Connection Check: 2 New Methods

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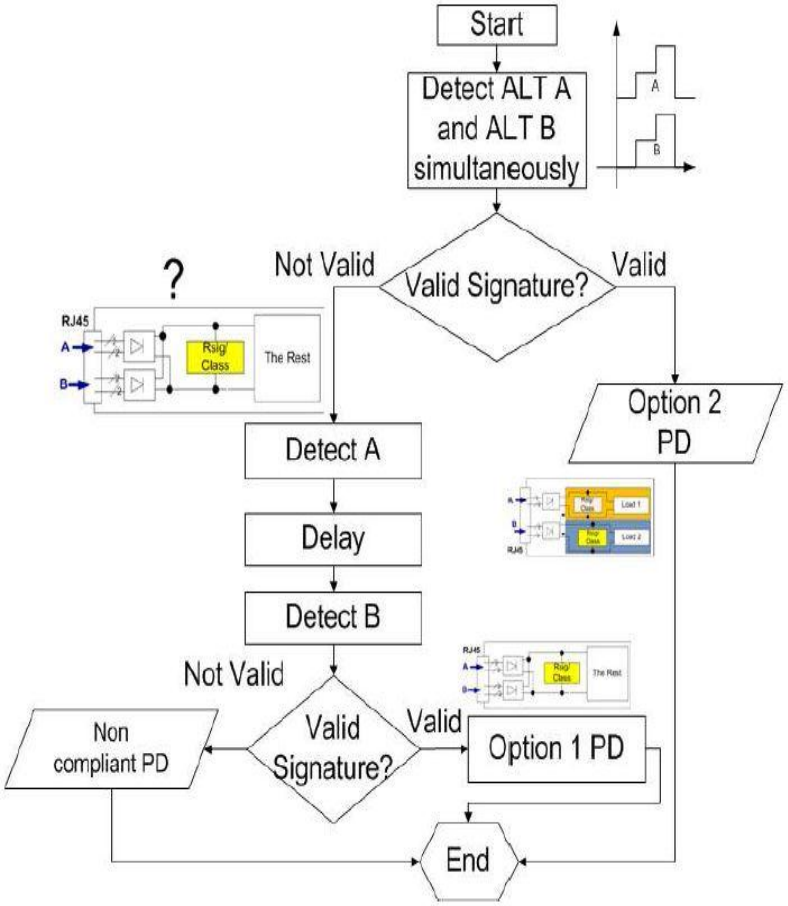
Connection Check

- Previous work has shown the need for a connection check to determine if a PSE is attached to a single or dual interface PD.
  - Simplifies Mutual ID.
  - Allows for powering of Type 1 and Type 2 PDs.
- Two approaches for implementing a connection check have been shown.
  - Corruption of simultaneous detection: darshan_6_0914_rev_05a.pdf
  - Signature pollution test: dwelley_01_0914.pdf
- Two new (and similar) approaches are presented here.
  - Both new approaches use a probe and measure technique where one pair set is probed while the other pair set is measured.
  - Both new approaches be done using existing circuitry.
  - Both new approaches can be done quickly.

Earlier proposal: simultaneous detection

Problems:

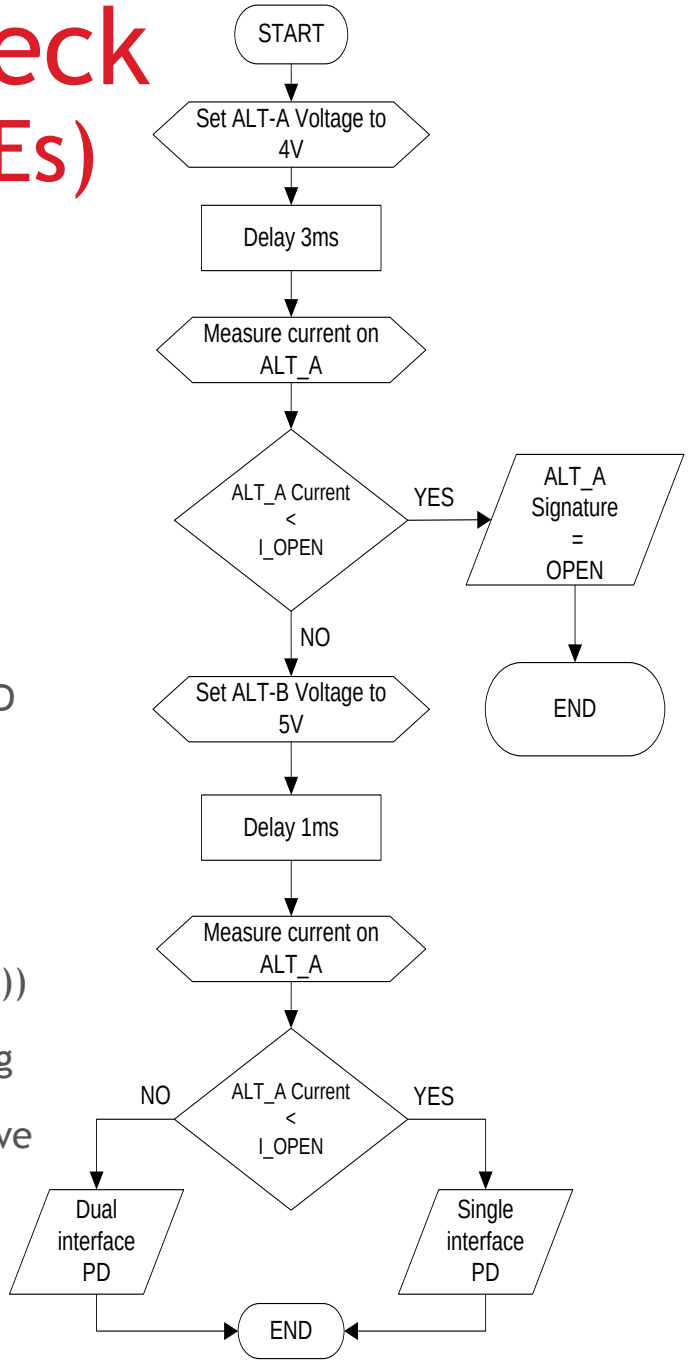
- Voltage forcing PSEs
  - Due to the following factors the signature is inconsistent (any combination of Open, Rhigh, Rgood on the two alternatives)
    - Tolerance of Vdetect on the two alternatives
    - Diode nonliearity
    - Cable or connection faults
- Voltage and Current Forcing PSEs:
  - The detection process is too long (~60-400ms), and need to be executed multiple times in the proposed method



Picture taken from darshan_6_0914_rev_05a.pdf

Proposed connection check (for detect voltage forcing PSEs)

1. Force a voltage on one of the alternatives (ex.: 4V)
2. Measure the current on the first alternative
3. If the current is higher than zero
   a) Force an 1V higher voltage (5V) on the other alternative
   b) Measure the current on the first alternative
   c) If the same current is measured like in step 2. (within tolerances) then the PD is a Dual PD
   d) If the current is zero (within tolerances) the PD is a Single PD
4. Else ALT_A Signature = OPEN

