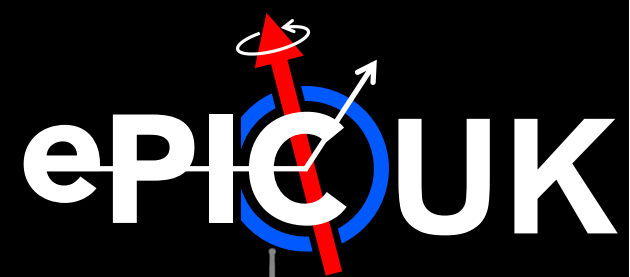




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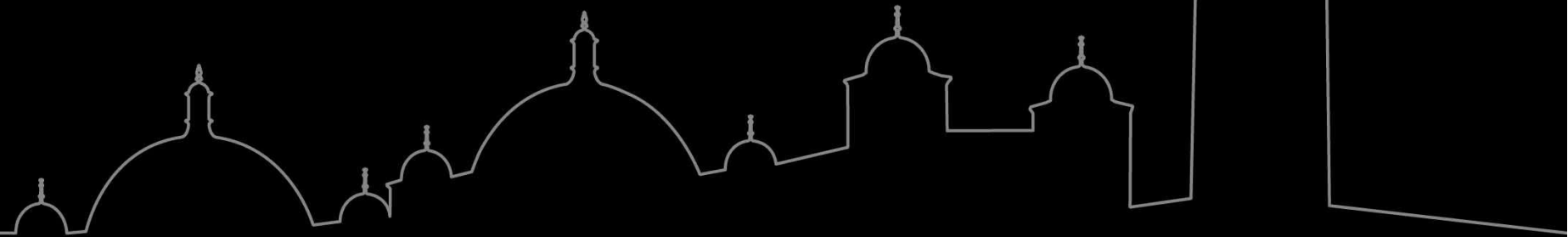


MPW2 testing @ B'ham: Comparison plots

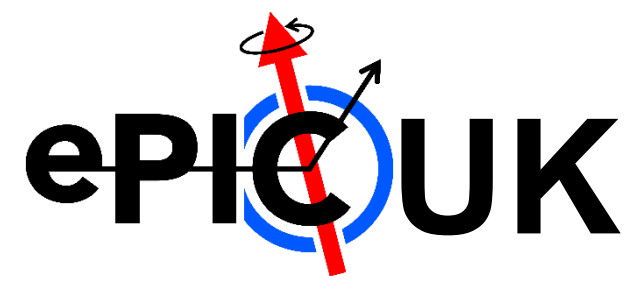
James Glover

EIC-UK WP1 meeting

Wed, 3rd June 2026



MPW2 testing in the UK



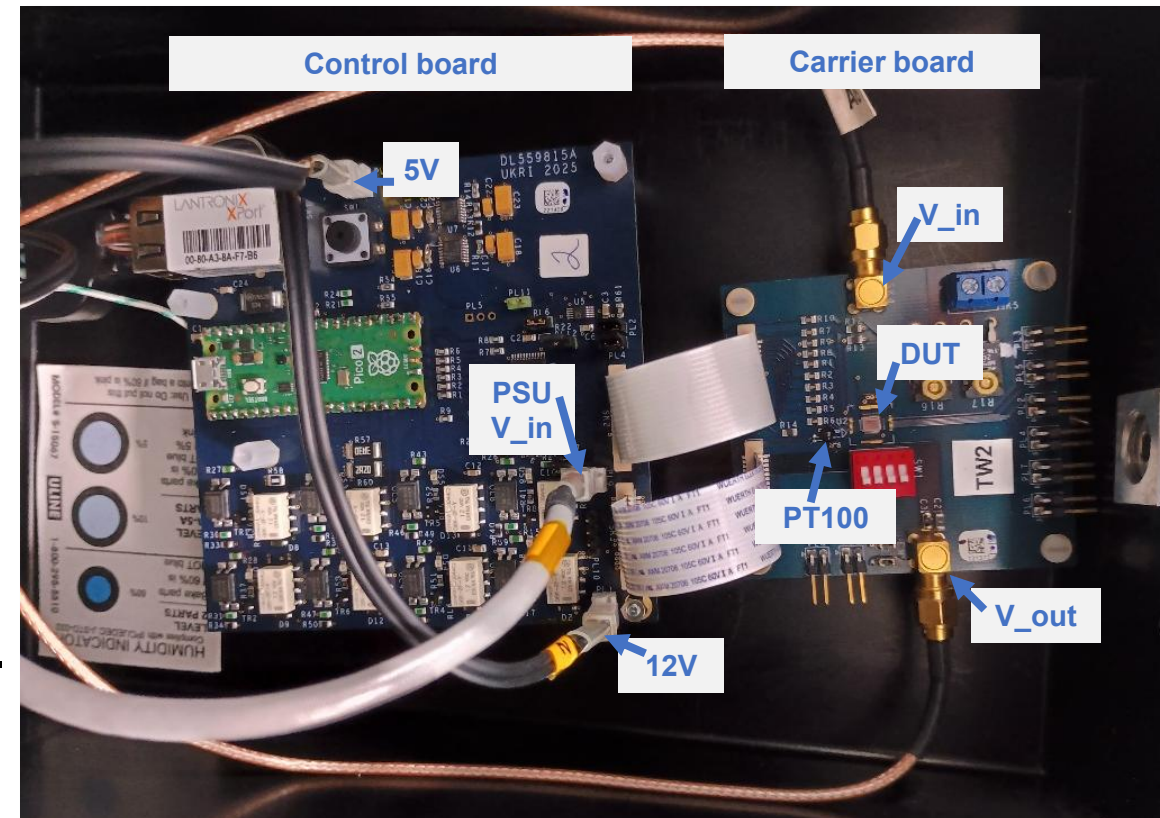
Previously reports on the UK's MPW2 testing set-ups include:

- [A. Hill, SVT working meeting @ Oxford, Dec '25.](#)
- [L. Ranatunge, ePIC SVT WP2 general meeting, Jan '26.](#)
- [J. Glover, ePIC SVT WP2 general meeting, Feb '26.](#)
- [J. Glover, ePIC SVT DSC general meeting, Mar '26.](#)
- [L. Godfrey, ePIC SVT DSC general meeting, May '26.](#)

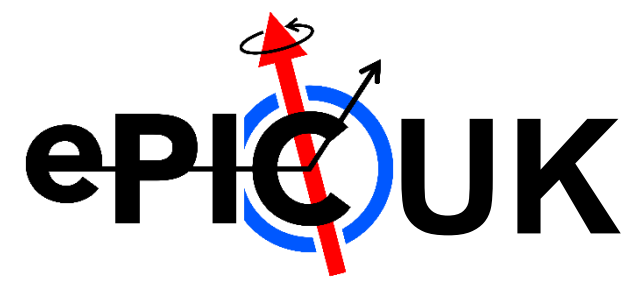


Test set-up overview

- 2 board set-up.
 - Control board with μ -controller and relays to switch in/out loads.
 - Carrier board for the DUT with onboard temperature monitoring (PT100).
- Interconnecting flex ribbons with ZIF connectors.
- 3 sites, 3 DUTS:
 - DL: TW1 (27 °C, X-ray, SP chain).
 - B'ham: TW2 (-20 & 105 °C).
 - Brunel: TW3 (27 & 60 °C).



Tests to be considered



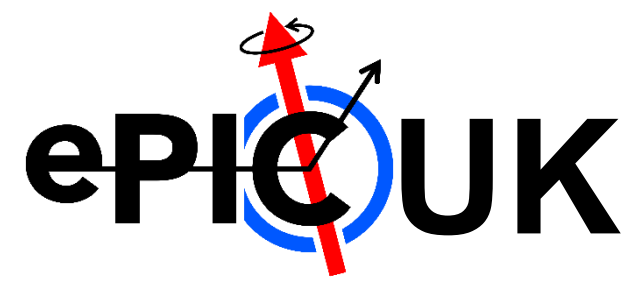
Two modes of operation:

- Mode1: SLDO active at power-up.
- Mode0: SLDO in tri-state at power-up, needs to be enabled.

Majority of tests to be performed at -20, 27, 60, & 105 °C (except irradiation and SP chain testing).

Test: Cap load	Mode1															Mode0								
	Power-up			DAC scan			Ramp rate			PSRR			X-ray irradiation			Serial powering chain			Power-up		Over current			
No load	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
10 nF	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
100 nF	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
1 μF	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
10 μF	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA

Tests achieved to date (B'ham, @ -20 °C)



Two modes of operation:

- Mode1: SLDO active at power-up.
- Mode0: SLDO in tri-state at power-up, needs to be enabled.

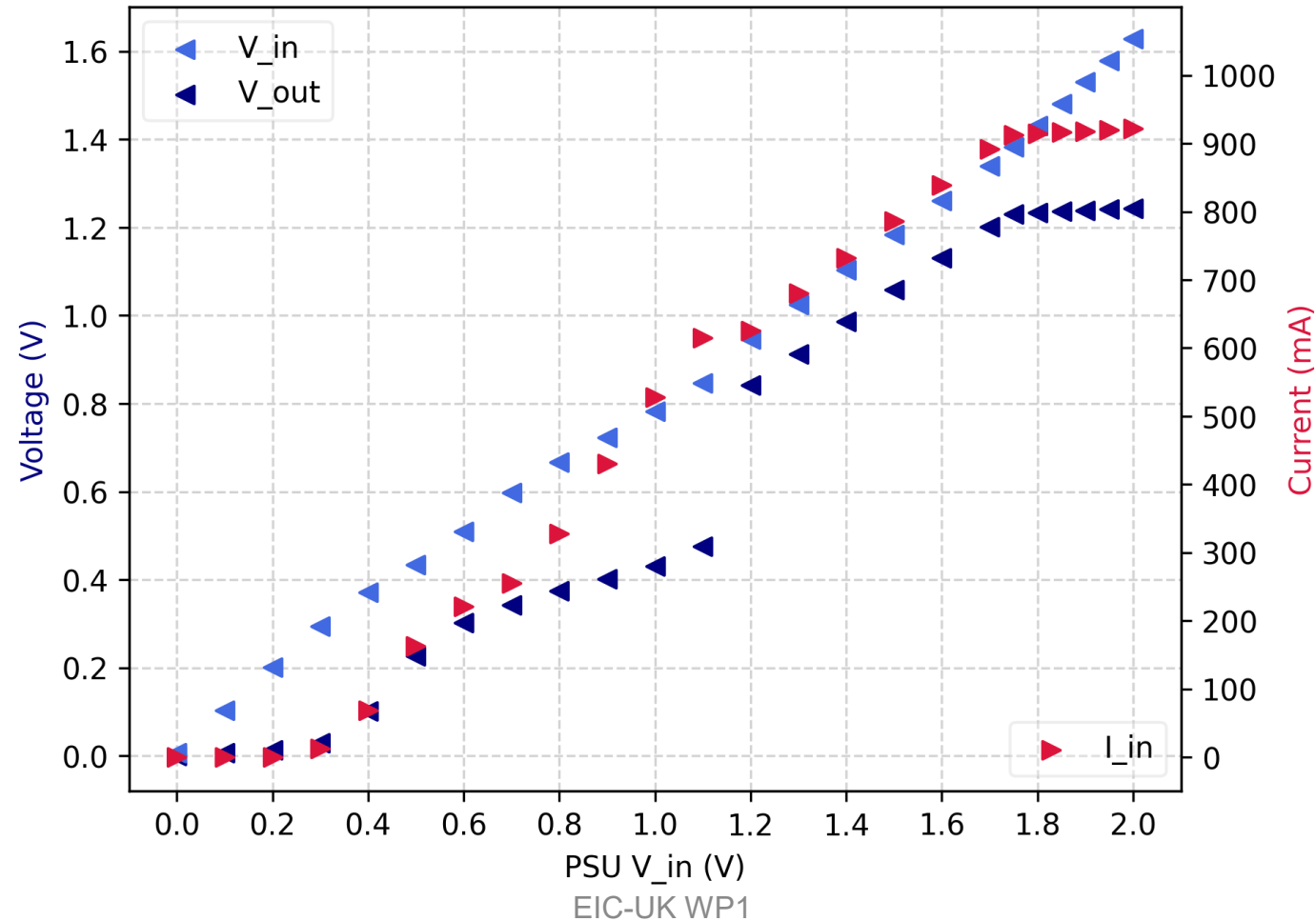
X-ray and SP testing not being considered for none room temp tests.

-20 °C Test: Cap load		Mode1										Mode0																
		Power-up			DAC scan			Ramp rate			PSRR			X-ray irradiation			Serial powering chain			Power-up		Over current						
No load		40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA			
10 nF		40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
100 nF		40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
1 μF		40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA
10 μF		40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA	40 mA	500 mA	900 mA

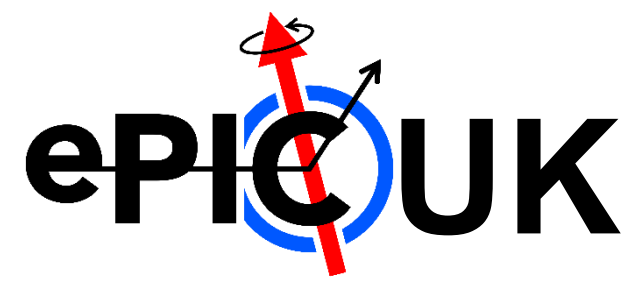
Mode1, Power-up example

Previously presented plot:

Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)

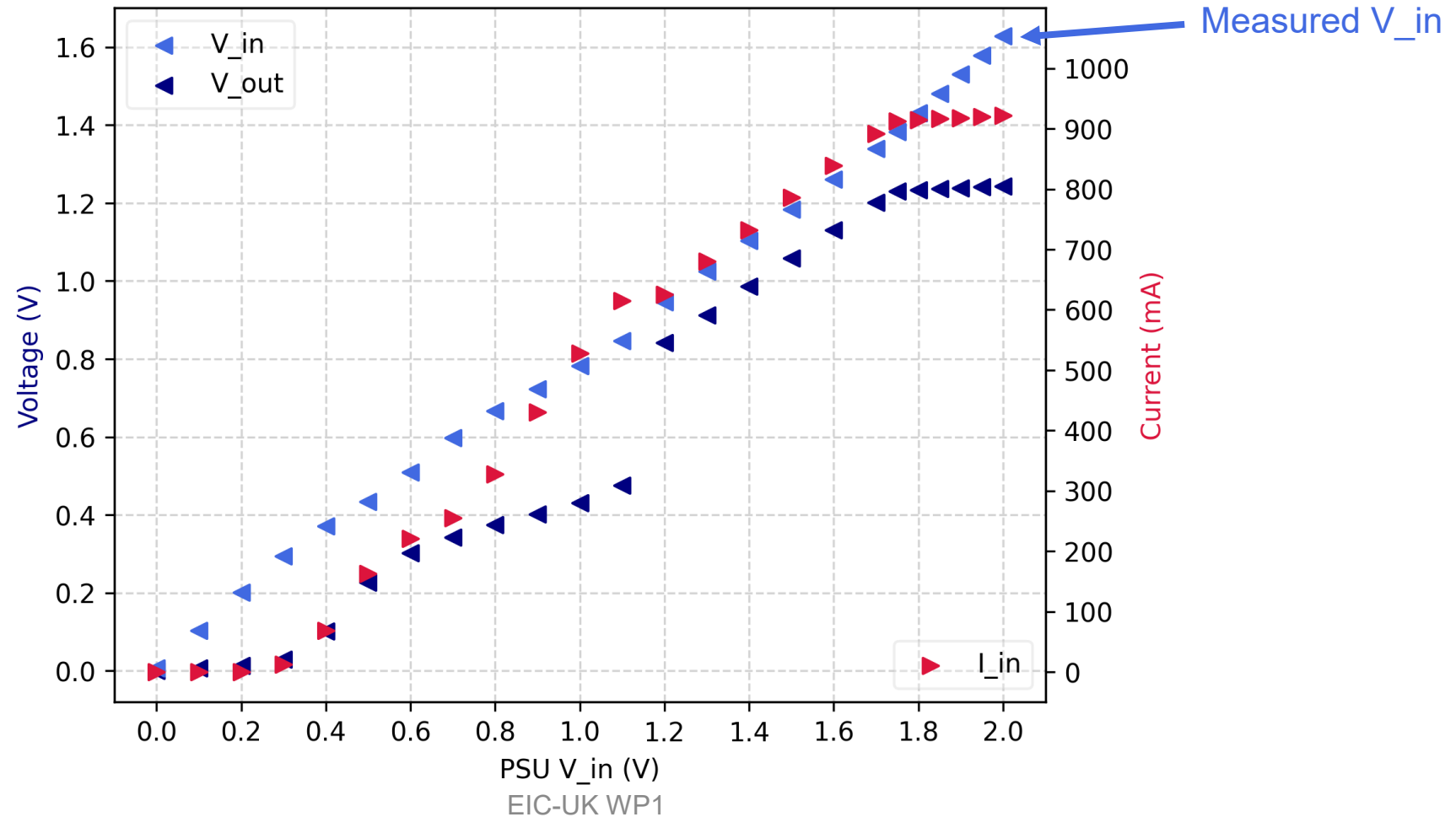


Mode1, Power-up example

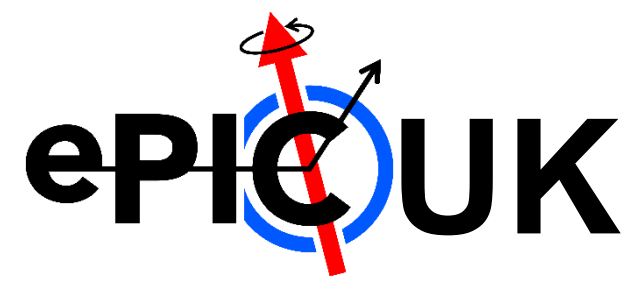


Previously presented plot:

Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)

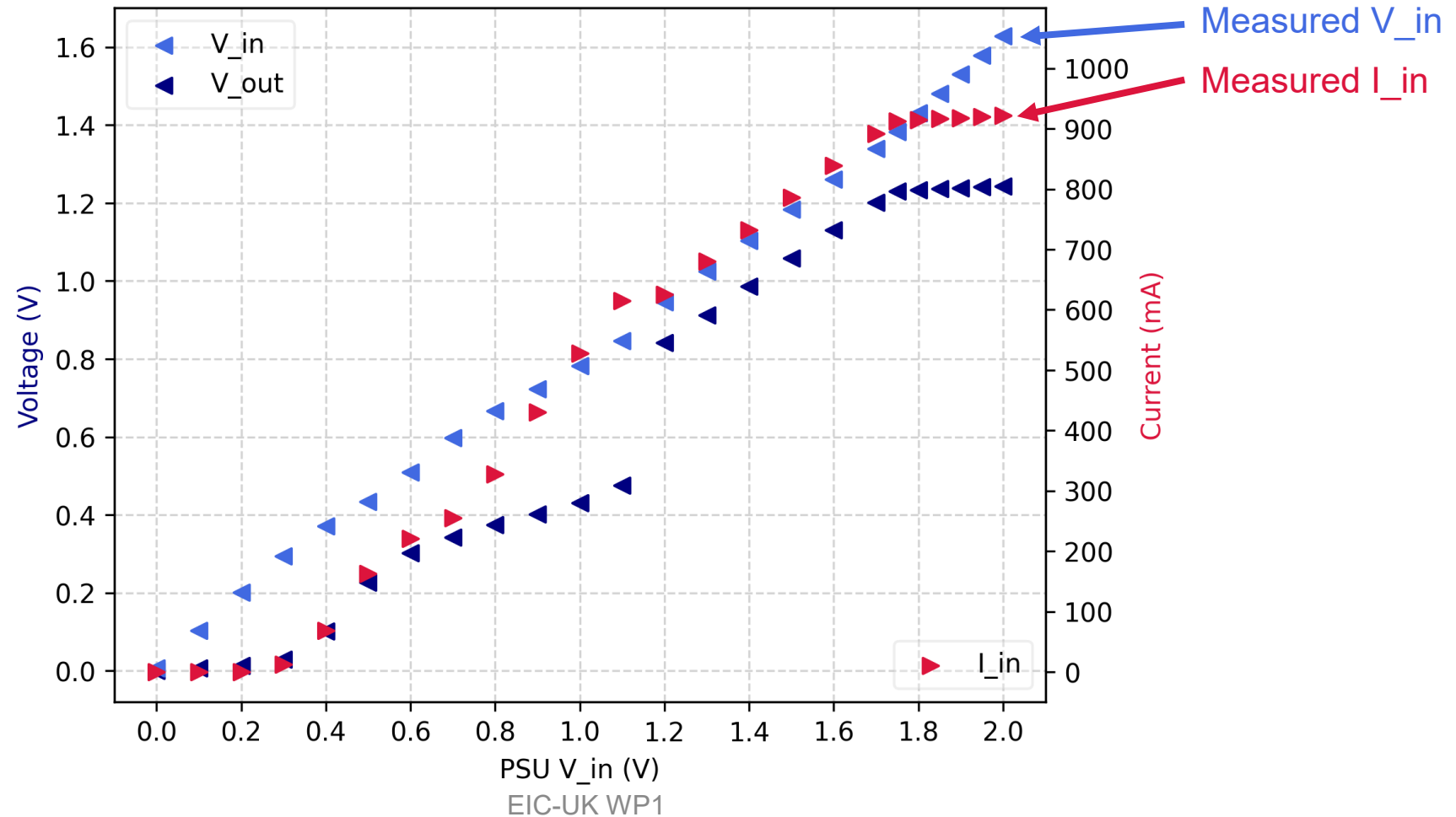


Mode1, Power-up example



Previously presented plot:

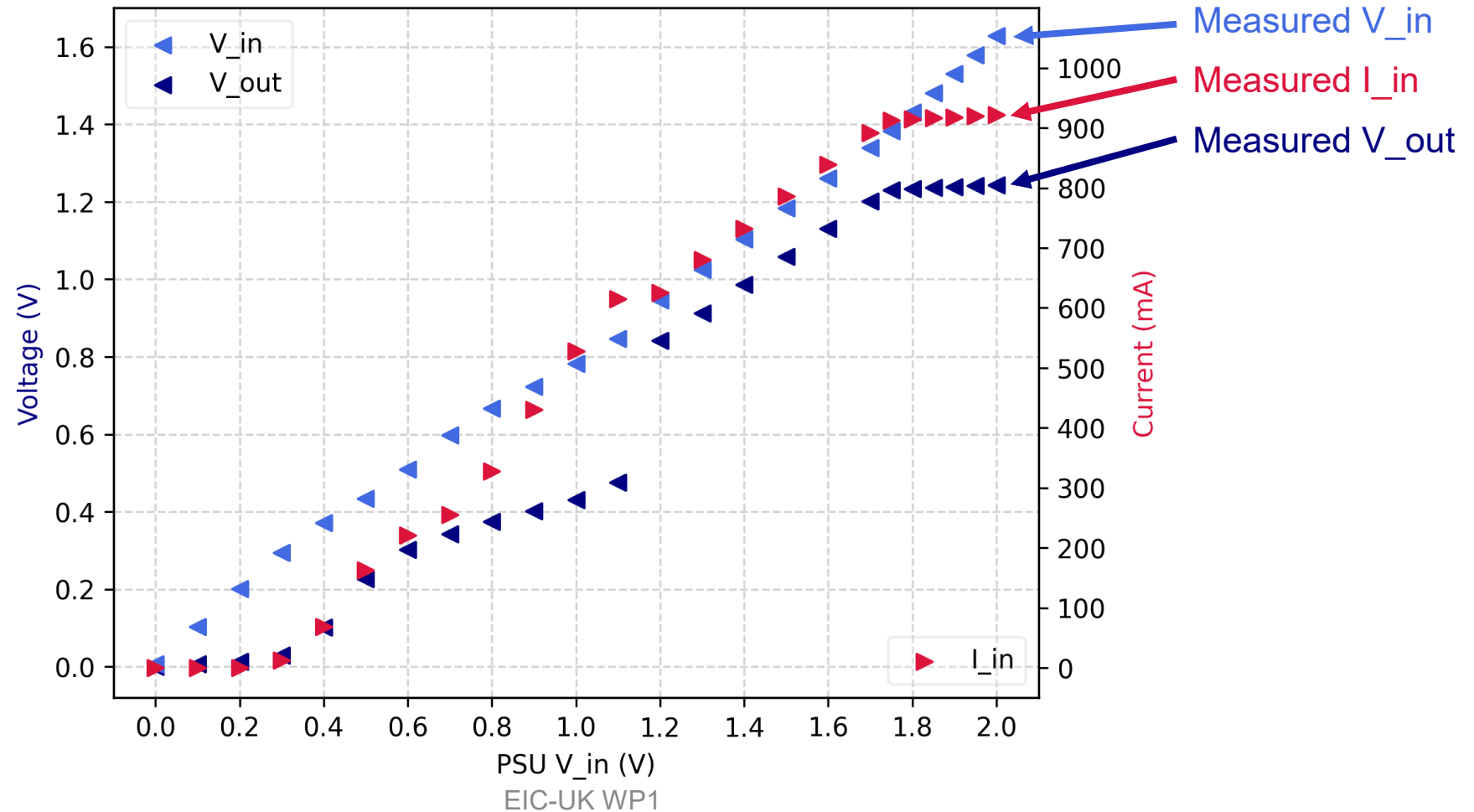
Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)



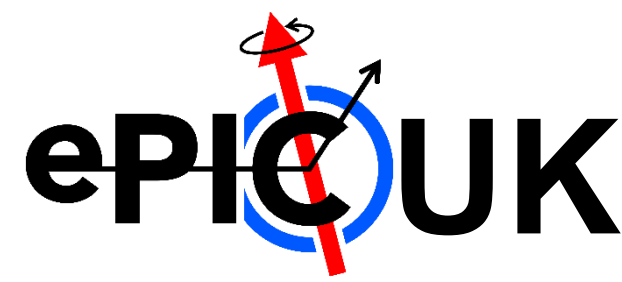
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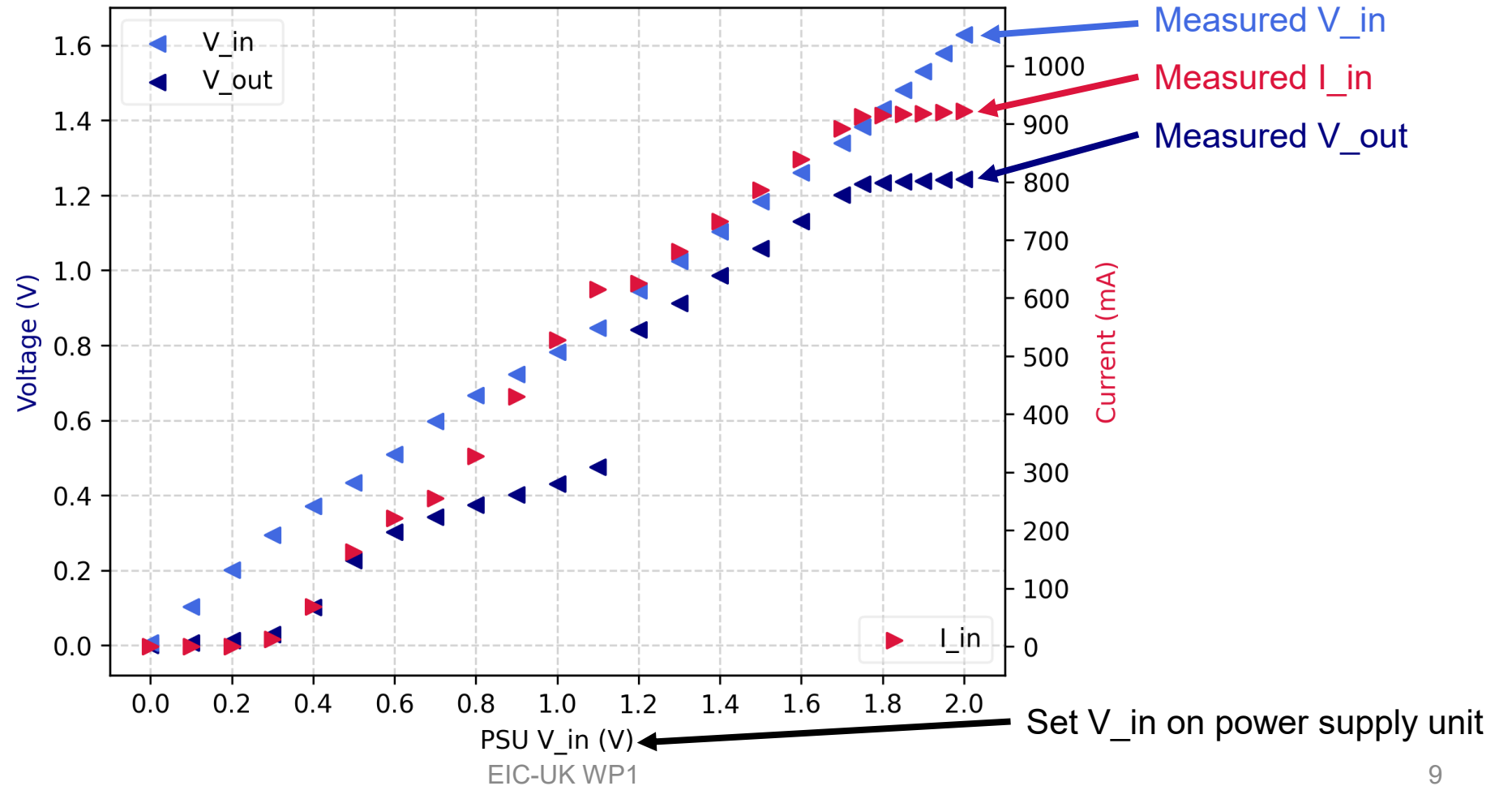


Mode1, Power-up example

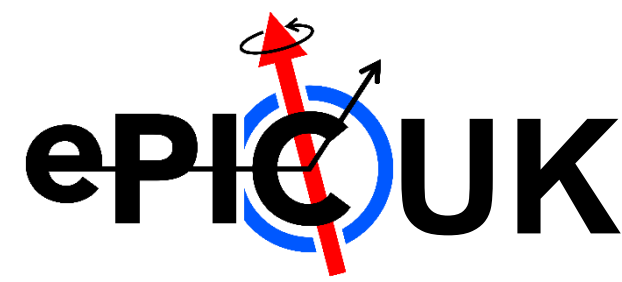


Previously presented plot:

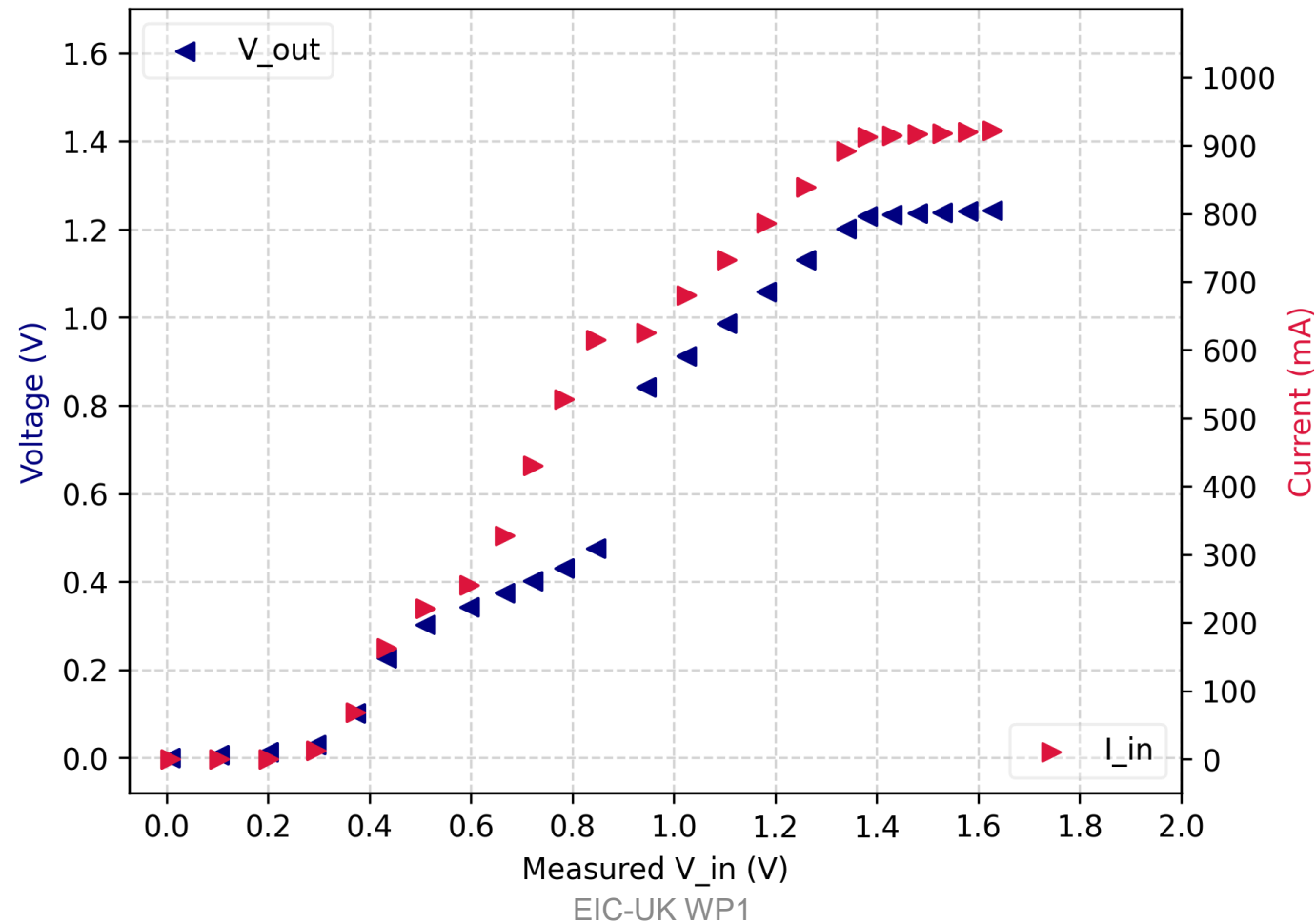
Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)



