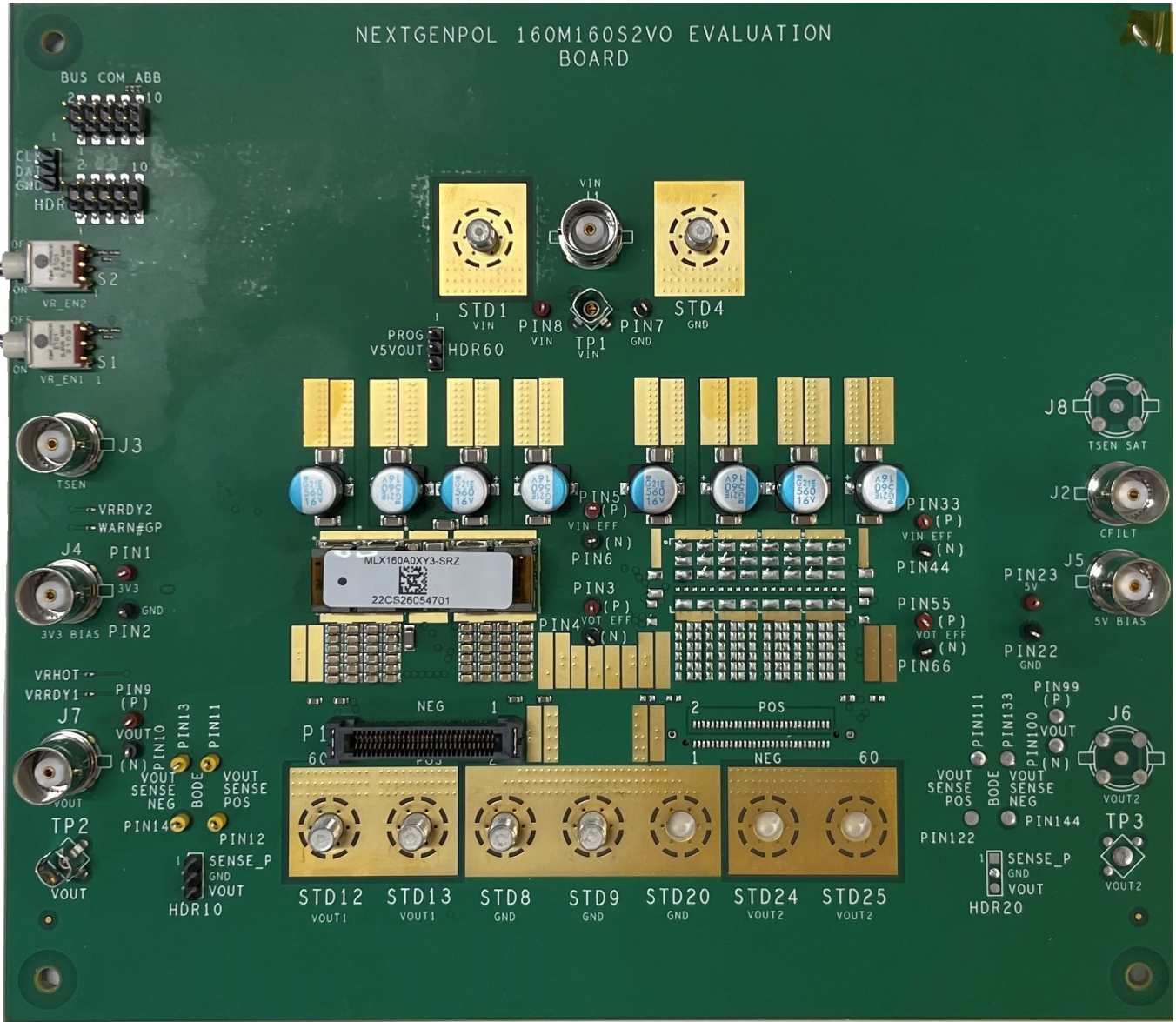


# NEXTGENPOL 160M160S1V0 SINGLE LOOP/OUTPUT

Single Loop/Output Voltage Evaluation Board populated with MLX040 / MLX080 / MLX120 or MLX160



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## 1. Description

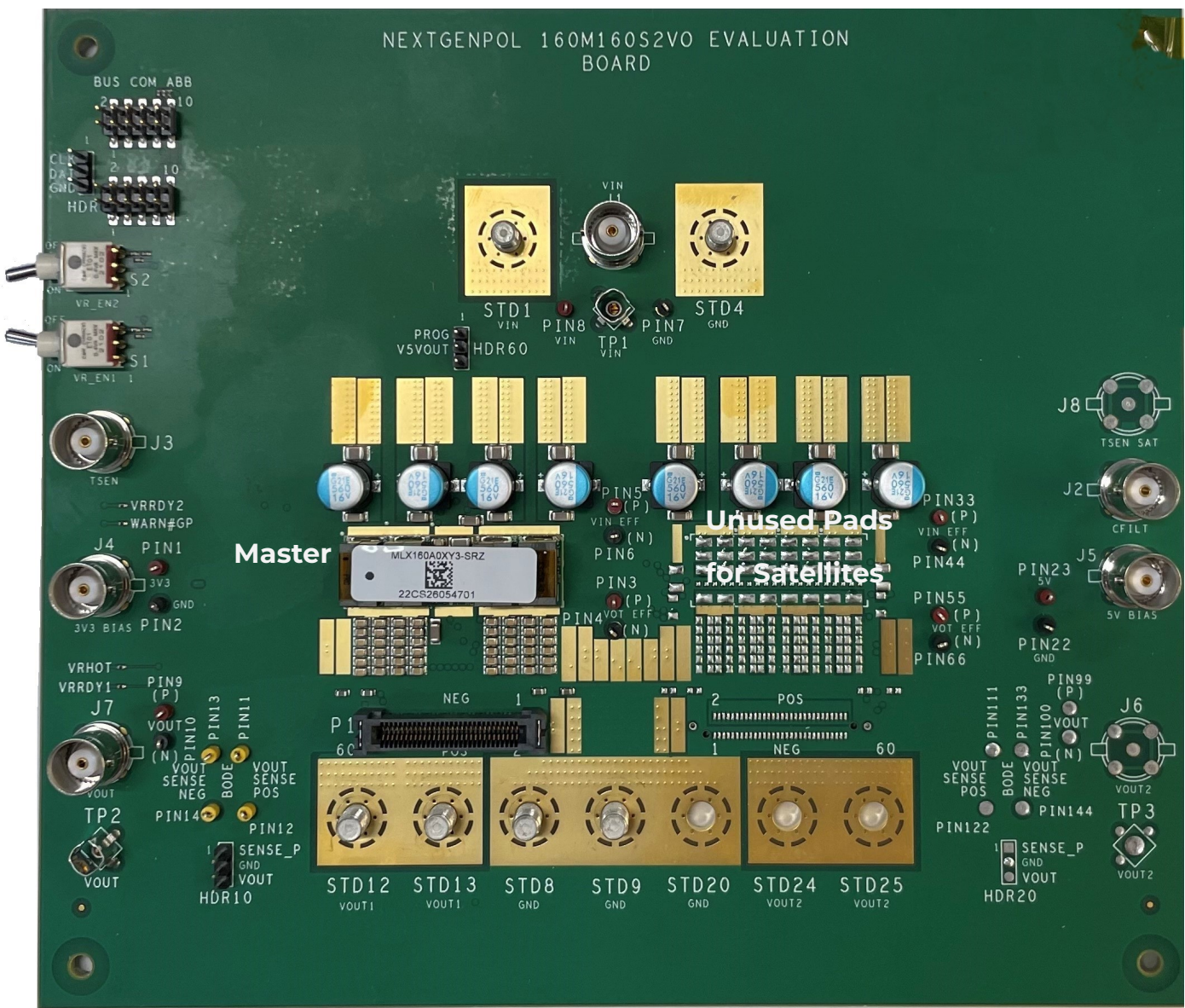
The MLX series are the next generation of POL modules that can deliver 40-320A in a fully configured mode. It operates over a wide input range from 7V to 14Vdc and provides precisely regulated output voltage from 0.45 to 2.0V

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.

The board shown below is common to the MLX160, MLX120, MLX080 and MLX040 module.s. [This evaluation board guide can be used to connect and configure evaluation boards with any of these modules](#)

