



TracePQM – WP1 Proposed LF set- ups (D1 part 1)

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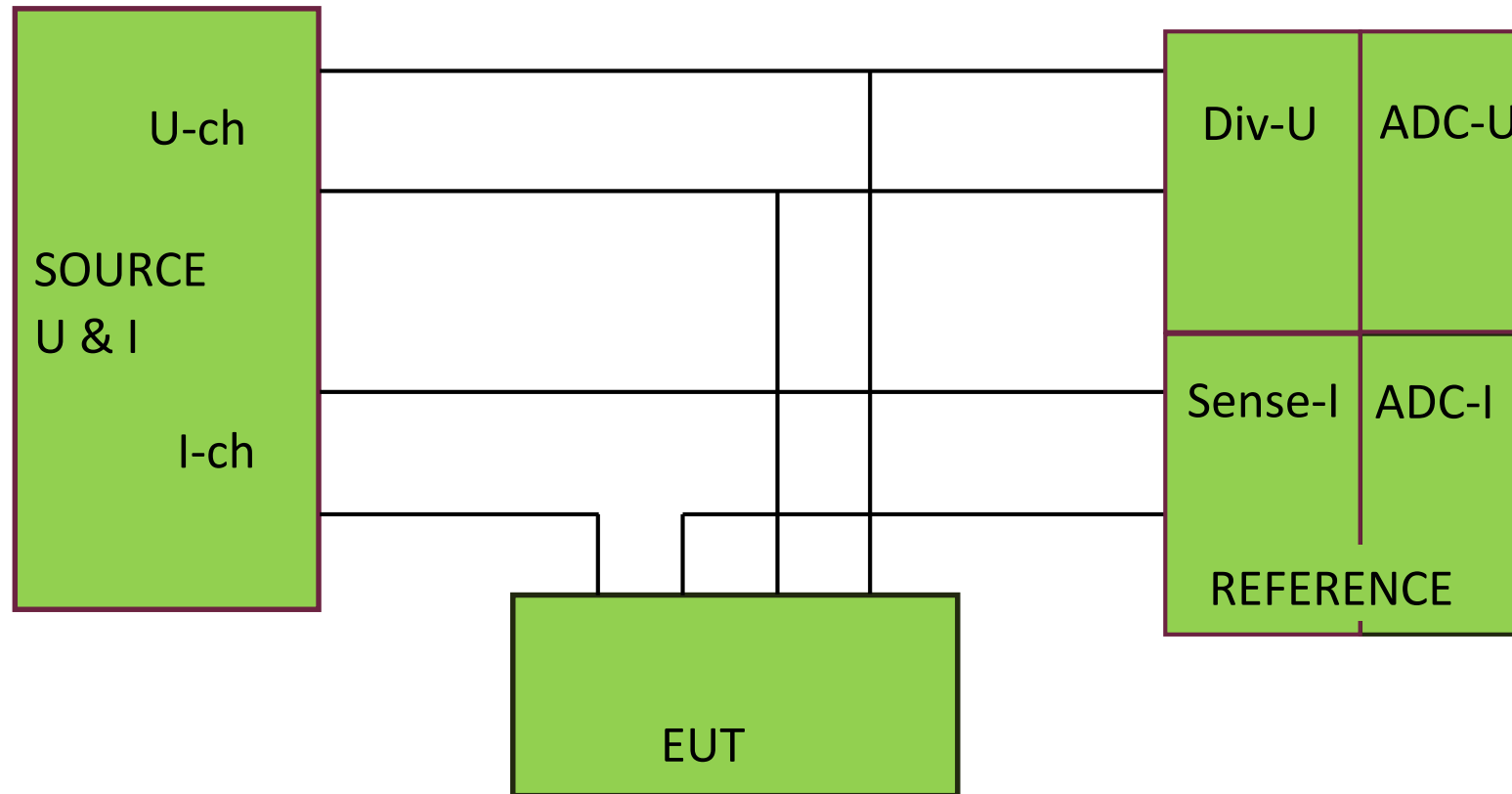
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**Transport and Safety
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A general calibration system



Measurement hardware

DIV-U: Divides a higher voltage down to $< 1\text{V}$.

