MPW2-SLDO
test system update

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20250704

Shunt Regulator Test System.

Microsoft Visual Studio

Raspberry Pi 5

Power

Power

Regulation

Level Shift

DEBUG (serial)

PICO

GPIO

I2C

R3

Digital Pot

SLDO Power

Bias T

Signal Generator

DVM

FPC's

DUT

IN

GPIO

OUT

UKRI 2025
DL559810A

PT100

Chip Status Monitoring

Network

Outside of x-ray chamber

Ethernet

Serial

GPIO

UKRI 2025
DL559815A

Programmable Load / Capacitance

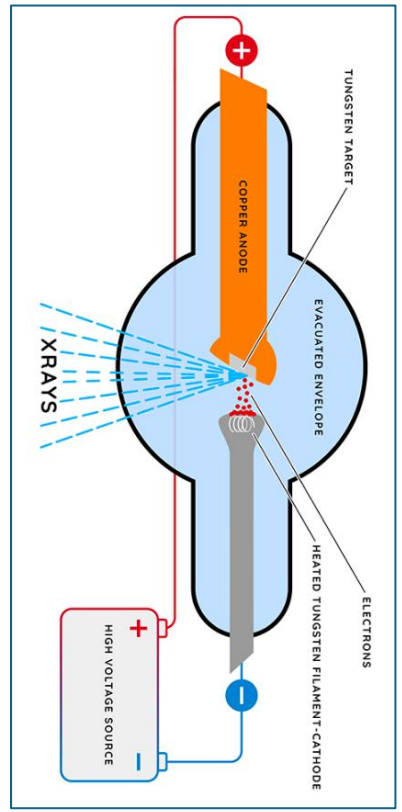
FPC Connectors

Scope

Shielded Box inside x-ray chamber

Thermal Monitoring

Environment Temperature Control



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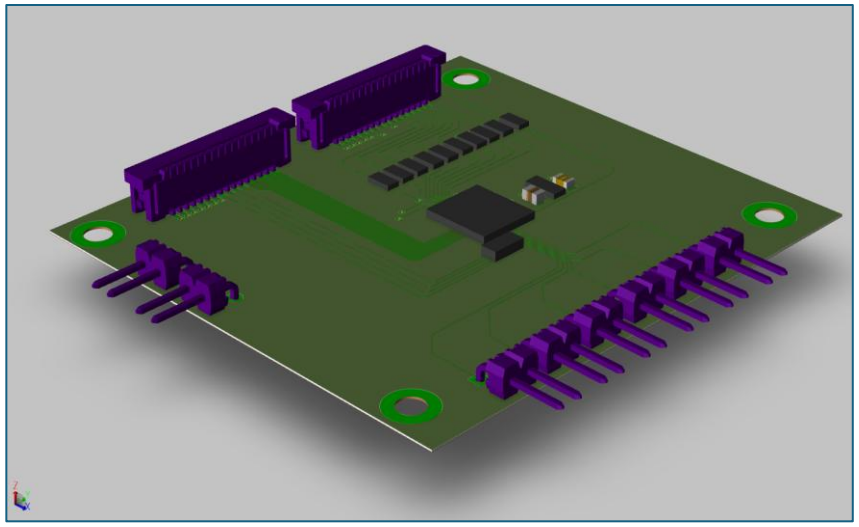
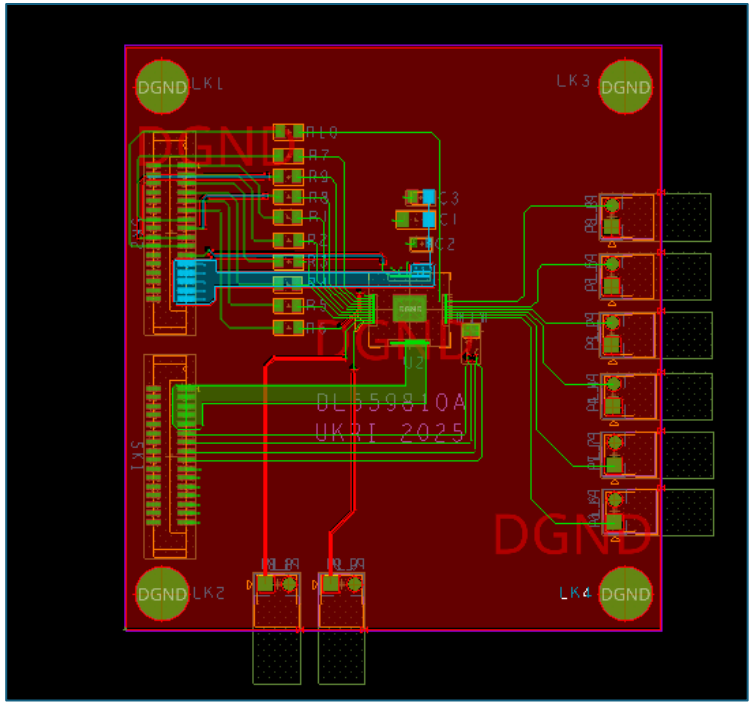
SLDO Carrier Board Layout