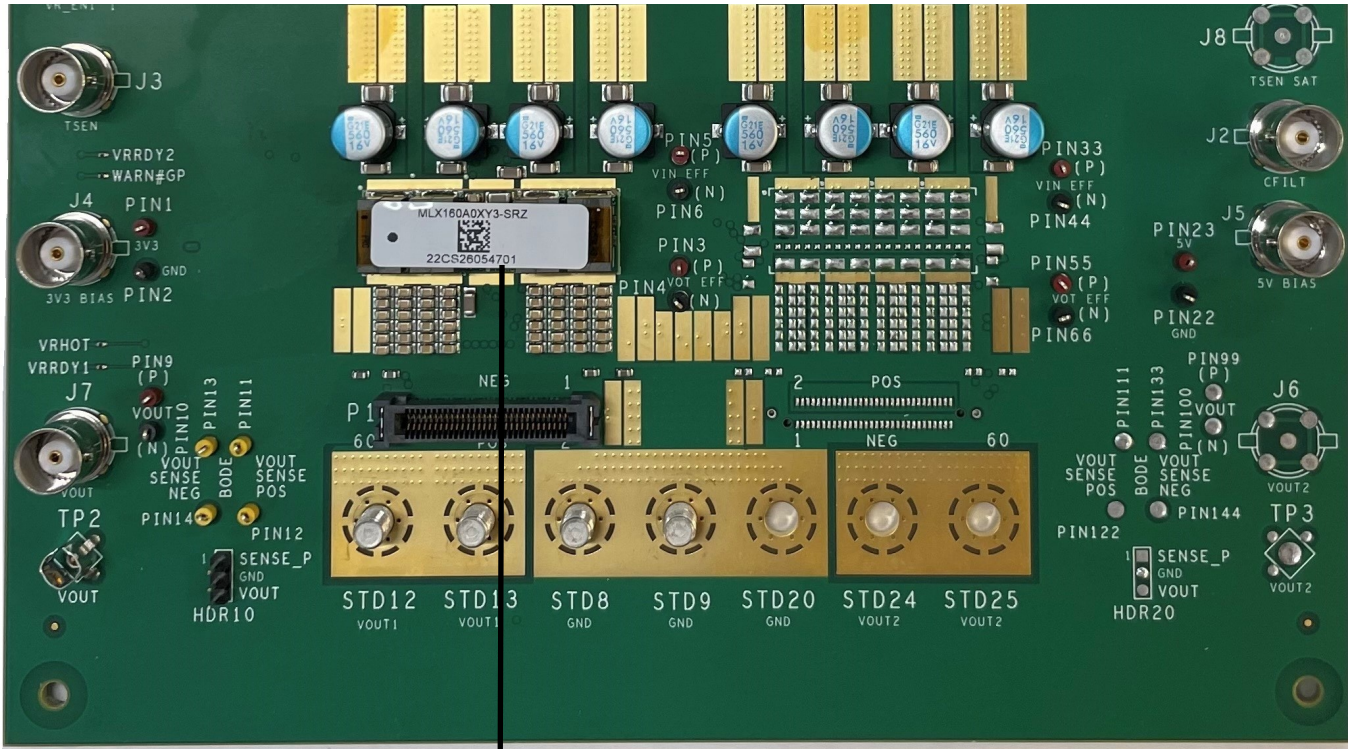
**Top View of Evaluation Board with MLX160 module**



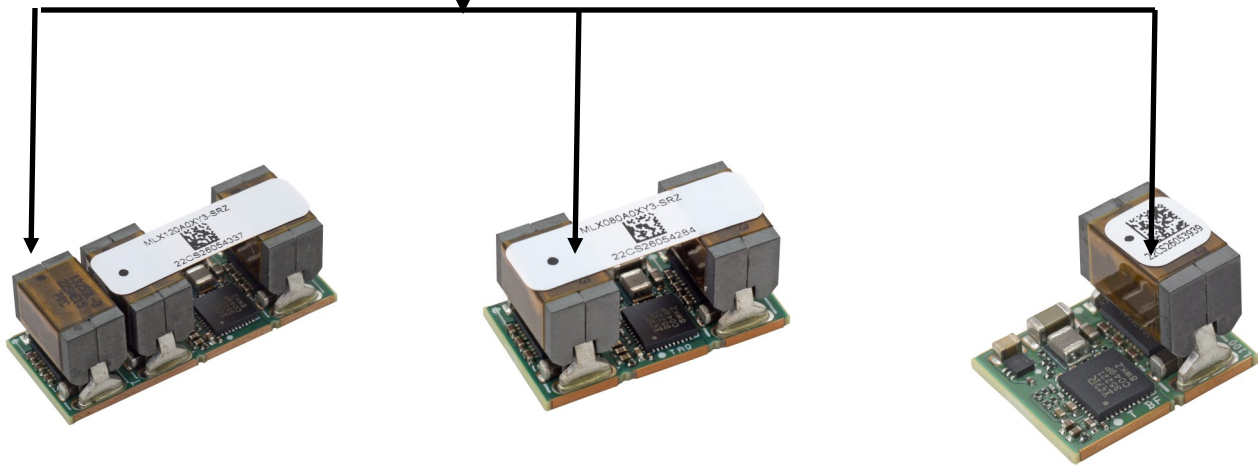
## 1. Description (Continued)

