



April 2016

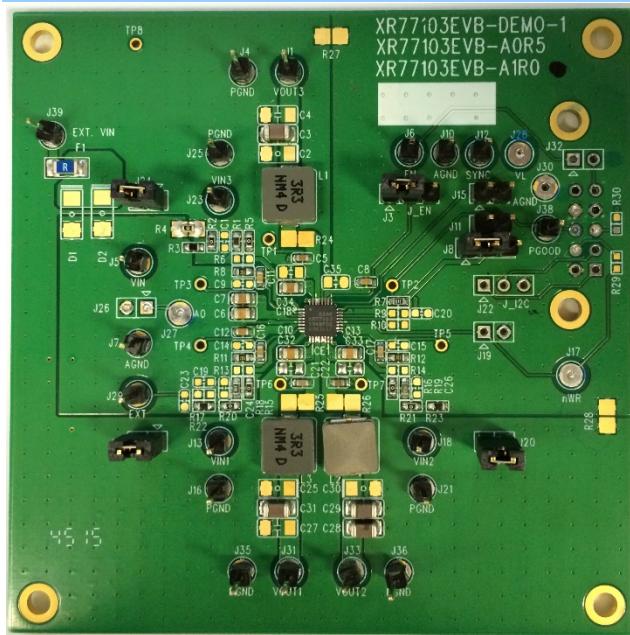
Rev. 1A

**GENERAL DESCRIPTION**

The XR77103-A1R0 Universal PMIC features three 2A synchronous high efficiency buck regulators with integrated power switches. They can operate in 5V, 9V and 12V powered systems with minimal required external component thus providing the smallest size solution possible. Two of the outputs may be paralleled for output currents up to 5A peak with steady state current of up to 4A.

The output voltage of each converter can be adjusted by external resistor divider down to voltage as low as 0.8V. With a nominal switching frequency of 1MHz, the regulators can also be synchronized to an external clock in applications where EMI control is critical.

XR77103-A1R0 features a supervisor circuit that monitors each converter output. PGOOD pin is asserted once sequencing is done, outputs are reported in regulation and the reset timer expires. The polarity of the signal is active high. A pulse skipping mode (PSM) reduces switching losses maintaining high efficiency when the system is unloaded or in standby mode.

**EVALUATION BOARD MANUAL****FEATURES**

- 4.5V to 14V wide input supply voltage range
- Built-In MOSFET & Synchronous rectifier
- 0.8V, high accuracy reference (1%)
- Current-mode control with simple compensation circuit
- External synchronization
- Power Good
- Protection
  - Thermal shutdown
  - Overvoltage transient protection
  - Over current protection
- 32pin TQFN package, 4mm x 4mm



