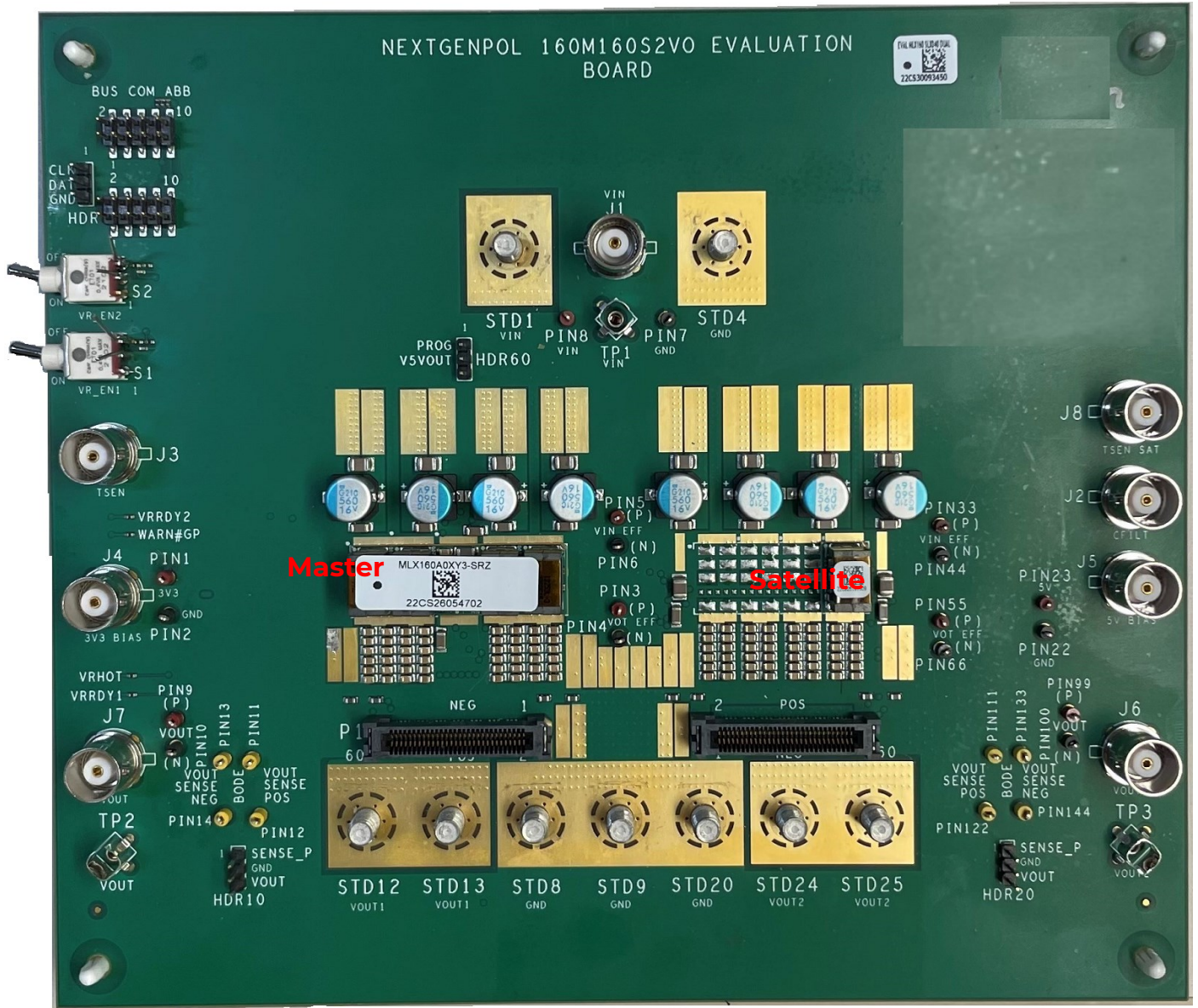


NEXTGENPOL 160M160S2V0 Dual LOOP/OUTPUT



Evaluation Board Guide

NEXTGENPOL 160M160S2V0 DUAL LOOP/OUTPUT

Dual Loop/Output Voltage Evaluation Board populated with MLX040 /MLX080 / MLX120 /MLX160 /MLX160+SLX040 or MLX160+SLX160

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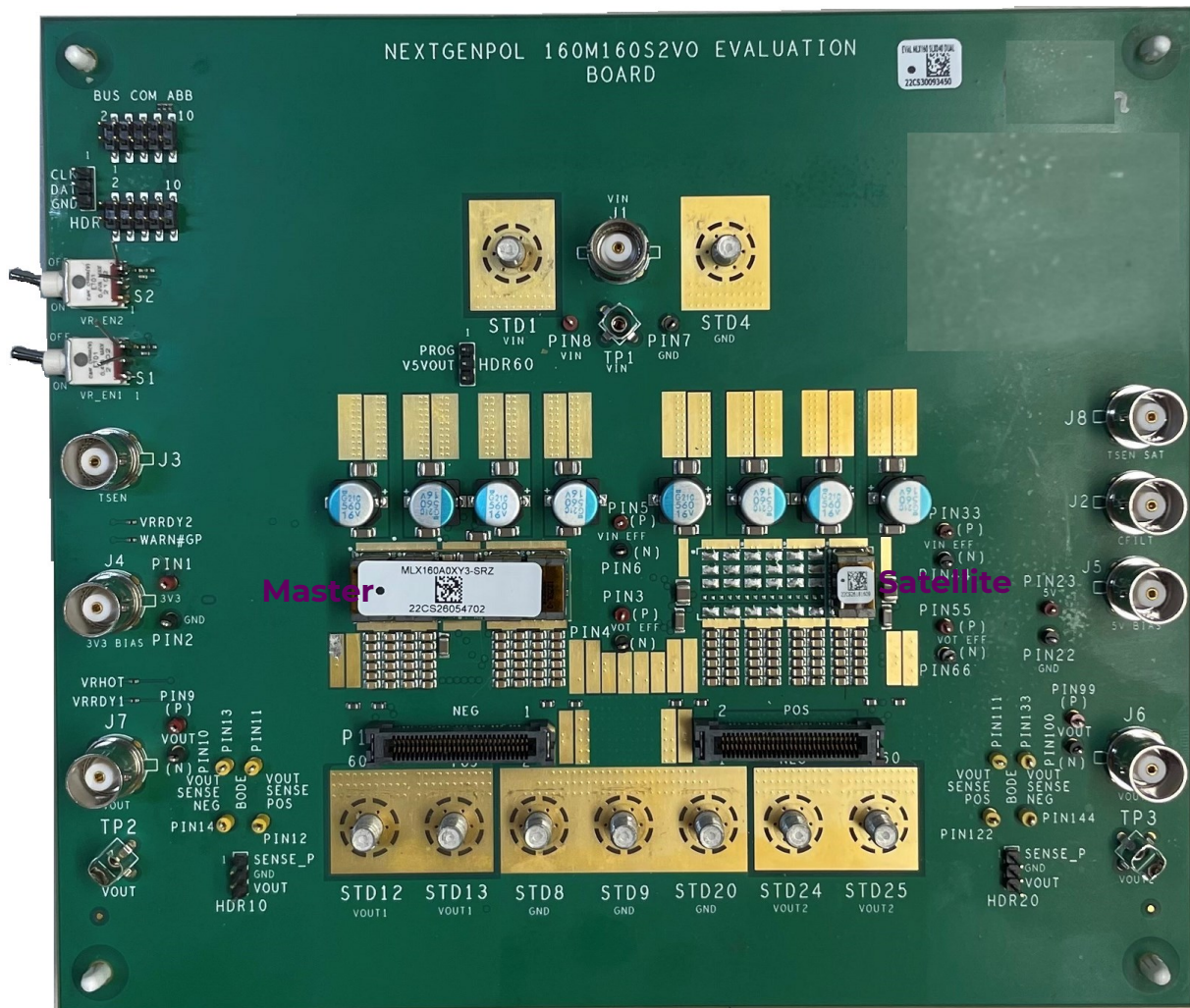
1. Description

The MLX series are the next generation of POL modules that can deliver 40-160A; 40-160A in a two loop 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.

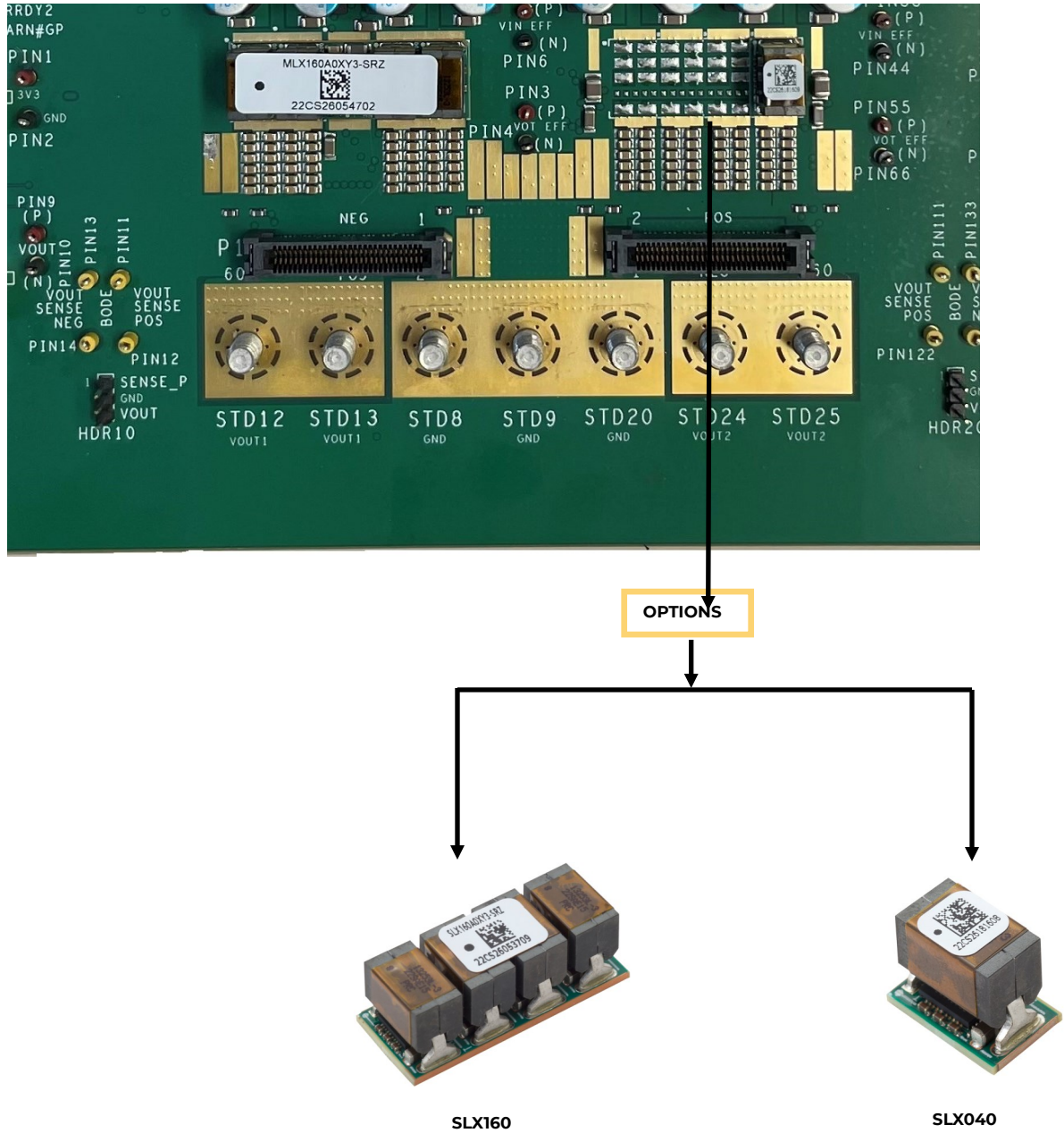
Top View of Evaluation Board with MLX160 +SLX160 moule



