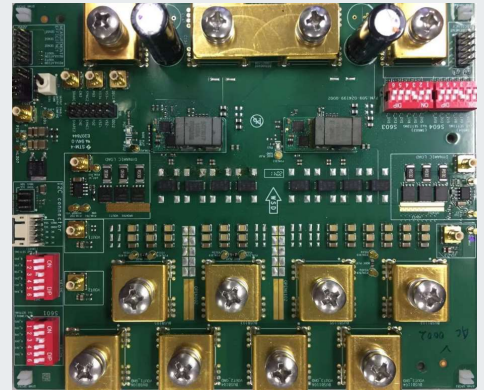Advanced
Energy®

ARTESYN LGA110-EVAL-KIT
Evaluation Test Board

PRODUCT DESCRIPTION

Advanced Energy's Artesyn LGA110D Evaluation Test Board is designed to have two LGA110D non-isolated modules. It allows the user to test and investigate the performance of modules.

This document is a reference guide for the evaluation test board. It provides output terminals, test points to power signals, control signals and communication interface via I^2C bus. Refer to the technical reference note of the power supply for more information about the specifications and the signal definitions.

AT A GLANCE

Total Power

350 Watts per Module

Input Voltage

0.5 to 5 Vdc

# of Outputs

Dual or Single

CONTENTS

- Overview
- Pin Assignment
- Test Point Introduction
- Test Set Up
- Operation
- Supported Models
- Schematic
- PCB Layout

OVERVIEW

Overview

Default Settings:

Module1 is configured as 2 phase 2 output (Vo1, Vo2)

Module2 is configured as 2 phase 1 output (Vo3)

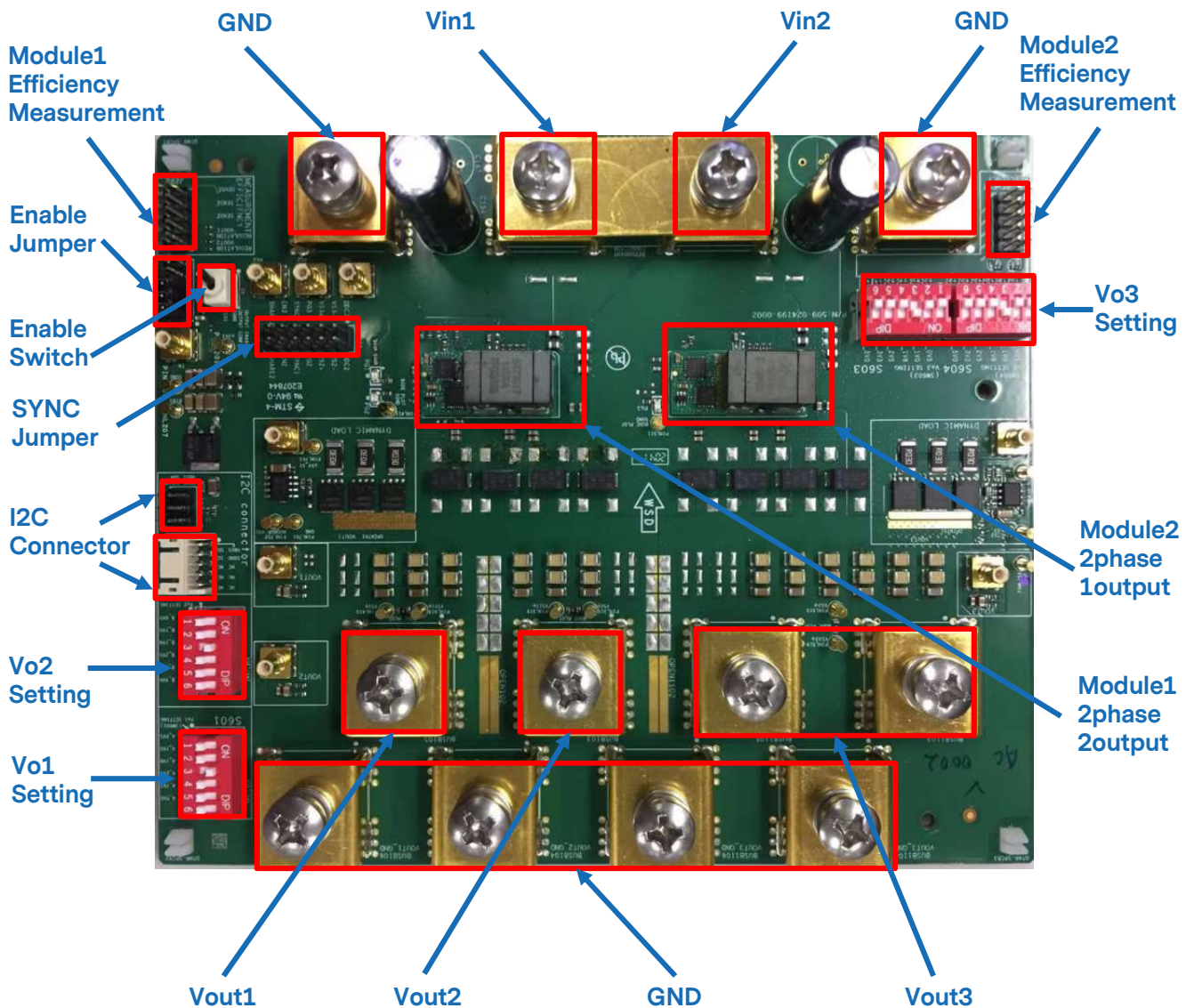The key components and connection locations are shown in the picture of the evaluation board below.
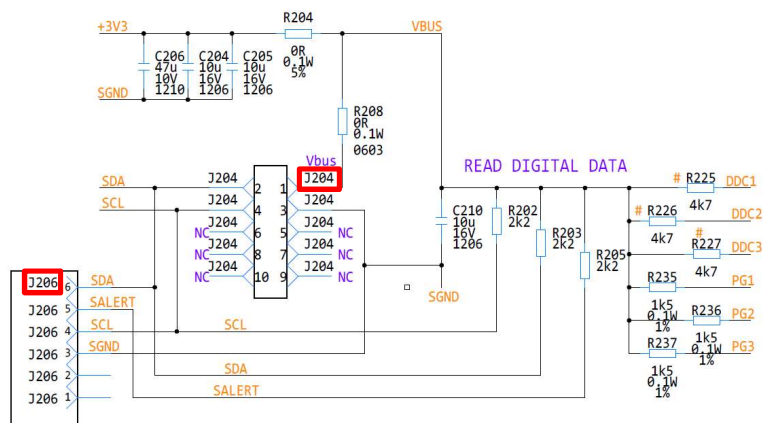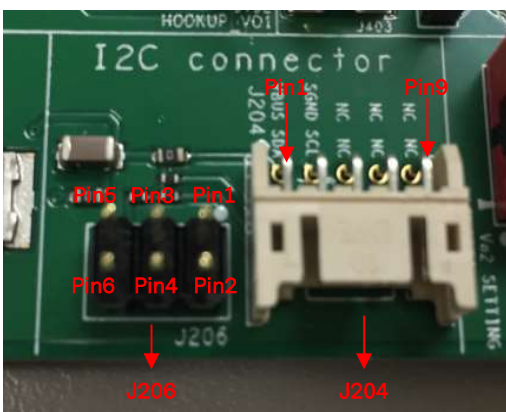

Figure 1. Evaluation Test Board for LGA110D

PIN ASSIGNMENT

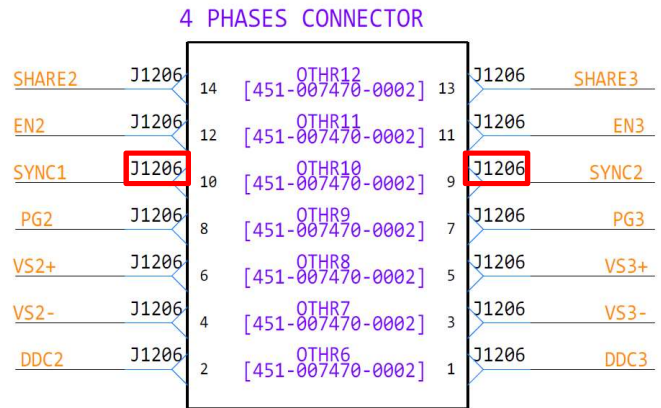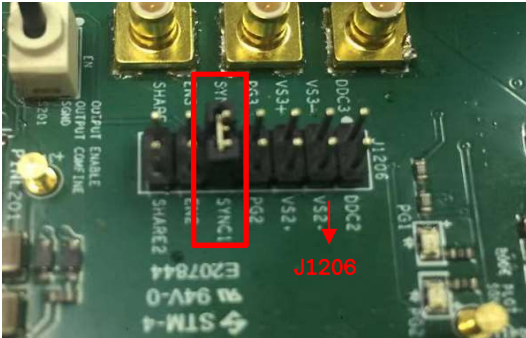| Pin Assignment			
Item	**Pin Number**	**Designation**	**Function**
Test Point	BUSB101	V_{IN1}	Input Terminal
	BUSB102	V_{IN1_GND}	Input Return Terminal
	BUSB1101	V_{IN2}	Input Terminal
	BUSB1102	V_{IN2_GND}	Input Return Terminal
	BUSB105	V_{O1}	Output Terminal
	BUSB106	V_{O1_GND}	Output Return Terminal
	BUSB103	V_{O2}	Output Terminal
	BUSB104	V_{O2_GND}	Output Return Terminal
	BUSB1105	V_{O3}	Output Terminal
	BUSB1106	V_{O3_GND}	Output Return Terminal
	BUSB1103	V_{O3}	Output Terminal
	BUSB1104	V_{O3_GND}	Output Return Terminal
	J205	V_{IN1} , V_{O1} & V_{O2}	Module1 Efficiency Measurement
	J1205	V_{IN2} & V_{O3}	Module2 Efficiency Measurement
Jumper	J203	Enable Jumper	Output Enable
	J1206	SYNC Jumper	Clock Synchronization
Switch	S201	Enable Switch	Output Enable
	S601	V_{O1}	V_{O1} Setting
	S602	V_{O2}	V_{O2} Setting
	S603	V_{O3}	V_{O3} Setting
Connector	J204	I^2C Connector	I^2C Communication
	J206		

