Chipsmall

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Contact us

December 2013

Rev. 1.0.0

GENERAL DESCRIPTION

The XRP779710EVB-DEMO-1 board is a complete, two channel power system. The default configuration provides 1.8V and 2.5V at maximum loads of 6Amps per output. The supplies can be dynamically adjusted in 5mV increments. The order and ramp rates for each supply can be programmed to accommodate any sequencing requirement. All power supply operations can be controlled over an I^2C interface. Faults, output voltages and currents can also be monitored. Two GPIO and three PSIO signals are available and can be programmed to provide a variety of functions. Unused GPIO/PSIO pins can be programmed as I/O expansion for a microcontroller. The board is supported by PowerArchitect^{TM} 5.1 or later, and plugs directly onto the interposer board acting as an interface to Arduino controller.

EVALUATION BOARD MANUAL
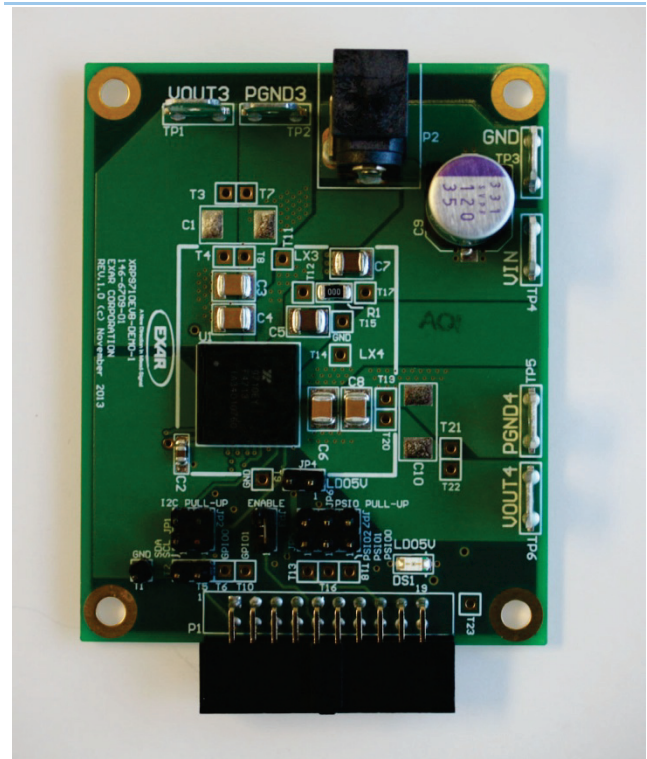
XRP9710EVB-DEMO-1

FEATURES

- **XRP9710 Programmable Power Module**
  - o   Channel 3 and 4 internal converters
- **2 Channel Power System**
- **Wide Input Voltage Range: 5.5V-22V**
- **I^2C Interface**
  - – Programming
  - – Monitoring
  - – Control
- **Arduino GPIO, PSIO and ENABLE control**

EVALUATION BOARD SCHEMATICS
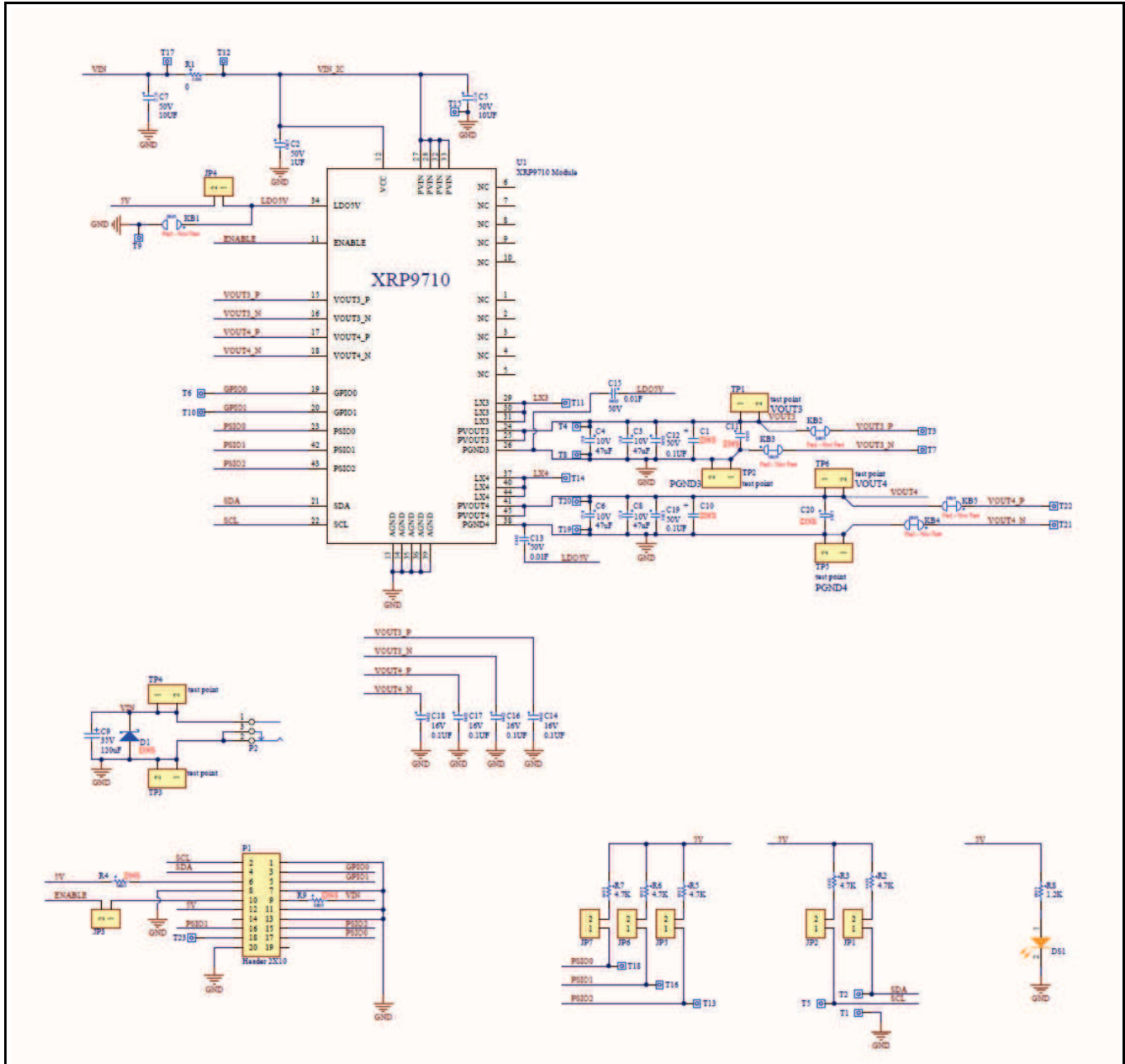
Figure 1 XRP9710 Evaluation Board Schematics

PIN ASSIGNMENT

NC	1
NC	2
NC	3
NC	4
NC	5
NC	6
NC	7
NC	8
NC	9
NC	10
ENABLE	11
VCC	12

24 PVOUT3
25 PVOUT3
26 PGND3
27 PVIN
28 PVIN
29 LX3
30 LX3
31 LX3
32 PVIN
33 PVIN
34 LDO5
35 AGND
36 AGND
37 LX4
38 PGND4
39 AGND
40 LX4
41 PVOUT4
42 PSIO1
43 PSIO2
44 LX4
45 PVOUT4

