MPW2 (SLDO) chip testing: UK summary

James Glover, Andy Hill

SVT DSC general Meeting

Tue, 3rd March 2026

MPW2 testing in the UK

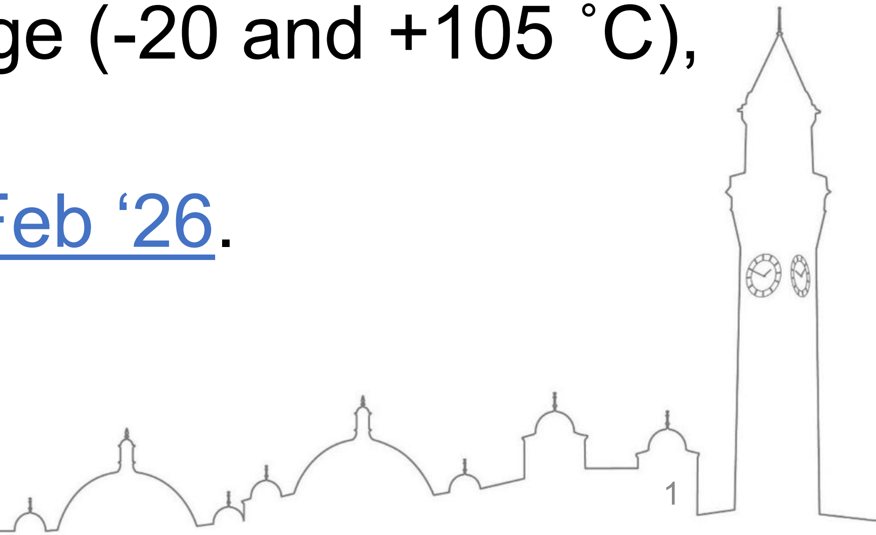
Previously reported by Andy and Lochana and James.

Test set-ups have been established and room temperature results demonstrated at both Daresbury Lab and Brunel:

- A. Hill, SVT working meeting @ Oxford, Dec ‘25.
- L. Ranatunge, ePIC SVT WP2 general meeting, Jan ‘26.

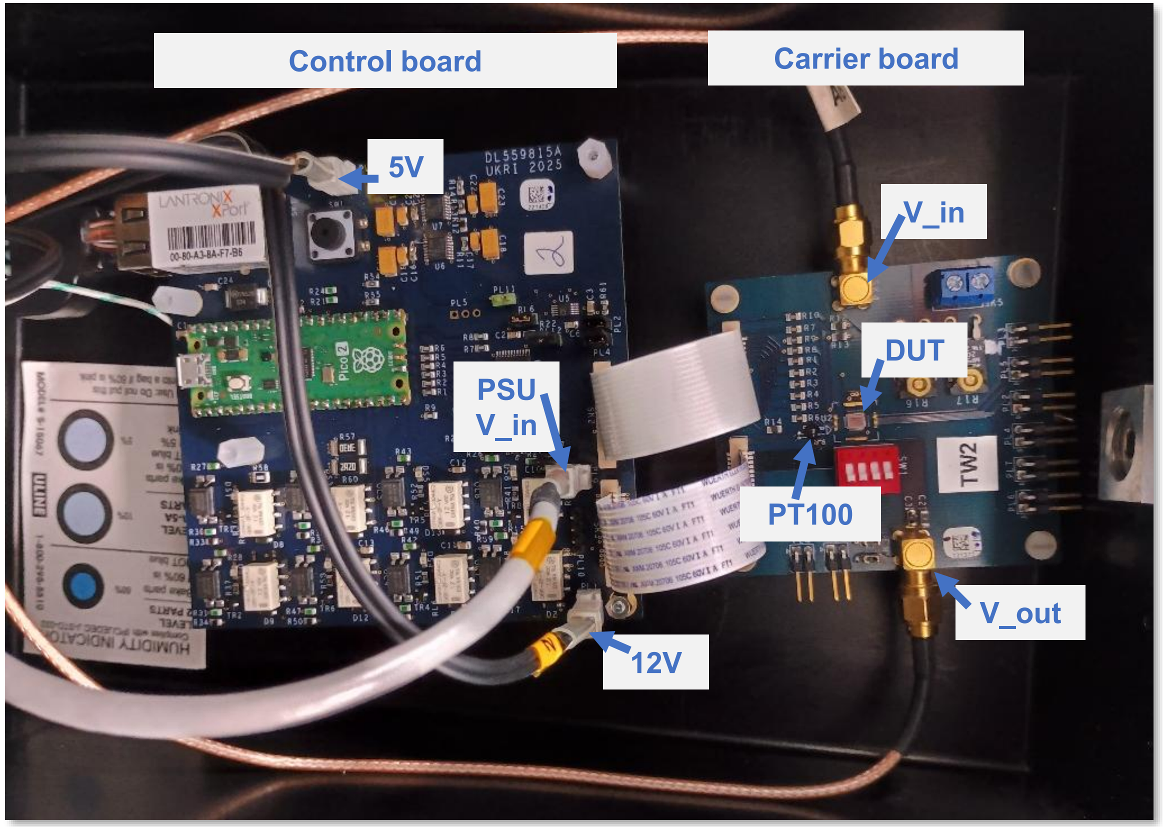
Birmingham has also commissioned a set-up for testing the chip at the extremities of its designed temperature range (-20 and +105 ˚C), using their climate chamber :

- J.Glover, ePIC SVT WP2 general meeting, Feb ‘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.

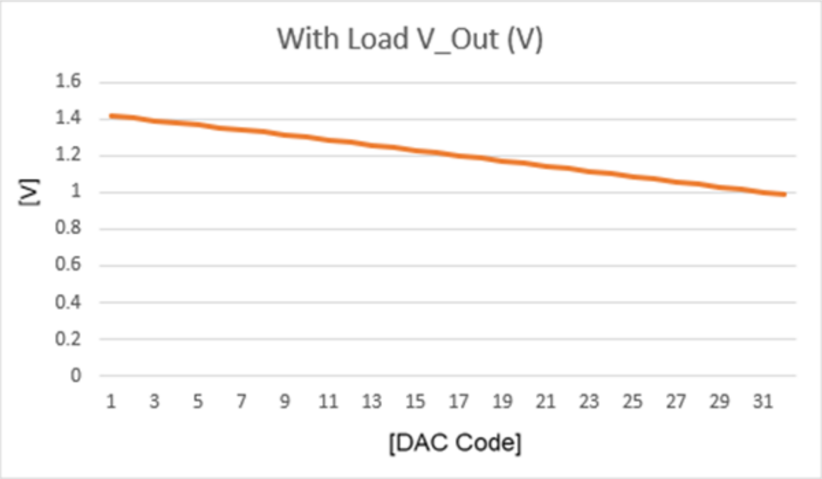
Majority of tests to be performed at -20, 27, 60, & 105 ˚C (except irradiation and SP chain testing).

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

DL: DUT-TW1

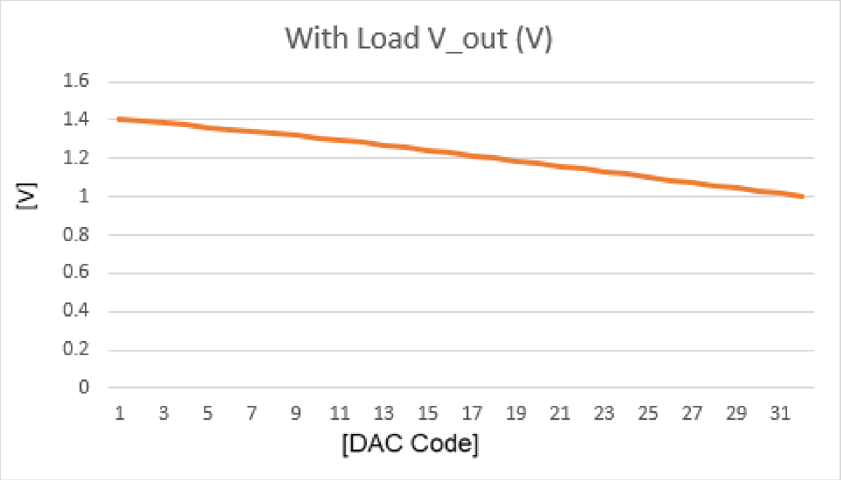
- Showed tuneable V_out with MPW2’s included 5-bit DAC (Mode1).