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

### Evaluation Board with different module variants



**OPTIONS**



MLX120

MLX080

MLX040

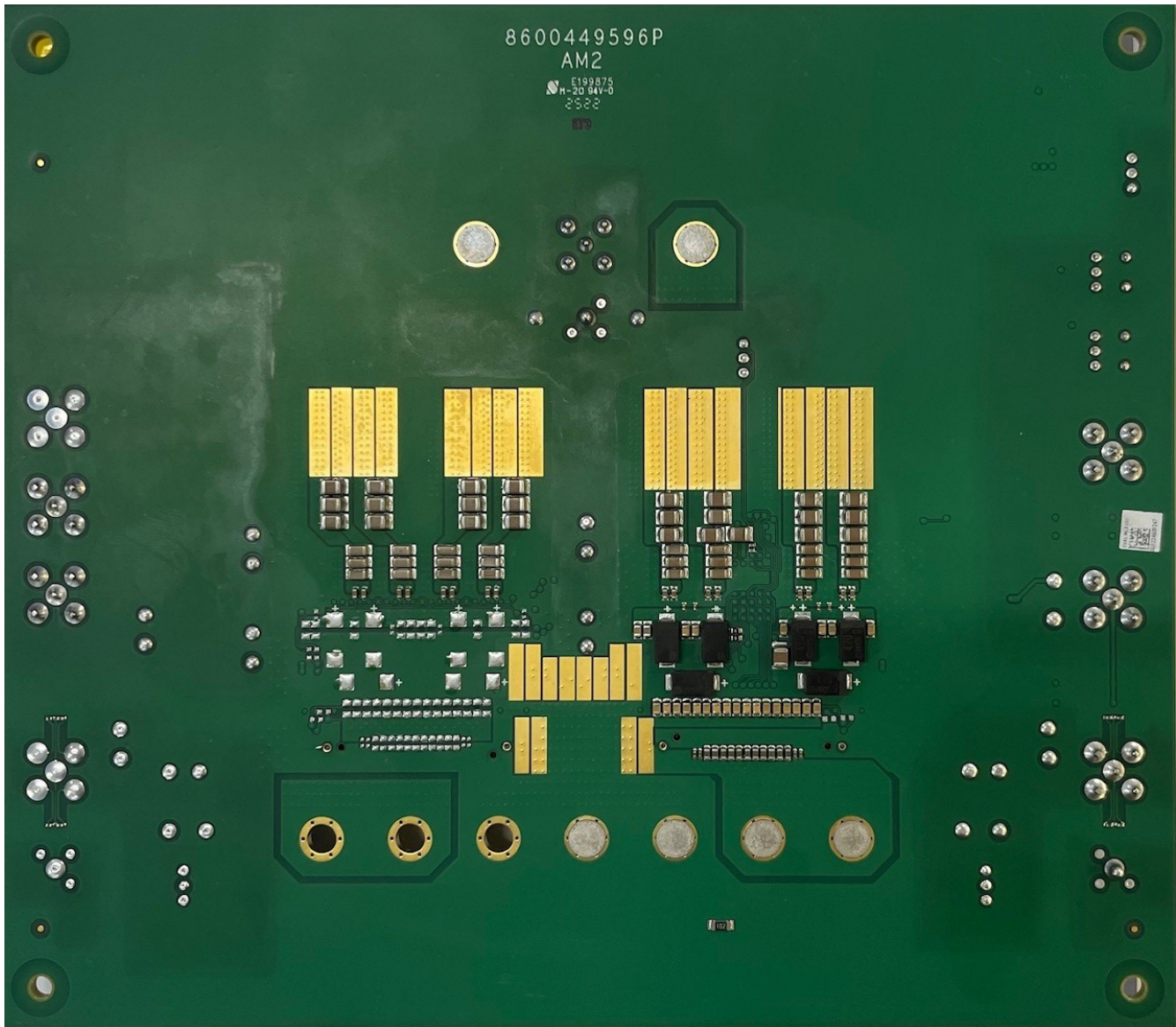


## 1. Description (Continued)

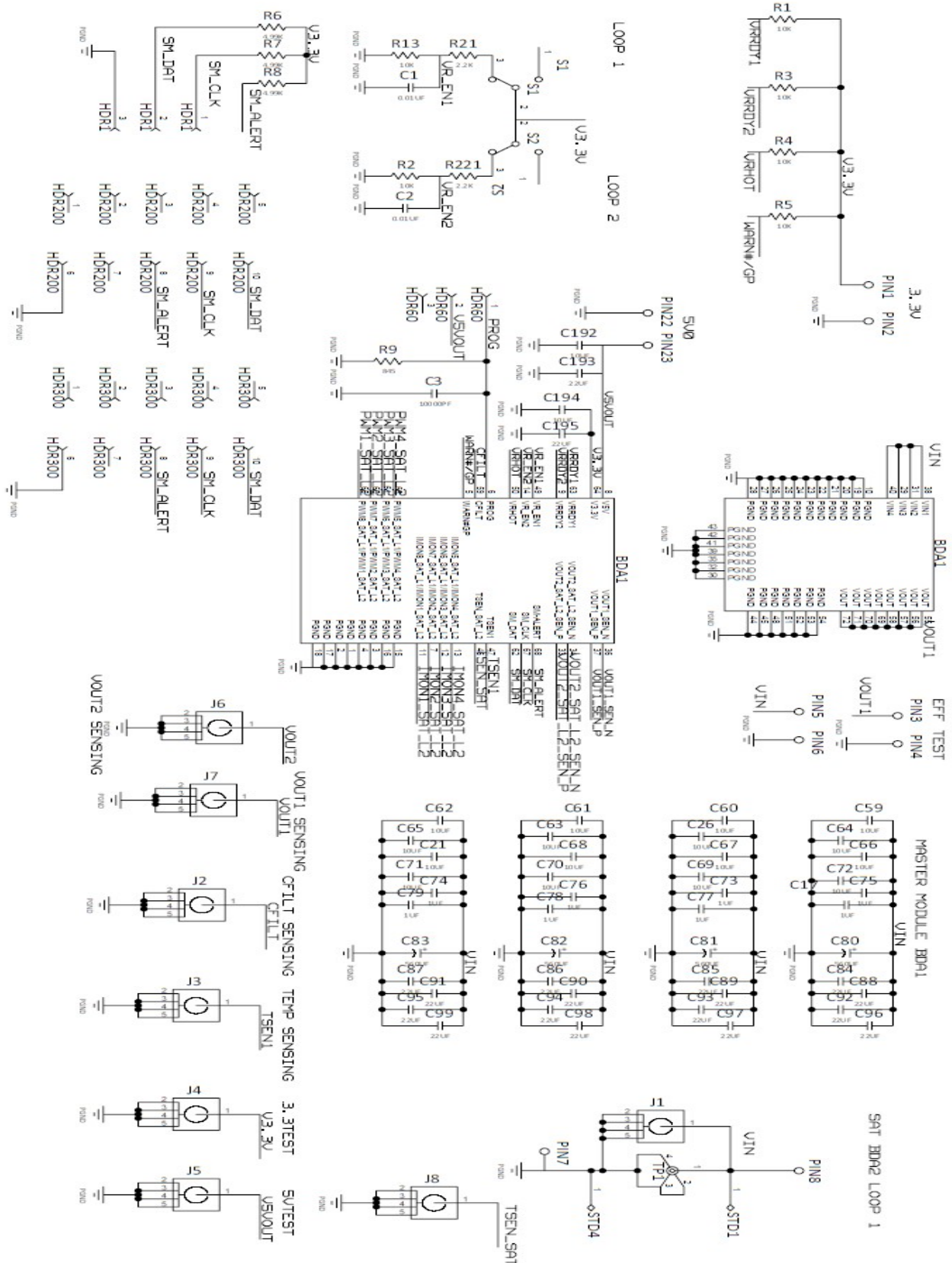
The Installed components are as follows. The schematic on the following page shows maximum capability and includes expansion capability:

