SPS TRIGGER LOGIC

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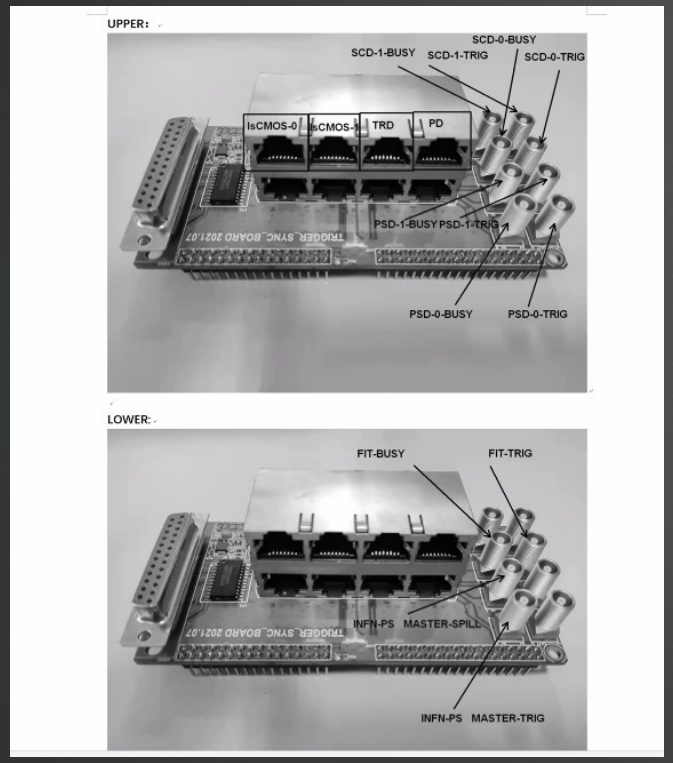
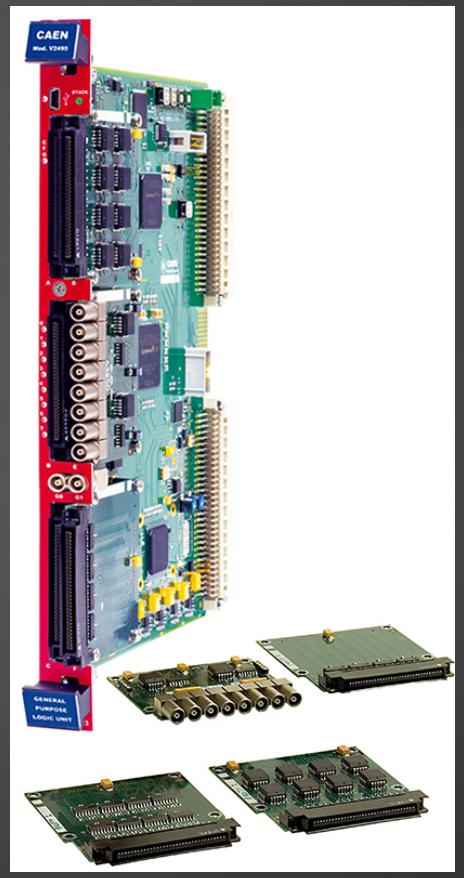
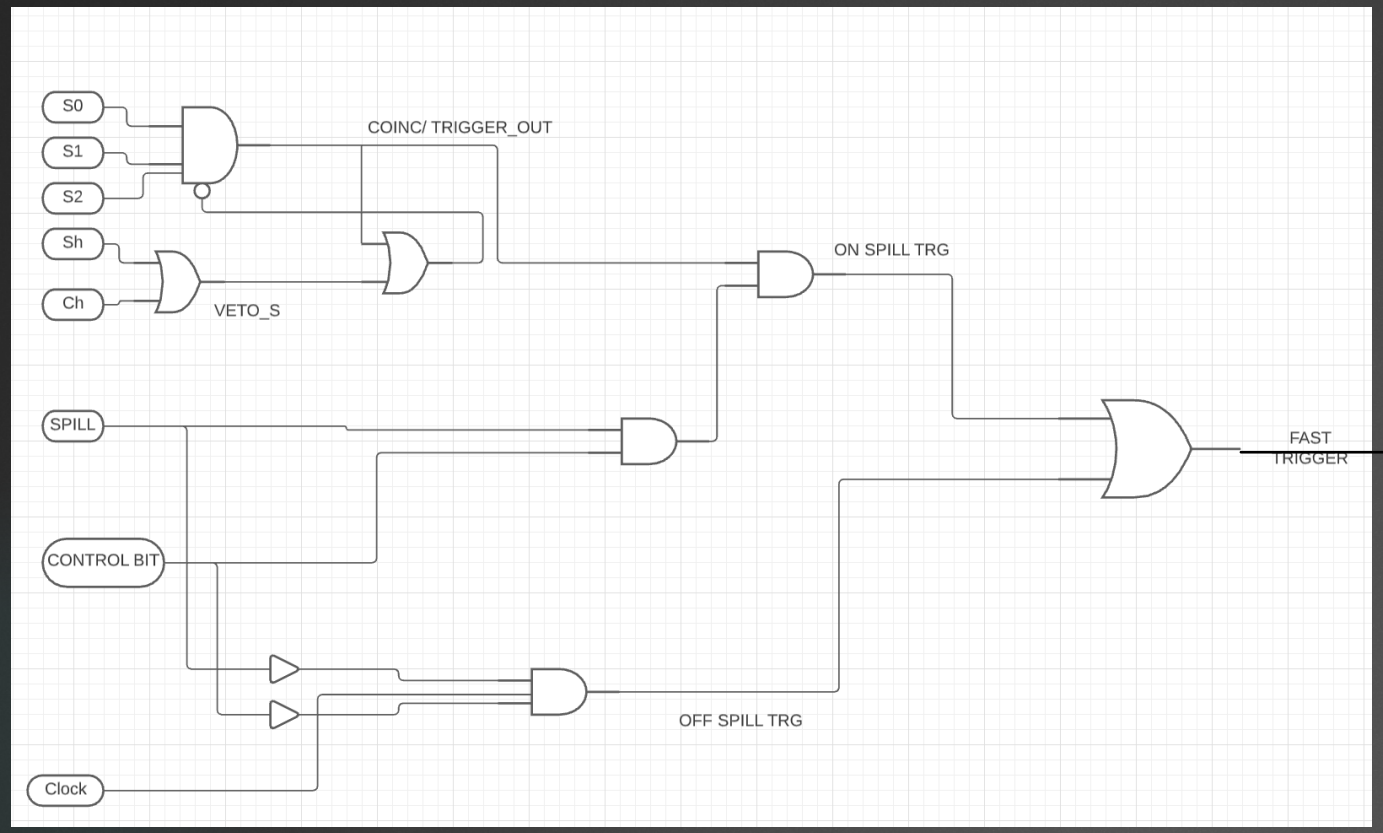
- We are working on two options:
  1. All the trigger logic is done with CAEN V2495
  2. The trigger logic for the INFN-PS is done with CAEN V2495 and it is fed into TRIGGER_SYNC_BOARD