40 mA



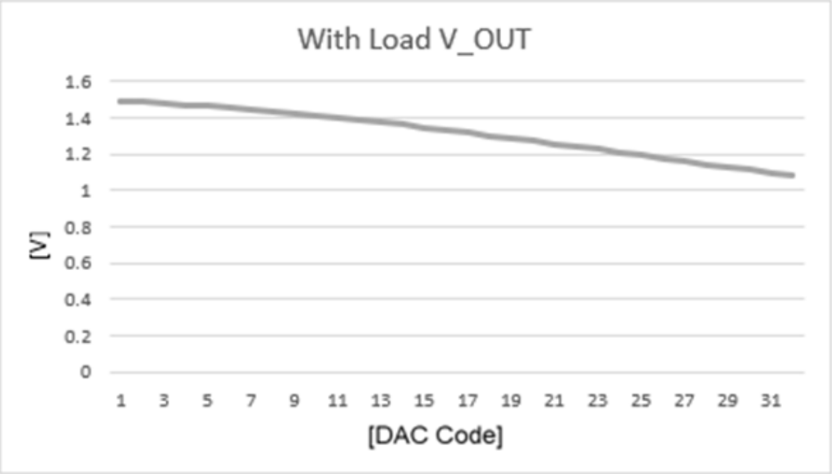
(V_in = 1.65 V)

500 mA



(V_in = 1.62 V)

900 mA

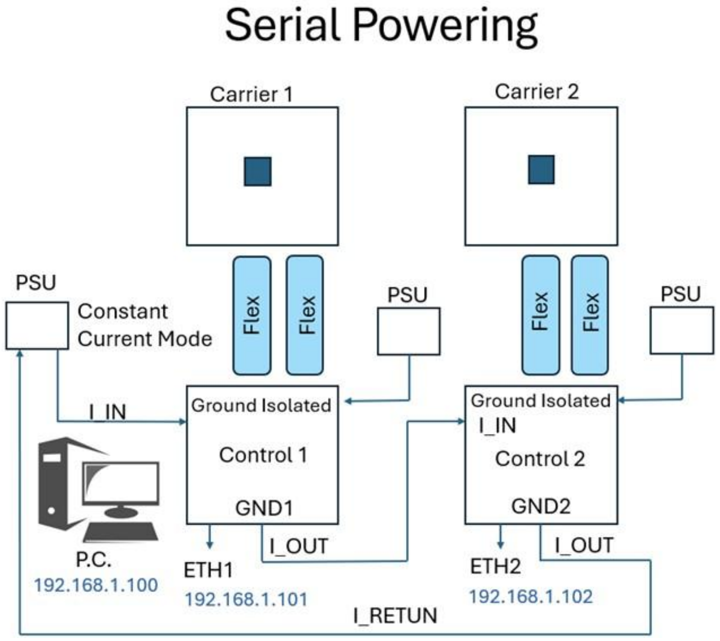


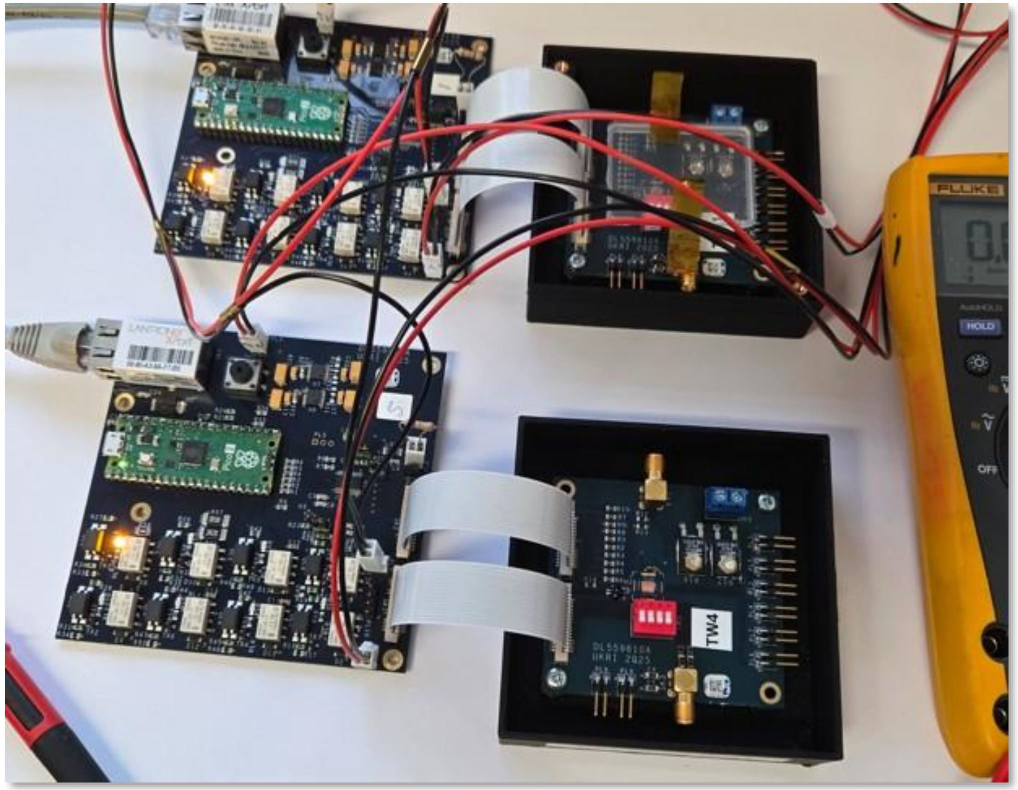
(V_in = 1.71 V)

From: [A. Hill, SVT working meeting @ Oxford, Dec ‘25]

DL: SP chain (DUT-TW1 + TW4)

- Early checks on testing a serial powering chain shown (@ 40 mA).





PSU V_OUT 3.2V 0.05A CC Mode
Board 1 V_IN =1.556V
Board 2 V_IN = 1.641V
Overall V_Drop = 0.003V

No Load test::-
Board 1 Dac set to 0 ∴ V_out = 1.416V
Board 2 Dac set to 0 ∴ V_out = 1.479V
PSU V_out = 3.2V 0.06A CC Mode