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

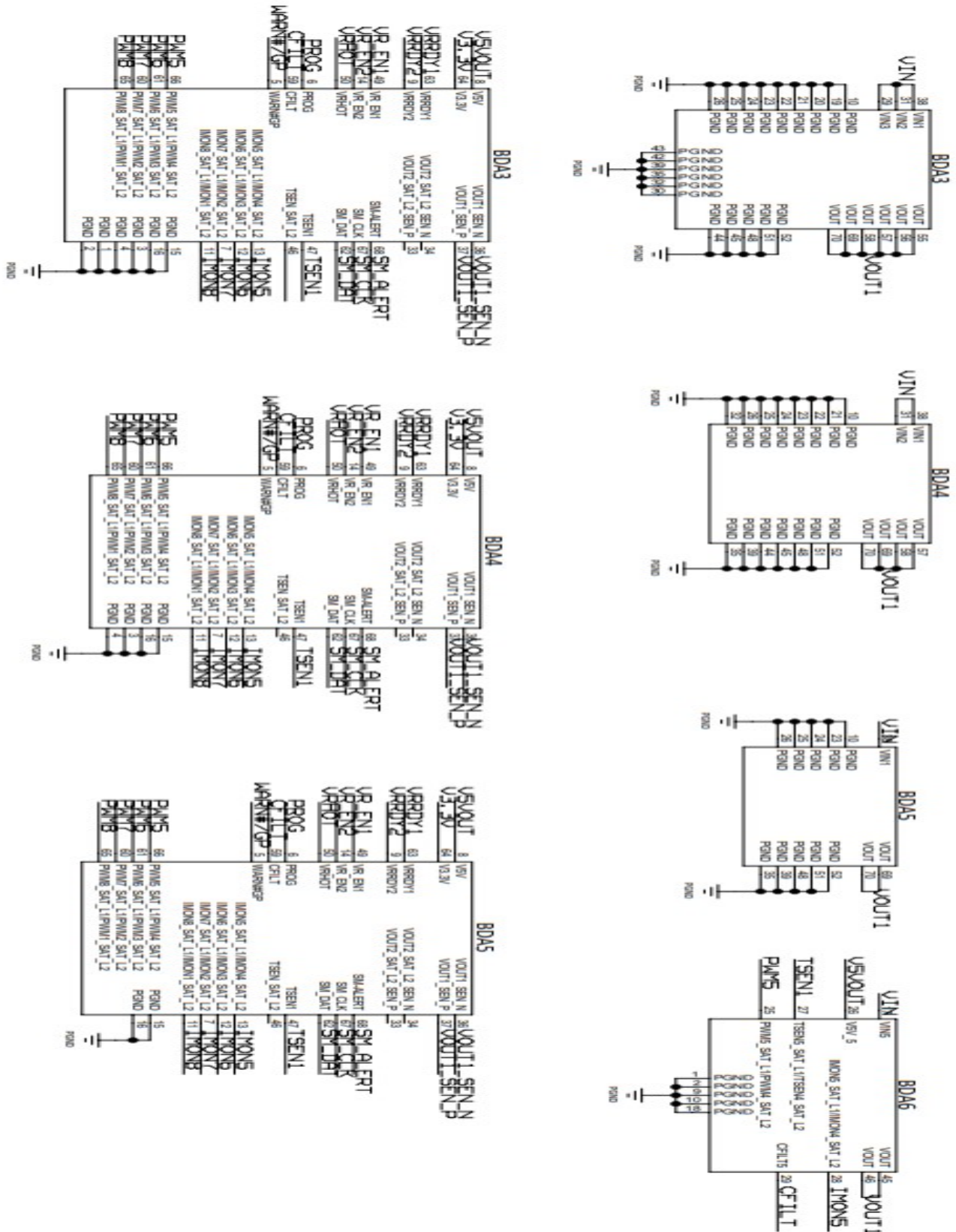
**Bottom View of Evaluation Board**



## 2. Schematic

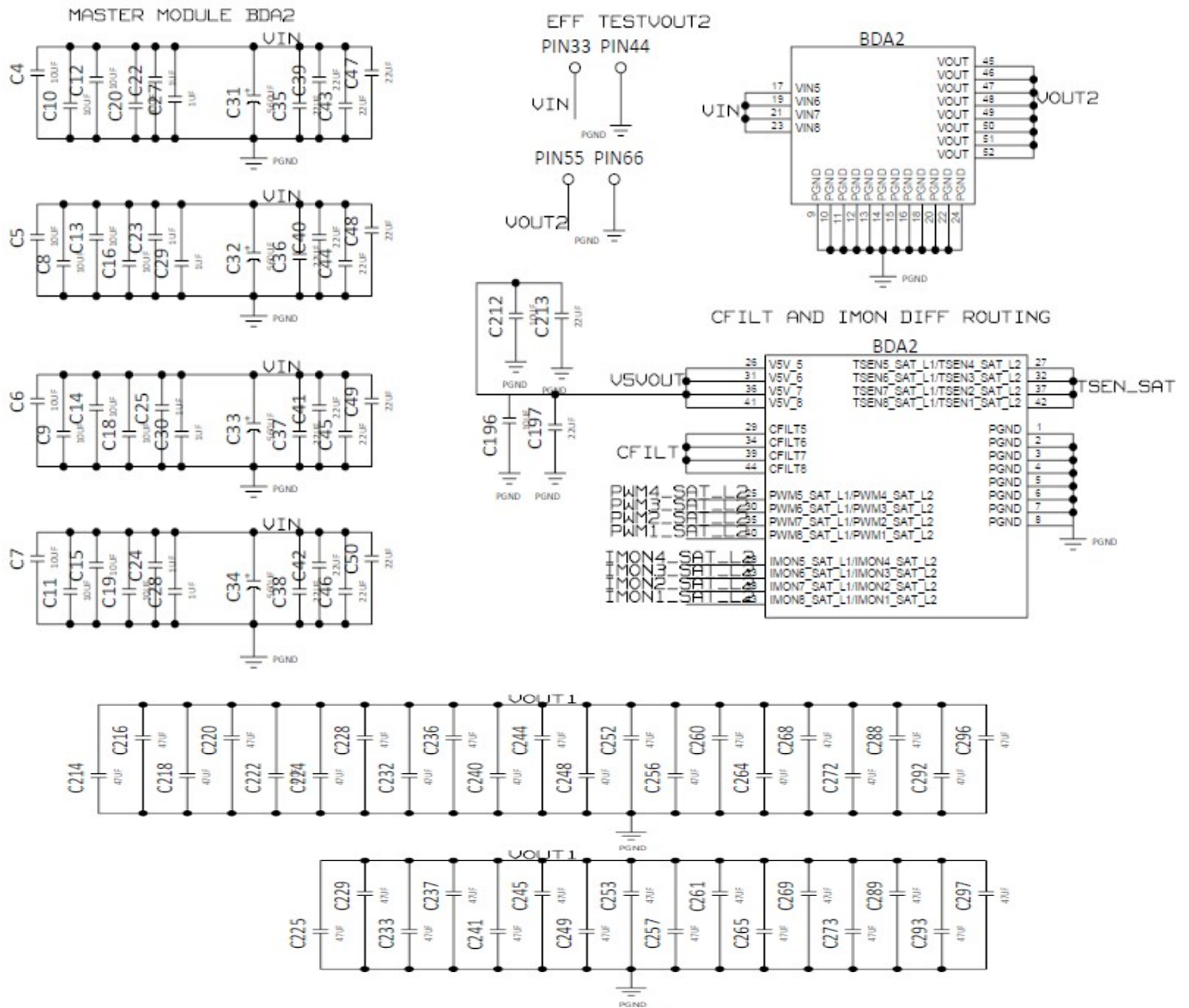


## 2. Schematic (Continued)





## 2. Schematic (Continued)

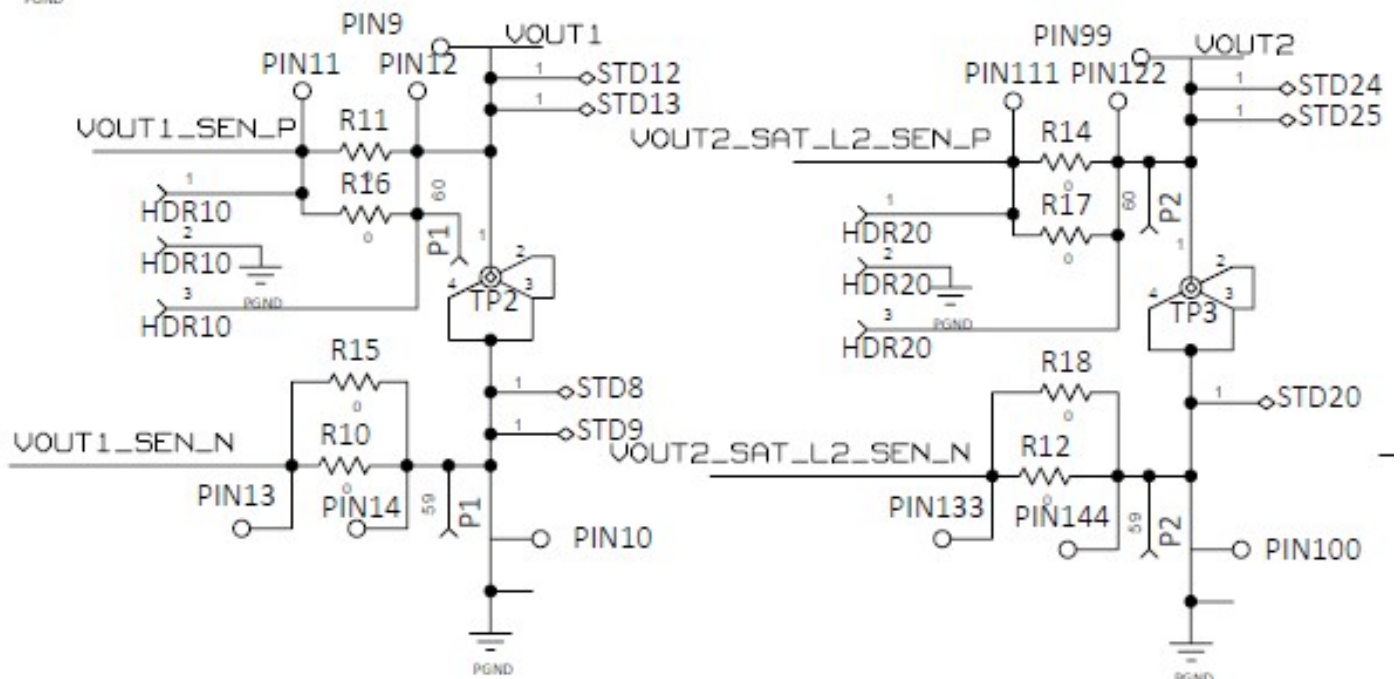
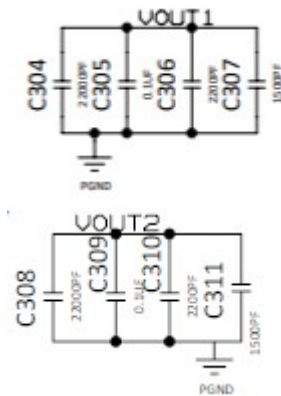
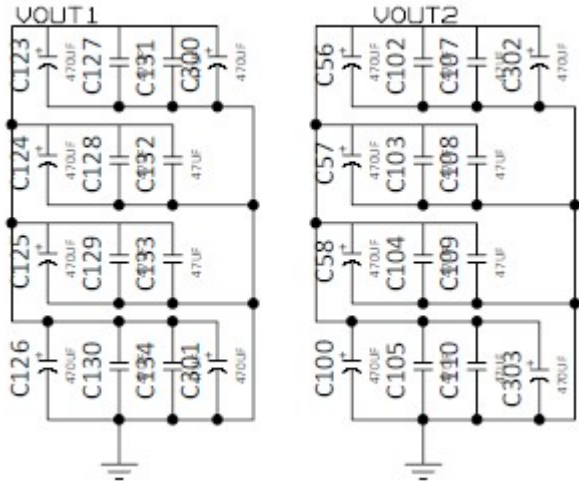






## 2. Schematic (Continued)

PLACE CLOSE TO IND



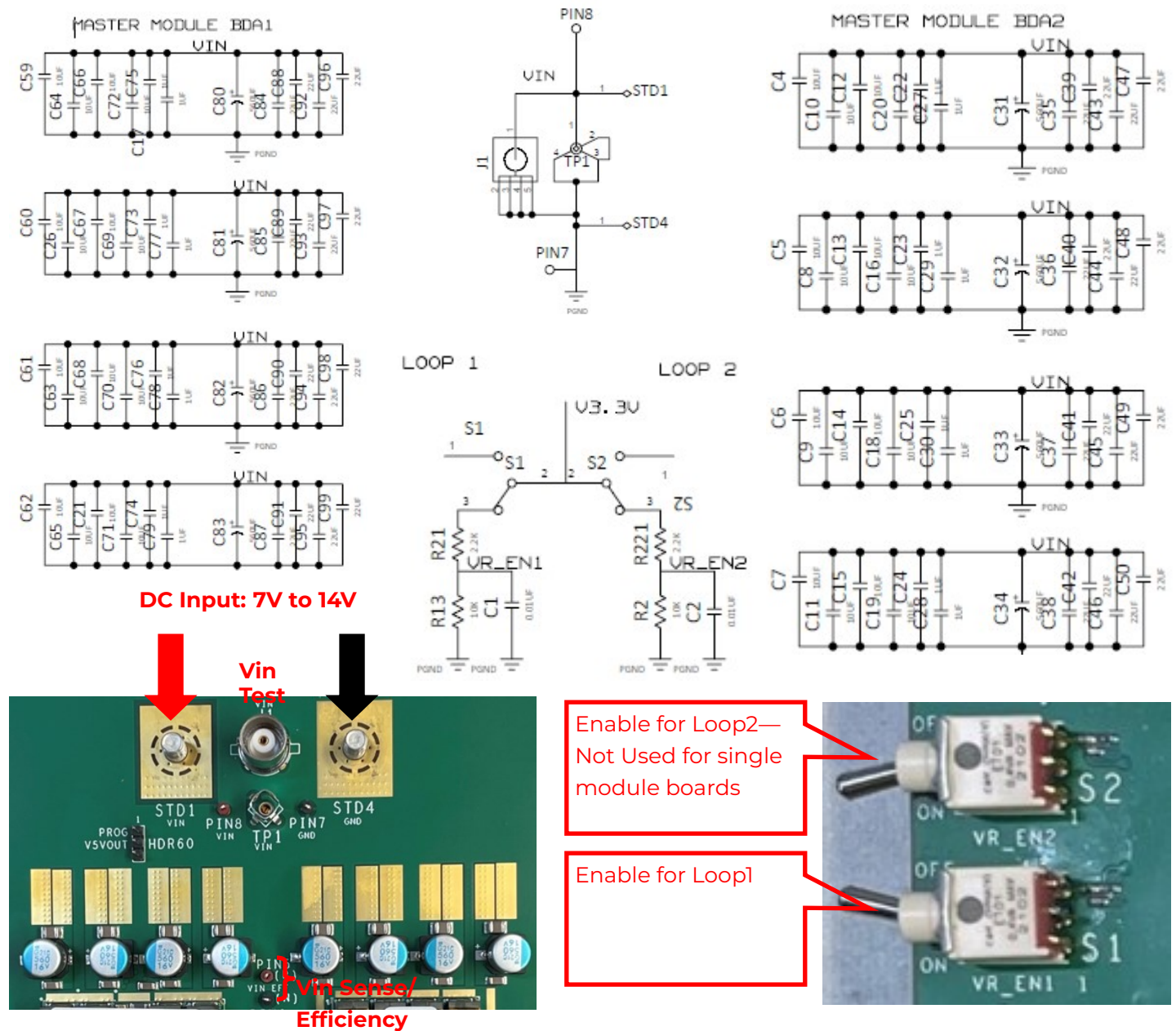


The complete schematic diagram of the MLX Series evaluation board is shown in the previous pages. Components on schematic show max capability and may not be actually used on the board.

