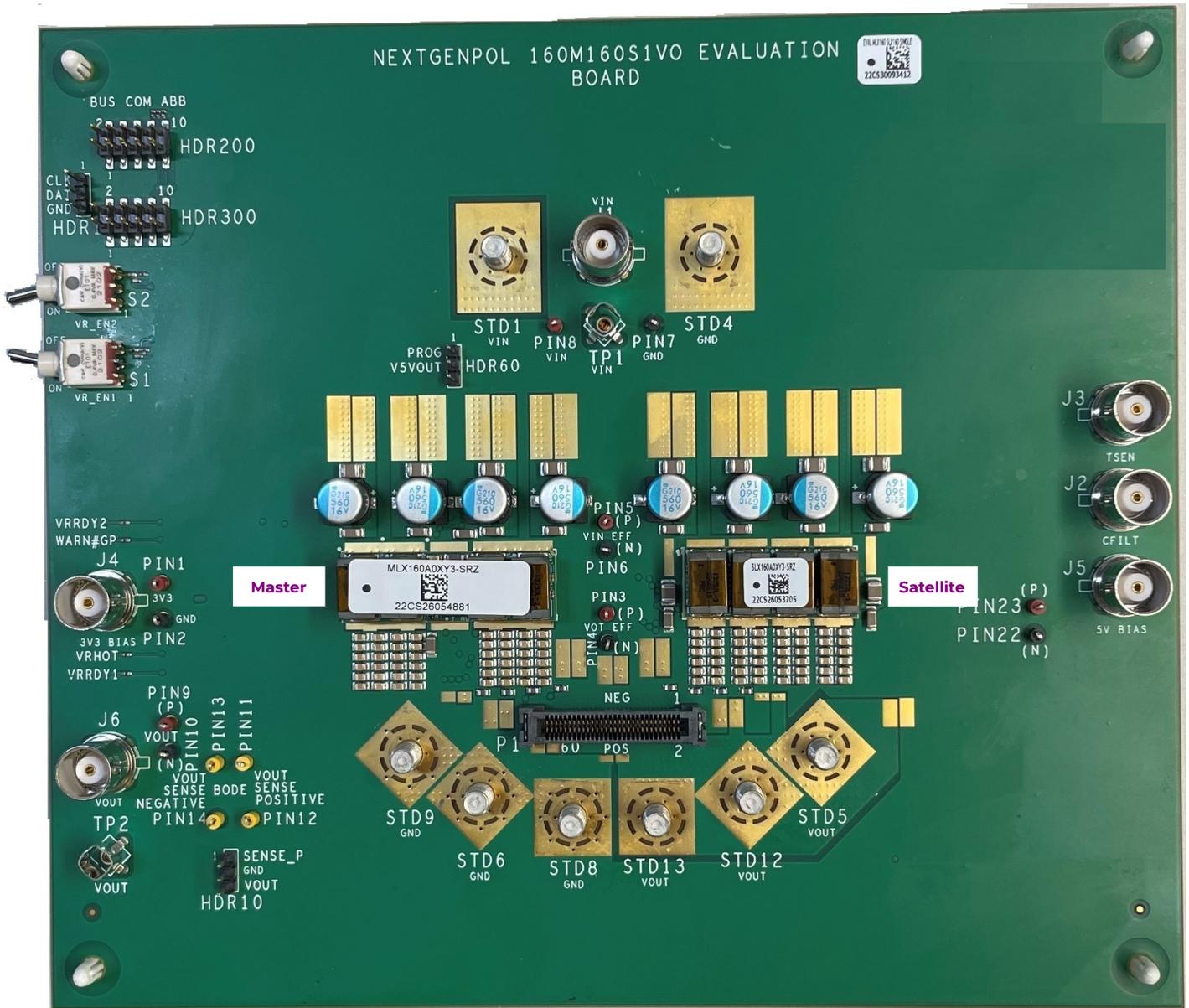


NEXTGENPOL 160M160S1V0 SINGLE LOOP/OUTPUT

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



Note: PGOOD1 may be marked as VRRDY1 or PGOOD1 on the Eval board PWB.
 PGOOD2 may be marked as VRRDY2 or PGOOD2 on the Eval board PWB.

Table of Contents

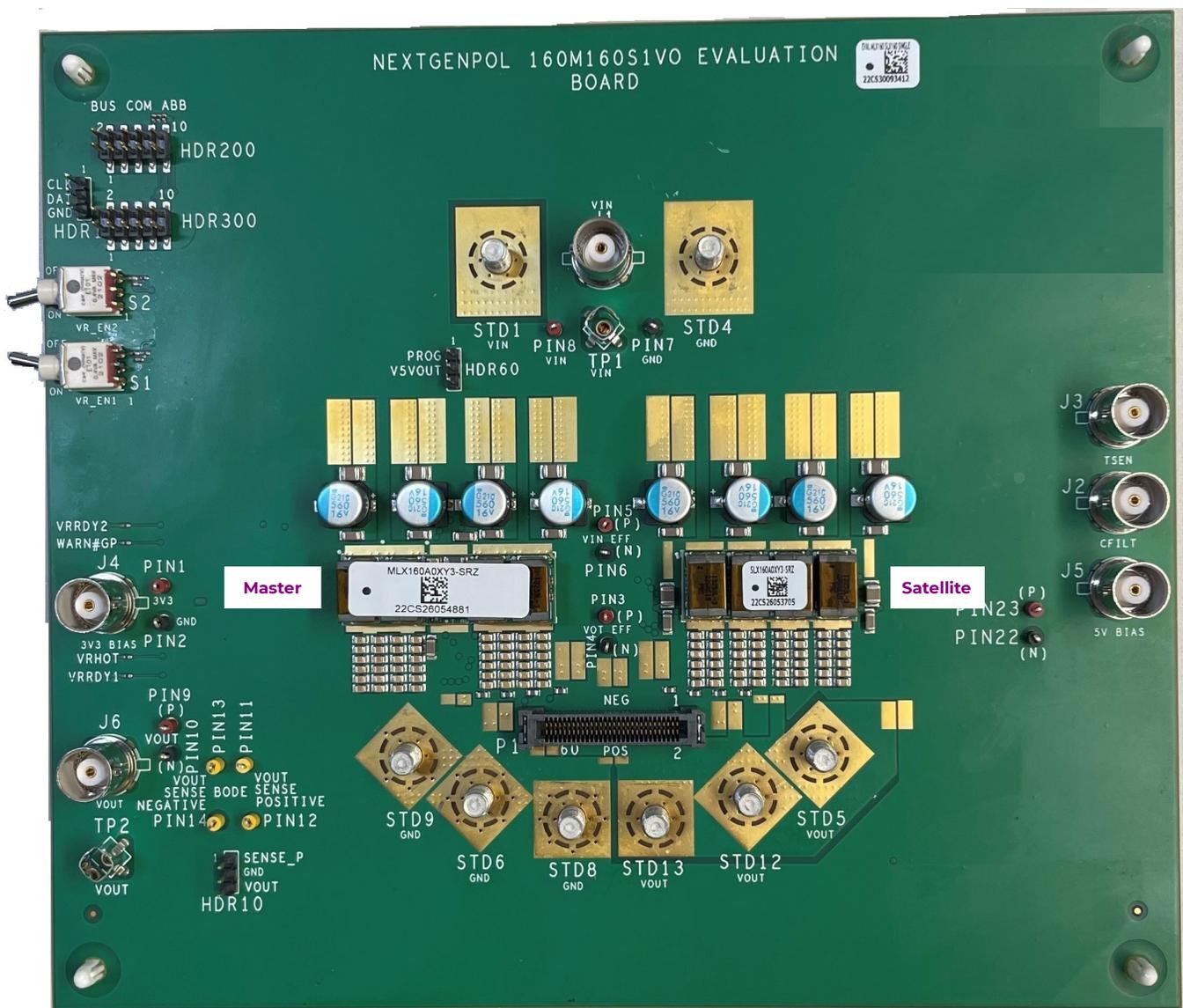
- 1. Description 3**
- 2. Schematic 6**
 - 2.1. Eval Board Sections.....11
 - 2.1.1. Input Connections.....11
 - 2.1.2. Output Connections.....12
 - 2.1.3. Load Transient Connection13
 - 2.1.4. PMBus Connection14
 - 2.1.5. Bode Plot Connection.....15
 - 2.1.6. Connections Summary16
 - 2.2. ProGUI III Connection and Setup.....18
- 3. Revision History 24**

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.

