bq25890/5 DSEL Pin & CDP Detection Limitation

bq25890/5 CDP Detection & DSEL pin Limitations

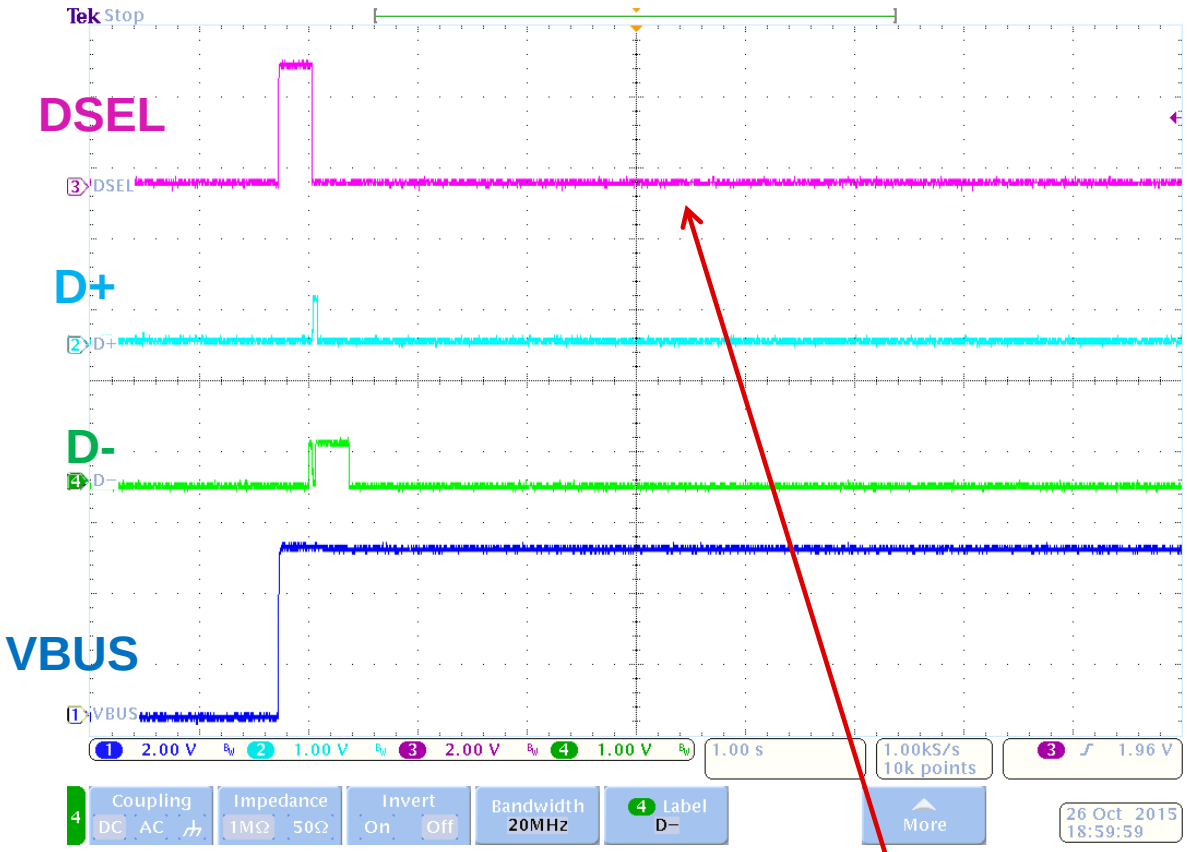
1. DSEL Pin Limitation
2. CDP Detection

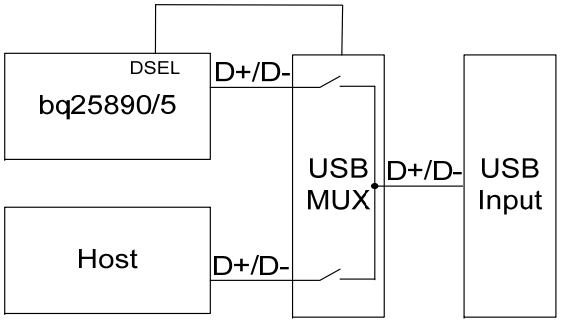
1) DSEL Pin Limitation

- **Background**
  - The DSEL pin is used to control external USB multiplexer to selection USB D+/D- connections to charger or host
  - Polarity of DSEL pin in bq25890/5 does not match datasheet after D+/D- detection is completed for CDP
  - DSEL pin is pulled low after CDP is detected.
  - Host cannot performance USB communication