13 AGND
14 AGND
15 VOUT3+
16 VOUT3-
17 VOUT4+
18 VOUT4-
19 GPIO0
20 GPIO1
21 SDA
22 SCL
23 PSIO0
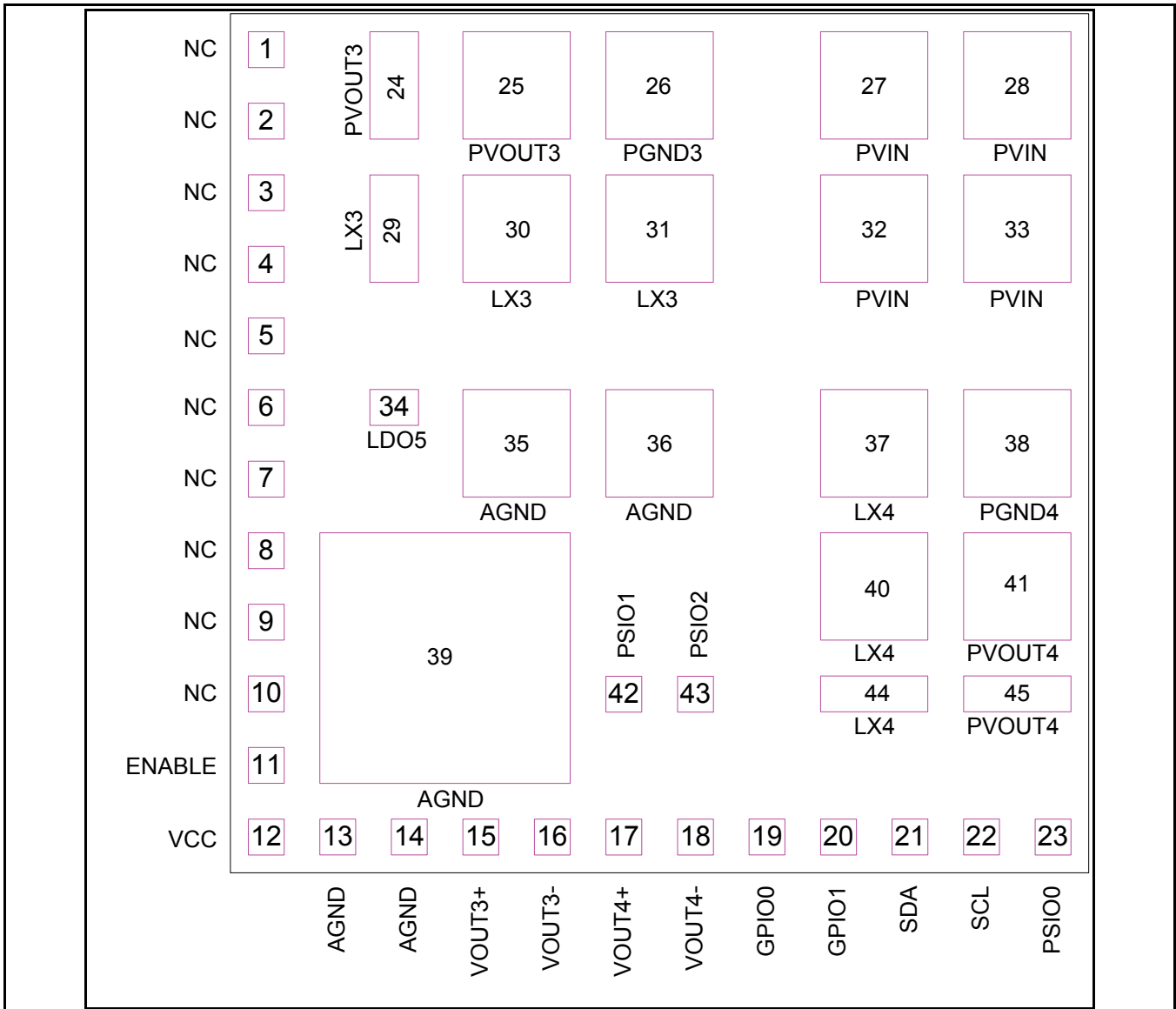
Figure 2 XRP9710 Pin Assignment

PIN DESCRIPTION

Pin #	Name	Description
1-10	NC	**No Connect**
11	ENABLE	**Enable.** If ENABLE is pulled high or allowed to float high, the chip is powered up. The pin must be held low for the XRP9711 to be placed into shutdown.
12	VCC	**Controller Supply Voltage.** Place a decoupling capacitor close to the controller IC. This input is used in UVLO fault generation.
13	AGND	**Analog Ground.** This is the small signal ground connection.
14	AGND	**Analog Ground.** This is the small signal ground connection.
15	VOUT3+	**Feedback Pin.** Positive input of remote sensing differential amplifier. Connect to the remote voltage load, positive terminal.
16	VOUT3-	**Feedback Pin.** Negative input of remote sensing differential amplifier. Connect to the remote voltage load, negative terminal.
17	VOUT4+	**Feedback Pin.** Positive input of remote sensing differential amplifier. Connect to the remote voltage load, positive terminal.
18	VOUT4-	**Feedback Pin.** Negative input of remote sensing differential amplifier. Connect to the remote voltage load, negative terminal.
19	GPIO0	**I/O Logic Signal.** Can be configured as input or output.
20	GPIO1	**I/O Logic Signal.** Can be configured as input or output.
21	SDA	**I²C Data**. SMBus/I²C serial interface communication.
22	SCL	**I²C Clock.** SMBus/I²C serial interface communication.
23	PSIO0	**I/O Logic Signal, HV.** Open drain, high voltage compliant. Can be configured as input or output.
24	PVOUT3	**Channel Output Power.** Output voltage for the internal channel.
25	PVOUT3	**Channel Output Power.** Output voltage for the internal channel.
26	PGND3	**Channel Output Ground.** Output ground for the internal channel.
27	PVIN	**Channel Input Power.** Internally connected to drain of upper switching MOSFET
28	PVIN	**Channel Input Power.** Internally connected to drain of upper switching MOSFET
29	LX3	**Switch Node.** Switch node of the internal channel.
30	LX3	**Switch Node.** Switch node of the internal channel.
31	LX3	**Switch Node.** Switch node of the internal channel.
32	PVIN	**Channel Input Power.** Internally connected to drain of upper switching MOSFET
33	PVIN	**Channel Input Power.** Internally connected to drain of upper switching MOSFET
34	LDO5	**5V LDO Output.** Used internally for power and may also be used for external power. LDO that can remain active while the rest of the IC is in standby mode.
35	AGND	**Analog Ground.** This is the small signal ground connection.
36	AGND	**Analog Ground.** This is the small signal ground connection.
37	LX4	**Switch Node.** Switch node of the internal channel.
38	PGND4	**Channel Output Ground.** Output ground for the internal channel.
39	AGND	**Analog Ground.** This is the small signal ground connection.
40	LX4	**Switch Node.** Switch node of the internal channel.
41	PVOUT4	**Channel Output Power.** Output voltage for the internal channel.
42	PSIO1	**I/O Logic Signal, HV.** Open drain, high voltage compliant. Can be configured as input or output.
43	PSIO2	**I/O Logic Signal, HV.** Open drain, high voltage compliant. Can be configured as input or output.
44	LX4	**Switch Node.** Switch node of the internal channel.
45	PVOUT4	**Channel Output Power.** Output voltage for the internal channel.

ORDERING INFORMATION

Refer to XRP9710's datasheet and/or www.exar.com for exact and up to date ordering information.

USING THE EVALUATION BOARD

INPUT VOLTAGE RANGE

The input voltage range of XRP9710EVB-DEMO-1 board is from 5.5V to 22V. The default configuration has been optimized for a 12V input rail. When running the board at an input voltage other than 12V, use PowerArchitect™ 5.1 (PA5.1) to evaluate the system performance.

I²C INTERFACE

The XRP9710 programmable power module employs a standard I²C interface. Although the I²C signals can be pulled up to LDO5 on board by means of installing jumpers at the locations JP1, JP2 and JP4, the I²C bus signals are pulled up on the controller interface board by default (refer to Appendix – jumpers installed shorting pins 2 and 3 together at the locations JP6 and JP7).

OPERATING THE EVALUATION BOARD

The XRP9710EVB-DEMO-1 is designed to be powered from either an AC/DC wall wart (the output voltage must be in the range of 5.5V to 22V) connected to the barrel connector or a test bench DC power supply (the voltage must be in the range of 5.5V to 22V) connected to the V_IN connectors.
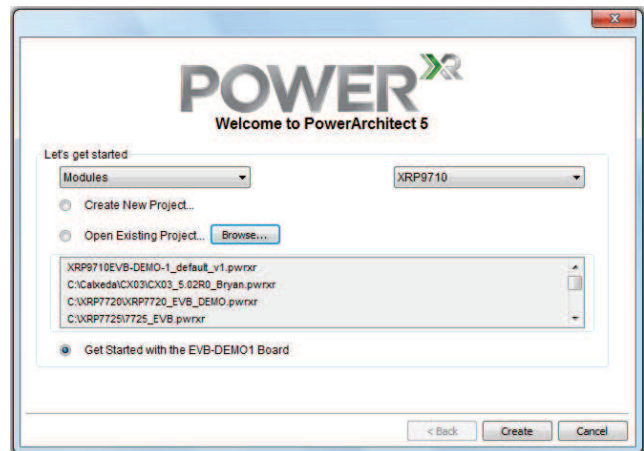
BRING UP PROCEDURE

Plug the XRP9710EVB-DEMO-1 evaluation board to the controller interface board as shown below.
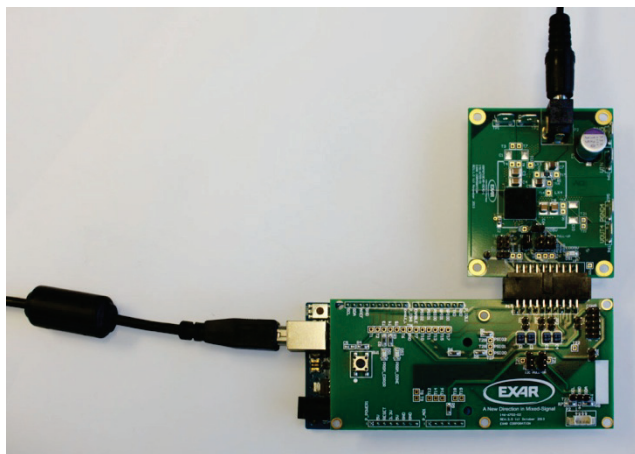
Load the PowerArchitect™ 5.1 software and run it.