TEST POINT INTRODUCTION

LGA110D Output Enable Connection (S201, J203)
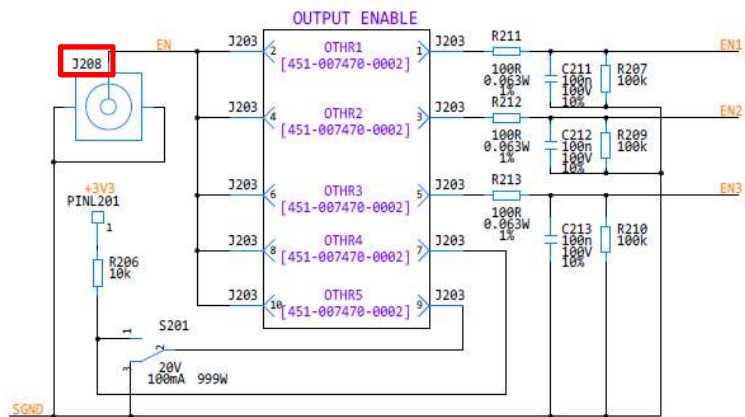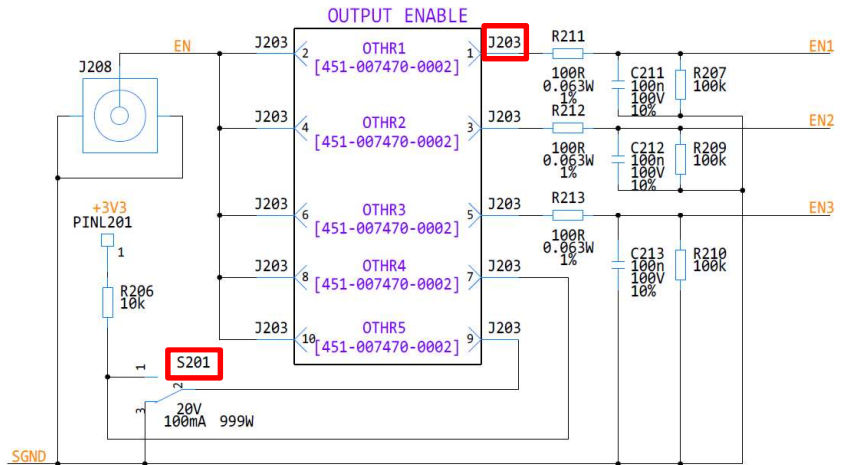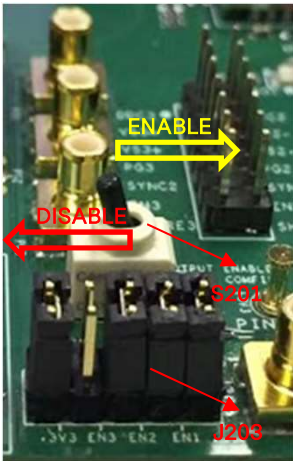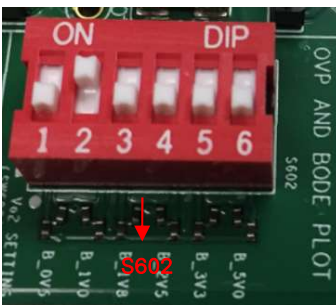

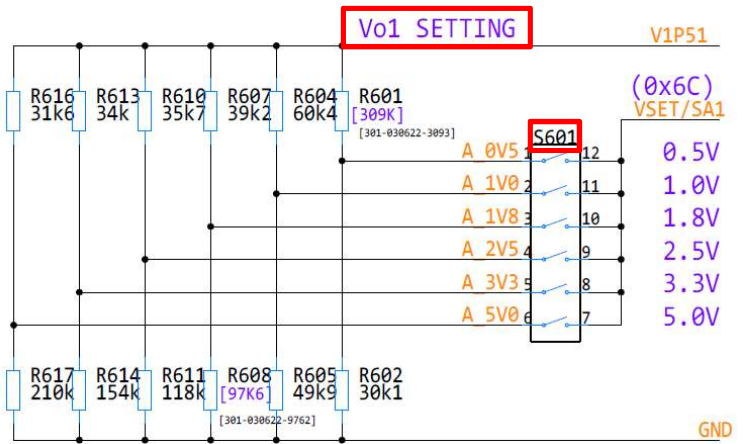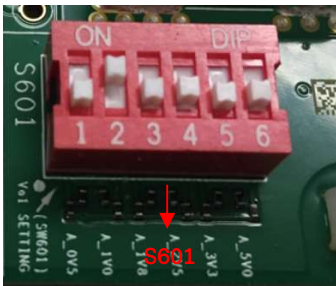## LGA110D I²C Connection (J204, J206)

TEST POINT INTRODUCTION

LGA110D SYNC Connection (J1206: SYNC1, SYNC2)

4 PHASES CONNECTOR

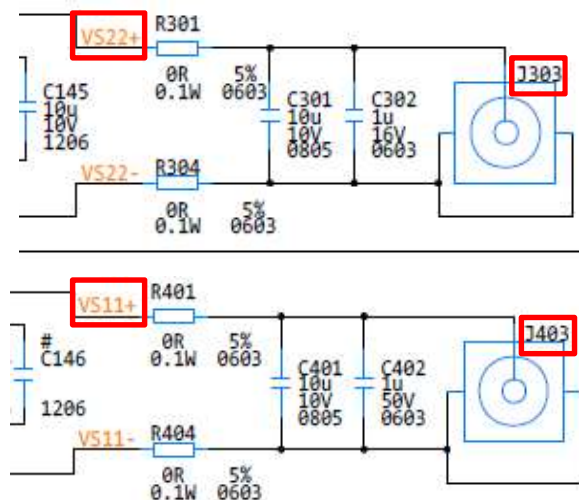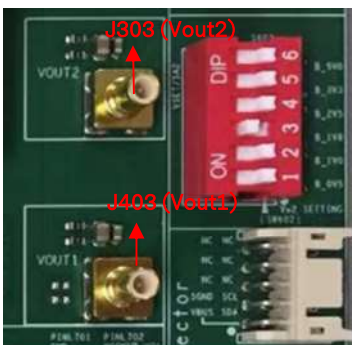|						
SHARE2	J1206	14	OTHR12 [451-007470-0002]	13	J1206	SHARE3
EN2	J1206	12	OTHR11 [451-007470-0002]	11	J1206	EN3
SYNC1	J1206	10	OTHR10 [451-007470-0002]	9	J1206	SYNC2
PG2	J1206	8	OTHR9 [451-007470-0002]	7	J1206	PG3
VS2+	J1206	6	OTHR8 [451-007470-0002]	5	J1206	VS3+
VS2-	J1206	4	OTHR7 [451-007470-0002]	3	J1206	VS3-
DDC2	J1206	2	OTHR6 [451-007470-0002]	1	J1206	DDC3

LGA110D Voltage Setting (S601, S602, S603 & S604)

Vo1 SETTING — V1P51

(0x6C) VSET/SA1

R616 31k6	R613 34k	R610 35k7	R607 39k2	R604 60k4	R601 [309K] [301-030622-3093]	S601	
					A_0V5 1	12	0.5V
					A_1V0 2	11	1.0V
					A_1V8 3	10	1.8V
					A_2V5 4	9	2.5V
					A_3V3 5	8	3.3V
					A_5V0 6	7	5.0V

R617 210k	R614 154k	R611 118k	R608 [97K6] [301-030622-9762]	R605 49k9	R602 30k1

GND

Vo2 SETTING — V1P52

(0x6D) VSET/SA2

R646 40k2	R643 42k2	R640 47k5	R637 49k9	R634 76k8	R631 [392K] [301-030622-3923]	S602	
					B_0V5 1	12	0.5V
					B_1V0 2	11	1.0V
					B_1V8 3	10	1.8V
					B_2V5 4	9	2.5V
					B_3V3 5	8	3.3V
					B_5V0 6	7	5.0V

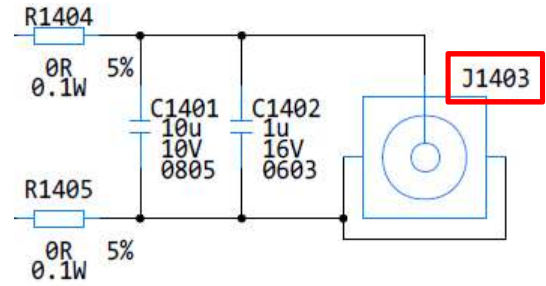| R647 267k	R644 191k	R641 154k	R638 124k	R635 63k4	R632 38k3

GND

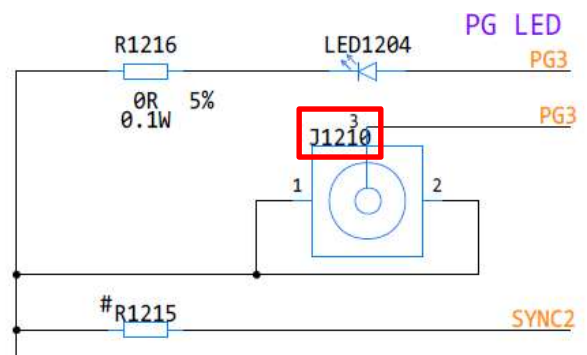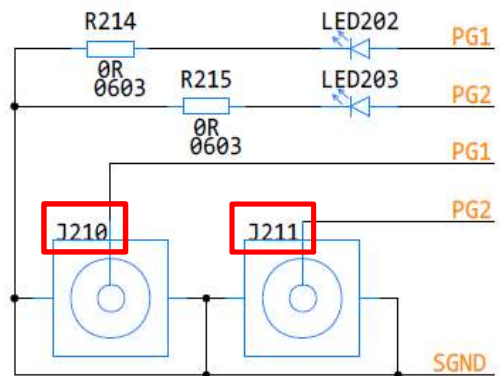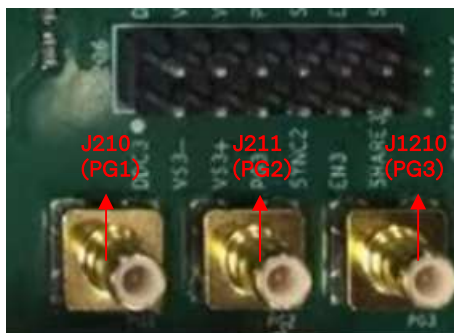# TEST POINT INTRODUCTION

LGA110D Vout Ripple Measurement Point (J303, J403, J1403)
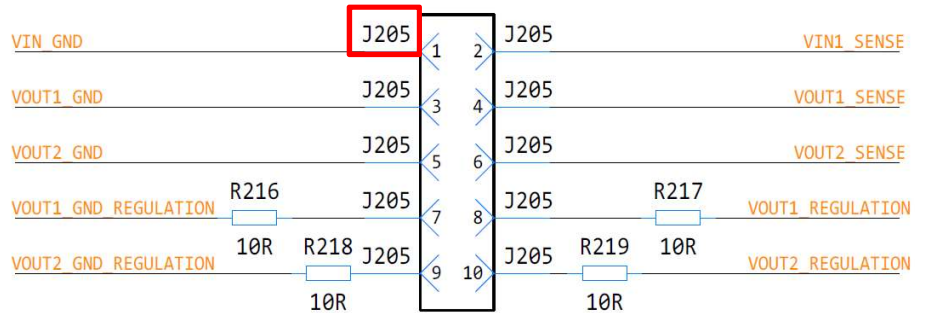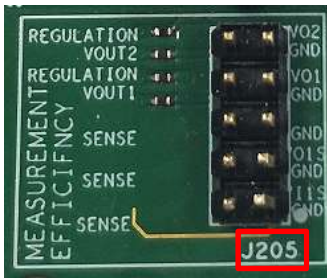
TEST POINT INTRODUCTION

LGA110D PG Measurement Point（J210, J211, J1210）
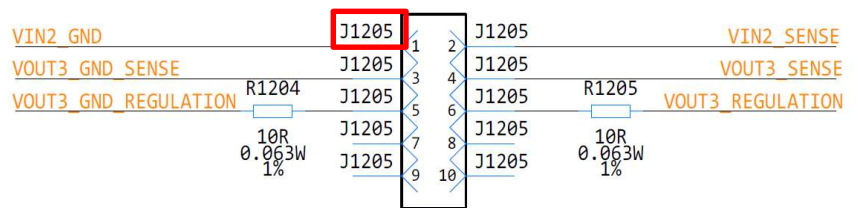
TEST POINT INTRODUCTION

LGA110D Efficiency & Regulation Measurement (J205, J1205)

Module1 Efficiency Measurement (Vo1&Vo2)

Module2 Efficiency Measurement (Vo3)

Note: The efficiency test point is Vout sense; The regulation test point is Vout regulation.

