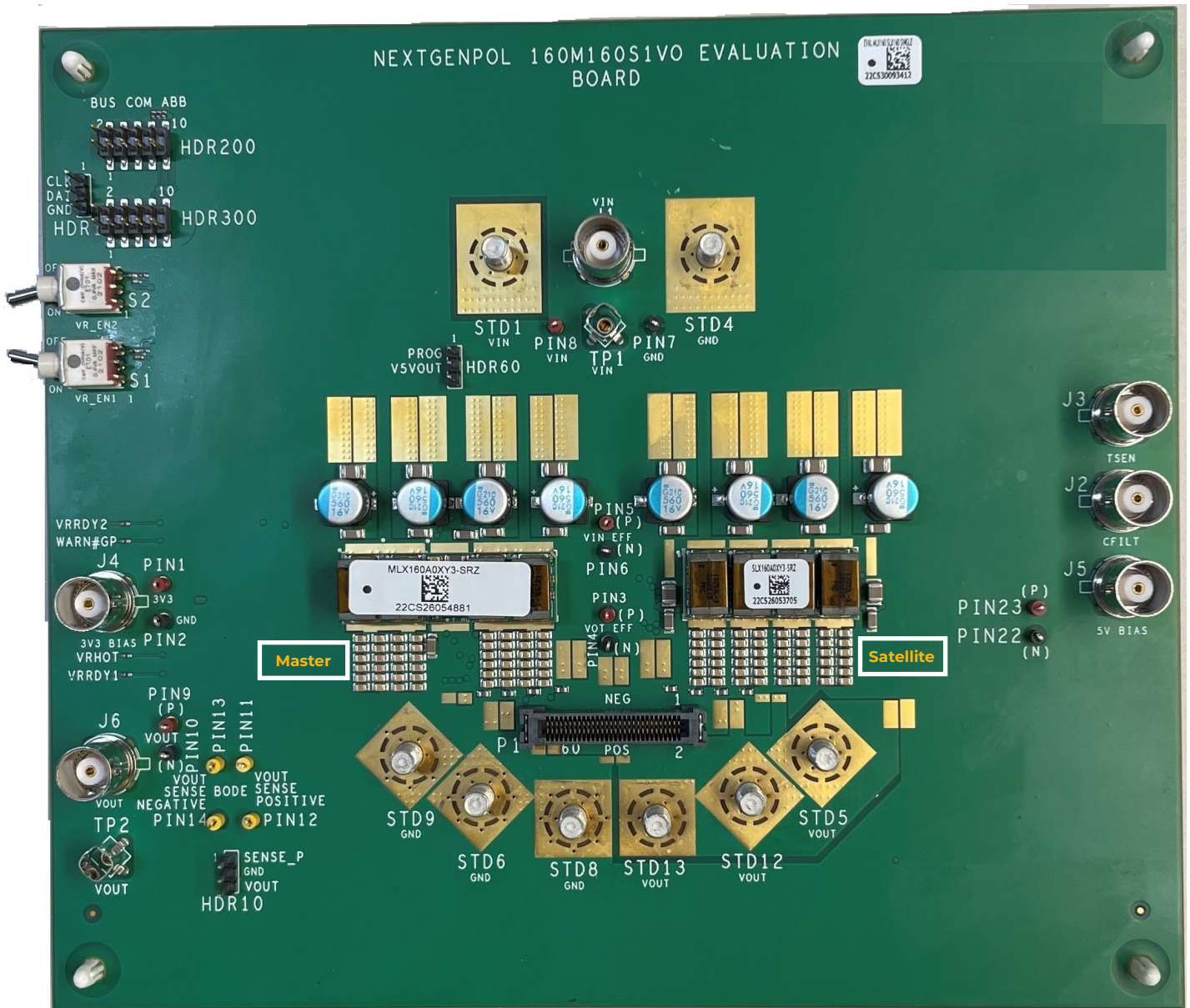


# NEXTGENPOL 160M160S1V0 SINGLE LOOP/OUTPUT

Single Loop/Output Voltage Evaluation Board populated with MLX160+SLX040 or MLX160+SLX160



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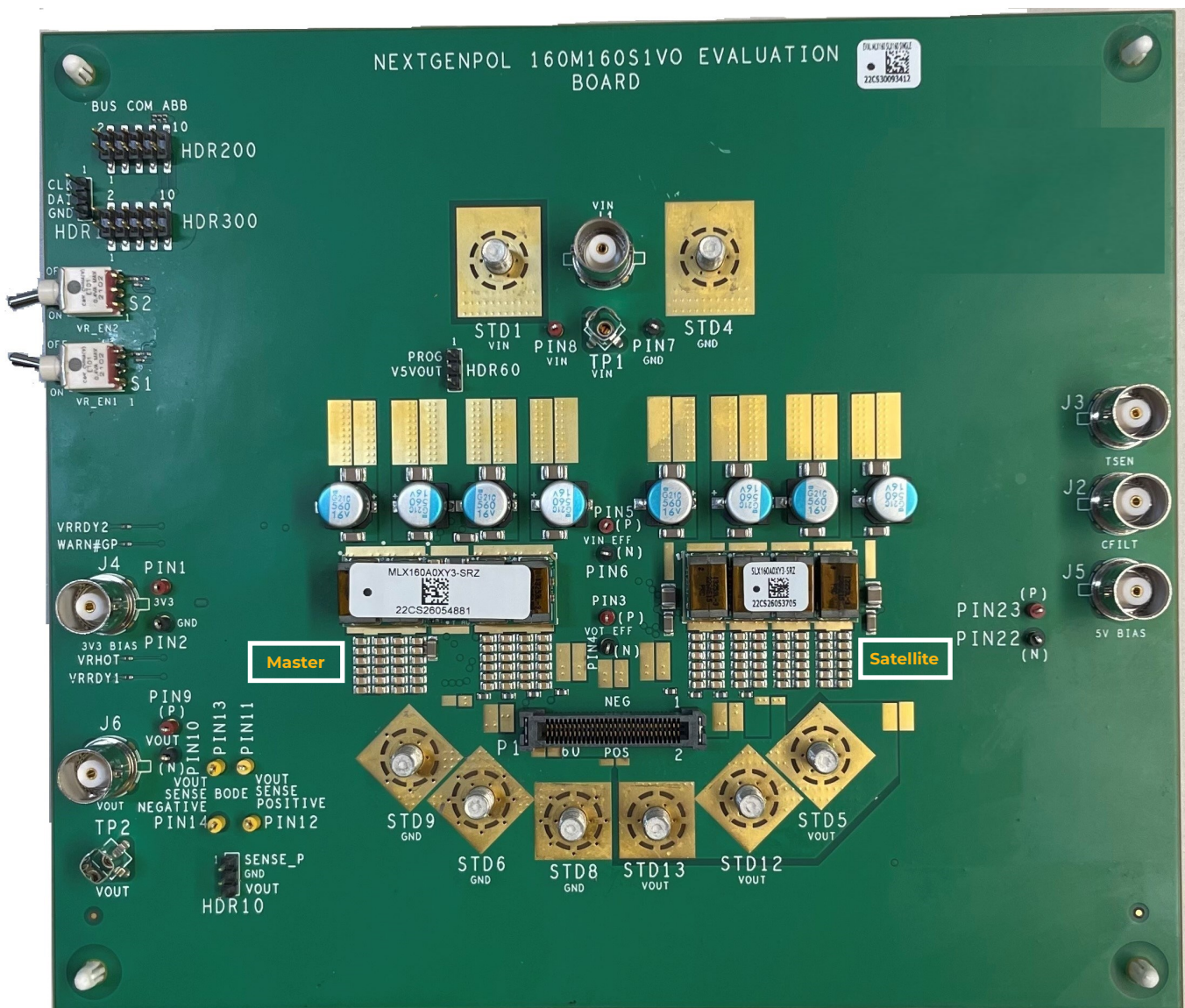


## 1. Description

The OmniOn Power™ MLX series are the next generation of POL modules that can deliver 40-320A in a fully configured mode. It operates over a wide input range from 7V to 14Vdc and provides precisely regulated output voltage from 0.45 to 2.0V

The module's features include digital PMBus™ interface, remote ON/OFF, output voltage sequencing, pre-biased start up, cycle-by-cycle output overcurrent protection, input and output under-voltage and over-voltage protections and over-temperature protections and more. The module has an extensive set of PMBus™ commands for both control and monitoring of the system parameters.

The evaluation board is shown on the picture below. It comes pre-populated with required minimum of input and output capacitors. Numerous empty component place holders allow the board to be reconfigured to match a specific customer's application. Various test points facilitate the easy setup and monitoring of the module operation.