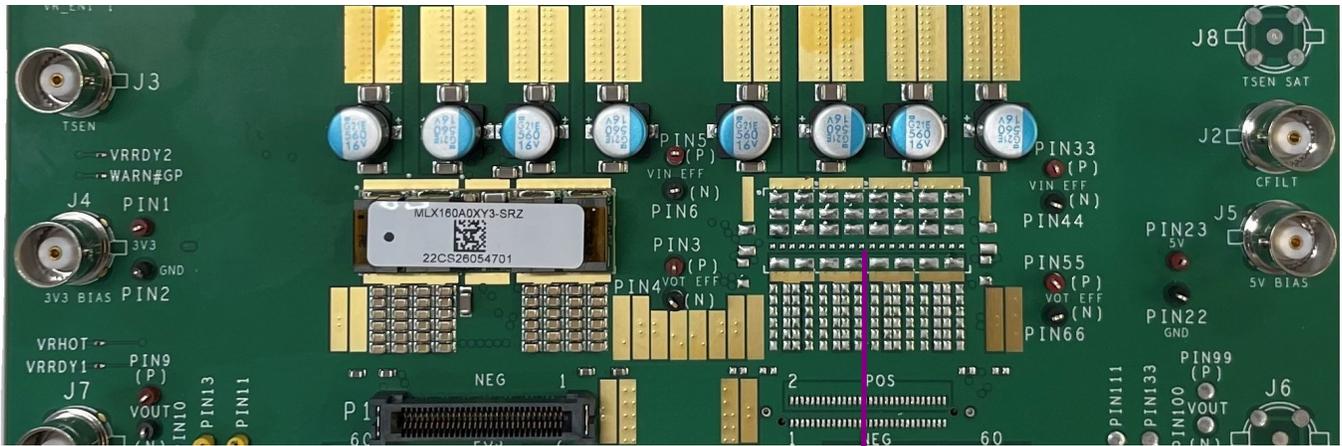


Top View of Evaluation Board with MLX160 + SLX160 module

1. Description (Continued)

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

Evaluation Board with different module variants



OPTIONS



SLX160

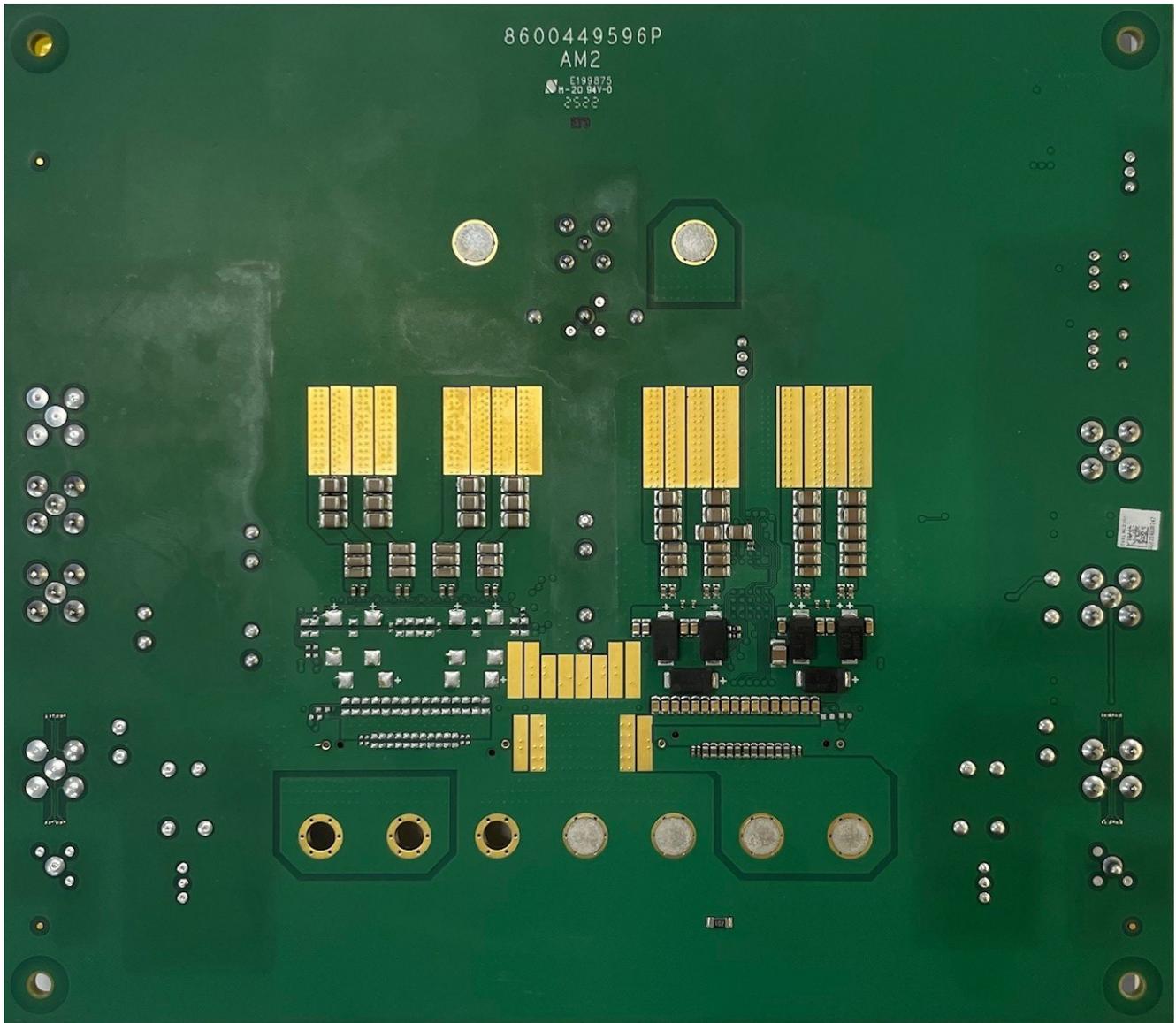


SLX040

1. Description (Continued)

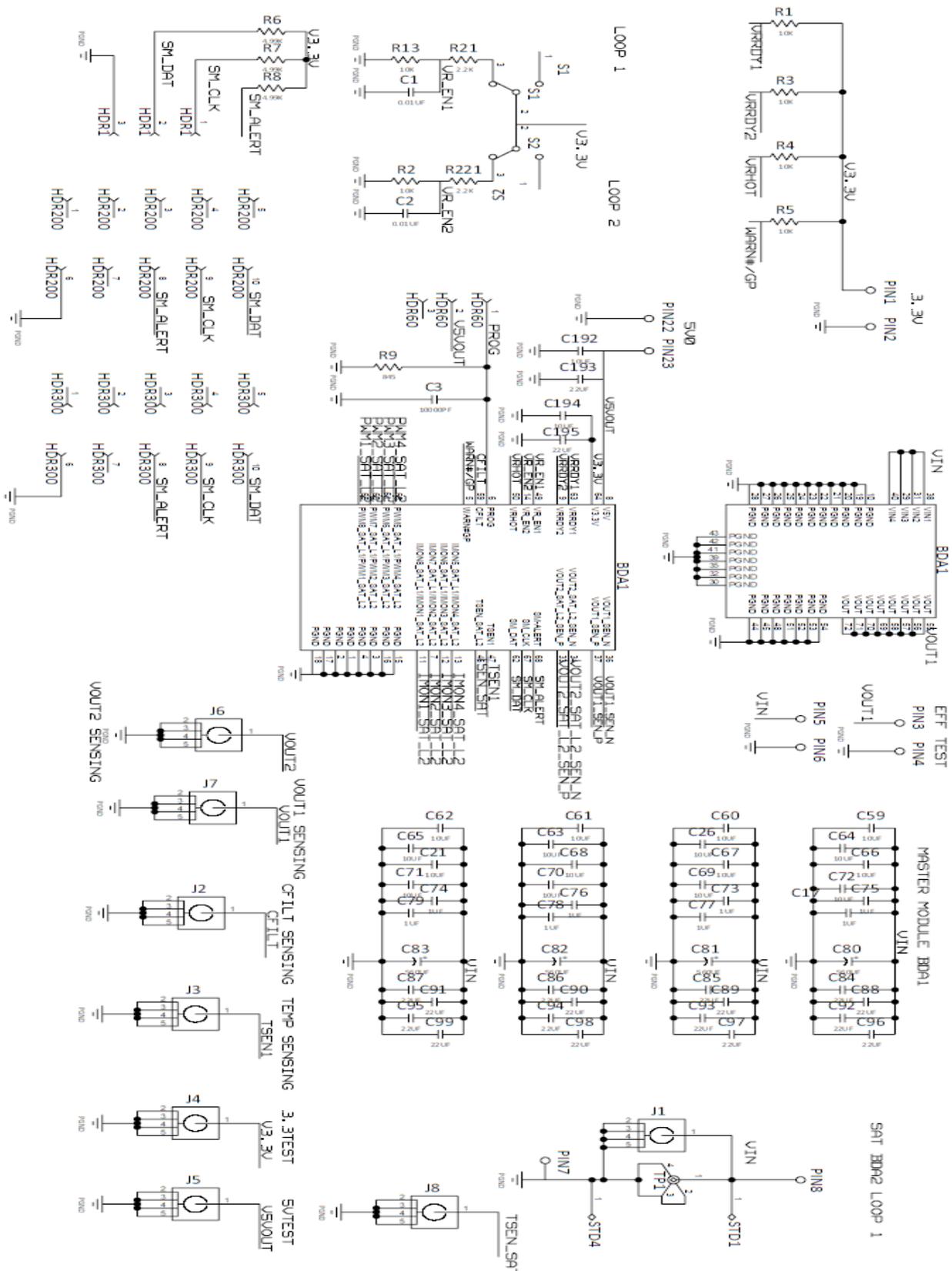
The Installed components are as follows. The schematic on the following page shows maximum capability and includes expansion capability:

