UPD301C Basic Sink Demo Read Me

Microchip Technology, Inc.

Microchip Technology, Incorporated
2355 W. Chandler Boulevard
Chandler, Arizona 85224
480/792-7200

REV	DATE	DESCRIPTION OF CHANGE
1.07	16-Oct-2020	Initial release of UPD301C Basic Sink AE Demo Read me
1.12	21-July-21	Updated ADC position 0,7 and CAP_MISMATCH functionality to align with V1.12

Table of Contents

1 Software License Agreement

2 Terms and Abbreviations

Term	Definition
PSF	Universal Serial Bus Power Delivery Software Framework
PCT	PSF Control Terminal
EVB	Evaluation Board
PD	Power Delivery
IDE	Integrated Development Environment
PDO	Power Data Object
LED	Light Emitting Diode
GPIO	General Purpose Input Output

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 Sink application supports basic USB-PD sink functionality in two modes. They are higher wattage at higher voltage (Mode A) and higher wattage at lower voltage (Mode B).

This document is intended to guide a user on setting up the UPD301C Basic Sink AE to work properly with Sink version of PSF along with a demonstration of PSF Control Terminal and Rotor knob functionality.

4 Prerequisites

Hardware:

1) Microchip UPD301C Basic Sink Board

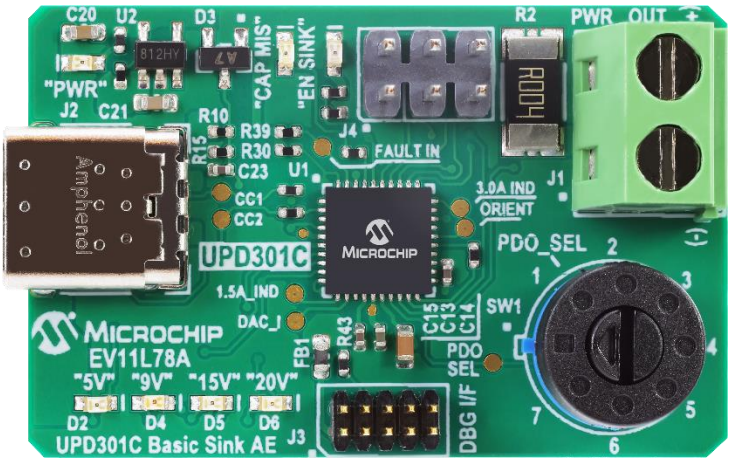

Figure 4.1 Microchip UPD301C Basic Sink Board

2) 65W USB PD Power Supply
3) FTDI Cable

4) Atmel ICE Debugger Kit

Figure 4.2 Atmel-ICE Debugger Kit

5 Setting up UPD301C Basic Sink for "UPD301C_Basic_Sink_AE"

1. Connect one end of Atmel ICE to PC using Micro-B cable and the other end of the Atmel ICE using a ribbon cable to J3 on the board as shown in the figure 5.1 and figure 5.2.