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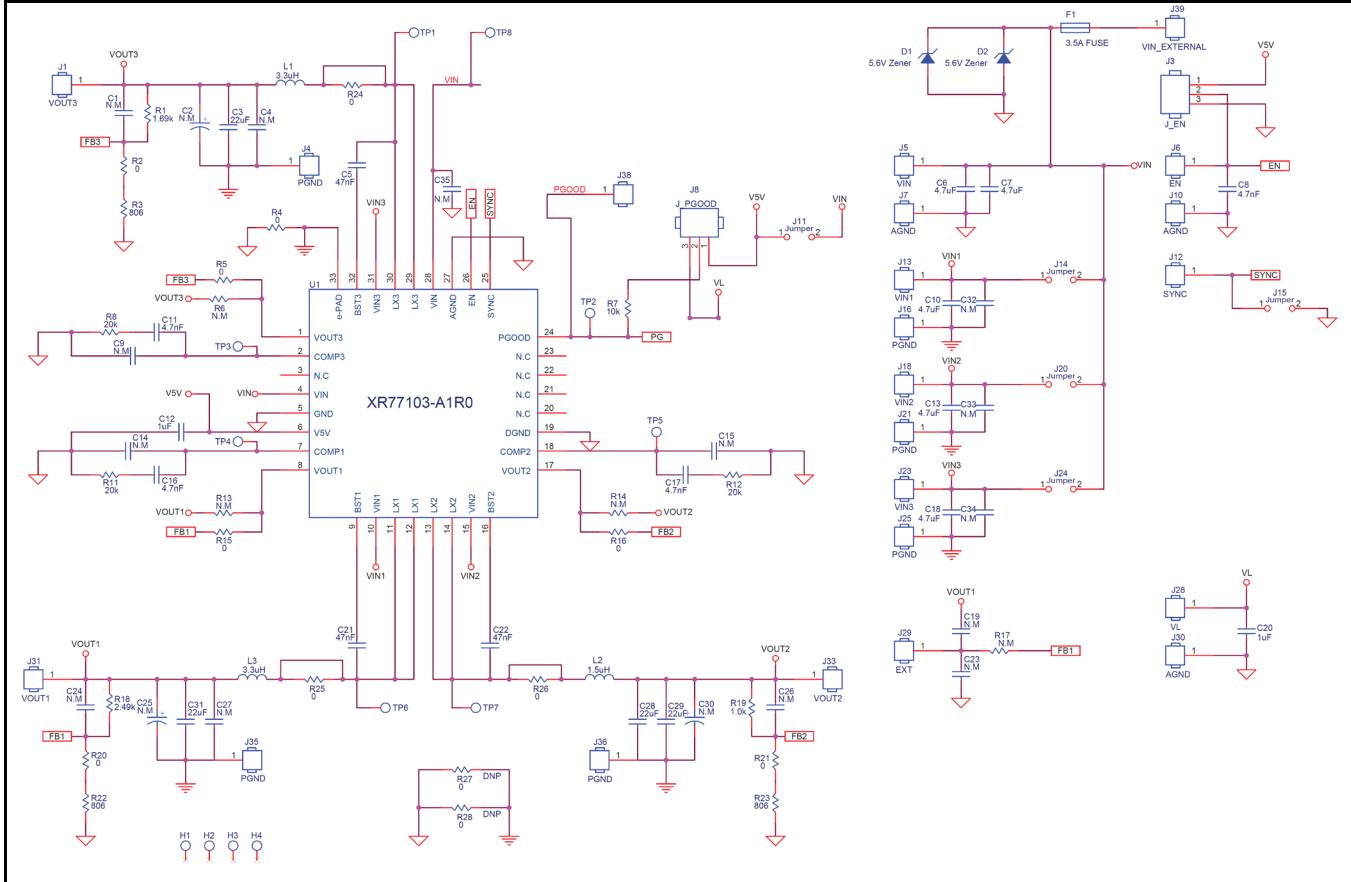