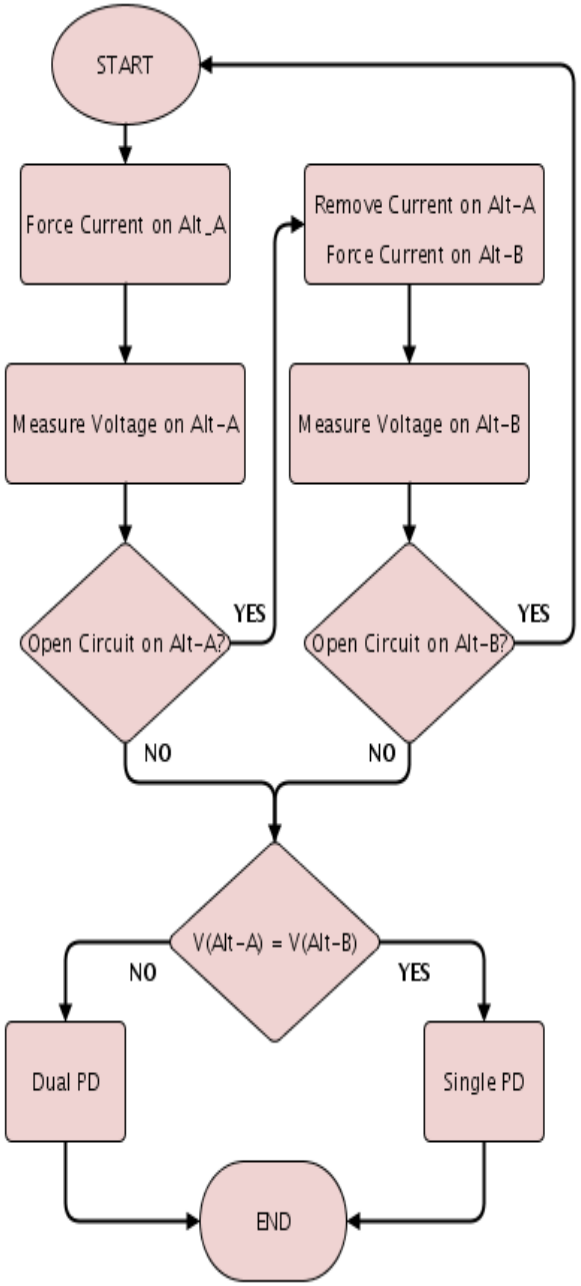


Comments:

- Can be done very fast (Timing should accomodate ~C_{bad_min} (10uF))
- The voltages included are examples only for easier understanding