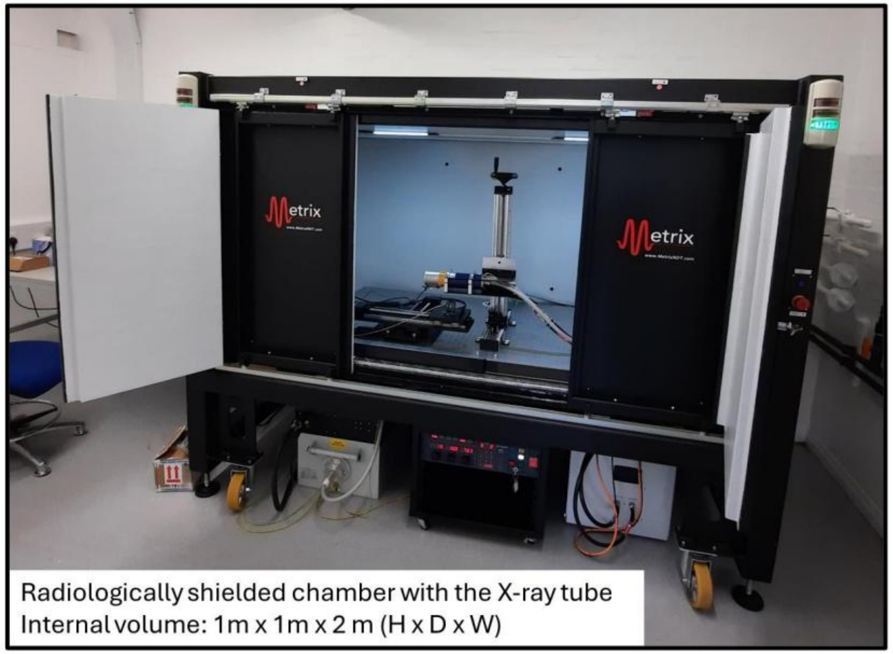
Board 1 Dac set to 31 ∴ V_out = 0.984V
Board 2 Dac set to 31 ∴ V_out = 1.055V
PSU V_out = 3.2V 0.06A CC Mode

With Load test:-
Board 1 Dac set to 0 ∴ V_out = 1.414V
Board 2 Dac set to 0 ∴ V_out = 1.478V
PSU V_out = 3.2V 0.06A CC Mode

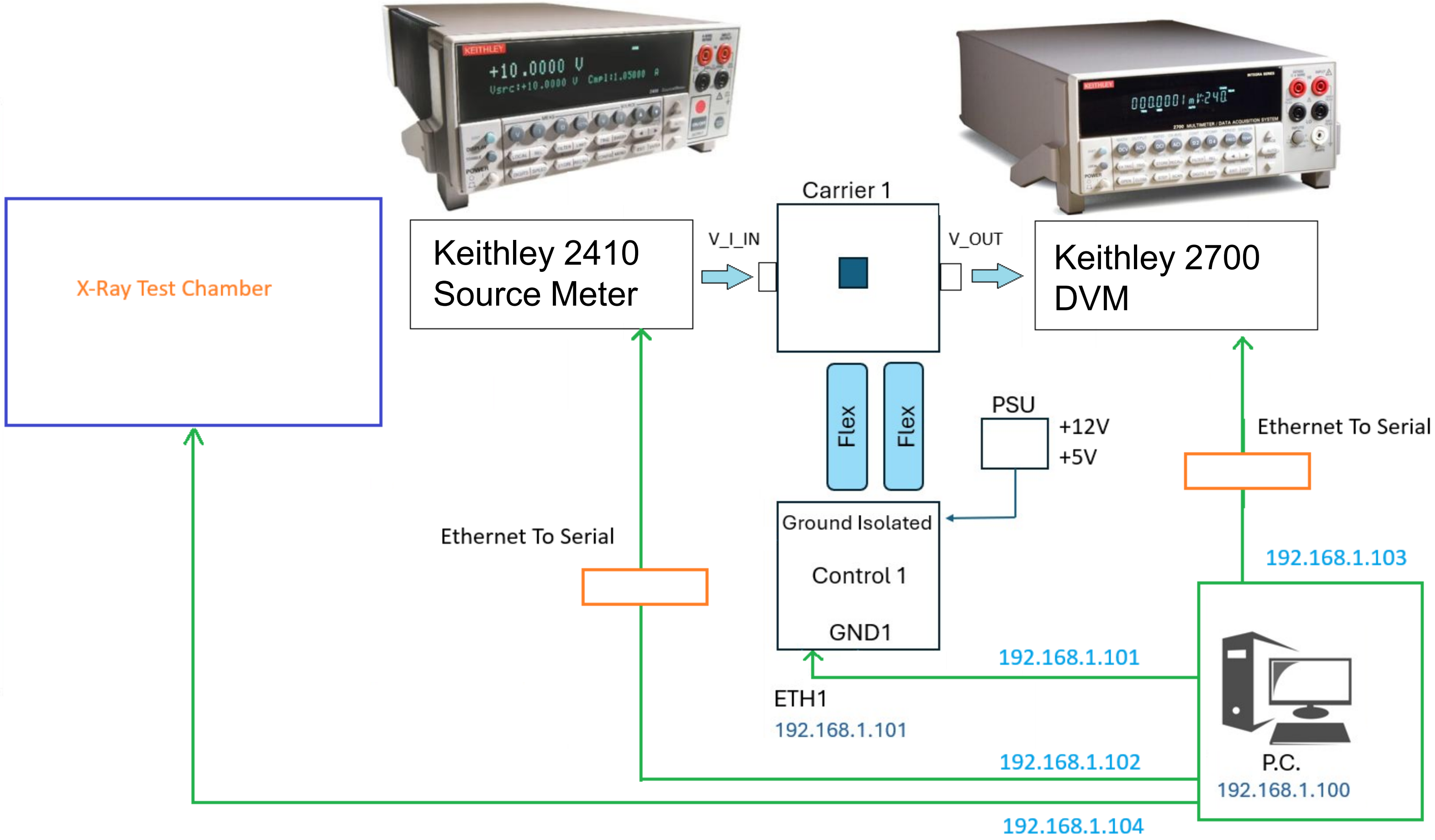
Board 1 Dac set to 31 ∴ V_out = 0.985 V
Board 2 Dac set to 31 ∴ V_out = 1.058V
PSU V_out = 3.2V 0.06A CC Mode

From: A. Hill, SVT working meeting @ Oxford, Dec ‘25

DL: X-ray irradiation set-up



Radiologically shielded chamber with the X-ray tube
Internal volume: 1m x 1m x 2 m (H x D x W)