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



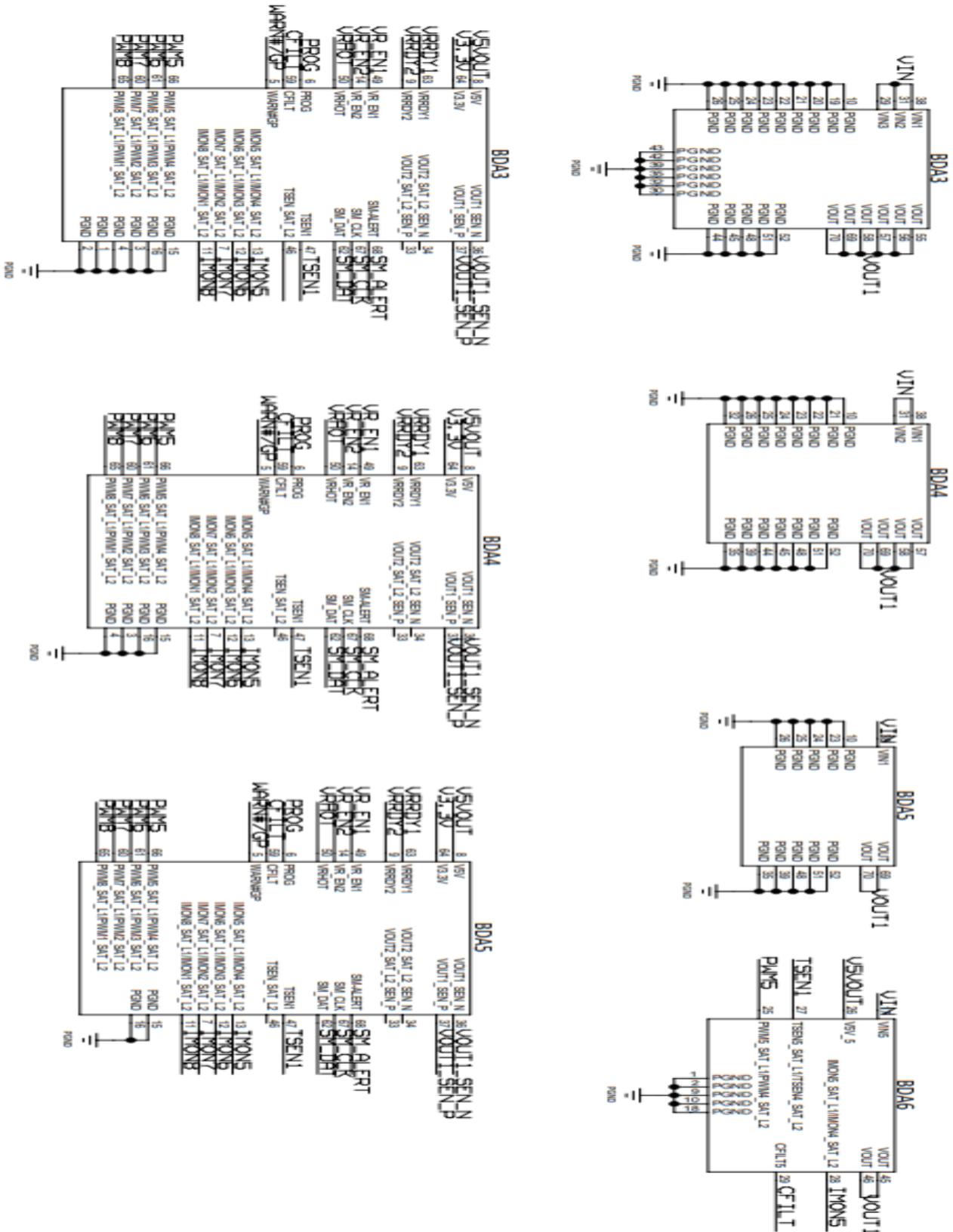
Bottom View of Evaluation Board

2. Schematic*



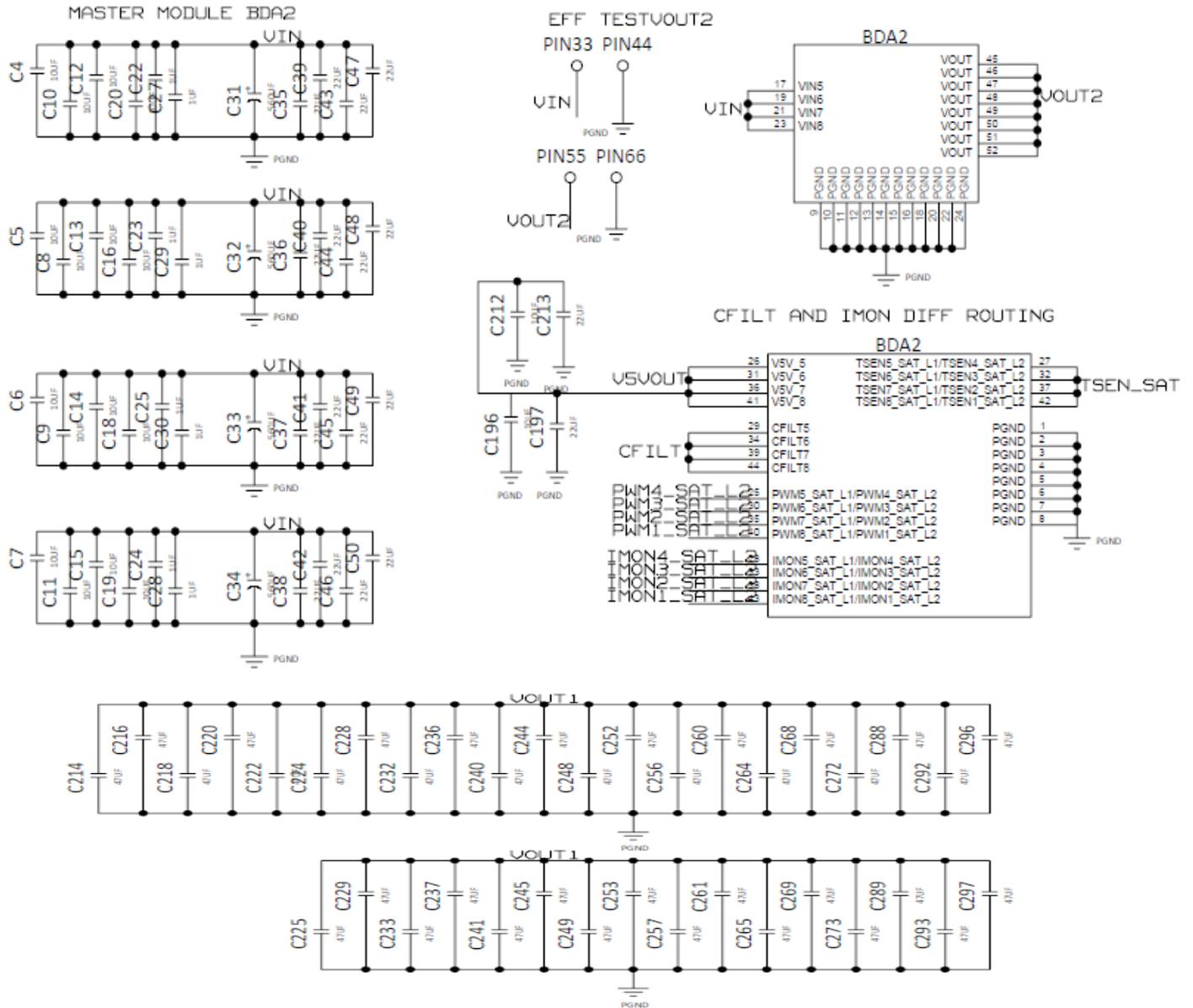
*Download Schematic at www.omnionpower.com.

2. Schematic* (Continued)



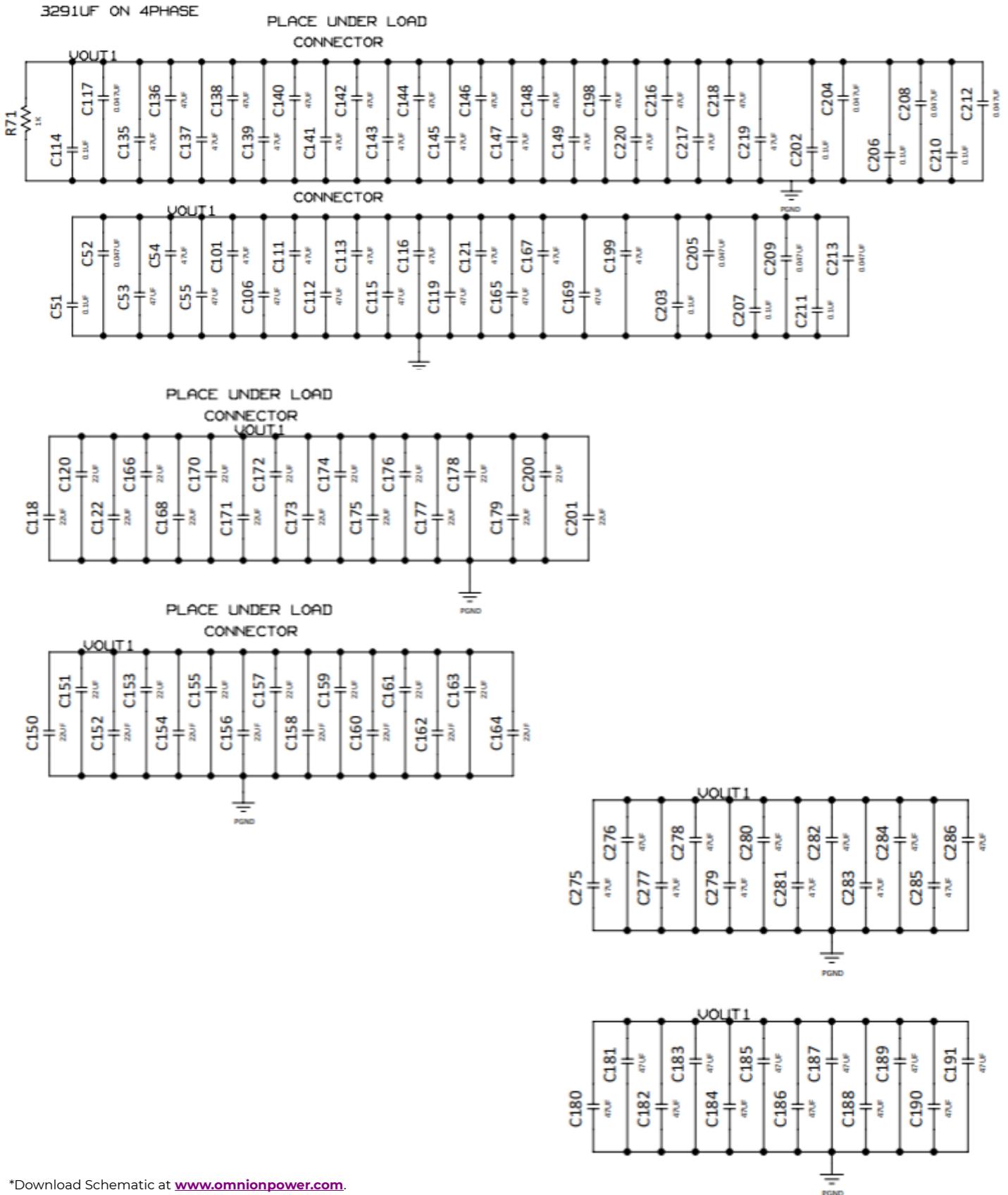
*Download Schematic at www.omnionpower.com.

2. Schematic* (Continued)



*Download Schematic at www.omnionpower.com.