1. Description (Continued)

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

Evaluation Board with different module variants

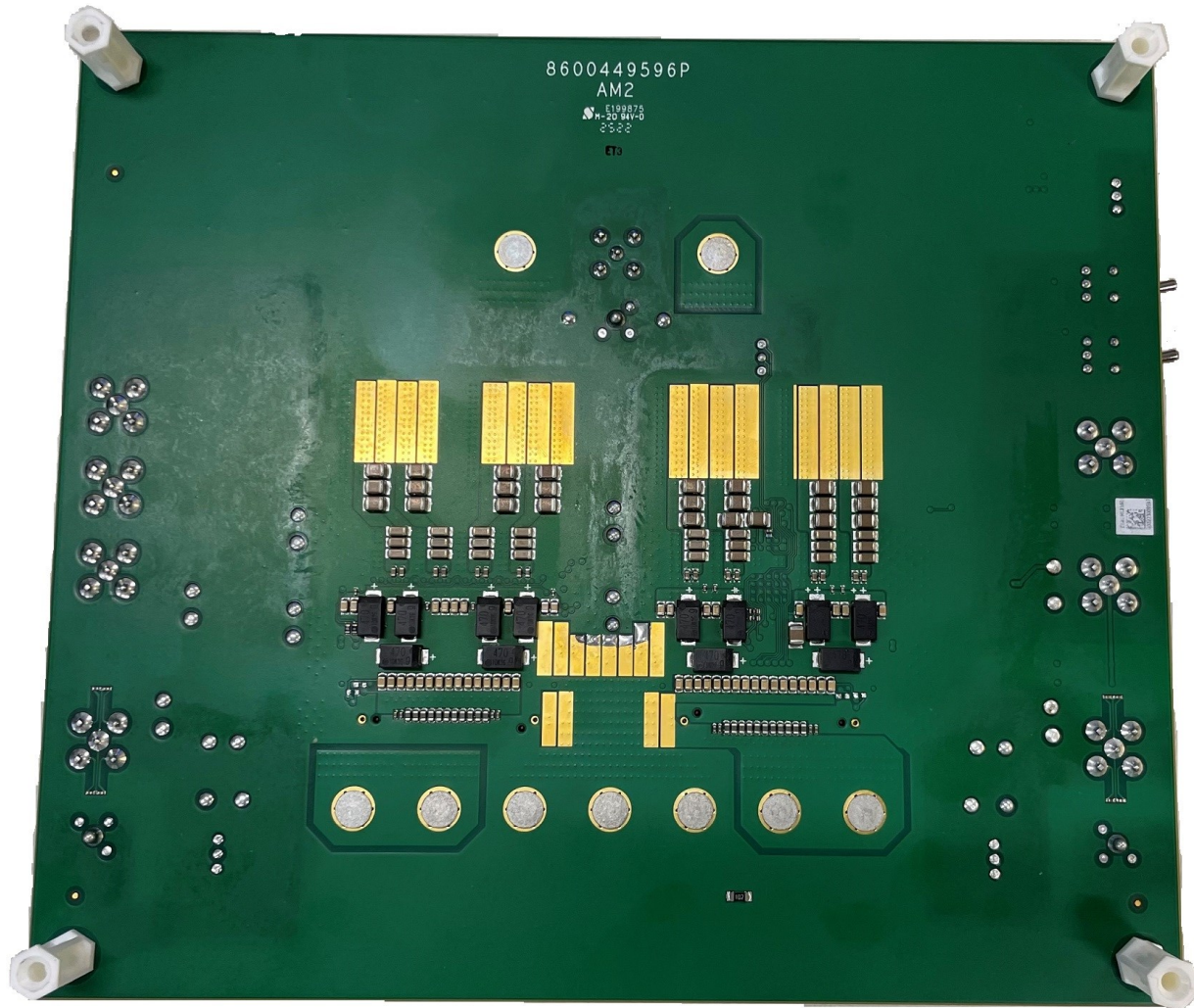


1. Description (Continued)

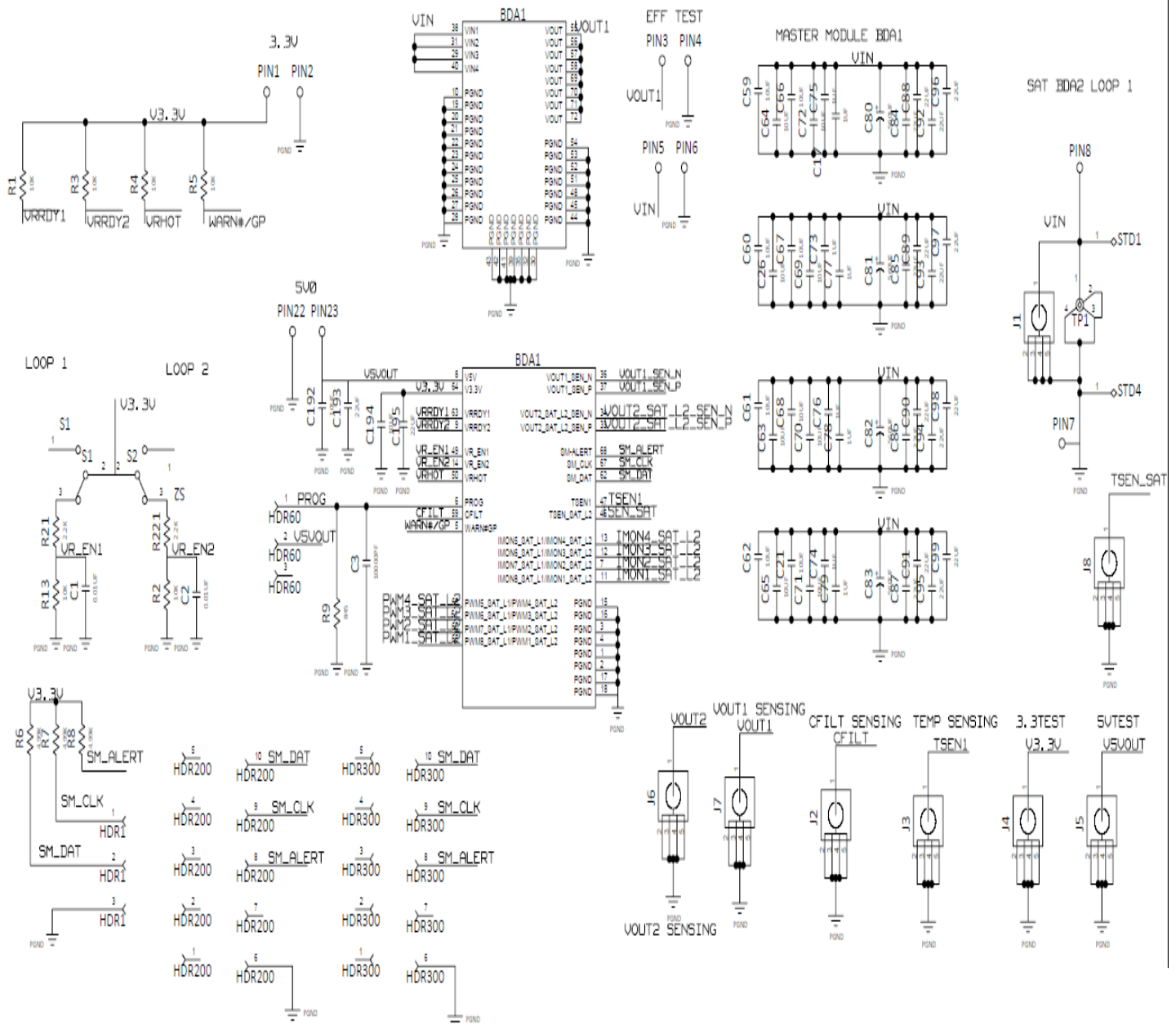
The Installed components are as follows. The schematic on the following page shows maximum capability and includes expansion capability:

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

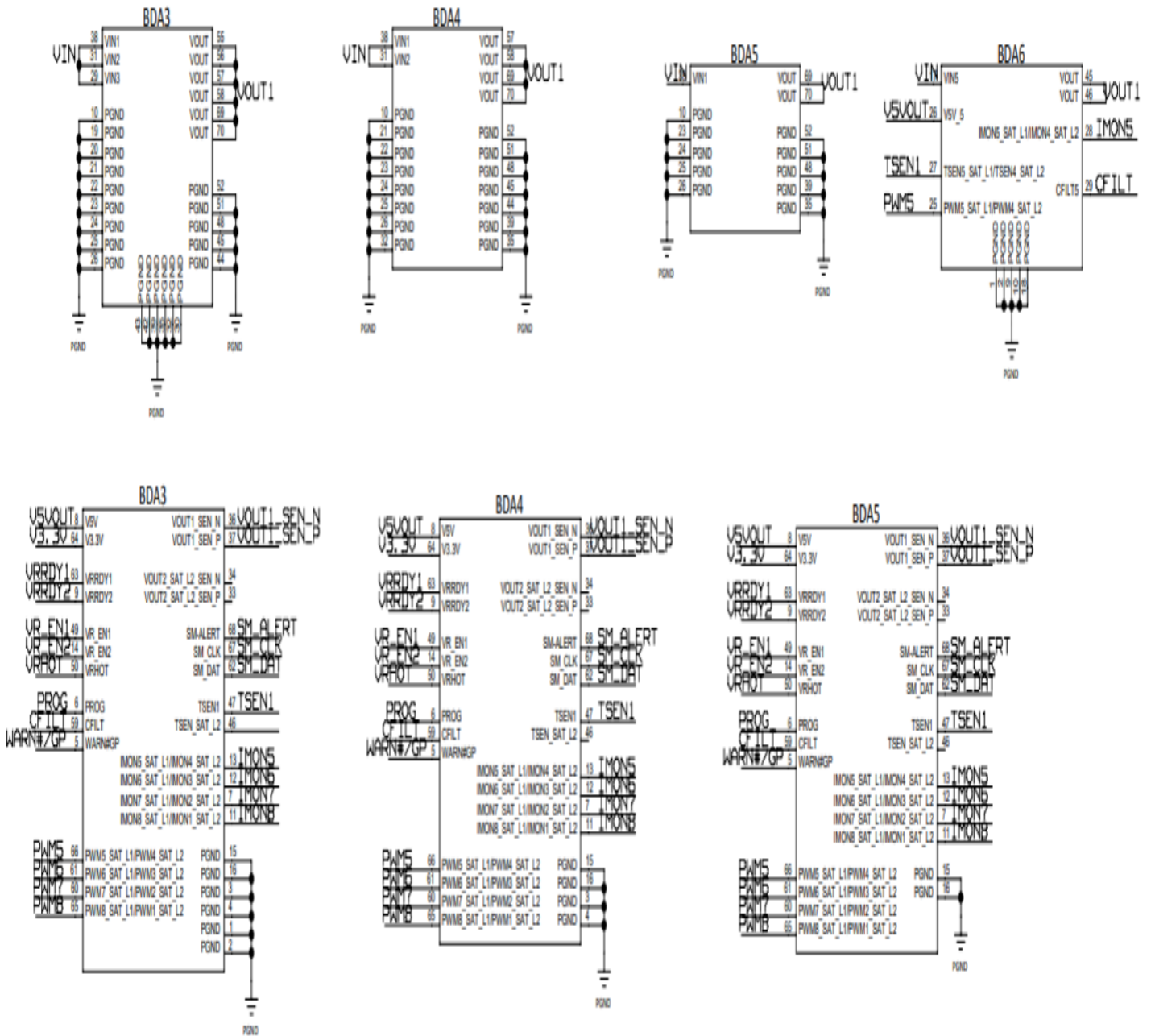
Bottom View of Evaluation Board



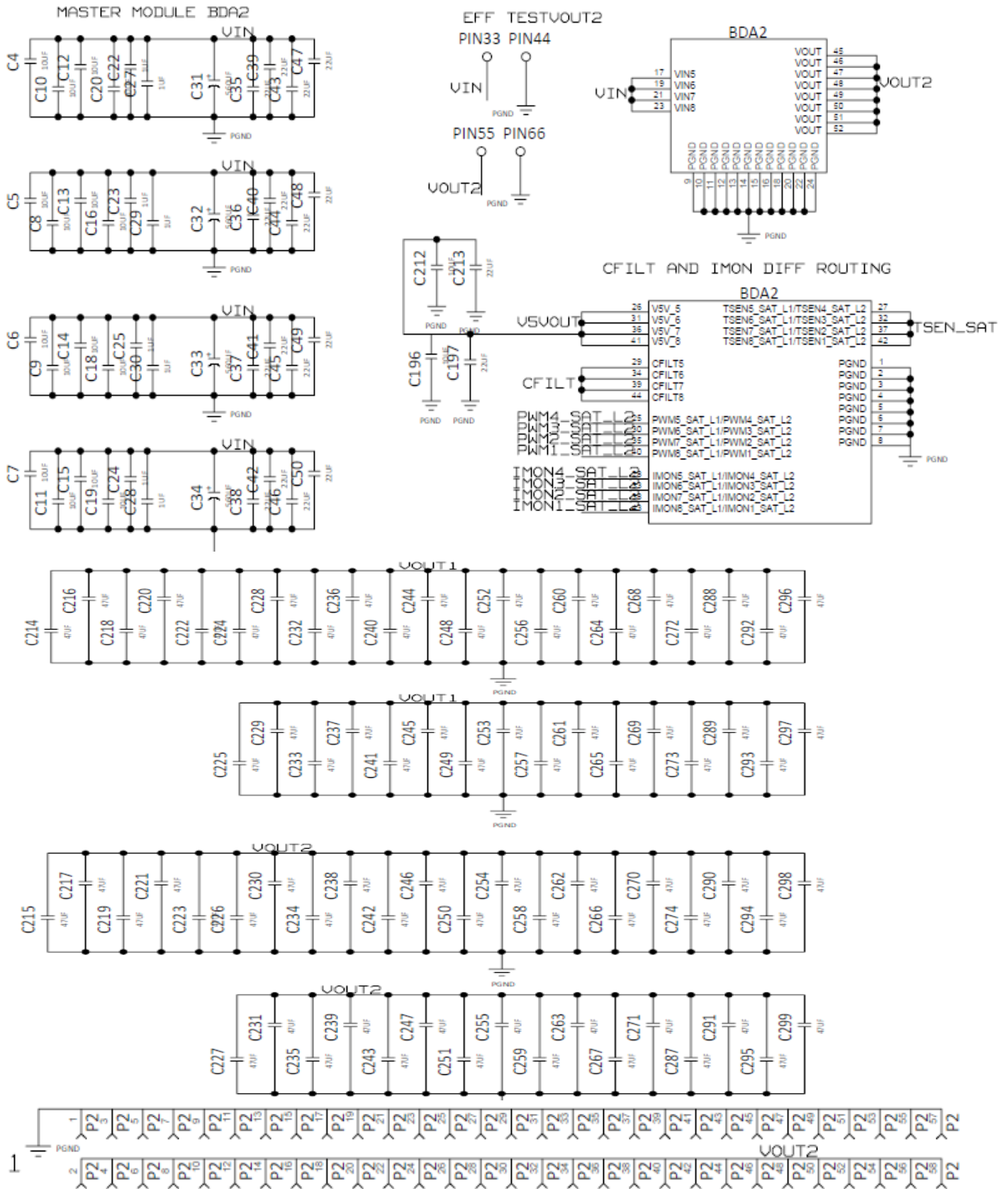
2. Schematic — Download Schematic at www.omnionpower.com