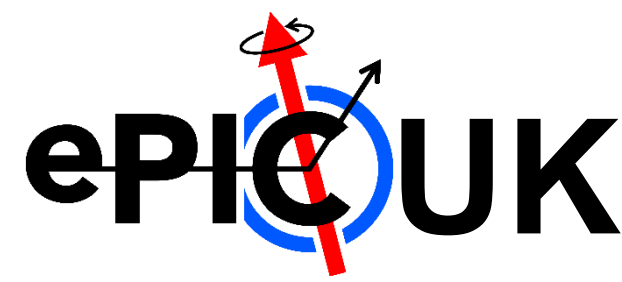
Mode1, Power-up (Plot against measured V_{in})



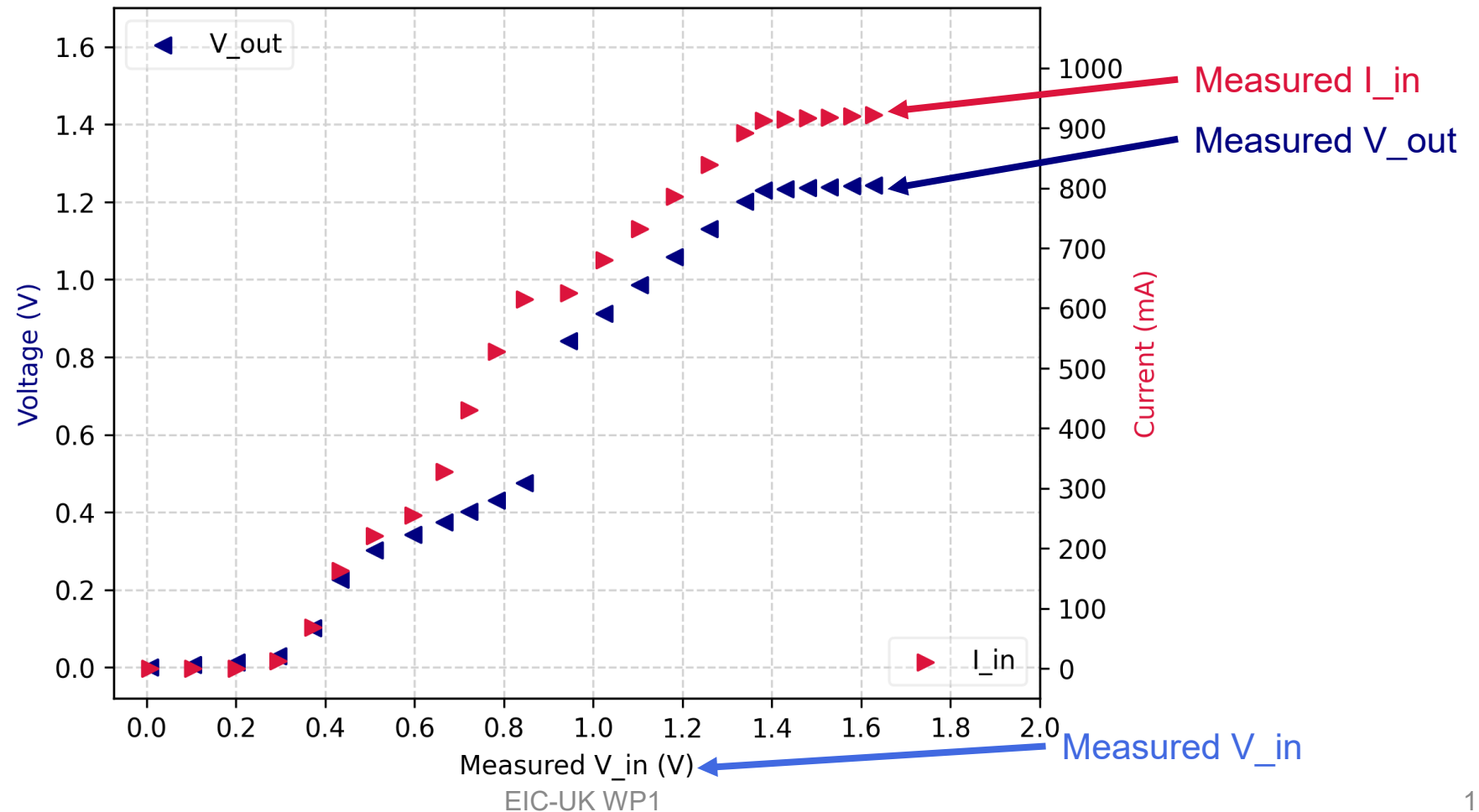
Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)



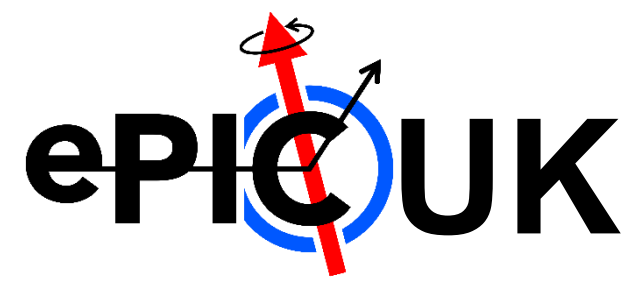
Mode1, Power-up (Plot against measured V_{in})



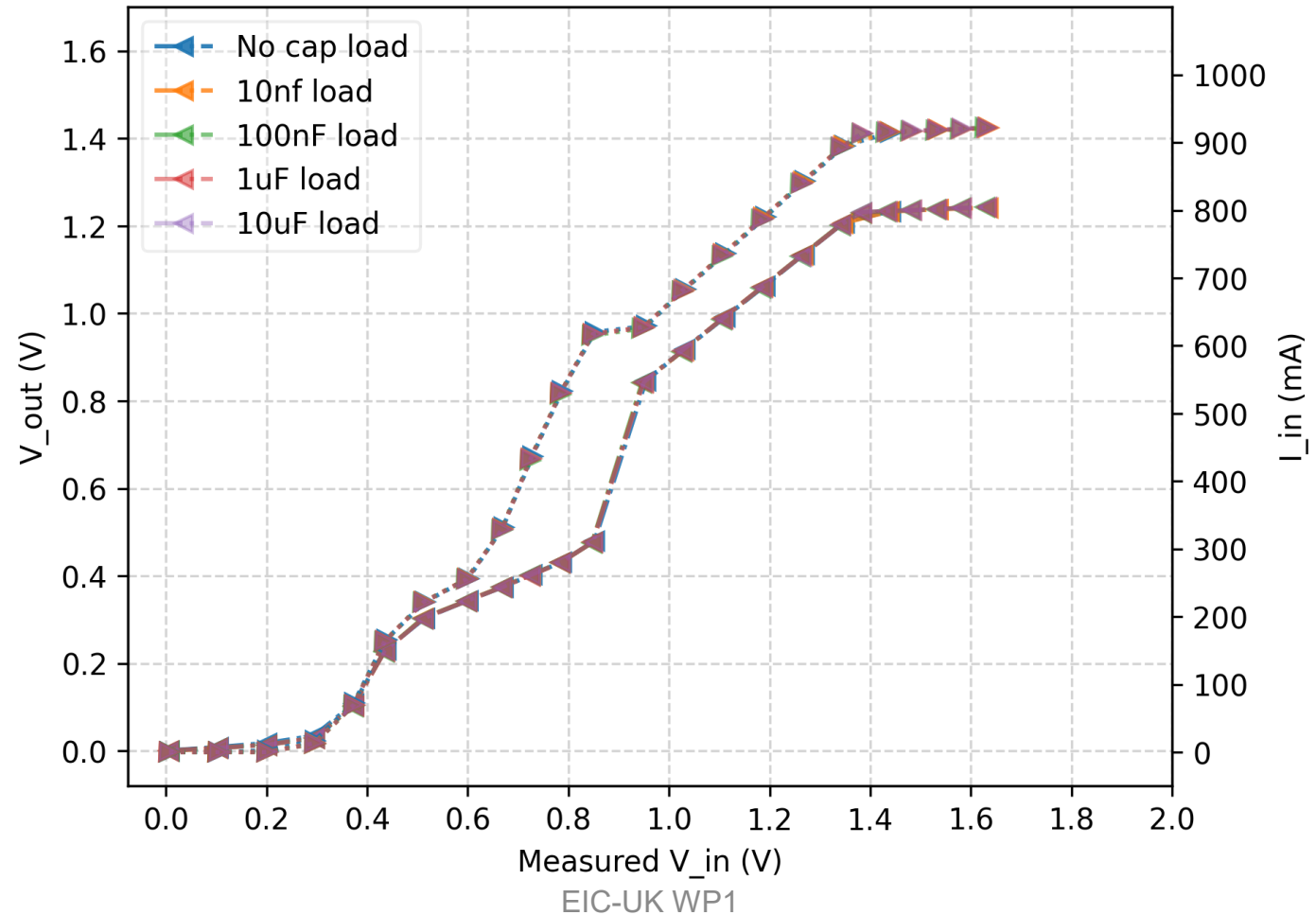
Mode1 IV scan (Load = 900mA, 100nF, DAC code = 16, Temp = -25.92°C)



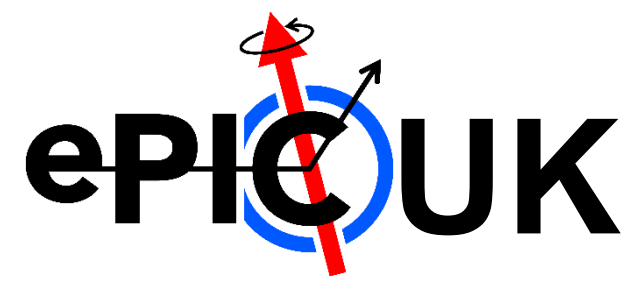
Mode1, Power-up (Compare capacitive loads)



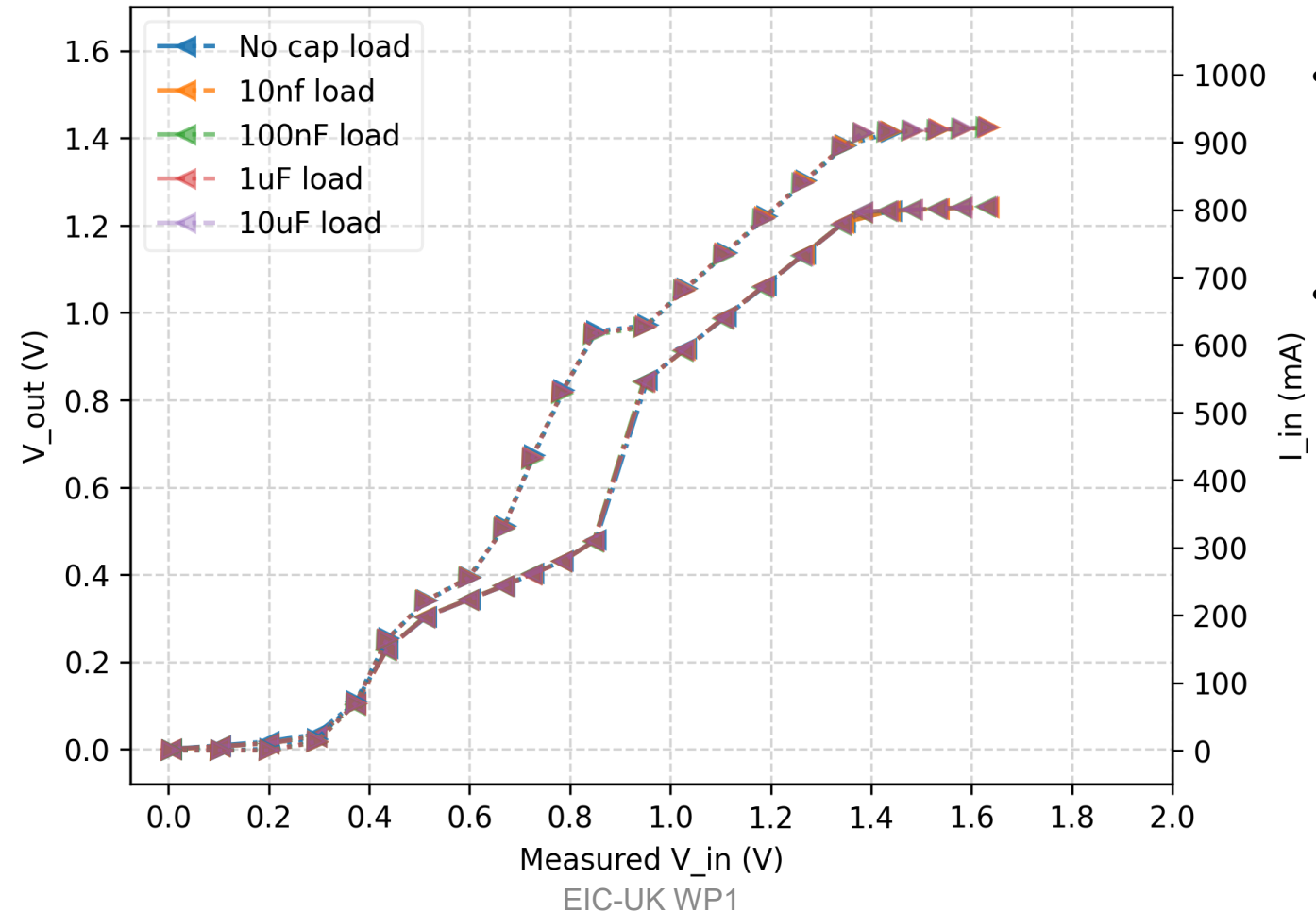
Mode1 IV scan (CurrentAim = 900mA, DAC code = 16, TempAim = -20 °C): CapLoad comparison



Mode1, Power-up (Compare capacitive loads)



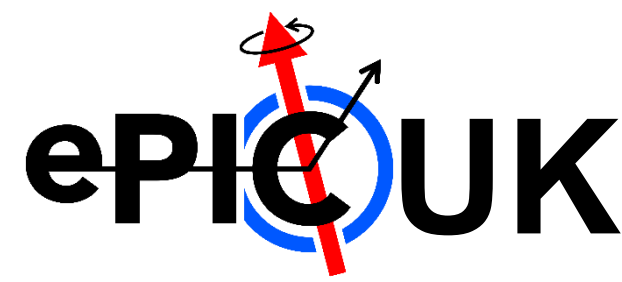
Mode1 IV scan (CurrentAim = 900mA, DAC code = 16, TempAim = -20 °C): CapLoad comparison



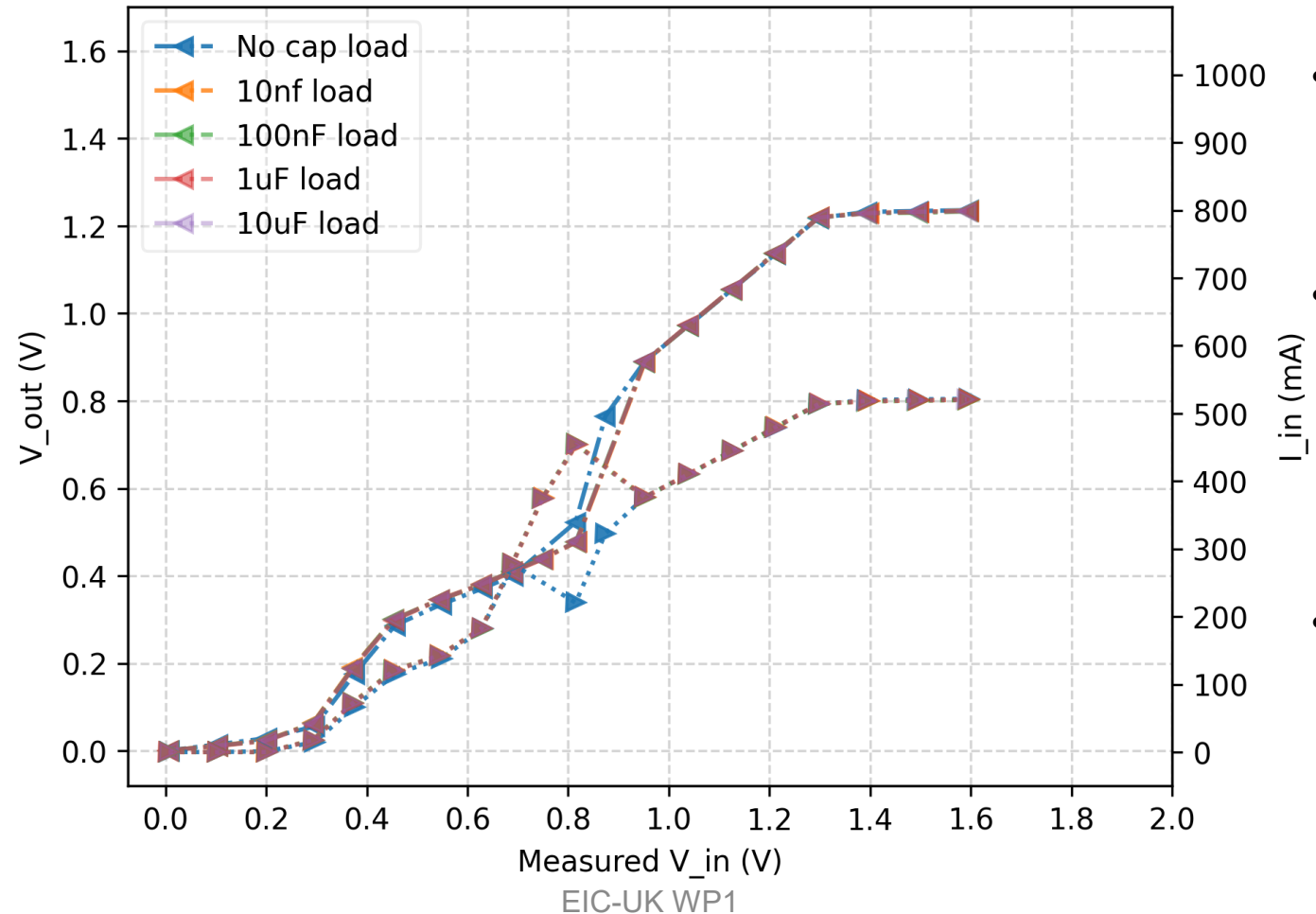
- Very little variation observed between this range of capacitive loads.
- The same behaviour is seen for all capacitive loads at 40mA and 500mA, except...