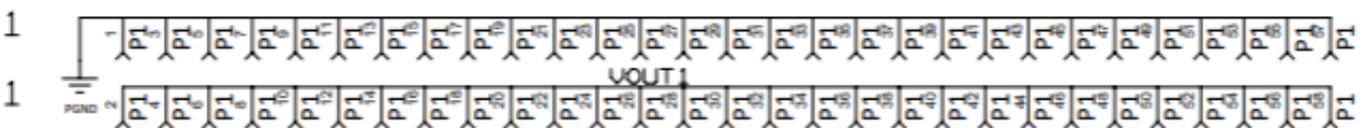
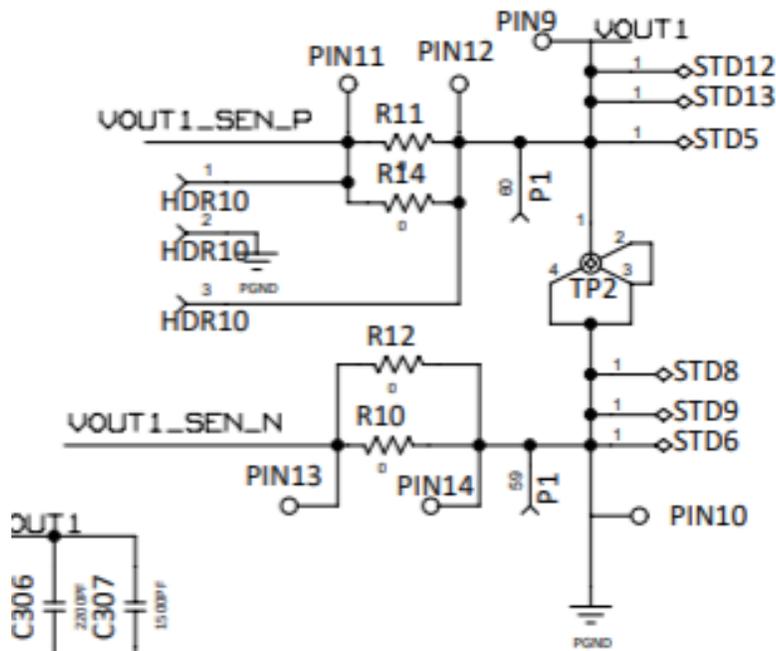
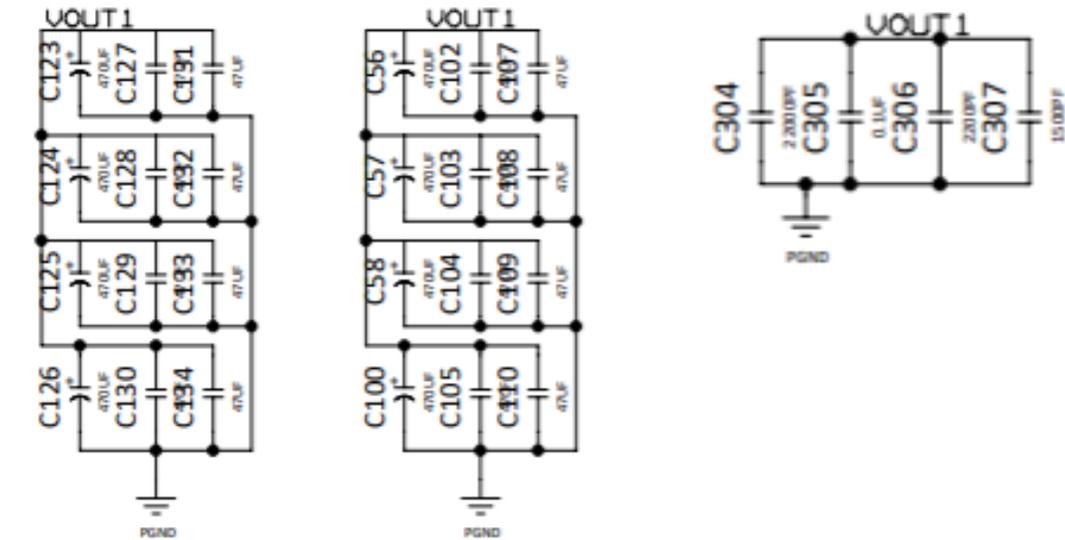
2. Schematic* (Continued)



*Download Schematic at www.omnionpower.com.

2. Schematic* (Continued)

PLACE CLOSE TO IND



*Download Schematic at www.omnionpower.com.

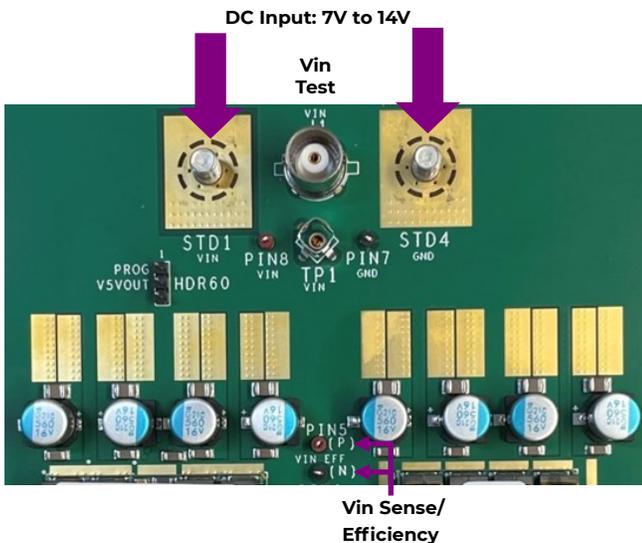
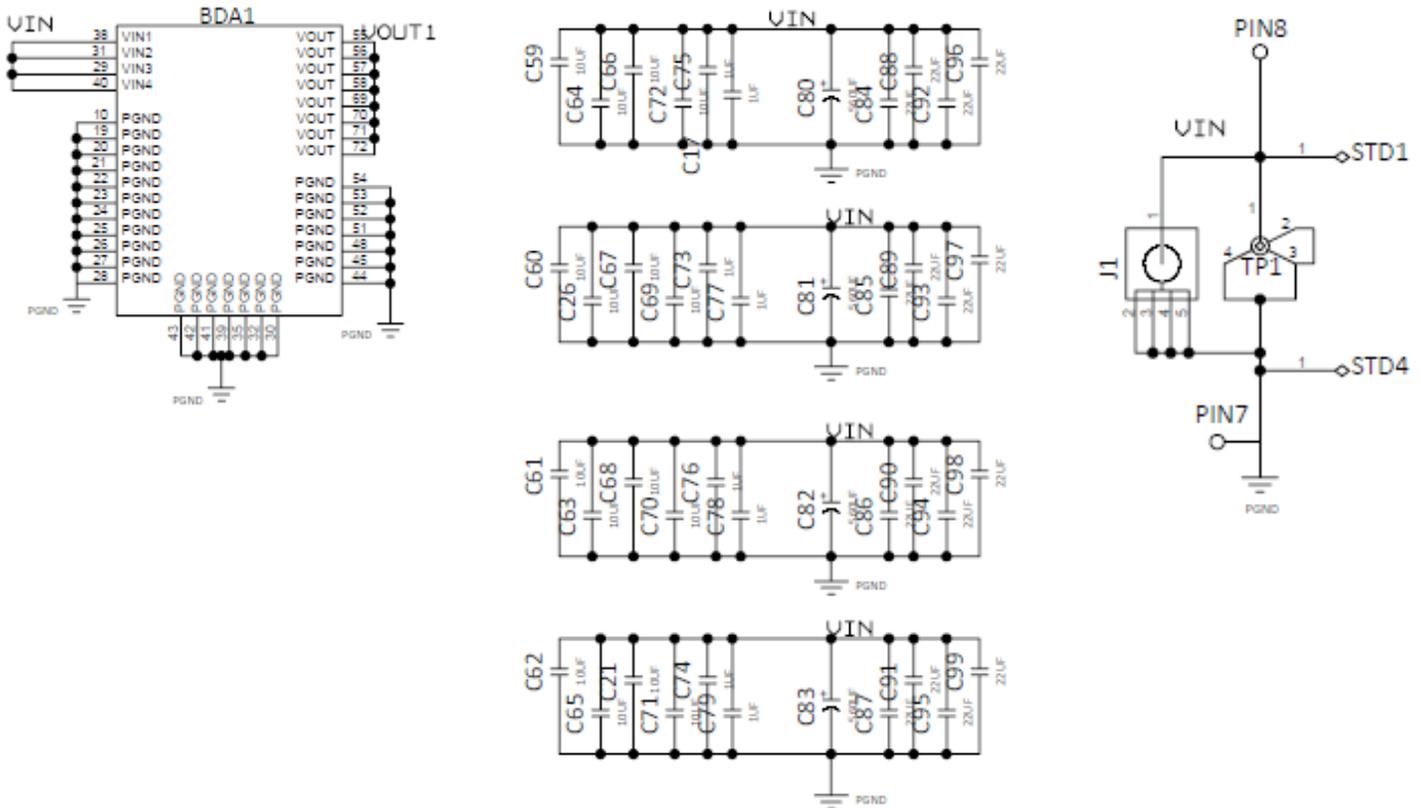
The complete schematic diagram of the MLX Series evaluation board is shown in the previous pages. Components on schematic show max capability and may not be actually used on the board.

The complete schematic can be downloaded from www.omnionpower.com.

2.1. Eval Board Sections

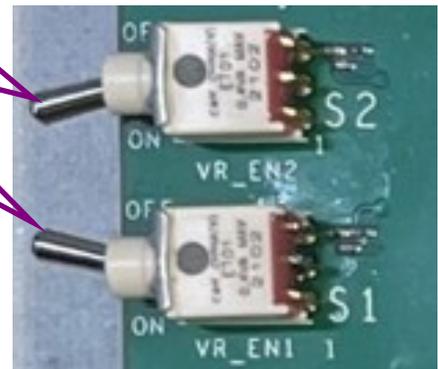
The following pictures show the input connections and components external to the module.

