Detection and PSE SD Refinements

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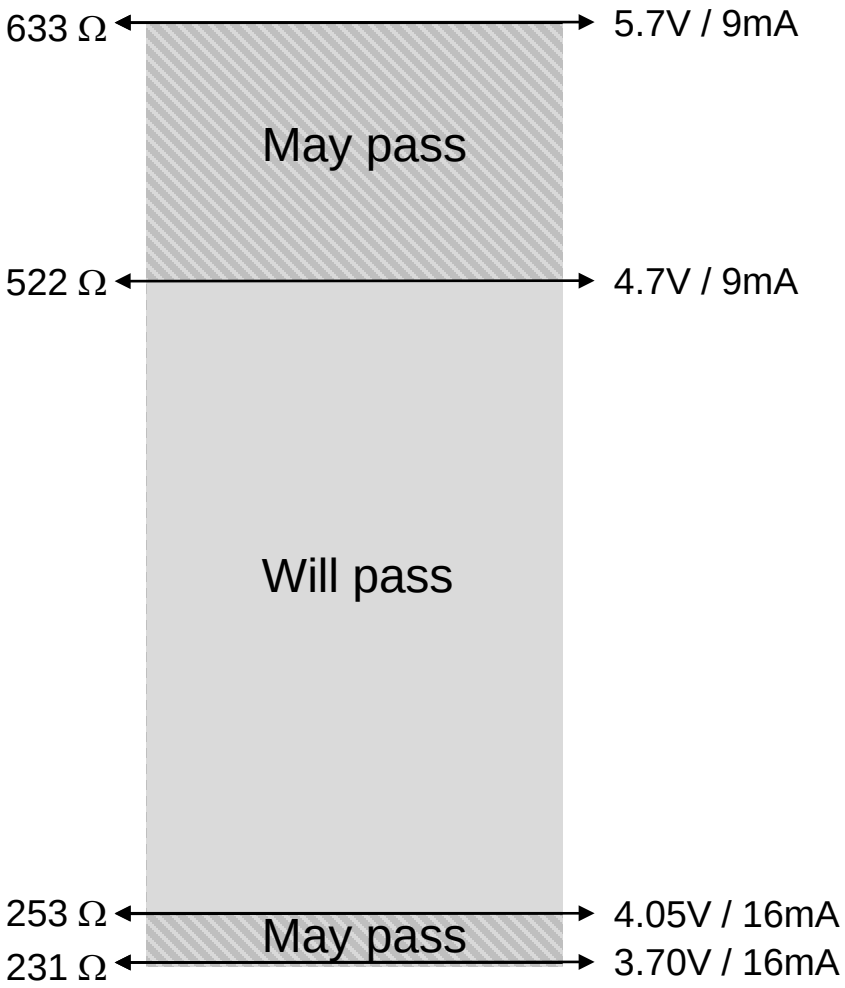
Presentation Objectives

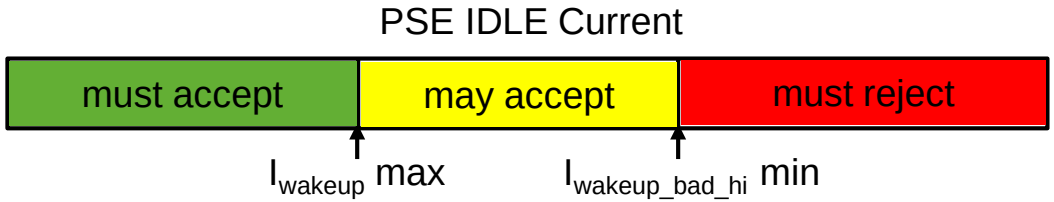
- To review a loophole that allows resistors to pass the existing detection scheme and propose a remedy (see comment 31).
- Propose changes that will make detection optional for PoDL PSEs that perform classification (see comment 30).
- Propose new PSE SD variables that will facilitate alignment between Clause 30 and Clause 45 and Clause 104 in response to unsatisfied D2.0 comment 333.

Problem: Resistors Can Pass Detection



Proposed Remedy for Detection Resistance Loophole

- Require that the PSE IDLE current be less than $I_{wakeup\_bad\_hi}$ for at least T_{Wakeup} min before detection can begin.



