

Deadtime Estimate Updates for HDSoC and SAMPic

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HDSoc

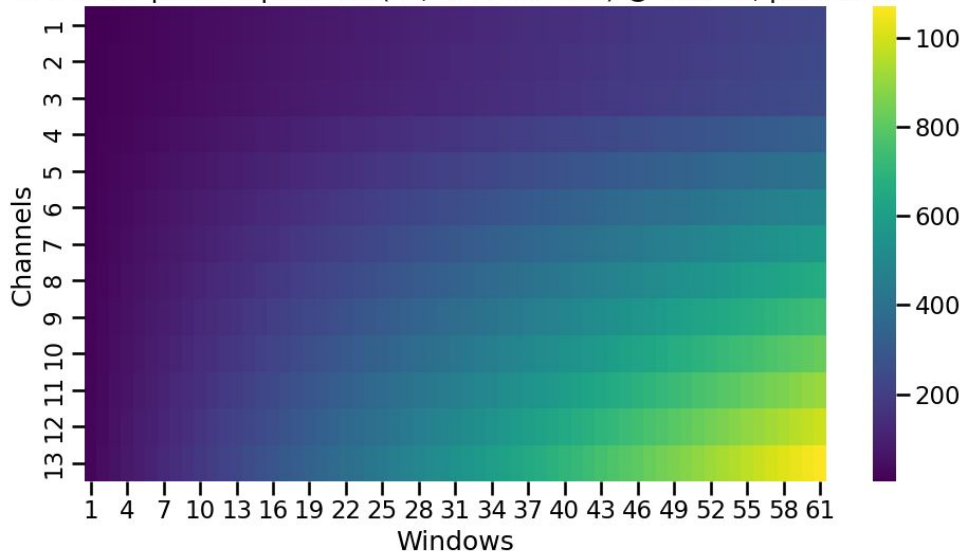
HDSoc Deadtime Scan (Results)

Parameter Space (793 combinations):

Channels = [1,2,...,13]

Windows = [1,2,3,...61]

Min multi-pulse separation (us, full channels) @ 100 Hz, pulses=2

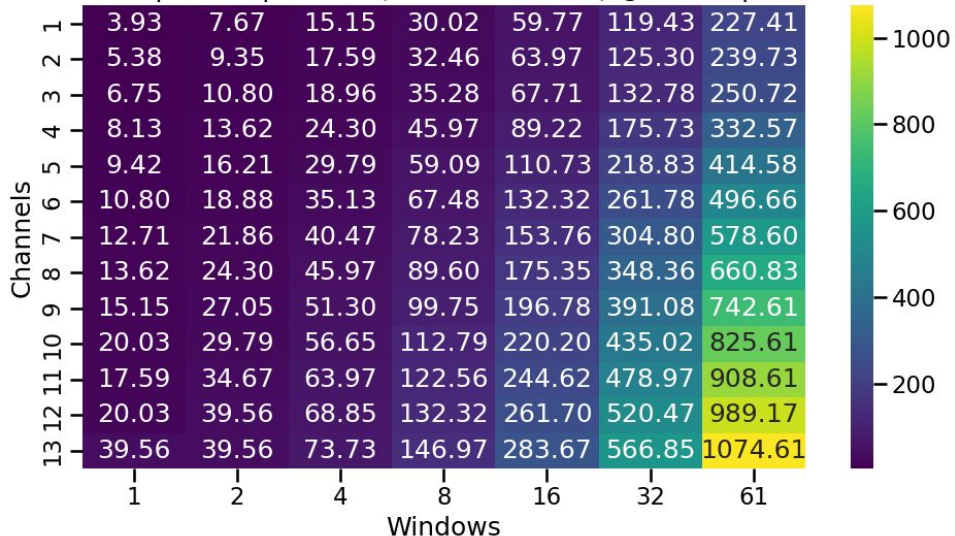


Parameter Space (91 combinations):

Channels = [1,2,...,13]