2. Schematic (Continued) Download Schematic @www.omnionpower.com

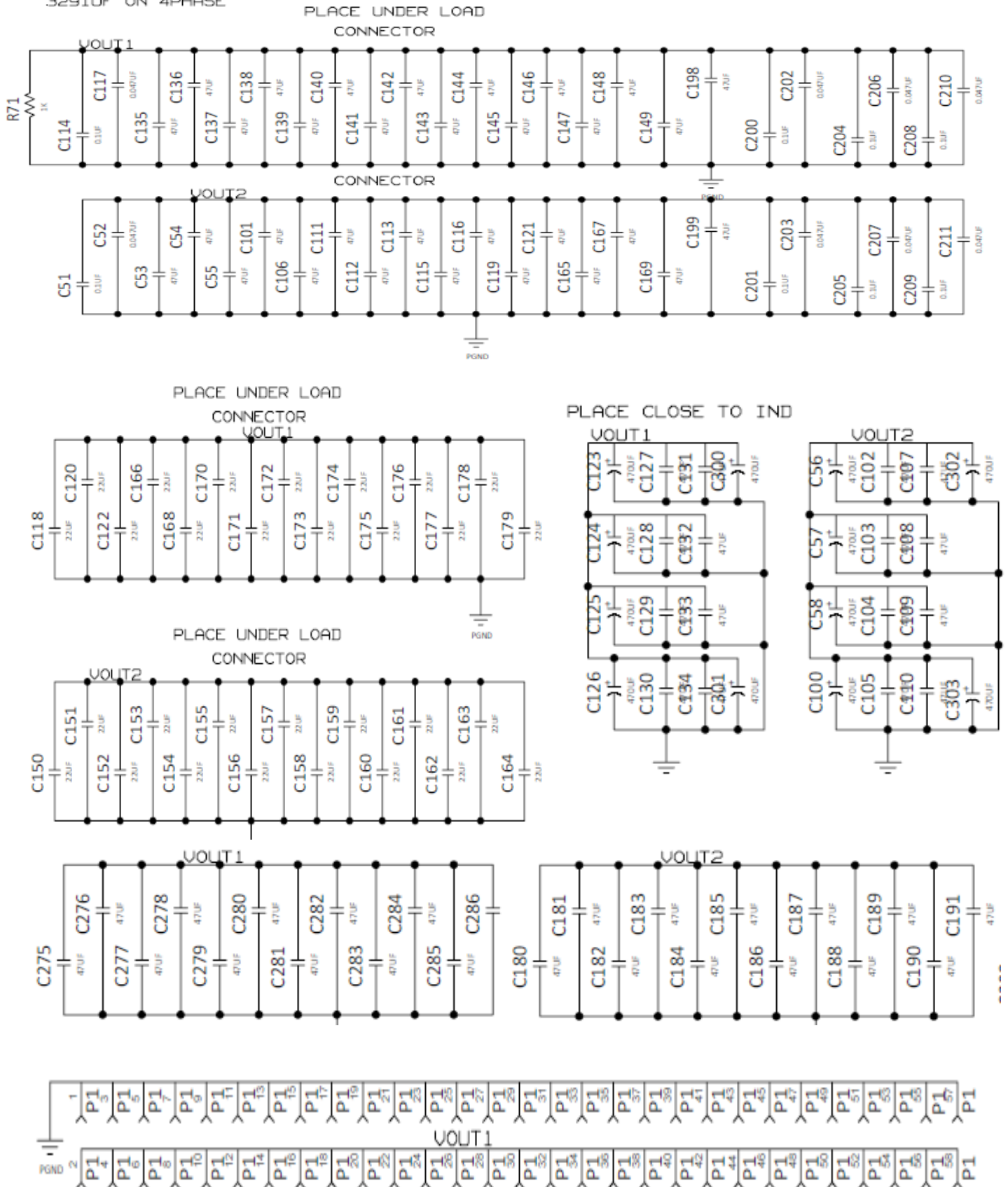


2. Schematic (Continued) Download Schematic @www.omnionpower.com



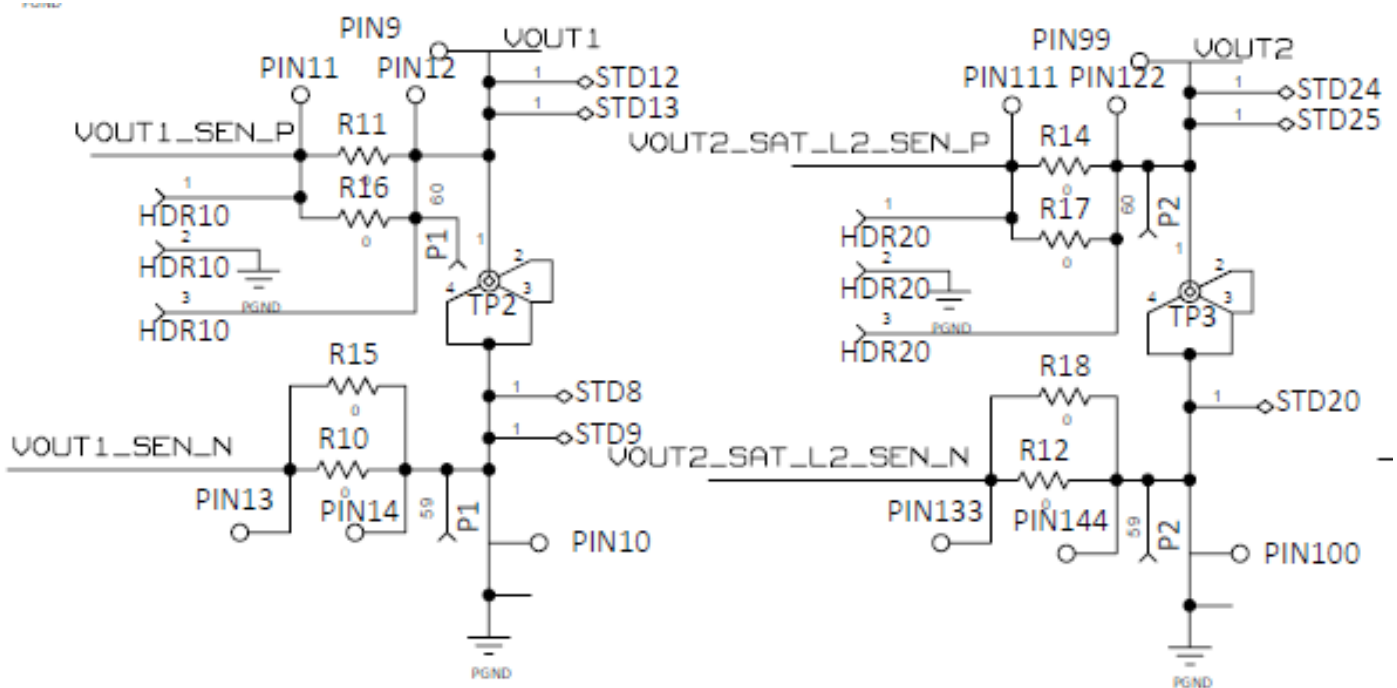
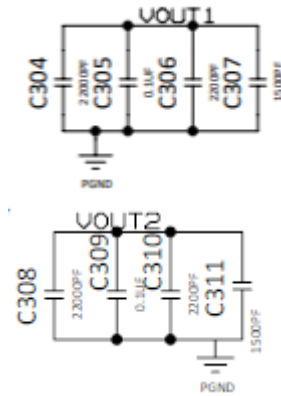
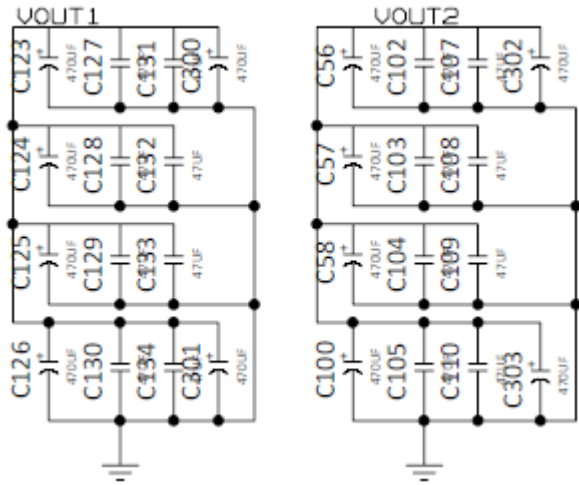
2. Schematic (Continued) Download Schematic @www.omnionpower.com

822UF PER PHASE
3291UF ON 4PHASE



2. Schematic (Continued) [Download Schematic @www.omnionpower.com](http://www.omnionpower.com)

PLACE CLOSE TO IND

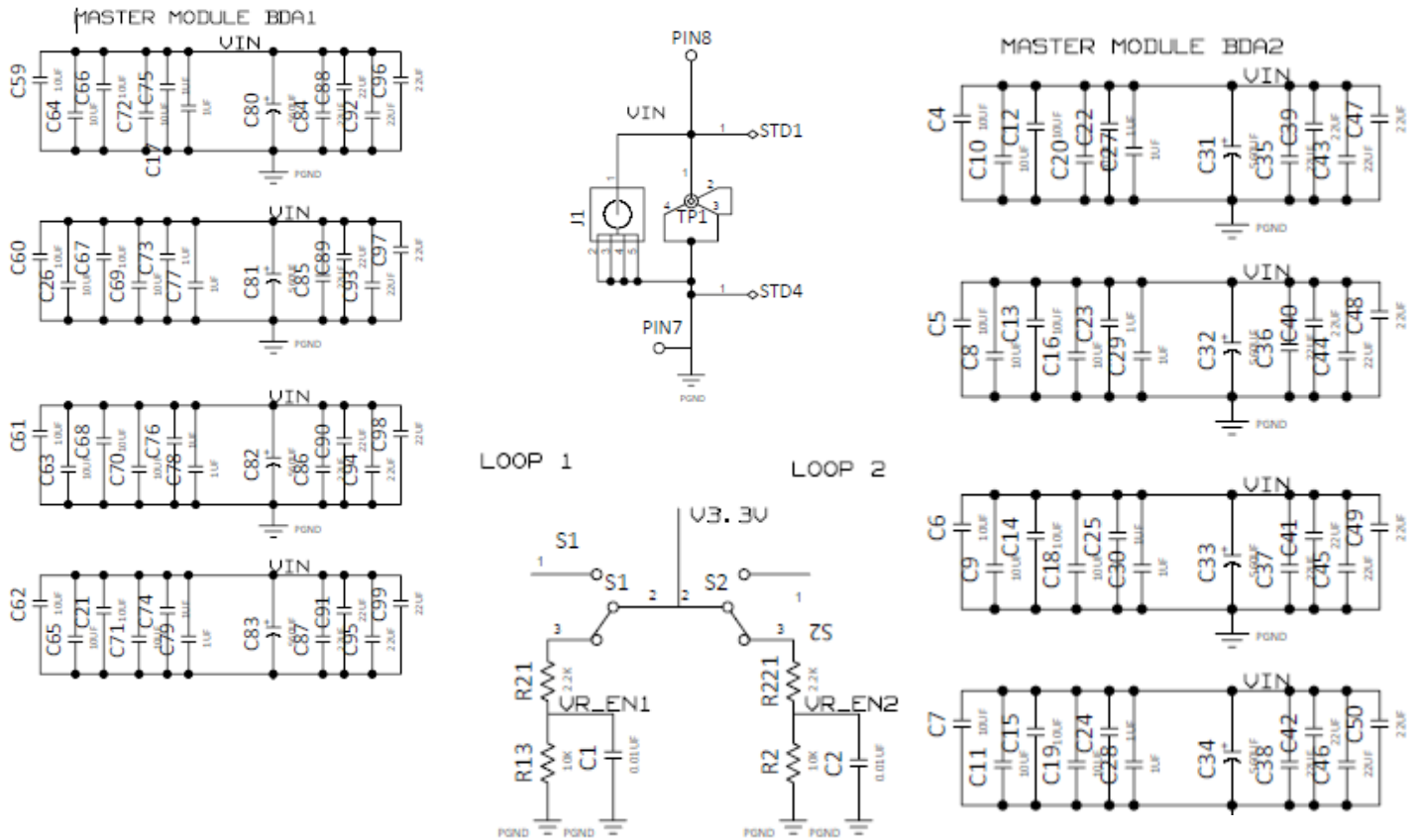


The complete schematic diagram of the MLX Series evaluation board is shown in the previous pages. Components on schematic show max capability and may not be actually used on the board. The complete schematic can be downloaded from www.omnionpower.com