- This test will prevent a resistor from being able to pass detection, i.e.

$$R_{min}@PI = {V_{Sleep},min}/{I_{Wakeup\_bad\_hi},min} = {3.15V}/{2.5mA} = 1260\ \Omega$$

- Create new PSE SD diagram variable ‘iprebias_valid’ that is asserted when I_{PSE} is valid during idle, and logically AND it with the existing expression governing the arc between the IDLE and DETECTION states.

Proposal for Making Detection Optional for PoDL PSEs that Perform Classification

- By itself, SCCP is definitive about a valid PD being connected.
- SCCP uses low voltage swings with limited current and is benign.
- Hence physical detection is superfluous for PoDL PSEs that perform classification and should be optional.

Proposal for Supporting Alignment with Clause 30 Management and Clause 45 Status Registers

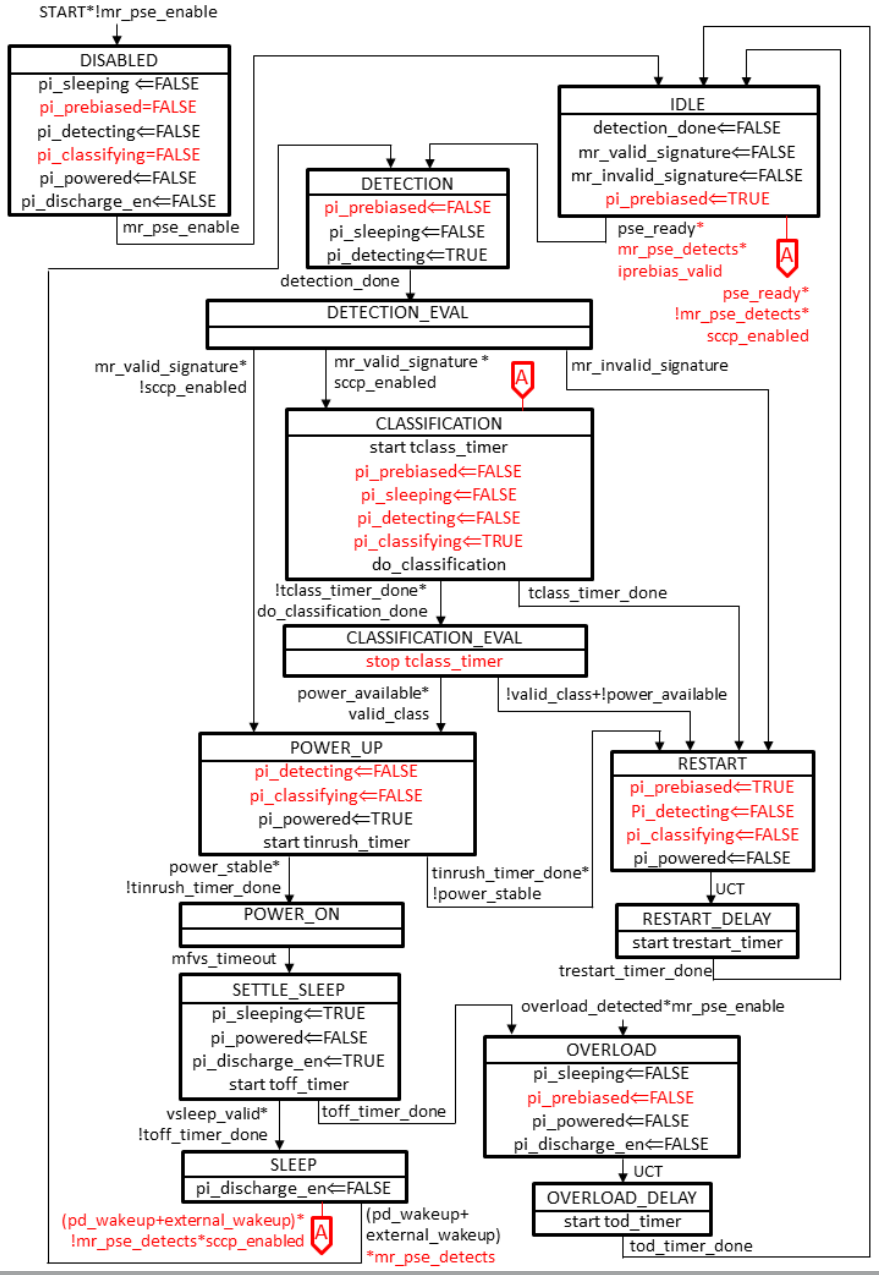
- PSE SD needs to have variables that uniquely identify the observable behavior at the PSE PI during the IDLE, RESTART, DETECTION, DETECTION_EVAL, CLASSIFICATION, and CLASSIFICATION_EVAL states.
- Propose adding the following new variables:

  pi_prebiased: asserted during IDLE and RESTART states. When true, V_{Sleep} is applied at the PI.

  pi_detecting: asserted during DETECTION and DETECTION_EVAL.

  pi_classifying: asserted during CLASSIFICATION and CLASSIFICATION_EVAL.

Proposed Changes to 104.4.3.6 (PSE SD)



Proposed Changes to PSE Baseline Text for Pre-Bias Current Test during IDLE

- Add the following sub-clause:

  104.4.6.2.3 Output current requirement during idle

  The PSE output current during the IDLE state shall be defined as valid if it less than I_{Wakeup} max for at least T_{Wakeup} min (see Table 104-3). A PSE may define its output current during the IDLE state as valid if the current is in the range between I_{Wakeup} max and $I_{Wakeup\_bad\_hi}$ for at least T_{Wakeup} min.

  A PSE may define its output current during the IDLE state as invalid if the current is in the range between I_{Wakeup} max and $I_{Wakeup\_bad\_hi}$. A PSE shall consider its output current during the IDLE state to be invalid if the current is greater than $I_{Wakeup\_bad\_hi}$.

- Add the following state diagram variable definition to 104.3.3.3:

  iprebias_valid

  TRUE: the PSE pre-bias output current is valid (see 104.4.6.2.3).

  FALSE: the PSE pre-bias output current is invalid.

Proposed Changes to Baseline Text for Making Detection Optional cont'd

104.4.4 PSE detection of a PD

~~The PSE shall probe the PI as described in 104.4.4.1.~~ PSEs that opt not to perform classification as described in 104.7 shall probe the PI as described in 104.4.4.1. A ~~The~~ PSE is connected to a PD through the PIs and a link segment.

PSEs that opt not to perform classification ~~the PSE~~ shall complete detection of a valid PD signature within T_{det} as specified in Table 104–2.

104.4.5 PSE classification of a PD

Classification is optional if the PSE detects a valid PD signature. PSEs that opt to omit detection shall perform classification. ~~and is performed using SCCP. Implementation of SCCP by a PSE is also optional.~~

PSEs that opt not to perform detection shall complete classification of a valid PD ~~A PSE with SCCP enabled shall complete classification after detection and~~ prior to application of full operating voltage at the PI in a time less than T_{Class} as specified in Table 104-3. If classification is not completed before the T_{Class} timer expires, a new ~~detection~~ classification sequence ~~cycle~~ shall be completed before any subsequent application of full operating voltage.

Proposed PSE SD Variable for Optional Detection

- Add the following state diagram variable definitions to 104.3.3.3:

  mr_pse_detects

  TRUE: optional detection is enabled.

  FALSE: optional detection is disabled.

Proposed Changes to PSE SD for Alignment with Clause 30 and Clause 45 Registers

- Add the following state diagram variable definitions to 104.4.3.3:

  pi_classifying

  TRUE: the PSE is performing classification through the PI (see 104.7)

  FALSE: the PSE is not performing classification through the PI.

  pi_detecting

  TRUE: the PSE is performing detection through the PI (see 104.4.4).

  FALSE: the PSE is not performing detection through the PI.

  pi_prebiased

  TRUE: the circuitry that applies V_{Sleep} at the PI is enabled.

  FALSE: the circuitry that applies V_{Sleep} at the PI is disabled.

Summary

- A remedy to minimize the possibility a resistor can pass detection was proposed.
- Changes were proposed to make detection optional for PSEs that perform classification.
- New PSE SD variables that facilitate alignment between Clause 30, Clause 40, and Clause 45 were proposed.

Questions?