Detection Result	Datasheet	Behavior
USB SDP	High	High
CDP	High	**Low**
DCP/MaxCharge/HVDCP	Low	Low
Non-Standard Adapter	High	High

1) DSEL Pin Limitation

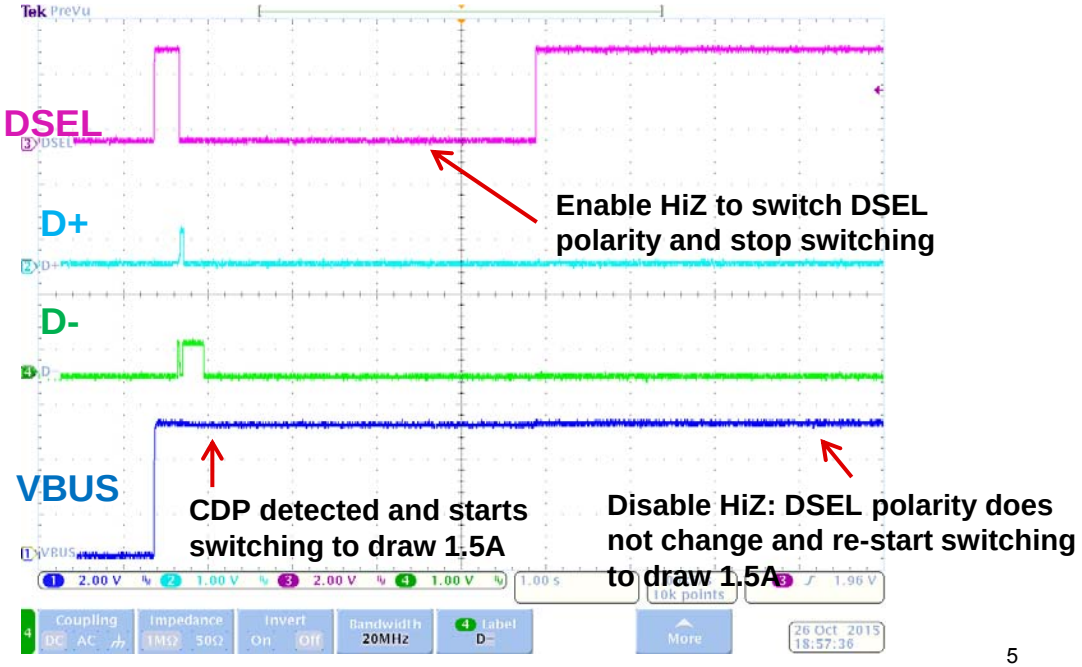




After CDP is detected, DSEL is held low

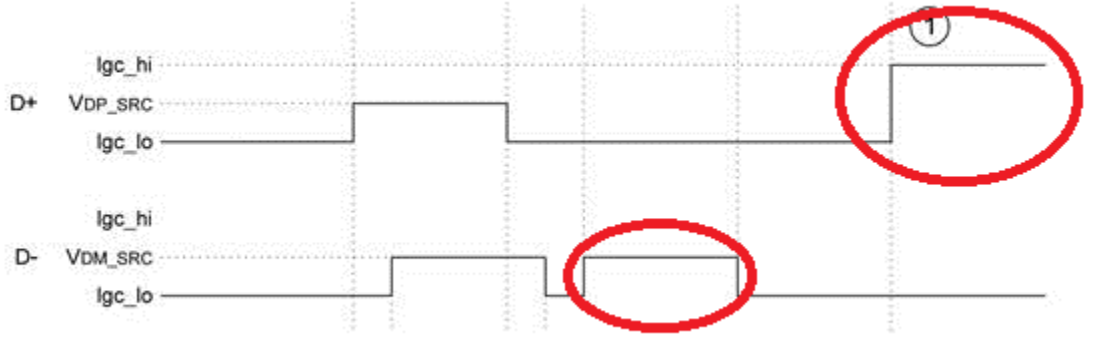
1) DSEL Pin Limitation

- **Software Work-around**
  1. After CDP is detected, host can set EN_HIZ (REG00[7]=1) to enter HiZ mode which force DSEL to change to high and stop converter switching. Host can start USB data communications
  2. Then the host can clear EN_HIZ (REG00[7]=0) to exit HiZ to re-start converter switching while DSEL polarity is unchanged. Also all VINDPM and IINDPM threshold remain the same
  3. Side-effect is that converter switching hence charging is momentarily paused



2) CDP Detection Limitation

- **Background**
  - Bq25890/bq25895 can run D+/D- input detection including USB BC1.2
  - For CDP detection, two pull up events on D-/D+ pin do not match, marked as below
  - The missed pull-up caused some Notebook CDP port to be recognized as SDP