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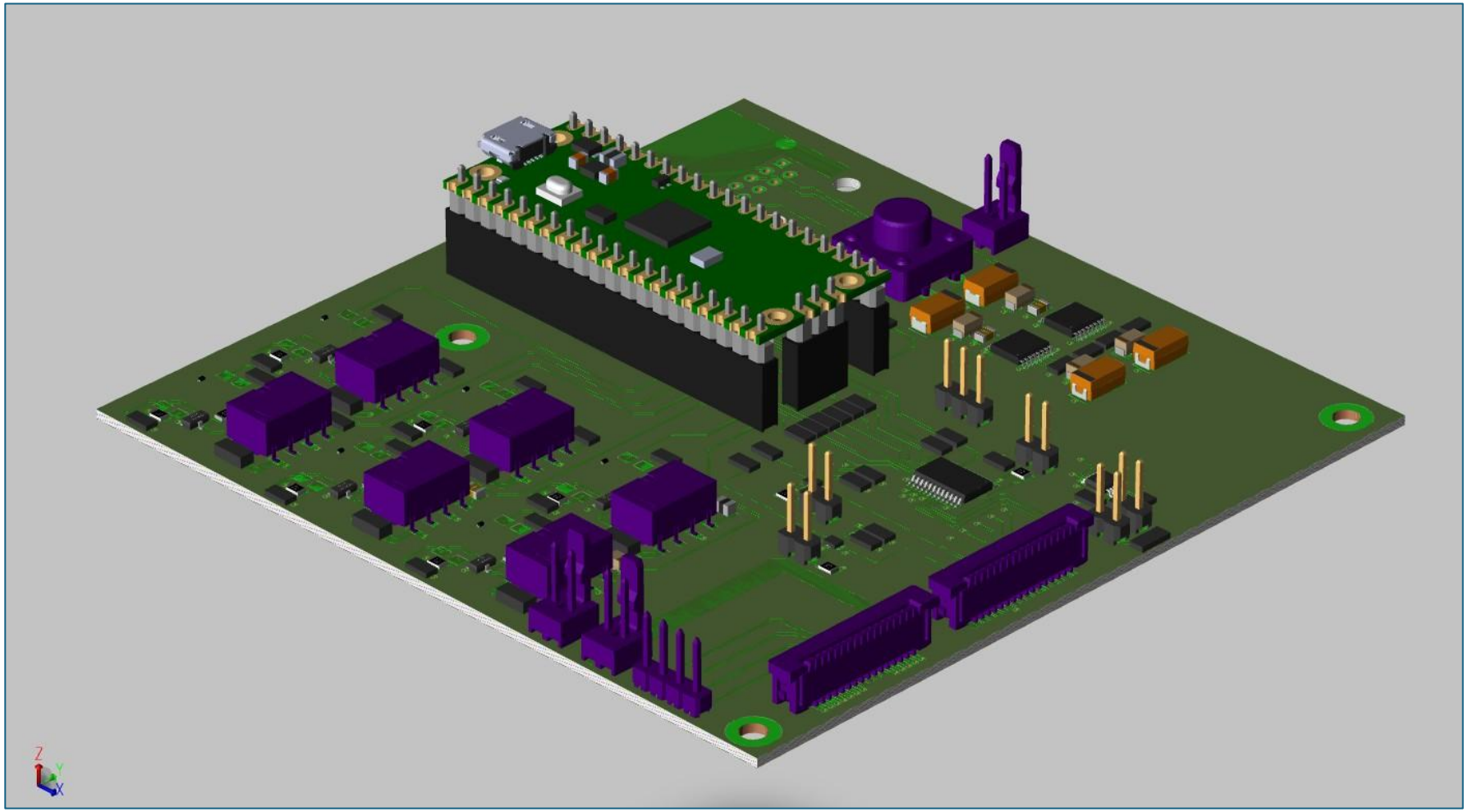
SLDO Control Board Layout