- Not symmetrical, but the detection afterwards on both alternative will clear the open ‚questions'

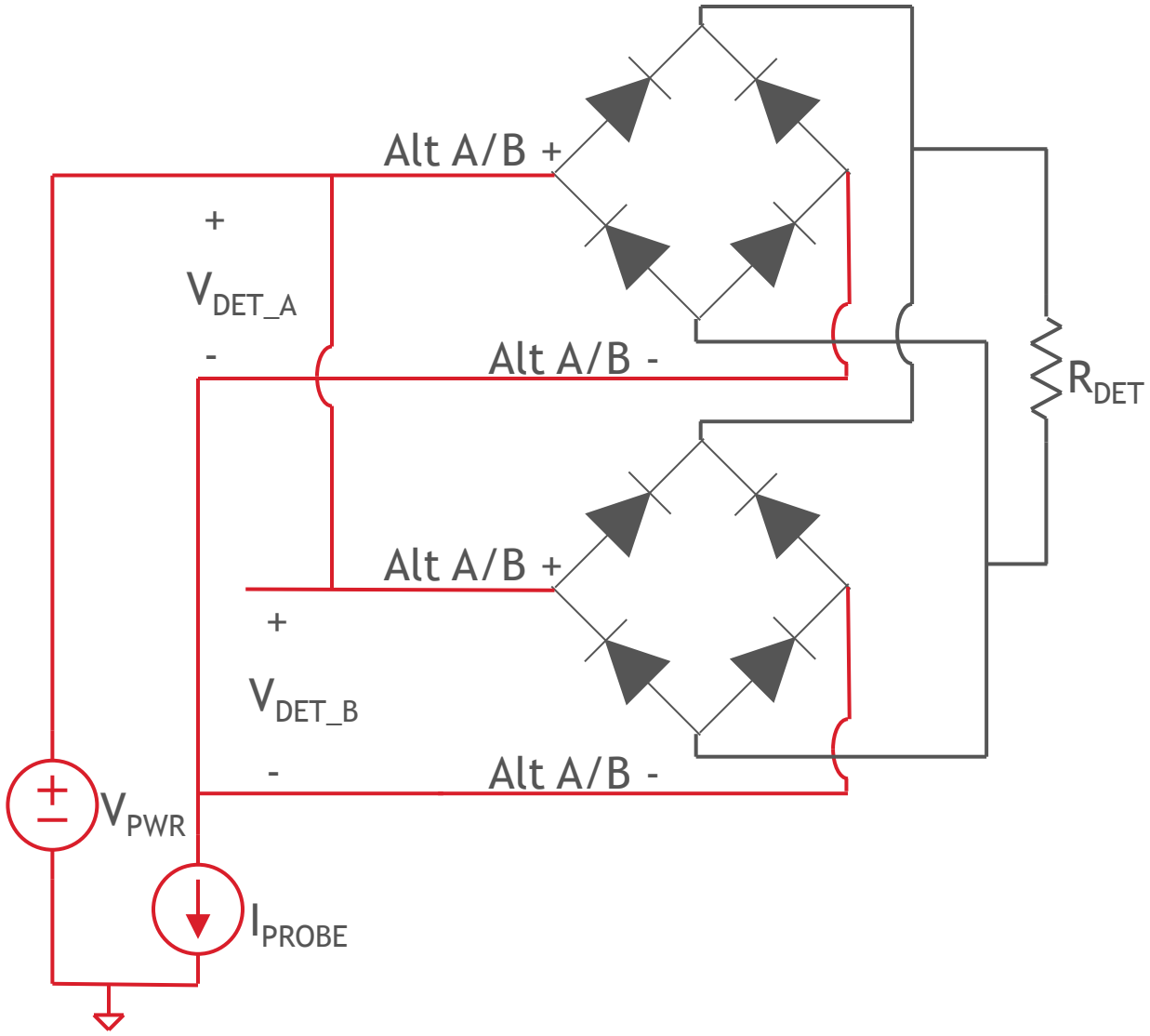
Proposed Connection Check for Current Forcing PSEs