X-Ray Test Chamber

Keithley 2410
Source Meter

V_I_IN

Carrier 1

V_OUT

Keithley 2700
DVM

Flex

Flex

PSU
+12V
+5V

Ground Isolated
Control 1
GND1

ETH1
192.168.1.101

Ethernet To Serial

Ethernet To Serial

192.168.1.103

192.168.1.101

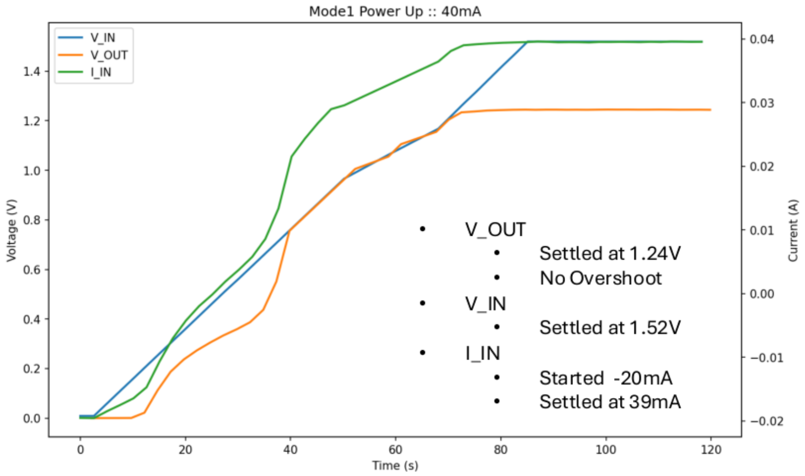
192.168.1.102

192.168.1.104

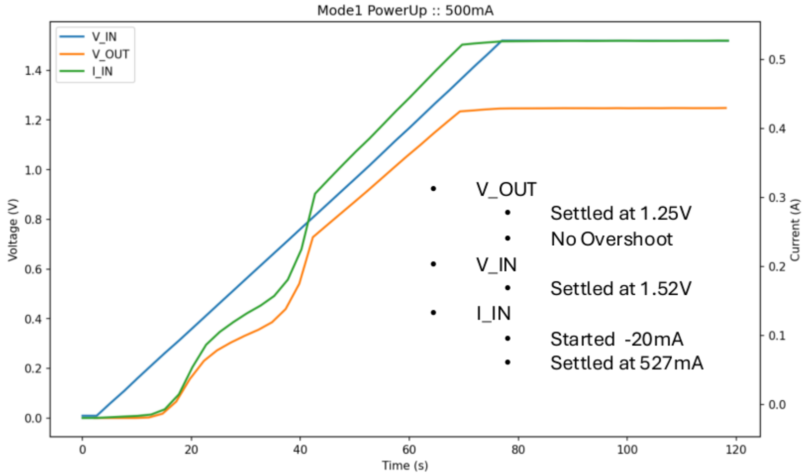
P.C.
192.168.1.100

Brunel: DUT-TW3

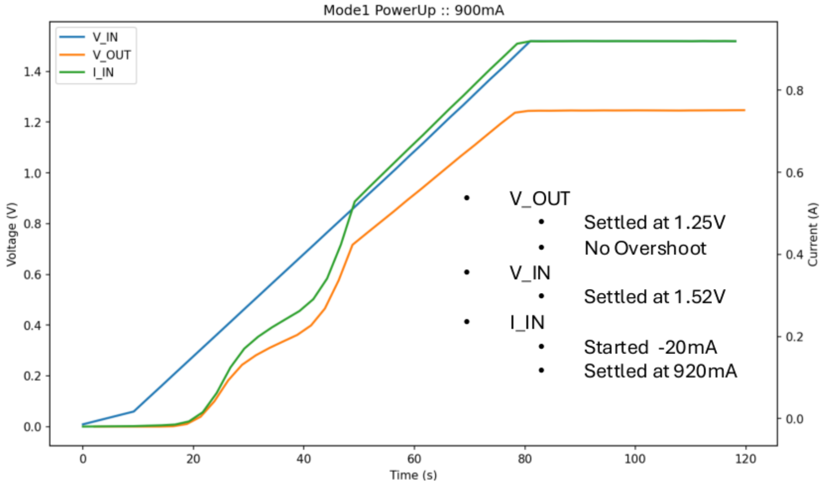
- Showed power-on ramps for all current levels (Mode1).



- V_OUT
  - Settled at 1.24V
  - No Overshoot
- V_IN
  - Settled at 1.52V
- I_IN
  - Started -20mA
  - Settled at 39mA



- V_OUT
  - Settled at 1.25V
  - No Overshoot
- V_IN
  - Settled at 1.52V
- I_IN
  - Started -20mA
  - Settled at 527mA

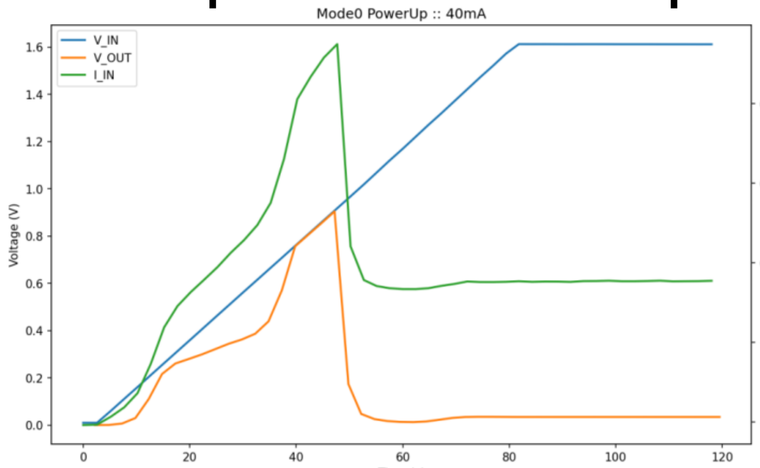


- V_OUT
  - Settled at 1.25V
  - No Overshoot
- V_IN
  - Settled at 1.52V
- I_IN
  - Started -20mA
  - Settled at 920mA

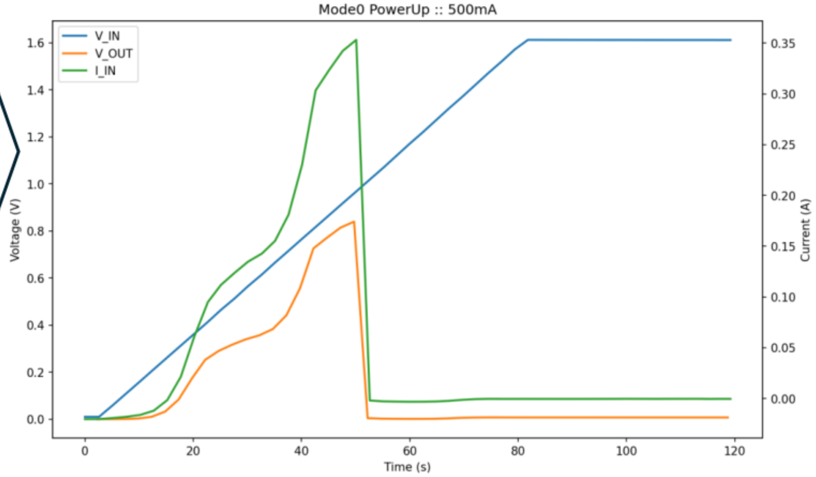
From:
L. Ranatunge, ePIC SVT WP2 general meeting, Jan '26

Brunel: DUT-TW3

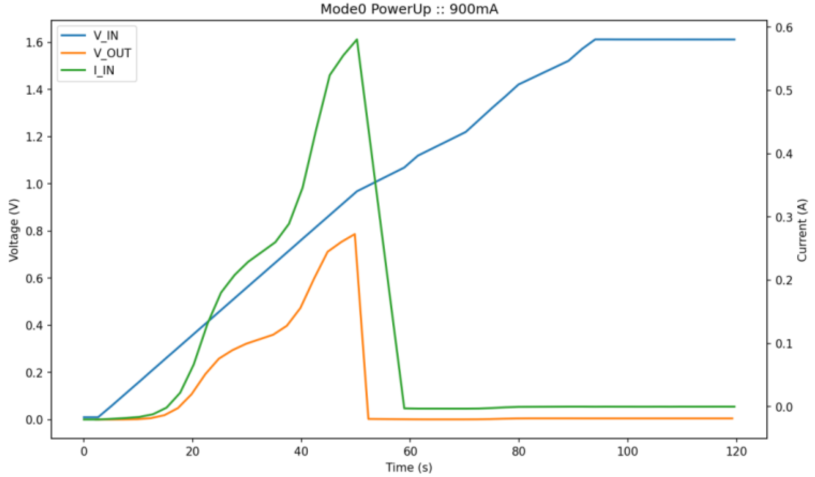
- Showed power-on ramps for all current levels (Mode0).