Battery Charging Specification, Revision 1.2 October 21, 2010

Notes:
1) The timing for a LS PD is the same as shown above, except that a LS PD will pull D- high, instead of D+.

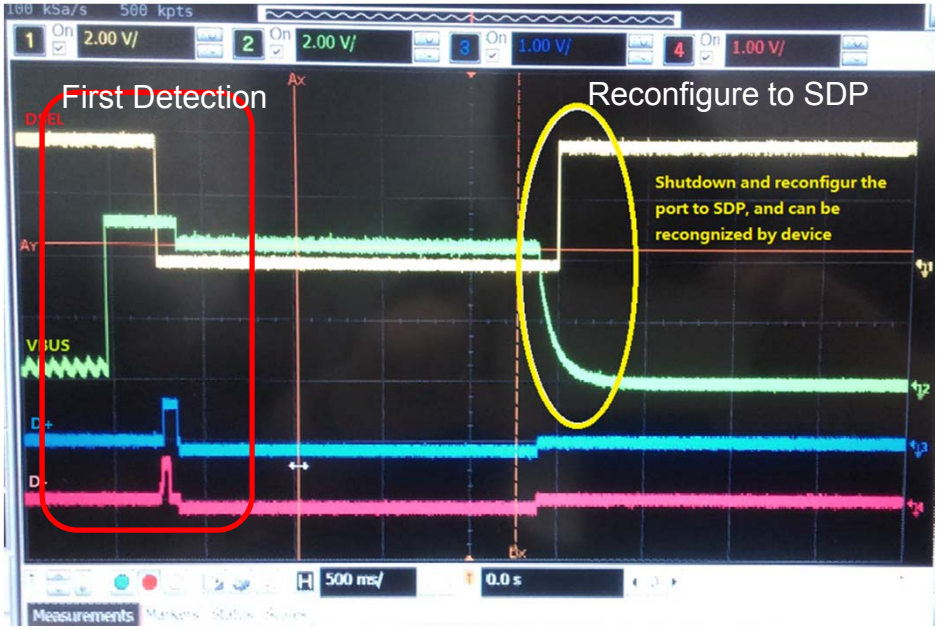
2) CDP Detection Limitation

- The USB port at notebook or PC side use different configuration to connect to CDP which causes the phone/tablet to work in different mode after detection

- Case 1 ： After detection, the USB port waits for 2S for the pull up signal, when pull-up is not detected, the USB port will shutdown the output and re-configure the port to SDP for second detection as SDP. The phone recognized SDP and set the current limit to 500mA which is lower than if it detects CDP (1.5A).

- Case 2 : After detection, the USB port does not require pull up signal to confirm CDP detection. The device can be charged with higher current.

Case 1



2) CDP Detection Limitation

- Impact (Case 1)
  - When SDP is detected, the input current limit is set at 500mA and can slow down charging.