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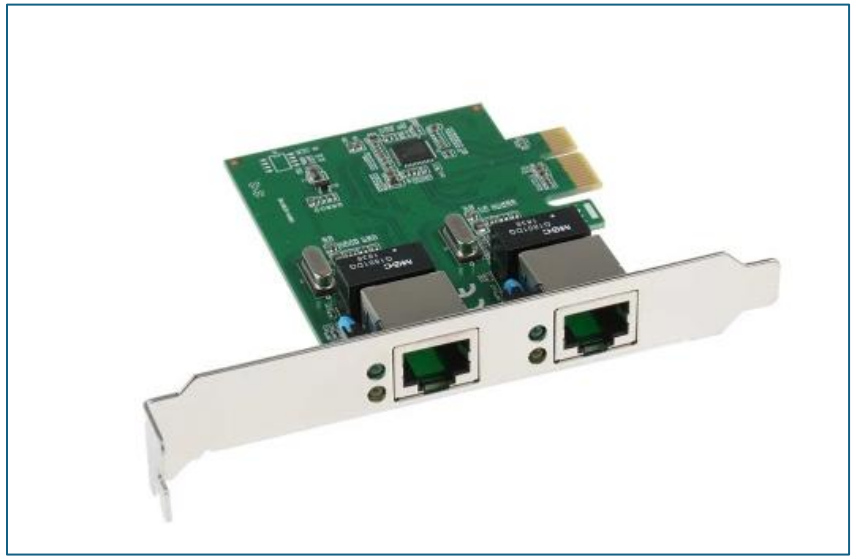
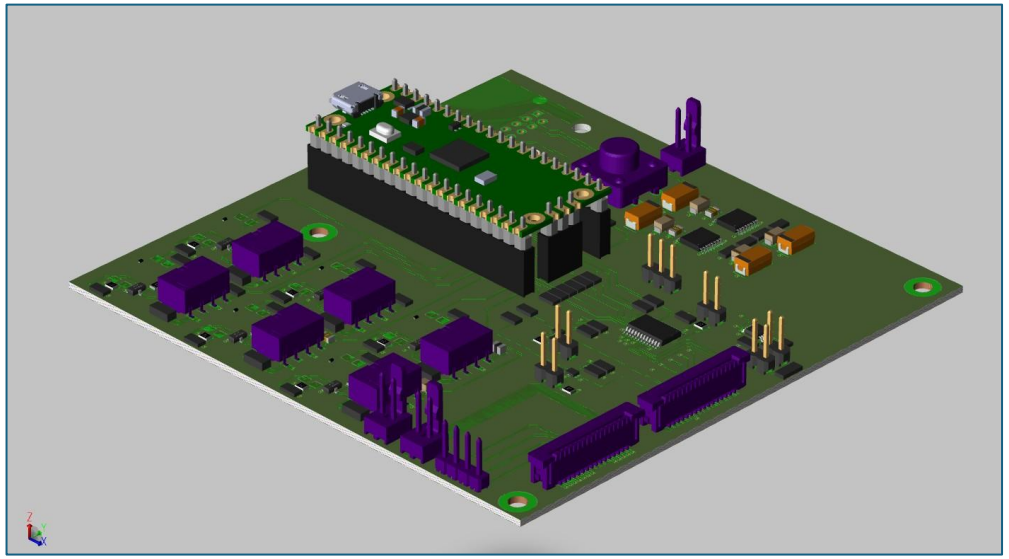
Communication



P.C Ethernet Card:-
IP Address: 192.168.1.103
Subnet Mask 255.255.255.0
Default Gateway 0.0.0.0
This is required for initial configuration of Lantronix Ethernet Socket on the control board.

Initial communication will be a LAN configuration.

If a network connection is required, then DHCP can be used along with the supplied MAC address.



Interface Ethernet Sochet:-
IP Address: 192.168.1.100 Port 10001
Subnet Mask 255.255.255.0
Default Gateway 0.0.0.0