- V_OUT
  - Overshoot at 0.839V
  - Settled at 7.1mV
- V_IN
  - Settled at 1.61V
- I_IN
  - Started -20mA
  - Peaked at 353mA
  - Settled at -0.4mA



- V_OUT
  - Overshoot at 0.904V
  - Settled at 34mV
- V_IN
  - Settled at 1.61V
- I_IN
  - Started -20mA
  - Peaked at 34mA
  - Settled at -2.4mA

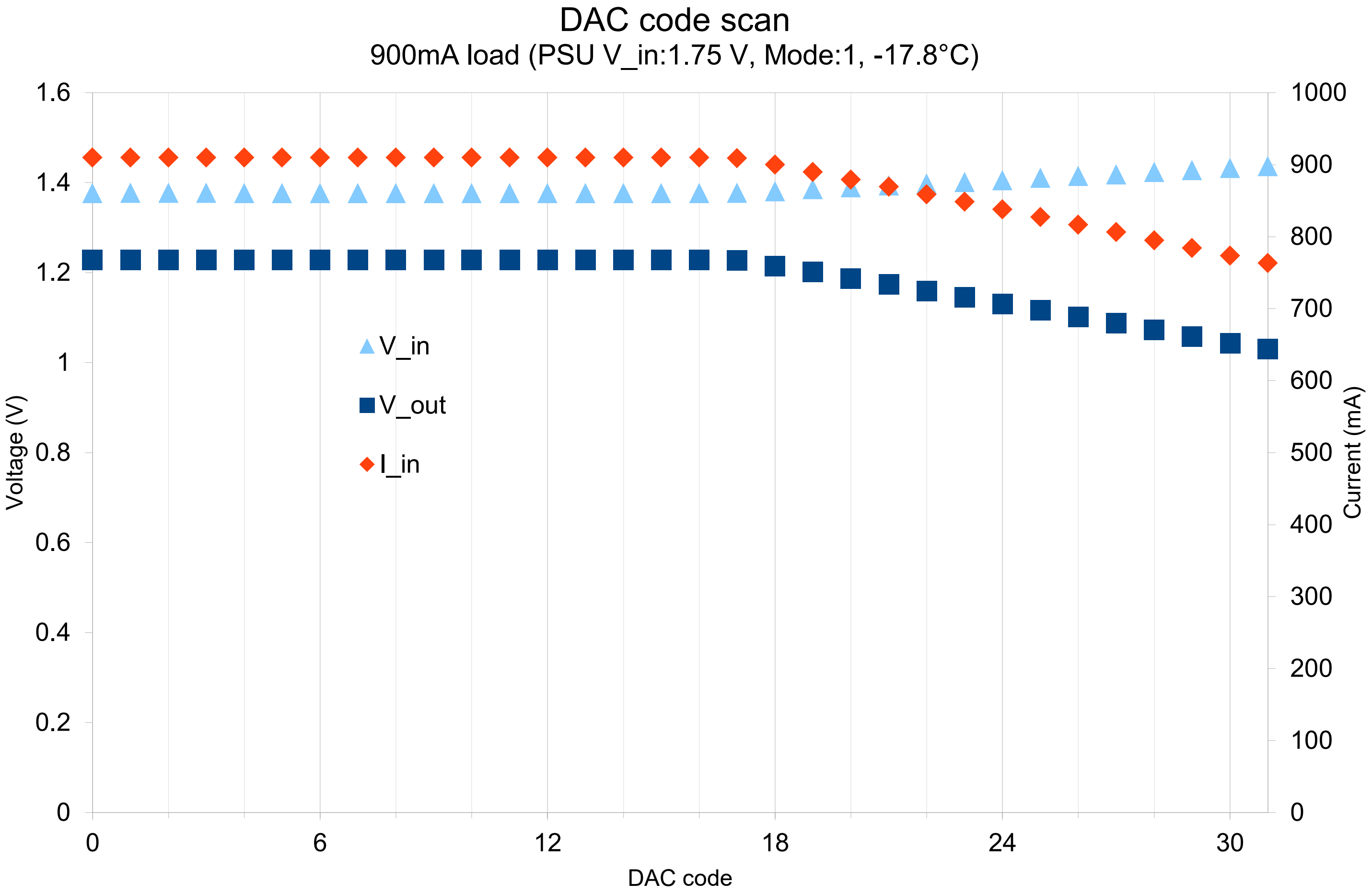


- V_OUT
  - Overshoot at 0.786V
  - Settled at 4.6mV
- V_IN
  - Settled at 1.61V
- I_IN
  - Started -20mA
  - Peaked at 580.5mA
  - Settled at 50μA

From:
L. Ranatunge, ePIC SVT WP2 general meeting, Jan '26

B’ham: DUT-TW2

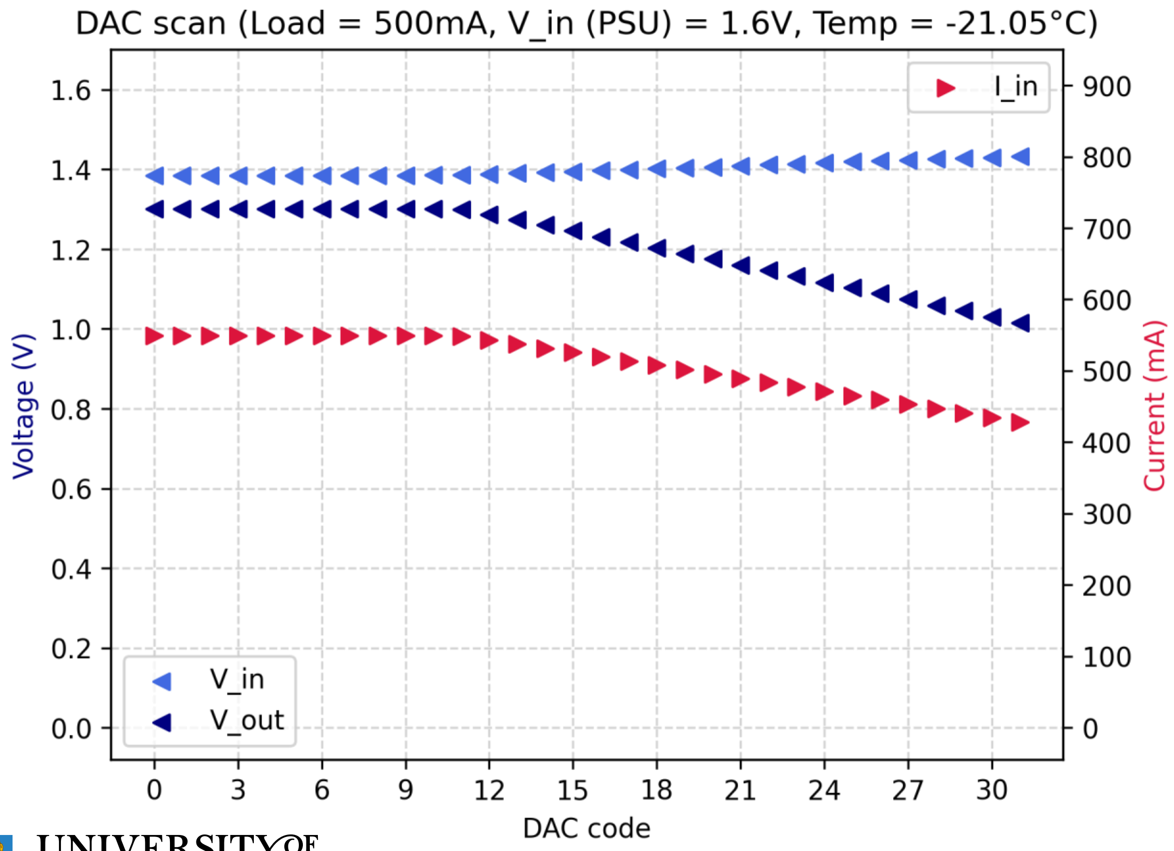
- Cold DAC scan performed (temp based on thermocouple).