2.1.1. Input Connections



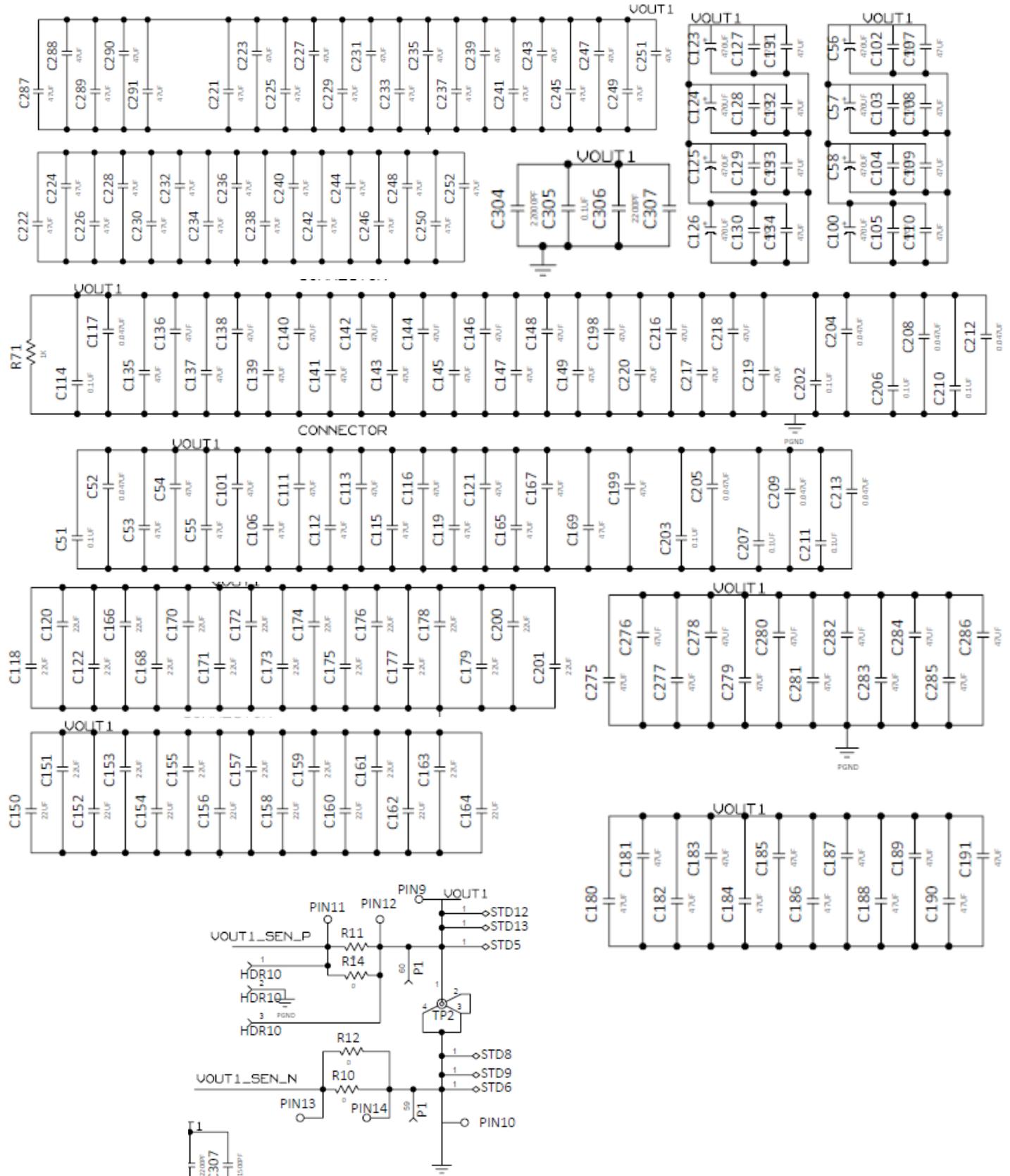
Enable for Loop2 - Not Used for Single Output Mode. Turn to OFF position

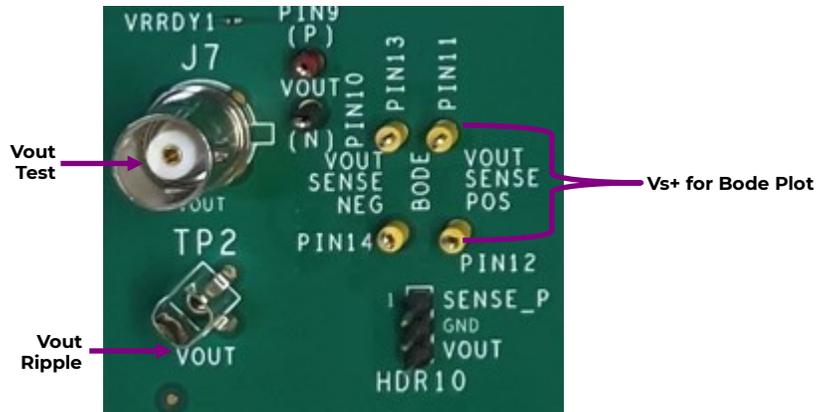
Enable for Loop1. Turn this ON



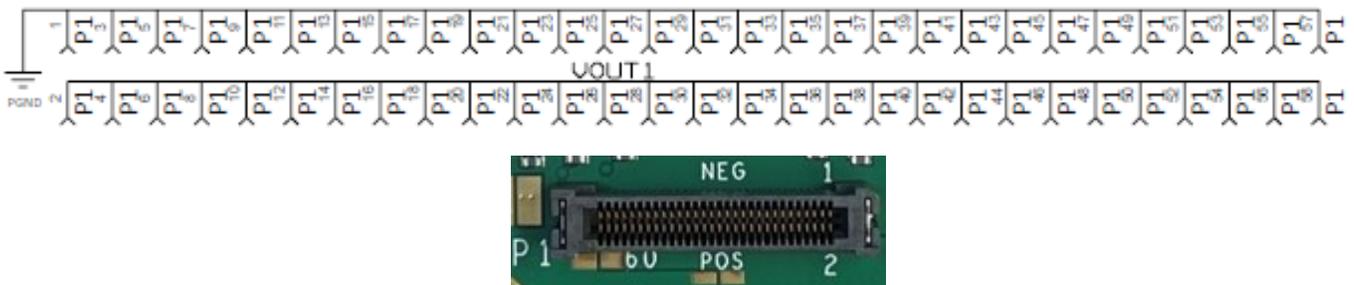
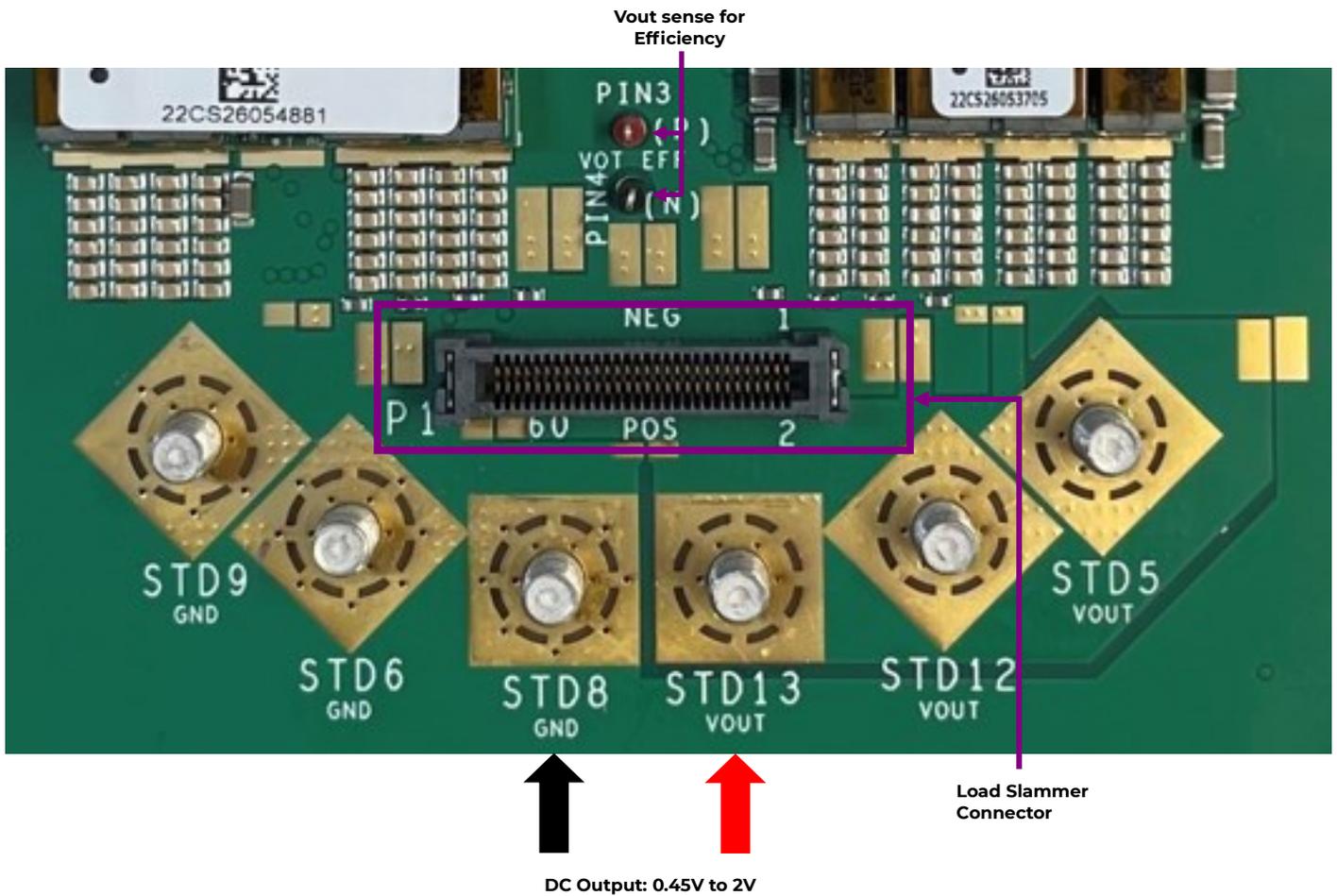
2.1.2. Output Connections

Schematic shows max capability. Board will not be populated with all components.