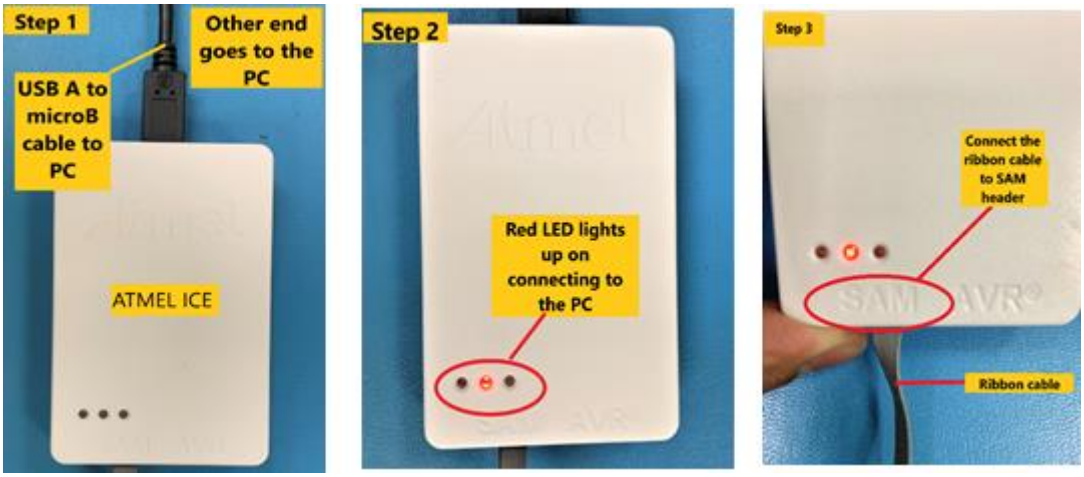

Figure 5.1 Atmel ICE Connection

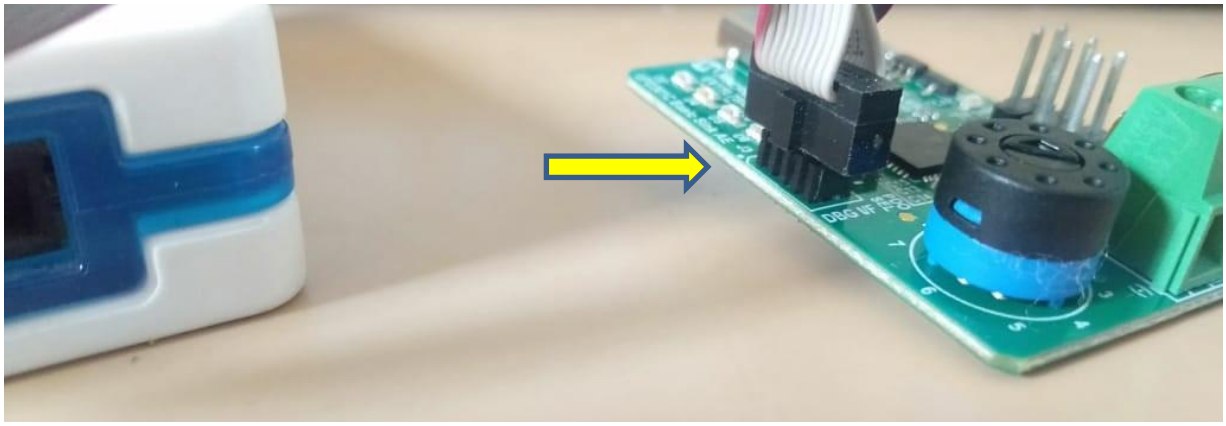

Figure 5.2 Atmel ICE Connection onto the board

2. Connect RX, TX and GND of FTDI cable to Pin 2, Pin 4, and Pin 6 of J4 respectively as shown in the figure 5.3.
3. Connect a 65W power adapter to J2 using USB-C to USB-C cable.
4. The whole connection looks as in the below figure 5.3

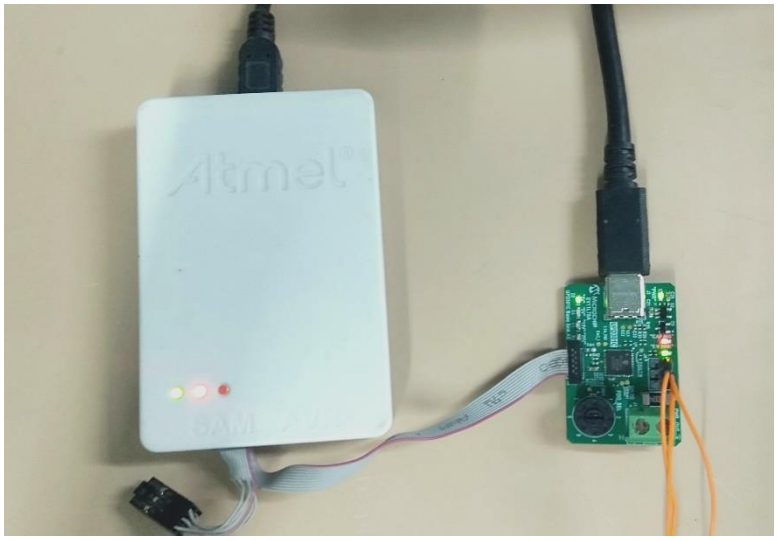

Figure 5.3 Basic Sink full setup

6 Running the demo

Refer Getting Started with PSF document for the detailed steps on setting up the build environment, building the UPD301C Basic Sink AE project and programming the UPD301C Basic Sink.

Refer Appendix 8.2 of Getting Started with PSF to change any SAMD20 Harmony configuration.