## 2.1. Eval Board Sections

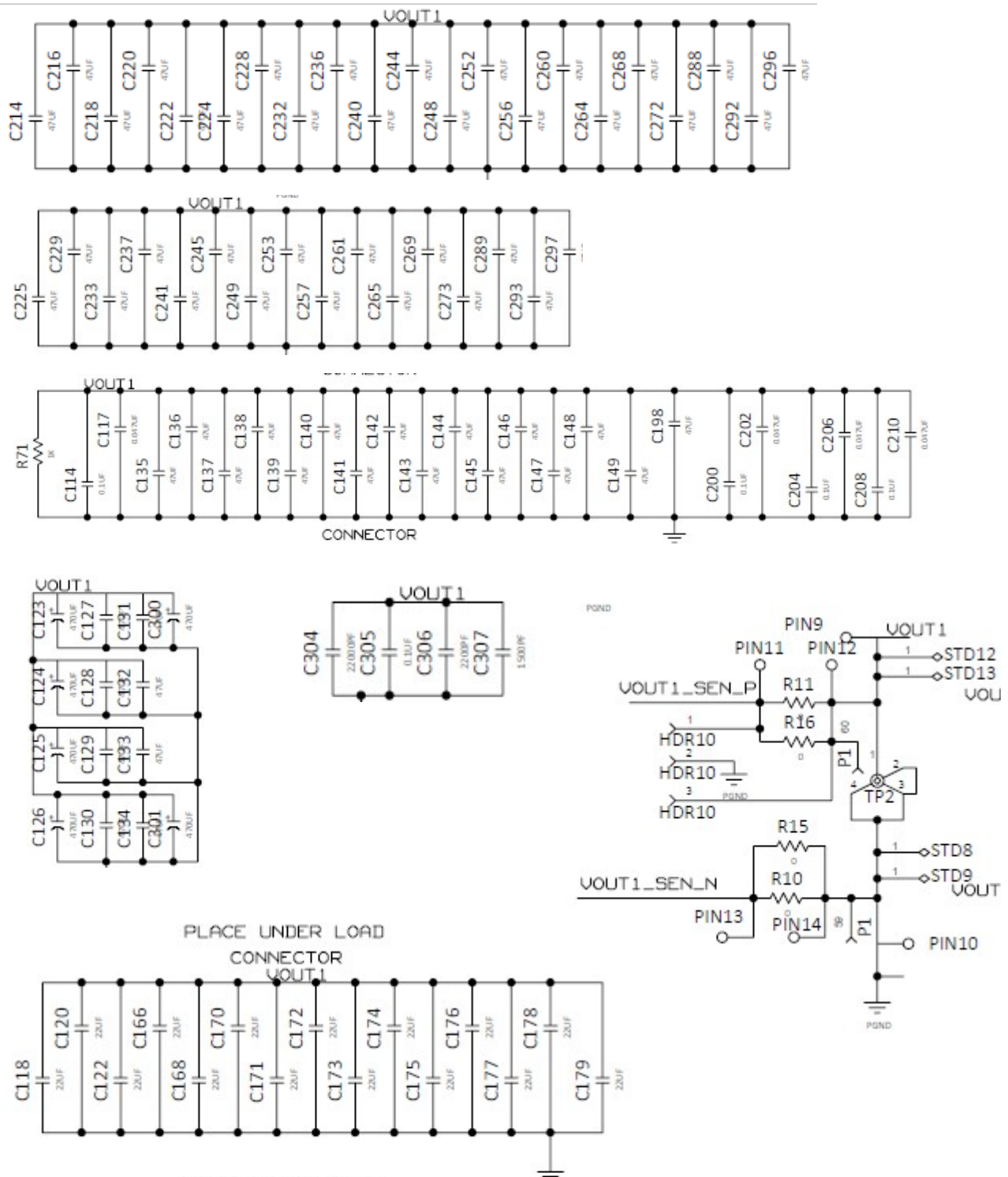
The following pictures show the input connections and components external to the module

### 2.1.1. Input Connections

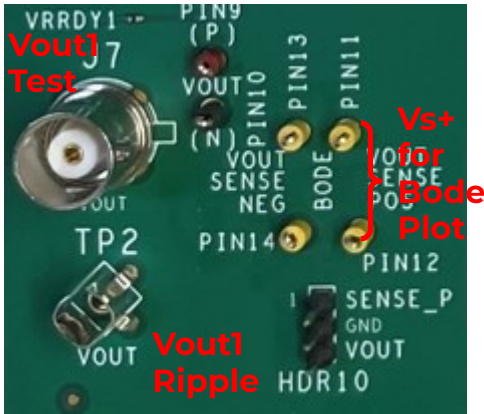


## 2.1.2. Output Connections

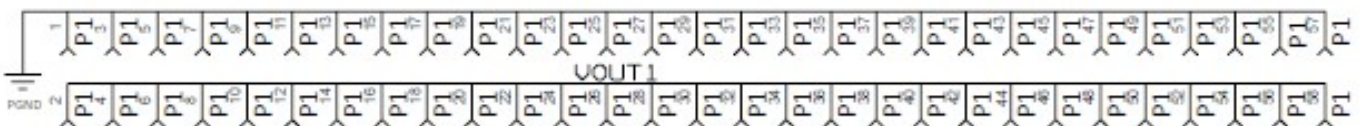
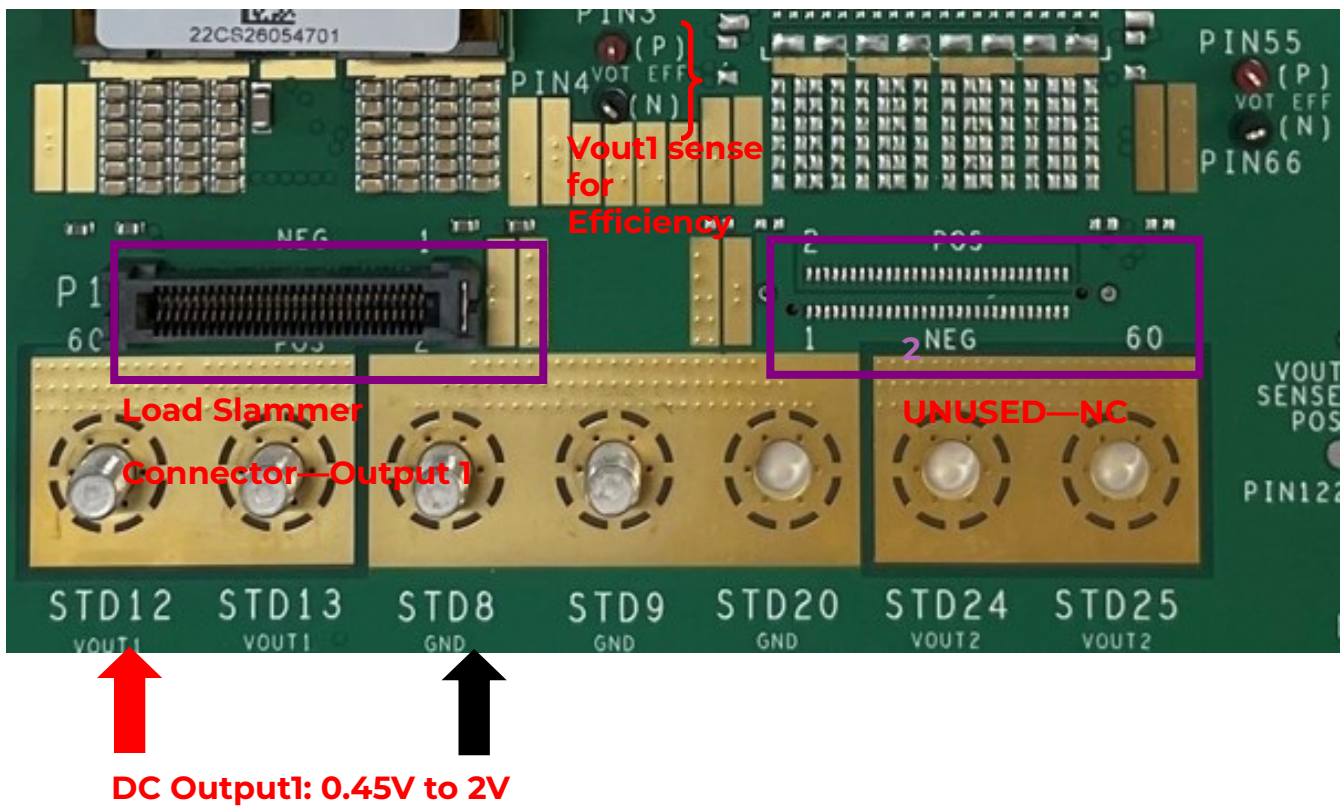
Schematic shows max capability. Board will not be populated with all components