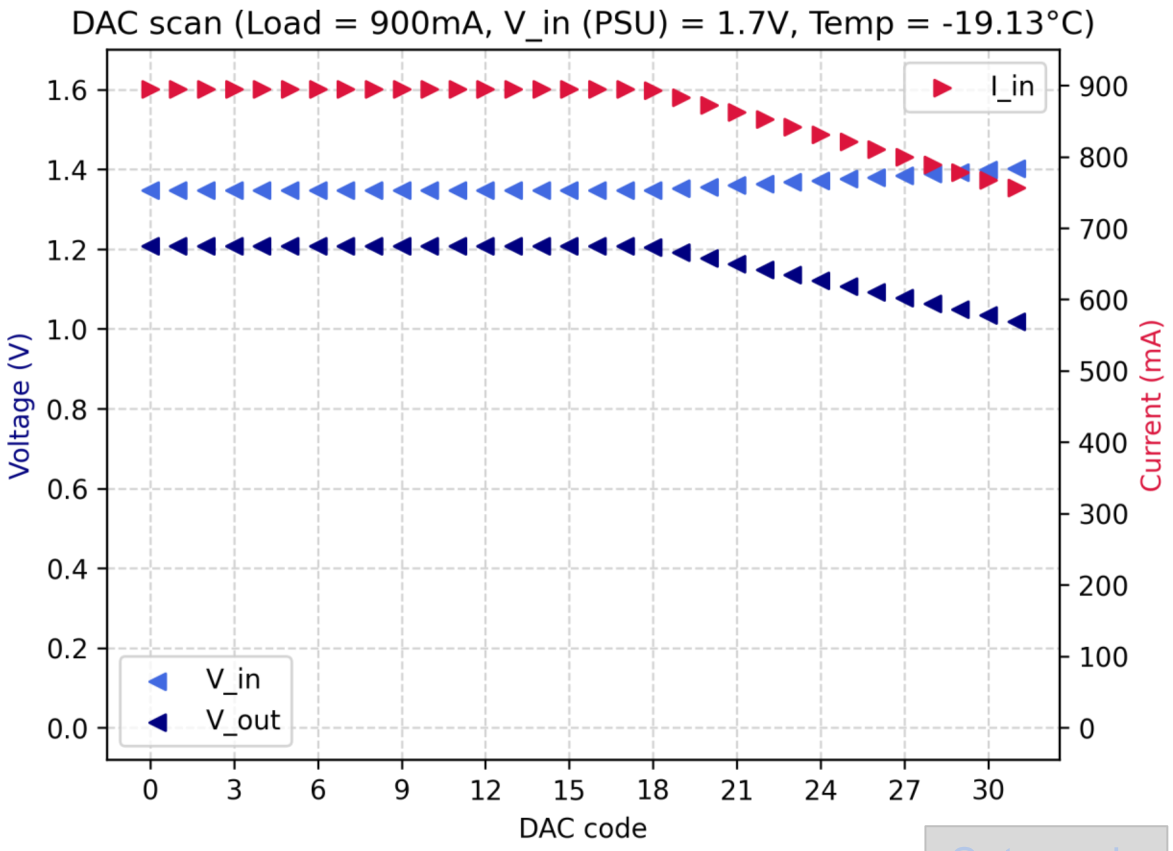


From: J.Glover, ePIC SVT WP2 general meeting, Feb ‘26

New B’ham: DUT-TW2

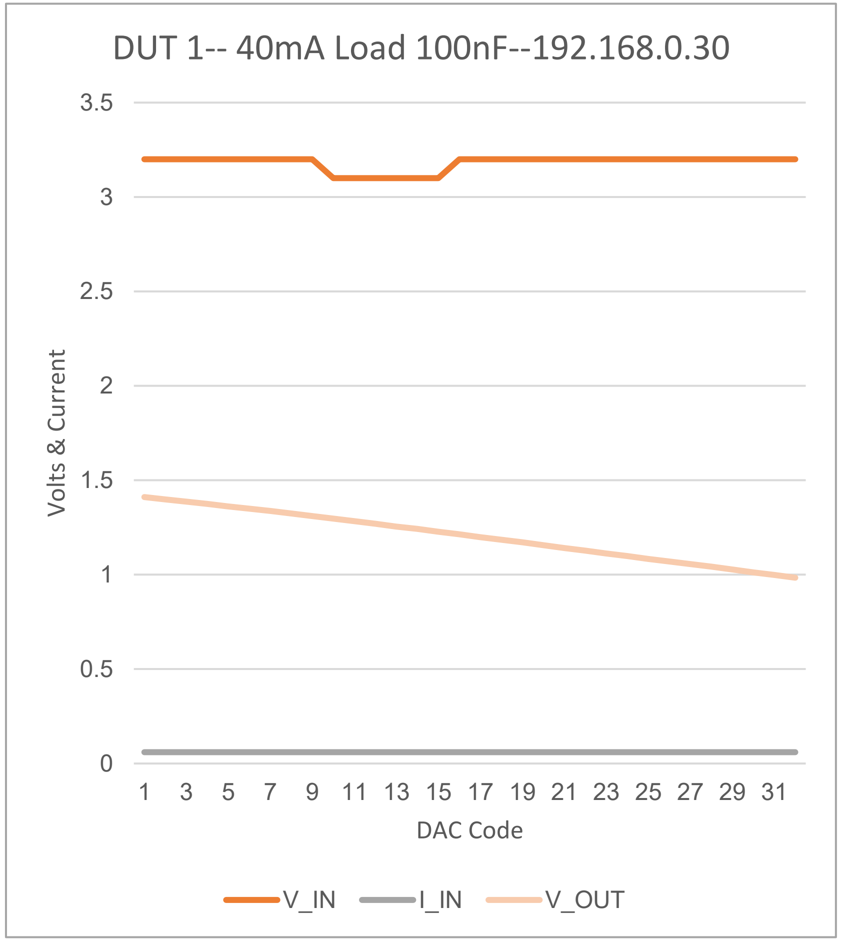
- Further tests performed, pushing temp further and recording via on-board PT100.

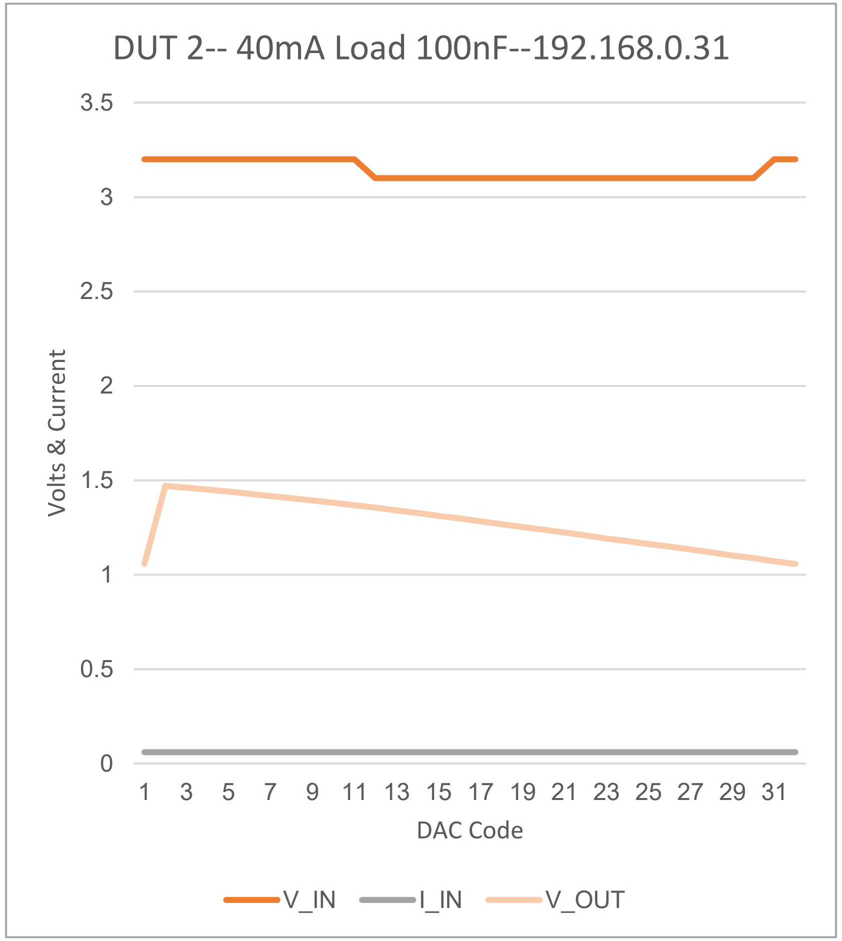

DAC scan (Load = 500mA, V_in (PSU) = 1.6V, Temp = -21.05°C)