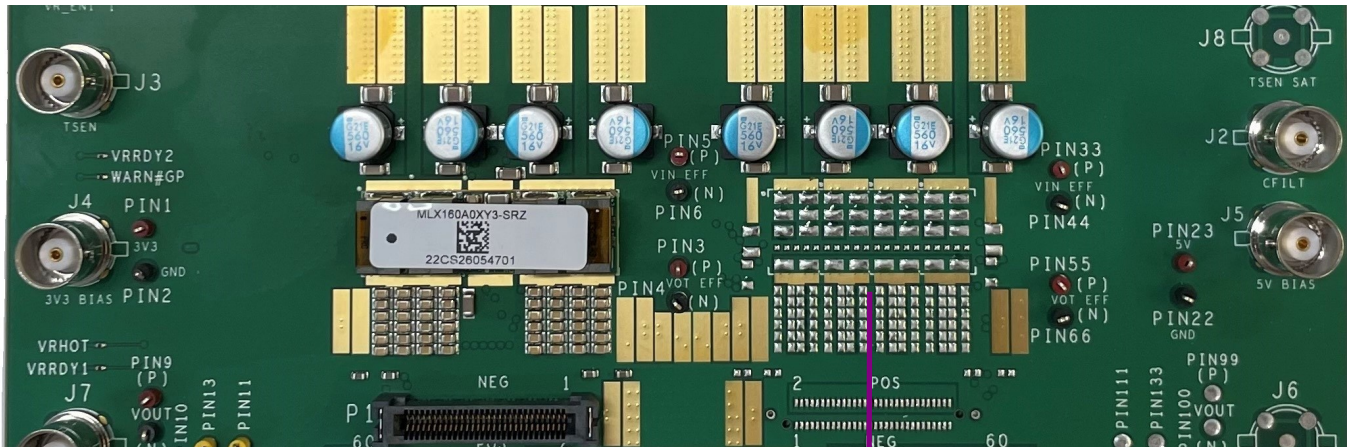


Top View of Evaluation Board with MLX160 +SLX160 module

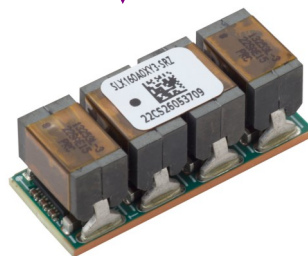
## 1. Description (Continued)

The evaluation board can come pre-installed with any of the Satellite Modules

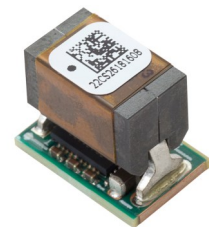
**Evaluation Board with different module variants**



**OPTIONS**



**SLX160**



**SLX040**

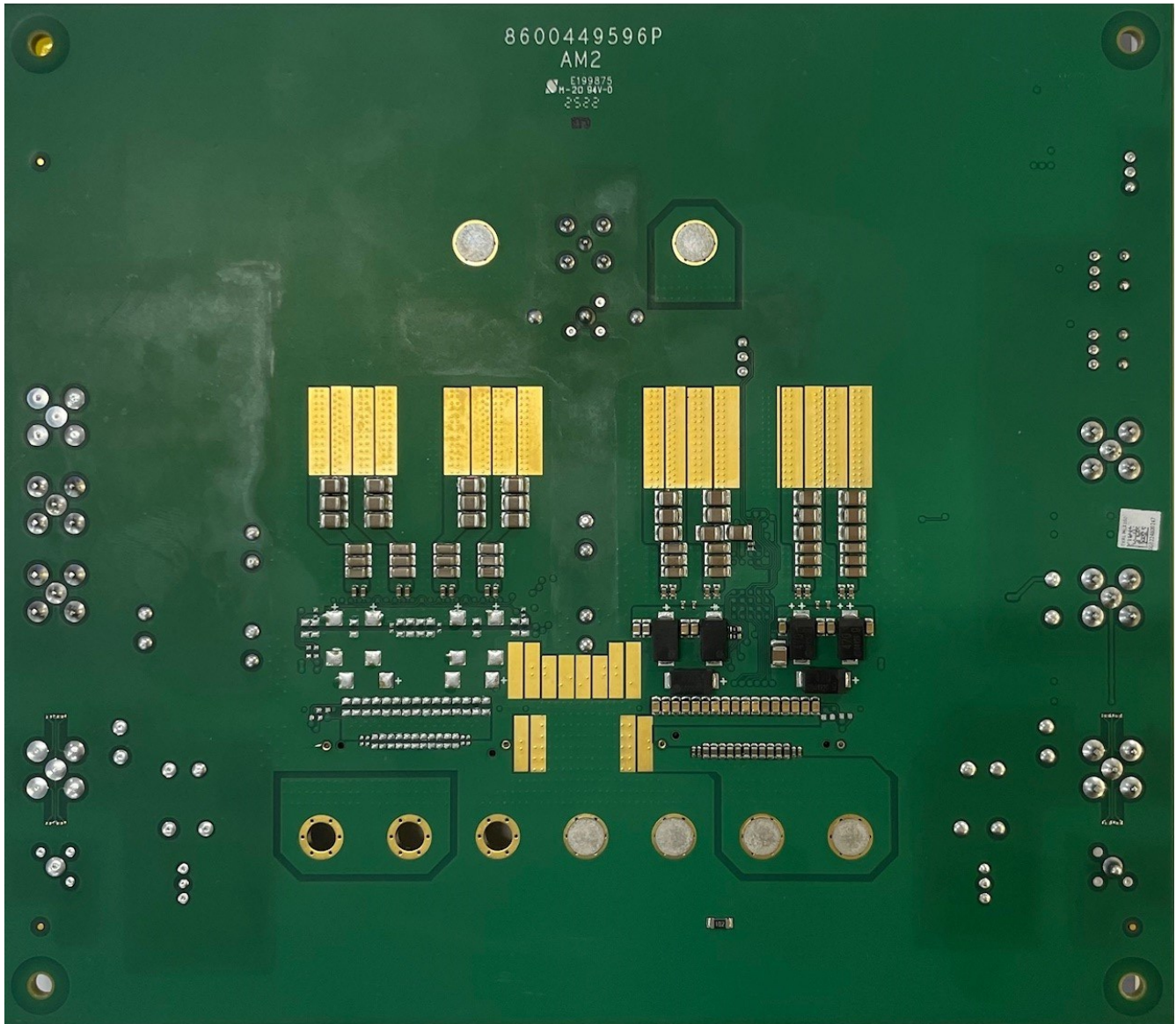


## 1. Description (Continued)

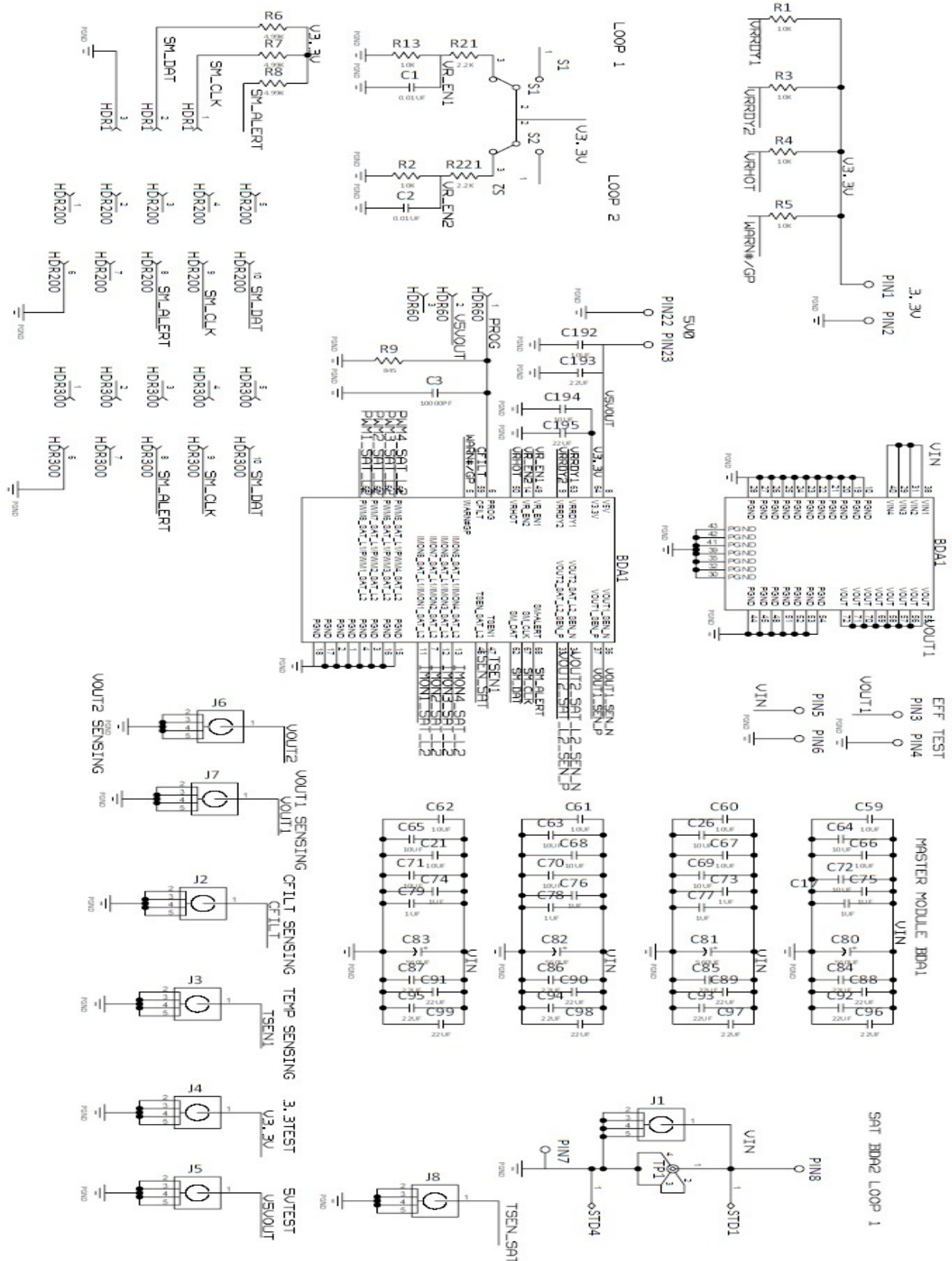
The Installed components are as follows. The schematic on the following page shows maximum capability and includes expansion capability:

- Ceramic caps for input
- Ceramic and Surface electrolytic on output

**Bottom View of Evaluation Board**



## 2. Schematic



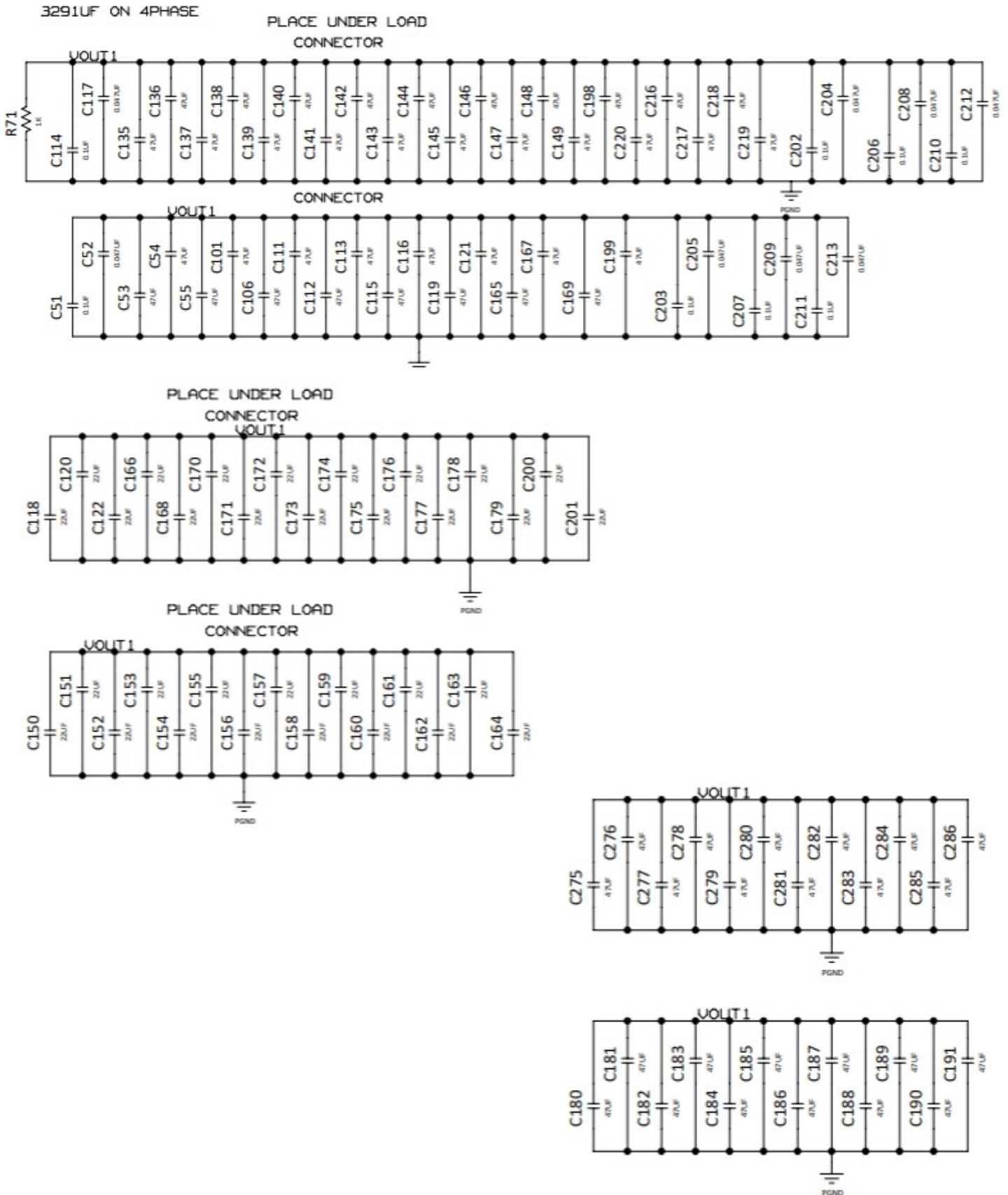








## 2. Schematic (Continued)



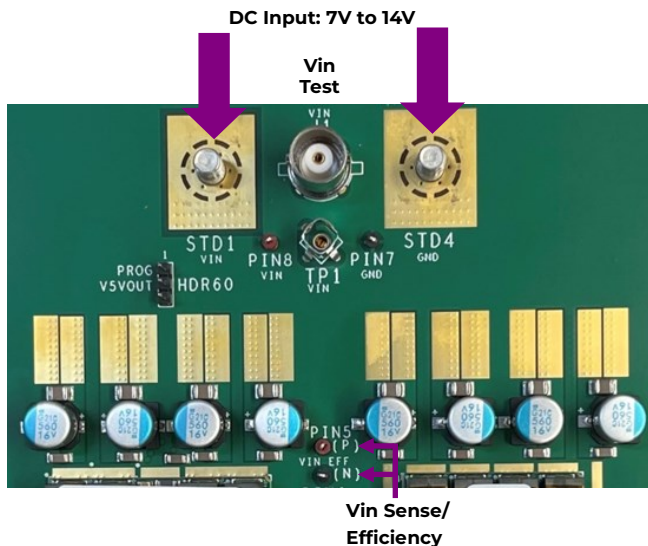
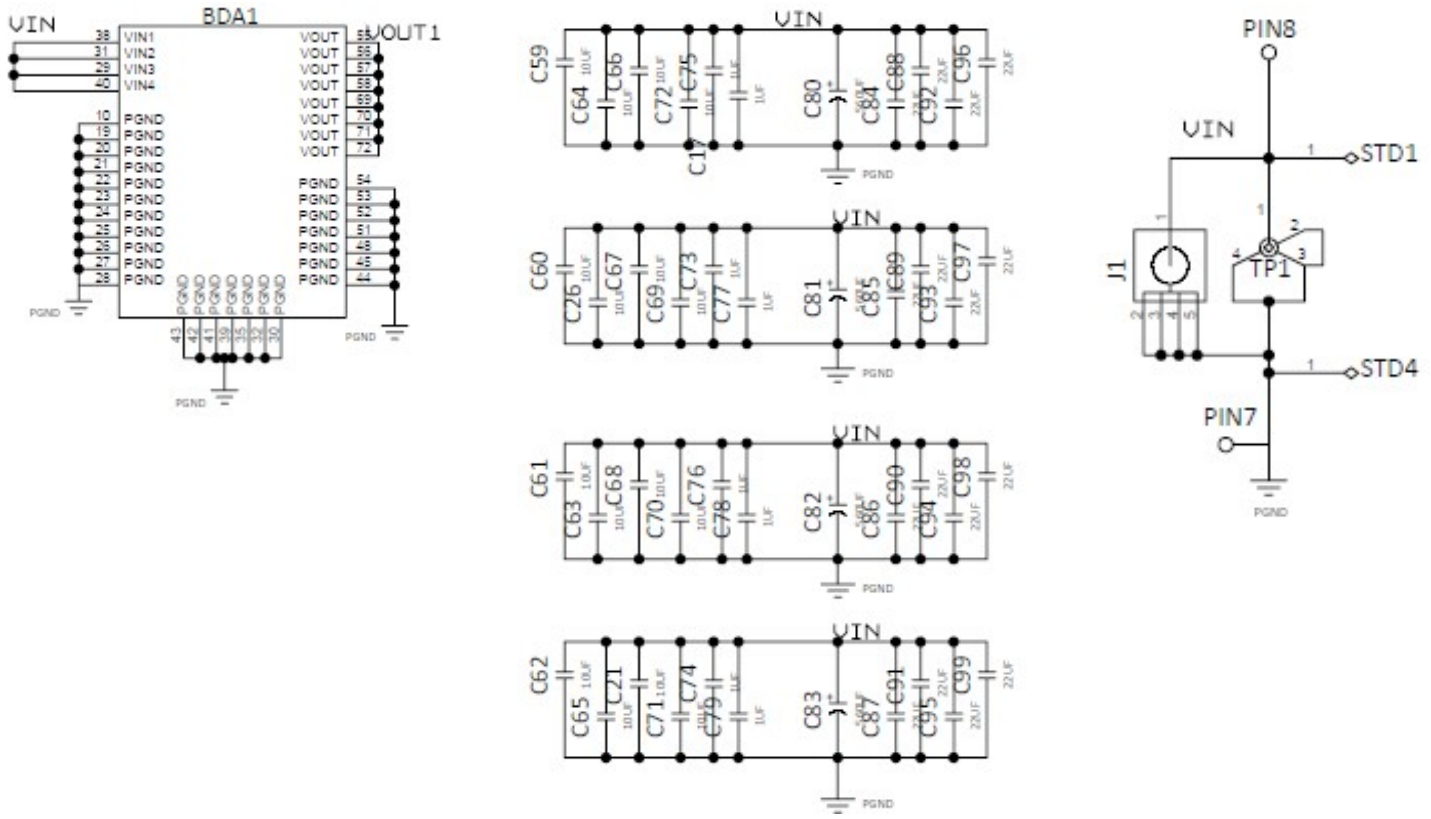


The complete schematic diagram of the MLX Series evaluation board is shown in the previous pages. Components on schematic show max capability and may not be actually used on the board.