Mode1, Power-up (Compare capacitive loads)



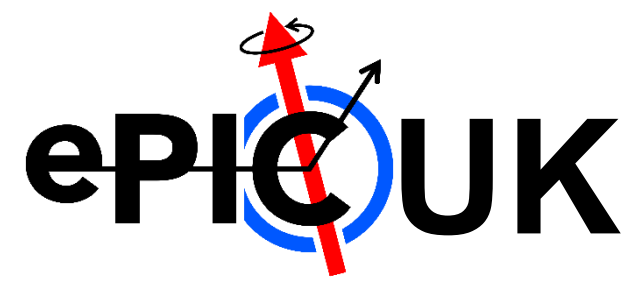
Mode1 IV scan (CurrentAim = 500mA, DAC code = 16, TempAim = -20 °C): CapLoad comparison



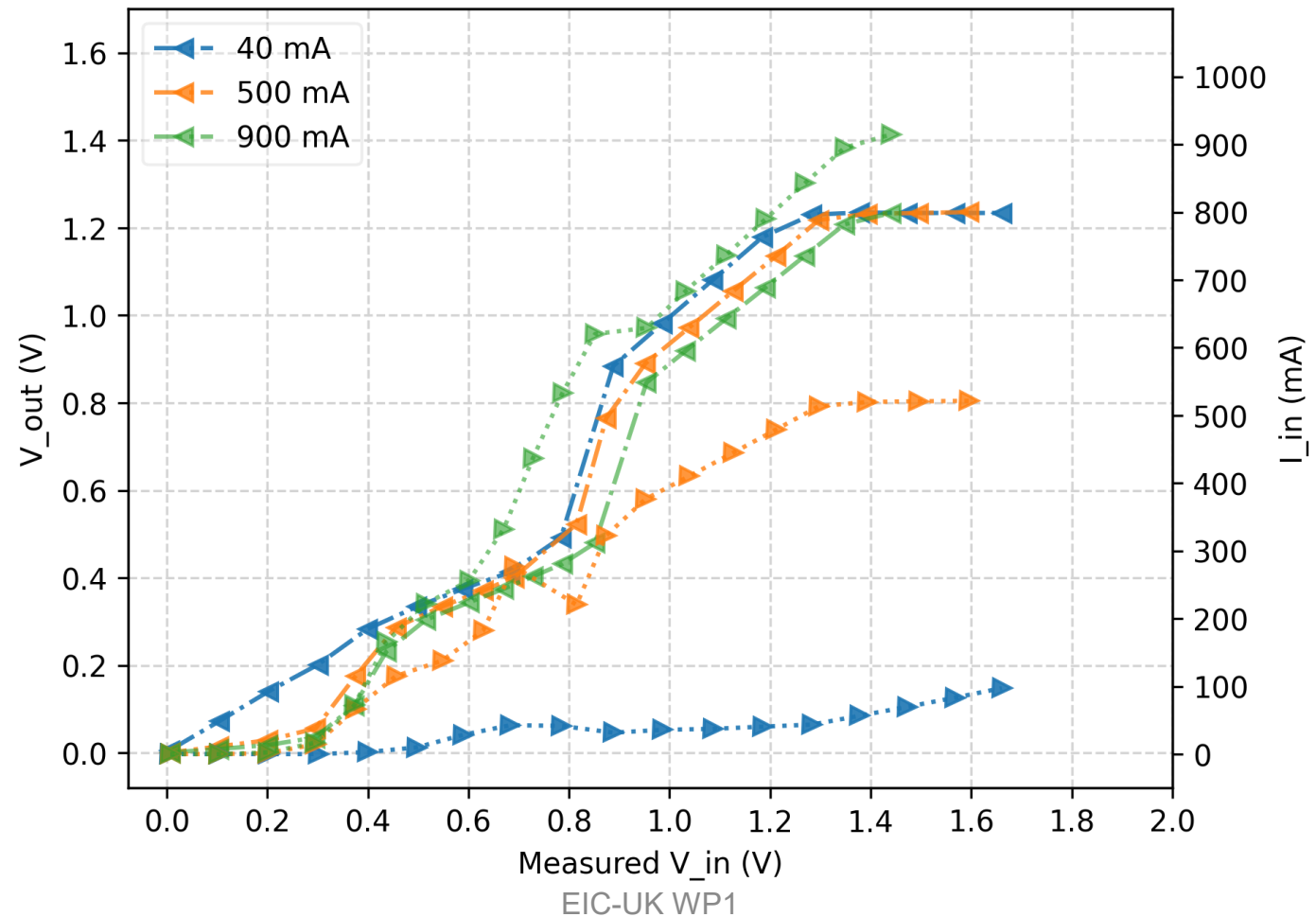
- Very little variation observed between this range of capacitive loads.
- The same behaviour is seen for all capacitive loads at 40mA and 500mA, except for No cap load @ 500mA!
- This one test point should be retaken to confirm the behaviour.



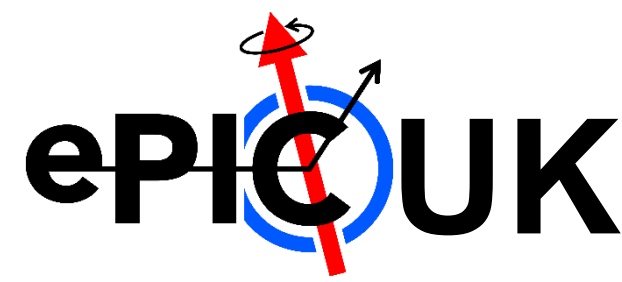
Mode1, Power-up (Compare resistive loads)



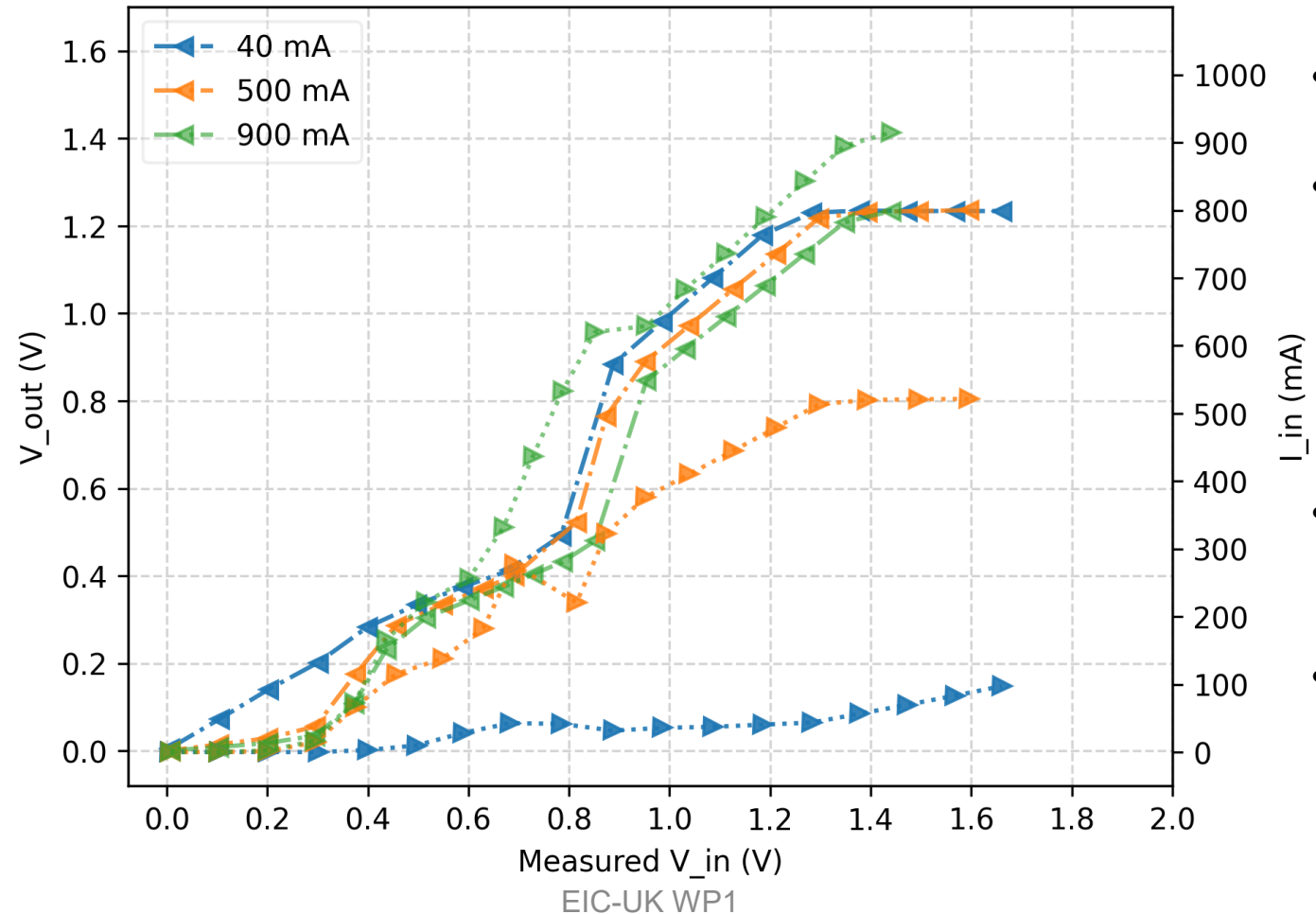
Mode1 IV scan (DAC code = 16, No cap load, TempAim = -20 °C): Current level comparison



Mode1, Power-up (Compare resistive loads)



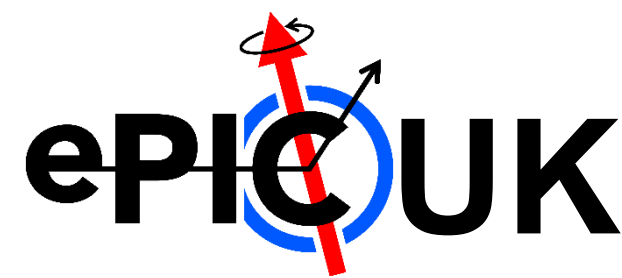
Mode1 IV scan (DAC code = 16, No cap load, TempAim = -20 °C): Current level comparison



- All three current levels can be clearly seen.
- Plateaus (in both V_out and I_in) are not reached for 900mA test, V_in needs to be pushed higher.
- Plateau for I_in @ 40mA does not match the V_out plateau.
- Extra current drawn for a 40mA load is higher than at 500mA and 900mA.

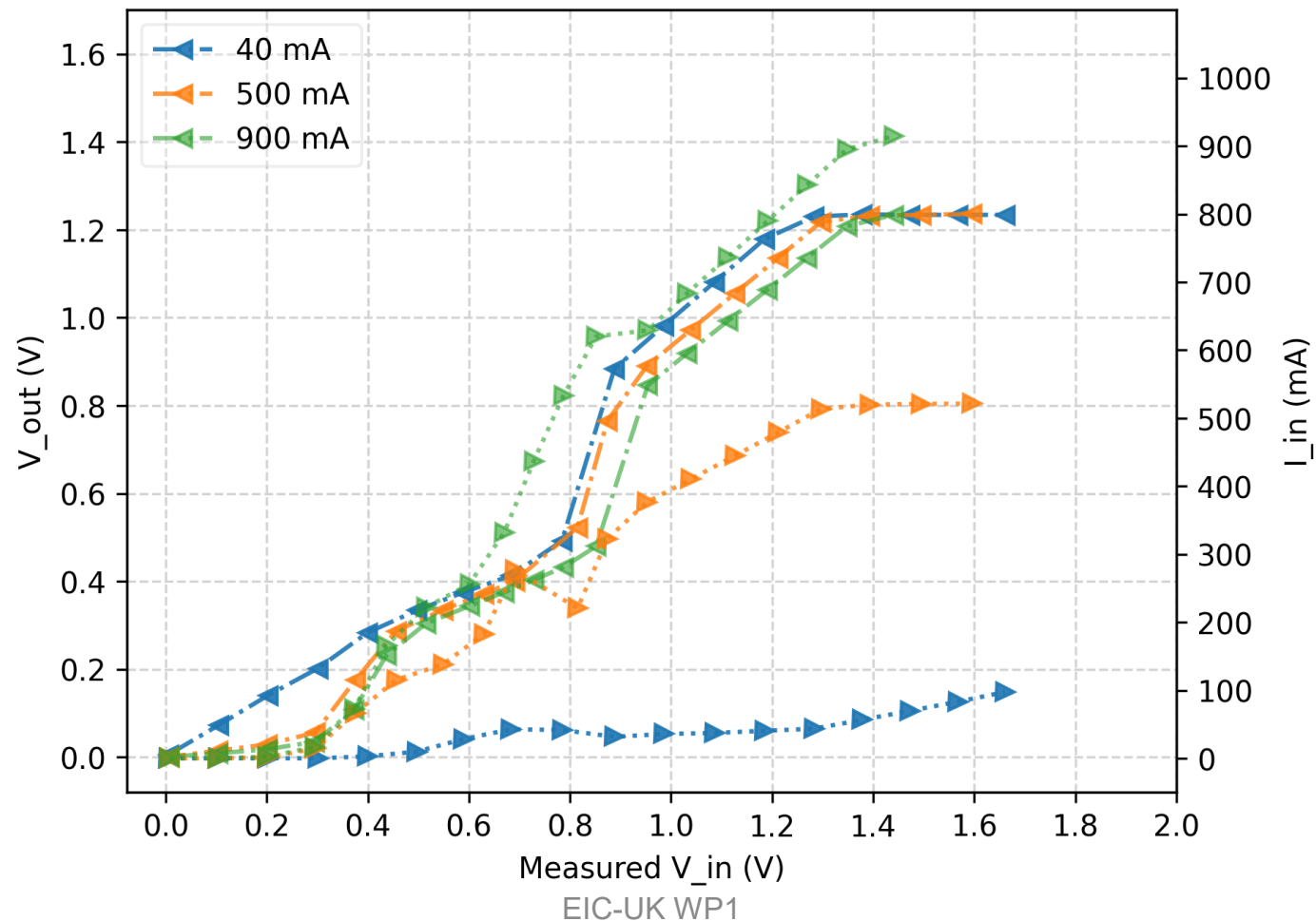


Mode1, Power-up (Compare resistive loads)



Mode1 IV scan (DAC code = 16, No cap load, TempAim = -20 °C): Current level comparison

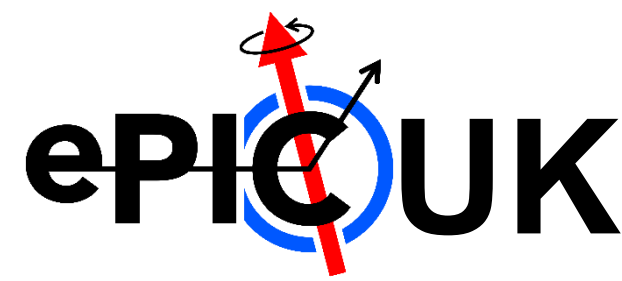
- Final V_{out} value is the same for all resistive loads.
- Higher current levels require a higher V_{in} for the same V_{out} while ramping.