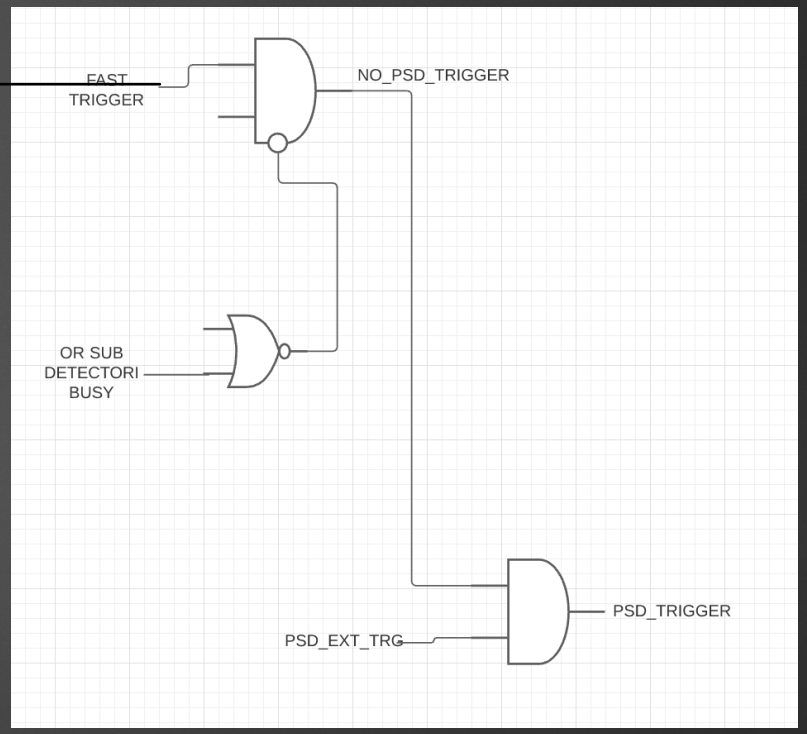


OPTION 1



NO_PSD_TRIGGER is the trigger to all the sub-detectors but the PSD

PSD_EXT_TRG is the self trigger from the PSD CAEN DT5550W readout board

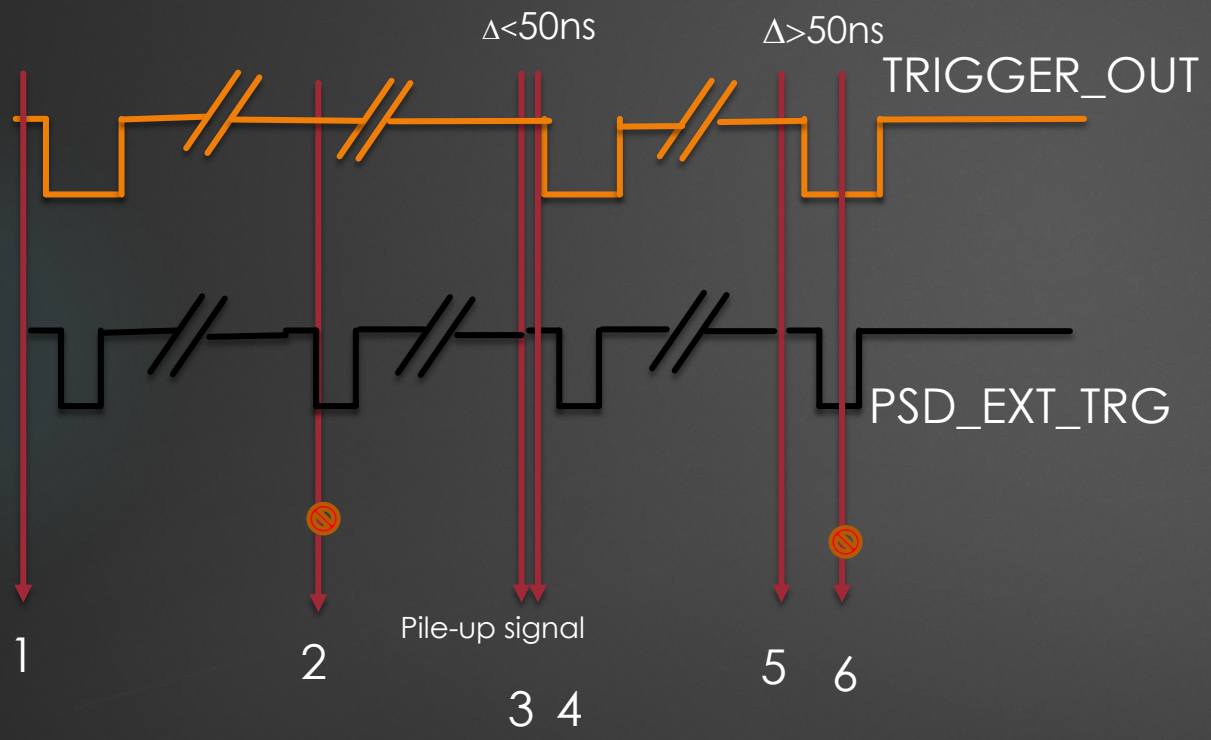


The time needed to build the TRIGGER_OUT is almost 30ns

