# UCSI for TPS25810, TPS25820, and TPS25821

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References:

[1] “USB Type-CTM Connector System Software Interface [UCSI]” – August 2017, Revision 1.1

* (<https://www.intel.com/content/dam/www/public/us/en/documents/technical-specifications/usb-type-c-ucsi-spec.pdf>)

The UCSI defines the following key terms:

* OPM: OS Policy manager.
* PPM: platform policy manager, this is implemented by the EC. The EC must interpret messages from the OPM and respond to them. For many messages the response will be “not supported” and the TPS258xx is not involved. For a few messages the EC needs to read the status of some TPS258xx pins or change an input pin.
  + refer to Section 4.1 of [1].

Table 1 UCSI command mapped to TPS25810 (requires monitoring/controlling 5 to 7 pins of the ‘810). All fields not mentioned here should be set to 0. All commands not mentioned here should be responded to with ‘not supported’.

|  |  |  |
| --- | --- | --- |
| UCSI command  (R) = required  (O) = Optional | field within the UCSI command | TPS25810 Comment |
| CONNECTOR\_RESET (R) |  | when this command is received, toggle the EN pin low for 100ms (tErrorRecovery plus extra time to ensure VBUS discharges). |
| SET\_NOTIFICATION\_ENABLE (R) | Power Operation Mode Change | Assert when CHG or CHG\_HI is changed. *Only used if CHG and CHG\_HI will be changed by the system.* |
| Connector Partner Change | assert if GET\_CONNECTOR\_CAPABILITY.ConnectorPartnerType changes |
| Connect Change | assert if GET\_CONNECTOR\_STATUS changes |
| GET\_CAPABILITY (R) | bcdUSBTypeCVersion | 1.1 |
| bmAttributes.DisabledState | supported by pulling EN low. |
| GET\_CONNECTOR\_CAPABILITY (R) | Operation Mode | these are supported:   * Rp Only, * Ra/Ra (optional), * Rd/Rd (optional) * USB2 * USB3 * Provider |
| GET\_CONNECTOR\_STATUS (R) | Power Operation Mode | set based on how CHG and CHG\_HI are configured |
| Connect Status | set based on state of UFPb pin |
| Connector Partner Type | set based on UFPb, AUDIOb, DEBUGb pins |
| GET\_ERROR\_STATUS (R) | Error Information | assert Overcurrent if FAULTb is asserted |
| SET\_POWER\_LEVEL (O) | USB Type-C Current | use this to set CHG and CHG\_HI pins |

Table 2 UCSI command mapped to TPS25810 when DEBUG and AUDIO accessories NOT supported (requires 3 GPIO pins on EC). All fields not mentioned here should be set to 0. All commands not mentioned here should be responded to with ‘not supported’.

|  |  |  |
| --- | --- | --- |
| UCSI command  (R) = required  (O) = Optional | field within the UCSI command | TPS25810 Comment |
| CONNECTOR\_RESET (R) |  | when this command is received, toggle the EN pin low for 100ms (chosen to ensure VBUS discharges, it could be shortened or lengthened). |
| SET\_NOTIFICATION\_ENABLE (R) | Power Operation Mode Change | Assert when CHG or CHG\_HI is changed. *Only used if CHG and CHG\_HI will be changed by the system.* |
| Connector Partner Change | assert if GET\_CONNECTOR\_STATUS.ConnectorPartnerType changes *(i.e. if UFPb changes)* |
| Connect Change | assert if GET\_CONNECTOR\_STATUS changes *(i.e. if UFPb changes)* |
| GET\_CAPABILITY (R) | bcdUSBTypeCVersion | 1.1 |
| bmAttributes.USBTypeCCurrent | 1 |
| bmAttributes.DisabledState | set to 1 |
| GET\_CONNECTOR\_CAPABILITY (R) | Operation Mode | set to 0x61  B0: set to 1 (DFP)  B1: set to 0 (UFP)  B2: set to 0 (DRP)  B3: set to 0 (audio)  B4: set to 0 (debug)  B5: set to 1 (USB2)  B6: set to 1 (USB3)  B7: set to 0 (Alternate mode) |
| GET\_CONNECTOR\_STATUS (R) | Power Operation Mode | if CHG = 0, then set to 1 (assuming BC1.2 is not supported).  if CHG=1 and CHG\_HI = 0, then set to 4.  if CHG=1 and CHG\_HI = 1, then set to 5. |
| Connect Status | set to 1 if UFPb is pulled low.  Set to 0 if UFPb is pulled high. |
| Connector Partner Type | always set this to 2. |
| GET\_ERROR\_STATUS (R) | Error Information | assert B7 (Overcurrent) if FAULTb is asserted.  Note that the EC may need to assert other bits such as “unrecognized command” that are unrelated to the TPS25810. |
| SET\_POWER\_LEVEL (O) | USB Type-C Current | This is optional, so in this case is assumed not to be supported. |



Figure 1 EC connections to the TPS25810 for Table 2, when Debug and Accessory detection are not supported.

Table 3 UCSI command mapped to TPS25820/TPS25821 (requires monitoring/controlling 4 pins of the ‘82x). All fields not mentioned here should be set to 0. All commands not mentioned here should be responded to with ‘not supported’.

|  |  |  |
| --- | --- | --- |
| UCSI command | field within the command | TPS25820 / TPS25821 action |
| CONNECTOR\_RESET |  | when received, toggle the EN pin low for a certain time (there is no minimum time defined in Type-C for Sources. It should just be long enough to ensure that VBUS is fully discharged). |
| SET\_NOTIFICATION\_ENABLE | Power Operation Mode Change | Assert when CHG is changed |
| Connector Partner Change | assert if GET\_CONNECTOR\_CAPABILITY.ConnectorPartnerType changes |
| Connect Change | assert if GET\_CONNECTOR\_STATUS changes |
| GET\_CAPABILITY | bcdUSBTypeCVersion | 1.3 |
| bmAttributes.DisabledState | supported by pulling EN low. |
| GET\_CONNECTOR\_CAPABILITY | Operation Mode | these are supported:   * Rp Only, * USB2 * USB3 (only TPS25820) * Provider |
| GET\_CONNECTOR\_STATUS | Power Operation Mode | set based on how CHG is configured |
| Connect Status | set based on state of SINKb pin |
| Connector Partner Type | set based on SINKb |
| GET\_ERROR\_STATUS | Error Information | assert Overcurrent if FAULTb is asserted |
| SET\_POWER\_LEVEL | USB Type-C Current | use this to set CHG pin |