DAC scan (Load = 900mA, V_in (PSU) = 1.7V, Temp = -19.13°C)

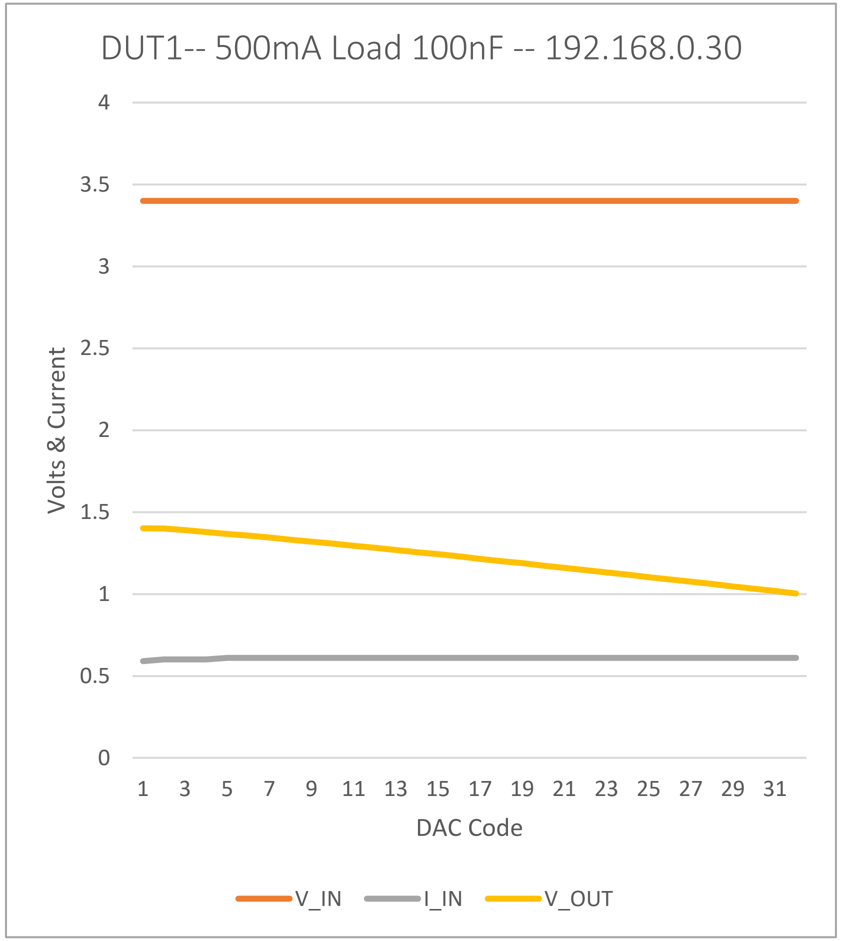
Set-up pic

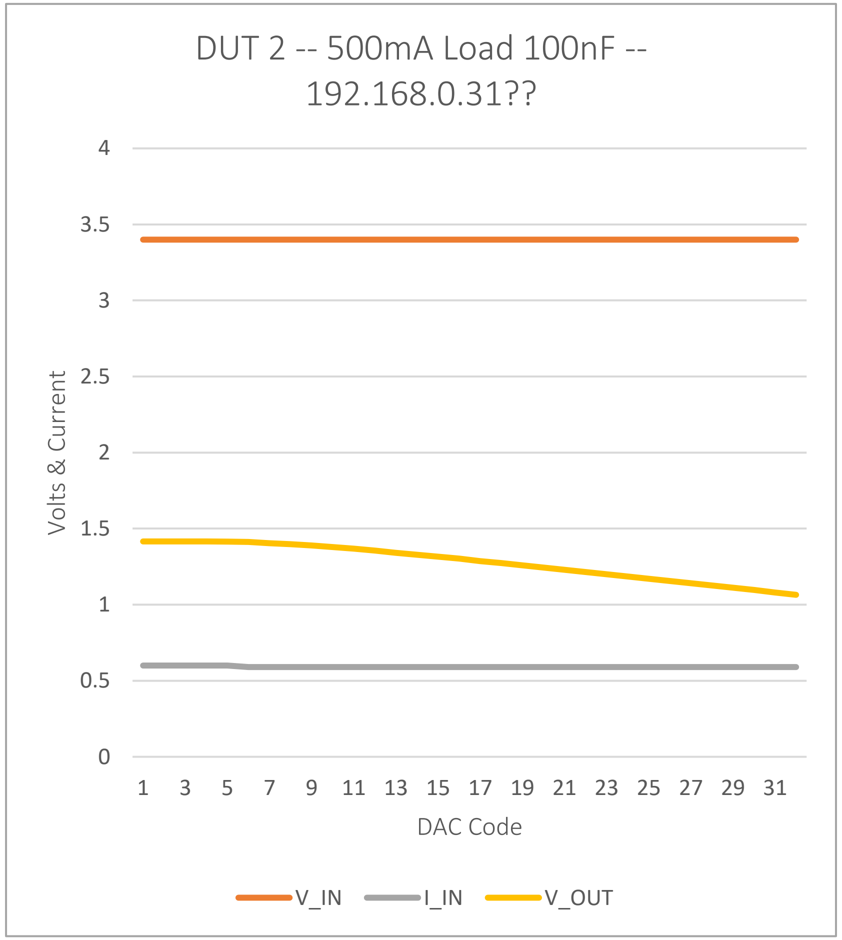
New DL: SP chain (40 mA, 100 nF)