TEST SET UP

Hardware Test Setup

The LGA110D can be connected with the E-load via the Vout and Return terminals, and communicates with LGA110D GUI by the I^{2}C connector J204.
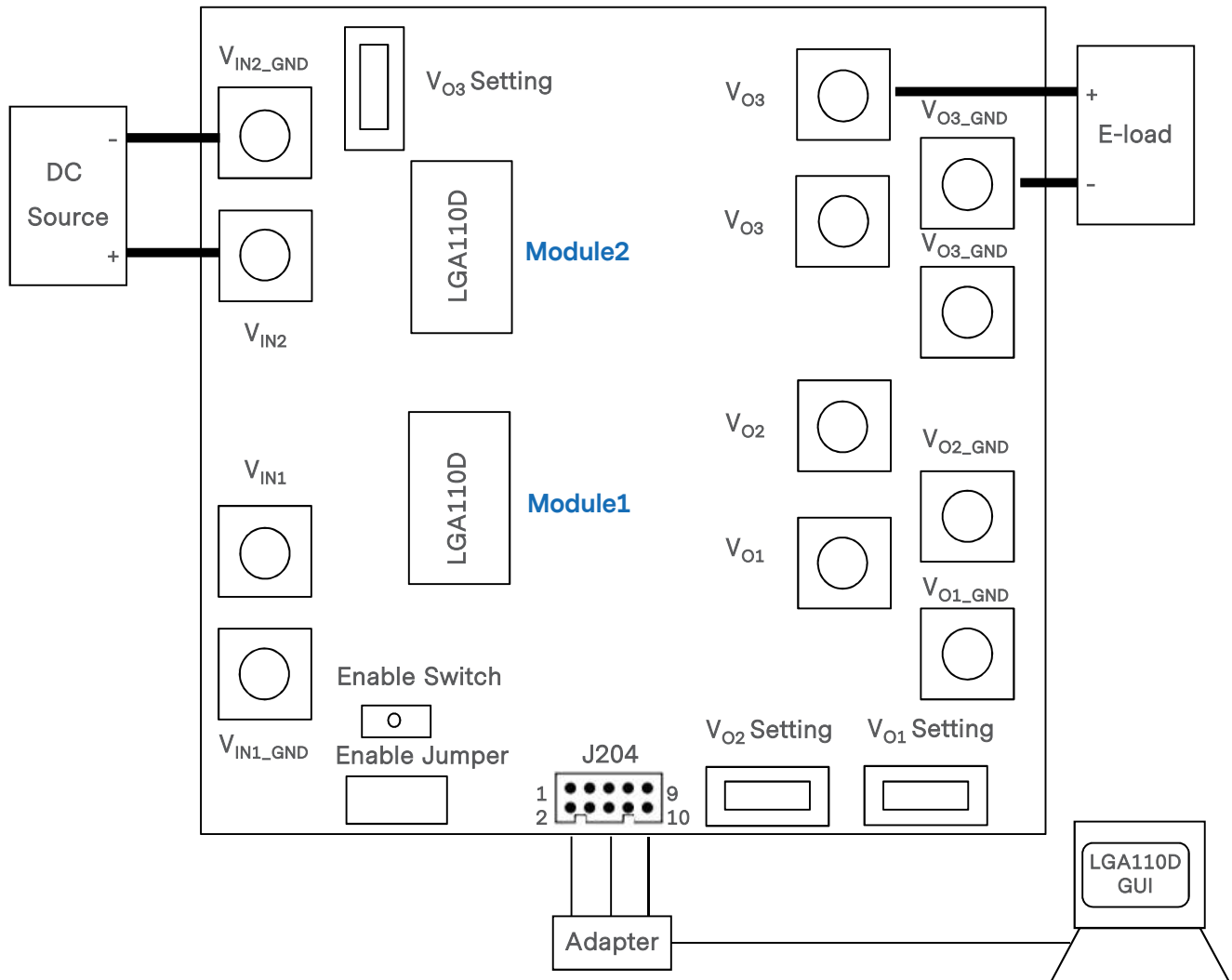
Example:

Figure 2. Hardware Interface Setup

TEST SET UP

Software Test Setup

The LGA110D has an evaluation software, LGA110D GUI, designed to make the unit accessible to the user. It is intended to control and monitor the LGA110D units as they would be used in an application.
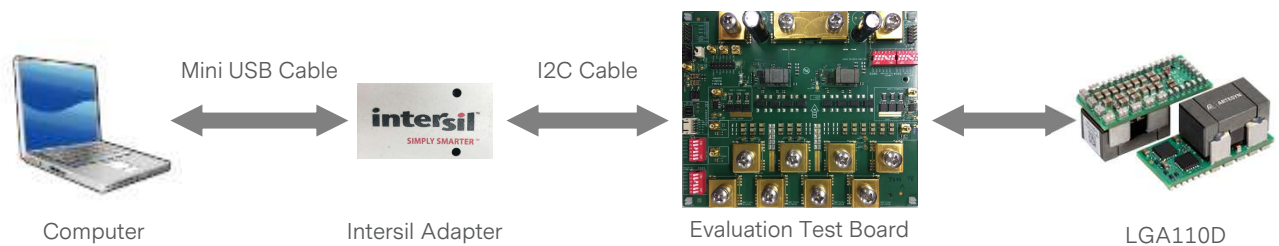

Figure 3. Software Interface Setup

The LGA110D GUI must be installed on a PC before using of all of the functions of this program. Please refer to the Figure 4.
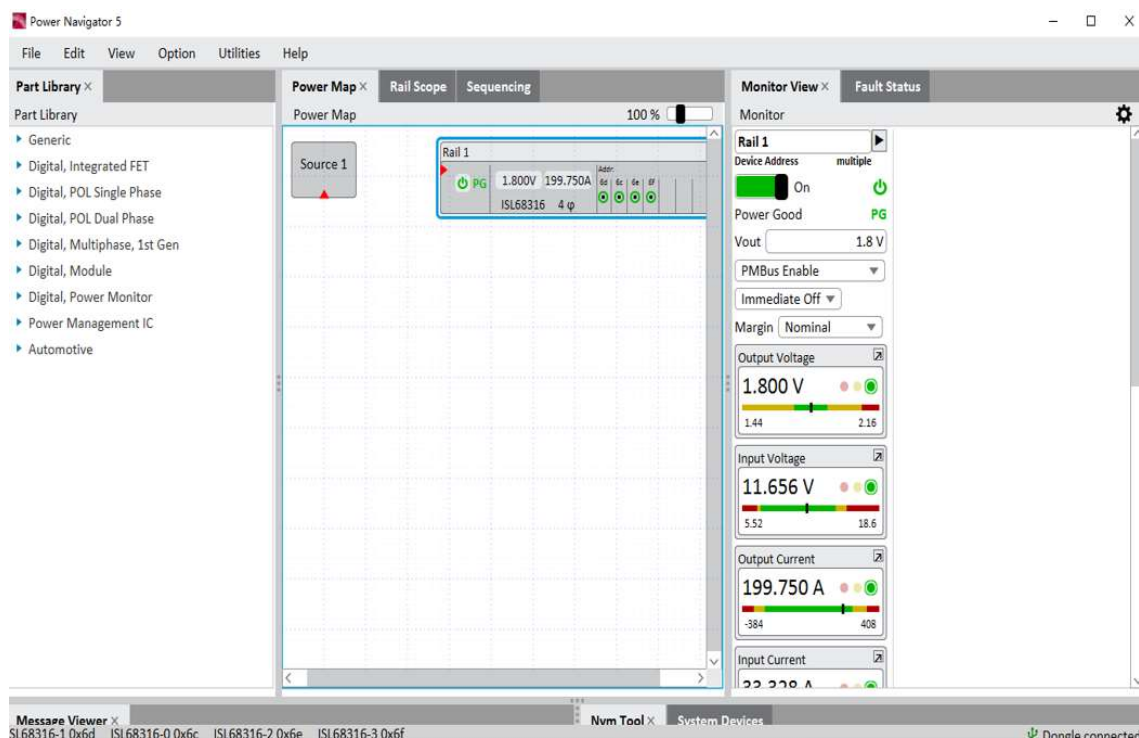

