30, Port 2 – D29
20V	Port 1 – D33, Port 2 – D32

Table 8.1 PDO Status LEDs

Example with Port 1: If 5V is negotiated by the device, LED in the D20 of Port 1 PDO will glow. If 9V is negotiated, then LEDs in D20 and D25 will glow. In case of 15V, LEDs in D20, D25 and D30 will glow. If 20V is negotiated, all the LEDs will glow.

5. In our case, UPD301C Basic Sink AE requested 20V. The status of VBUS_EN and PDO status LEDs is shown in Figure 7.2.

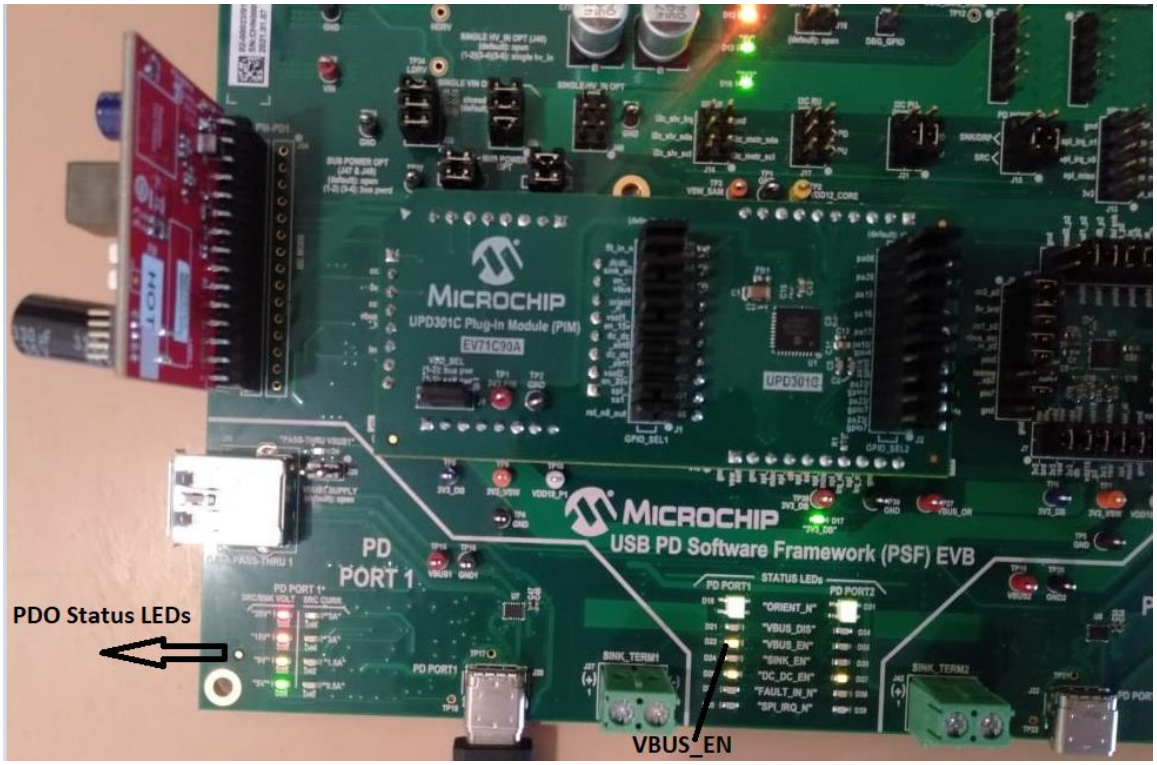

Figure 7.2 VBUS_EN and PDO Status LEDs after device attach