- Impact (Case 2)
  - When CDP is detected, the DSEL pin stay low and prevent data communications.
  - Limitation #1 work-around can be applied to solve communication limitation

bq2589x Flowchart Comparison vs BC1.2 (Meet Requirements)

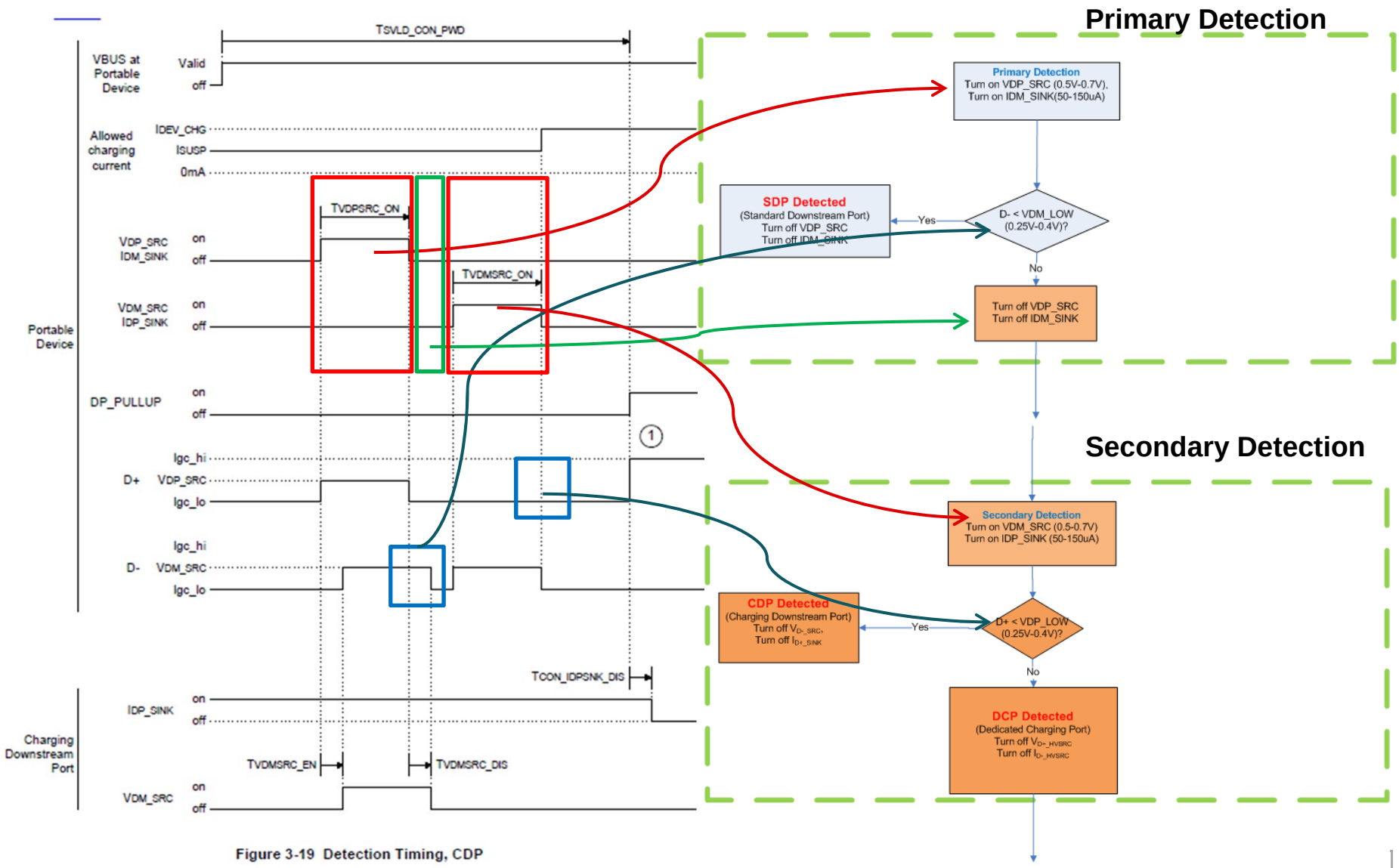


Figure 3-19 Detection Timing, CDP

bq2589x Timing vs BC1.2 (Meet Requirements)