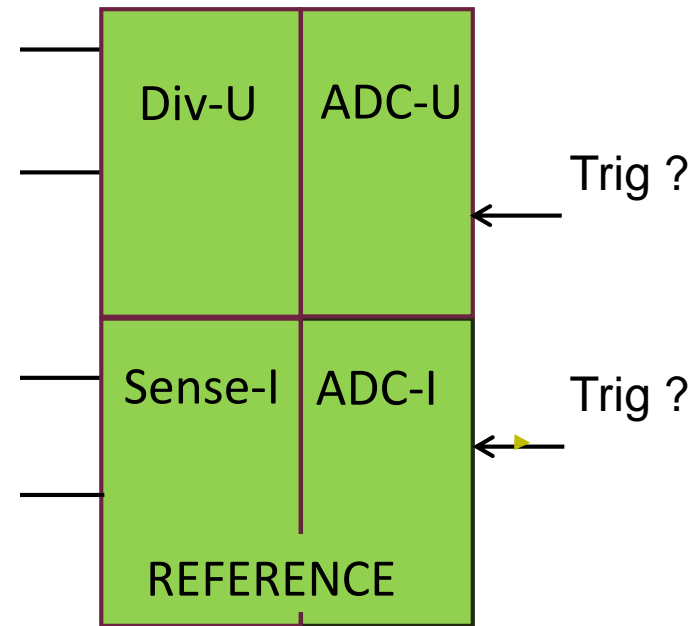
- Can be IVD or resistive divider, this project is concentrated on resistive dividers.

Sense-I: Transforms a current to voltage $< 1\text{ V}$

- May be shunt resistance or transformer and shunt resistance, this project is concentrated on shunts.

ADC-U and ADC-I

- May be any appropriate ADC, but this project concentrates on 3458A precision multimeters.



Reviewed LF system (power frequency and harmonics)

Synchronous digitizing set-ups

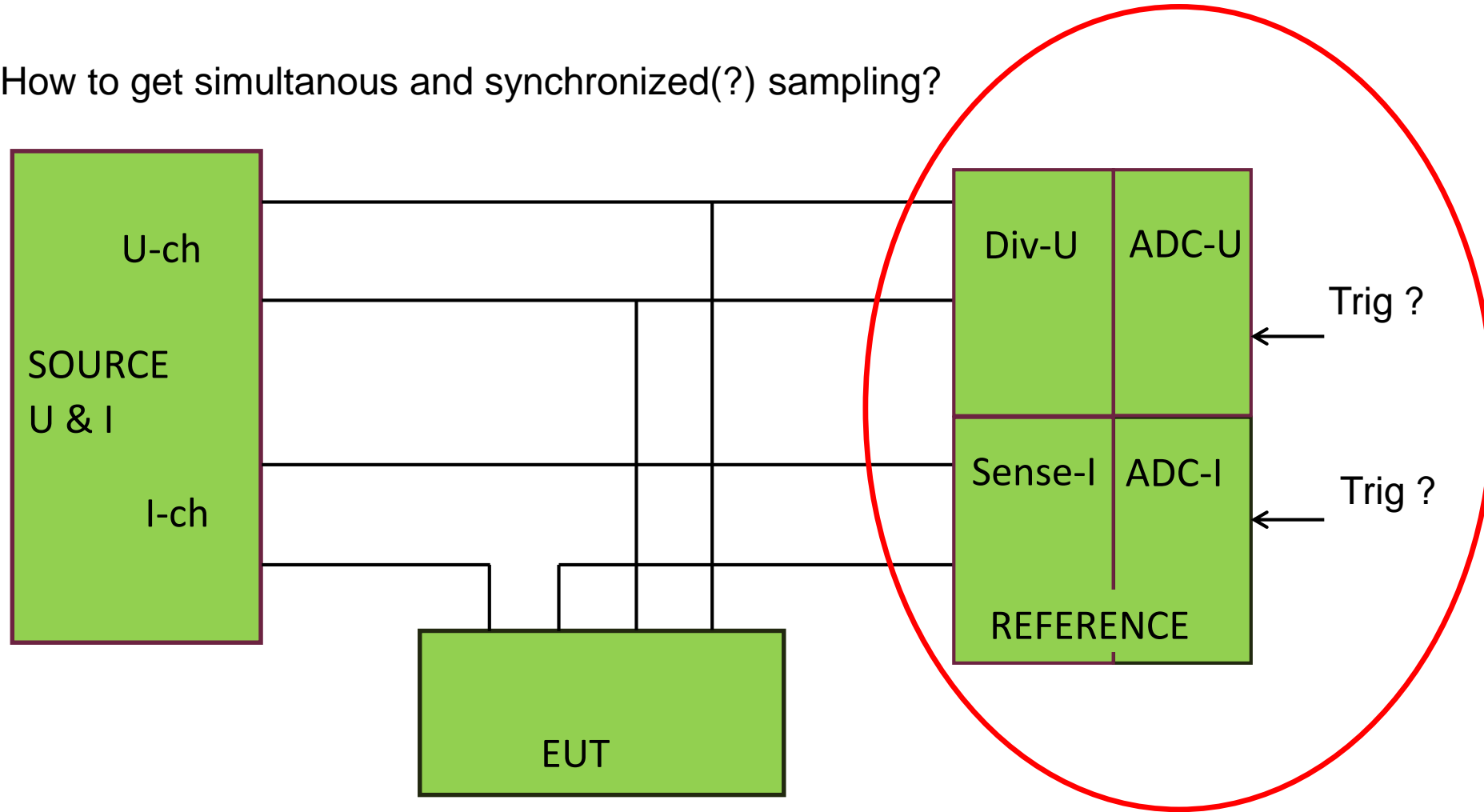
- “one digitizer with a switch” – High accuracy, only one digitizer needed, but complex and only for sinusoidal signals
- “Hardware phase-lock” – Versatile but need purpose-built hardware
- “Synchronized source and measurement ” – Can be versatile, extra (commercial) equipment may be needed