## 2.1. Eval Board Sections

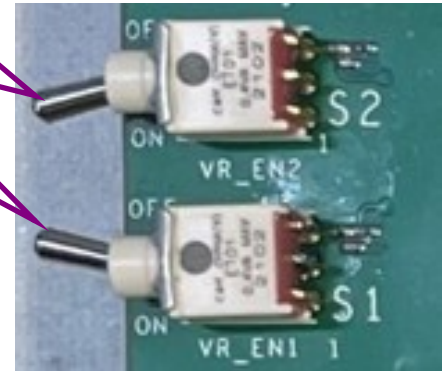
The following pictures show the input connections and components external to the module

### 2.1.1. Input Connections



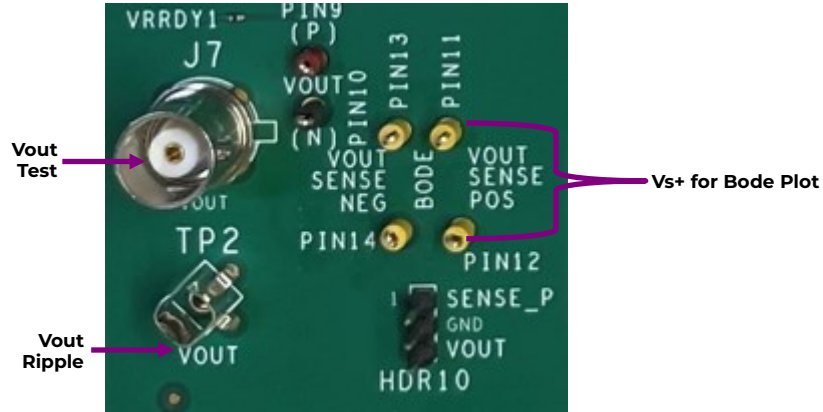
Enable for Loop2 - Not Used for Single Output Mode. Turn to OFF position

Enable for Loop1 . Turn this ON

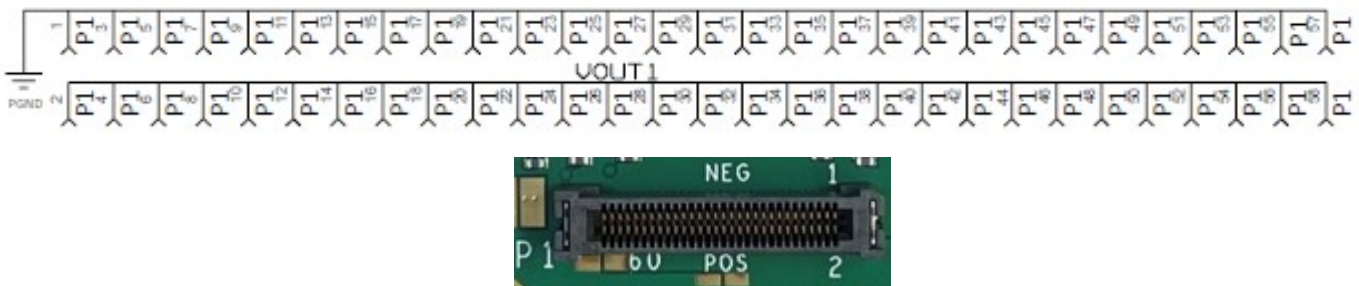
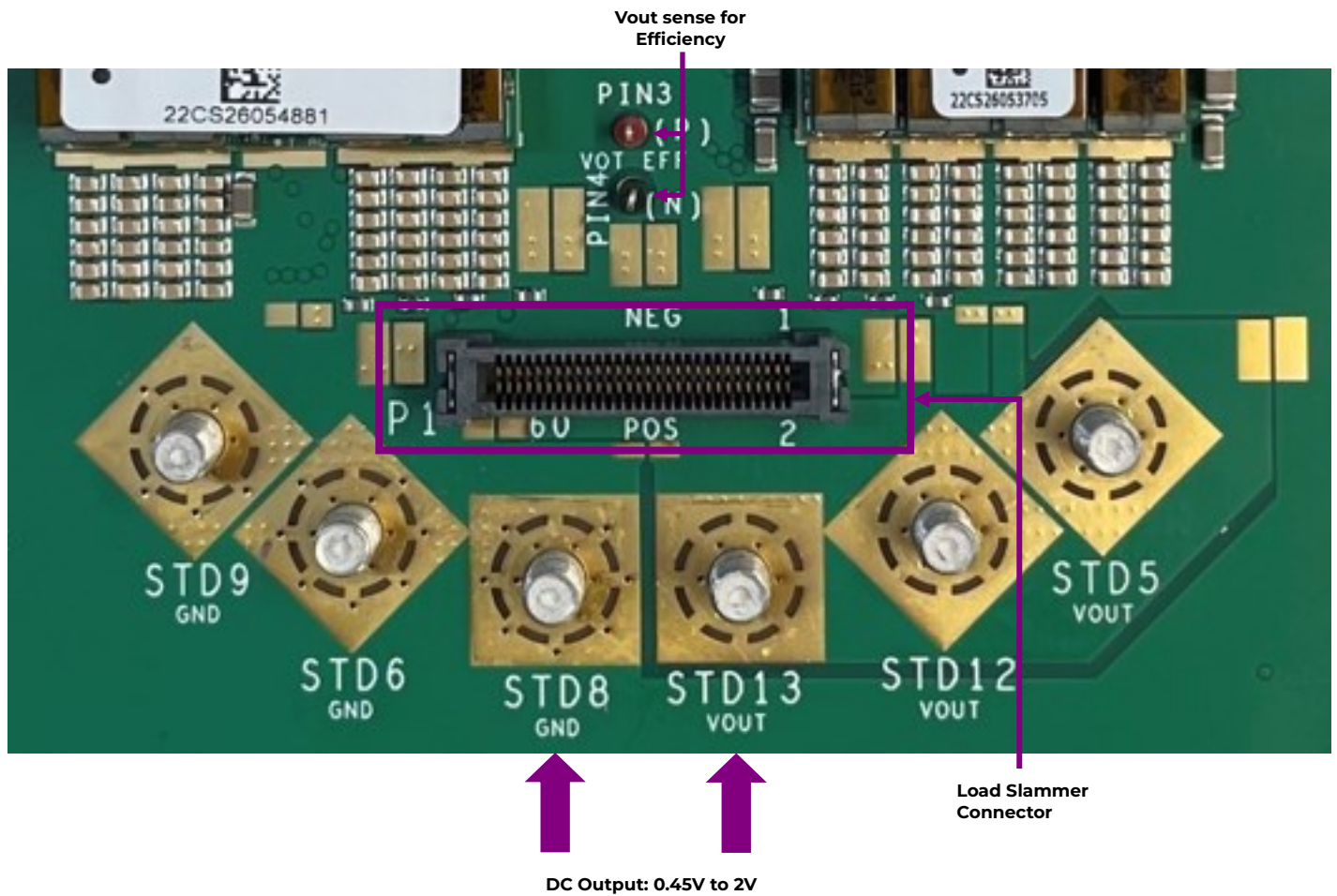






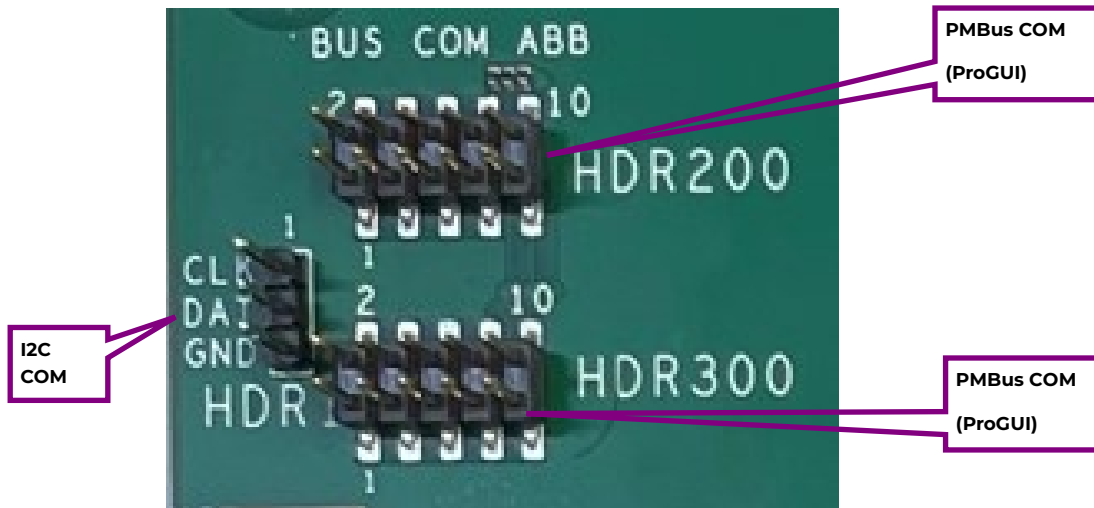
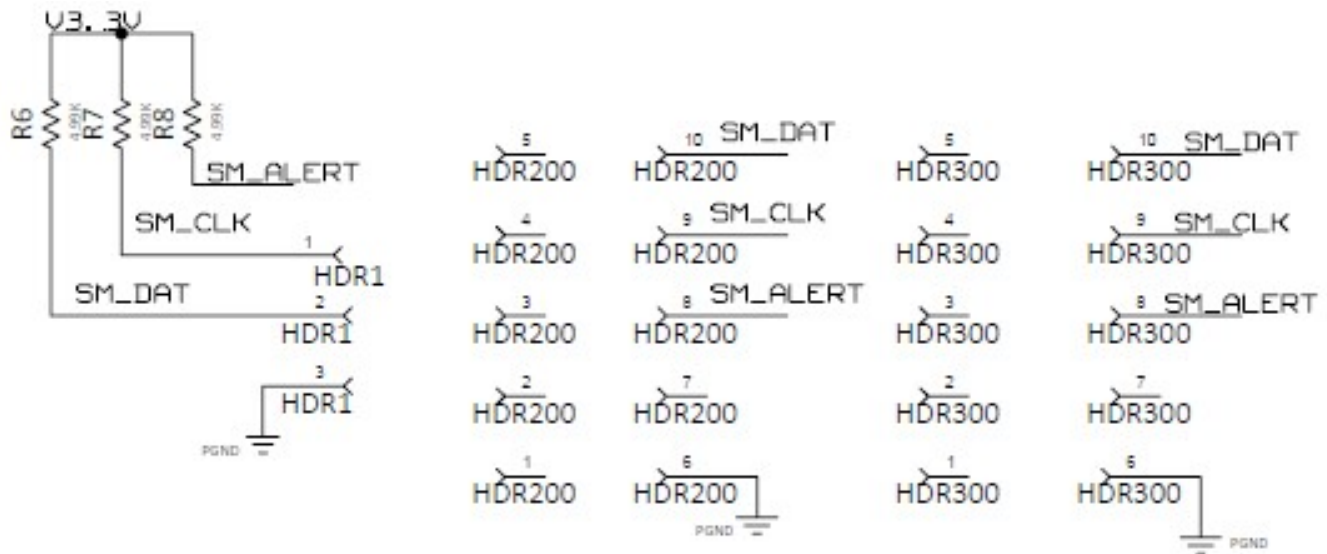