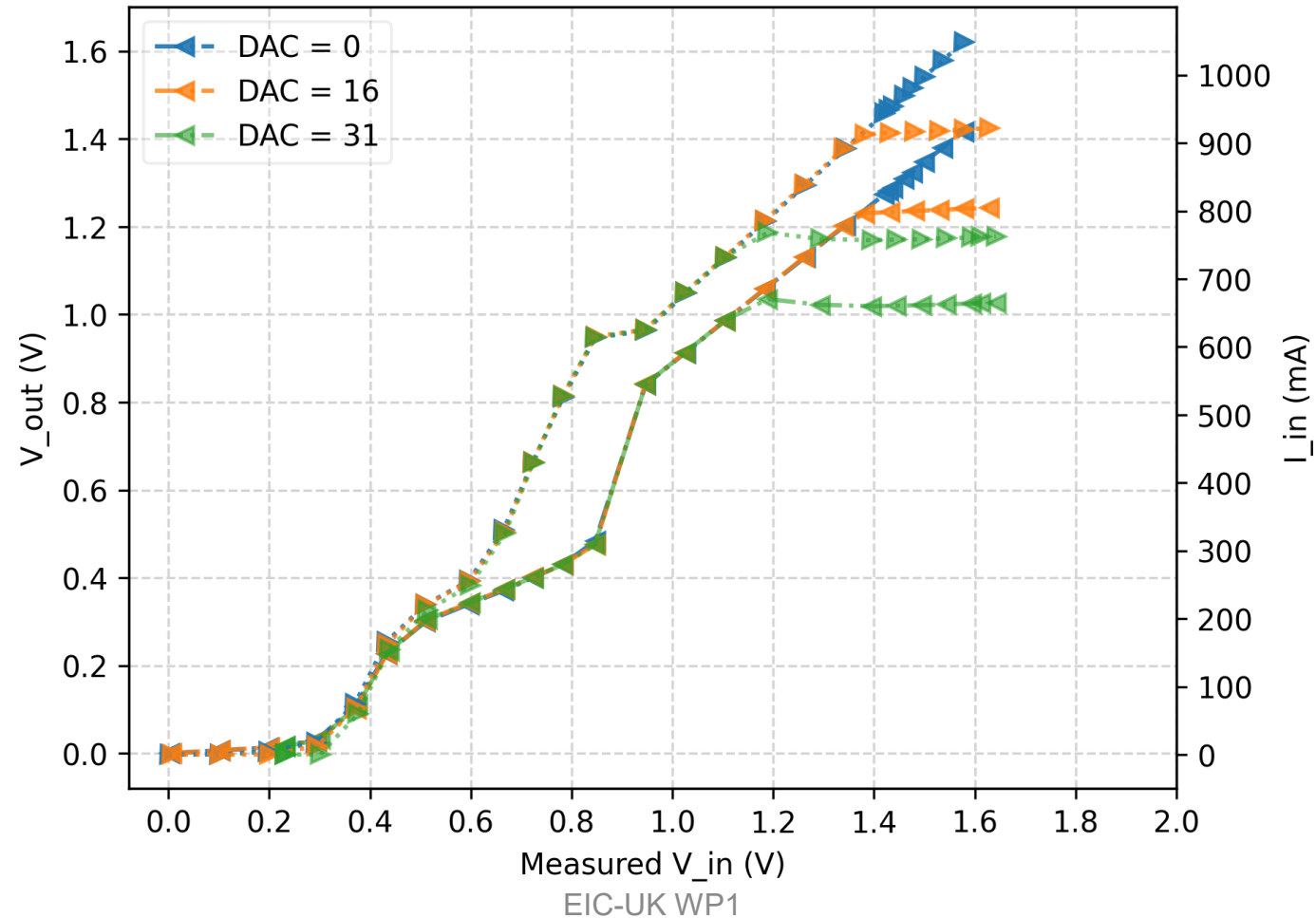
- All three current levels can be clearly seen.
- Plateaus (in both V_{out} and I_{in}) are not reached for 900mA test, V_{in} needs to be pushed higher.
- Plateau for I_{in} @ 40mA does not match the V_{out} plateau.
- Extra current drawn for a 40mA load is higher than at 500mA and 900mA.



Mode1, Power-up (Compare DAC codes)

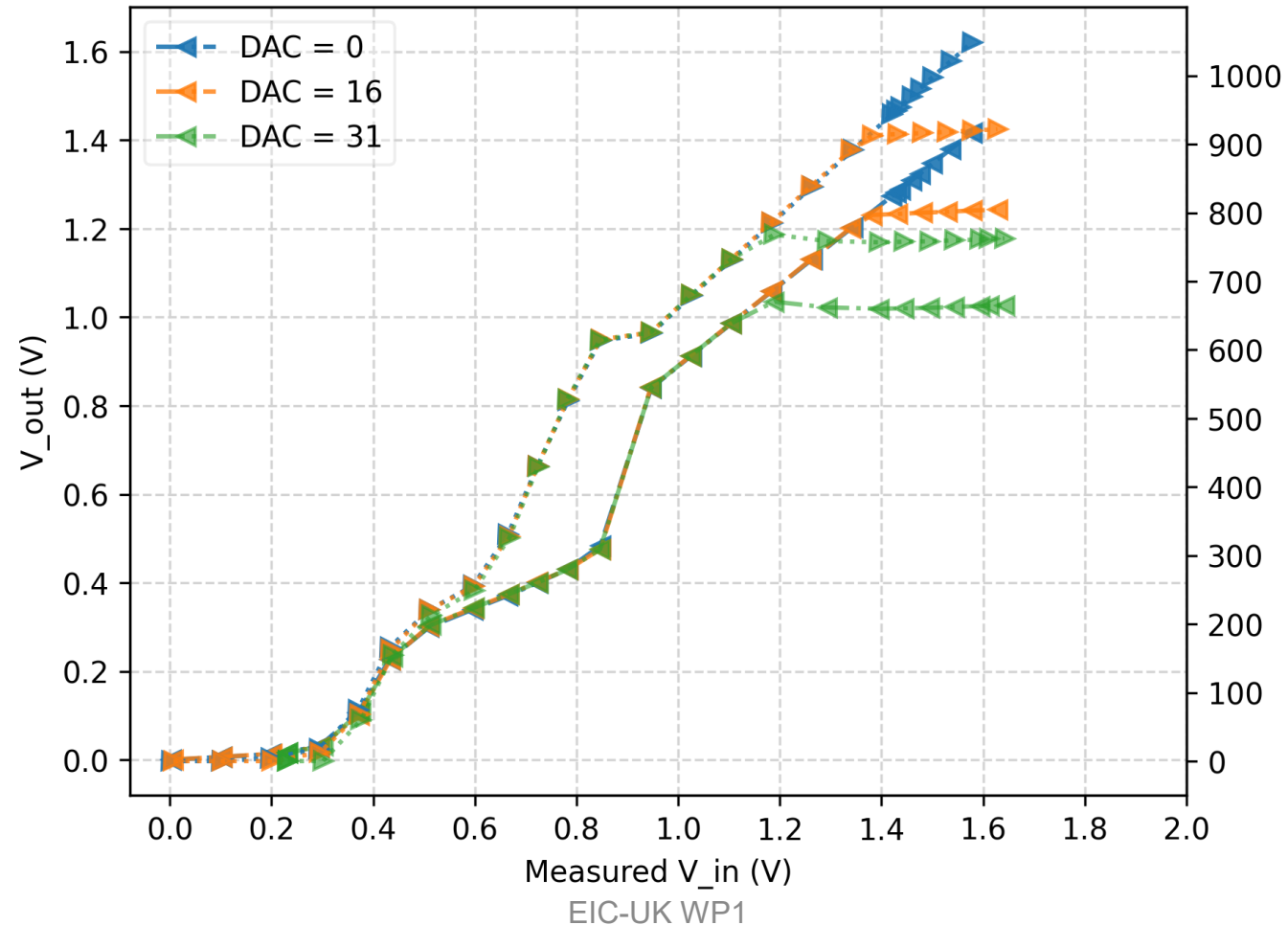


Mode1 IV scan (CurrentAim = 900mA, 100nF, TempAim = -20 °C): DAC code comparison



Mode1, Power-up (Compare DAC codes)

Mode1 IV scan (CurrentAim = 900mA, 100nF, TempAim = -20 °C): DAC code comparison

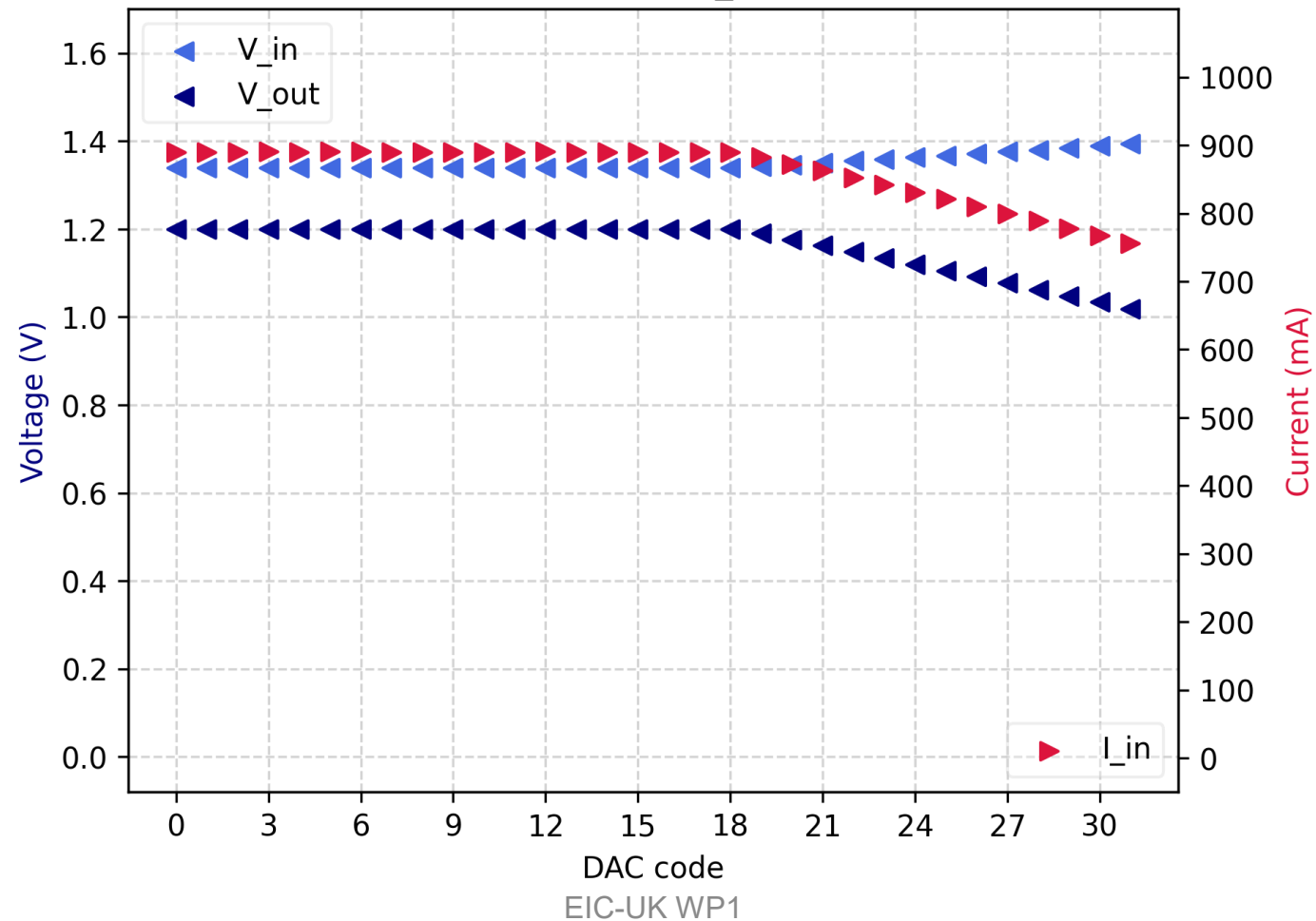


- Variations can be observed between the low (0), mid (16) and high (31) DAC codes. Values can be tuned.
- No plateau observed on DAC=0, V_in needs to be pushed beyond 1.6V.
- All DAC codes show the same Power-up characteristics, until the DAC-related V_out is reached.

Mode1, DAC scan example

Previously presented plot:

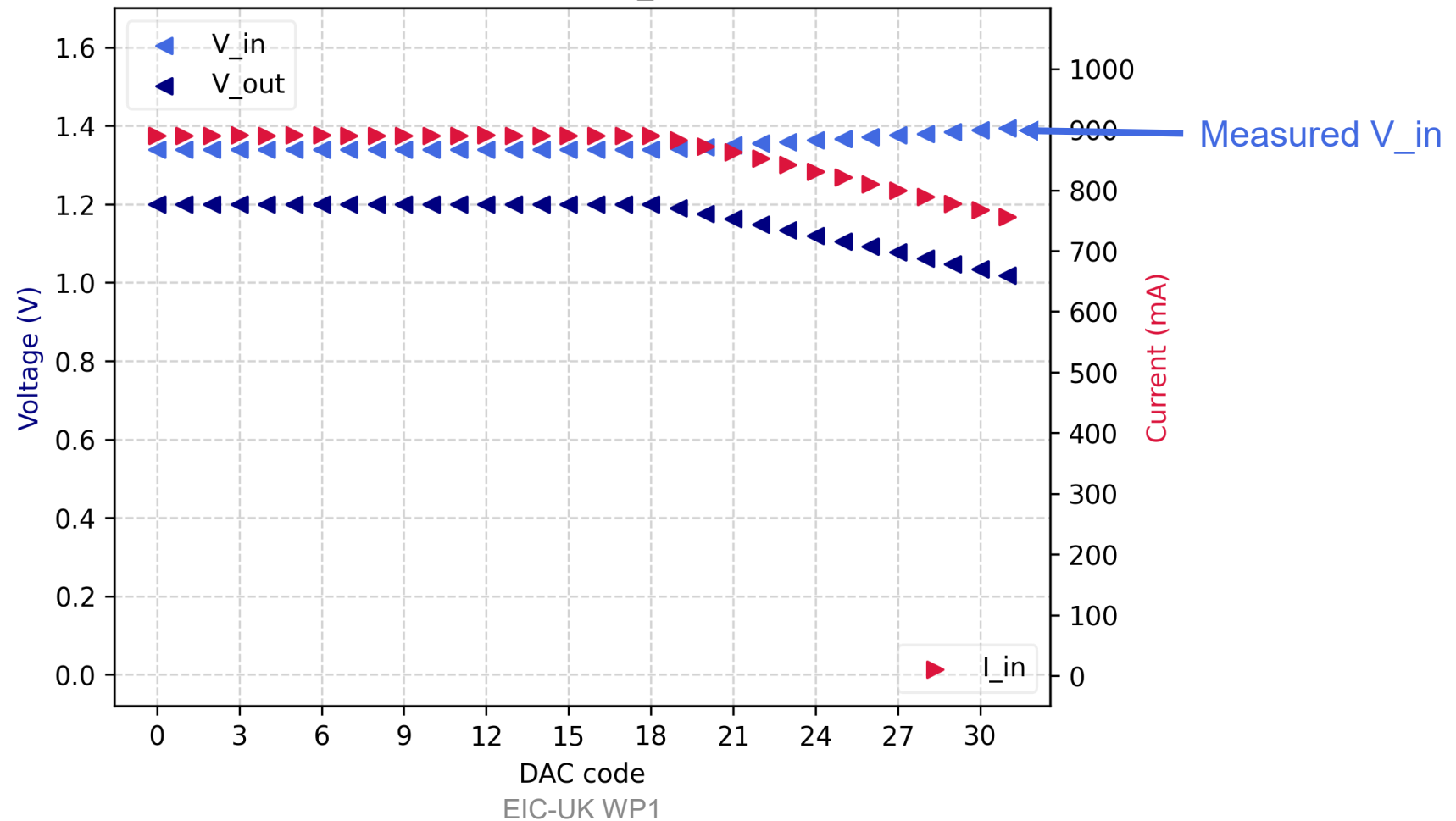
Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)



Mode1, DAC scan example

Previously presented plot:

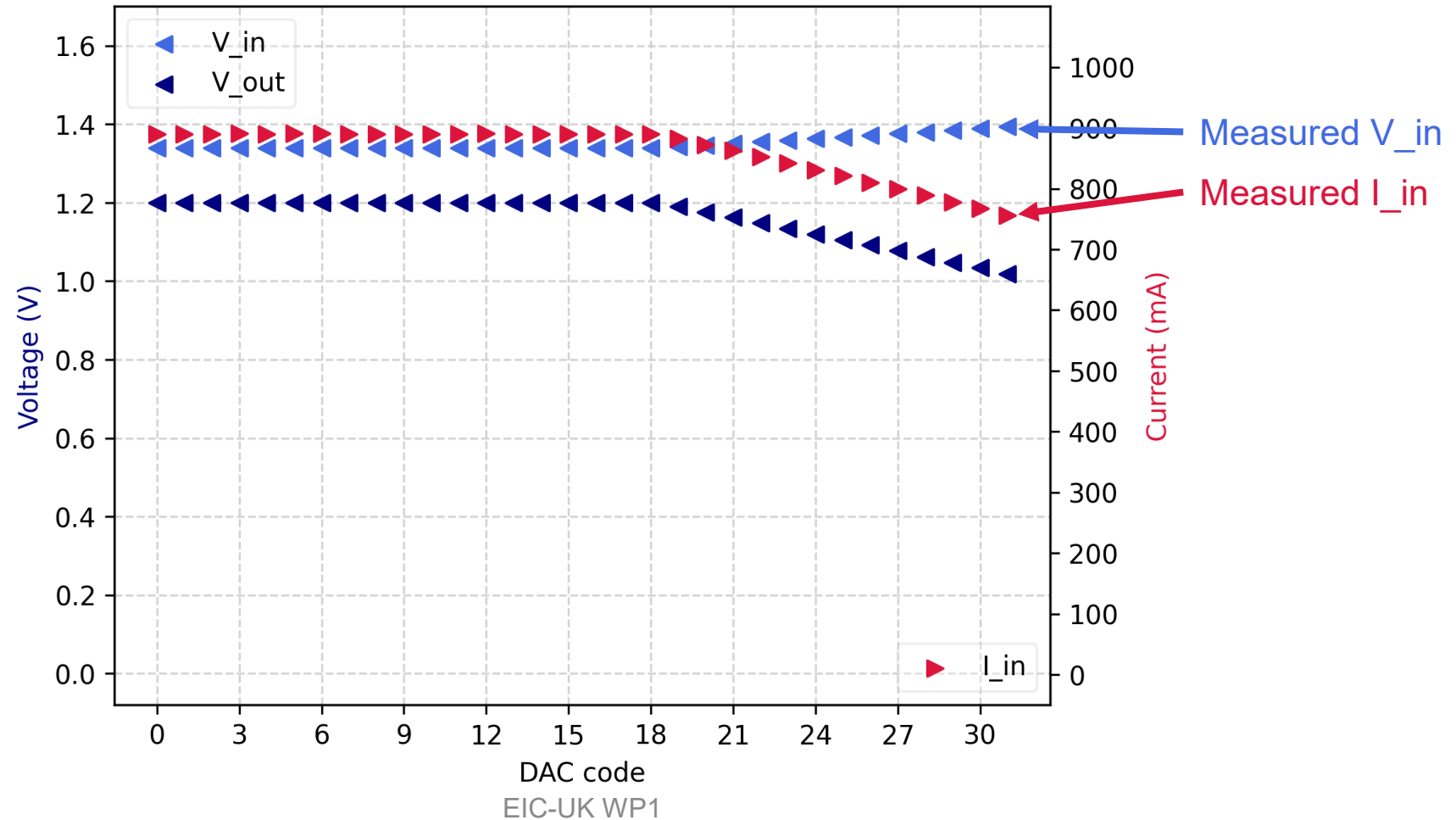
Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)