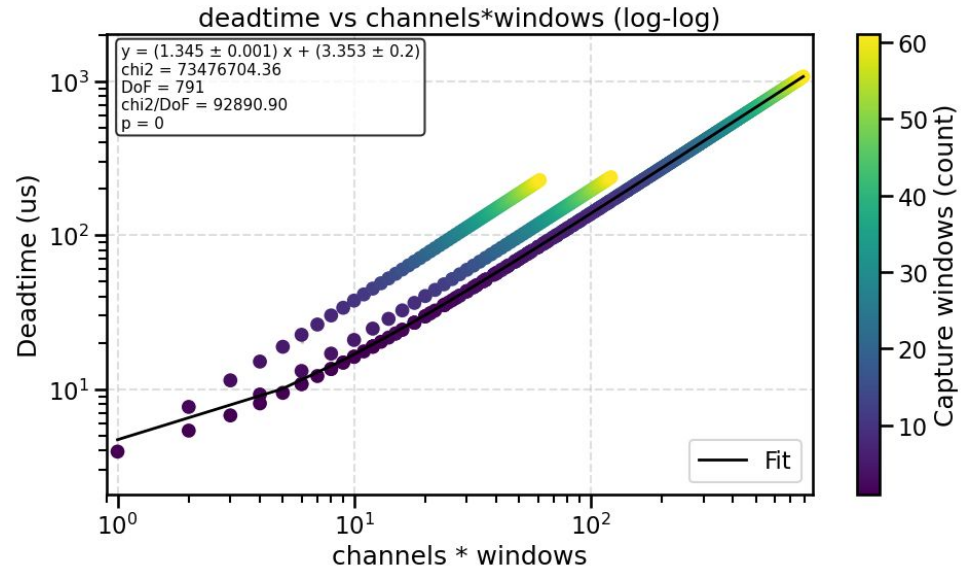
Windows = [1,2,4,8,16,32,61]

Min multi-pulse separation (us, full channels) @ 10 Hz, pulses=2



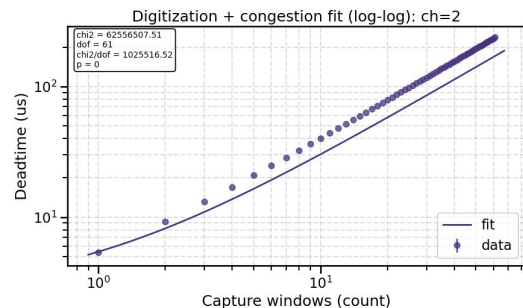
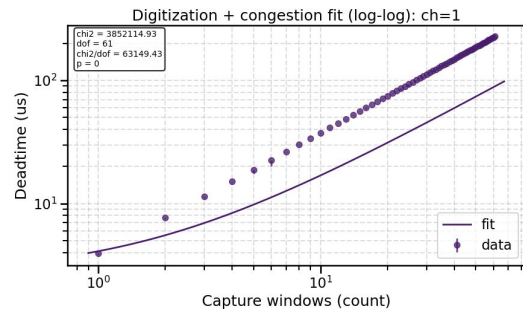
HDSoc Deadtime Scan (Fits)

- Idea: deadtime should scale linearly with payload size
- Works well for >2 channels
- Fails for 1 and 2 channel cases

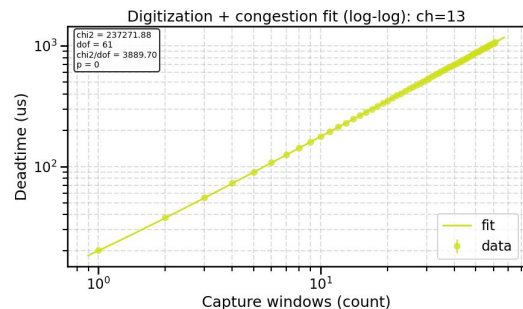


HDSoc Deadtime Scan (Fits)

- Idea:
 - Fit
$$y = a + b \cdot \text{windows} + c \cdot (\text{channels} \cdot \text{windows})$$
 - Add a “digitization” cost term
 - Product is the “congestion” cost term
- Again, works well for >2 channels
- Again, fails for 1 and 2 channel cases
- Could try more complex fits but not sure how to motivate them



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SAMPic

SAMPiC Deadtime Scan (Results)