### 2.1.3. Load Transient Connections



## 2.1.4. PMBus Connection

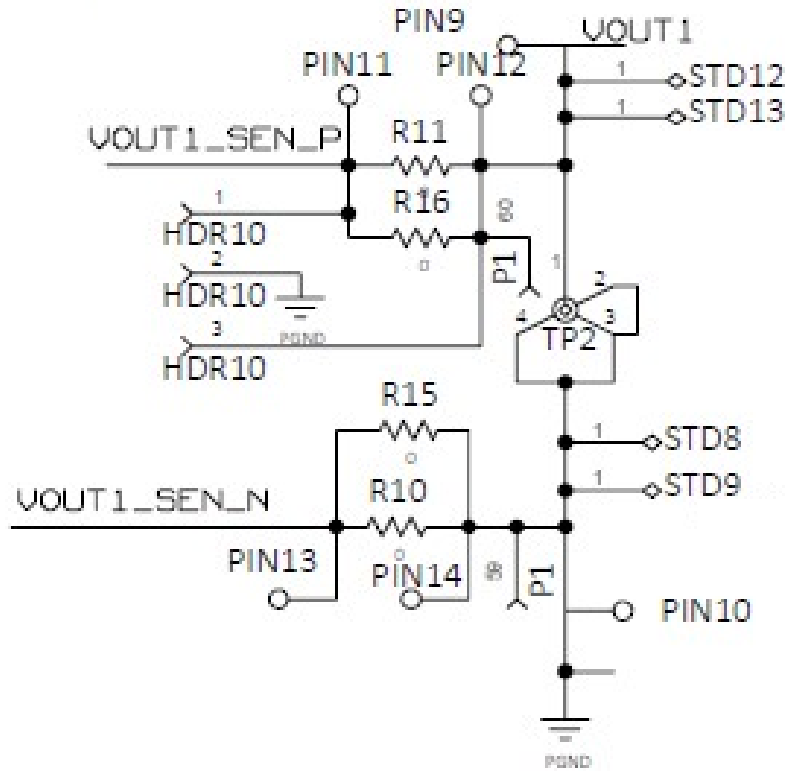
Evaluation Board is provided with a pair of 10 pin connectors and 3 pin header for PMBus connectivity



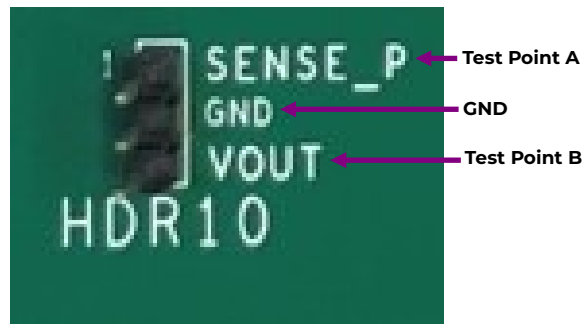


## 2.1.5. Bode Plot Connection

Evaluation Board is provided with test points for Bode Plot connections. Populate a 10-50 ohm resistor between test points A&B, and inject a small signal across Point A and Point B by using a transformer. Measure voltage of Ch1 (A and GND) and Ch2 (B and GND); Gain=Ch1/Ch2



**Bode Measurement**



There are two set of traces for Vout sensing. Zero ohm resistors are provided to select the sensing location.

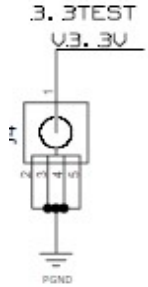

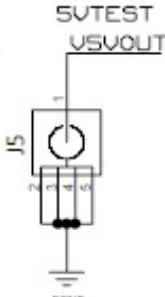

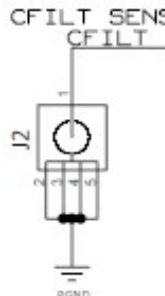

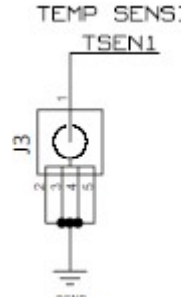

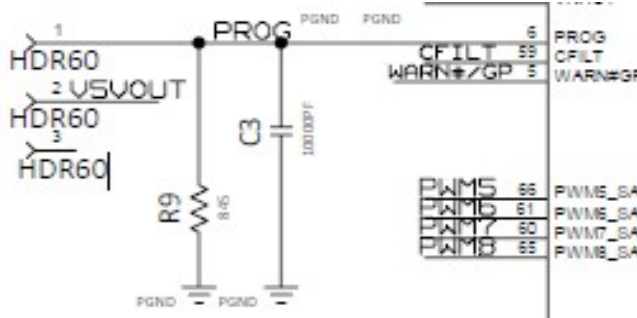

Sense at the output of the POL module (R15,R16) are zero ohm resistors

Sense at the slammer connector (R10,R11) either zero ohm or 50 ohm,

The single output and the dual output evaluation boards come with the Zero ohm resistors to regulate at the POL. To regulate at the slammer connector remove zero ohm resistors near module and populate at the slammer connector R10 and R11.

## 2.1.6. Miscellaneous Connections

### Bias Rails

 <p>3.3V TEST V3.3V</p> <p>J4</p> <p>PGND</p>	 <p>VRRDY2 WARN#GP J4 PIN1 3V3 GND 3V3 BIAS PIN2 VRHOT VRRDY1</p>
 <p>5V TEST V5VOUT</p> <p>J5</p> <p>PGND</p>	 <p>PIN23 (P) PIN22 (N) 5V BIAS</p>
 <p>CFILT SENSING CFILT</p> <p>J2</p> <p>PGND</p>	 <p>J2 CFILT</p>
 <p>TEMP SENSING TSEN1</p> <p>J3</p> <p>PGND</p>	 <p>J3 TSEN</p>
 <p>1 HDR60 2 V5VOUT 3 HDR60</p> <p>PROG</p> <p>R9 845</p> <p>C3 1000PF</p> <p>PGND</p> <p>CFILT WARN#GP</p> <p>PROG CFILT WARN#GP</p> <p>PWMS 66 PWMS 61 PWMS 60 PWMS 65</p> <p>PWMS_SAT, PWMS_SAT, PWMS_SAT, PWMS_SAT,</p>	 <p>PROG V5VOUT HDR60</p>

## Output Rails

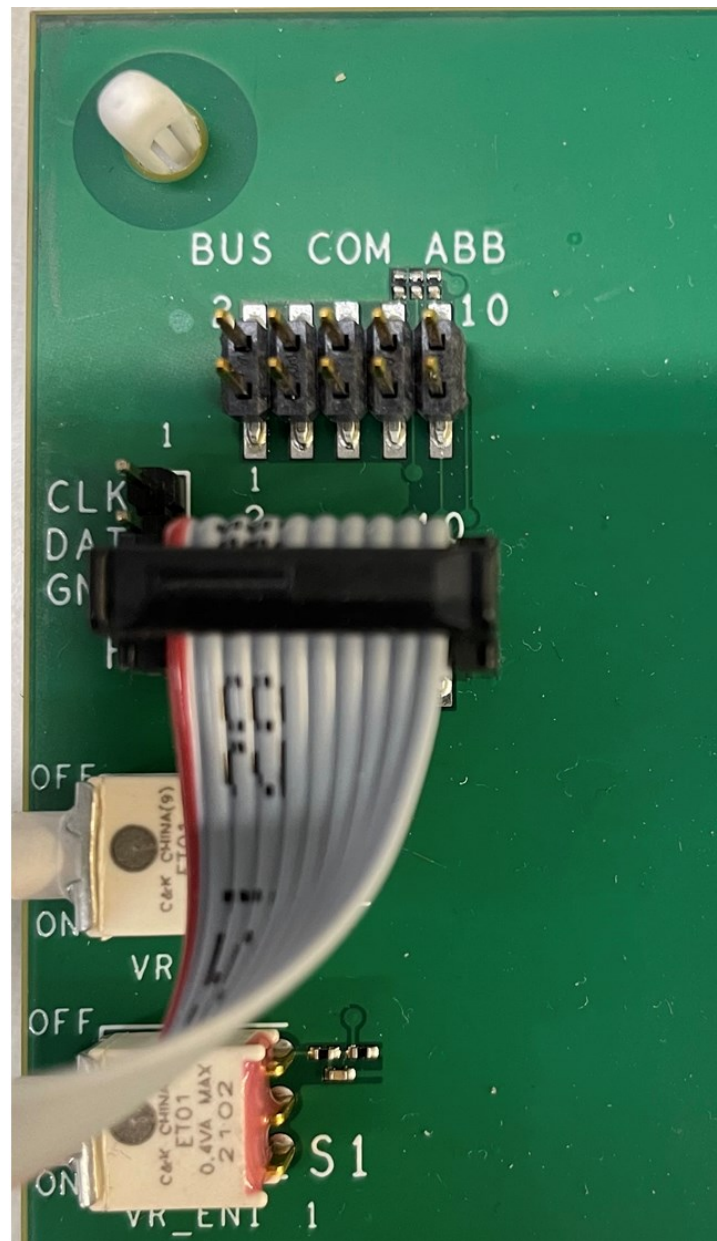
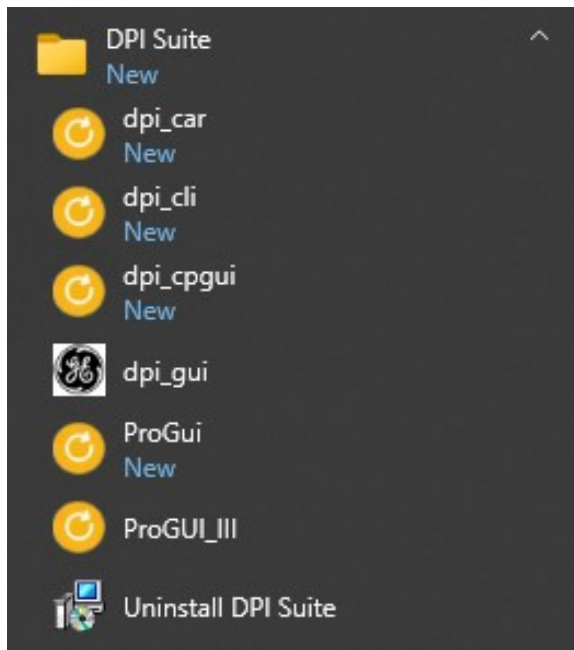
VOUT1