After selecting the proper family (Modules) and the device (XRP9710), select the "Get Started with the EVB-DEMO-1" option when prompted as shown below.


When done, click "Create". PA 5.1 will load the default XRP9710EVB-DEMO-1 configuration automatically.

Apply power to the board. Please refer to the sections above on how to properly supply power to the board and what voltage range to use.

Turn on the Power supply.

Use USB cable to connect the computer (type A) and the Arduino controller board (type B).

Go to the Tools tab in PA 5.1 and select Boards. The software will identify communication ports where it found the Arduino controller board. Select the port.
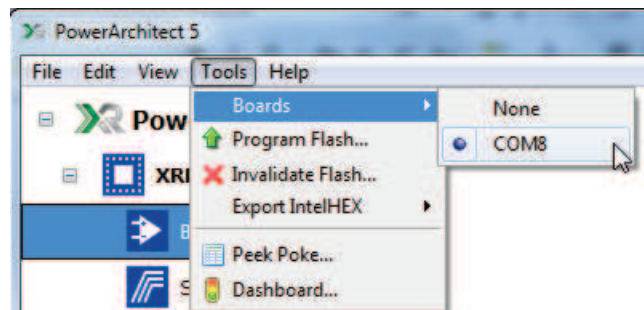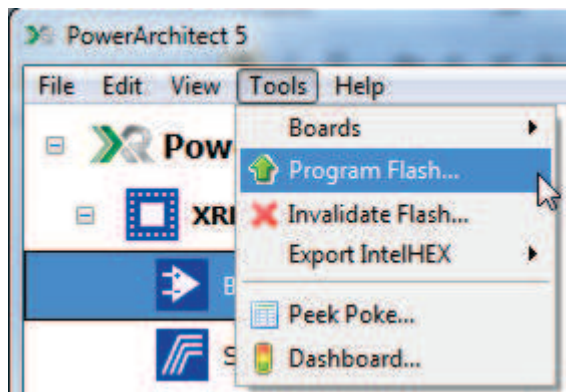
PA 5.1 is now communicating with the Arduino controller board which is indicated in the lower left corner.
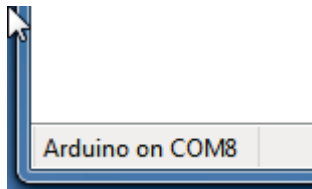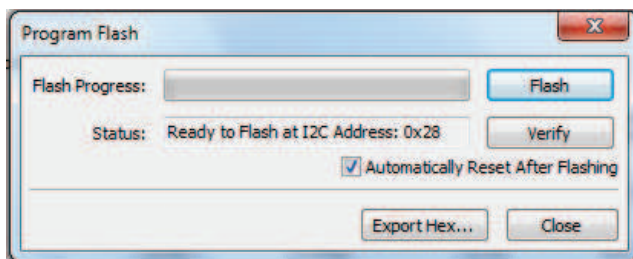

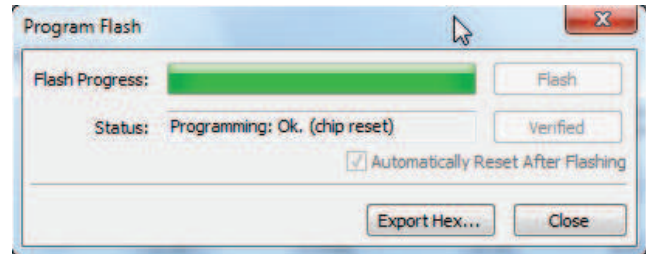### Programming the Configuration onto XRP9710

To program a configuration go to the Tools tab in PA 5.1 and select Program Flash.

The program Flash window will appear.

Click the Flash button.

PA 5.1 will go through the process of loading configuration in the flash. Once it has successfully completed the task, it will report the outcome as seen above and reset the device if "Automatically Reset After Flashing" box checked (default option).

Close the window.

Note that XRP9710EVB-DEMO-1 boards will be pre-loaded with the default configuration.

Regulation

To enable channel regulation go to the Tools tab in PA 5.1 and select Dashboard.
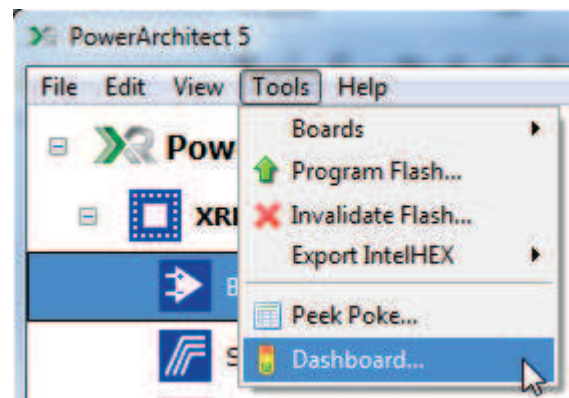
In Dashboard turn Group 1 on. The configuration groups the channels 3 and 4 into Group 1. The channels are now in regulation as indicated by V_{OUT} readings as well as the in-regulation indicators.

Channels can be turned on individually if desired.

GPIO and PISO interface

The GPIOs, PSIOs and ENABLE can be controlled from the Arduino controller dynamically in the dashboard.

ENABLE signal is connected to the Arduino controller board by default (JP3 header is shorted). Arduino drives the ENABLE pin low to place XRP9710 into the shutdown mode. It releases the ENABLE pin to enable the device. If leaving the ENABLE pin floating is desired, the jumper at JP3 shall be removed.

The PSIOs are not pulled up on XRP9710EVB-DEMO-1 by default. There is a loading option to pull PSIOs up to LDO5 if desired. To do this, one will need to short JP4, JP5, JP6 and JP7 headers by means of installing jumpers.
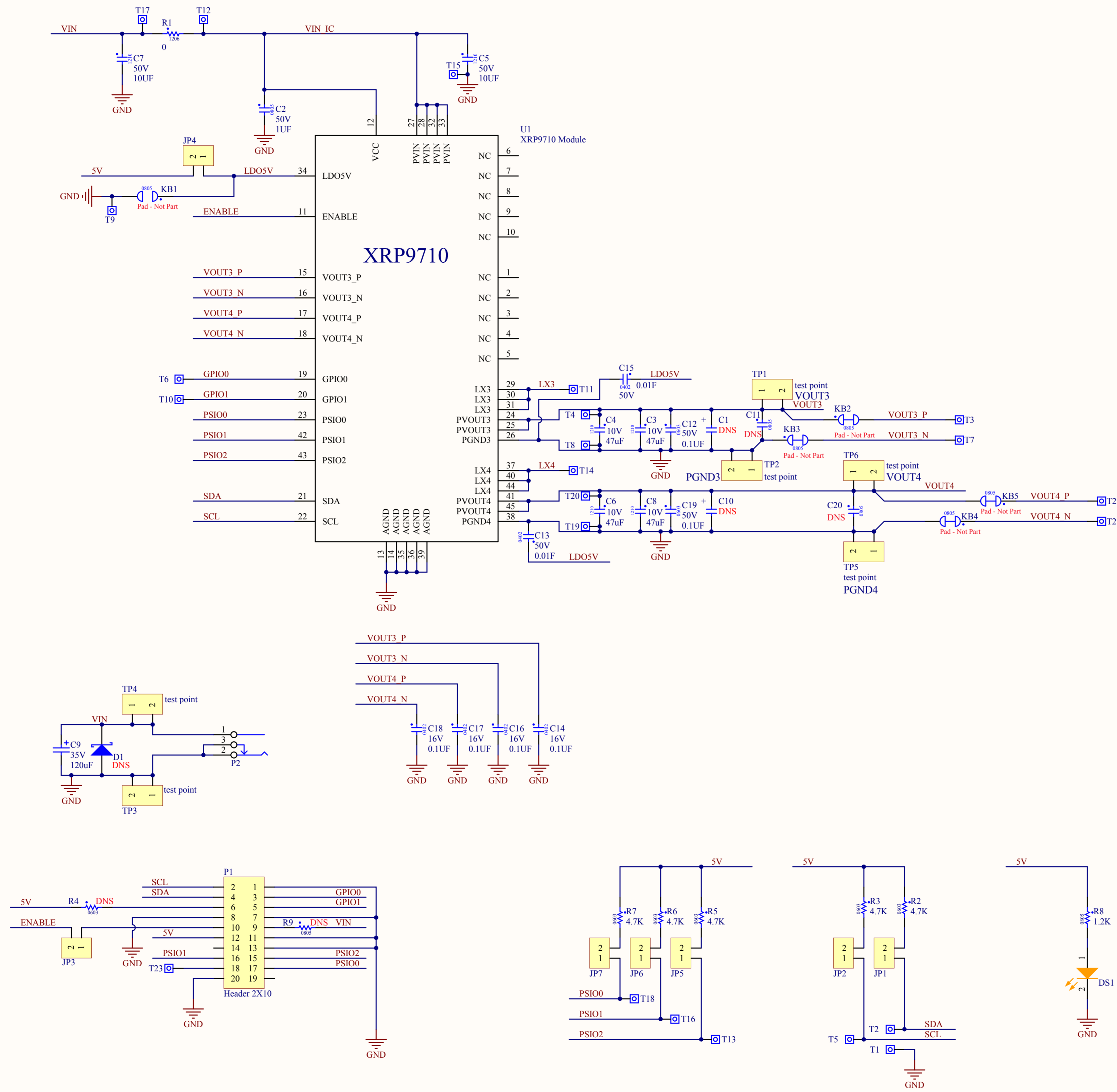
EVALUATION BOARD CONNECTIONS