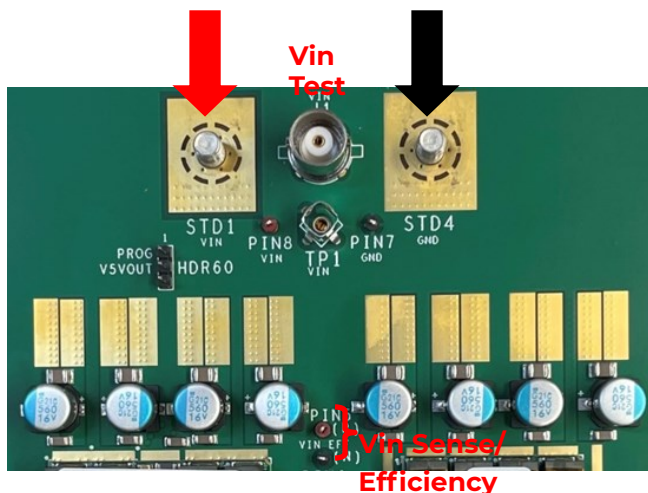
2.1. Eval Board Sections

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

2.1.1. Input Connections

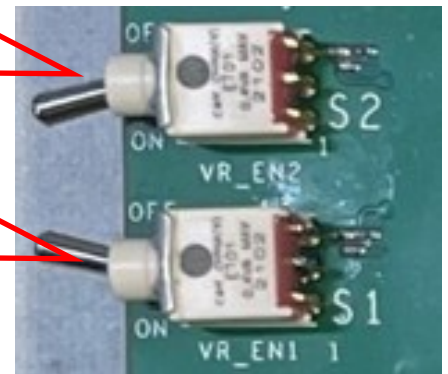


DC Input: 7V to 14V



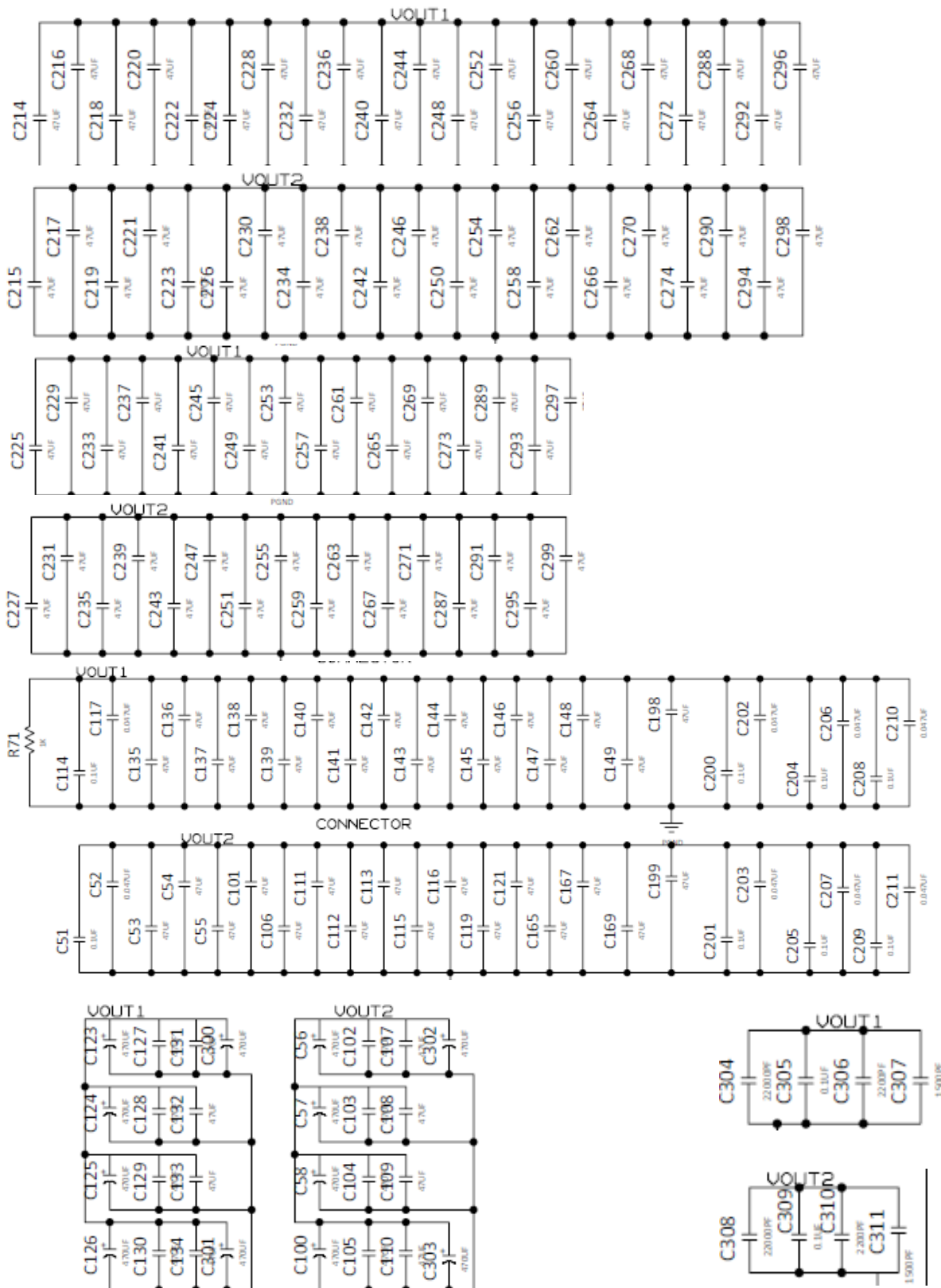
Switch in ON Position. Loop2 is Enabled

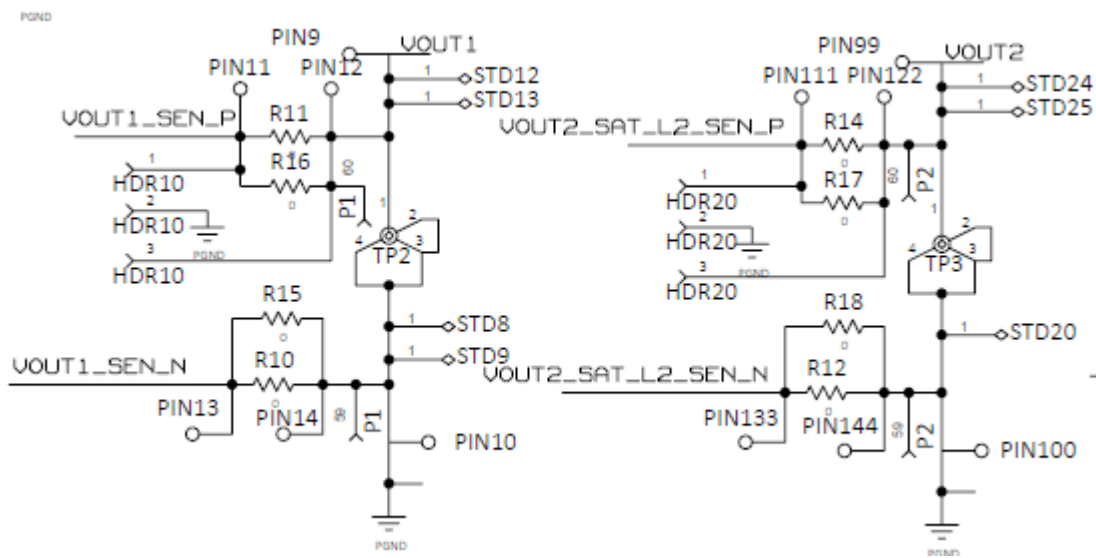
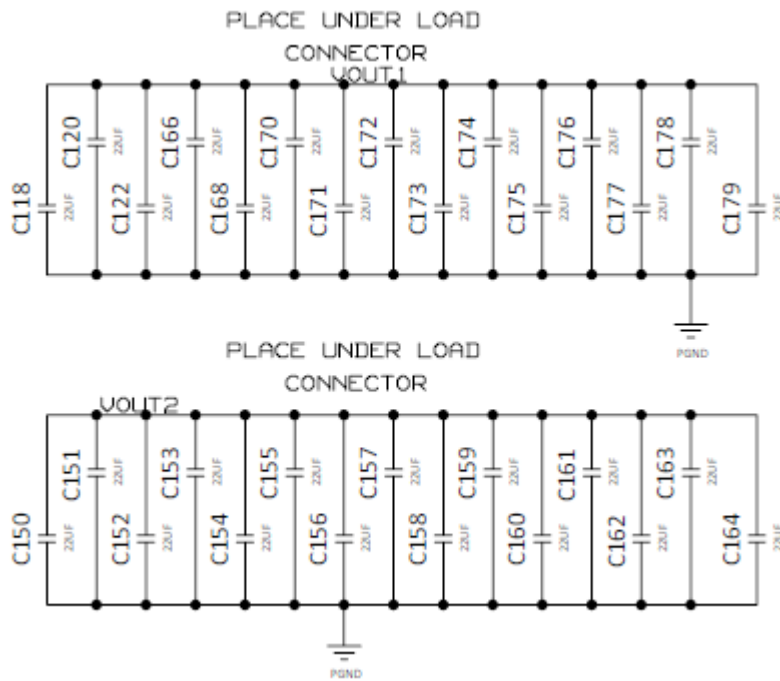
Switch in OFF Position. Loop1 is Disabled