- The proposed connection check is as follows:
  1. Force a current on a single pair set.
  2. Measure voltage on the same pair set.
  3. If the voltage does not correspond with an open circuit, continue. Otherwise:
     a) Remove original current probe.
     b) Apply current probe and measure voltage on opposite pair set.
     c) If voltage does not correspond with an open circuit, continue, otherwise reset to step 1.
  4. Measure voltage on the opposite pair set.
  5. If the voltages are equal (within tolerances), then you are attached to a Single PD.
  6. If the voltages are not equal, then you are attached to a Dual PD.
  7. Detection must still be done on each pair set to make sure a valid PD is attached to each one.
     - Because this is a single point measurement, a voltage source on the opposite alternative could fool the algorithm, thus detection is still required on both pair sets before powering on.



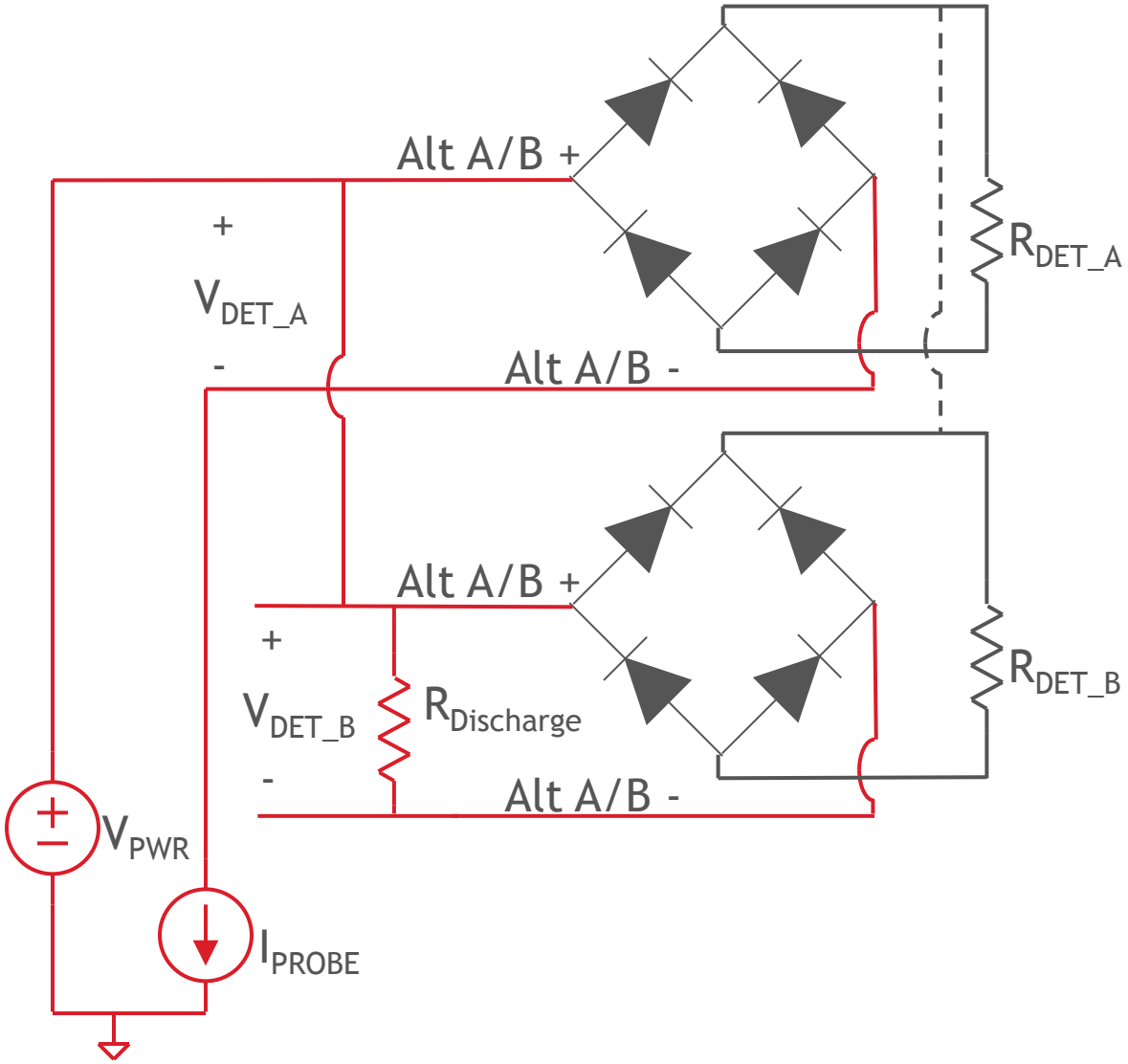
Forced Current Check: Single PD

- A probe current is applied to a single pair set while the voltage across both pair sets is measured independently.
- For a single PD, the voltage across each pair set will be approximately equal (small differences due to diode voltages).
- Lab results showed that with I_{PROBE} = 160uA and R_{DET} = 24.3K, V_{DET_A} and V_{DET_B} both measured 3.44V.



Forced Current Check: Dual PD

- A probe current is applied to a single pair set while the voltage across both pair sets is measured independently.
- For a dual PD, the voltage across the pair set with the current probe will be approximately the probe current multiplied by the detection resistor. The voltage across the pair set without the current probe will be approximately zero.
- Lab results showed that with I_{PROBE} = 160uA and R_{DET} = 24.3K, V_{DET_A} measured 3.44V, while V_{DET_B} measured 0.05V.



Summary

- Two new approaches for the connection check have been presented and should be considered when writing baseline text for the connection check and/or 4-Pair ID.
  - Both new approaches use a probe and measure technique where one pair set is probed while the other pair set is measured.
    - The forced voltage method forces different voltages on Alt-A and Alt-B while measuring the current on the lower voltage pair set.
    - The forced current method forces a current on one pair set while measuring the voltage on the opposite pair set.
  - Both new approaches be done using existing circuitry.
    - Reuse of detection voltage/current sources and measurement circuits.
  - Both new approaches can be done quickly.
    - Single-point measurements

Thank You!