Mode1, DAC scan example

Previously presented plot:

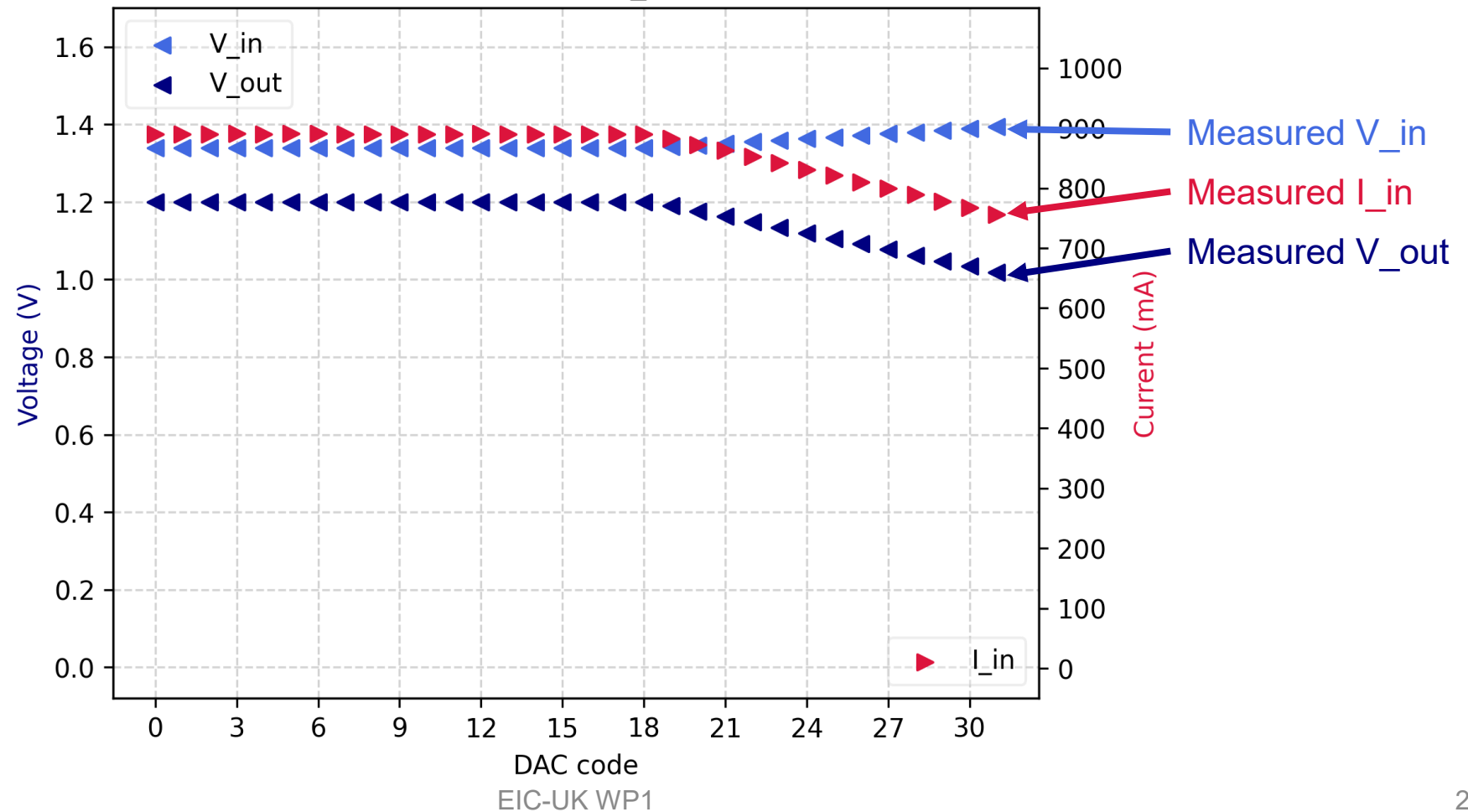
Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)



Mode1, DAC scan example

Previously presented plot:

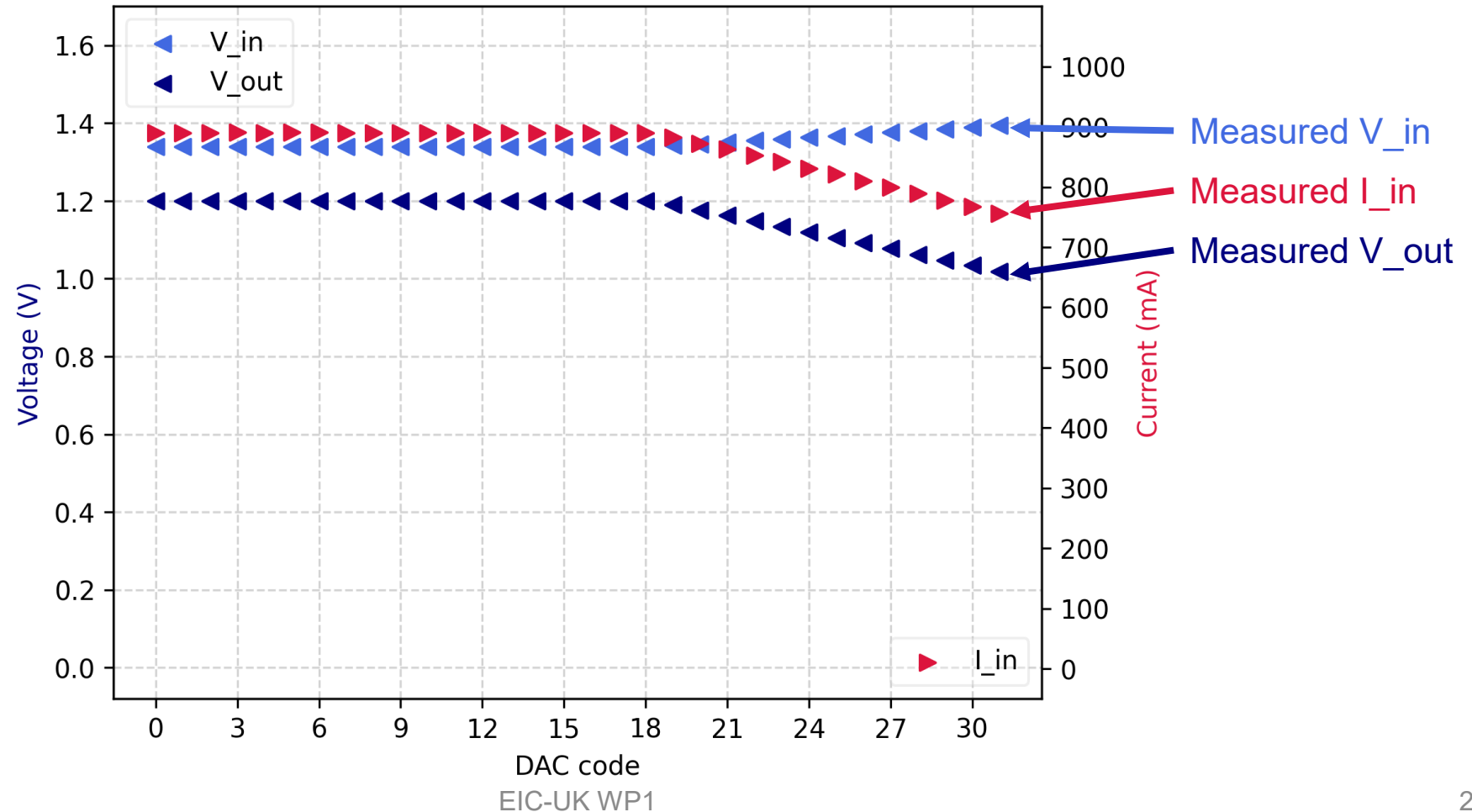
Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)



Mode1, DAC scan example

Previously presented plot:

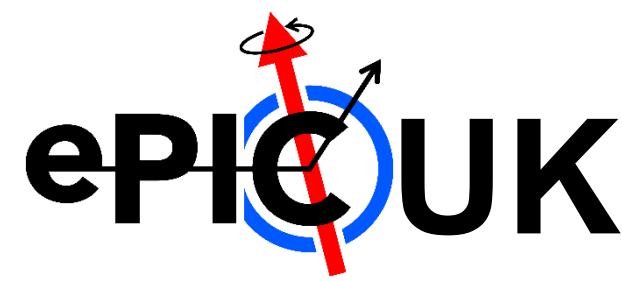
Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)



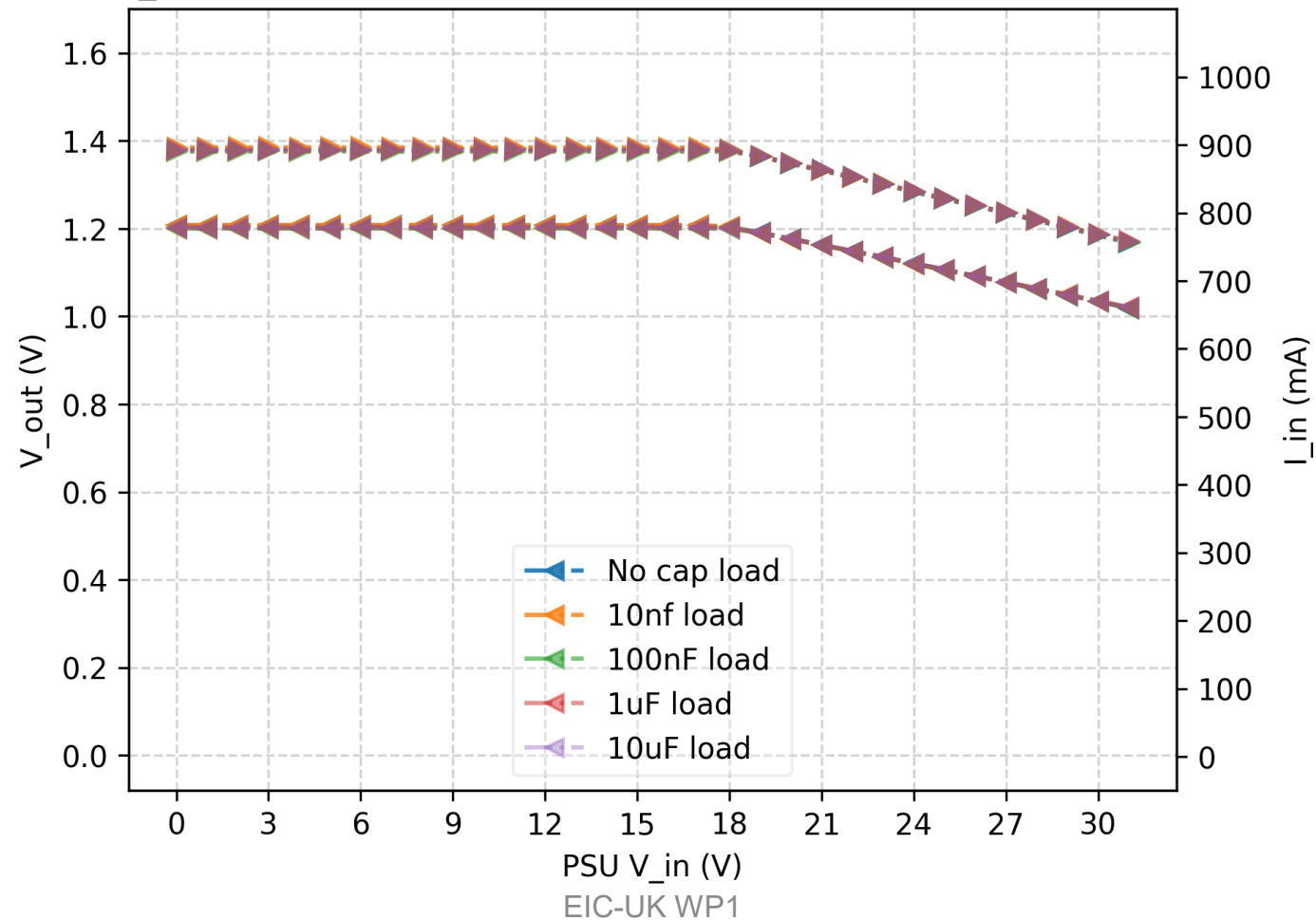
Notes for upcoming slides:

- DAC scans are performed with a fixed PSU V_{in} .
- Measured V_{in} **does** vary with the DAC code used.

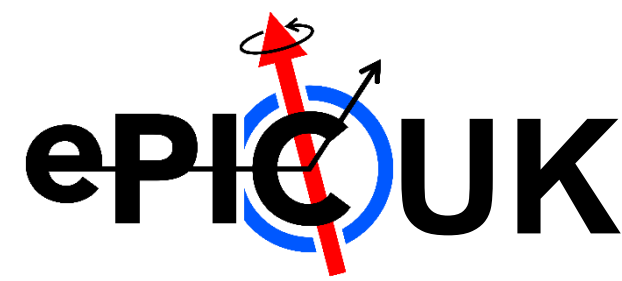
Mode1, DAC scan example (Compare capacitive loads)



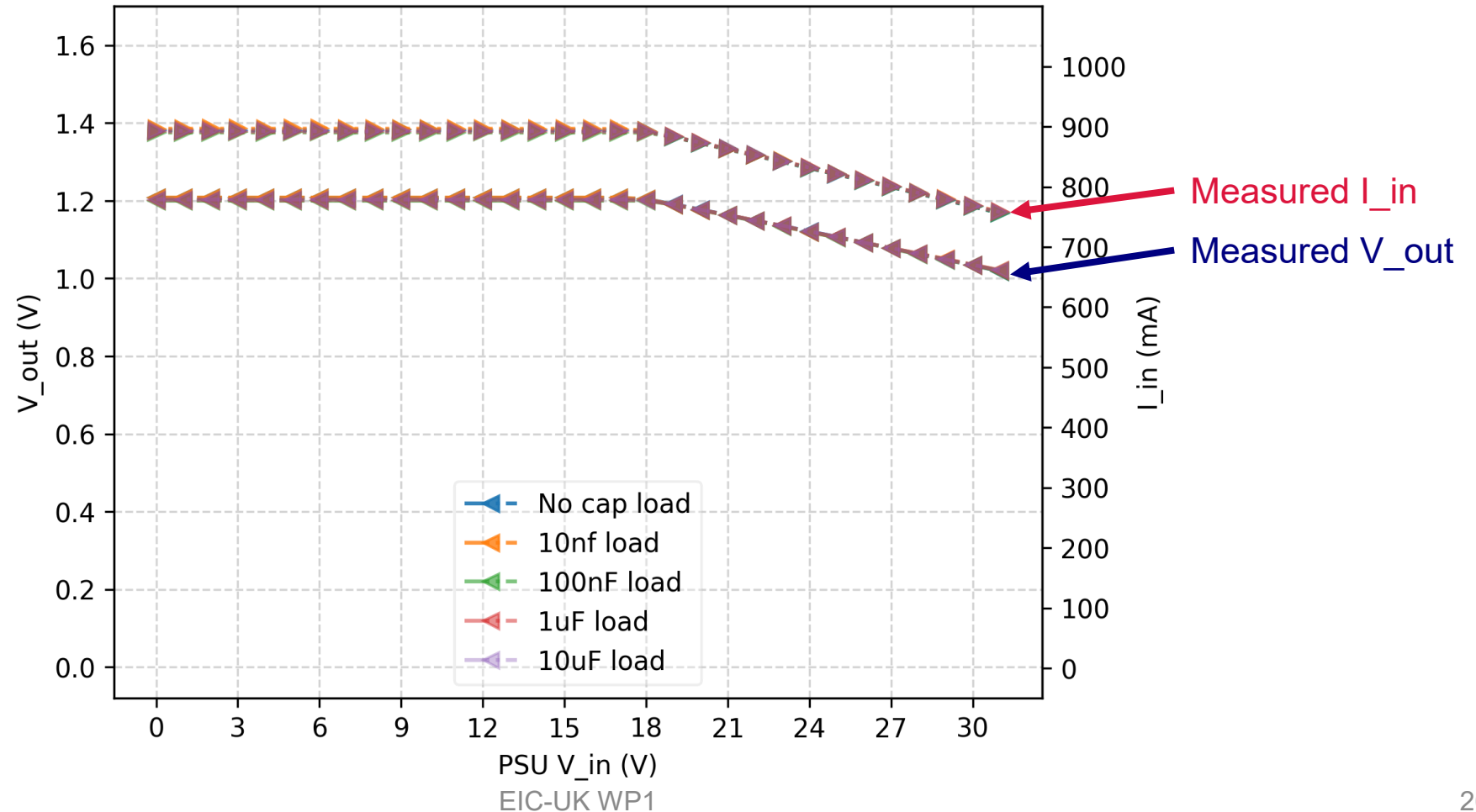
Mode1 DAC scan (PSU V_{in} = 1.7V, CurrentAim = 900mA, TempAim = -20 °C): Capacitive load comparison