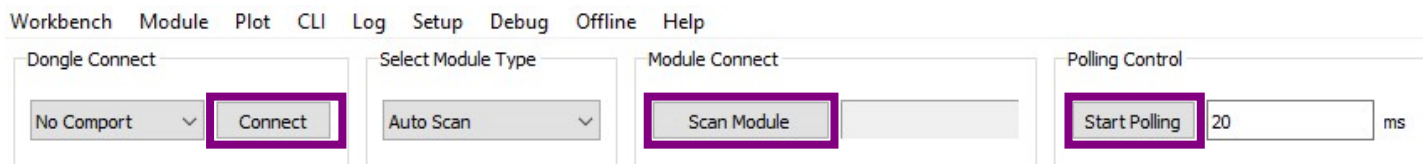


## 2.2 ProGUI III Connection and Setup

Click on ProGUI\_III option after clicking on your Windows Start Icon. Make sure the dongle is connected to the board and the computer. Ensure ribbon cable is connected with the pin alignment shown below.

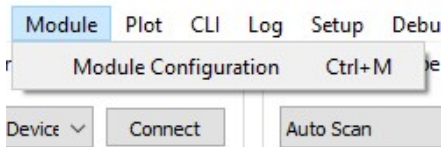


Click on Connect and then Scan Module to find the MLX module and then click on Start Polling

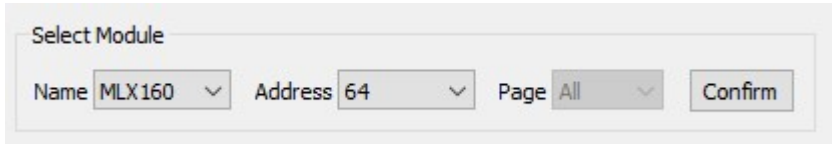


## 2.2 ProGUI III Connection and Setup (Continued)

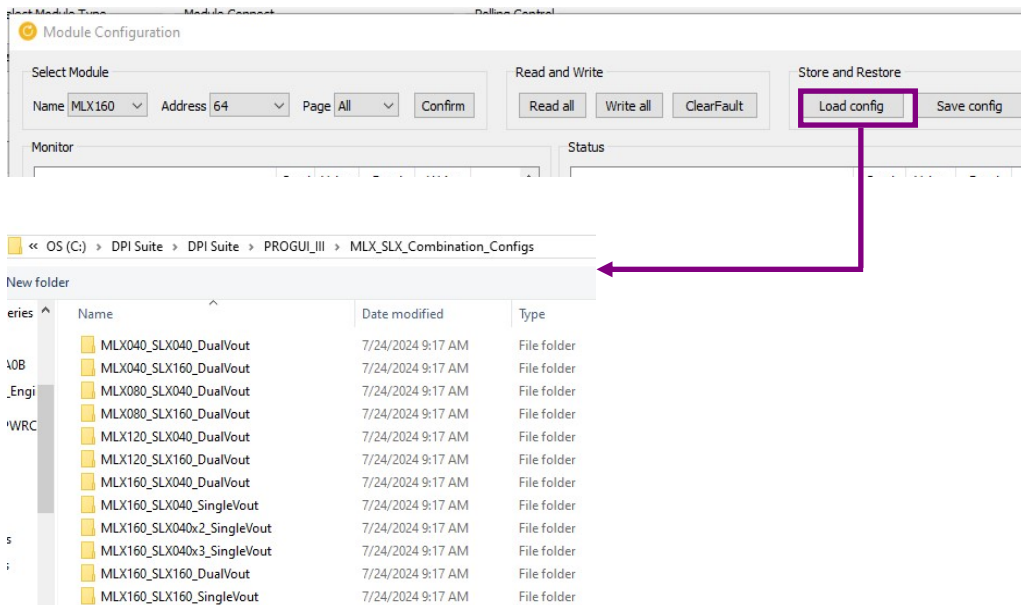
- Click on “Module” in the top left corner and then click on Module Configuration



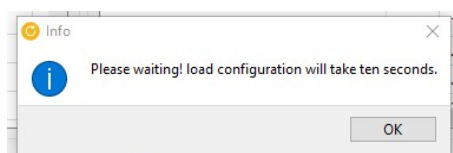
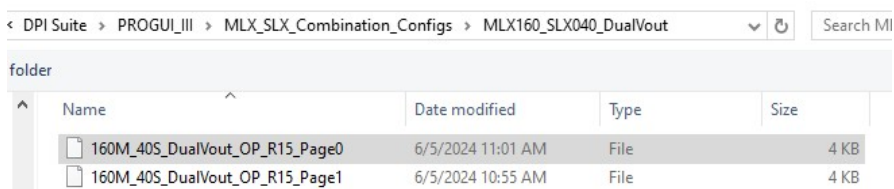
- A new window will open up. Click on the Confirm button to allow access to the module.



- Clicking on the Load Configuration in the Store and Restore section on the Right Upper corner which enables the user to select pre-loaded config files for the type of MLX+SLX board being used.

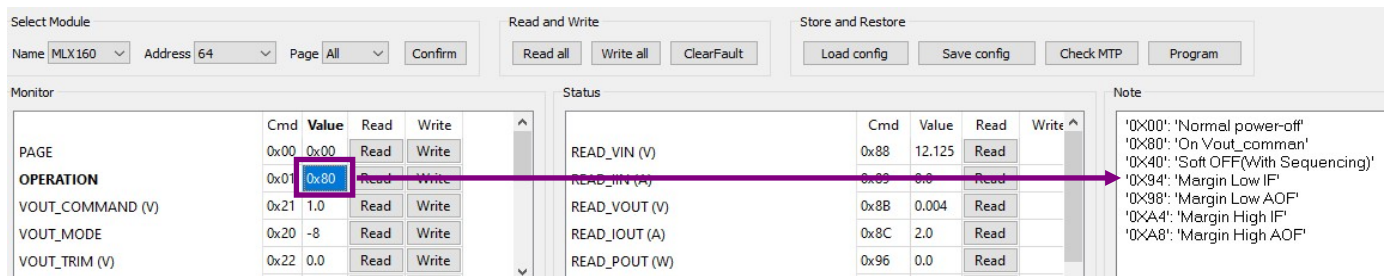


- Select the file from the folder representing the configuration on the board. Be aware that some configurations may have 2 files. Load page 0 followed by Page 1. There are separate files for Single Output and Dual Output. Example below is of Dual Output. For this board use Single Output



## 2.2 ProGUI III Connection and Setup (Continued)

- Clicking on the Hex Command or the Value field for the configurable registers populates the Notes filed on the Right Upper corner which provides the user with information on the available options for that command/register. For example clicking on the current value of 0x80 shows the available valid values for OPERATION command. Remember to click on the Write button after entering the value in the Value register. Click on save config only once all changes have been made since there are limited number of writes available. Another way to conserve number of writes is mentioned later in this document.



Select Module: Name MLX160 Address 64 Page All Confirm

Read and Write: Read all Write all ClearFault

Store and Restore: Load config Save config Check MTP Program

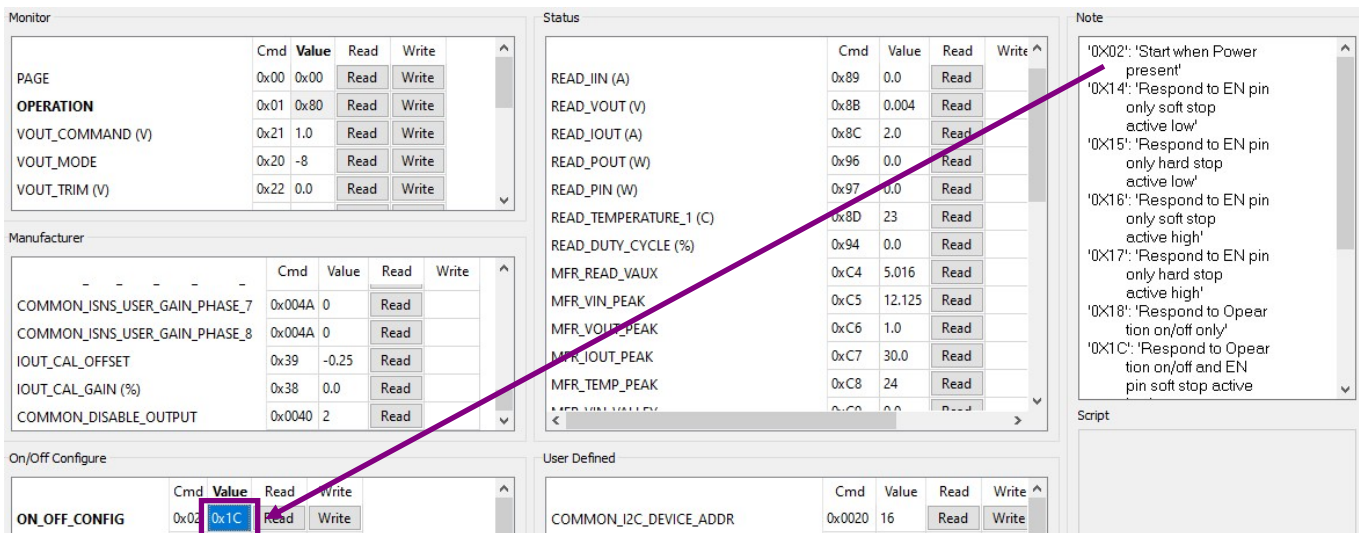
Monitor	Cmd	Value	Read	Write
PAGE	0x00	0x00	Read	Write
<b>OPERATION</b>	0x01	<b>0x80</b>	Read	Write
VOUT_COMMAND (V)	0x21	1.0	Read	Write
VOUT_MODE	0x20	-8	Read	Write
VOUT_TRIM (V)	0x22	0.0	Read	Write