The following picture illustrates how V_{IN} supplied from a test bench DC power supply and instruments attached to the outputs would be connected to the XRP9710EVB-DEMO-1 board.
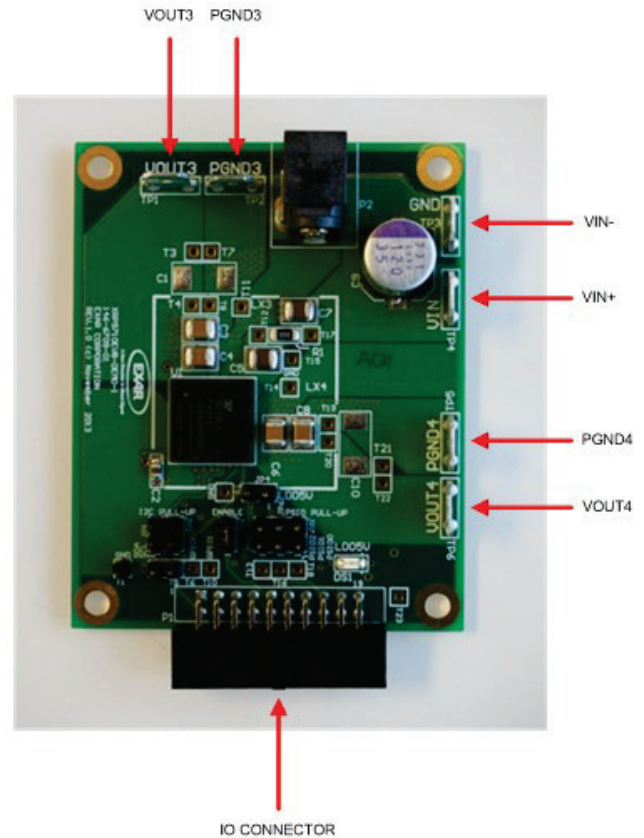
EVALUATION BOARD SCHEMAITCS

XRP9710

U1
XRP9710 Module

8/19

EXAR

A New Direction in Mixed-Signal

BILL OF MATERIAL

Ref.	Qty	Manufacturer	Part Number	Size	Component
	1	Exar Corporation	146-6709-01	2.25x2.80in	PCB
U1	1	Exar Corporation	XRP9710	12x12mm LGA	Dual 6A Programmable Power Module
DS1	1	Wurth Elektronik	150120AS75000	1206	SMD Amber Chip LED
C2	1	Murata Corporation	GRM21BR71H105KA12L	0805	Ceramic Capacitor 1µF, 50V, X7R
C3, C4, C6, C8	4	Murata Corporation	GRM32ER71A476KE15L	1210	Ceramic Capacitor 47µF, 10V, X7R
C5, C7	2	Murata Corporation	GRM32ER71H106KA12L	1210	Ceramic Capacitor 10µF, 50V, X7R
C9	1	Panasonic/Sanyo	35SVPF120M	F12	OSCON Capacitor 120µF, 35V
C12, C19	2	Murata Corporation	GRM188R71H104KA93D	0603	Ceramic Capacitor 0.1µF, 50V, X7R
C13, C15	2	Murata Corporation	GRM155R71H103KA88D	0402	Ceramic Capacitor 0.01µF, 50V, X7R
C14, C16, C17, C18	4	Murata Corporation	GRM155R71C104KA88D	0402	Ceramic Capacitor 0.1µF, 16V, X7R
R1	1	Vishay Dale	CRCW12060000Z0EAHP	1206	RES 0 Ω, 1/2W, SMD
R2, R3, R5, R6, R7	5	Panasonic	ERJ-3EKF4701V	0603	RES 4.7kΩ, 1/10W, 5%, SMD
R8	1	Panasonic	ERJ-6GEYJ122V	0805	RES 1.2kΩ, 1/8W, 5%, SMD
JP1, JP2, JP3, JP4, JP5, JP6, JP7	7	Wurth Elektronik	61300211121	0.20x0.10in	Connector, Male Header, 2 Positions, 100mil Spacing, Vertical, TH
P1	1	Sullins Connector Solutions	SFH11-PBPC-D10-RA-BK	1.20x0.55in	Connector, Female Header, 20 Positions, 100mil Spacing, RA, TH
P2	1	Switchcraft	RAPC722X	0.60x0.40in	Connector, Power Jack Mini R/A, T/H
T1, T2, T5	3	Wurth Elektronik	61300111121	0.10x0.10in	Square Test Posts, TH
TP1, TP2, TP3, TP4, TP5, TP6	6	Wurth Elektronik	7471287	0.32x0.10in	Mounting Tabs