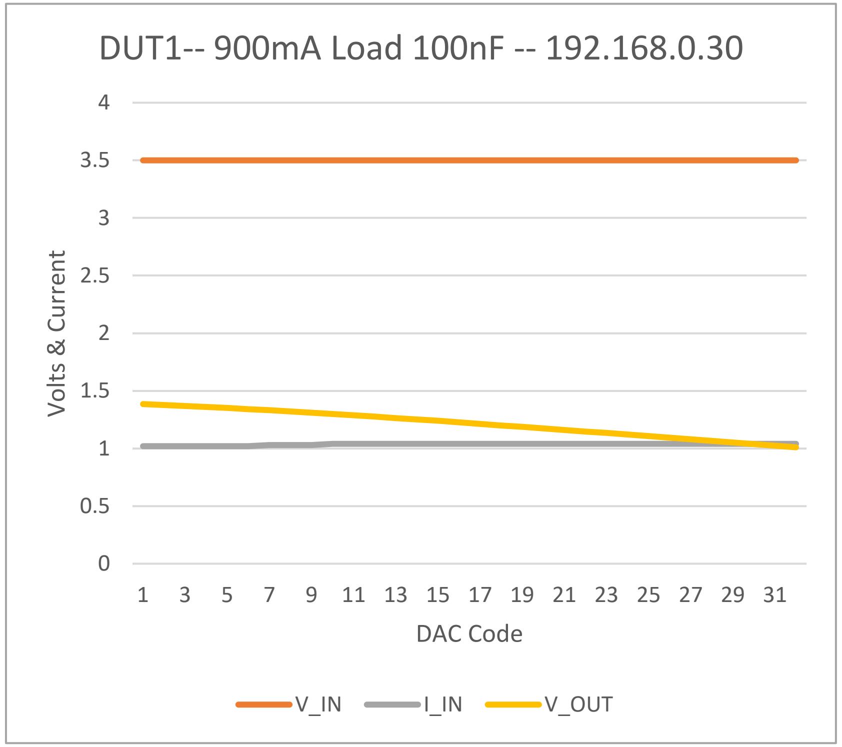


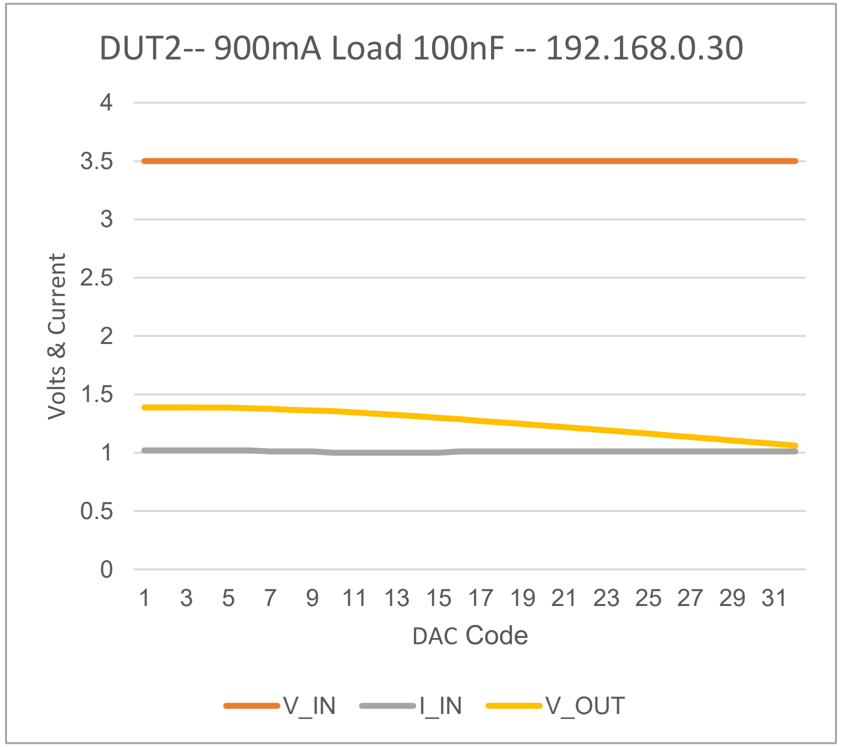
New DL: SP chain (500 mA, 100 nF)





New DL: SP chain (900 mA, 100 nF)



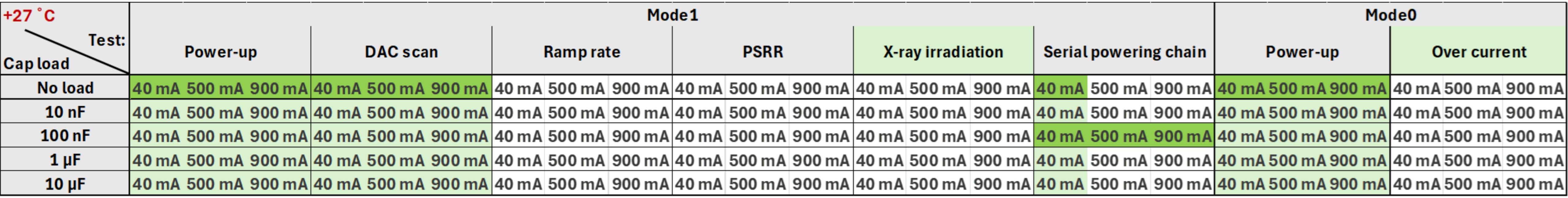


Tests achieved to date (@ 27 ˚C)

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).



+27 ˚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
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 (@ -20 ˚C)

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).

-20 ˚C	Mode1																		Mode0					
Test: Cap load	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

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Summary

- MPW2 test set-ups commissioned at three UK sites.
- Test procedures established and confirmed at 27 ˚C.
- Mode0 testing has not been the focus, but has started.
- Ramp rate and PSRR testing to begin soon.
- Additional testing set-ups developing:
  - Serial powering chains.
  - X-ray irradiation.
  - -20 ˚C chip operating temperature.
- More testing to follow over the coming weeks.
  - Many more test modes and configurations to be ran.

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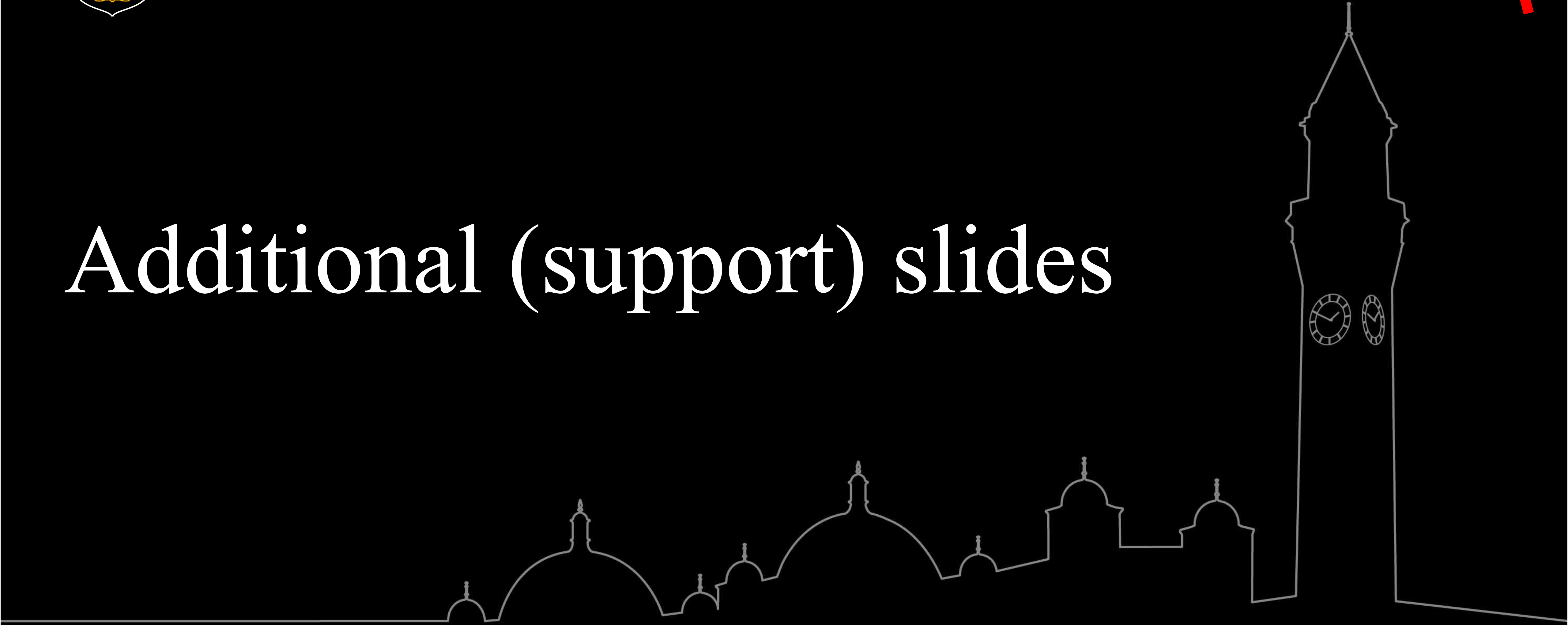
Thank you very much!

Any questions?

Additional (support) slides



No tests performed @ 60 or 105 ˚C (yet)

+60 ˚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
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

+105 ˚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
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