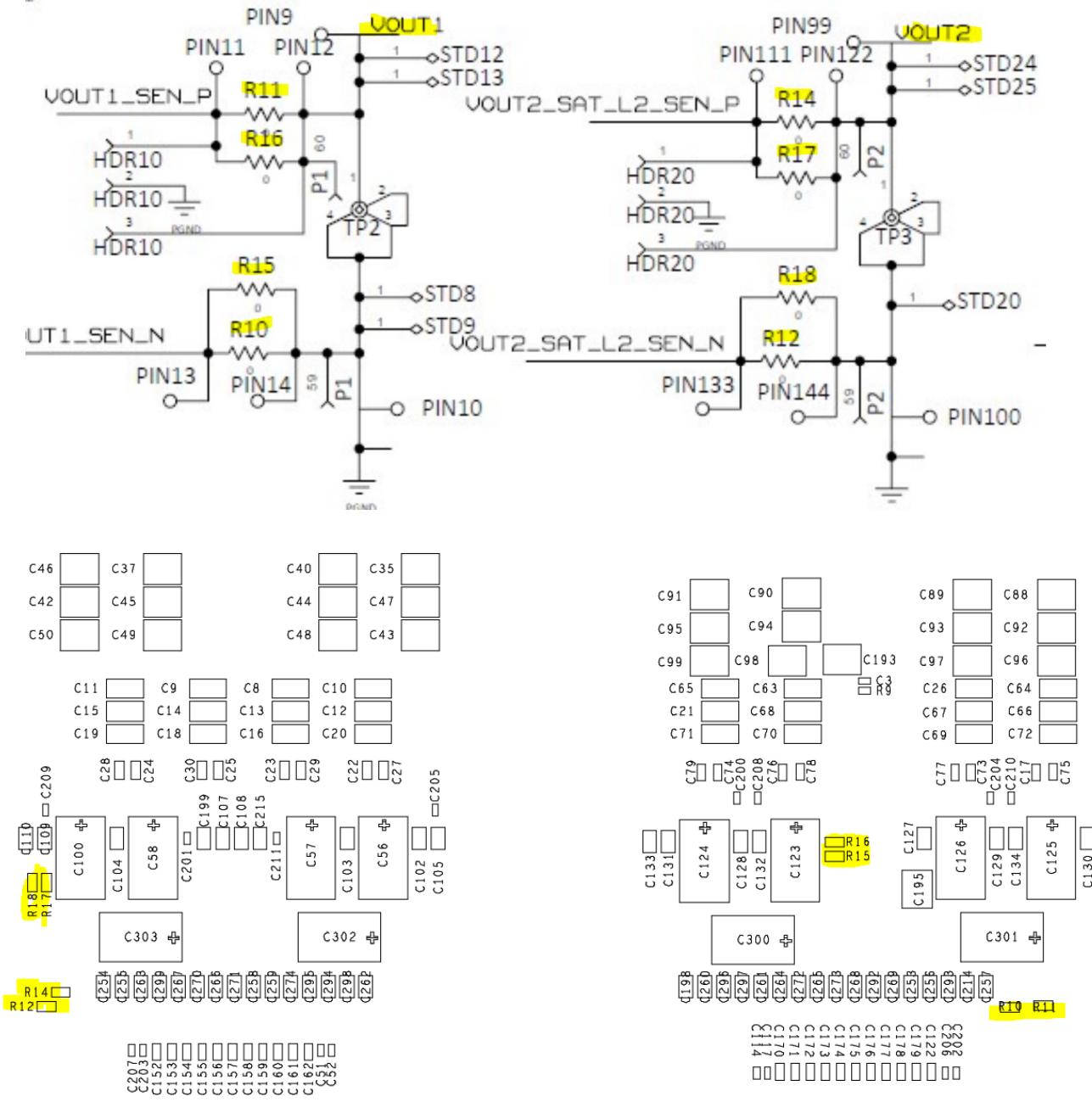
2.1.2. Output Connections

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





2.1.2. Output Connections (Continued)

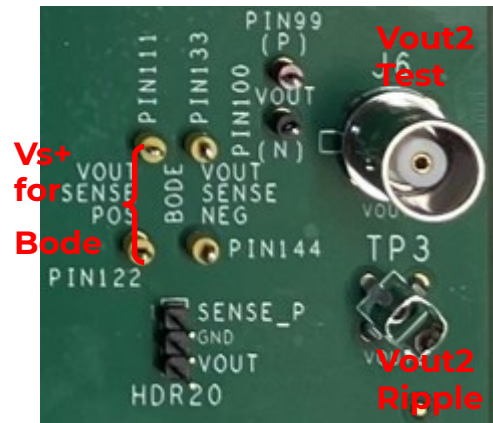
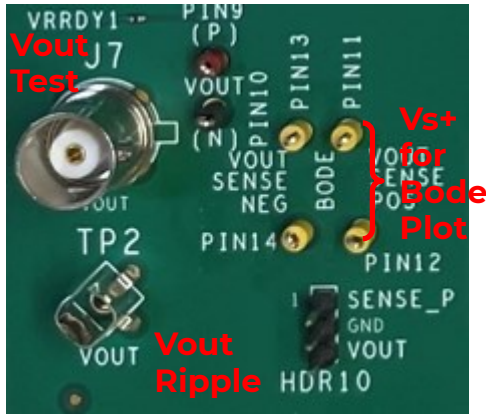


There are two set of traces for Vout sensing. Zero ohm resistors are provided to select the sensing location.

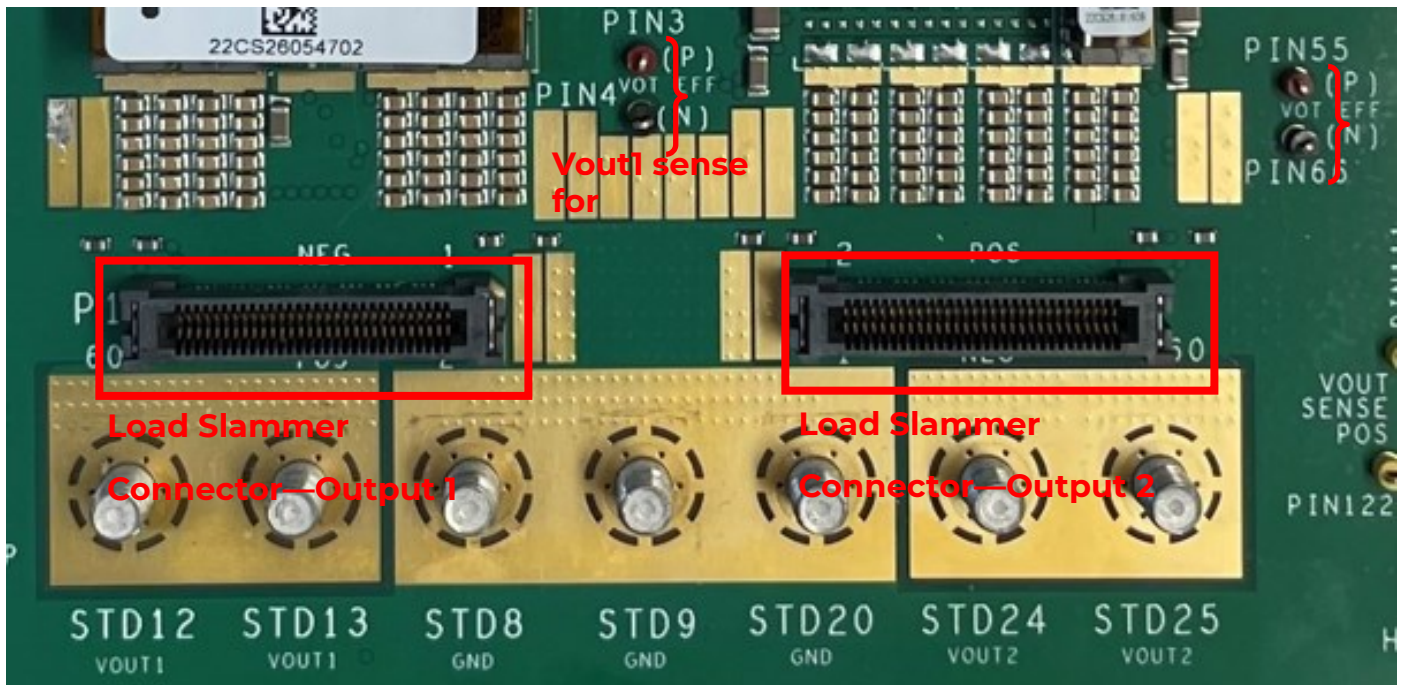
Sense at the output of the POL module (R15,R16,R17,R18) are zero ohm resistors

Sense at the slammer connector (R10,R11,R12,R14) 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,R11,R12,R14.



2.1.3. Load Transient Connections



DC Output1: 0.45V to 2V

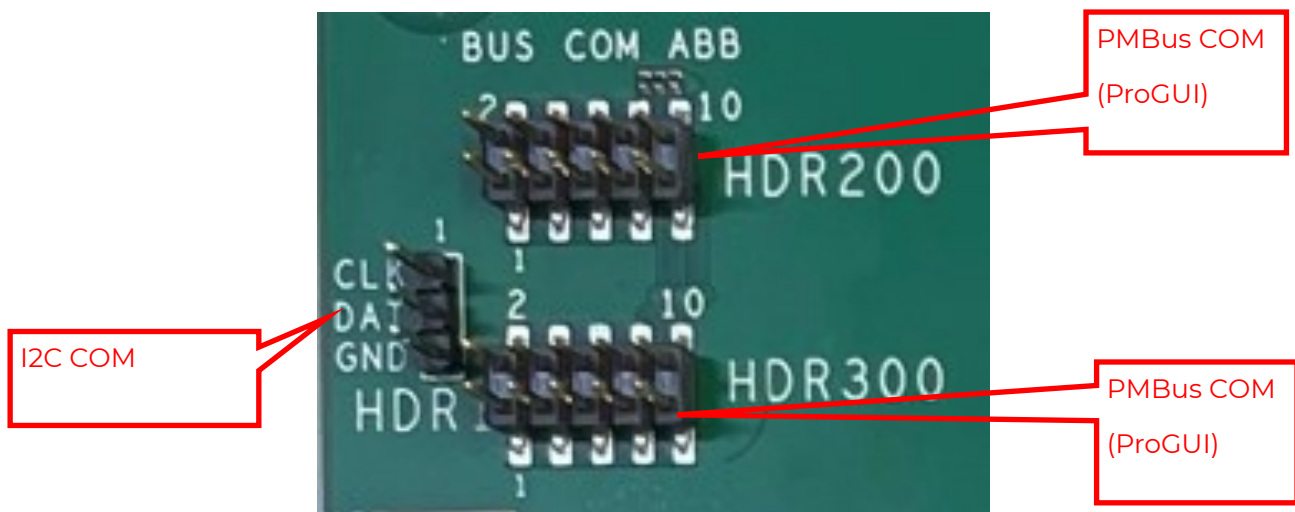
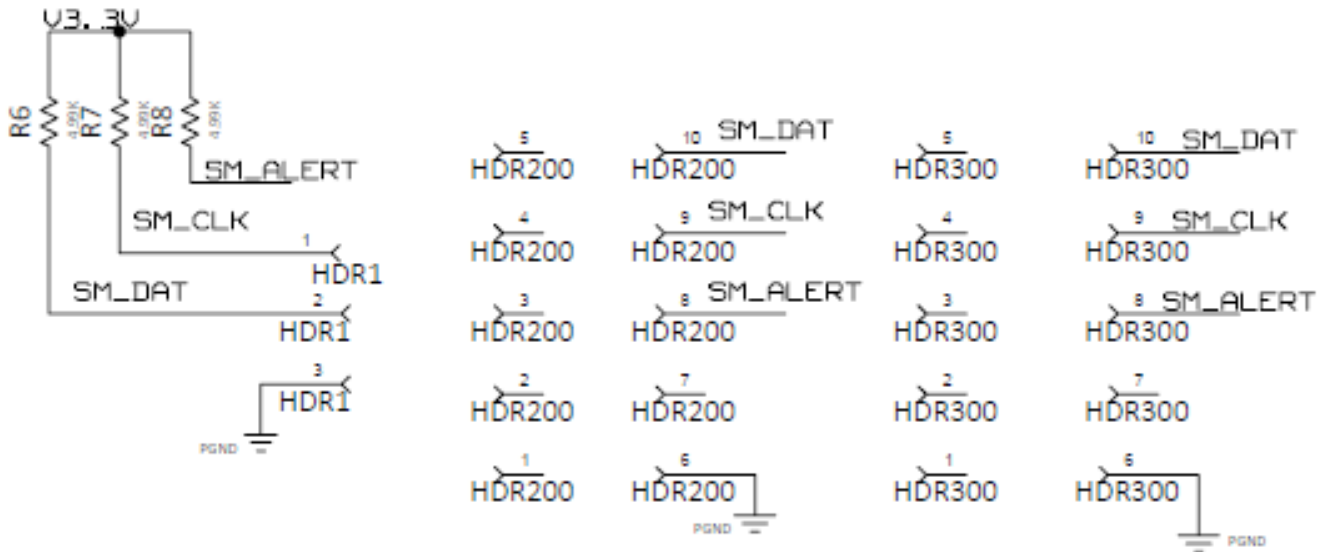