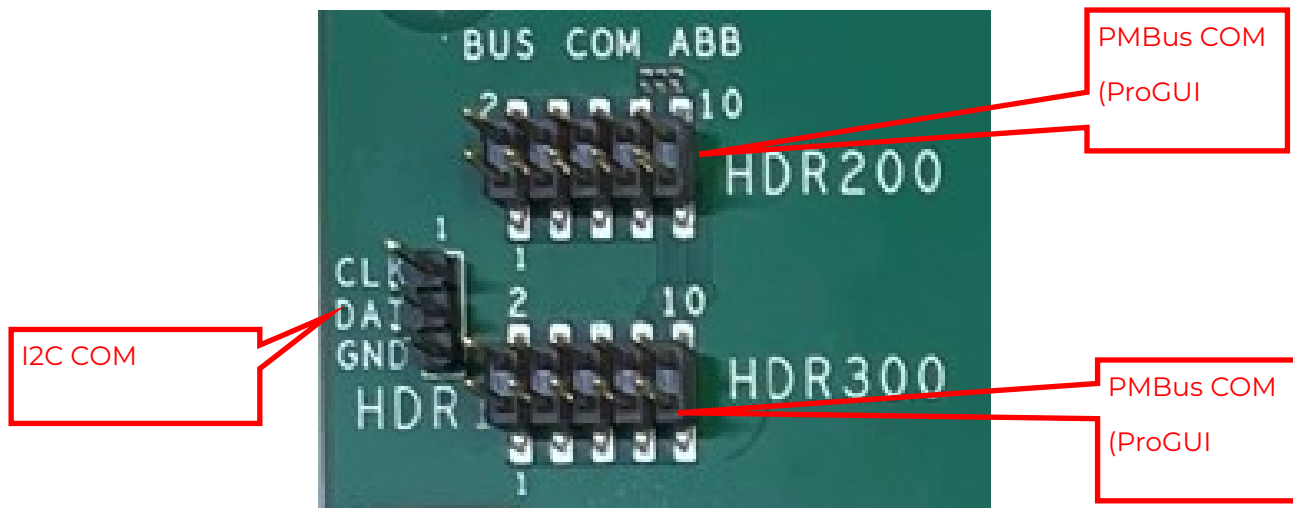
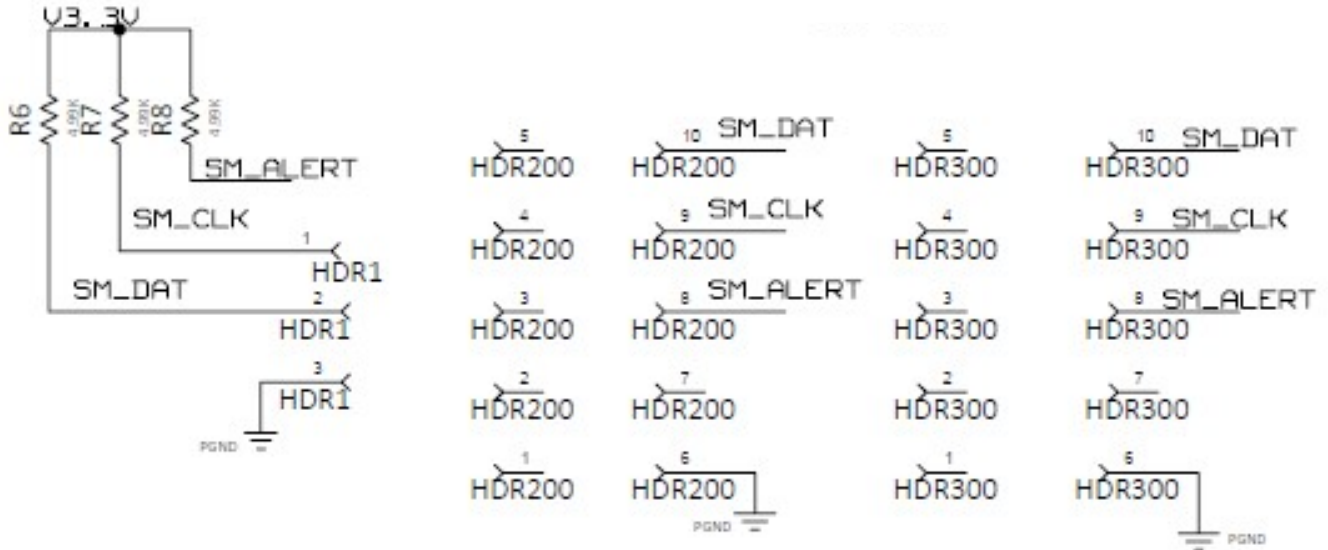


### 2.1.3. Load Transient Connections



### 2.1.4. PMBus Connection

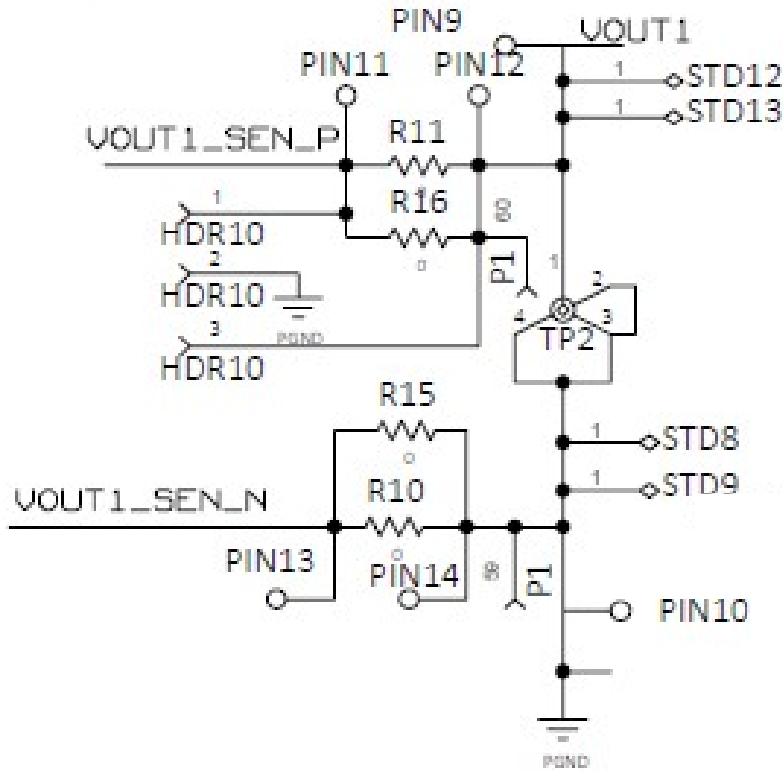
Evaluation Board is provided with a pair of 10 pin connectors and 3 pin header for PMBus connectivity