Status	Cmd	Value	Read	Write
READ_VIN (V)	0x88	12.125	Read	
READ_IIN (A)	0x89	0.0	Read	
READ_VOUT (V)	0x8B	0.004	Read	
READ_IOUT (A)	0x8C	2.0	Read	
READ_POUT (W)	0x96	0.0	Read	

Note:

- '0x00': 'Normal power-off'
- '0x80': 'On Vout\_comman'
- '0x40': 'Soft OFF(With Sequencing)'
- '0x94': 'Margin Low IF'
- '0x98': 'Margin Low AOF'
- '0xA4': 'Margin High IF'
- '0xA8': 'Margin High AOF'

- Similarly clicking on ON\_OFF\_CONFIG Value 0x1C data field below brings up all the options available to the user in the Note Section. For example, enter 0x02 if you want module to powerup as soon as input is applied



Monitor:

Cmd	Value	Read	Write
0x00	0x00	Read	Write
0x01	0x80	Read	Write
0x21	1.0	Read	Write
0x20	-8	Read	Write
0x22	0.0	Read	Write

Manufacturer:

Cmd	Value	Read	Write
0x004A	0	Read	
0x004A	0	Read	
0x39	-0.25	Read	
0x38	0.0	Read	
0x0040	2	Read	

On/Off Configure:

Cmd	Value	Read	Write
0x02	<b>0x1C</b>	Read	Write

Status:

Cmd	Value	Read	Write
0x89	0.0	Read	
0x8B	0.004	Read	
0x8C	2.0	Read	
0x96	0.0	Read	
0x97	0.0	Read	
0x8D	23	Read	
0x94	0.0	Read	
0xC4	5.016	Read	
0xC5	12.125	Read	
0xC6	1.0	Read	
0xC7	30.0	Read	
0xC8	24	Read	

Note:

- '0x02': 'Start when Power present'
- '0x14': 'Respond to EN pin only soft stop active low'
- '0x15': 'Respond to EN pin only hard stop active low'
- '0x16': 'Respond to EN pin only soft stop active high'
- '0x17': 'Respond to EN pin only hard stop active high'
- '0x18': 'Respond to Operation on/off only'
- '0x1C': 'Respond to Operation on/off and EN pin soft stop active'

User Defined:

Cmd	Value	Read	Write
0x0020	16	Read	Write



## 2.2 ProGUI III Connection and Setup (Continued)

Starts communication

Read / Write command for all registers

Use these to save values of all registers to a local file on the or load a local file with desired register values

MTP shows current no. of writes available and Program writes all register values into NVM

Core R/W registers affecting many other registers

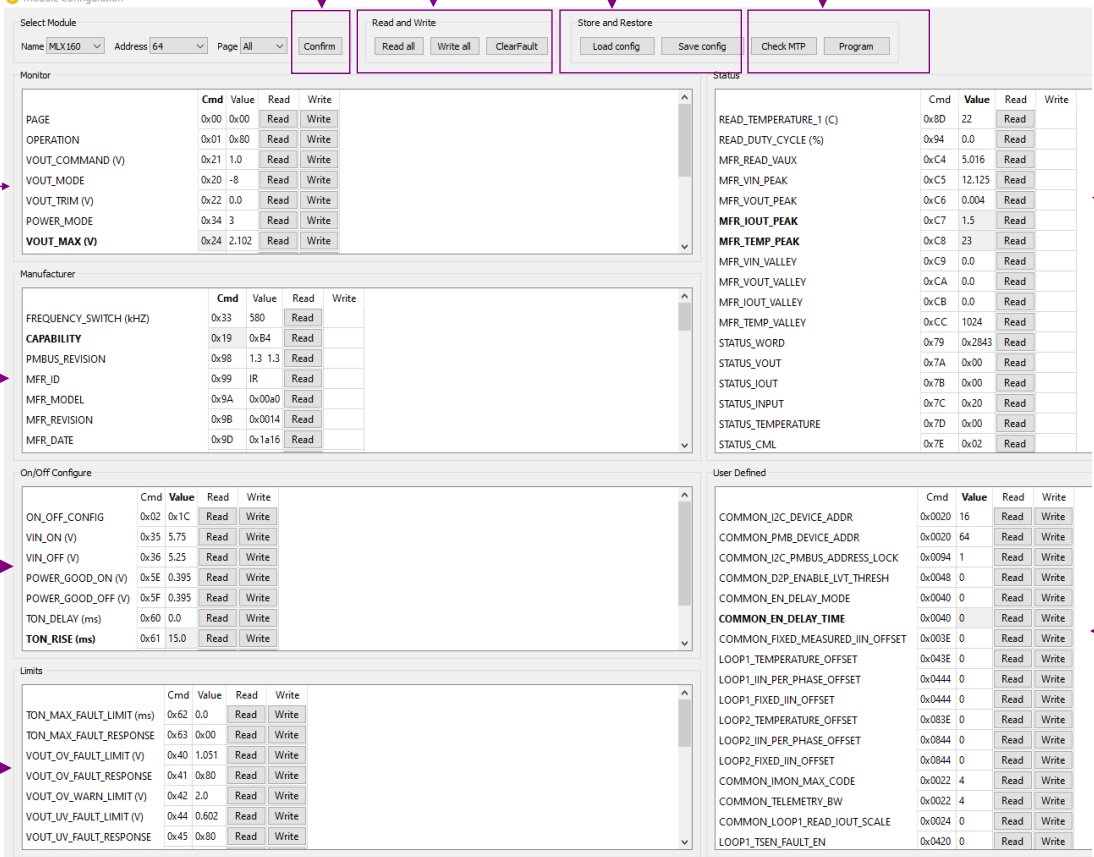
Read only registers with MFR data

Adjustment of ON/OFF thresholds and ramp-up

Fault, and Warning Thresholds and Response behavior

Read only registers with Performance data and Status Registers

Advanced Performance registers including Control Loop and Module Calibration and response



**Module Configuration**

Select Module: Name: MLX160 Address: 64 Page: All

Buttons: Confirm, Read and Write (Read all, Write all, Clear Fault), Store and Restore (Load config, Save config), Check MTP, Program

**Monitor**

Cmd	Value	Read	Write
PAGE	0x00	Read	Write
OPERATION	0x01	Read	Write
VOUT_COMMAND (V)	0x21	Read	Write
VOUT_MODE	0x20	Read	Write
VOUT_TRIM (V)	0x22	Read	Write
POWER_MODE	0x34	Read	Write
VOUT_MAX (V)	0x24	Read	Write

**Manufacturer**

Cmd	Value	Read	Write
FREQUENCY_SWITCH (kHz)	0x33	Read	Write
CAPABILITY	0x19	Read	Write
PMBUS_REVISION	0x98	Read	Write
MFR_ID	0x99	Read	Write
MFR_MODEL	0x9A	Read	Write
MFR_REVISION	0x9B	Read	Write
MFR_DATE	0x9D	Read	Write

**On/Off Configure**

Cmd	Value	Read	Write
ON_OFF_CONFIG	0x02	Read	Write
VIN_ON (V)	0x35	Read	Write
VIN_OFF (V)	0x36	Read	Write
POWER_GOOD_ON (V)	0x5E	Read	Write
POWER_GOOD_OFF (V)	0x5F	Read	Write
TON_DELAY (ms)	0x60	Read	Write
TON_RISE (ms)	0x61	Read	Write

**Limits**

Cmd	Value	Read	Write
TON_MAX_FAULT_LIMIT (ms)	0x62	Read	Write
TON_MAX_FAULT_RESPONSE	0x63	Read	Write
VOUT_OV_FAULT_LIMIT (V)	0x40	Read	Write
VOUT_OV_FAULT_RESPONSE	0x41	Read	Write
VOUT_OV_WARN_LIMIT (V)	0x42	Read	Write
VOUT_UV_FAULT_LIMIT (V)	0x44	Read	Write
VOUT_UV_FAULT_RESPONSE	0x45	Read	Write