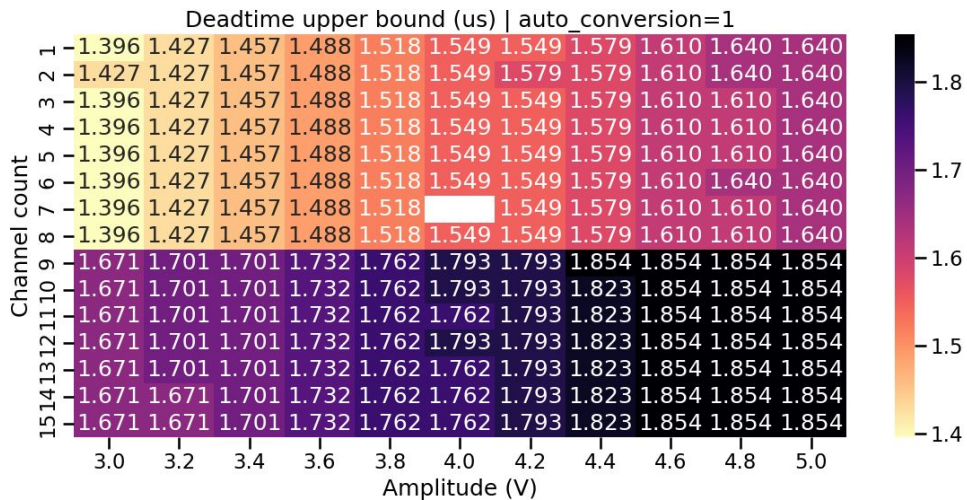
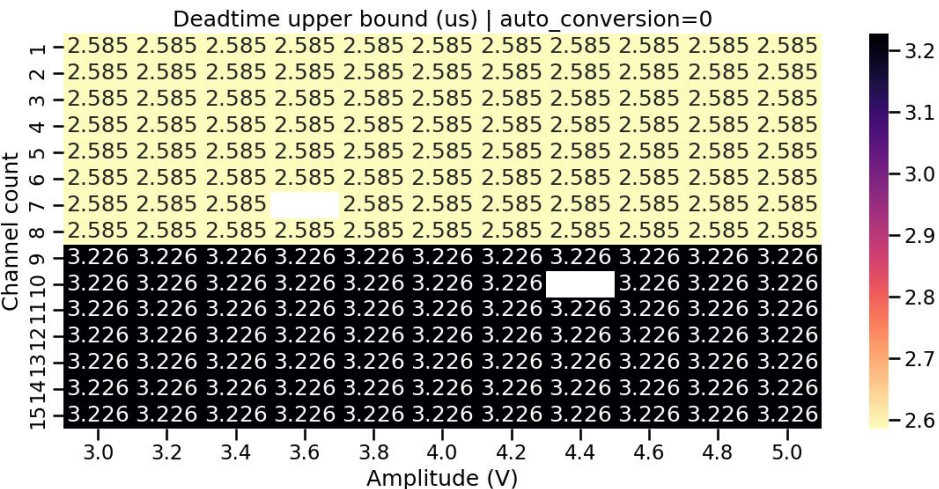
- Some runs failed (likely a communication error), the scan was programmed to move on in this case
- There's some scaling between Lecroy input voltage and SAMPic read voltage (ex. 5V lecroiy input digitizes as ~0.5V(?) pulse on SAMPic)

Parameter Space (330 combinations):

Channels = [1,2,...,13,14,15]