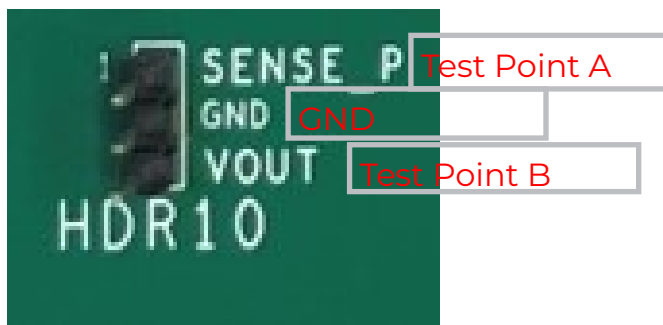


### 2.1.5. Bode Plot Connection

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

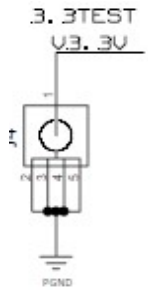

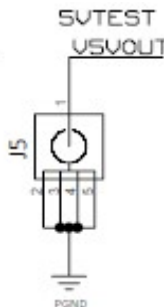

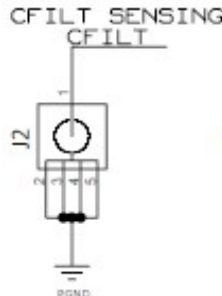

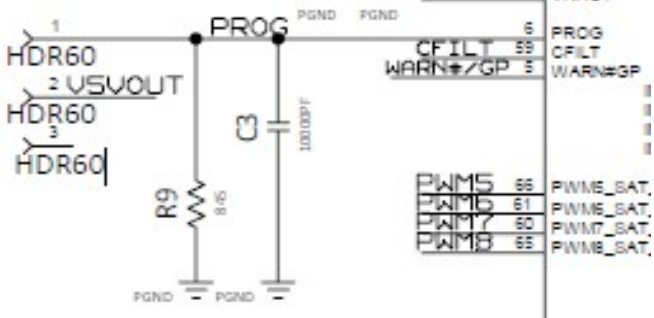



### Bode Measurement



## 2.1.6. Miscellaneous Connections

### Bias Rails

**Output Rails**

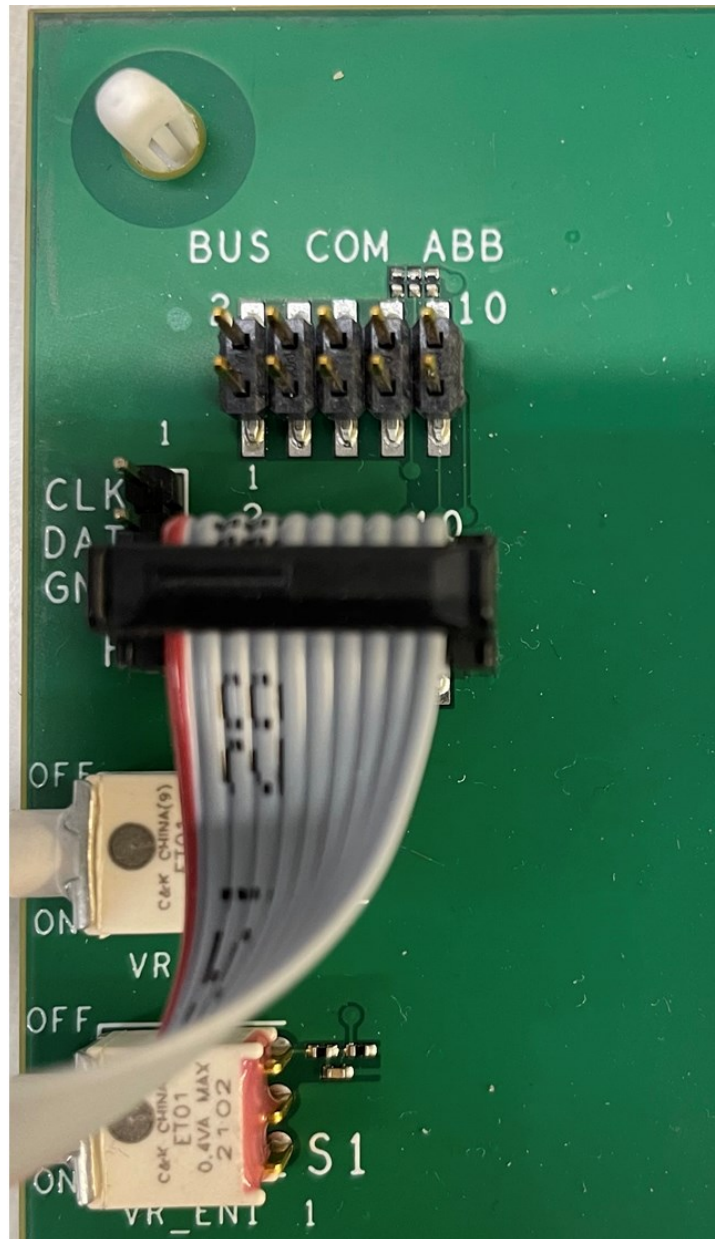
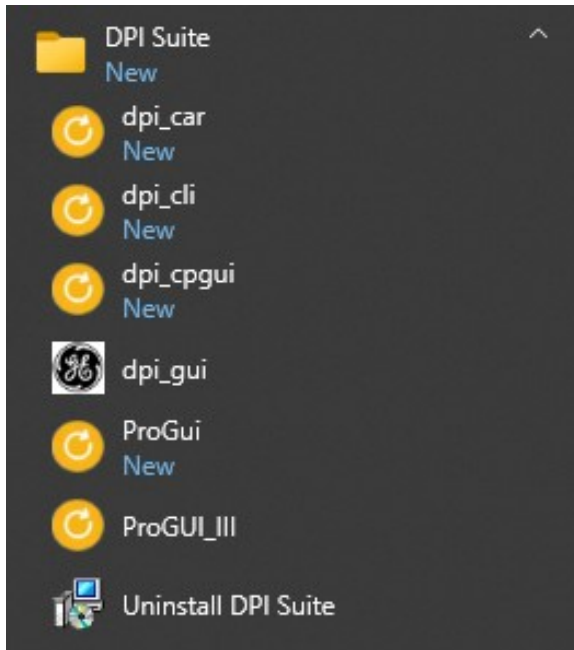
VOUT1



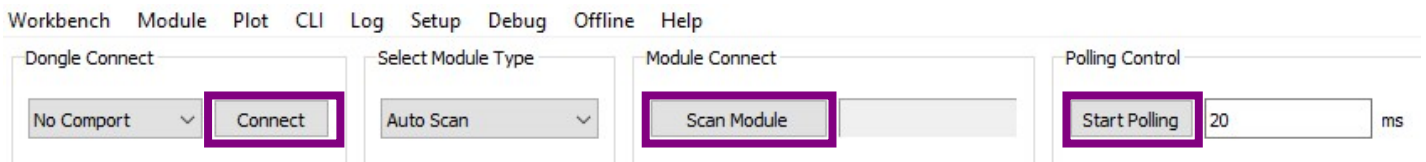


## 2.1.2. ProGUI Connection and Setup

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.

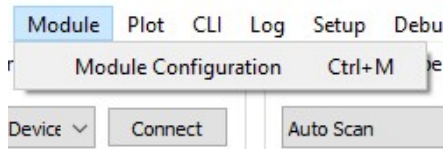


Click on Connect and then Scan Module to find the MLX module and then click on Start Polling

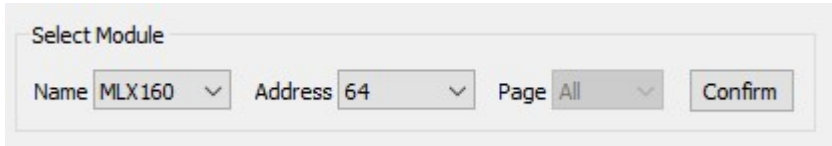


## 2.1.2. ProGUI Connection and Setup

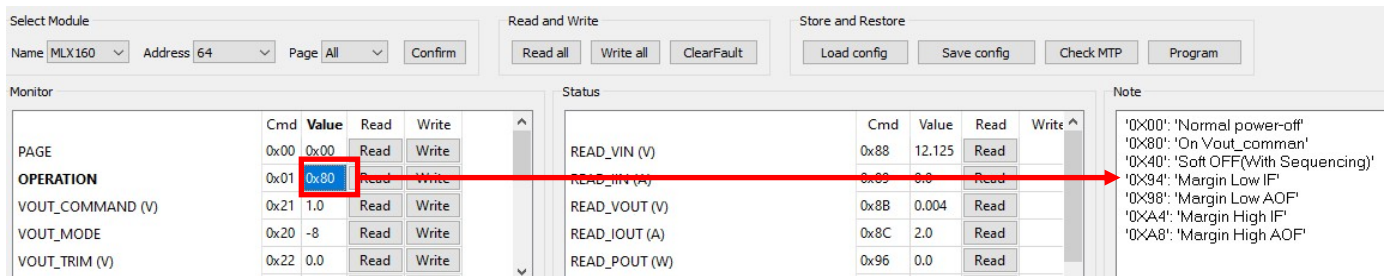
- Click on “Module” in the top left corner and then click on Module Configuration



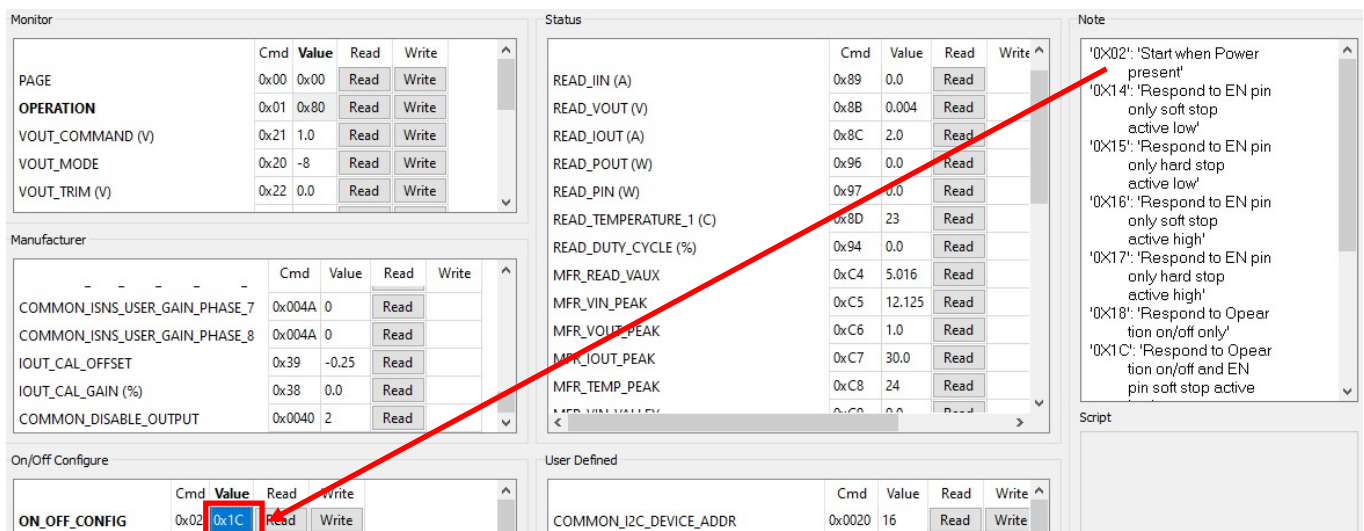
- A new window will open up. Click on the Confirm button to allow access to the module.



- Clicking on the 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.



- 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



## 2.1.2. ProGUI Connection and Setup

The screenshot shows the ProGUI Module Configuration interface for an MLX160 module. The interface is divided into several sections: Monitor, Manufacturer, On/Off Configure, Limits, and User Defined. Callouts provide detailed explanations of key features:

- Starts communication:** Points to the 'Confirm' button.
- Read / Write command for all registers:** Points to the 'Read all' and 'Write all' 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 the 'Load config' and 'Save config' buttons.
- MTP shows current no. of writes available and Program writes all register values into NVM:** Points to the 'Check MTP' and 'Program' buttons.
- Core R/W registers affecting many other registers:** Points to the 'Monitor' table.
- Read only registers with MFR data:** Points to the 'Manufacturer' table.
- Adjustment of ON/OFF thresholds and ramp-up:** Points to the 'On/Off Configure' table.
- Fault, and Warning Thresholds and Response behavior:** Points to the 'Limits' table.
- Read only registers with Performance data and Status Registers:** Points to the 'STATUS' table.
- Advanced Performance registers including Control Loop and Module Calibration and response:** Points to the 'User Defined' table.