Figure 4. LGA110D GUI (Power Navigator)
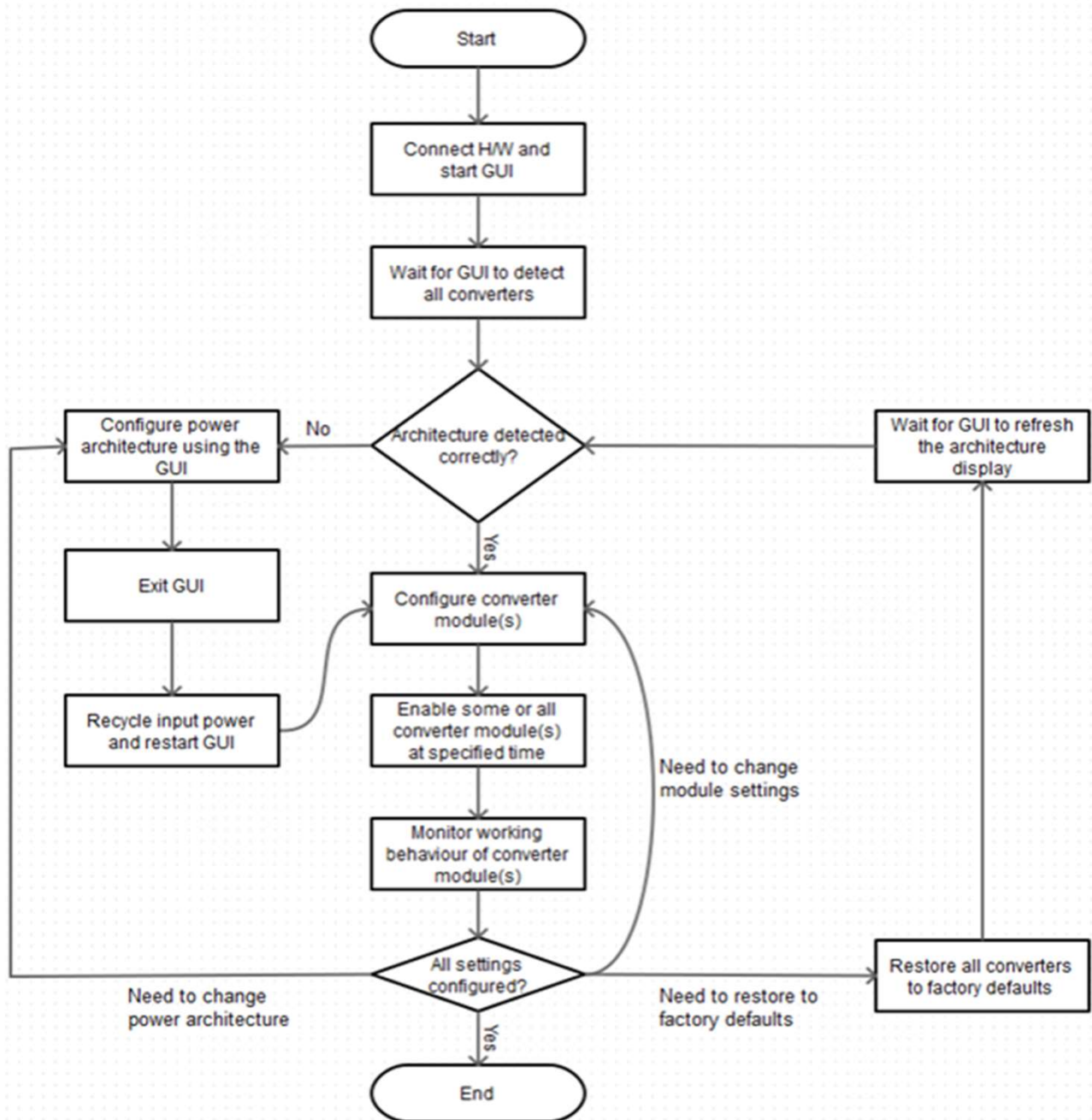
TEST SET UP

Programming Sequence

Figure 5. Programming Sequence

TEST SET UP

Test Setup Example

The setup example is shown in figure 5. It contains the input cord, LGA110D, evaluation test board, intersil adapter and computer. The adapter is required to connect the unit to the computer.
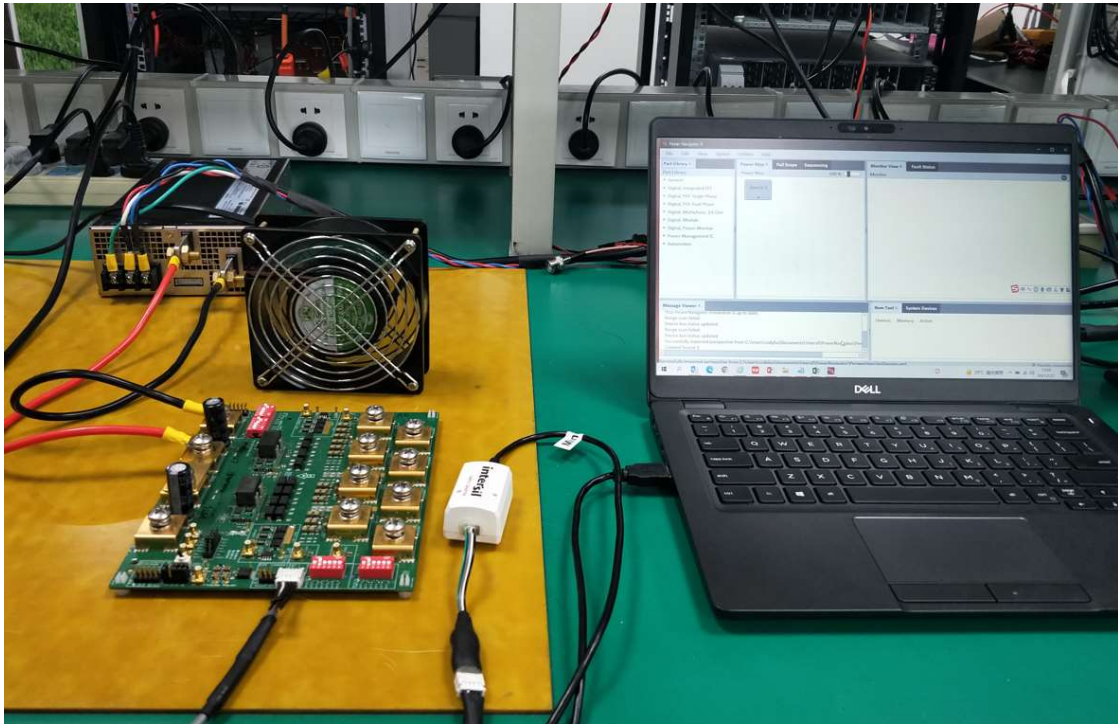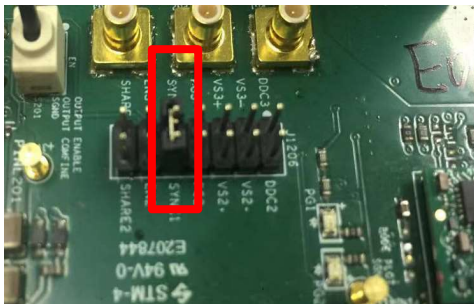

Figure 6. Setup Example
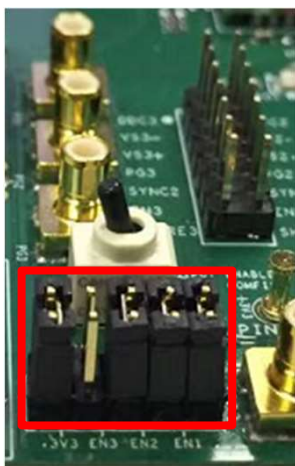
OPERATION

Power Up/Down Sequence

1. Please make sure the OUTPUT ENABLE toggle switch (S201) is disabled.

2. Connect the input and output cables to the bus-bars.

   a. Vin1 and Vin2 connect to the main DC source

   b. Vo1, Vo2 and Vo3 connect to the E-load
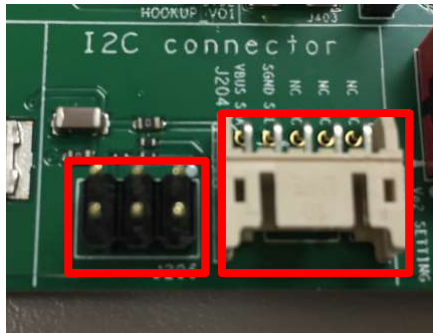
   c. Add SYNC jumper to J1206 (SYNC1 to SYNC2)

   d. Add Enable jumper to short EN1, EN2, EN3 and Switch-EN on J203. If only Vo1 and Vo2 are needed, then jumper is only needed to put at EN1, EN2 and Switch-EN.
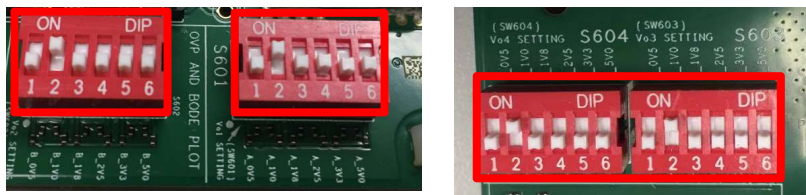
OPERATION

Power Up/Down Sequence Con't

3. If I2C communication is needed, connect I2C dongle to I2C connector (J204 or J206).

4. Select the suitable voltage for Vo1, Vo2 and Vo3 by switches (S601, S602, S603 & S604). Default setting is Pin2 on and the Vout=1V. Use the PMBus command to change the Vout setting.

5. Power up sequence.

   a. Apply main voltage to Vin1 and Vin2. Vin1 is for module1 (Vo1 & Vo2), Vin2 is for module2 (Vo3).

   b. Toggle Enable switch (S201) to enable LGA110D Vout.

6. Power down sequence.

   a. Toggle Enable switch to disable LGA110D Vout.

   b. Turn off main voltage to Vin1 and Vin2.

Warning: Not follow power up/down sequence may damage the demo board.

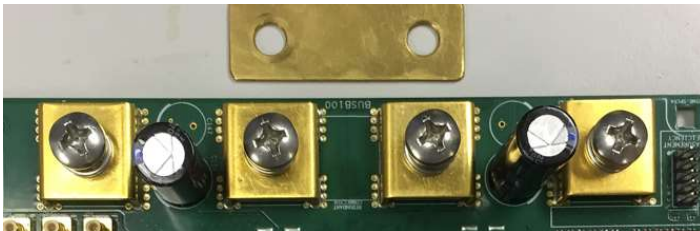# OPERATION

Additional information

1. EN1, EN2 and EN3 can control Vo1, Vo2 and Vo3 individually.

2. This demo board is designed to have two LGA110D modules which can be tested efficiency independently. If the user wants to use only one module, need to follow below steps to measure the efficiency.

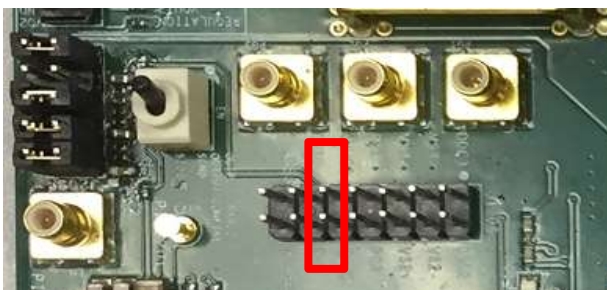### For module1 (2phase 2output) efficiency measurement:

1. Please make sure the OUTPUT ENABLE toggle switch (S201) is disabled.

2. Hardware change:

   a. Separate the input

   b. Remove the SYNC jumper on J1206

   c. Remove the bias resistor R201

   d. Add 5V bias to the PINL207 & PINL209

   e. Remove module2 PMBus resistors R1201, R1202, R1203

OPERATION

3. Configuration file changed to '1+1' by GUI.

4. Power up sequence.

   a. Apply 5V bias voltage.

   b. Apply main voltage to Vin1.

   c. Toggle Enable switch (S201) to enable LGA110D Vout.

5. Power down sequence

   a. Toggle Enable switch to disable LGA110D Vout.

   b. Turn off main voltage to Vin1.

   c. Turn off bias 5V voltage.