EXAR
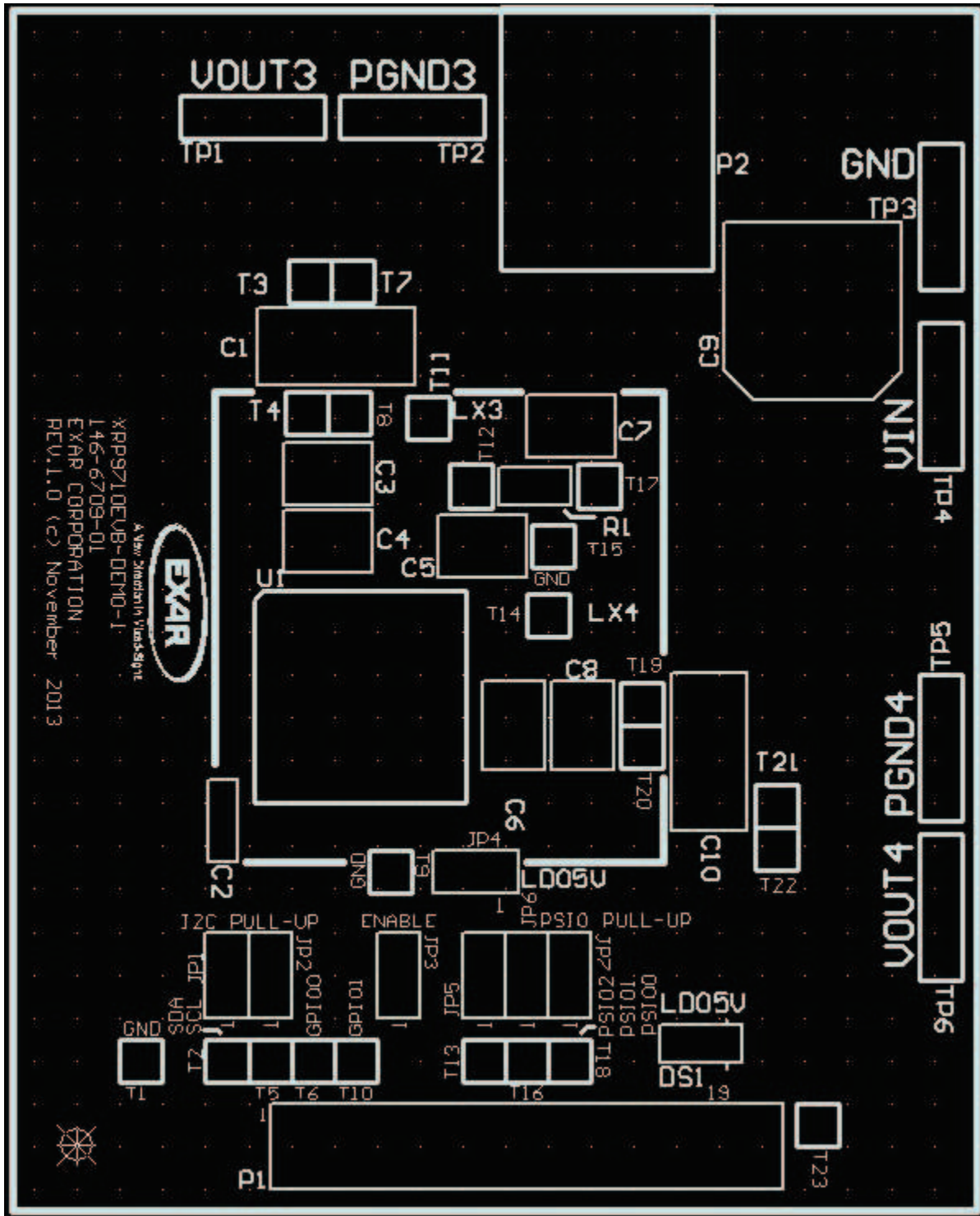A New Direction in Mixed-Signal

EVALUATION BOARD LAYOUT

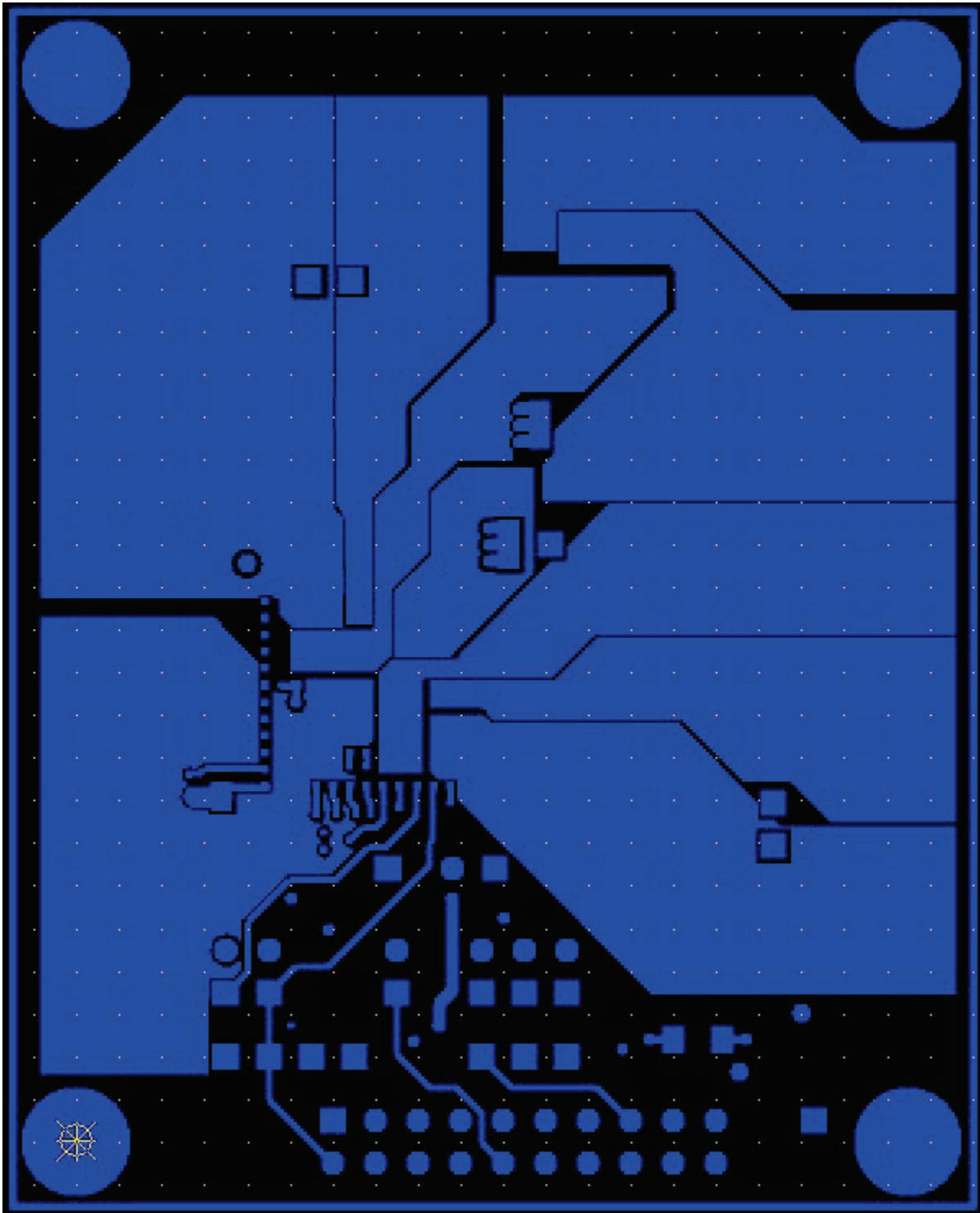Figure 3 Component Placement – Top Side