1. Ensure FTDI cable is connected at the right place
2. Program the UPD301C Basic Sink by following the steps mentioned in section 7 of Getting Started with PSF by setting rotor knob to position 1.
3. Set up the Tera term/Real term setup as shown below.

6.1.1 Real Term Setup

1. In Real Term set the baud rate to 3000000
2. Set the COM port number

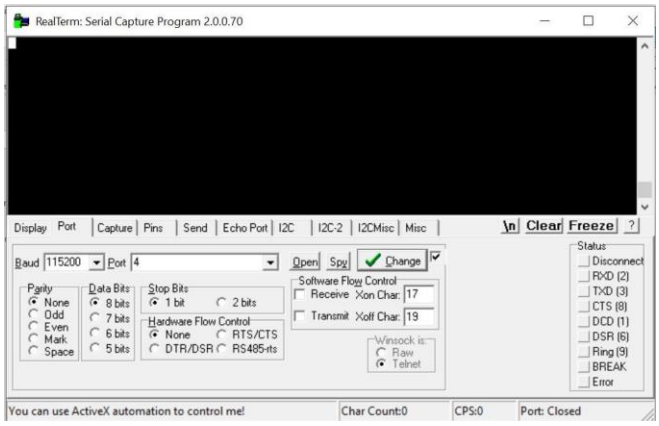

Figure 6.1 Set Com port number

6.1.2 Tera Term Setup

1. Open the Tera Term and select the com port

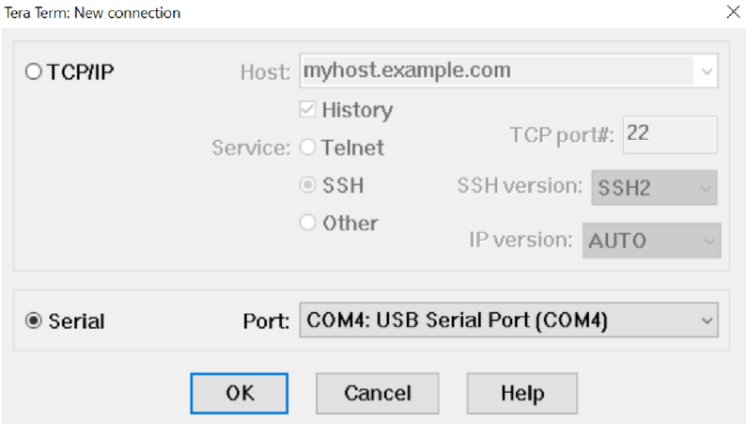

Figure 6.2 Set Com port number

2. Click on setup -> serial port-> Baud Rate

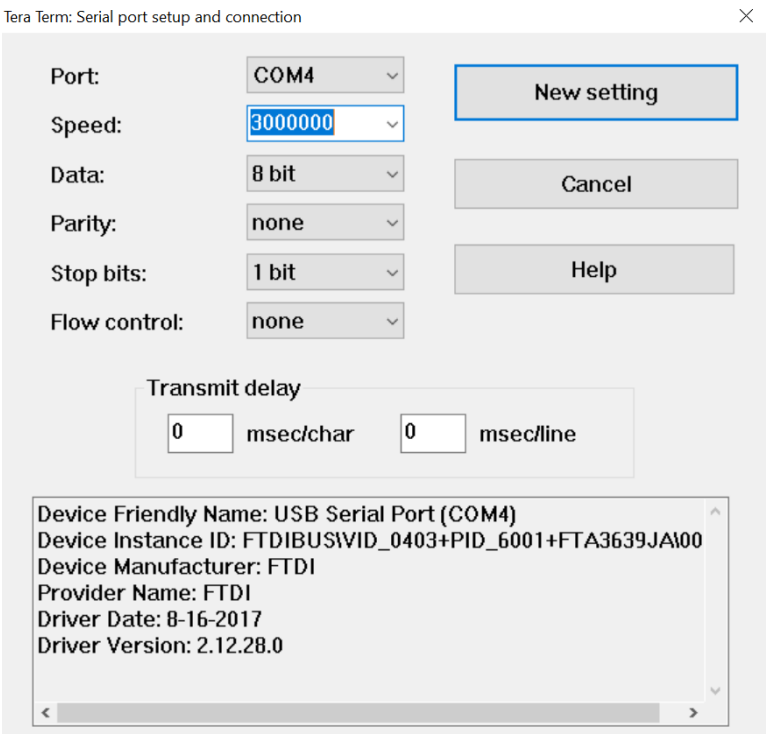

Figure 6.3 Set Baud Rate

3. Click New setting
4. Now Click on setup -> Terminal-> New-line->CR+LF->OK

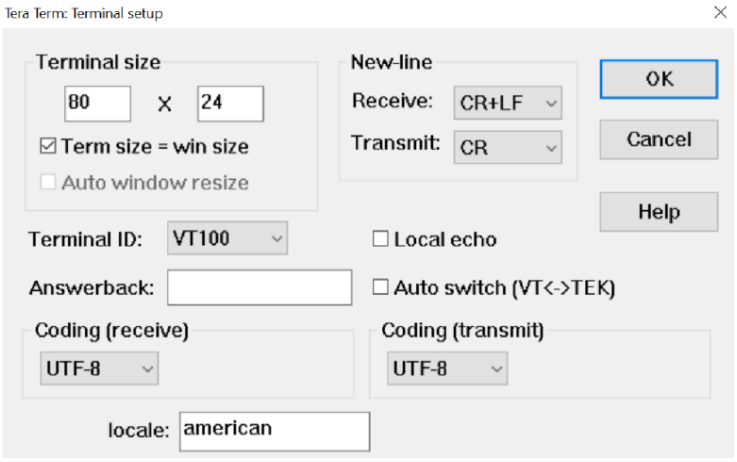

Figure 6.4

7 Expected Results

7.1 Rotor Knob

1. Once the hex file is programmed, the PWR and EN_SINK LEDs turn on. According to the PD source adapter used, the PDO Status LEDs turn on.
2. Once the Source PD Device is attached to a PD port, the device gives out 5V followed by Source capabilities.