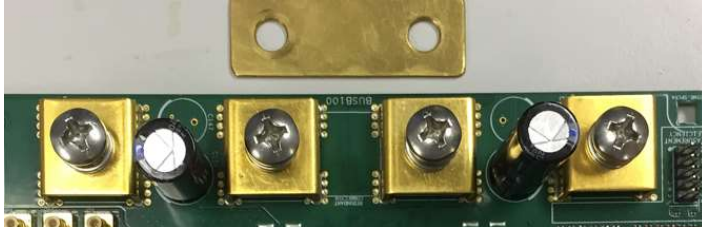**Warning: Not follow power up/down sequence may damage the demo board.**

For module2 (2phase 1output) efficiency measurement:

1. Please make sure the OUTPUT ENABLE toggle switch (S201) is disabled.

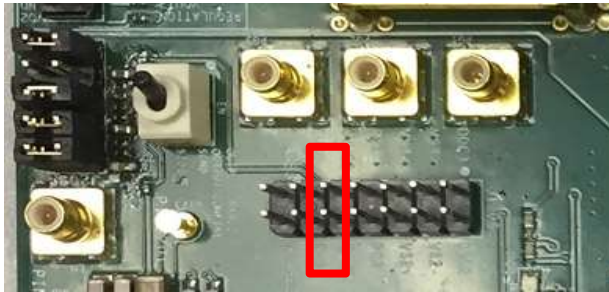# OPERATION

2. Hardware change:

  a. Separate the input

  b. Remove the SYNC jumper on J1206

  c. Remove the bias resistor R201

  d. Add 5V bias to the PINL207 & PINL209

  e. Remove module1 PMBus resistors R1211, R1212, R1213

3. Configuration file changed to '2' by GUI.

4. Power up sequence.

  a. Apply 5V bias voltage.

  b. Apply main voltage to Vin2.

  c. Toggle Enable switch (S201) to enable LGA110D Vout.

5. Power down sequence.

  a. Toggle Enable switch to disable LGA110D Vout.

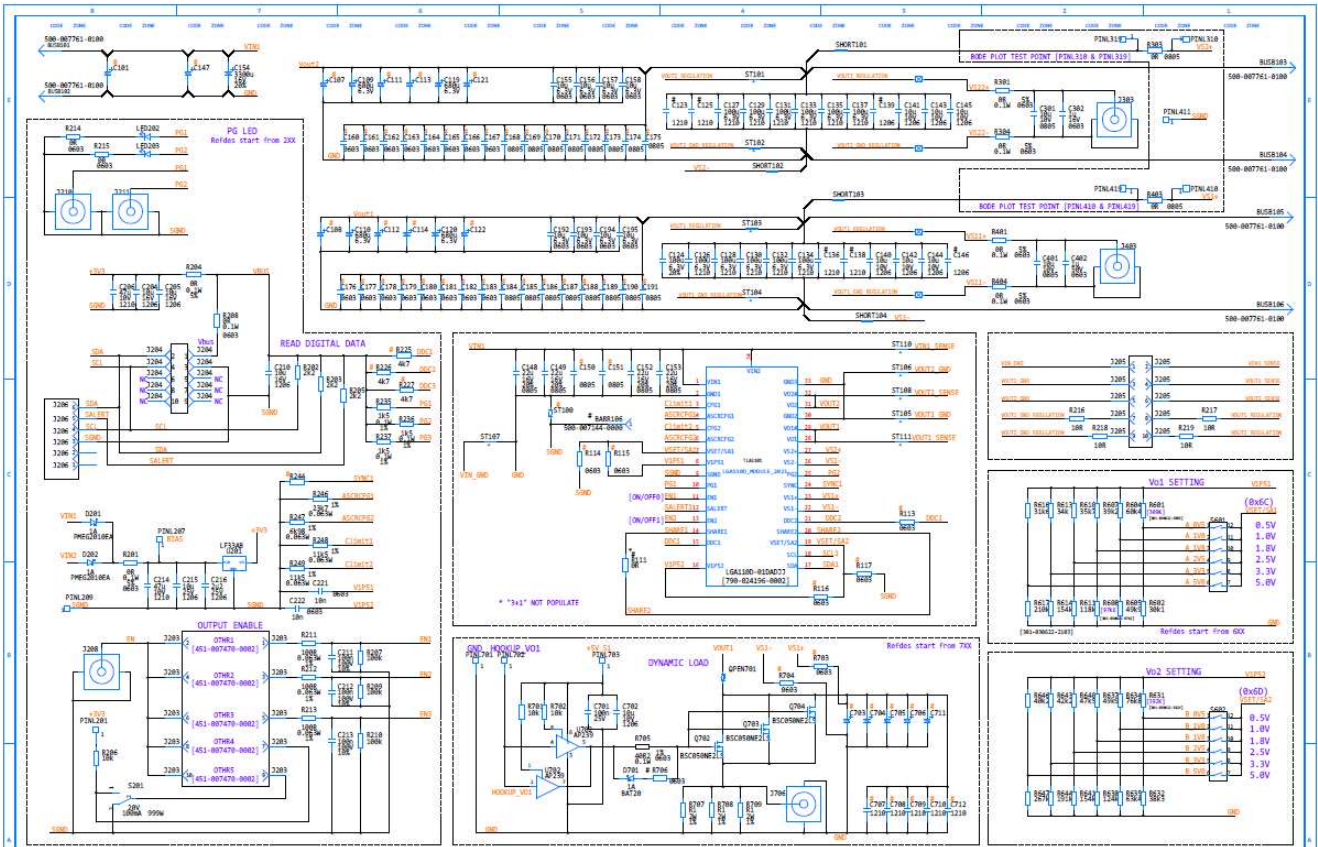 b. Turn off main voltage to Vin2.

  c. Turn off bias 5V voltage.

Warning: Not follow power up/down sequence may damage the demo board.

SUPPORTED MODELS

Part Number	Description
LGA110D-01DADJJ	Dual O/P Non-isolated 110 A Digital DC/DC Converter