**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
VIN_ON (V)	0x35	5.75	Read
VIN_OFF (V)	0x36	5.25	Read
POWER_GOOD_ON (V)	0x5E	0.395	Read
POWER_GOOD_OFF (V)	0x5F	0.395	Read
TON_DELAY (ms)	0x60	0.0	Read
TON_RISE (ms)	0x61	15.0	Read

**Limits Table:**

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

**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

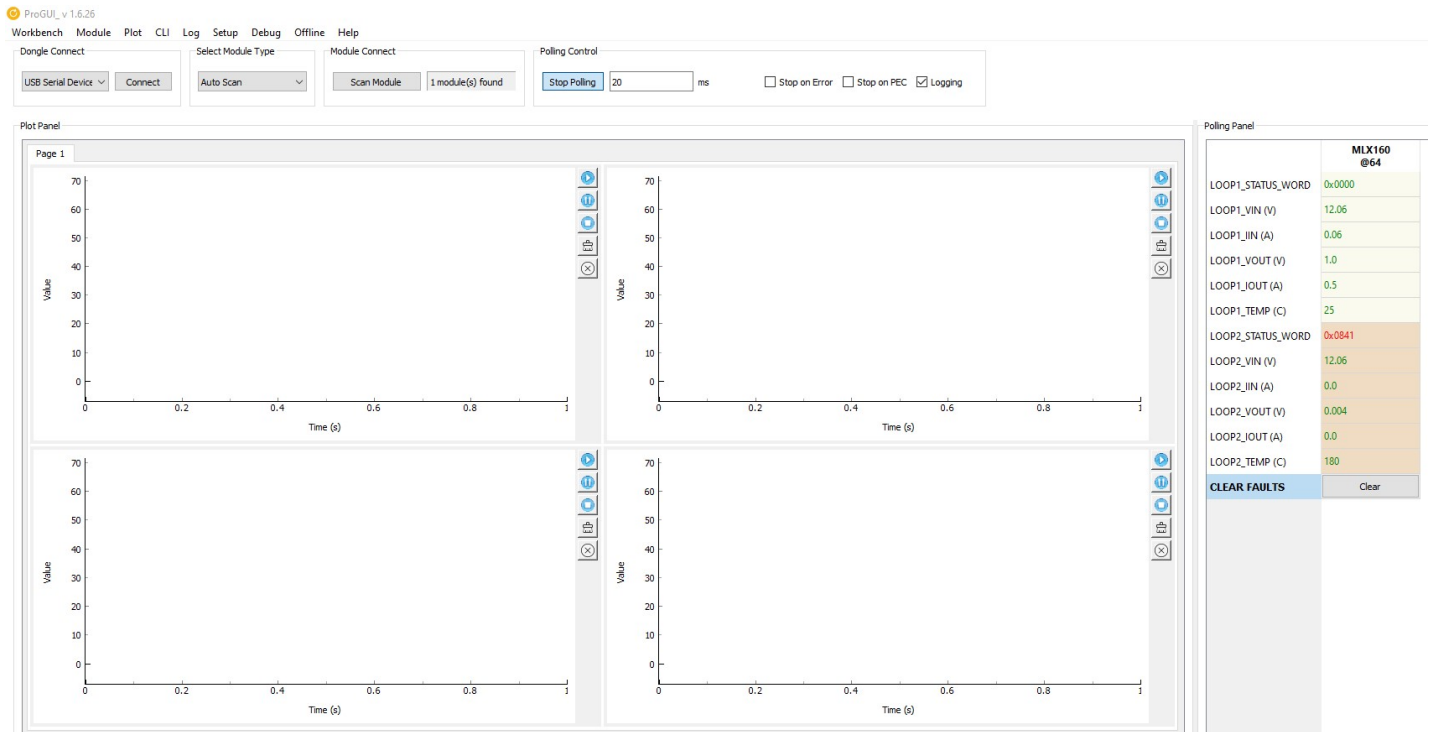
**User Defined Table:**

Cmd	Value	Read	Write
COMMON_I2C_DEVICE_ADDR	0x0020	16	Read
COMMON_PMB_DEVICE_ADDR	0x0020	64	Read
COMMON_I2C_PMBUS_ADDRESS_LOCK	0x0094	1	Read
COMMON_DZP_ENABLE_LVT_THRESH	0x0048	0	Read
COMMON_EN_DELAY_MODE	0x0040	0	Read
COMMON_EN_DELAY_TIME	0x0040	0	Read
COMMON_FIXED_MEASURED_IIN_OFFSET	0x003E	0	Read
LOOP1_TEMPERATURE_OFFSET	0x043E	0	Read
LOOP1_IIN_PER_PHASE_OFFSET	0x0444	0	Read
LOOP1_FIXED_IIN_OFFSET	0x0444	0	Read
LOOP2_TEMPERATURE_OFFSET	0x083E	0	Read
LOOP2_IIN_PER_PHASE_OFFSET	0x0844	0	Read
LOOP2_FIXED_IIN_OFFSET	0x0844	0	Read
COMMON_IMON_MAX_CODE	0x0022	4	Read
COMMON_TELEMETRY_BW	0x0022	4	Read
COMMON_LOOP1_READ_IOUT_SCALE	0x0024	0	Read
LOOP1_TSEN_FAULT_EN	0x0420	0	Read

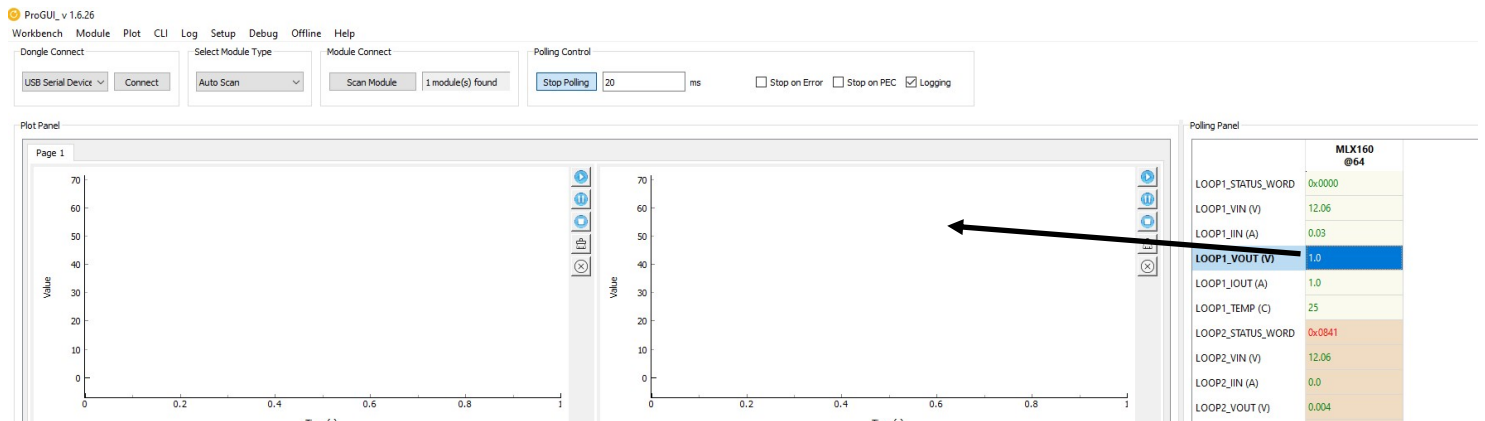


## 2.1.2. ProGUI Connection and Setup (Continued)

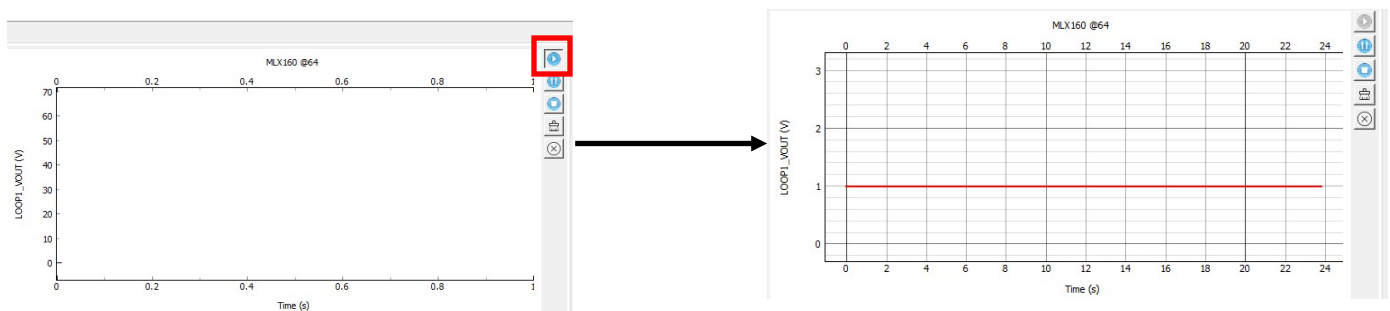
Main Display Screen once Module is On (with output)



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



Remember to click Start



## 2.1.2. ProGUI 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
<b>ON_OFF_CONFIG</b>	0x02	0x02	Read	Write

Polling Panel

<b>MLX160 @64</b>	
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

## 2.1.2. ProGUI Connection and Setup

Module Plot CLI Log Setup Debu

Module Configuration Ctrl+M

Device

Select Module

Name  Address  Page

Select Module: Name  Address  Page

Read and Write:

Store and Restore:

Monitor

	Cmd	Value	Read	Write
PAGE	0x00	0x00	Read	Write
<b>OPERATION</b>	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'

Manufacturer

	Cmd	Value	Read	Write
COMMON_ISNS_USER_GAIN_PHASE_7	0x004A	0	Read	
COMMON_ISNS_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	

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'

On/Off Configure

	Cmd	Value	Read	Write
ON_OFF_CONFIG	0x02	0x1C	Read	Write

User Defined

	Cmd	Value	Read	Write
COMMON_I2C_DEVICE_ADDR	0x0020	16	Read	Write

On/Off Configure

	Cmd	Value	Read	Write
<b>ON_OFF_CONFIG</b>	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



## 2.1.2. ProGUI Connection and Setup

## Revision History

Revision	Date	Description of the change
1.1	02/23/2024	Initial Release
1.2	03/08/2024	Updated as per OmniOn template

**OmniOn Power Inc.**

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