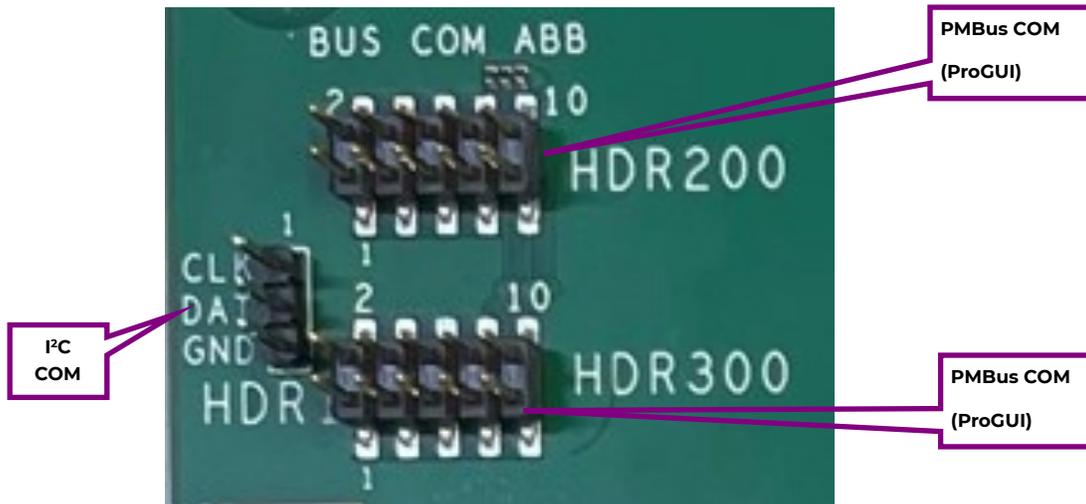
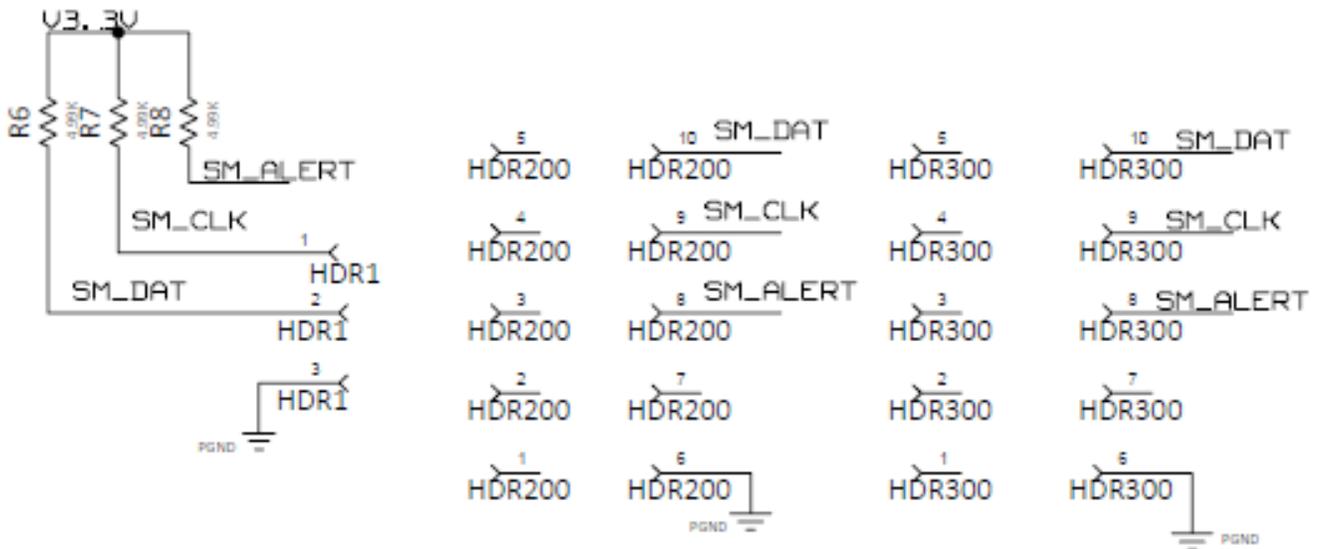


2.1.3. Load Transient Connections



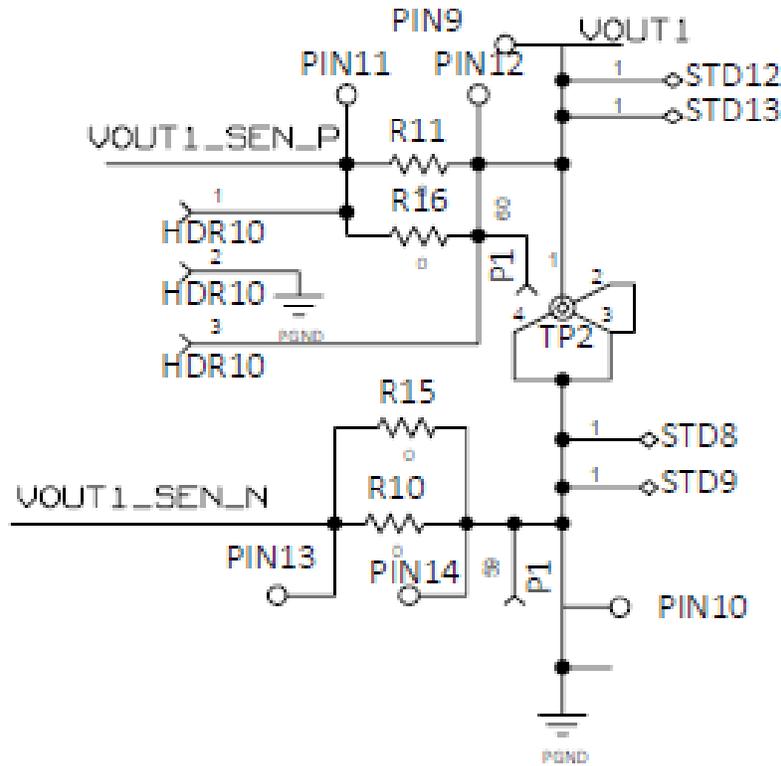
2.1.4. PMBus Connection

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

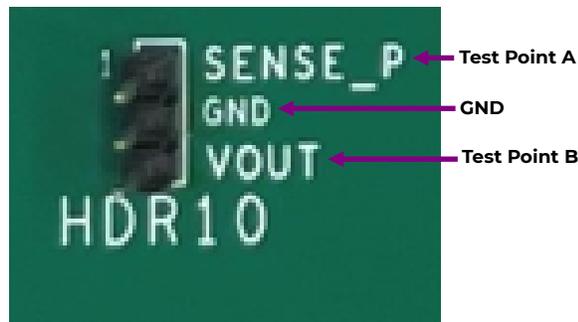


2.1.5. Bode Plot Connection

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 U3.3V</p> <p>J4</p> <p>PGND</p>	<p>VRRDY2 WARN#GP J4 PIN1 3V3 GND 3V3 BIAS PIN2 VRHOT VRRDY1</p>
<p>5V TEST USVOUT</p> <p>J5</p> <p>PGND</p>	<p>J5 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 2 3 HDR60 USVOUT HDR60</p> <p>PROG PGND PGND</p> <p>R9 0.45</p> <p>1000pF</p> <p>CFILT 55 WARN#ZGP 5</p> <p>PROG CFILT WARN#GP</p> <p>PWMS 55 PWME_SAT. PWMB 61 PWME_SAT. PWM7 60 PWM7_SAT. PWMB 55 PWME_SAT.</p> <p>PGND PGND PGND</p>	<p>PROG V5VOUT HDR60</p>

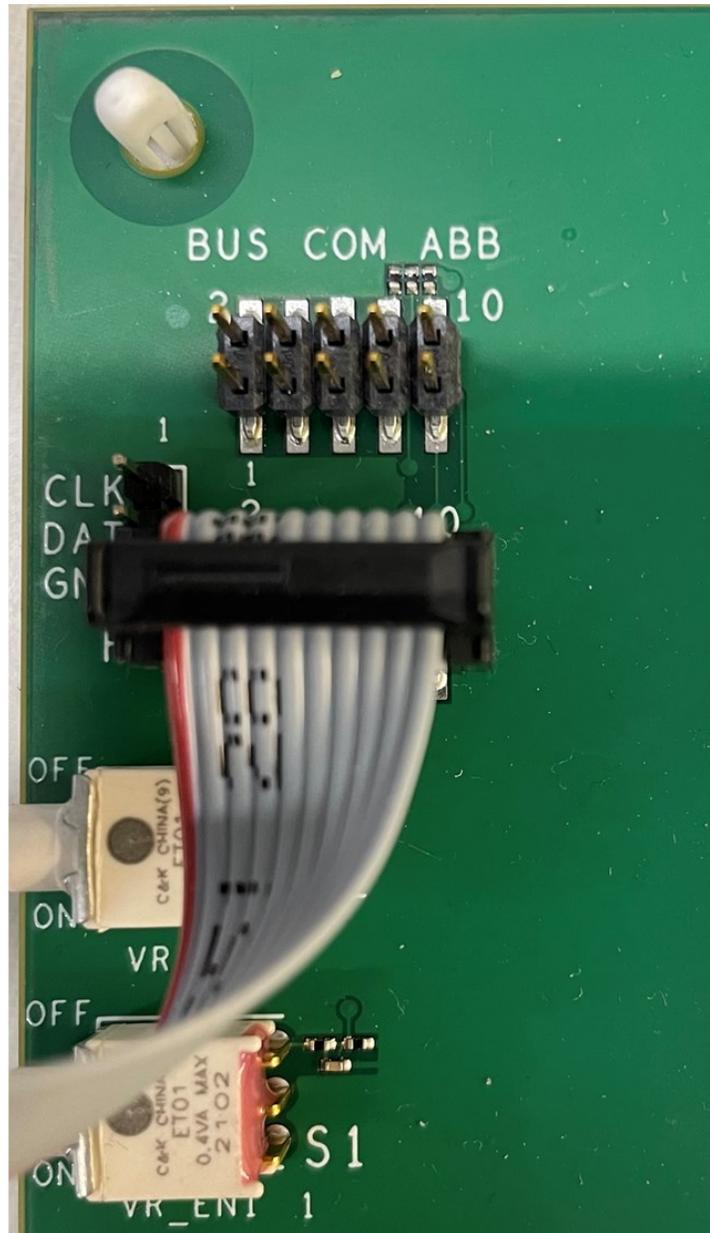
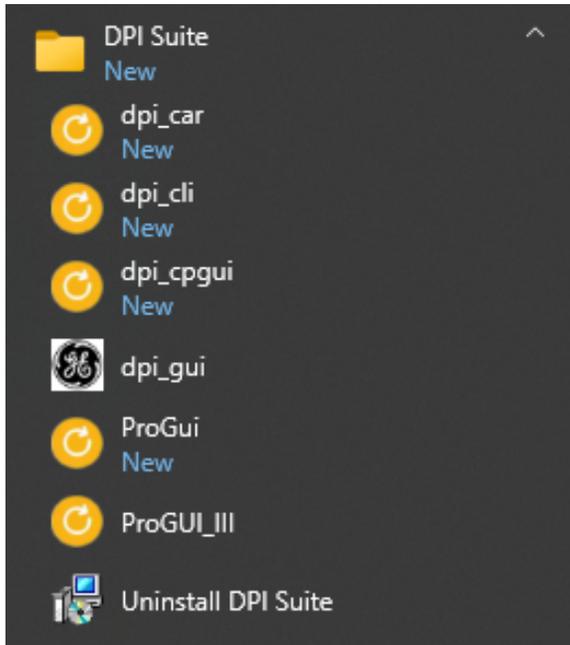
2.1.6. Miscellaneous Connections (Continued)