SCHEMATIC

Schematic

SCHEMATIC

Schematic
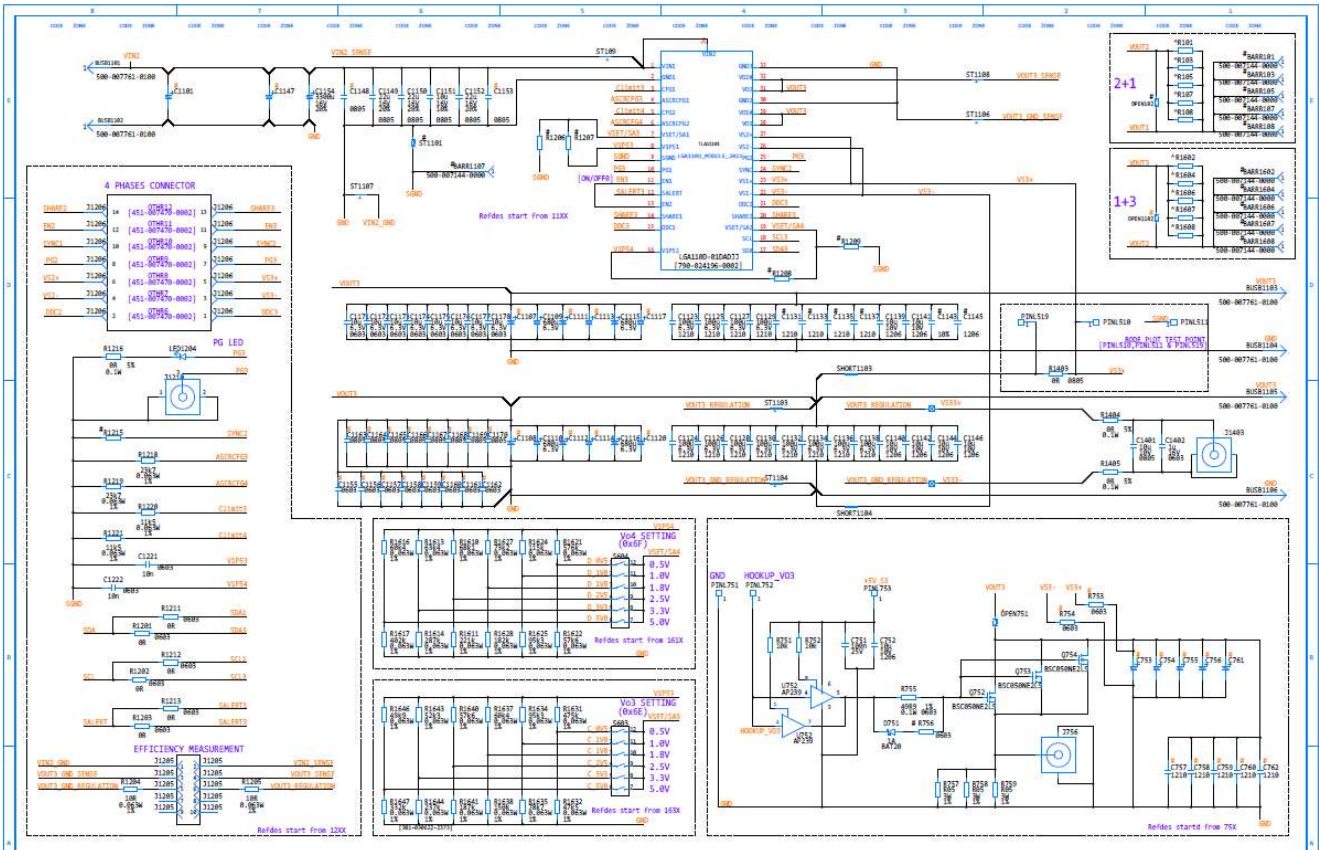
PCB LAYOUT

Silkscreen
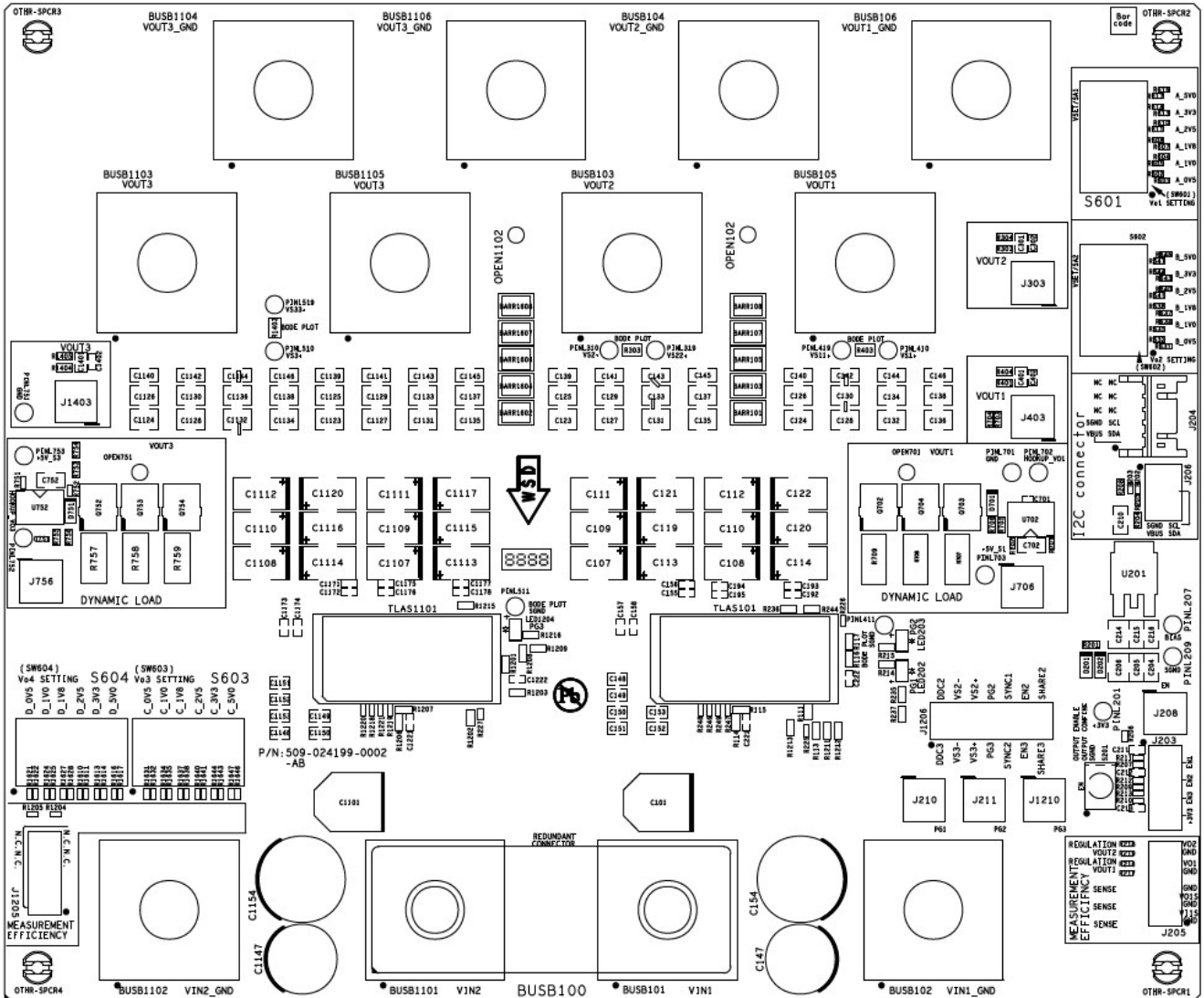
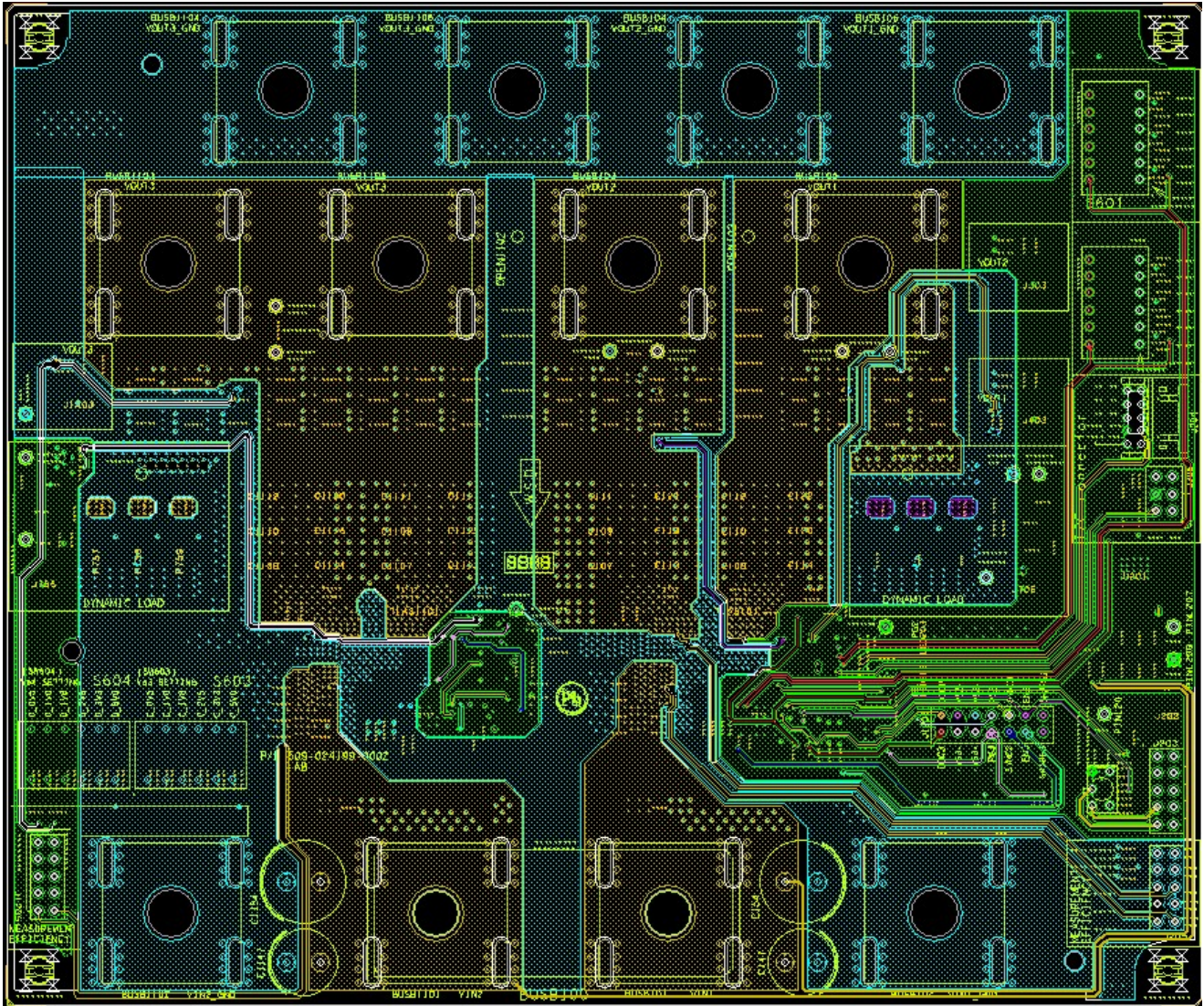## PCB LAYOUT