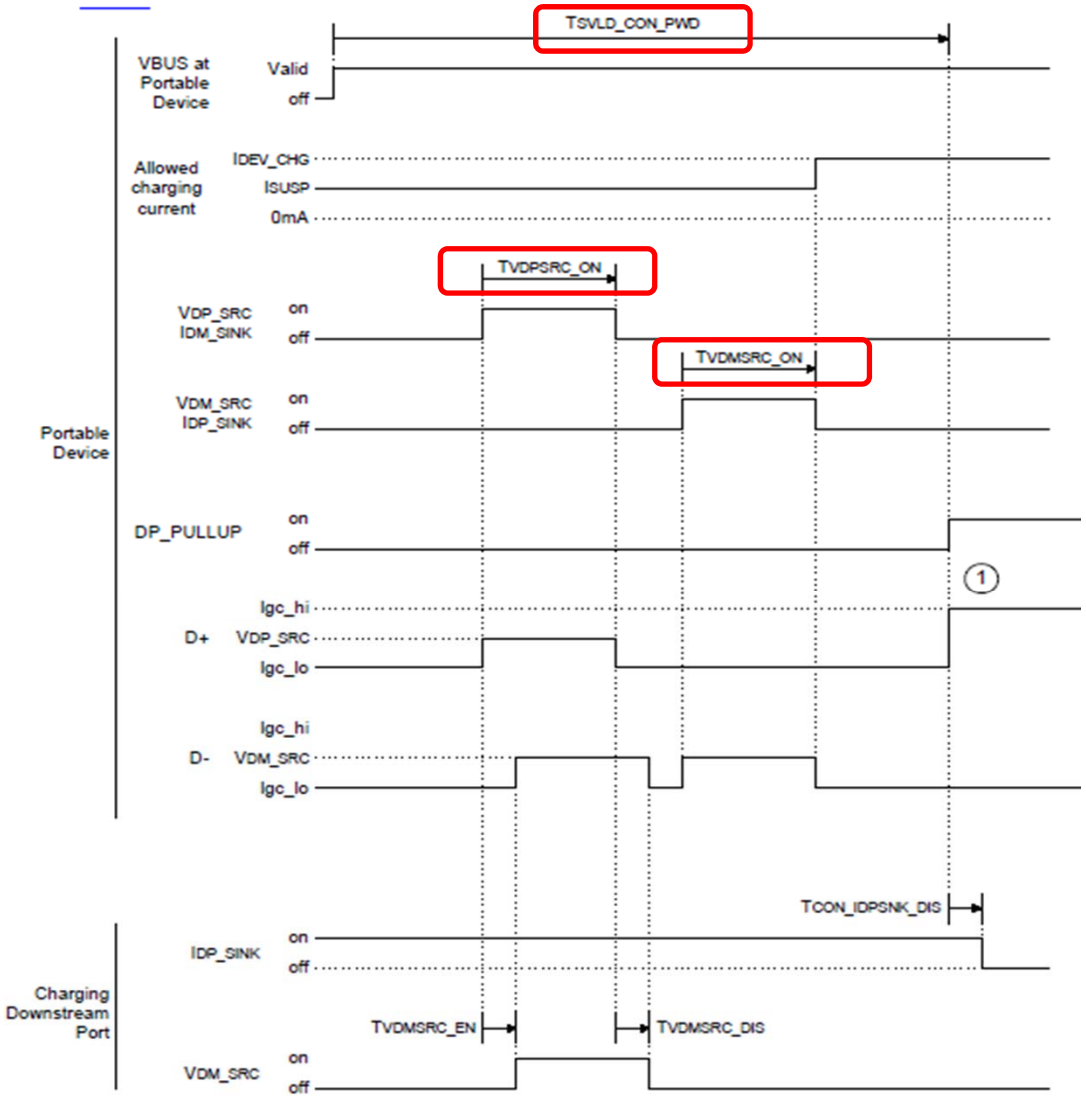


Figure 3-19 Detection Timing, CDP

Charger Controlled (Meet BC1.2)

- ✓ TVDPSRC_ON = 40ms min.
- ✓ TVDMSR_ON = 40ms min.
- ✓ TSVLD_CON_PWD = 1s max.