Output Rails

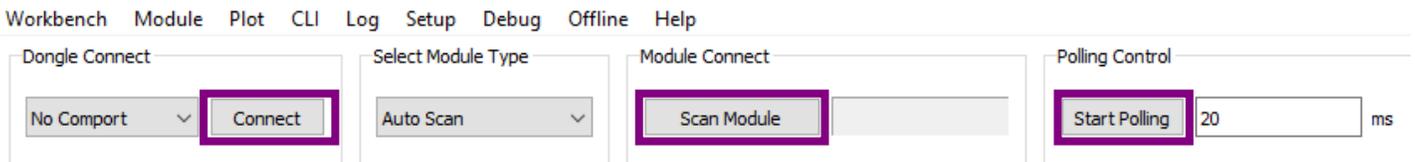
<p>VOUT1</p>	
--------------	--

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.

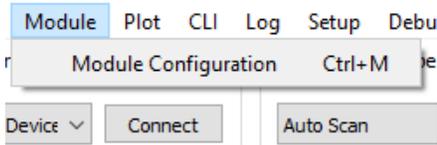


Click on Connect and then Scan Module to find the MLX module and then click on Start Polling.

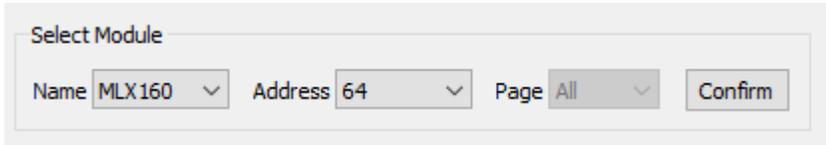


2.2 ProGUI III Connection and Setup (Continued)

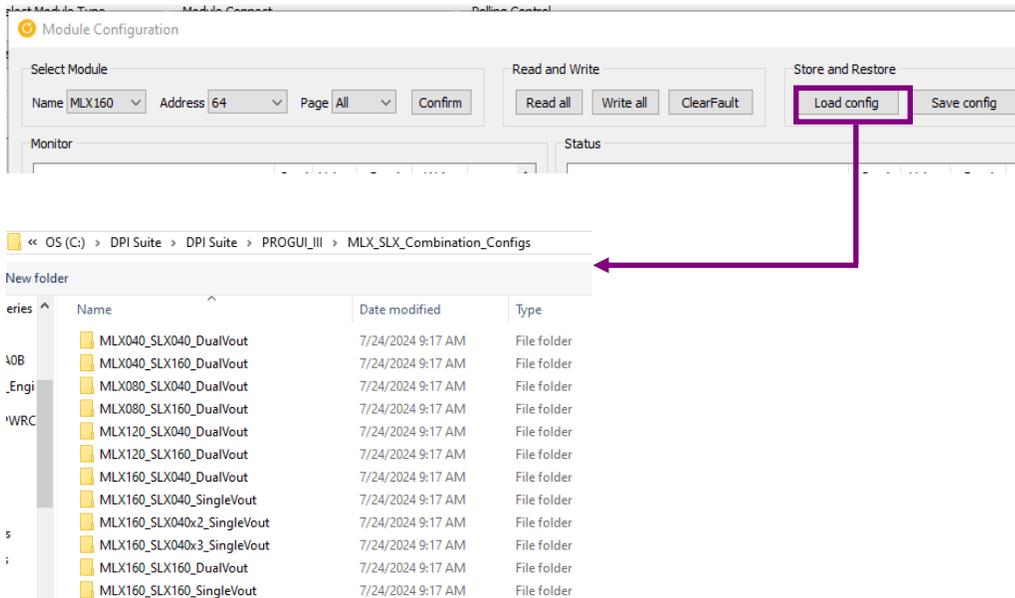
- Click on “Module” in the top left corner and then click on Module Configuration.



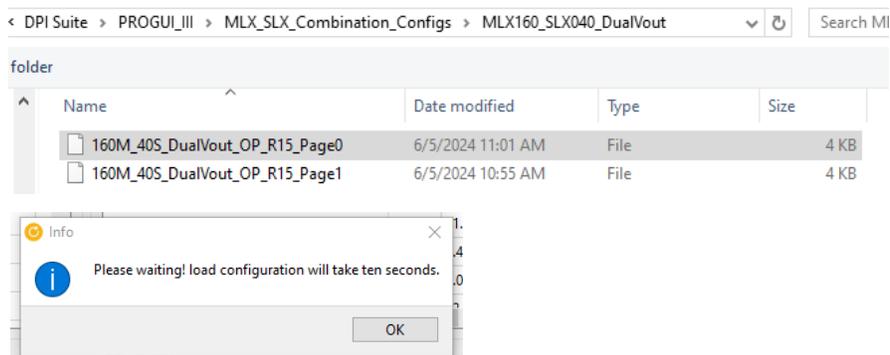
- A new window will open up. Click on the Confirm button to allow access to the module.



- 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
OPERATION	0x01	0x80	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
PAGE	0x00	0x00	Read	Write
OPERATION	0x01	0x80	Read	Write
VOUT_COMMAND (V)	0x21	1.0	Read	Write
VOUT_MODE	0x20	-8	Read	Write
VOUT_TRIM (V)	0x22	0.0	Read	Write

Manufacturer	Cmd	Value	Read	Write
COMMON_JSNS_USER_GAIN_PHASE_7	0x004A	0	Read	
COMMON_JSNS_USER_GAIN_PHASE_8	0x004A	0	Read	
IOUT_CAL_OFFSET	0x39	-0.25	Read	
IOUT_CAL_GAIN (%)	0x38	0.0	Read	
COMMON_DISABLE_OUTPUT	0x0040	2	Read	

On/Off Configure	Cmd	Value	Read	Write
ON_OFF_CONFIG	0x02	0x1C	Read	Write

Status	Cmd	Value	Read	Write
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	
READ_PIN (W)	0x97	0.0	Read	
READ_TEMPERATURE_1 (C)	0x8D	23	Read	
READ_DUTY_CYCLE (%)	0x94	0.0	Read	
MFR_READ_VAUX	0xC4	5.016	Read	
MFR_VIN_PEAK	0xC5	12.125	Read	
MFR_VOUT_PEAK	0xC6	1.0	Read	
MFR_IOUT_PEAK	0xC7	30.0	Read	
MFR_TEMP_PEAK	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
COMMON_I2C_DEVICE_ADDR	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 0x00	Read	Write
OPERATION	0x01 0x80	Read	Write
VOUT_COMMAND (V)	0x21 1.0	Read	Write
VOUT_MODE	0x20 -8	Read	Write
VOUT_TRIM (V)	0x22 0.0	Read	Write
POWER_MODE	0x34 3	Read	Write
VOUT_MAX (V)	0x24 2.102	Read	Write

Manufacturer

Cmd	Value	Read	Write
FREQUENCY_SWITCH (KHZ)	0x33 580	Read	Write
CAPABILITY	0x19 0xB4	Read	Write
PMBUS_REVISION	0x98 1.3 1.3	Read	Write
MFR_ID	0x99 IR	Read	Write
MFR_MODEL	0x9A 0x00A0	Read	Write
MFR_REVISION	0x9B 0x0014	Read	Write
MFR_DATE	0x9D 0x1A16	Read	Write

On/Off Configure

Cmd	Value	Read	Write
ON_OFF_CONFIG	0x02 0x1C	Read	Write
VIN_ON (V)	0x35 5.75	Read	Write
VIN_OFF (V)	0x36 5.25	Read	Write
POWER_GOOD_ON (V)	0x5E 0.395	Read	Write
POWER_GOOD_OFF (V)	0x5F 0.395	Read	Write
TON_DELAY (ms)	0x60 0.0	Read	Write
TON_RISE (ms)	0x61 15.0	Read	Write