Top Copper
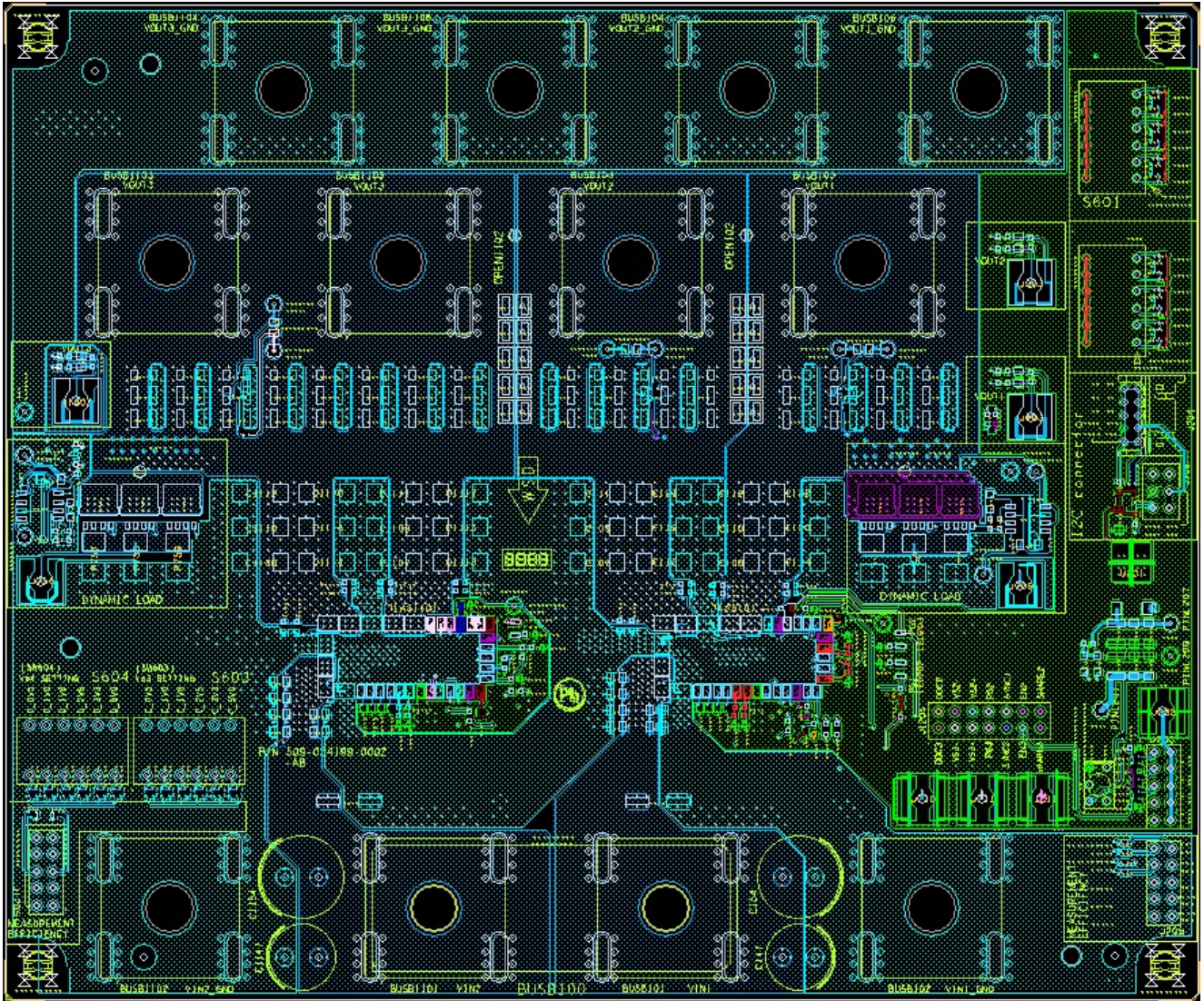
PCB LAYOUT

Layer2 Copper
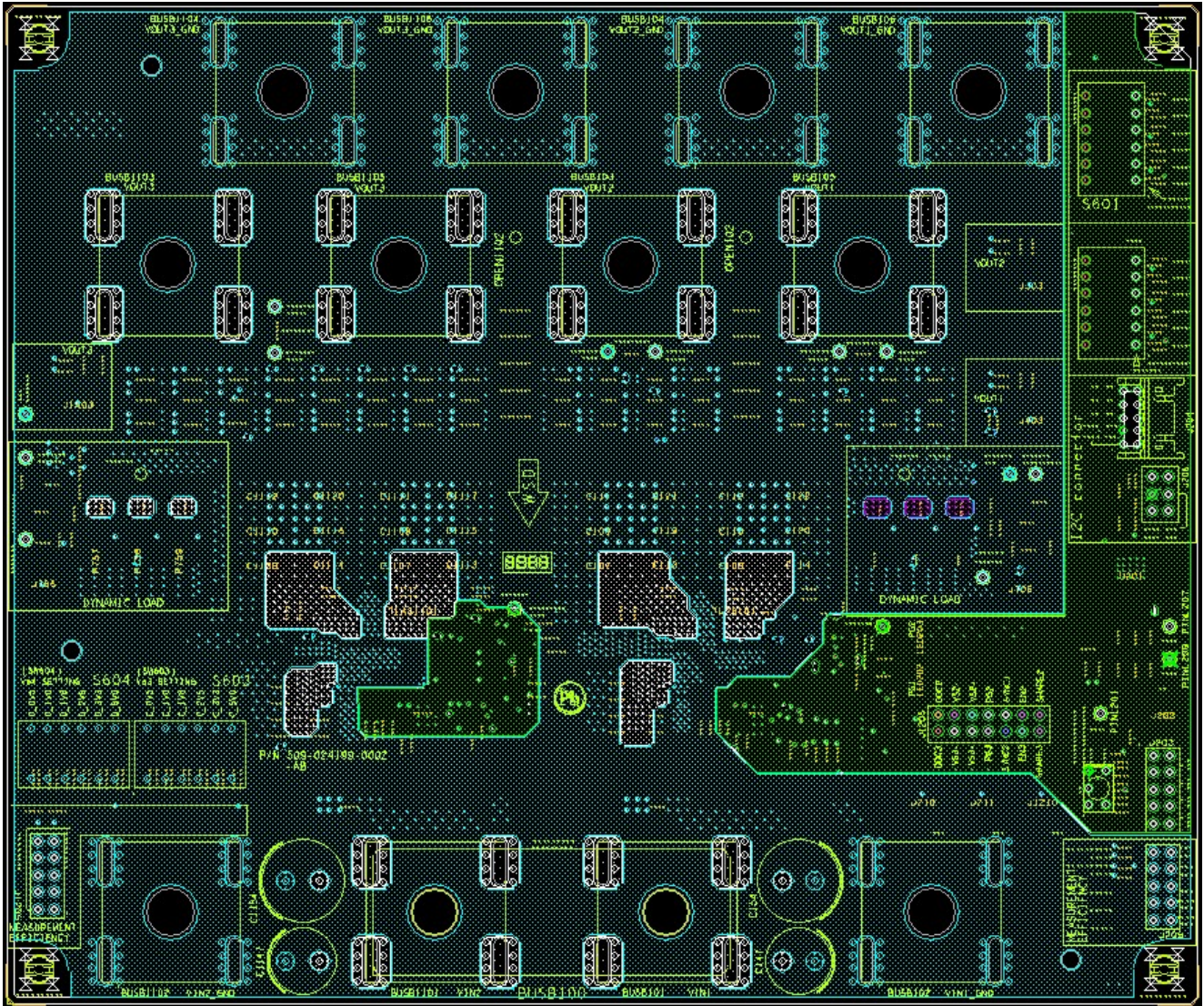
PCB LAYOUT

Layer3 Copper
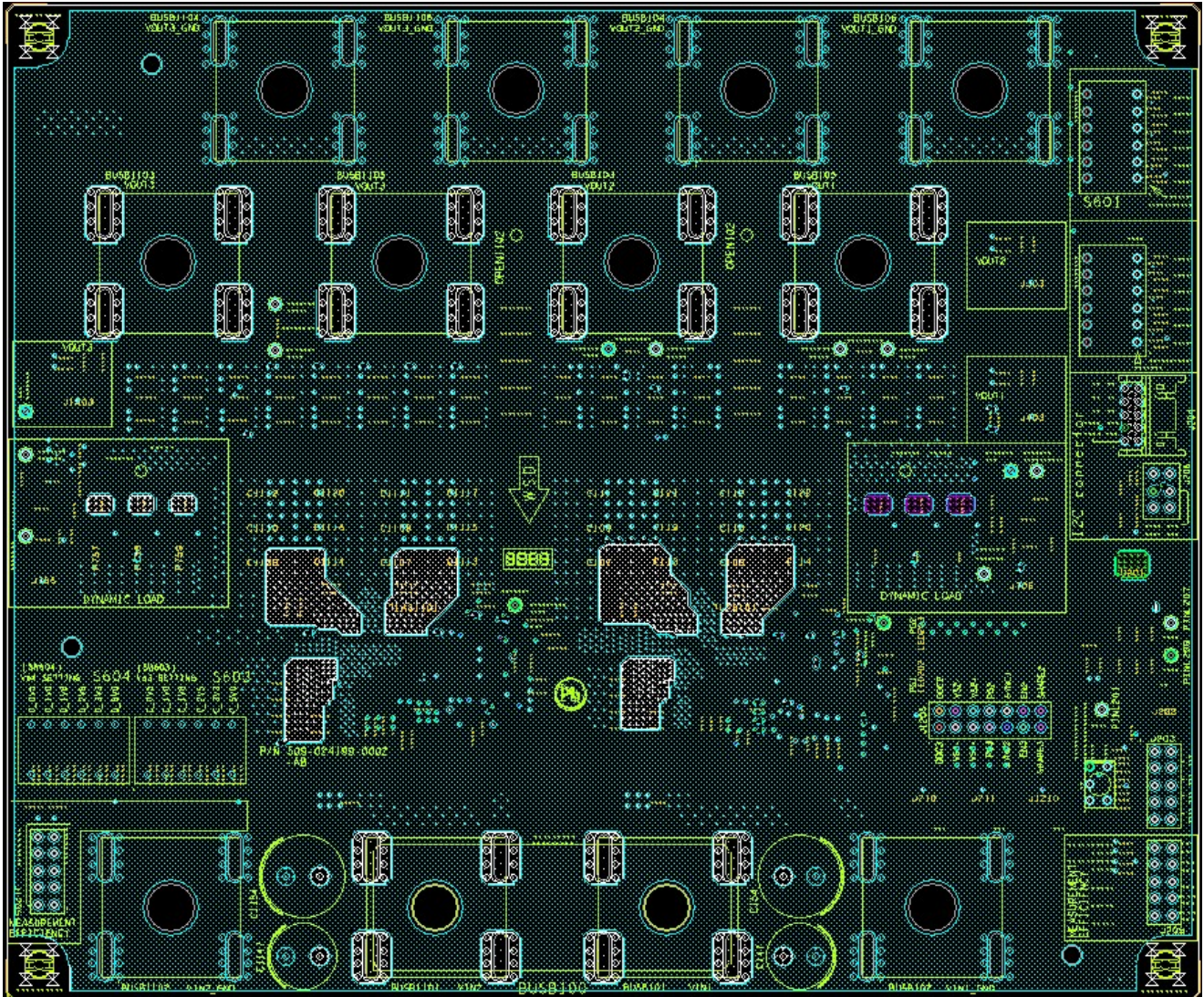
PCB LAYOUT

Layer4 Copper
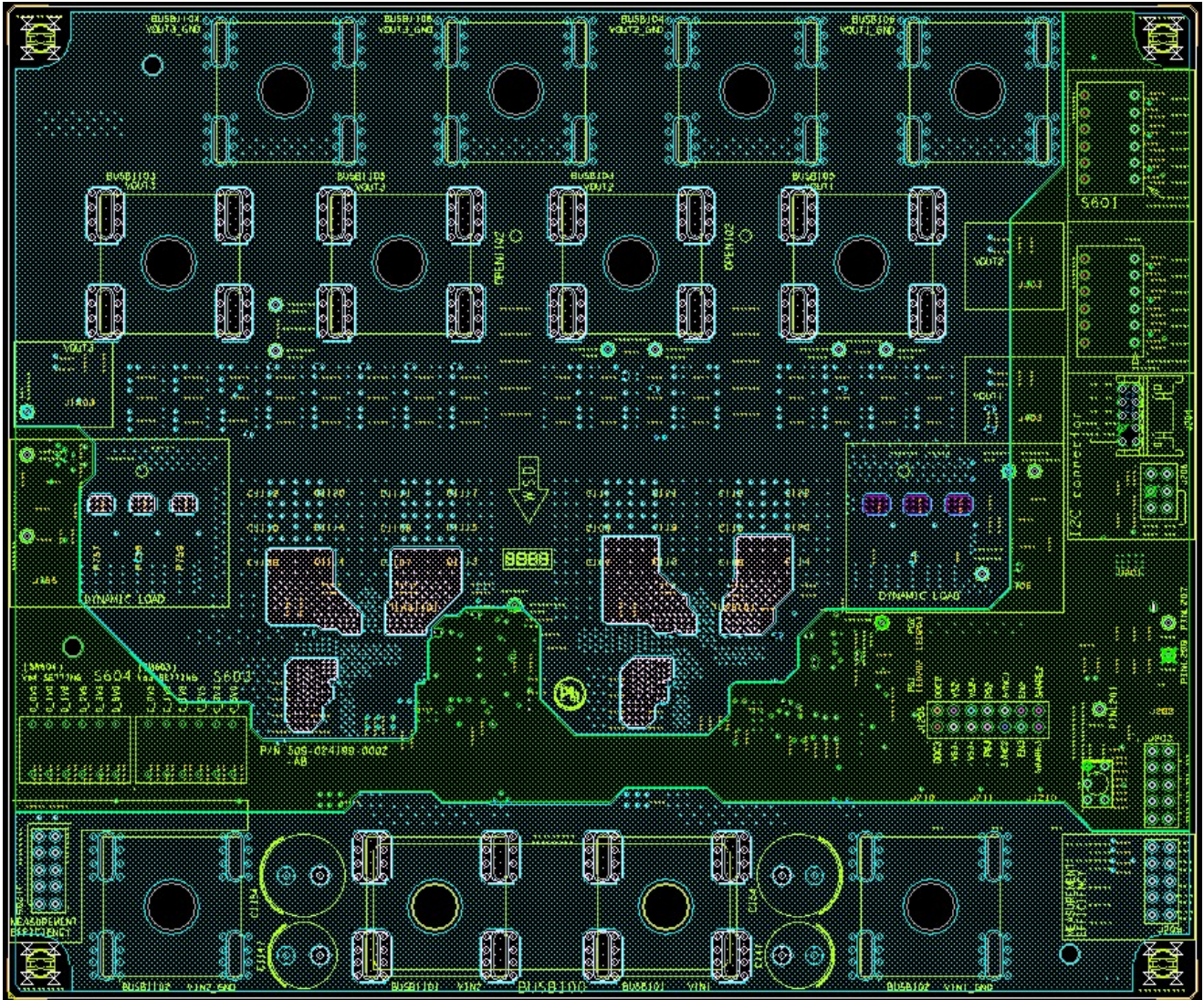
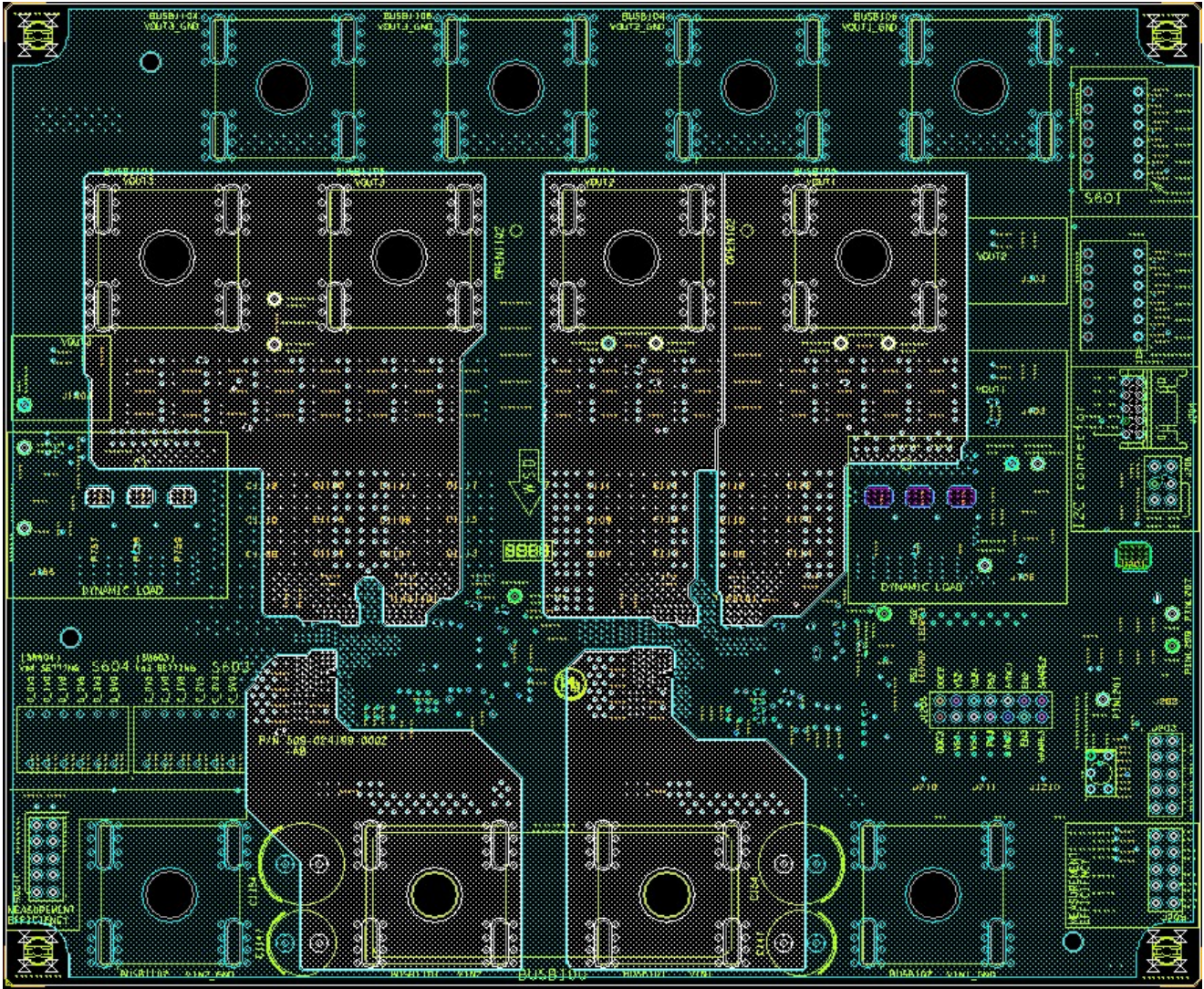## PCB LAYOUT