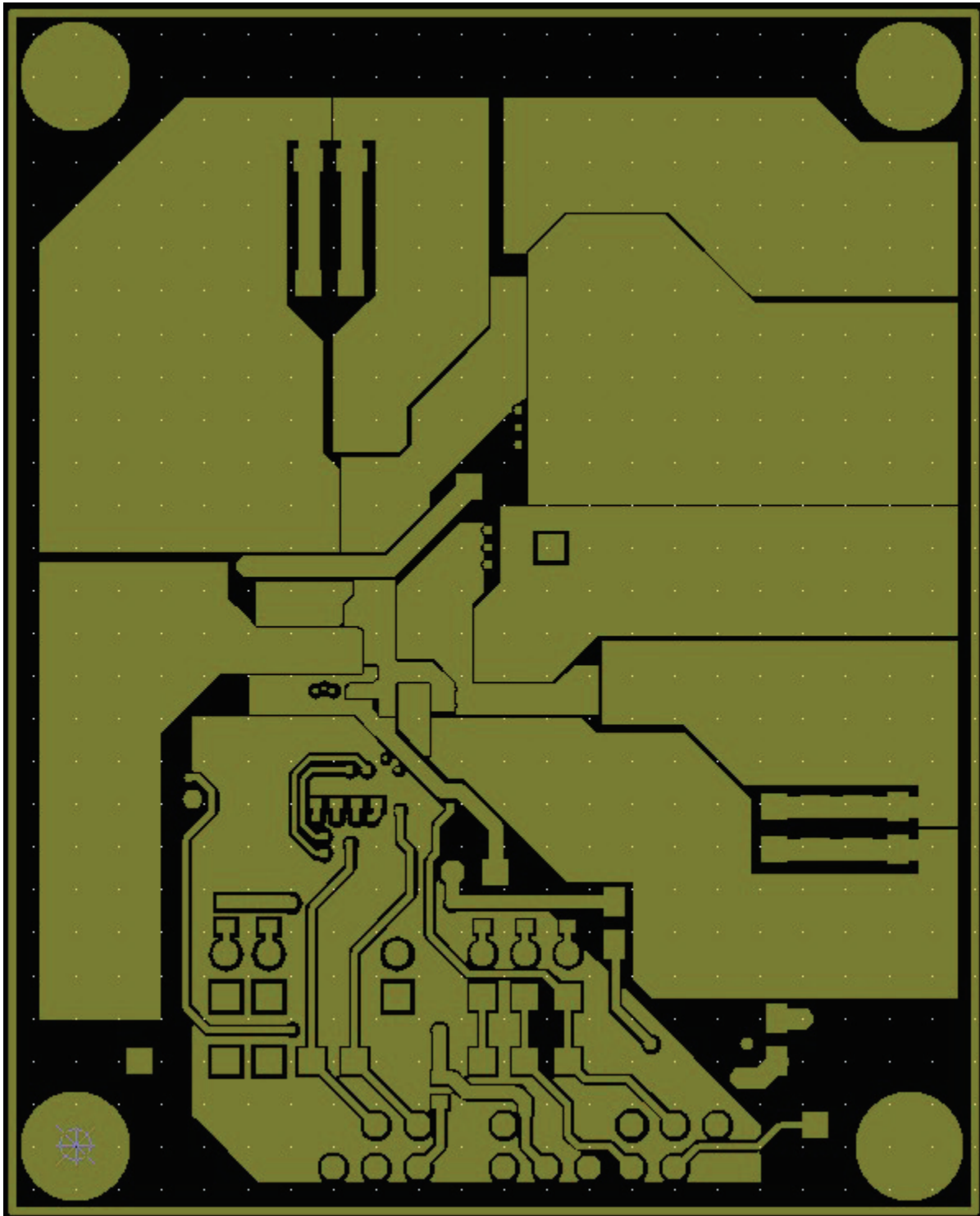
Figure 4 Layout – Top Side
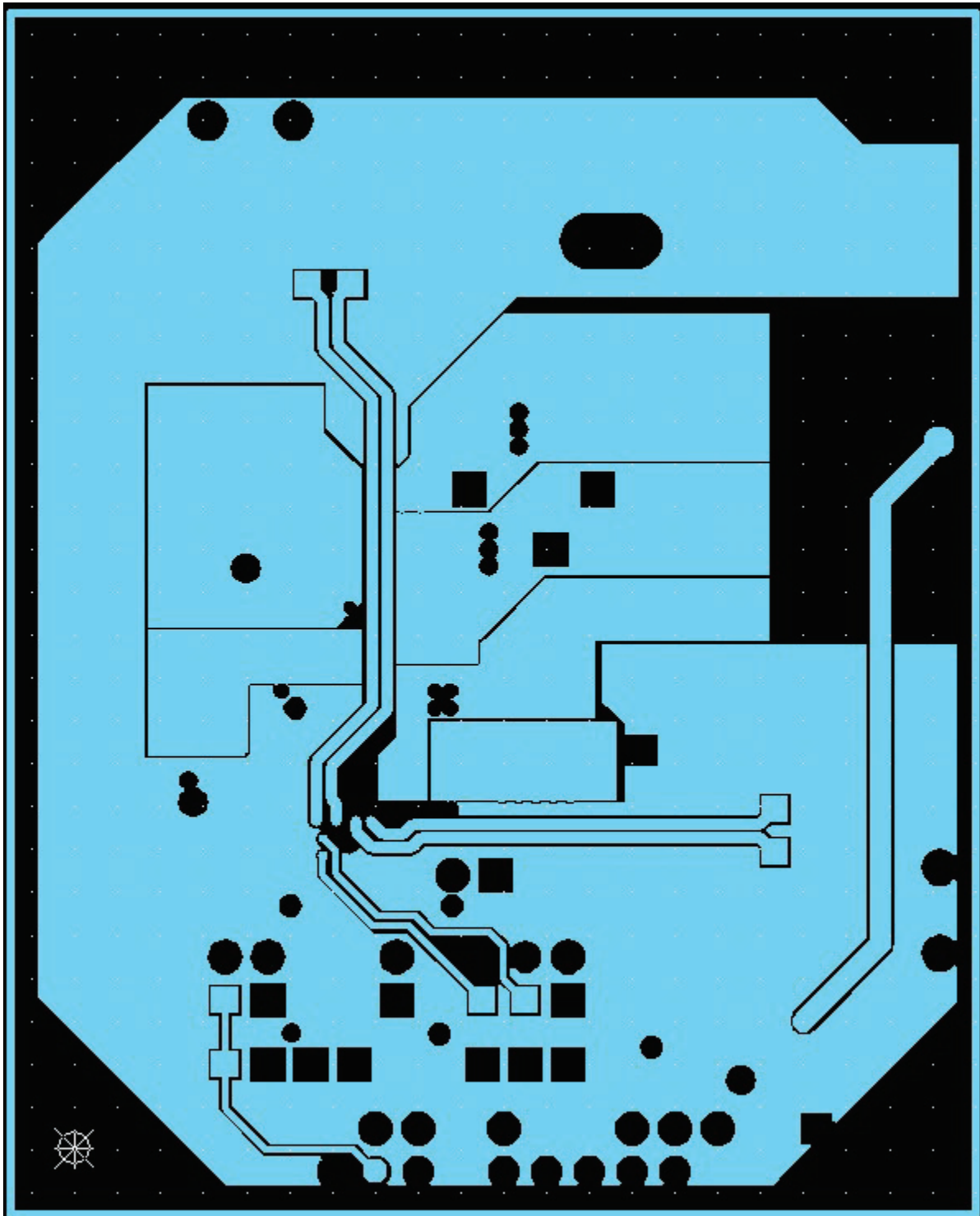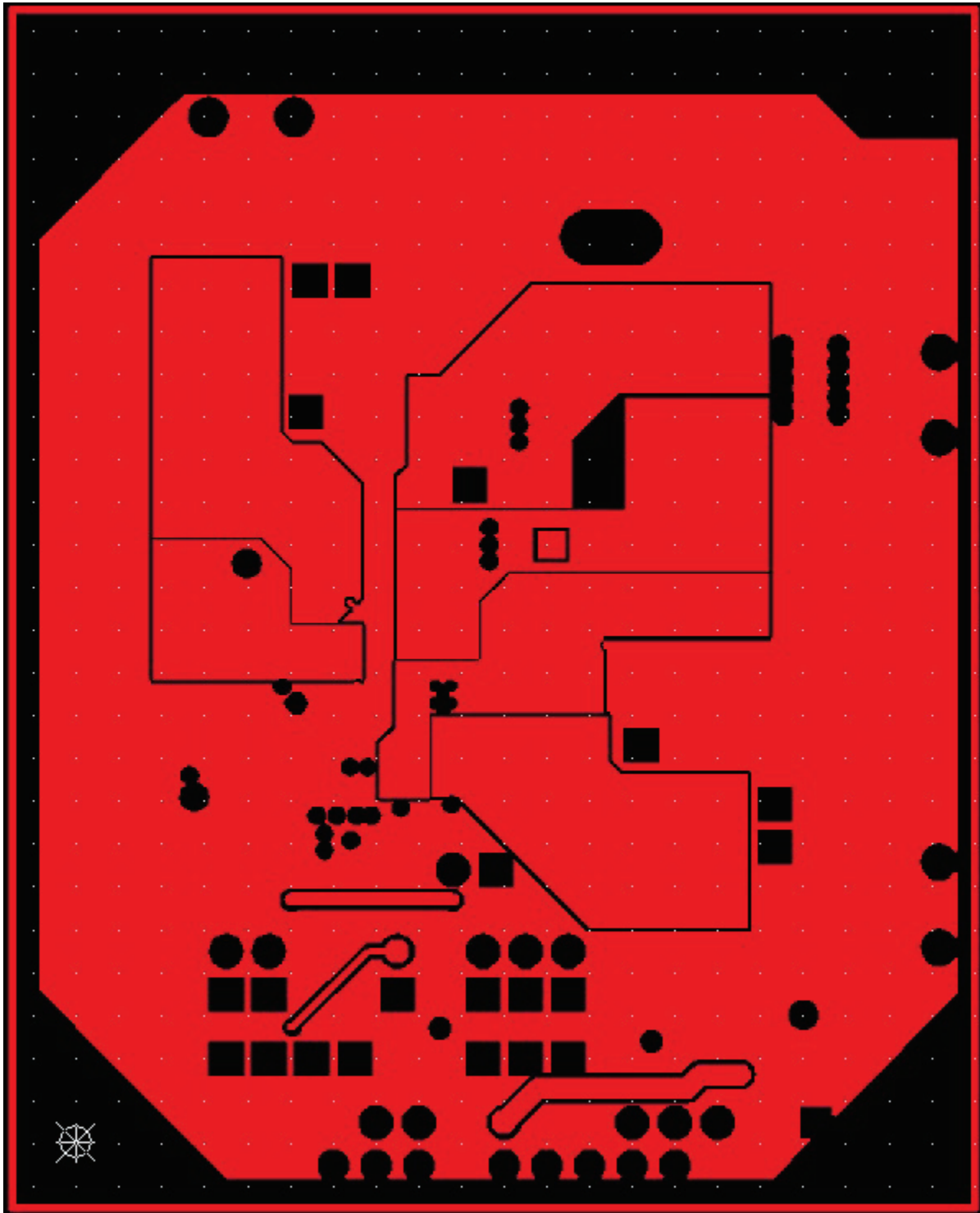
Figure 5 Layout - Bottom