DC Output2: 0.45V to 2V



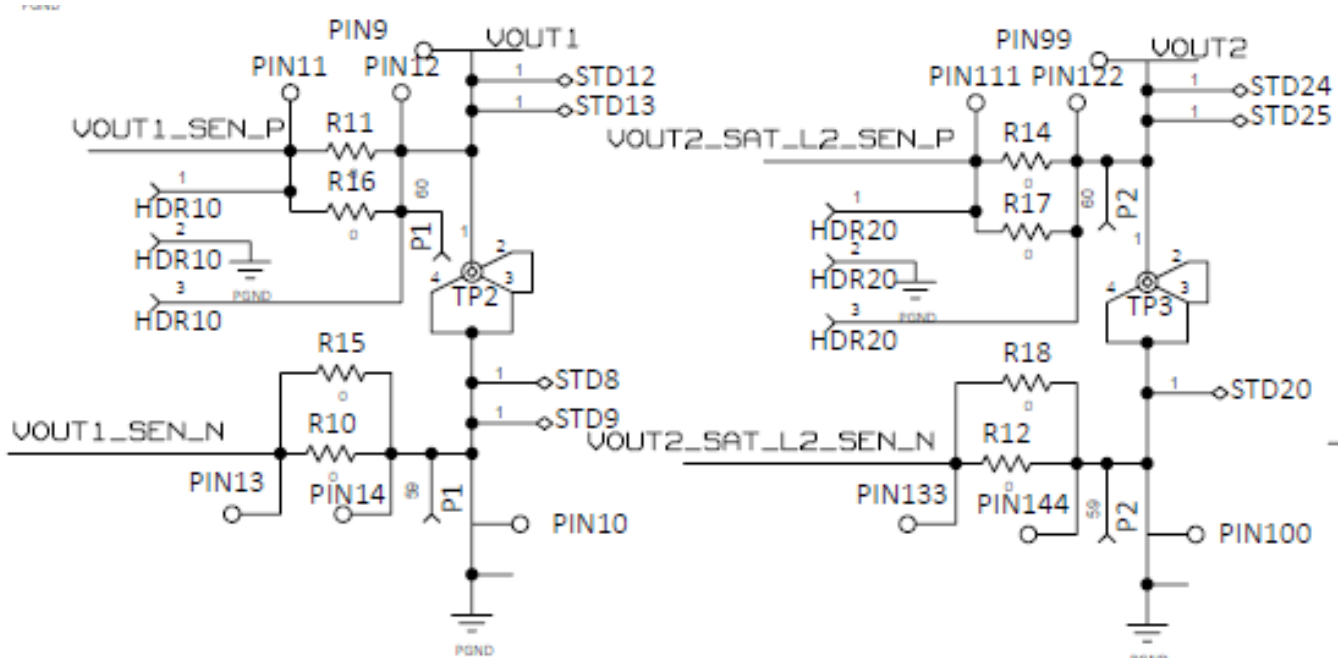
2.1.4. PMBus Connection

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

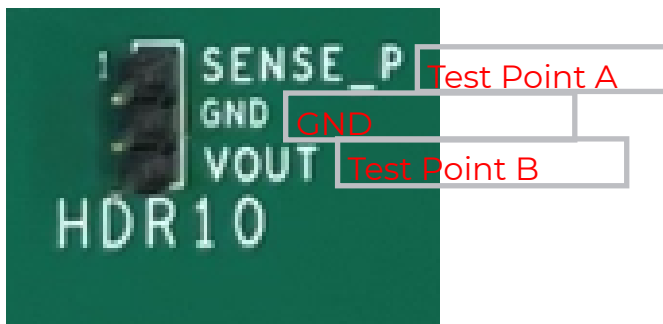


2.1.5. Bode Plot Connection

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



2.1.6. Connections Summary

Bias Rails

Output Rails

VOUT1

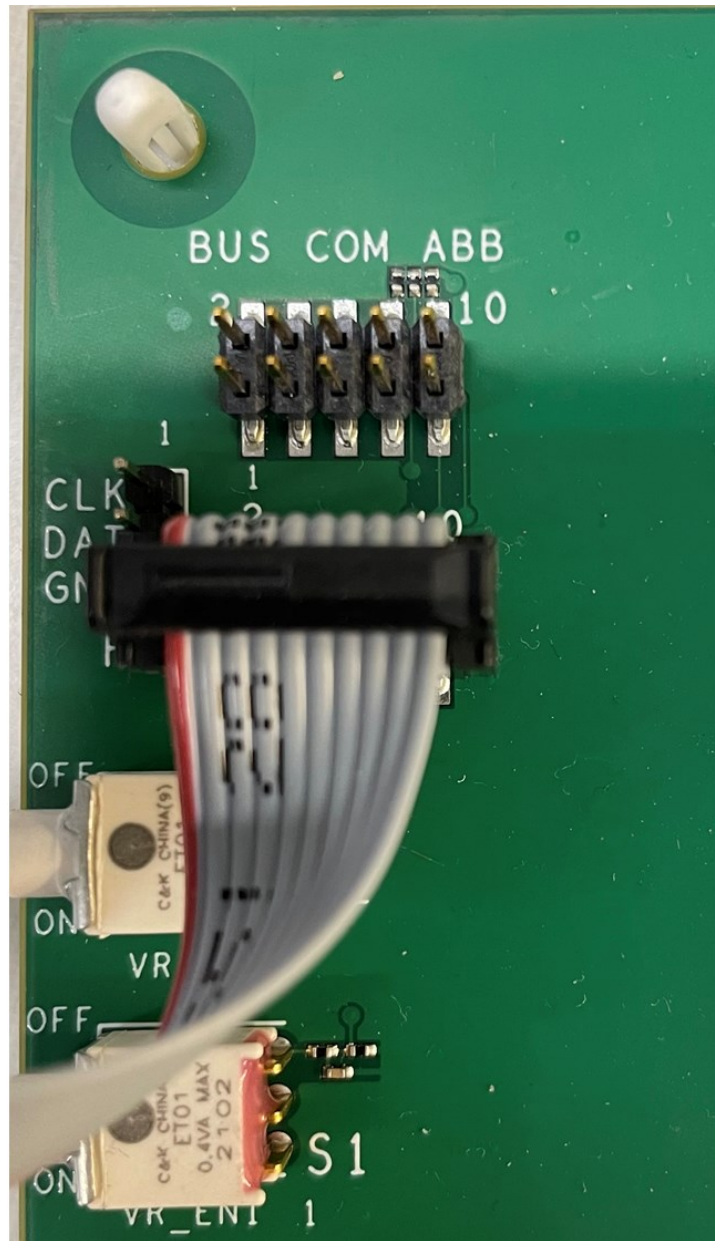
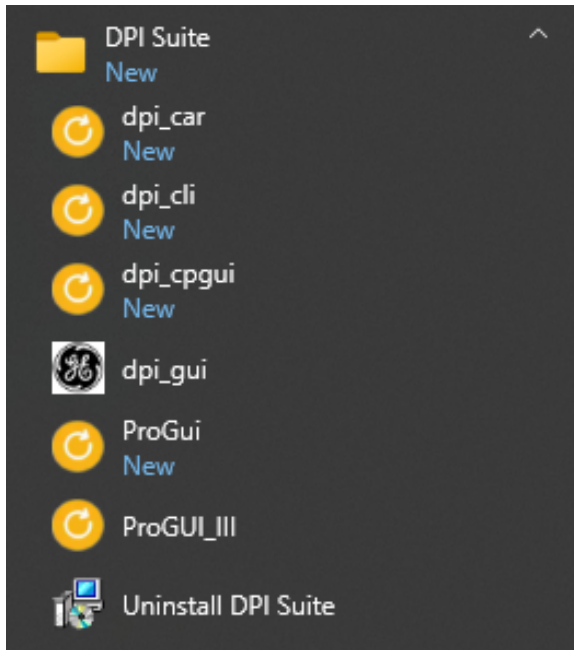


VOUT2

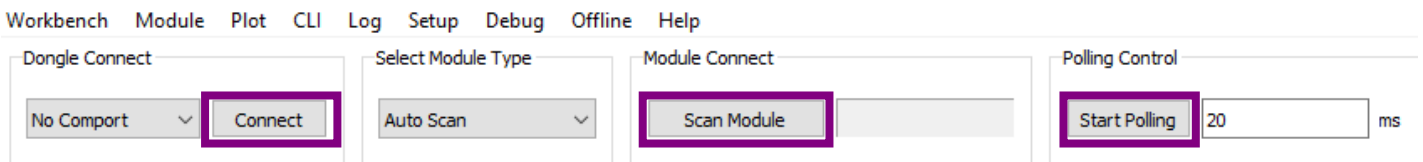


2.2 ProGUI III Connection and Setup

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.