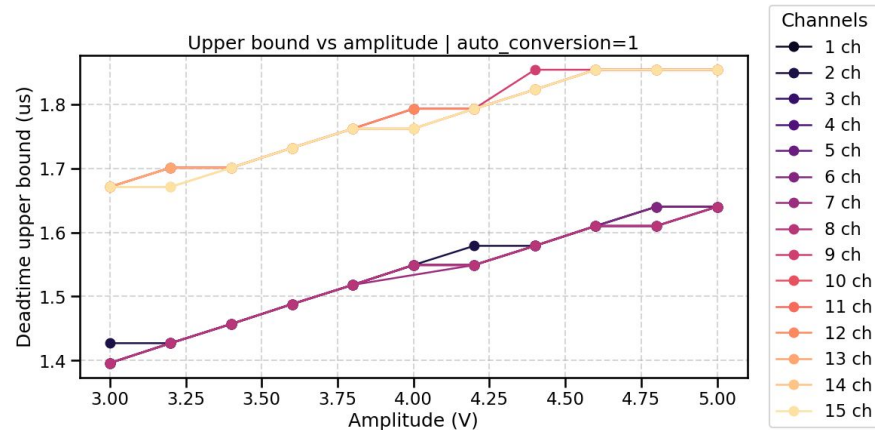
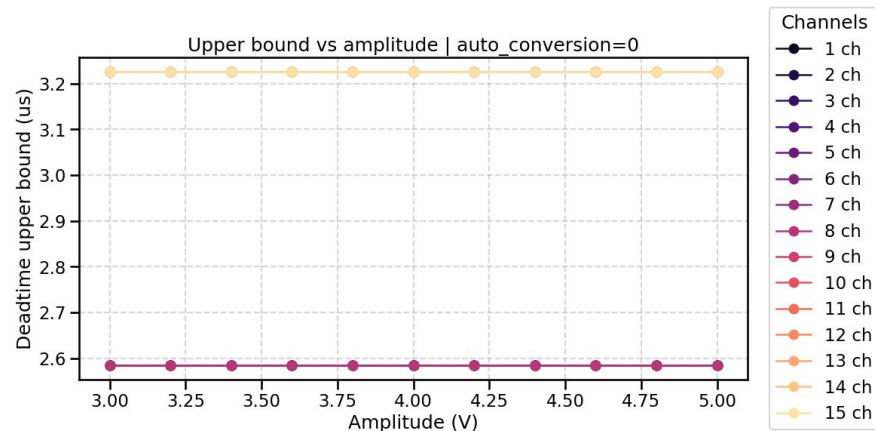
Amplitude = [3.0,3.2, ... 5.0]

Auto_conversion = [False, True]



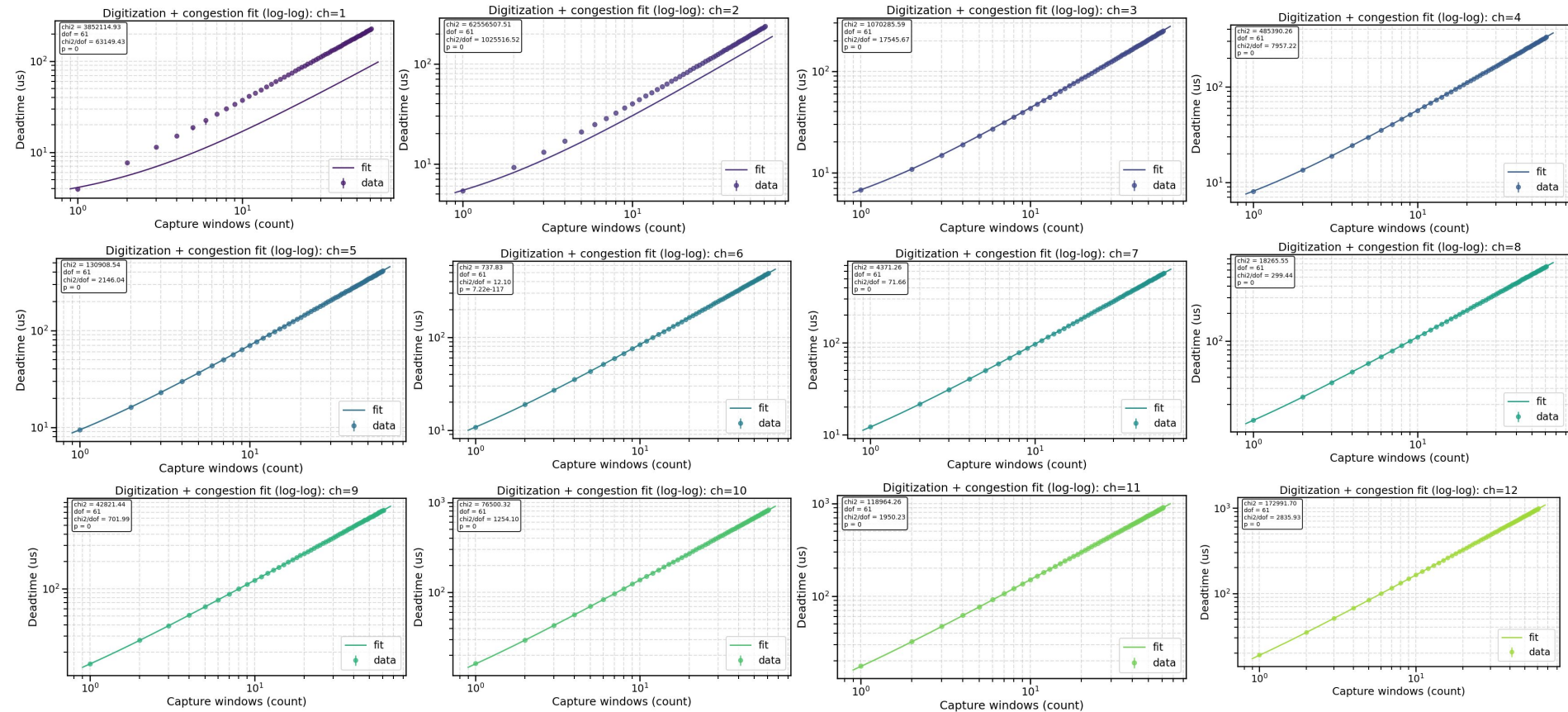
SAMPiC Deadtime Scan (Results)