The PSD_EXT_TRG needs to be validated in time by the NO_PSD_TRIGGER

OPTION 1

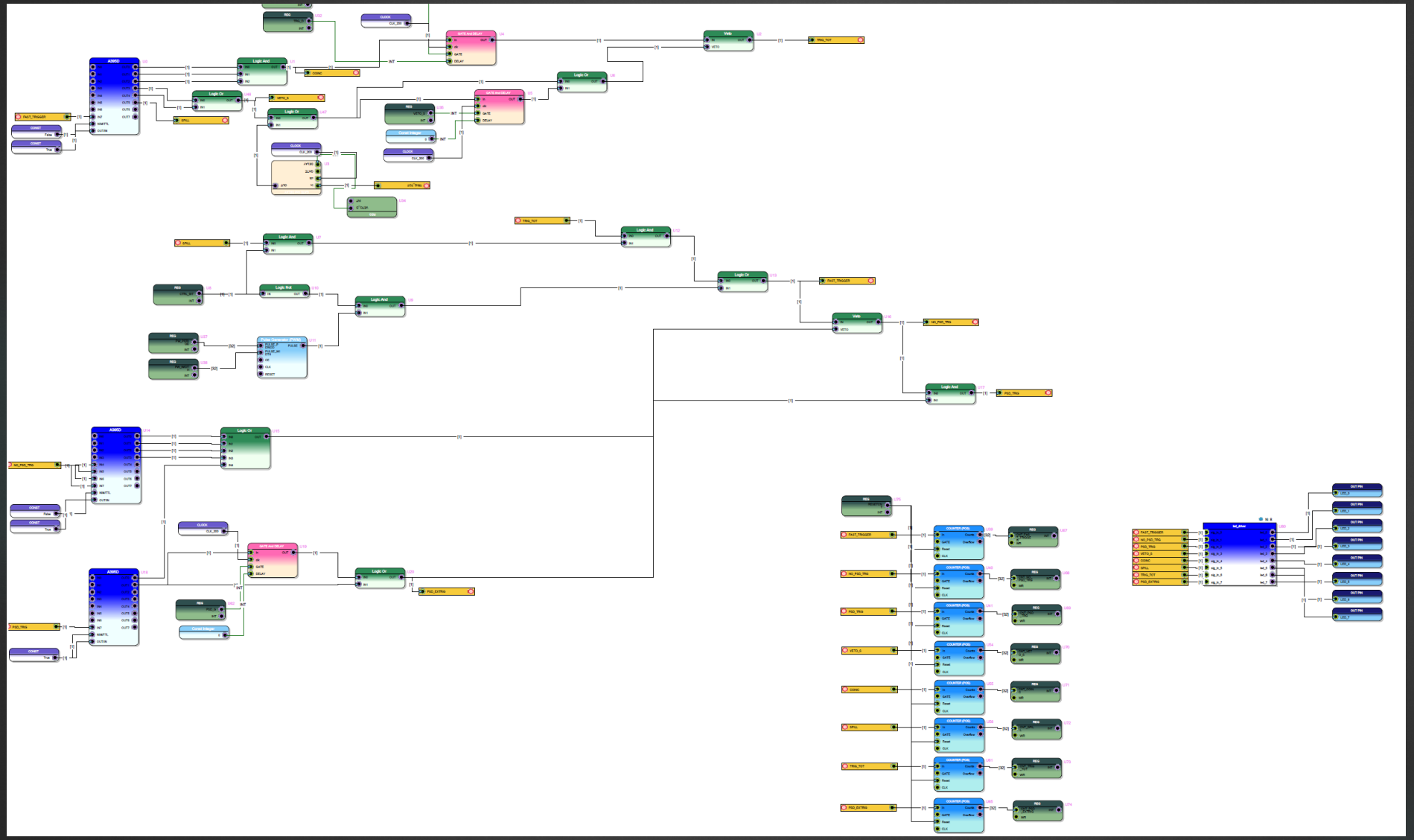
- PSD_EXT_TRG takes 50ns from the particle crossing and it is on for 50ns (adjustable)
  - This is strictly related to the CITIROC shaping time
- TRIGGER_OUT takes 30ns from the particle crossing and it is on for 100ns (adjustable)