3. PSF requests for suitable PDO from source capability based on the configuration. PD negotiation takes place if the source accepts the request and sources the requested power.

4. Now change the positions of Rotor Knob and the following changes can be observed in the LEDs D2, D4, D5, D6. Refer section 7.2.3 to observe the respective PDO values on PCT. Also refer section 7.2.8 to set new PDO values.

Rotor Knob Position	Status LED
Position 1	D2
Position 2	D2, D4
Position 3	D2, D4, D5
Position 4	D2, D4, D5, D6
Position 5	Supports Mode A. Depends on source capabilities
Position 6	Supports Mode B. Depends on source capabilities

Table 7.1 Rotor Knob positions and corresponding LEDS

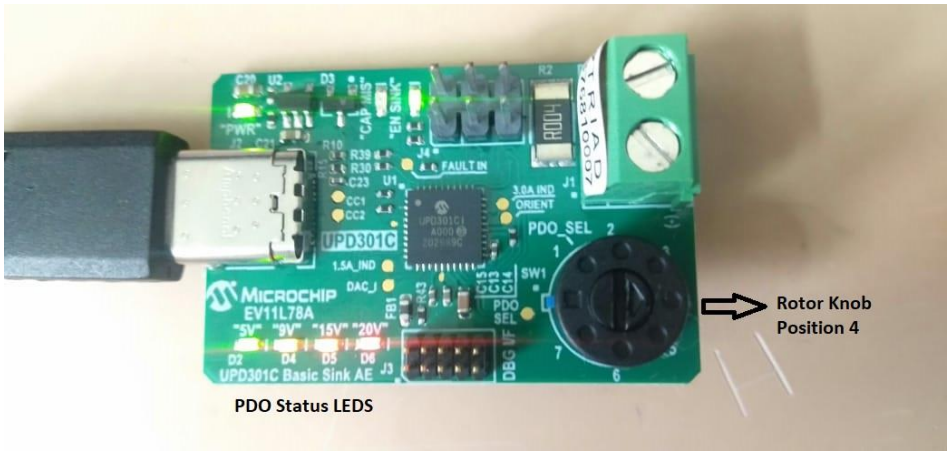

Figure 7.1 Sink PDO Status LEDs for Rotor Knob Position 4

7.2 PSF Control Terminal

PSF has a range of compile time and runtime configuration options for the various USB-PD features and other special features.
This release of PCT allows configuration of the following:

- Version
- PDO
- Memory
- Status Data
- Rotor knob

7.2.1 Supported commands

A list of supported commands, their description and expected results is given below.