- As expected with auto conversion off deadtime performance is worse, but consistent
- Also as expected, deadtime scales with voltage if auto conversion is on
 - I may want to try parameterizing the baseline, here it's set to default 0.5 V
 - Also could try negative signals
- Deadtime somehow influenced by whether both channels of lecroys were used or not
 - Outside of this, it appeared each channel has its own independent deadtime
 - Deadtime does not scale with number of channels



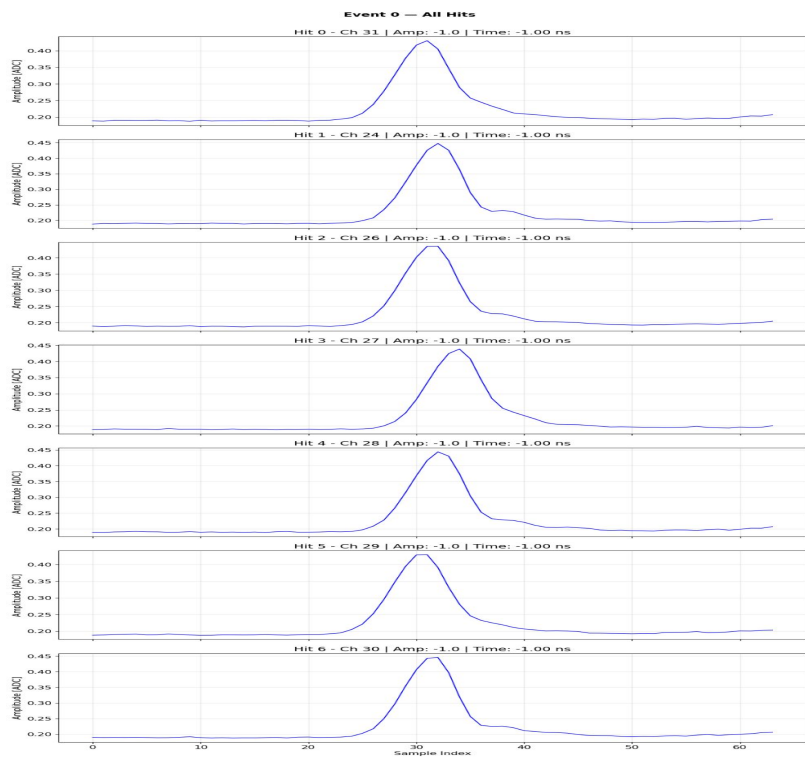
Auxiliary Slides

HDSoc Deadtime Scan (Fits)



Example SAMPic digitization of lecroy signal

Lecroy Module B



Lecroy Module A