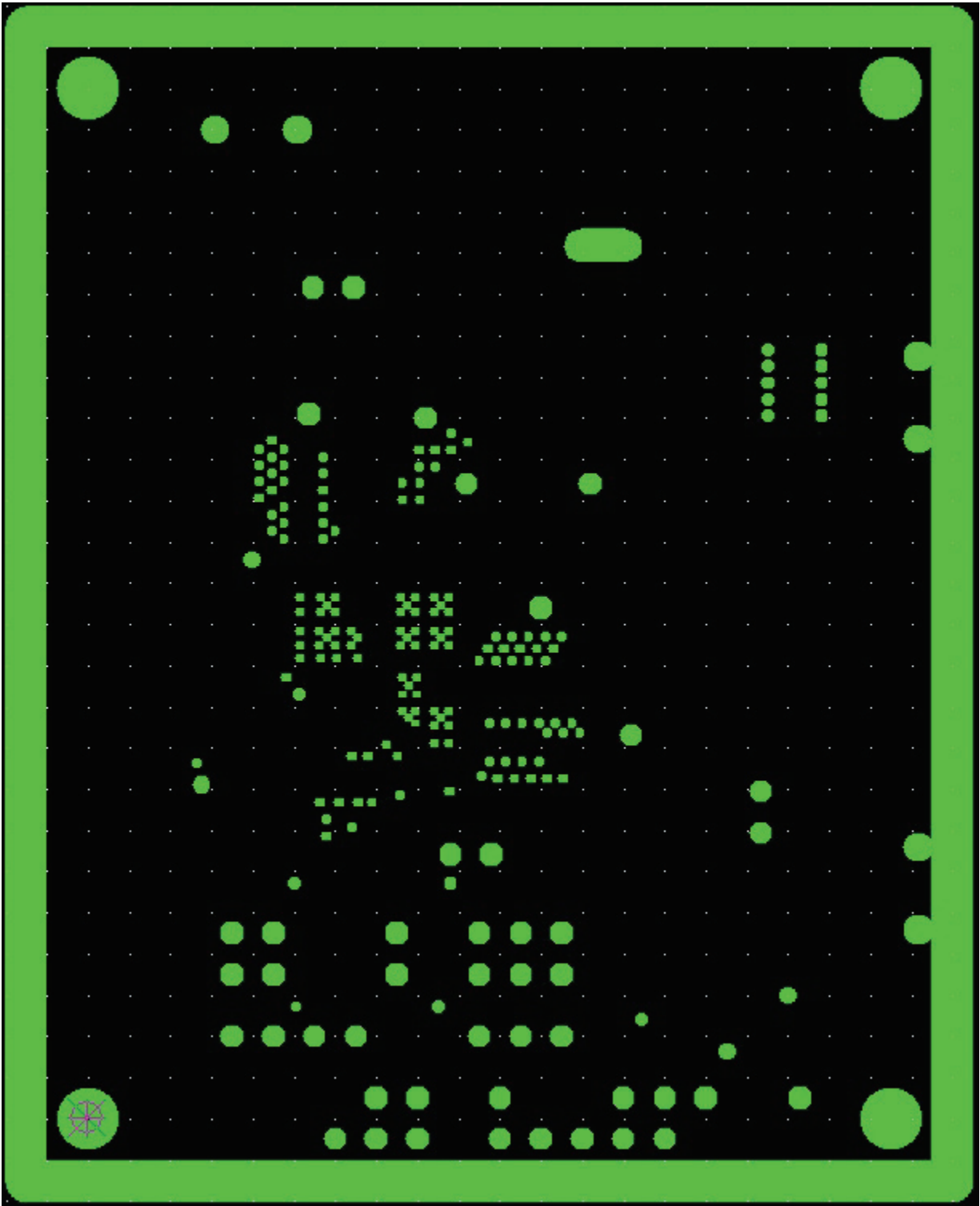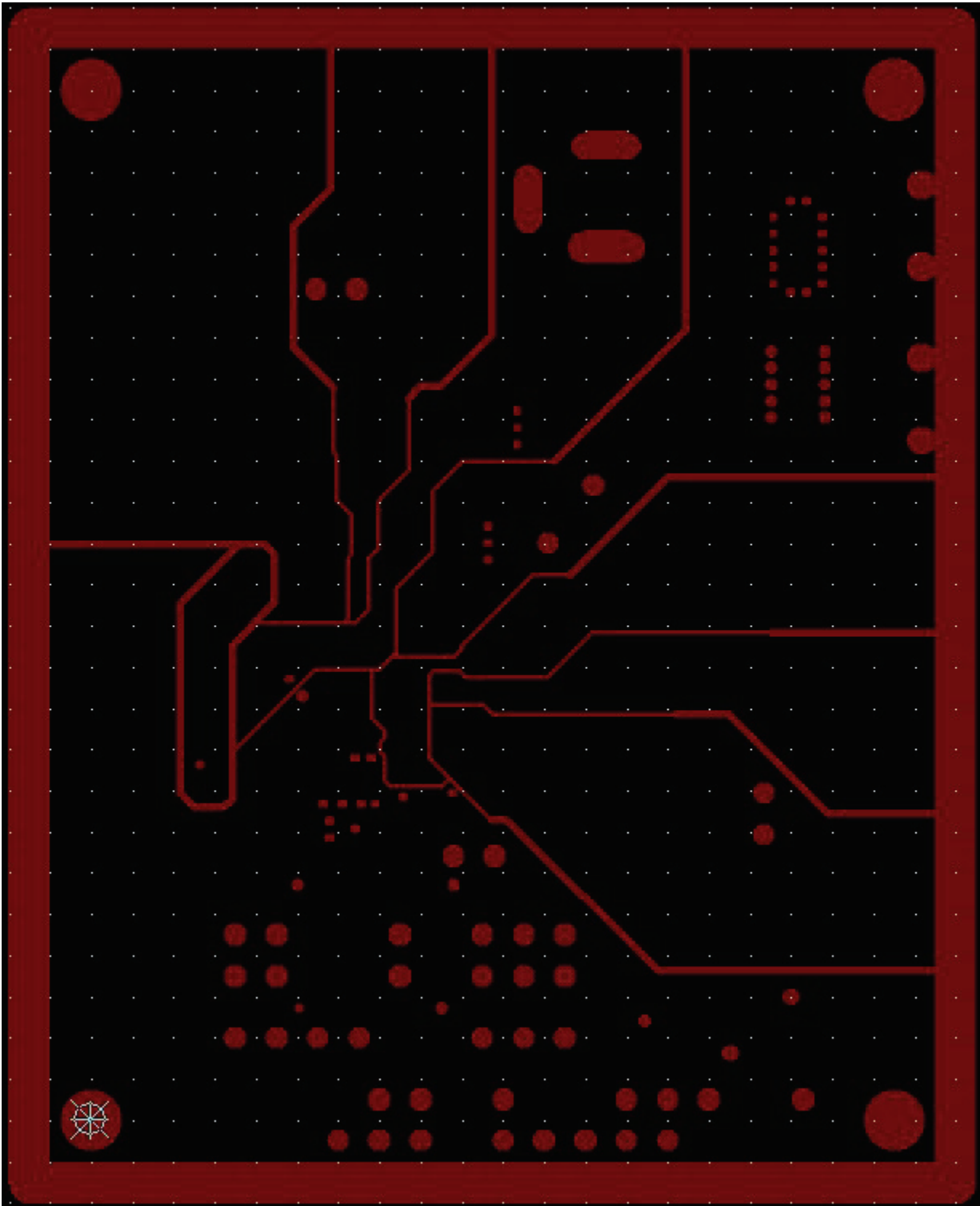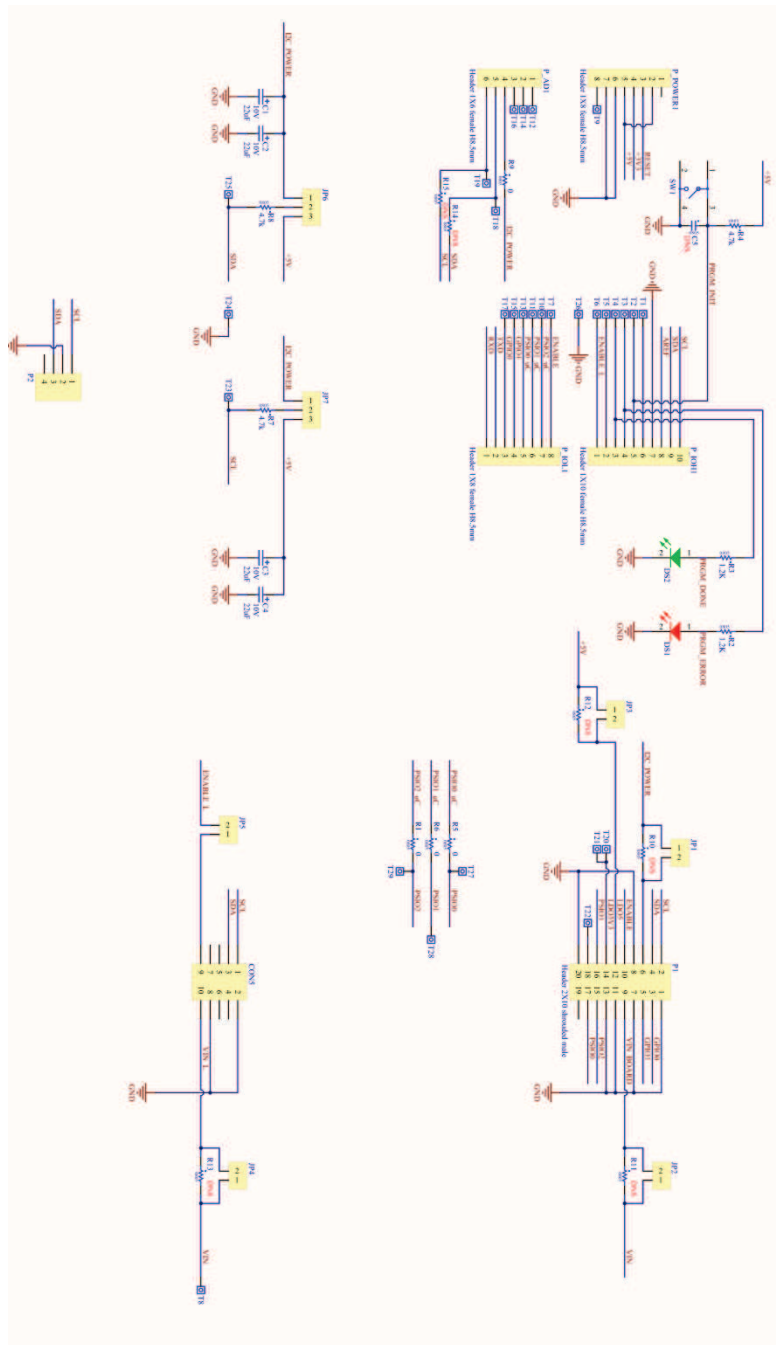Figure 6 Layout – Middle Layer 1