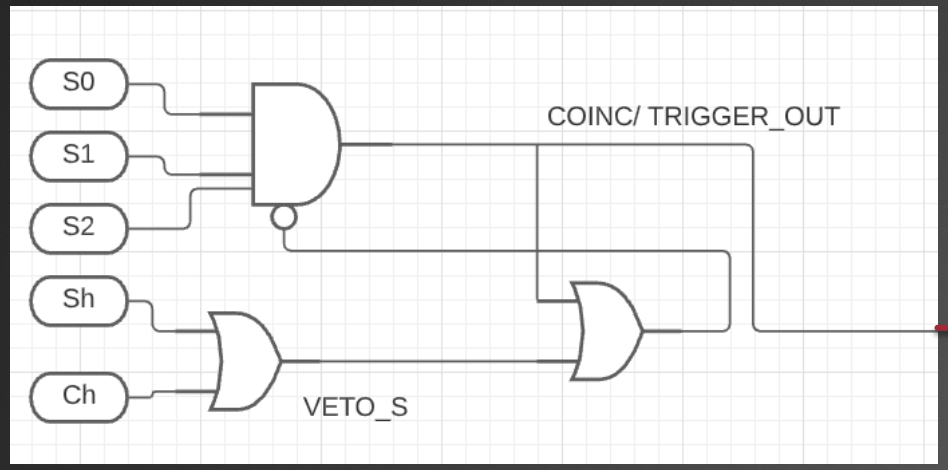
Particle

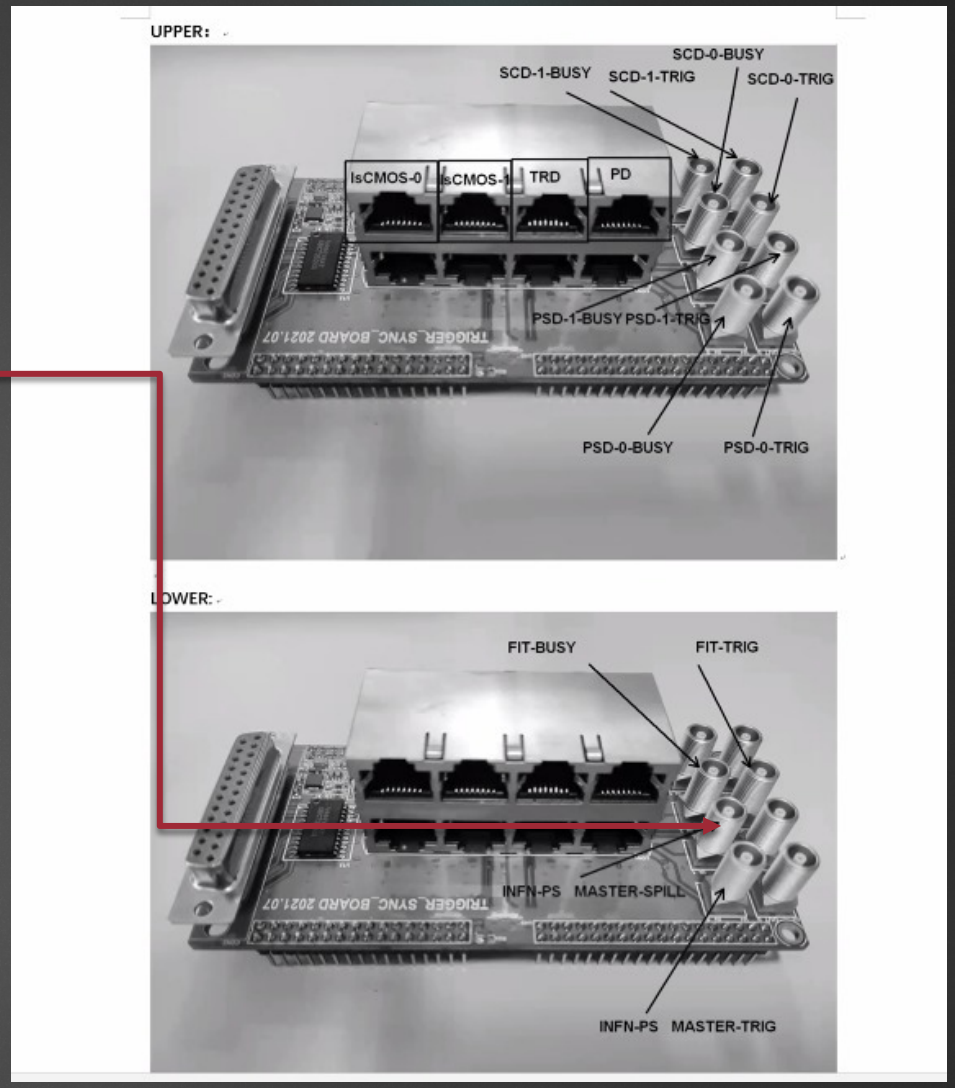
1. PSD_EXT_TRG & TRIGGER_OUT – **AQURIED**
2. PSD_EXT_TRG & ! TRIGGER_OUT – **REJECTED** (increase the count number of PSD trigger just for reference)
3. PSD_EXT_TRG & TRIGGER_OUT – **AQURIED**
4. Pile-up signal on particle 3
5. PSD_EXT_TRG & TRIGGER_OUT – **AQURIED**
6. ! PSD_EXT_TRG & ! TRIGGER_OUT – **REJECTED**