Limits

Cmd	Value	Read	Write
TON_MAX_FAULT_LIMIT (ms)	0x62 0.0	Read	Write
TON_MAX_FAULT_RESPONSE	0x63 0x00	Read	Write
VOUT_OV_FAULT_LIMIT (V)	0x40 1.051	Read	Write
VOUT_OV_FAULT_RESPONSE	0x41 0x80	Read	Write
VOUT_OV_WARN_LIMIT (V)	0x42 2.0	Read	Write
VOUT_UV_FAULT_LIMIT (V)	0x44 0.602	Read	Write
VOUT_UV_FAULT_RESPONSE	0x45 0x80	Read	Write

Status

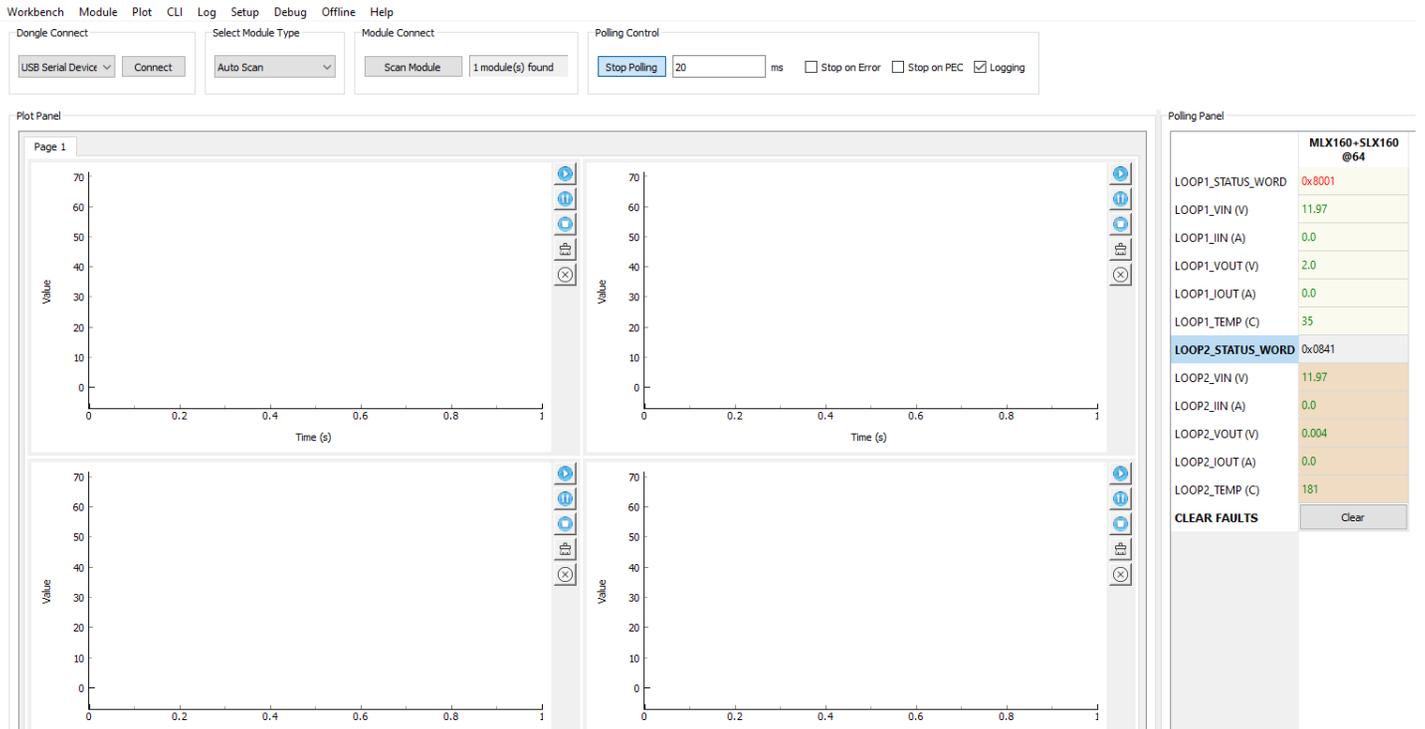
Cmd	Value	Read	Write
READ_TEMPERATURE_1 (C)	0x8D 22	Read	Write
READ_DUTY_CYCLE (%)	0x94 0.0	Read	Write
MFR_READ_VAUX	0xC4 5.016	Read	Write
MFR_VIN_PEAK	0xC5 12.125	Read	Write
MFR_VOUT_PEAK	0xC6 0.004	Read	Write
MFR_IOUT_PEAK	0xC7 1.5	Read	Write
MFR_TEMP_PEAK	0xC8 23	Read	Write
MFR_VIN_VALLEY	0xC9 0.0	Read	Write
MFR_VOUT_VALLEY	0xCA 0.0	Read	Write
MFR_IOUT_VALLEY	0xCB 0.0	Read	Write
MFR_TEMP_VALLEY	0xCC 1024	Read	Write
STATUS_WORD	0x79 0x2843	Read	Write
STATUS_VOUT	0x7A 0x00	Read	Write
STATUS_IOUT	0x7B 0x00	Read	Write
STATUS_INPUT	0x7C 0x20	Read	Write
STATUS_TEMPERATURE	0x7D 0x00	Read	Write
STATUS_CML	0x7E 0x02	Read	Write

User Defined

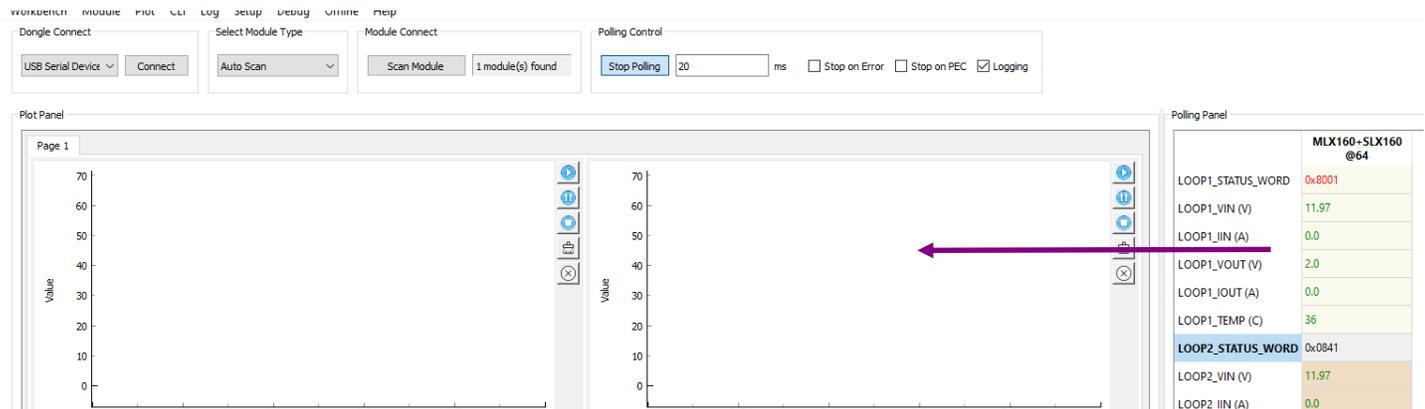
Cmd	Value	Read	Write
COMMON_I2C_DEVICE_ADDR	0x0020 16	Read	Write
COMMON_PMB_DEVICE_ADDR	0x0020 64	Read	Write
COMMON_I2C_PMBUS_ADDRESS_LOCK	0x0094 1	Read	Write
COMMON_D2P_ENABLE_LVT_THRESH	0x0048 0	Read	Write
COMMON_EN_DELAY_MODE	0x0040 0	Read	Write
COMMON_EN_DELAY_TIME	0x0040 0	Read	Write
COMMON_FIXED_MEASURED_IN_OFFSET	0x003E 0	Read	Write
LOOP1_TEMPERATURE_OFFSET	0x043E 0	Read	Write
LOOP1_IN_PER_PHASE_OFFSET	0x0444 0	Read	Write
LOOP1_FIXED_IN_OFFSET	0x0444 0	Read	Write
LOOP2_TEMPERATURE_OFFSET	0x083E 0	Read	Write
LOOP2_IN_PER_PHASE_OFFSET	0x0844 0	Read	Write
LOOP2_FIXED_IN_OFFSET	0x0844 0	Read	Write
COMMON_IMON_MAX_CODE	0x0022 4	Read	Write
COMMON_TELEMETRY_BW	0x0022 4	Read	Write
COMMON_LOOP1_READ_IOUT_SCALE	0x0024 0	Read	Write
LOOP1_TSEN_FAULT_EN	0x0420 0	Read	Write

2.2 ProGUI III Connection and Setup (Continued)

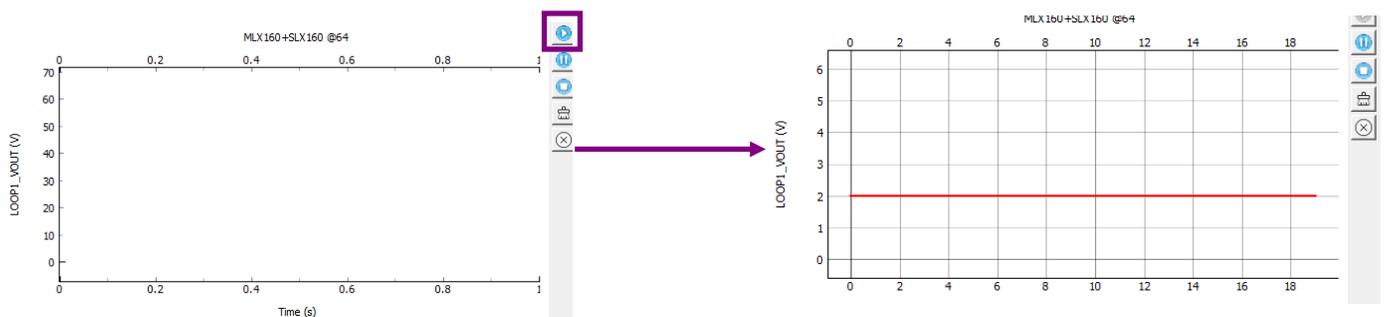
Main Display Screen once Module is On (with output).



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



Remember to click Start.



2.2 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
1.4	05/09/2025	Added note regarding PGOOD on cover page

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