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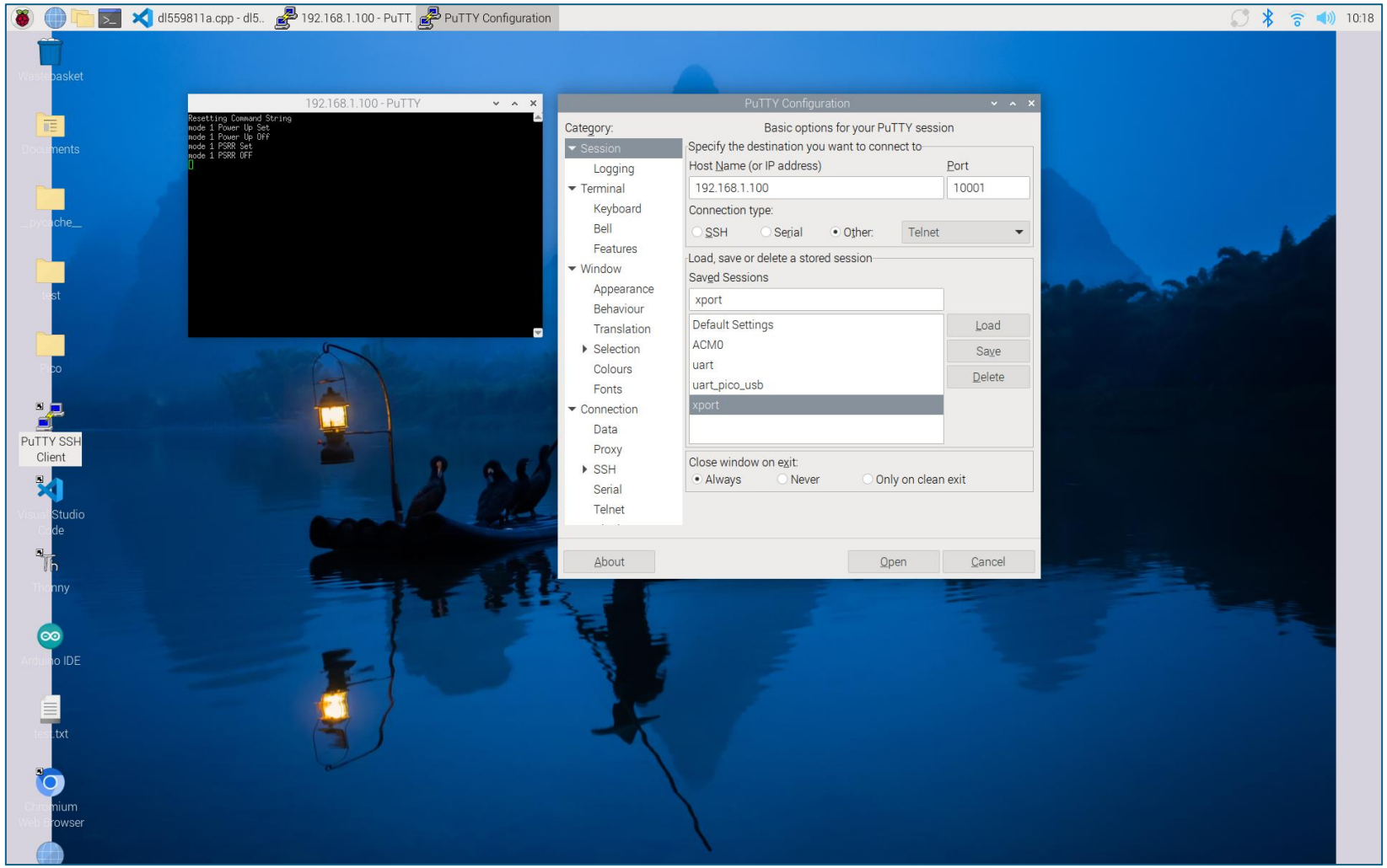
Communication



Opening a PuTTY Telnet Session gives you access to The command line interface of the control board.

Alternatively:- open a socket in Python and communicate That way.

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Command Line Interface

		Command	Function
		0x01 1	Realy 1 ON
		0x01 2	Relay 1 OFF
		0x02 1	Relay 2 ON
		0x02 2	Relay 2 OFF
		0x03 1	Relay 3 ON
		0x03 2	Relay 3 OFF
		0x04 1	Relay 4 ON
		0x04 2	Relay 4 OFF
		0x05 1	Relay 5 ON
		0x05 2	Realy 5 OFF
		0x06 1	Relay 6 ON
		0x06 2	Relay 6 OFF
	researved	0x07 1	DIS_LATCH_Q_N ON
	researved	0x07 2	DIS_LATCH_Q_N OFF
		0x08 1	SEL_EXT_DISABLE ON
		0x08 2	SEL_EXT_DISABLE OFF
		0x09 1	EXT_DISABLE ON
		0x09 2	EXT_DISABLE OFF
		0x10 1	ACTIVATE_OCP_N ON
		0x10 2	ACTIVATE_OCP_N OFF
		0x11 1	RESET_OCP_N ON
		0x11 2	RESET_OCP_N OFF
		0x12 1	CONTROL_4 ON
		0x12 2	CONTROL_4 OFF
		0x13 1	CONTROL_3 ON
		0x13 2	CONTROL_3 OFF
		0x14 1	CONTROL_2 ON
		0x14 2	CONTROL_2 OFF
		0x15 1	CONTROL_1 ON
		0x15 2	CONTROL_1 OFF
		0x16 1	CONTROL_0 ON
		0x16 2	CONTROL_0 OFF

Command 0x26 1 reads the Pico ADC channel Connected to an onboard temperature sensor. The temperature is selectable between degrees ‘C’ And degrees ‘F’.