Figure 7 Layout – Middle Layer 2

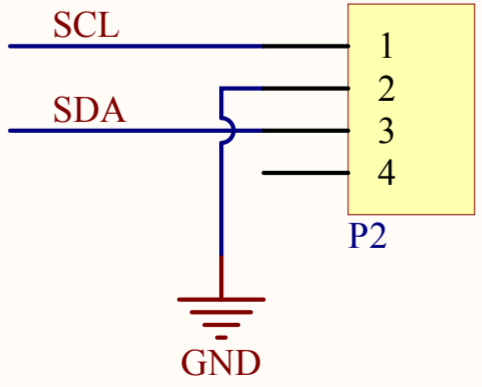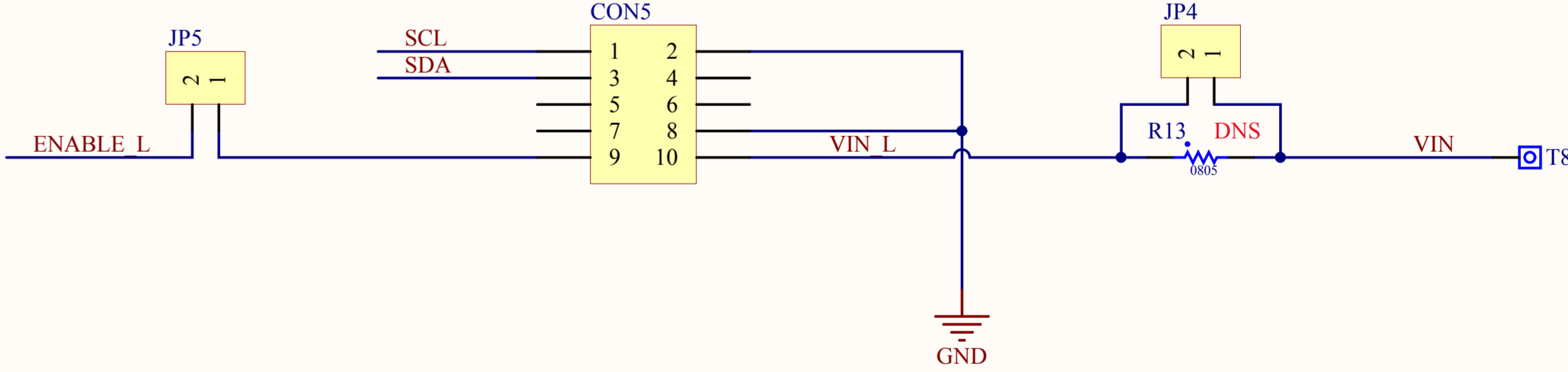Figure 8 Layout – Signal Ground Plane

Figure 9 Layout – Internal Plane

APPENDIX – INTERFACE BOARD

SCHEMATICS

APPENDIX - INTERFACE BOARD SCHEMATICS

+5V

R4 4.7k

PRGM_INIT

1   3
2   4
SW1

C5 DNS

GND

R3 1.2K
R2 1.2K

PRGM_DONE   PRGM_ERROR

DS2   DS1

GND   GND

P_POWER1
1
2
3
4
5
6
7
8

RESET
+3V3
+5V

T9

Header 1X8 female H8.5mm

GND

SCL
SDA
AREF

P_IOH1
10
9
8
7
6
5
4
3
2
1

GND

T1
T2
T3
T4
T5   ENABLE_L
T6

T26   GND

Header 1X10 female H8.5mm

P_AD1
1
2
3
4
5
6

T12
T14
T16

R9   0   I2C_POWER

T18

T19

R14   DNS   SDA
R15   DNS   SCL

Header 1X6 female H8.5mm

ENABLE
PSIO2_uC
PSIO1_uC
PSIO0_uC
GPIO1
GPIO0
TXD
RXD

P_IOL1
8
7
6
5
4
3
2
1

T7
T10
T11
T13
T15
T17

Header 1X8 female H8.5mm

JP1
1 2

SCL
SDA

I2C_POWER   R10   DNS

P1
2   1
4   3
6   5
8   7
10 9
12 11
14 13
16 15
18 17
20 19

GPIO0
GPIO1

VIN_BOARD

PSIO2
PSIO0

Header 2X10 shrouded male

ENABLE
LDO5
LDO3V3
PSIO1

JP2
2 1

R11   DNS   VIN

JP3
1 2

T20
T21

R12   DNS

+5V

T22

GND

GND

PSIO0_uC   R5   0   PSIO0   T27
PSIO1_uC   R6   0   PSIO1   T28
PSIO2_uC   R1   0   PSIO2   T29

JP6
1 2 3

I2C_POWER

C1
10V
22uF

C2
10V
22uF

R8 4.7k   +5V

T25   SDA

GND   GND

T24   GND

JP7
1 2 3

I2C_POWER

R7 4.7k   +5V

T23   SCL

C3
10V
22uF

C4
10V
22uF

GND   GND

GND

JP5
2 1

ENABLE_L

SCL
SDA

CON5
1   2
3   4
5   6
7   8
9   10

VIN_L

JP4
2 1

R13   DNS   VIN   T8

GND

SCL
SDA

1
2
3
4
P2

GND

BILL OF MATERIAL

Ref.	Qty	Manufacturer	Part Number	Size	Component
	1	Exar Corporation	146-6703-01	4.40x2.10in	PCB
DS1	1	Wurth Elektronik	150120RS75000	1206	SMD Red Chip LED
DS2	1	Wurth Elektronik	150120VS75000	1206	SMD Green Chip LED
C1, C2, C3, C4	4	Vishay Sprague	293D226X9010B2TE3	B	Tantalum Capacitor 22µF, 10V, 10%
R1, R5, R6, R9	4	Panasonic	ERJ-6GEY0R00V	0805	RES 0 Ω, 1/8W, 5% SMD
R2, R3	2	Panasonic	ERJ-6GEYJ122V	0805	RES 1.2kΩ, 1/8W, 5%, SMD
R4, R7, R8	3	Panasonic	ERJ-6GEYJ472V	0805	RES 4.7kΩ, 1/8W, 5%, SMD
SW1	1	Wurth Elektronik	430182050816	6x6mm	Tact Switch, SMD
CON5	1	Wurth Elektronik	61301021121	0.50x0.20in	Connector, Male Header, 10 Positions, Dual Row, 100mil Spacing, Vertical, TH
JP1, JP2, JP3, JP4, JP5	5	Wurth Elektronik	61300211121	0.20x0.10in	Connector, Male Header, 2 Positions, 100mil Spacing, Vertical, TH
JP6, JP7	2	Wurth Elektronik	61300311121	0.30x0.10in	Connector, Male Header, 3 Positions, 100mil Spacing, Vertical, TH
P1	1	Wurth Elektronik	612020235221	1.30x0.55in	Connector, Male Header, 20 Positions, Dual Row, 100mil Spacing, Shrouded, RA, TH
P2	1	Wurth Elektronik	653104124022	11x6mm	Wire-to-Board Connector, Male, 4 Positions, 1.25mm Spacing, Shrouded, SMT
P_IOH1	1	Wurth Elektronik	61301011121	1.00x0.10in	Connector, Male Header, 10 Positions, 100mil Spacing, Vertical, TH
P_POWER1, P_IOL1	2	Wurth Elektronik	61300811121	0.80x0.10in	Connector, Male Header, 8 Positions, 100mil Spacing, Vertical, TH
P_AD1	1	Wurth Elektronik	61300611121	0.60x0.10in	Connector, Male Header, 6 Positions, 100mil Spacing, Vertical, TH
T23, T24, T25	3	Wurth Elektronik	61300111121	0.10x0.10in	Square Test Posts, TH

DOCUMENT REVISION HISTORY

Revision	Date	Description
1.0.0	01/06/2014	Initial release of document

BOARD REVISION HISTORY

Board Revision	Date	Description
XRP9710EVB-DEMO-1-01	12/20/13	Initial release of evaluation board

FOR FURTHER ASSISTANCE

Email: customersupport@exar.com

Exar Technical Documentation: http://www.exar.com/TechDoc/default.aspx?

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