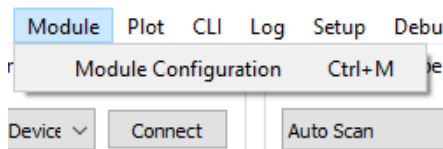


Click on Connect and then Scan Module to find the MLX module and then click on Start Polling

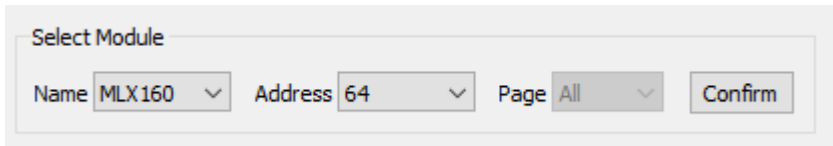


2.2 ProGUI III Connection and Setup (Continued)

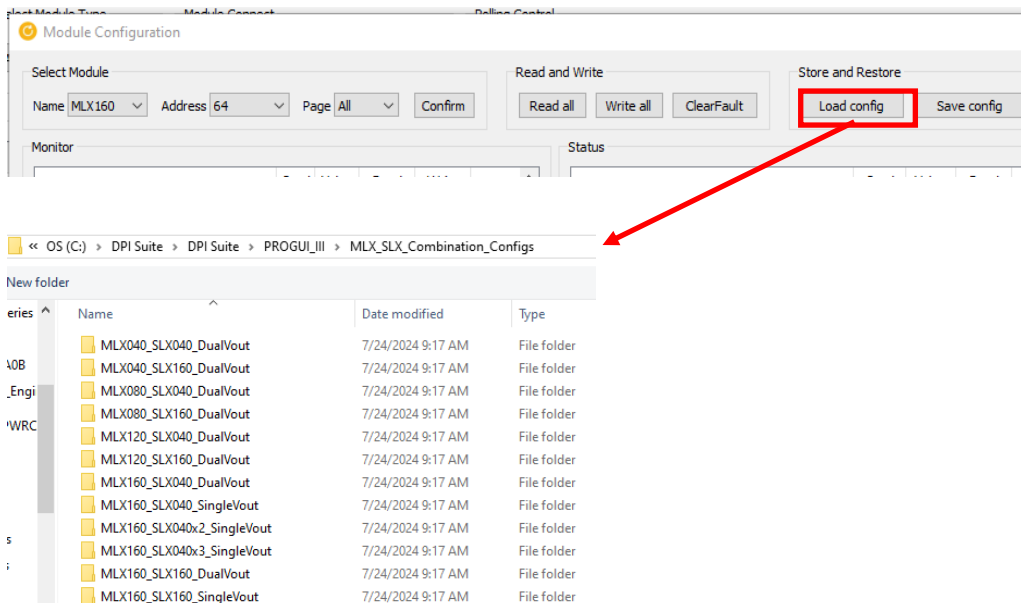
- Click on “Module” in the top left corner and then click on Module Configuration



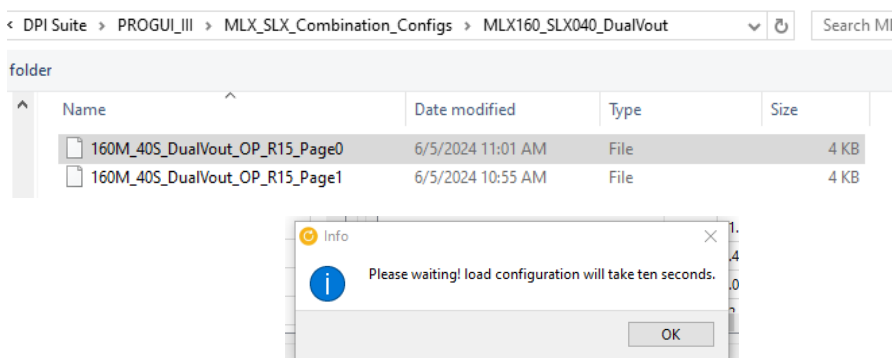
- A new window will open up. Click on the Confirm button to allow access to the module.



- 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



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.
- Use PAGE Command to switch between Loop1(Voltage1) and Loop2(Voltage2)

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_POOUT (W)	0x96	0.0	Read	

Note

- '0x00': 'Normal power-off'
- '0x80': 'On Vout_commen'
- '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_POOUT (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'

2.2 ProGUI III Connection and Setup (Continued)

Starts communication (points to Select Module dropdown)

Read / Write command for all registers (points to Read and Write buttons)

Use these to save values of all registers to a local file on the or load a local file with desired register values (points to Store and Restore buttons)

MTP shows current no. of writes available and Program writes all register values into NVM (points to Check MTP and Program buttons)

Core R/W registers affecting many other registers (points to Monitor table)

Read only registers with MFR data (points to Manufacturer table)

Adjustment of ON/OFF thresholds and ramp-up (points to On/Off Configure table)

Fault, and Warning Thresholds and Response behavior (points to Limits table)

Read only registers with Performance data and Status Registers (points to STATUS table)

Advanced Performance registers including Control Loop and Module Calibration and response (points to User Defined table)

Module Configuration Interface:

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

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

Monitor Table:

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 Table:

Cmd	Value	Read	Write
FREQUENCY_SWITCH (kHz)	0x33	580	Read
CAPABILITY	0x19	0x84	Read
PMBUS_REVISION	0x98	1.3 1.3	Read
MFR_ID	0x99	IR	Read
MFR_MODEL	0x9A	0x00a0	Read
MFR_REVISION	0x9B	0x0014	Read
MFR_DATE	0x9D	0x1a16	Read

On/Off Configure Table:

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 Table:

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 Table:

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

User Defined Table:

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_DZP_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_IIN_OFFSET	0x003E	0	Read Write
LOOP1_TEMPERATURE_OFFSET	0x043E	0	Read Write
LOOP1_IIN_PER_PHASE_OFFSET	0x0444	0	Read Write
LOOP1_FIXED_IIN_OFFSET	0x0444	0	Read Write
LOOP2_TEMPERATURE_OFFSET	0x083E	0	Read Write
LOOP2_IIN_PER_PHASE_OFFSET	0x0844	0	Read Write
LOOP2_FIXED_IIN_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

The screenshot shows the ProGUI III interface with the following components:

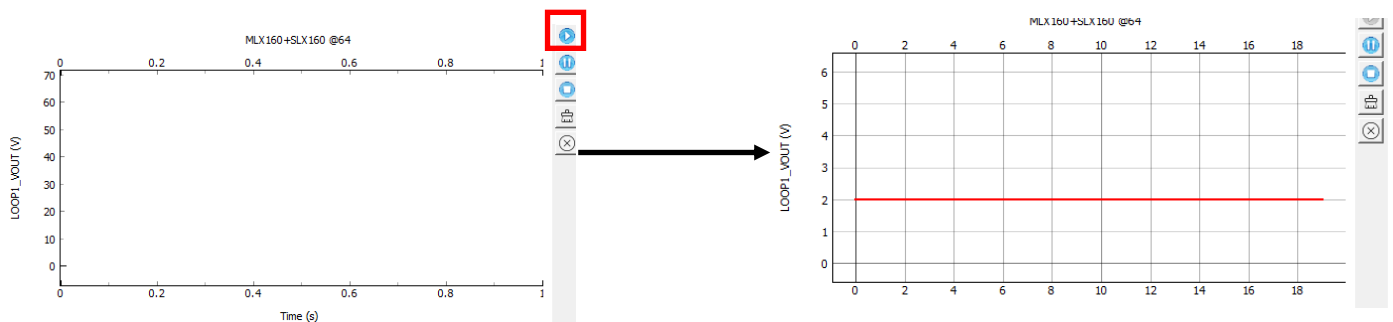
- Top Menu:** Workbench, Module, Plot, CLI, Log, Setup, Debug, Offline, Help
- Dongle Connect:** USB Serial Device (dropdown), Connect button
- Select Module Type:** Auto Scan (dropdown)
- Module Connect:** Scan Module button, 1 module(s) found
- Polling Control:** Stop Polling button, 20 ms, Stop on Error (checkbox), Stop on PEC (checkbox), Logging (checkbox checked)
- Plot Panel:** Four empty graphs with Y-axis 'Value' (0-70) and X-axis 'Time (s)' (0-1). Each graph has a toolbar with play, stop, refresh, and zoom icons.
- Polling Panel:**
 - Header: MLX160 | SLX160 @64
 - Parameters: LOOP1_STATUS_WORD (0x0000), LOOP1_VIN (V) (12.0), LOOP1_IIN (A) (0.06), LOOP1_VOUT (V) (1.0), LOOP1_IOUT (A) (1.0), LOOP1_TEMP (C) (27), LOOP2_STATUS_WORD (0x0000), LOOP2_VIN (V) (12.0), LOOP2_IIN (A) (0.12), LOOP2_VOUT (V) (1.199), LOOP2_IOUT (A) (1.5), LOOP2_TEMP (C) (28)
 - Buttons: CLEAR FAULTS (Clear), ON/OFF (ON/OFF)

The screenshot shows the ProGUI III interface with data displayed in the graphs. A black arrow points from the 'Start' button in the graph toolbar to the 'Start' button in the polling panel.

The **Polling Panel** data is as follows:

MLX160+SLX160 @64	
LOOP1_STATUS_WORD	0x8001
LOOP1_VIN (V)	11.97
LOOP1_IIN (A)	0.0
LOOP1_VOUT (V)	2.0
LOOP1_IOUT (A)	0.0
LOOP1_TEMP (C)	36
LOOP2_STATUS_WORD	0x0841
LOOP2_VIN (V)	11.97
LOOP2_IIN (A)	0.0

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	<input type="button" value="Read"/>	<input type="button" value="Write"/>

Polling Panel	
	MLX160 SLX160 @64
LOOP1_STATUS_WORD	0x0000
LOOP1_VIN (V)	12.0
LOOP1_IIN (A)	0.03
LOOP1_VOUT (V)	1.0
LOOP1_IOUT (A)	1.0
LOOP1_TEMP (C)	28
LOOP2_STATUS_WORD	0x0000
LOOP2_VIN (V)	12.0
LOOP2_IIN (A)	0.16
LOOP2_VOUT (V)	1.199
LOOP2_IOUT (A)	1.5
LOOP2_TEMP (C)	29
CLEAR FAULTS	<input type="button" value="Clear"/>
ON/OFF	<input type="button" value="ON/OFF"/>

Revision History

Revision	Date	Description of the change
1.1	2/6/2024	Initial Release
1.2	08/07/2024	Guidelines for use with ProGUI III added

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