Non-synchronous digitizing set-ups

- “Internal clock of one of the multimeters and master-slave configuration” – No extra components necessary, but limited number of algorithms that works well.
- “External (non-synchronized) frequency source (AWG) for triggering ” – Same as for above but equal sampling jitter in both channels

Proposed set-up(s) for calibration purposes

How to get simultaneous and synchronized(?) sampling?



Proposed set-up(s) - Master/slave and TIMER

Master/slave and TIMER

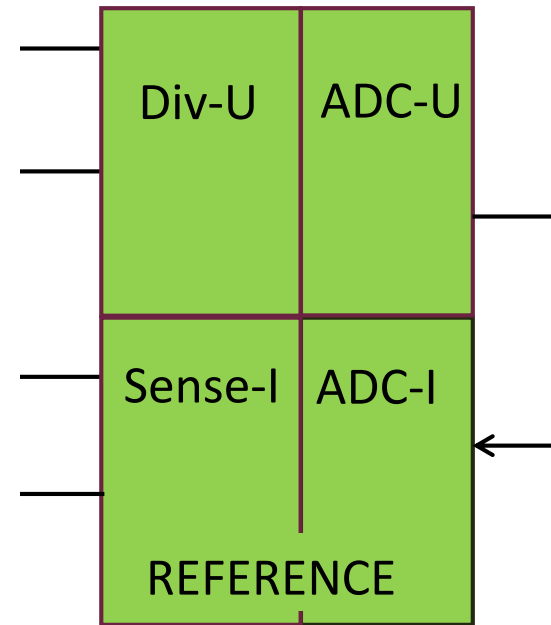
Internal timer in master is used for sampling, slave is triggered by master.

Advantages:

- No extra hardware

Disadvantages

- Limited frequency resolution, (100 ns timing resolution)
- Only semi-synchronous or non-synchronous sampling possible in practise



Proposed set-up(s) – External common trigger

External common trigger

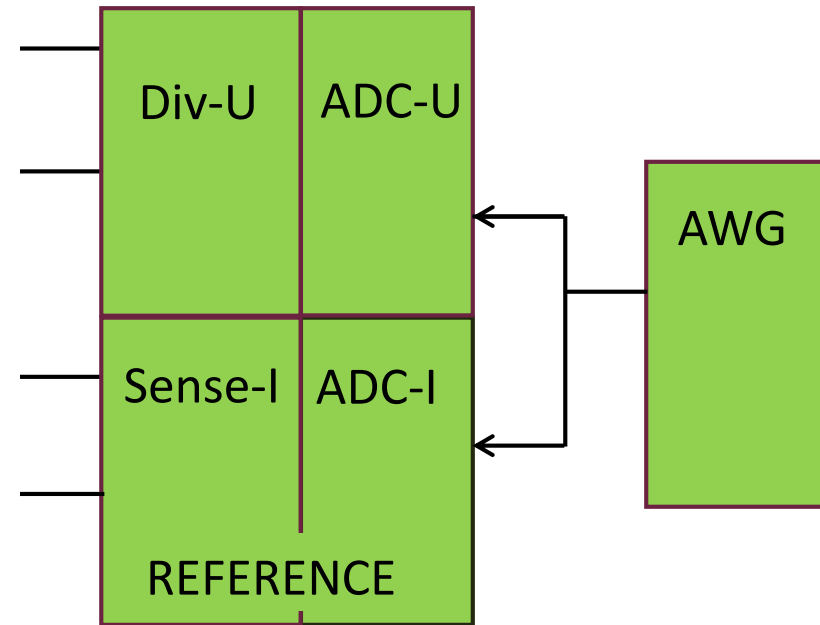
A common trigger signal to both digitizers, from a source (AWG) with high frequency resolution.