**Status**

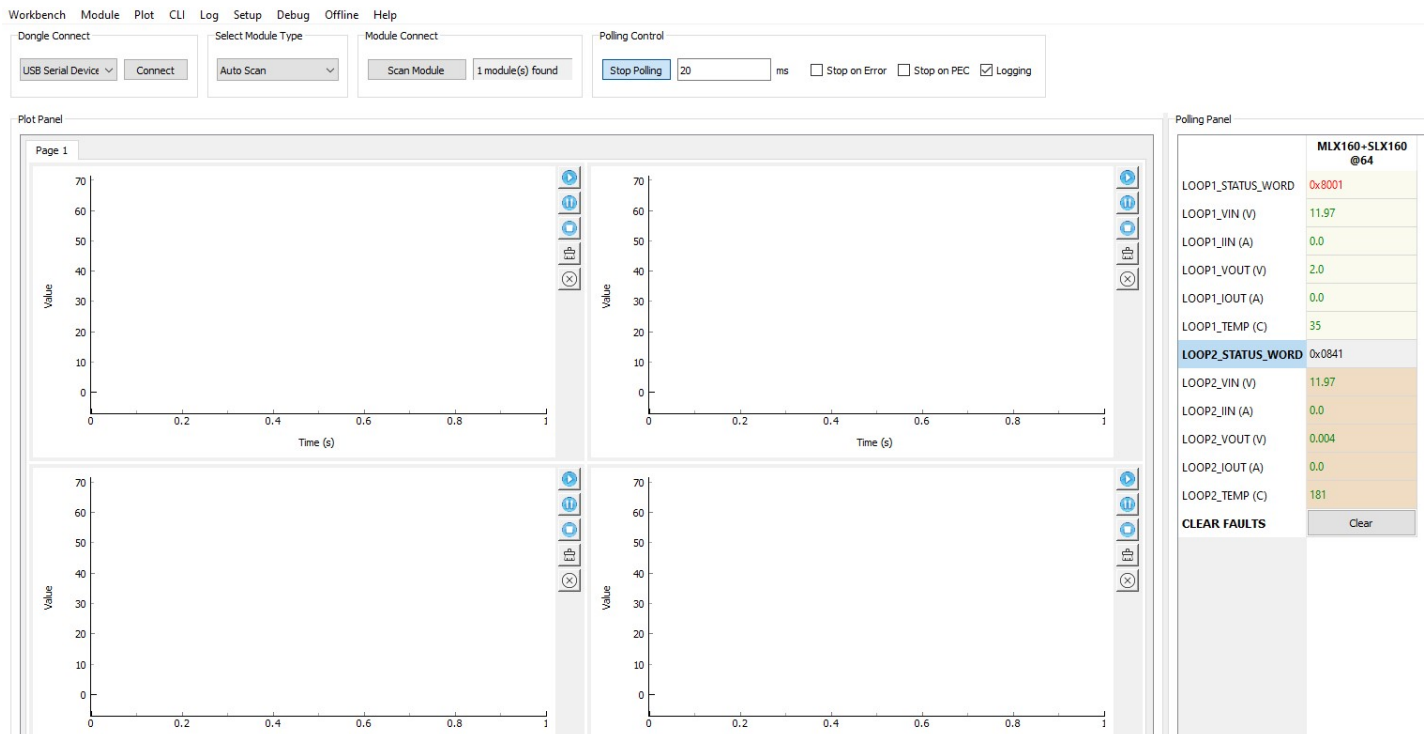
Cmd	Value	Read	Write
READ_TEMPERATURE_1 (C)	0x8D	Read	Write
READ_DUTY_CYCLE (%)	0x94	Read	Write
MFR_READ_VAUX	0xC4	Read	Write
MFR_VIN_PEAK	0xC5	Read	Write
MFR_VOUT_PEAK	0xC6	Read	Write
MFR_IOUT_PEAK	0xC7	Read	Write
MFR_TEMP_PEAK	0xC8	Read	Write
MFR_VIN_VALLEY	0xC9	Read	Write
MFR_VOUT_VALLEY	0xCA	Read	Write
MFR_IOUT_VALLEY	0xCB	Read	Write
MFR_TEMP_VALLEY	0xCC	Read	Write
STATUS_WORD	0x79	Read	Write
STATUS_VOUT	0x7A	Read	Write
STATUS_IOUT	0x7B	Read	Write
STATUS_INPUT	0x7C	Read	Write
STATUS_TEMPERATURE	0x7D	Read	Write
STATUS_CML	0x7E	Read	Write

**User Defined**

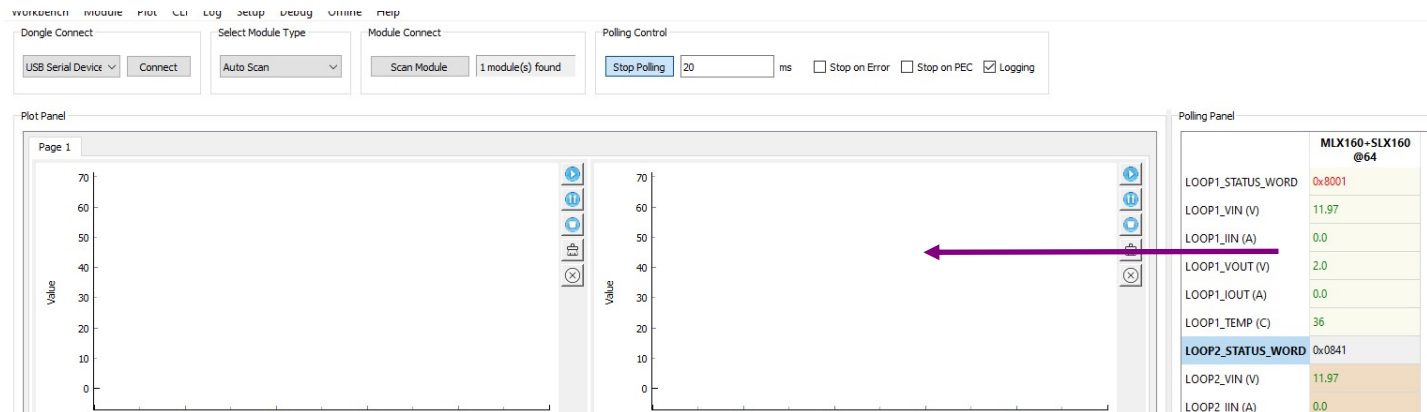
Cmd	Value	Read	Write
COMMON_I2C_DEVICE_ADDR	0x0020	Read	Write
COMMON_PMB_DEVICE_ADDR	0x0020	Read	Write
COMMON_I2C_PMBUS_ADDRESS_LOCK	0x0094	Read	Write
COMMON_D2P_ENABLE_LVT_THRESH	0x0048	Read	Write
COMMON_EN_DELAY_MODE	0x0040	Read	Write
COMMON_EN_DELAY_TIME	0x0040	Read	Write
COMMON_FIXED_MEASURED_IIN_OFFSET	0x003E	Read	Write
LOOP1_TEMPERATURE_OFFSET	0x043E	Read	Write
LOOP1_IIN_PER_PHASE_OFFSET	0x0444	Read	Write
LOOP1_FIXED_IIN_OFFSET	0x0444	Read	Write
LOOP2_TEMPERATURE_OFFSET	0x083E	Read	Write
LOOP2_IIN_PER_PHASE_OFFSET	0x0844	Read	Write
LOOP2_FIXED_IIN_OFFSET	0x0844	Read	Write
COMMON_IMON_MAX_CODE	0x0022	Read	Write
COMMON_TELEMETRY_BW	0x0022	Read	Write
COMMON_LOOP1_READ_IOUT_SCALE	0x0024	Read	Write
LOOP1_TSEN_FAULT_EN	0x0420	Read	Write

## 2.2 ProGUI III Connection and Setup (Continued)

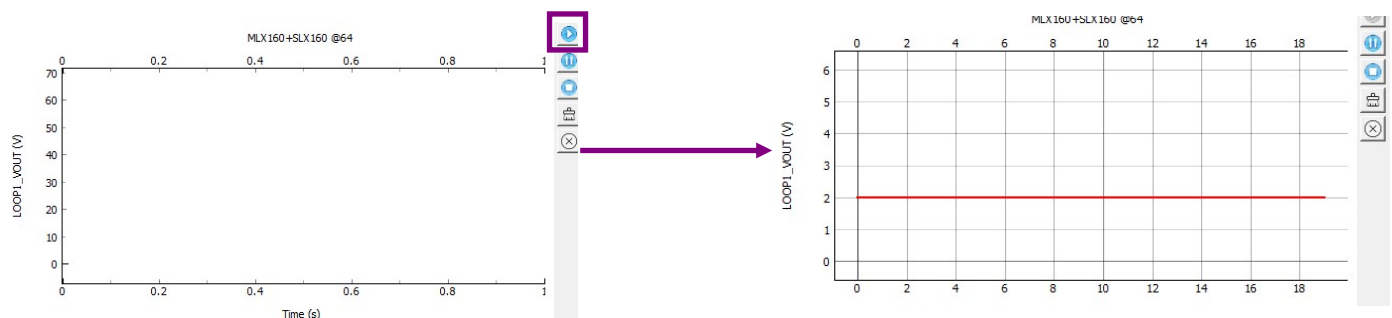
Main Display Screen once Module is On (with output)



Drag desired parameters to screen for polling and drop into graph area



Remember to click Start



## 2.1.2. ProGUI III Connection and Setup (Continued)

Once module is Turned On the main screen displays the key input-output measurements

On/Off Configure				
	Cmd	Value	Read	Write
ON_OFF_CONFIG	0x02	0x02	Read	Write

Polling Panel	
	MLX160 @64
LOOP1_STATUS_WORD	0x0000
LOOP1_VIN (V)	12.09
LOOP1_IIN (A)	0.03
LOOP1_VOUT (V)	1.0
LOOP1_IOUT (A)	0.5
LOOP1_TEMP (C)	25

## Revision History

Revision	Date	Description of the change
1.1	02/06/2024	Initial Release
1.2	08/01/2024	Guidelines for use with ProGUI III added
1.3	08/14/2024	Clarification on voltage Sense Connections



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