CDP Controlled
(not related to charger)

- ✓ TVDMSRC_EN = 1-20ms
- ✓ TVDMSRC_DIS = 0-20ms

bq2589x Timing vs BC1.2 (Undefined region)

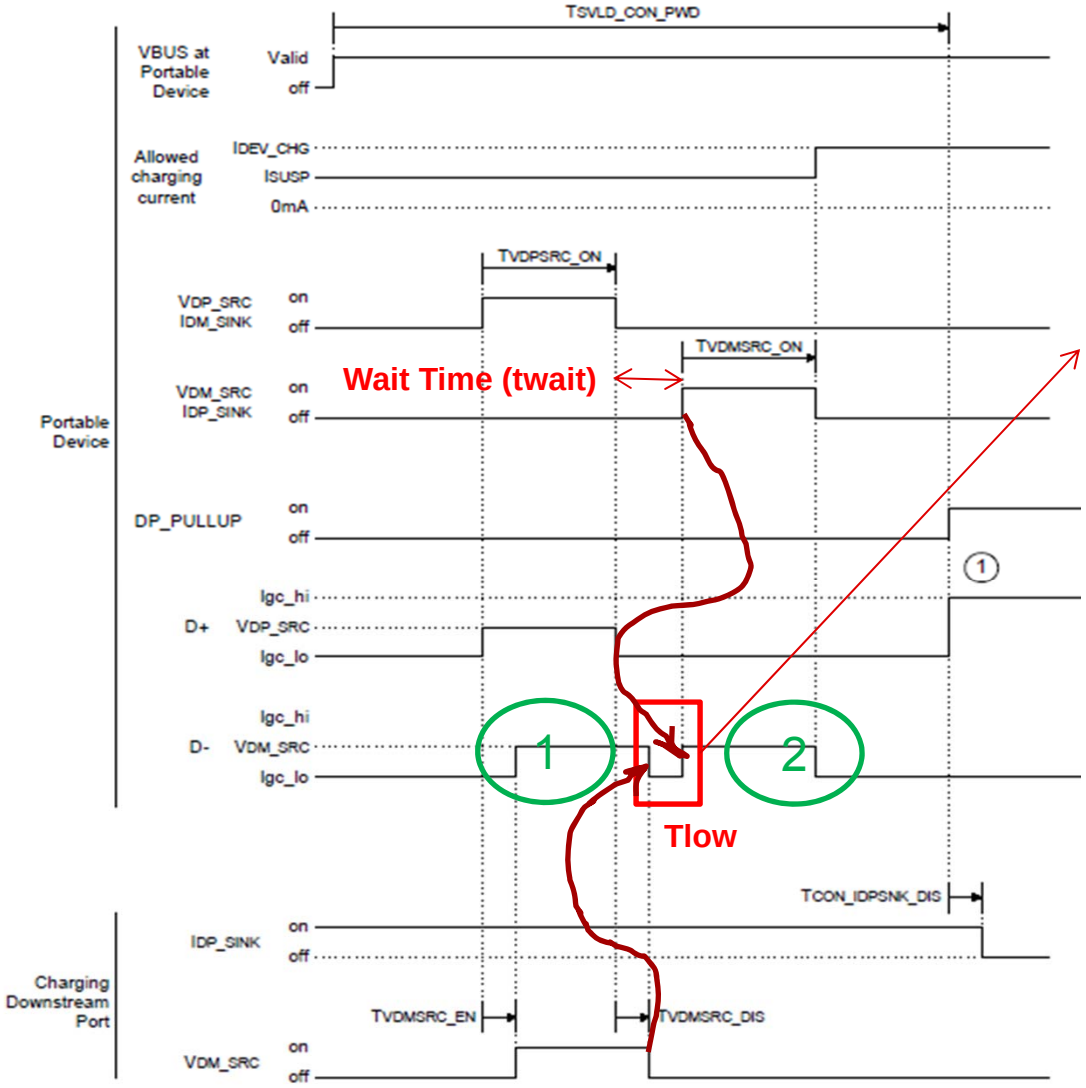


Figure 3-19 Detection Timing, CDP

- Tlow is defined by CDP turns off VDM_SRC until secondary detection starts.
- Tlow = twait – TVDMSRC_DIS
- TVDMSRC_DIS = 0 to 20ms
- However twait is not defined by BC1.2 and can be 0ms
- Min(Tlow) = 0ms
- Therefore region 1 and 2 may appear to merged