Advantages:

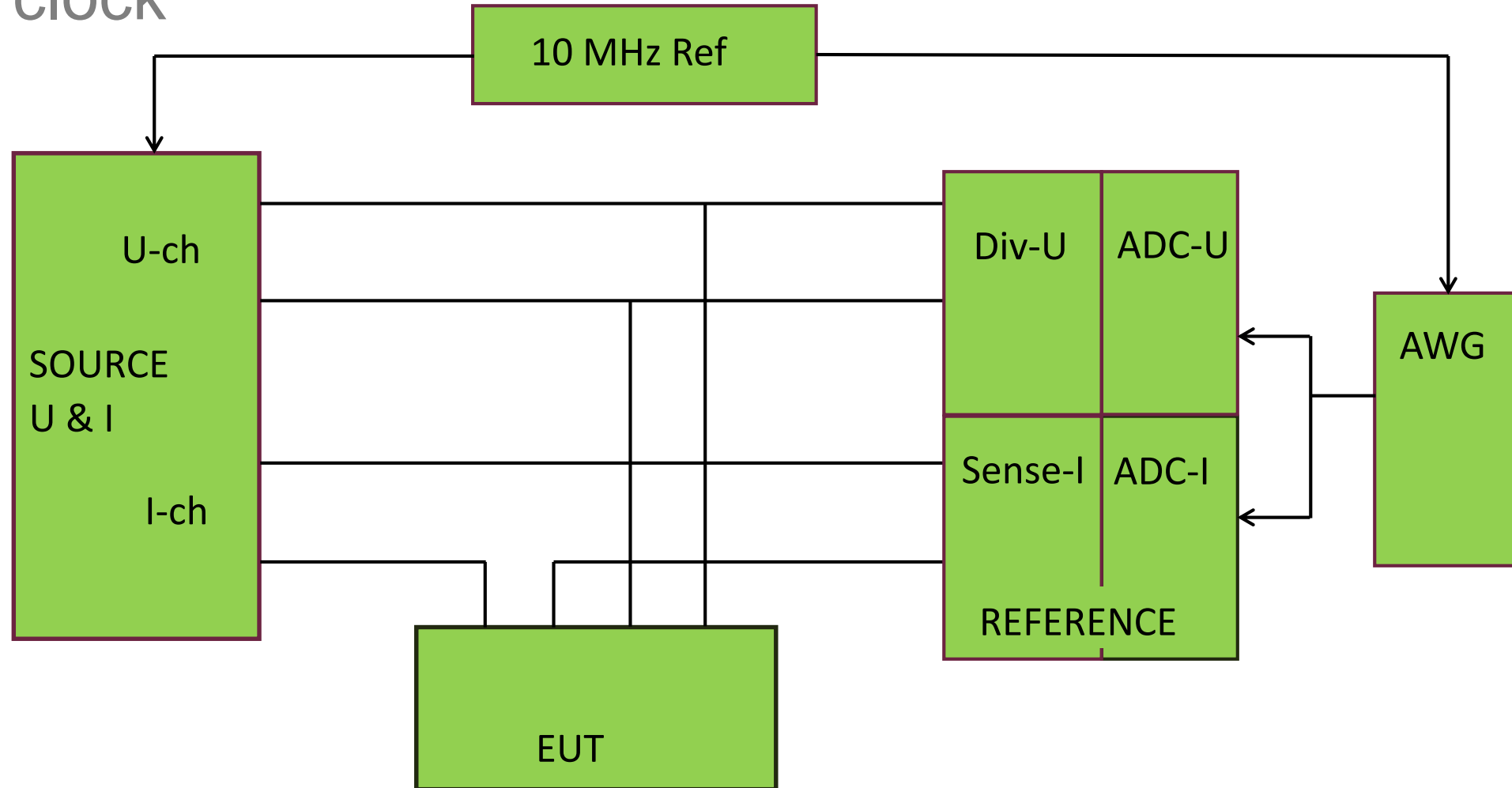
- Data from simultaneous and synchronised sampling works well with most algorithms.