Layer5 Copper
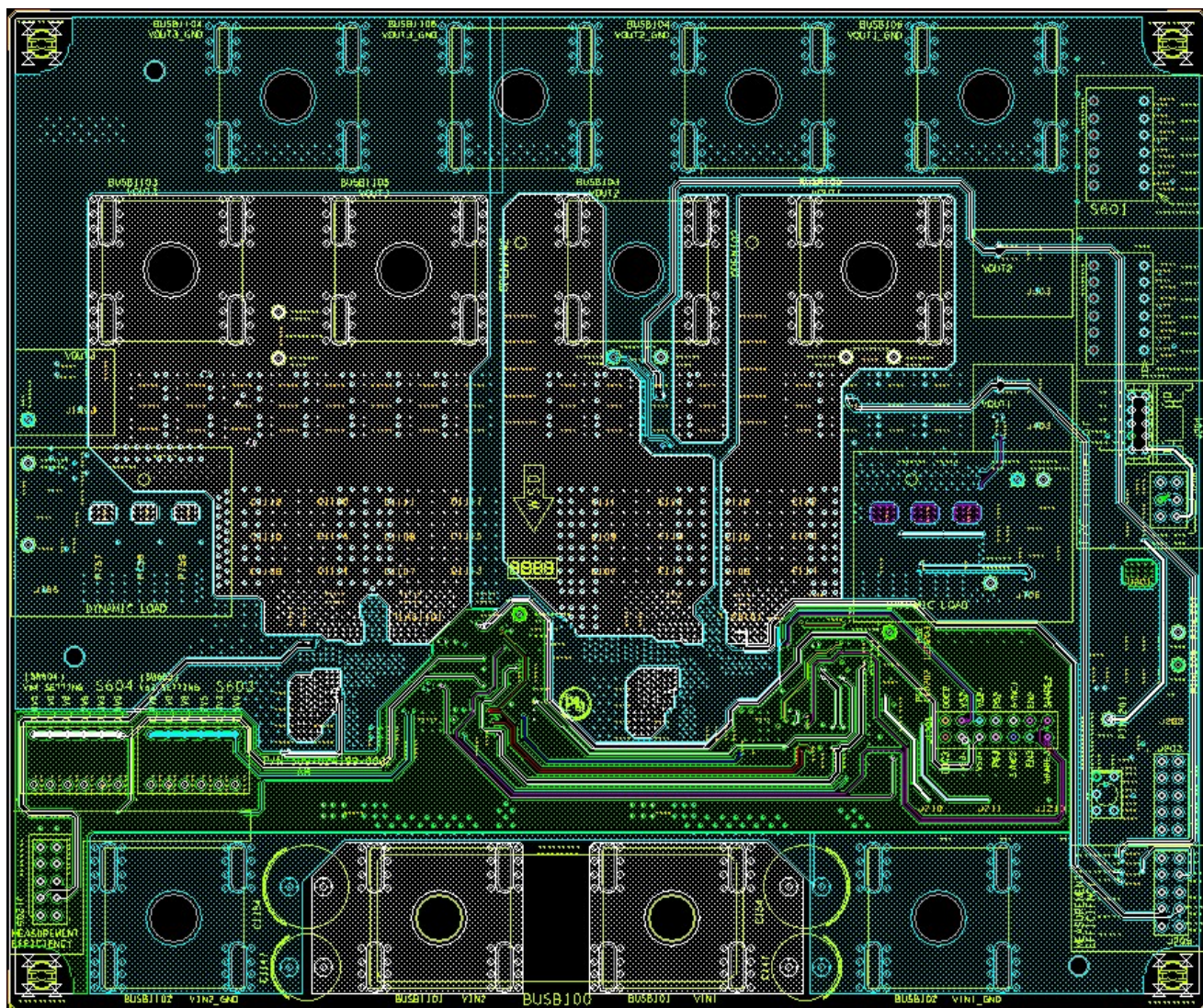
PCB LAYOUT

Layer6 Copper

PCB LAYOUT

Layer7 Copper

PCB LAYOUT

Bottom Copper
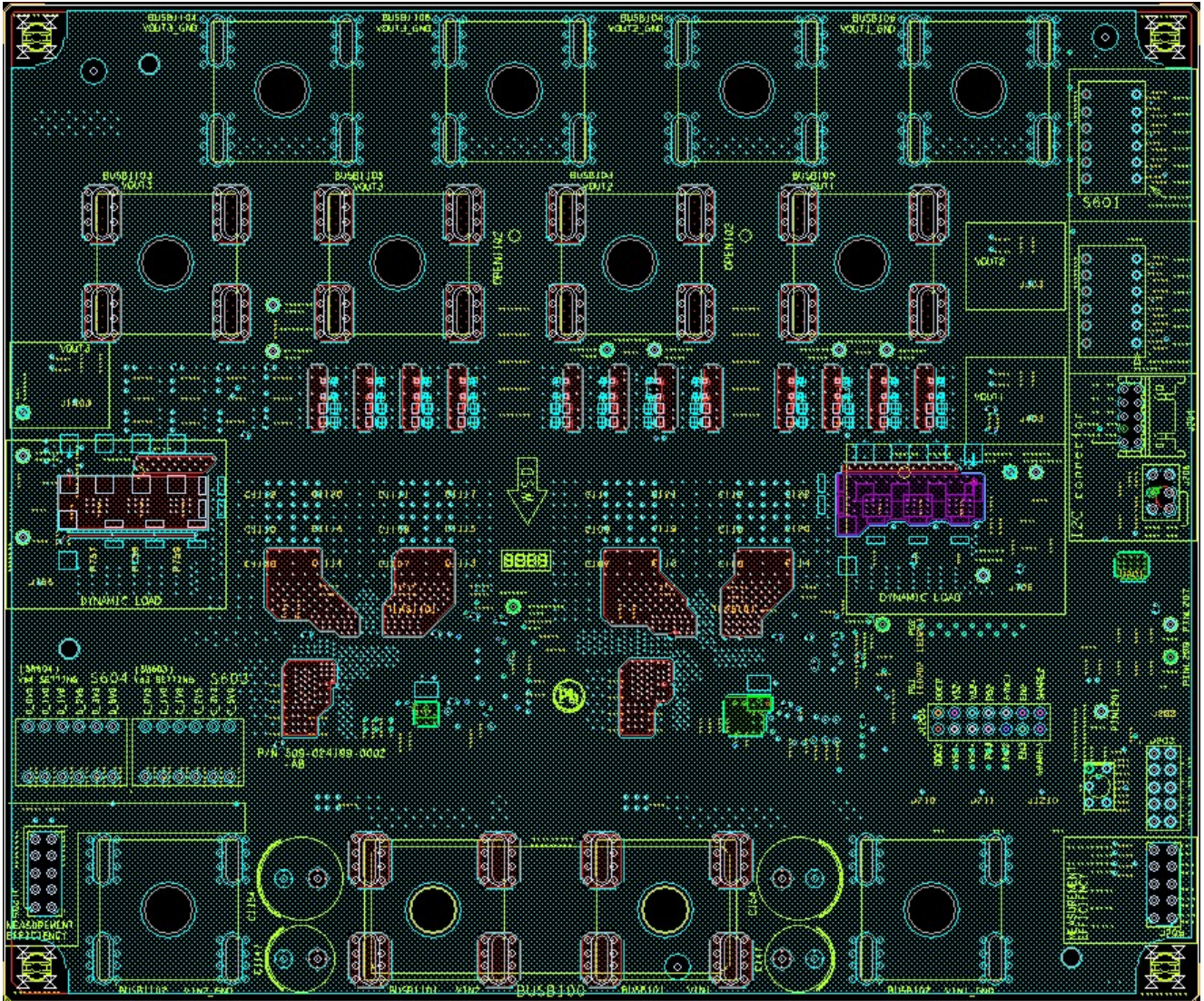
RECORD OF REVISION AND CHANGES

Issue	Date	Description	Originators
1.0	01.17.2022	First Issue	J. Ma

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative paGNDerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE

For international contact information,
visit advancedenergy.com.

powersales@aei.com (Sales Support)
productsupport.ep@aei.com (Technical Support)
+1 888 412 7832

LGA110-EVAL-KIT - Rev.01.17.22_#1.0