0x17 1	Mode 1 Power Up set	
0x17 2	Mode 1 Power up off	
0x18 1	Mode 1 PSSR set	
0x18 2	Mode 1 PSSR off	
0x19 1	Mode 1 Ramp Rate set	
0x19 2	Mode 1 Ramp Rate off	
0x20 1	Mode 1 DAC Scan set	Ramp control bits 0-31
0x20 2	Mode 1 DAC Scan set	
0x21 1	Mode 1 Irradiation set	
0x21 2	Mode 1 Irradiation off	
0x22 1	Mode 0 Power Up And Overcurrent Test set	
0x22 2	Mode 0 Power Up And Overcurrent Test off	
0x23 1	researved	
0x23 2	researved	
0x24 1	researved	
0x24 2	researved	
0x25 1	researved	
0x25 2		

Software has been developed to create a Command Line Interface.

The Command Line Interface gives independent control of the digital lines connected to the Asic.

The Command Line Interface gives independent control of the Load / Capacitance that will be connected to the output of the Asic (regulator).

0x01 to 0x16 commands are for Individual control.

0x17 to 0x22 commands are test specific:-

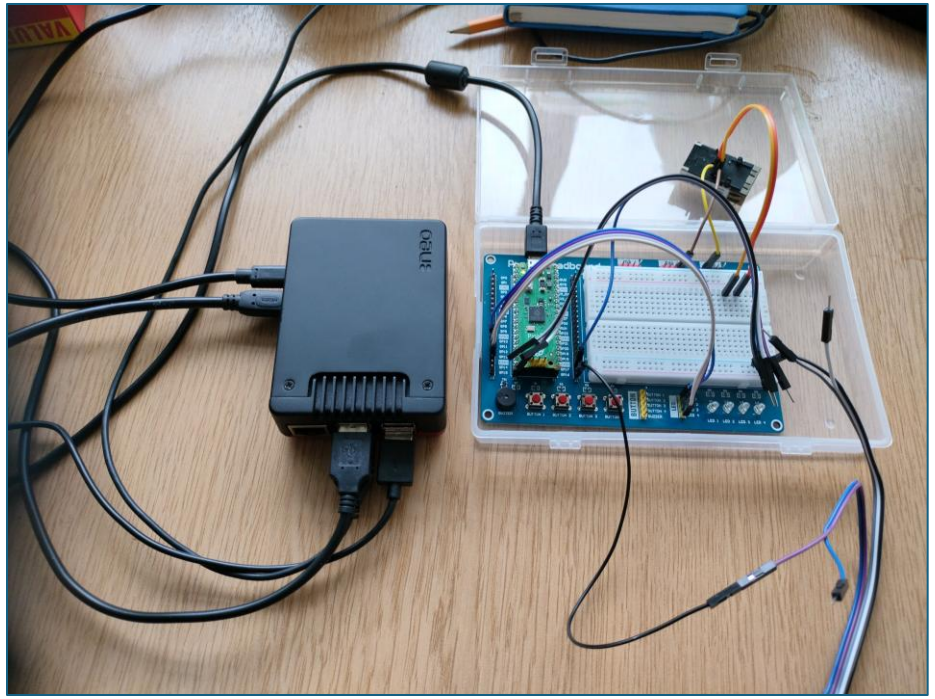
- Mode 1 Power Up.
- Mode 1 PSRR.
- Mode 1 Ramp Rate.
- Mode 1 DAC Scan.
- Mode 1 Irradiation.
- Mode 0 Power Up And Overcurrent.

All of these are outputs from the microprocessor to inputs of the Asic.

All of the Analogue signals from the Asic are monitored externally however there is one output from the asic (dis_latch_qn) that indicates that overcurrent shutdown has been triggered.

In the event that dis_latch_qn is triggered, it will cause an interrupt to occur within the microprocessor and enable the event to be captured and reported whilst normal operation continues.

Development Kit.



Code in ‘C’ / ’C++’ utilising Microsoft's Visual Studio Code on the Raspberry Pi 5, downloaded to the Raspberry Pi Pico 2.

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To Do

Although I have initialised an I2C component within the microcontroller I have not yet implemented The code required to adjust the digital potentiometer (R3) used on the control board.

It is difficult to do without an actual device.

When implemented this will result in expanding the command codes and it will be adjustable From the command interface.

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