Disadvantages

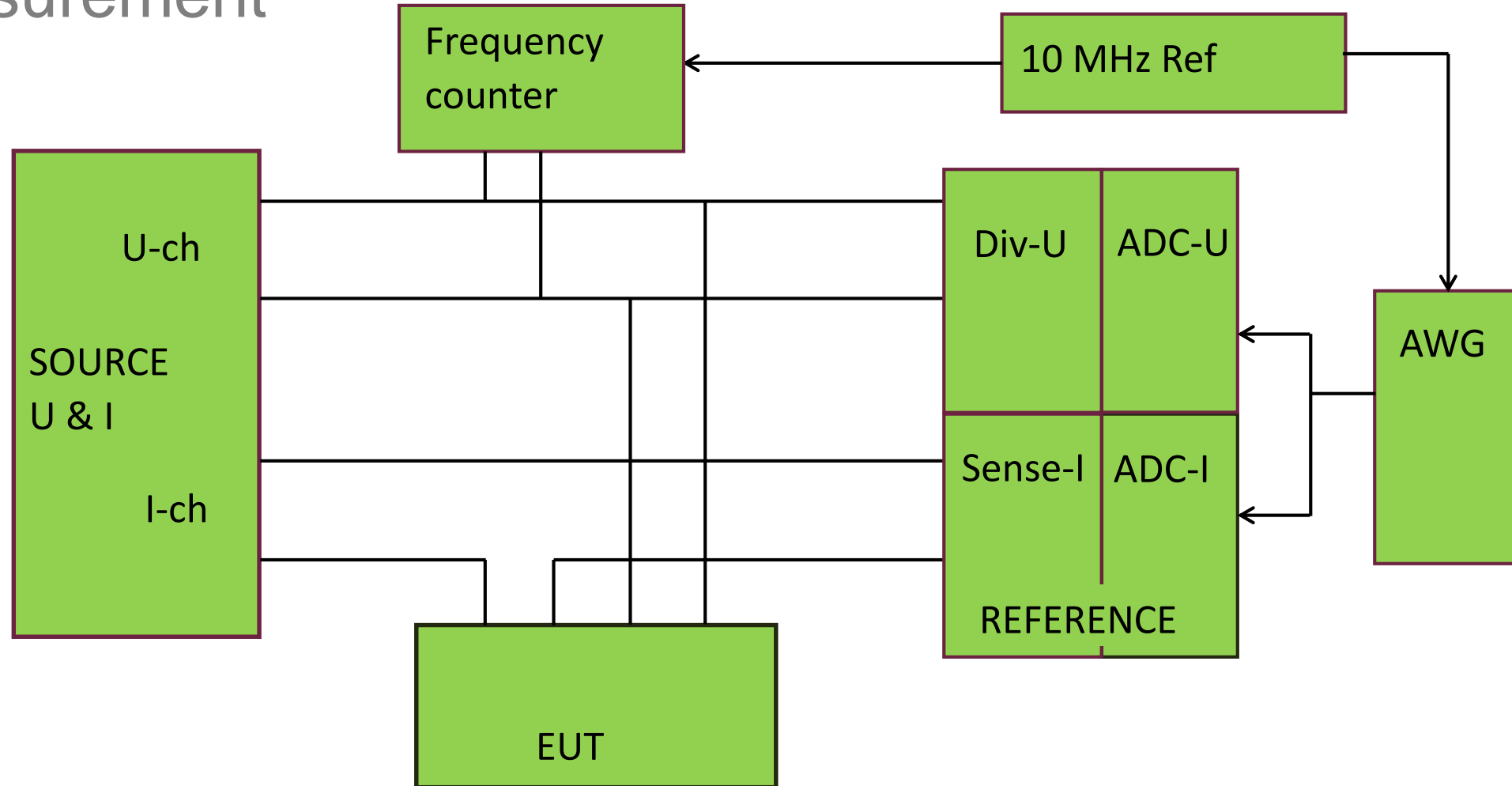
- Extra hardware required (AWG)
- Frequency may have to be measured by 'counter



Proposed set-up(s) – Calibration set-up with common 10 MHz clock



Proposed set-up(s) - Calibration set-up with frequency measurement





THANK YOU!

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