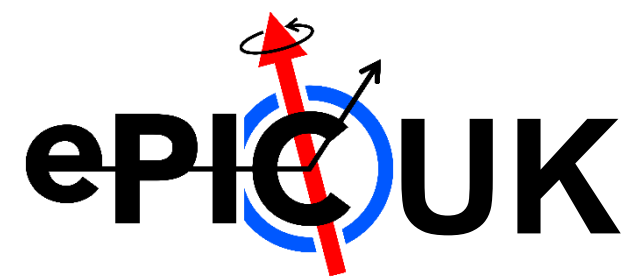
Mode1, DAC scan example (Compare capacitive loads)



Mode1 DAC scan (PSU V_{in} = 1.7V, CurrentAim = 900mA, TempAim = -20 °C): Capacitive load comparison

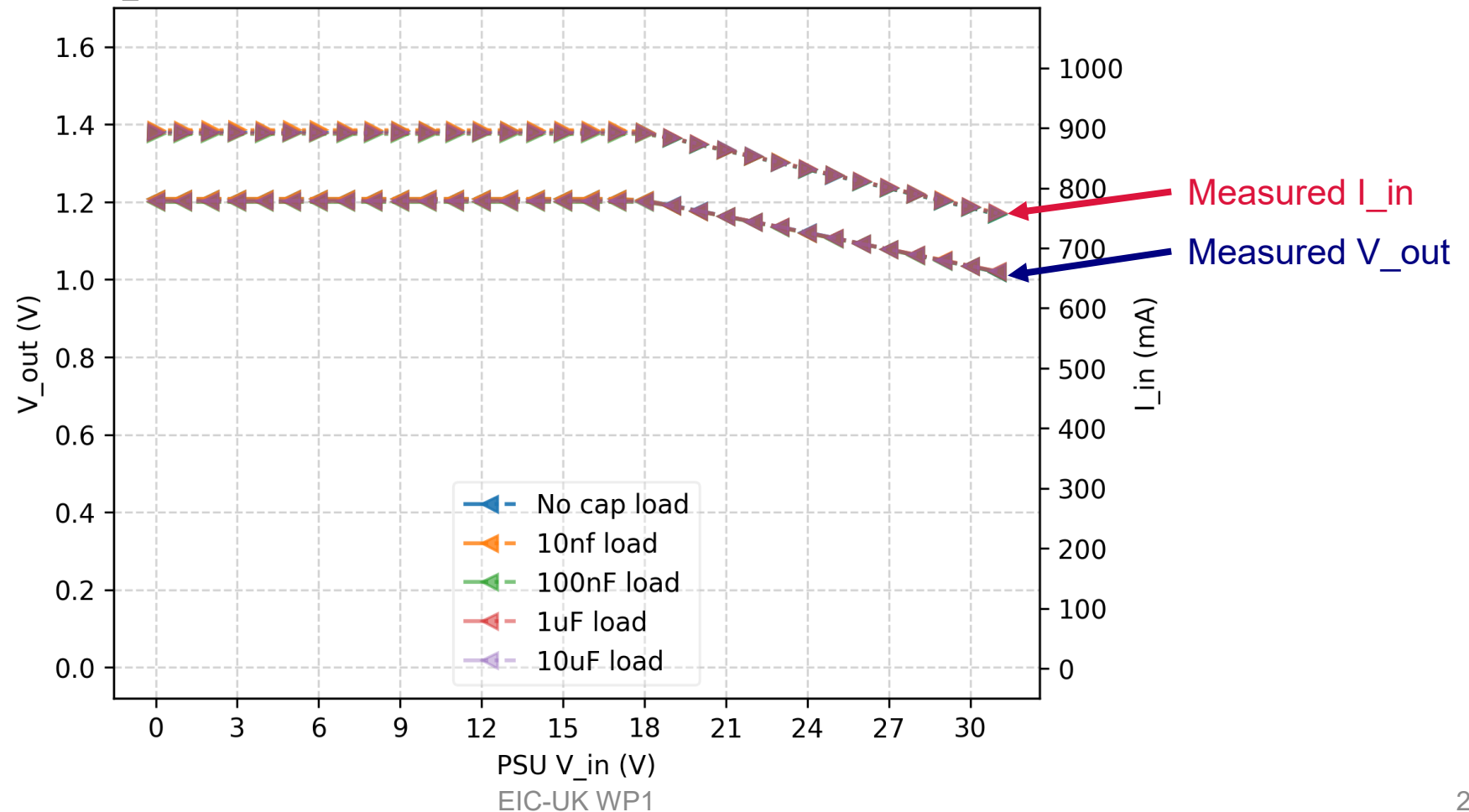


Mode1, DAC scan example (Compare capacitive loads)

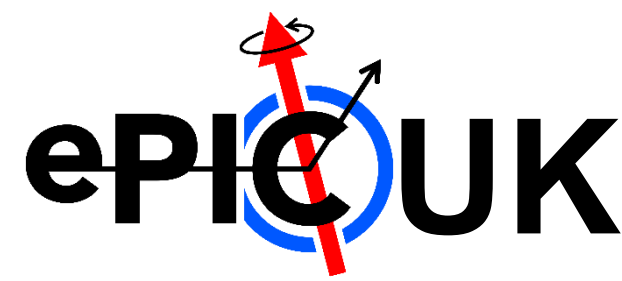


Mode1 DAC scan (PSU V_{in} = 1.7V, CurrentAim = 900mA, TempAim = -20 °C): Capacitive load comparison

- This DAC scan only shows variation above DAC=16.

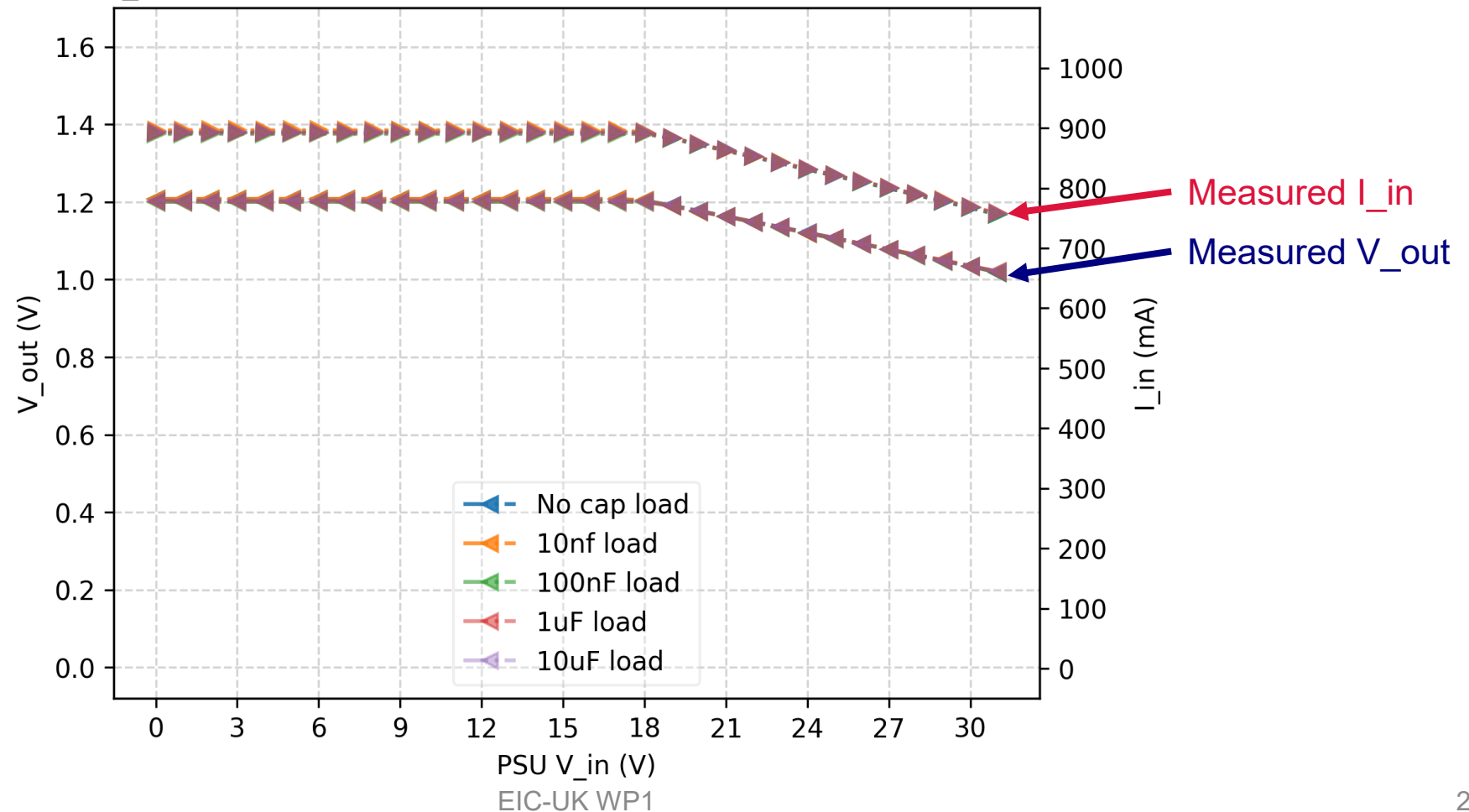


Mode1, DAC scan example (Compare capacitive loads)



Mode1 DAC scan (PSU V_{in} = 1.7V, CurrentAim = 900mA, TempAim = -20 °C): Capacitive load comparison

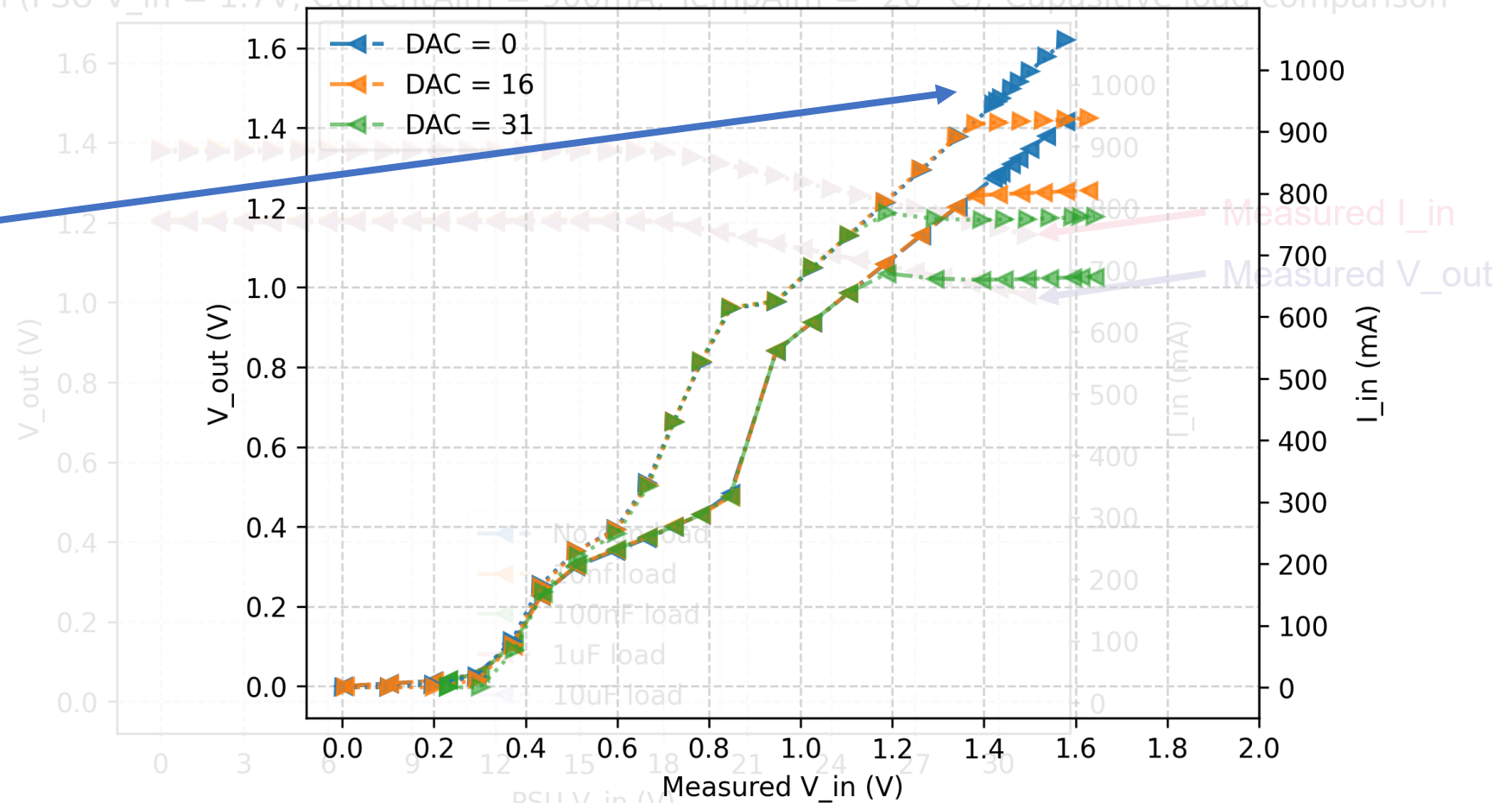
- This DAC scan only shows variation above DAC=16.
- We saw DAC=0 did tune values further...



Mode1, DAC scan example (Compare capacitive loads)

Mode1 IV scan (CurrentAim = 900mA, 100nF, TempAim = -20 °C): DAC code comparison

- This DAC scan only shows variation above **DAC=16**.
- We saw **DAC=0** did tune values further...

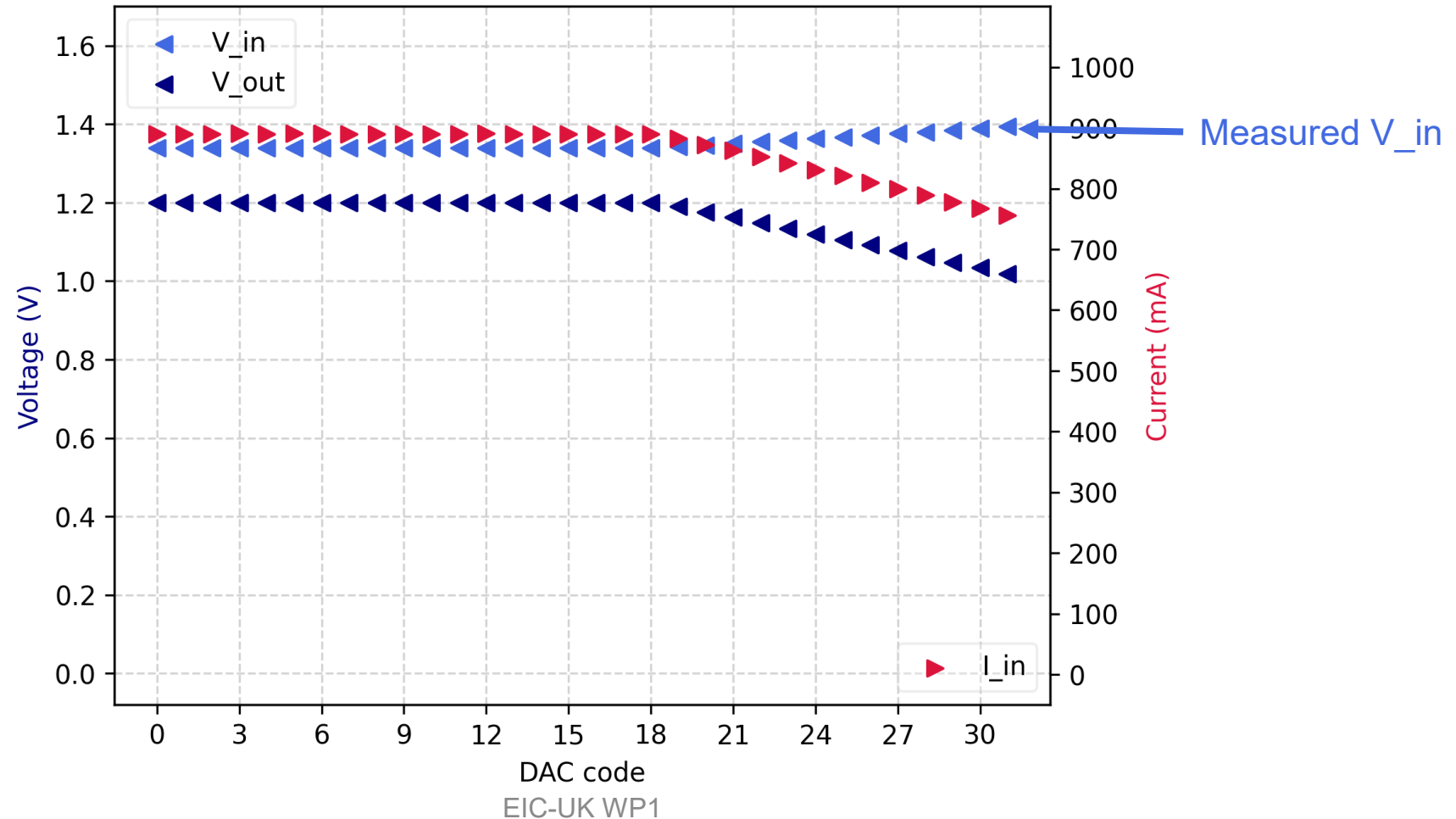


Mode1, DAC scan example

Returning to this plot:

Mode1 DAC scan (Load = 900mA, 100nF, V_{in} (PSU) = 1.7V, Temp = -26.37°C)

- It can be seen that **Measure V_{in}** is only around 1.35 - 1.40 V.