Andrea has already implemented the trigger logic in V2495 with SciCompiler



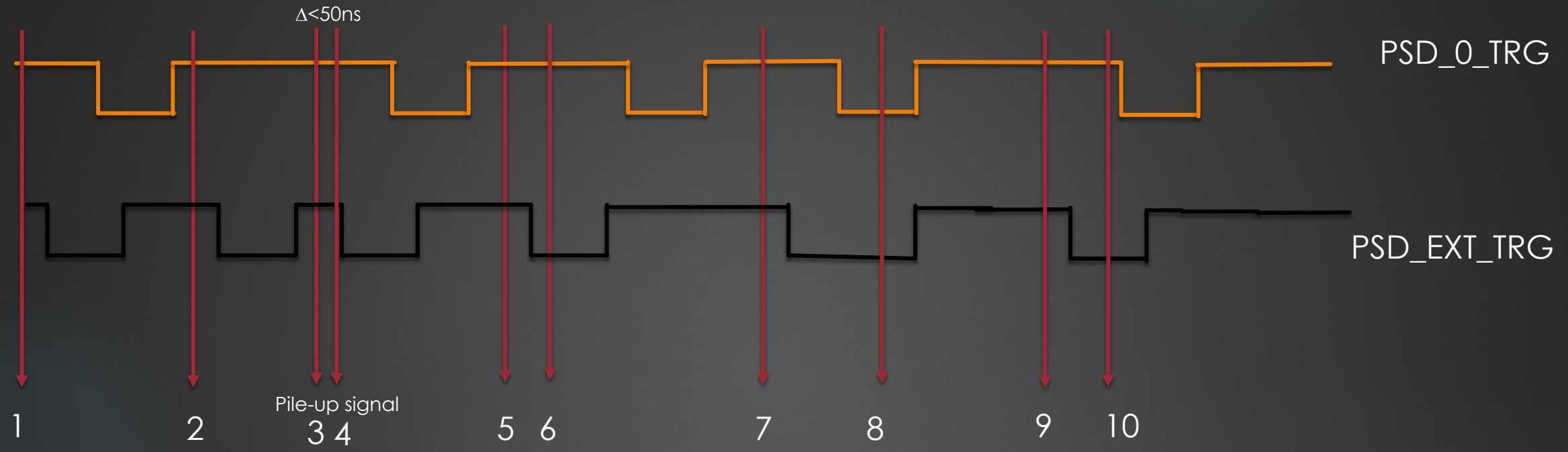
OPTION 2





In Option 2 the V2495 module will build in 30ns the TRIGGER_OUT that is fed into the TRIGGER_SYNC_BOARD

In the following we assume that the PSD_0_TRG provided from the TRIGGER_SYNC_BOARD will take 150ns to be ready and stays on for 150ns. This value need to be confirmed.



Particle

1. PSD_EXT_TRG & PSD_0_TRG – **AQURIED**
2. PSD_EXT_TRG & ! PSD_0_TRG – **REJECTED** (increase the count number of PSD trigger just for reference)
3. PSD_EXT_TRG & PSD_0_TRG – **AQURIED**
4. Pile-up signal on particle 3
5. PSD_EXT_TRG & ! PSD_0_TRG – **REJECTED** (increase the count number of PSD trigger just for reference)
6. ! PSD_EXT_TRG & PSD_0_TRG – **AQURIED** an empty event in the PSD
7. PSD_EXT_TRG & PSD_0_TRG – **AQURIED**
8. ! PSD_EXT_TRG & ! PSD_0_TRG – **REJECTED**
9. PSD_EXT_TRG & PSD_0_TRG – **AQURIED**
10. ! PSD_EXT_TRG & ! PSD_0_TRG – **REJECTED**