Name	Description
get version	Gives the demo version and firmware version
get pdo	Gives the default sink pdo details
get sr[globalcfgstatusdata]	Gives the Global config status data values
get sr[portcfgstatus]	Gives the port config status data values
get mem[memory_address][length]	Gets the value in the memory address of the firmware requested
set mem[memory_address][byte_value]	Sets the byte value at the memory address of the firmware specifies
set pdo[position][value]	Sets the pdo value at the position specified

Table 7.2 PCT supported commands

7.2.2 get version

Description

get version command when prompted in PCT gives the current demo version and firmware version

Remarks

Version keeps changing as the firmware is updated

Example

```
get version

>demo version=1.00
```

```
>firmware version=1.11
```

7.2.3 get pdo

Description

get pdo command when prompted in PCT gives out the advertised PDOs or the default supported PDO by the firmware
Position0: (5V,3A)
Position1: (5V,3A), (9V,3A)
Position2: (5V,3A), (15V,3A)
Position3: (5V,3A), (20V,3A)
Position4: (5V,3A), (9V,3A), (15V,3A) in Mode A.
Position5: (5V,3A), (9V,3A), (15V,3A) in Mode B.
Position6: (5V,3A), (9V,3A), (15V,3A), (20V,3A) in Mode A.
Position7: (5V,3A), (9V,3A), (15V,3A), (20V,3A) in Mode B.

Remarks

If a valid PDO is newly set, get PDO command should give the newly set PDO

Example

```
get pdo

> AdvertisedPDO -00

> Voltage = 05000mV Current = 3000mA

> AdvertisedPDO -01

> Voltage = 09000mV Current = 3000mA
```

Note:

get PDO displays values during run time and hence they may change.

7.2.4 get sr[globalcfgstatusdata]

Description

get sr[globalcfgstatusdata] command when prompted in PCT gives out the global config status data values

Remarks

These values keep changing as the firmware is updated

Example

```
get sr[globalcfgstatusdata]

>u8MinorVersion=2

>u8MajorVersion=1
```

7.2.5 get sr[portcfgstatus]

Description

get sr[portcfgstatus] command when prompted in PCT gives out the global config status data values

Remarks

These values keep changing as the firmware is updated

Example

```
get sr[portcfgstatus]

>u32cfgdata=238
```

Note:

get PDO displays values during run time and hence they may change.

7.2.6 get mem[memory_address] [length]

Description

get mem[memory_address][length] command when prompted in PCT gives out the value in the memory address specified to the given length.

Remarks

The memory 2000_0000 to 20001FF0 is accessible. Length cannot be more than 2.

Example

```
get mem[20001FA0][1]

>byte value=08
```

7.2.7 set mem[memory_address] [byte_value]

Description

set mem[memory_address][byte_value] command when prompted in PCT sets the byte value at the memory address of the firmware specifies

Remarks

The memory 2000_0000 to 20001FF0 is accessible.

Example

```
set mem[20001FA0][1]
```

7.2.8 set pdo[position][value]

Description

set pdo[position][value] command when prompted in PCT by setting the rotor knob position to be modified, sets the pdo value at the position specified

Remarks

- The pdo position cannot be greater than 7
- PDO value should be as the value calculated by ((((voltage)/50) << 10) | ((current)/10)).
- PDO values are always in ascending order
- Maximum PDO value could be 6412C(20V,3A)

Example

```
set pdo[1][4612c]
```

Important Note:

To view the PDOs supported by PSF, user should give a get PDO command. To modify a PDO user must give the position as displayed in get PDO list

For e.g.

- Set the Rotor position to 2
- Give a get pdo command to view the list of supported PDOs in position 2 [(5V,3A)(15V,3A)]
- Control terminal displays the PDOs as
  - Advertised PDO-00
    a. Voltage-1388
    b. Current-012c
  - Advertised PDO-01
    a. Voltage-3A98
    b. Current-012c
- Now if the user wants to set the PDO 0 as (4V,3A) , Then user must give the command-set pdo [0] [1412c]
- Now if the user wants to set the PDO 1 as (14V,3A) , Then user must give the command-set pdo [1] [4612c]

7.2.9 Space Bar

Description

If you want to interrupt current execution and set a new configuration, hit the space bar.

Message displayed when entering PCT: "Welcome to PSF Control terminal
Type ? for the list of supported commands
Hit space bar to exit"

Message displayed when exiting PCT: "Good Bye"

Note:

The background timers of PSF if set, might get timed out.