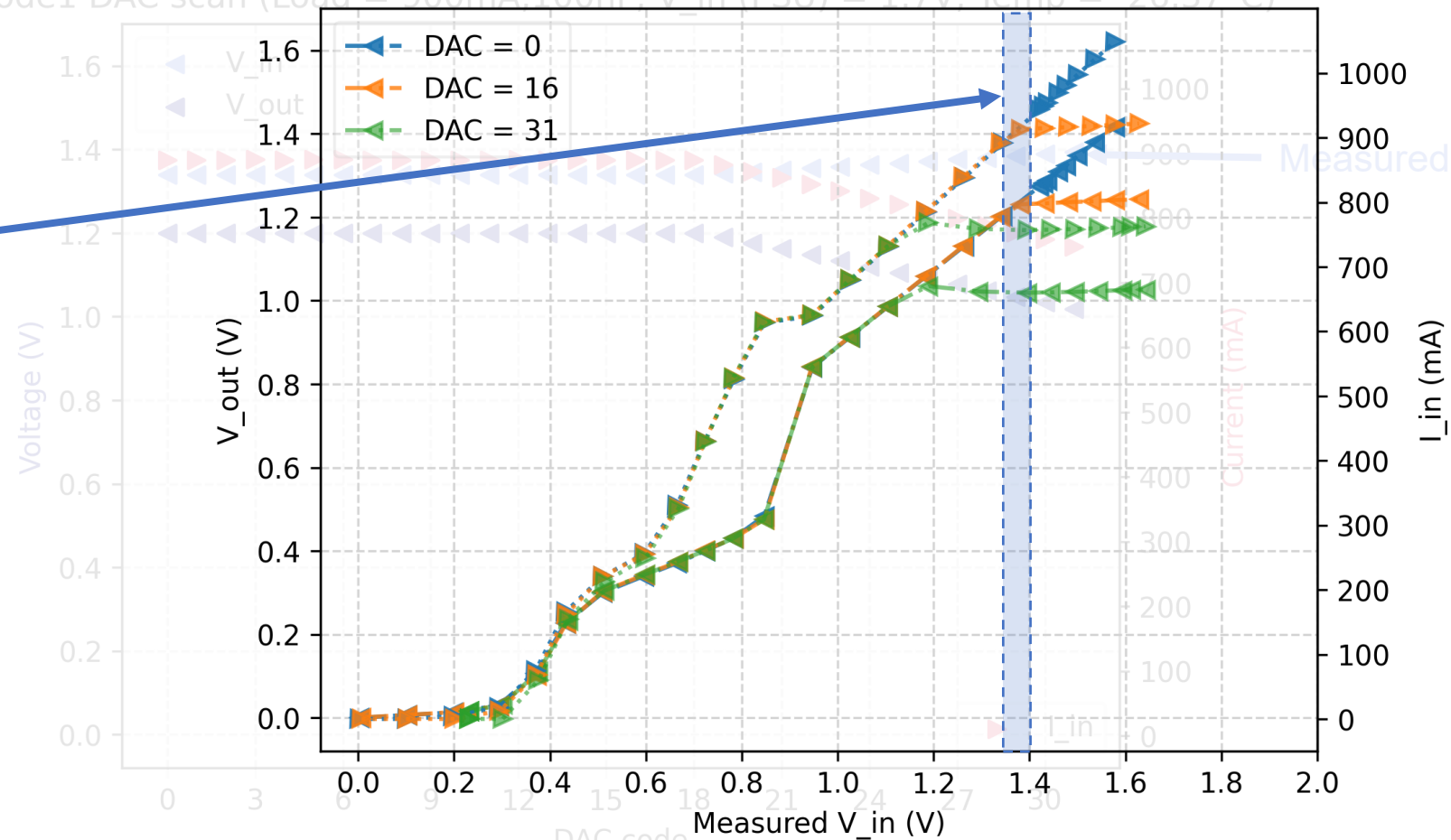


Mode1, DAC scan example

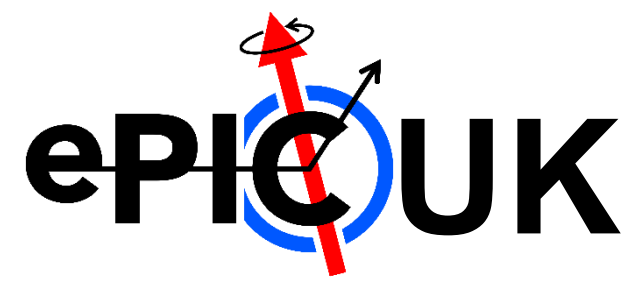
Returning to this plot:

Mode1 IV scan (CurrentAim = 900mA, 100nF, TempAim = -20 °C): DAC code comparison

- It can be seen that **Measure V_{in}** is only around 1.35-1.40 V.
- This **V_{in}** is not high enough to see the variations from **DAC=0-16**.

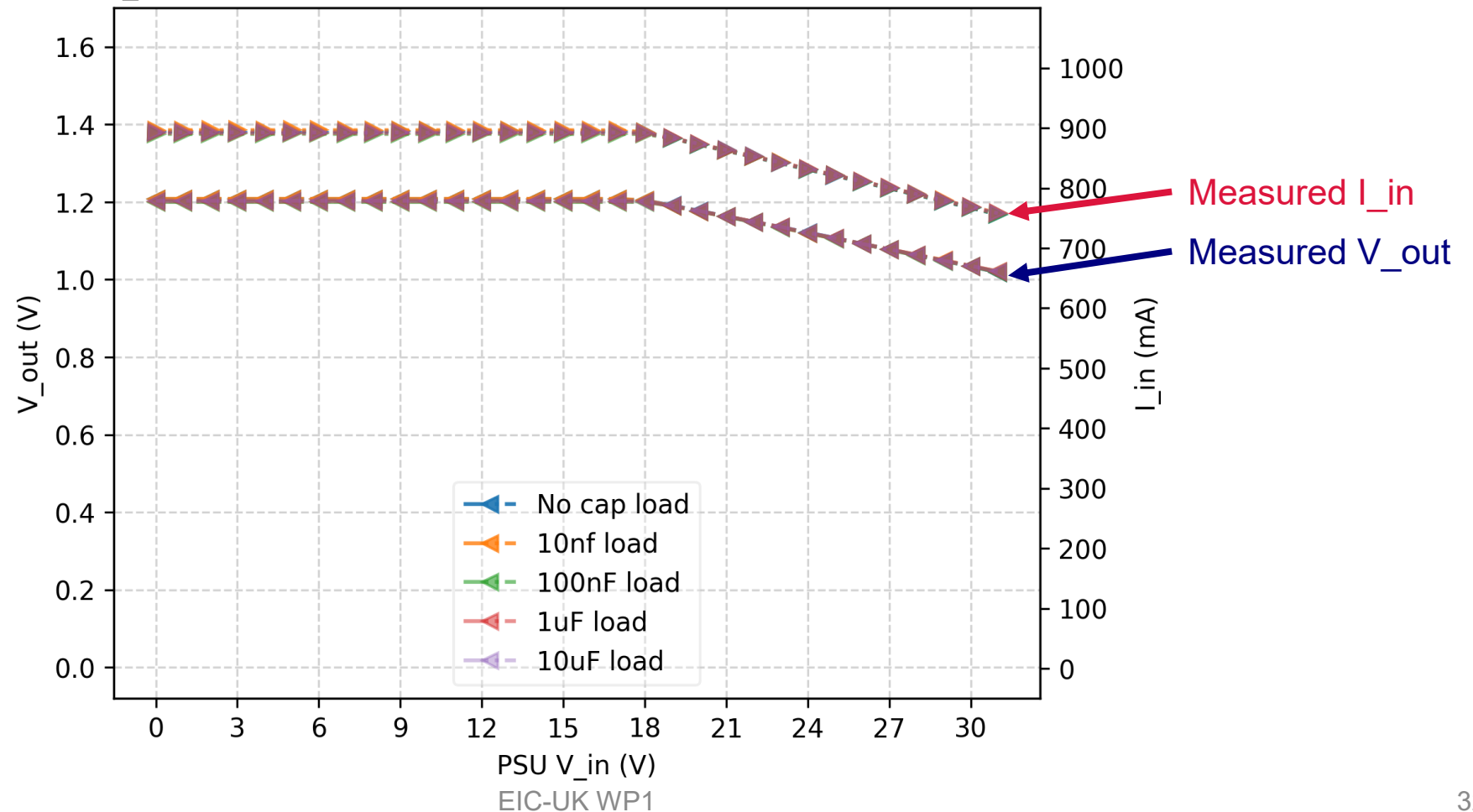


Mode1, DAC scan example (Compare capacitive loads)

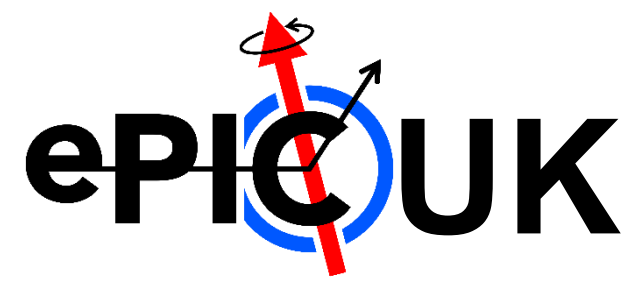


Mode1 DAC scan (PSU V_{in} = 1.7V, CurrentAim = 900mA, TempAim = -20 °C): Capacitive load comparison

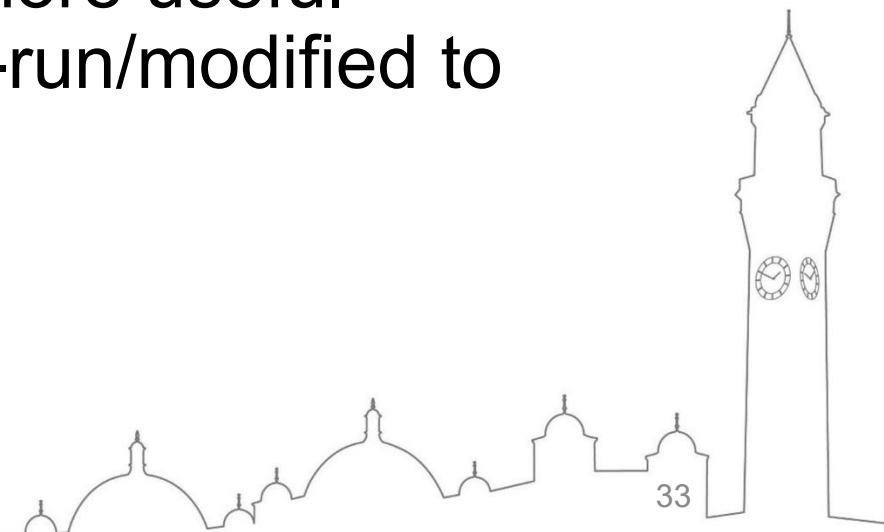
- This DAC scan only shows variation above DAC=16.
- We saw DAC=0 did tune values further.
- DAC scan will need to be re-run at a higher Measured V_{in} to show the full tunability.



Summary

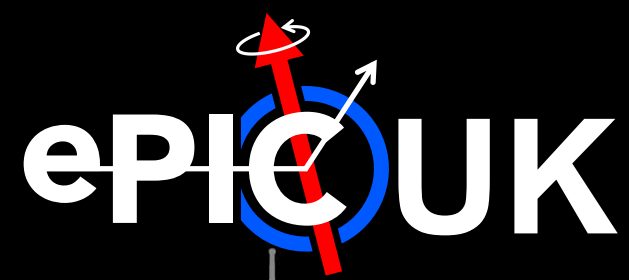


- MPW2 testing and analysis is ongoing at Birmingham.
- No new tests have been performed for some time.
- However, comparison plots have delivered more useful information, so test points that need to be re-run/modified to show the real chip capabilities



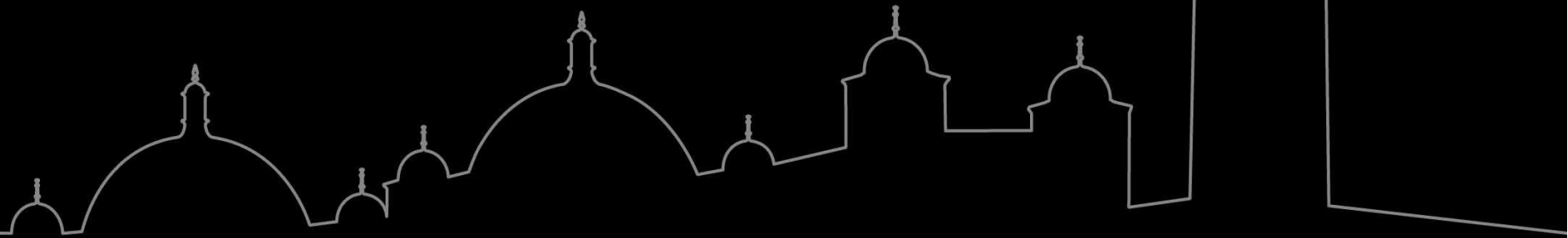


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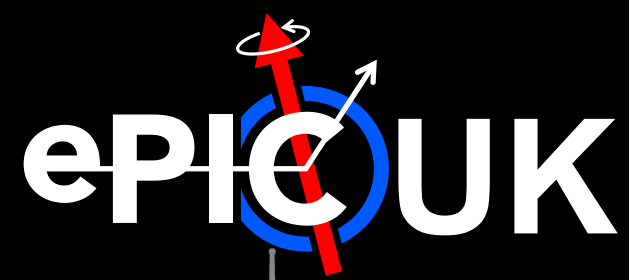
Thank you very much!

Any questions?

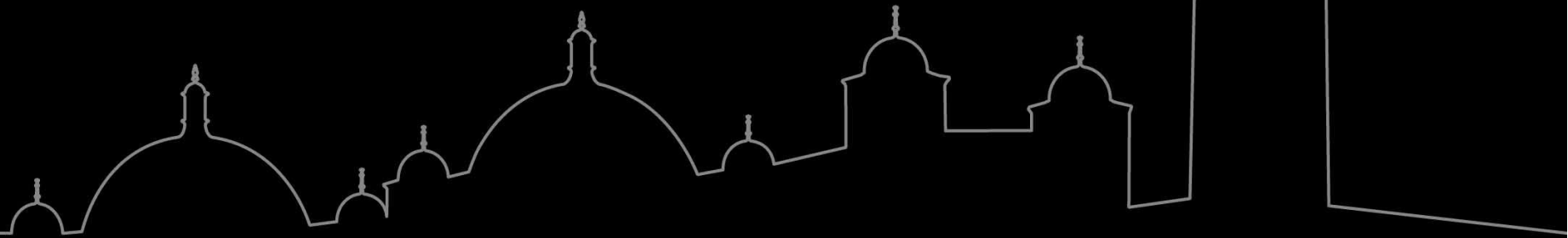




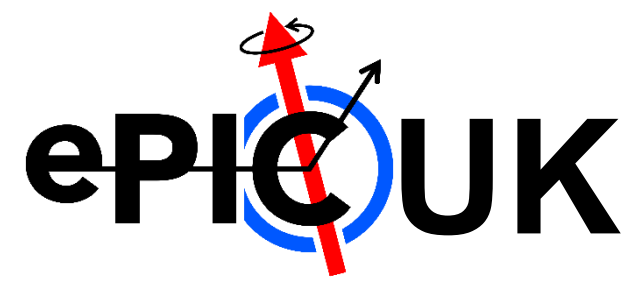
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Additional (support) slides



Plot labels and information



- All plots have 2 Y-axes.
 - Left: Voltages, always in V.
 - Right: Current, always in mA.
- Tests are run with control of the set '**PSU V_in**', not the '**Measured V_in**' (V-sense on PSU not used).
- For **Power-up** plots, X-axis can be plotted as the set '**PSU V_in**' **or** the '**Measured V_in**'.
- For **DAC scans**, X-axis is the DAC code (0-31, 5-bit DAC).
 - '**Measured V_in**' is plotted to show any variation, but tests are at a fix '**PSU V_in**'.