Figure 1: XR77103-A1R0 Evaluation Board Schematics

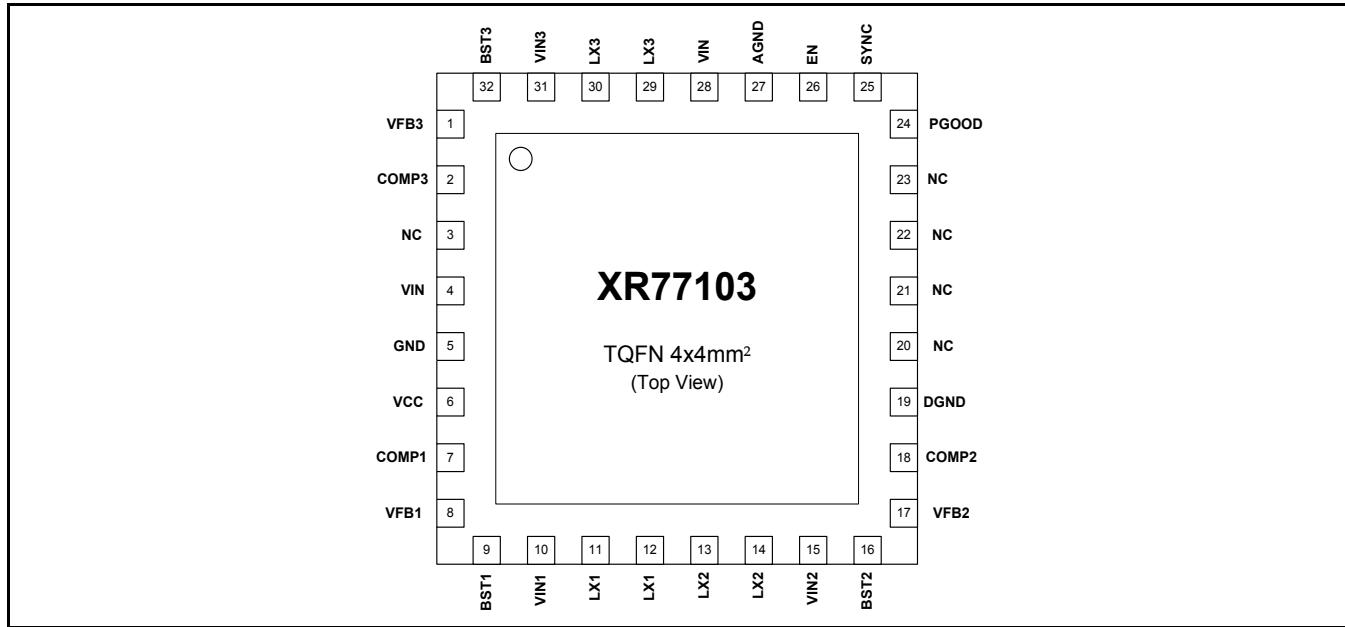
**PIN ASSIGNMENT**

Figure 2: XR77103-A1R0 Pin Assignment



## Universal PMIC 3 Output Buck Regulator

## PIN DESCRIPTION

Name	Pin Number	Description
VFB3	1	Buck 3 feedback pin
COMP3	2	Compensation pin for Buck 3. Connect a series RC circuit to this pin for compensation.
NC	3	No Connect
VIN	4	IC supply pin. Connect a capacitor as close as possible to this pin.
GND	5	Ground
VCC	6	Internal supply. Connect a ceramic capacitor from this pin to ground.
COMP1	7	Compensation pin for Buck 1. Connect a series RC circuit to this pin for compensation.
VFB1	8	Buck 1 feedback pin
BST1	9	Bootstrap capacitor for Buck 1. Connect a bootstrap capacitor from this pin to LX1
VIN1	10	Input supply for Buck1. Connect a capacitor as close as possible to this pin.
LX1	11	Switching node for Buck 1
LX1	12	Switching node for Buck 1
LX2	13	Switching node for Buck 2
LX2	14	Switching node for Buck 2
VIN2	15	Input supply for Buck 2. Connect a capacitor as close as possible to this pin.
BST2	16	Bootstrap capacitor for Buck 2. Connect a bootstrap capacitor from this pin to LX2
VFB2	17	Buck 2 feedback pin
COMP2	18	Compensation pin for Buck 2. Connect a series RC circuit to this pin for compensation.
DGND	19	Digital Ground
NC	20	No Connect
NC	21	No Connect
NC	22	No Connect
NC	23	No Connect
PGOOD	24	Power Good output. Open drain output asserted after all converters are sequenced and within regulation.
SYNC	25	External clock input pin. Connect to signal ground when unused.
EN	26	Enable Control Input. Set EN high to enable converters.
AGND	27	Analog ground
VIN	28	IC supply pin. Connect a capacitor as close as possible to this pin.
LX3	29	Switching node for Buck 3
LX3	30	Switching node for Buck 3
VIN3	31	Input supply for Buck 3. Connect a capacitor as close as possible to this pin.
BST3	32	Bootstrap capacitor for Buck 3. Connect a bootstrap capacitor from this pin to LX3
E-PAD	-	Connect to Power ground

## ORDERING INFORMATION

Refer to XR77103-A1R0 datasheet and/or [www.exar.com](http://www.exar.com) for exact and up to date ordering information.



## Universal PMIC 3 Output Buck Regulator

### USING THE EVALUATION BOARD

#### POWERING UP

Connect the VIN+/VIN- with short leads to power supply. Use test pins EXT. VIN (J39) and AGND (J7) to connect VIN+ and VIN- to the EVB respectively. Connect VOUTx/PGNDx test points (J31 VOUT1, J35 PGND1, J33 VOUT2, J36 PGND2, J1 VOUT3, J4 PGND3) with short leads to an electronic load. Use test pins VOUTx and PGNDx to monitor VOUTx+ and VOUTx- respectively. Apply 12V using the power supply. Make sure J14, J20 and J24 have jumpers installed to provide VIN to individual regulators. The XR77103EVB-A1R0 should power up and regulate the output at 3.3V, 1.8V and 2.5V at channels 1, 2, and 3. Input voltage range is from 5.5V to 14V. Maximum rated current for per channel is 2A.

#### JUMPER J3

This jumper controls the EN pin. Its default position is tied to 5V VCC (the jumper between positions 1 and 2) in which case channels will be enabled at power up. Placing the jumper between pins 2 and 3 will permanently disable channels.

#### JUMPER J8

This jumper controls the pull up of the PGOOD signal. The default position is between pins 1 and 2 in which case PGOOD is pulled up to 5V VCC.

#### OPERATION FROM A 5V RAIL ( $V_{IN}=4.5V-5.5V$ ) J11

For operation from a 5V rail it is required tie output of the LDO to  $V_{IN}$  by populating the jumper J11. This enhances the operation of the drivers at  $V_{IN}<5V$ .

Please remember to remove R11 for operation at higher  $V_{IN}$ . The board also has place holders for Zener diodes which can be installed to protect the IC if higher Vin is accidentally applied.

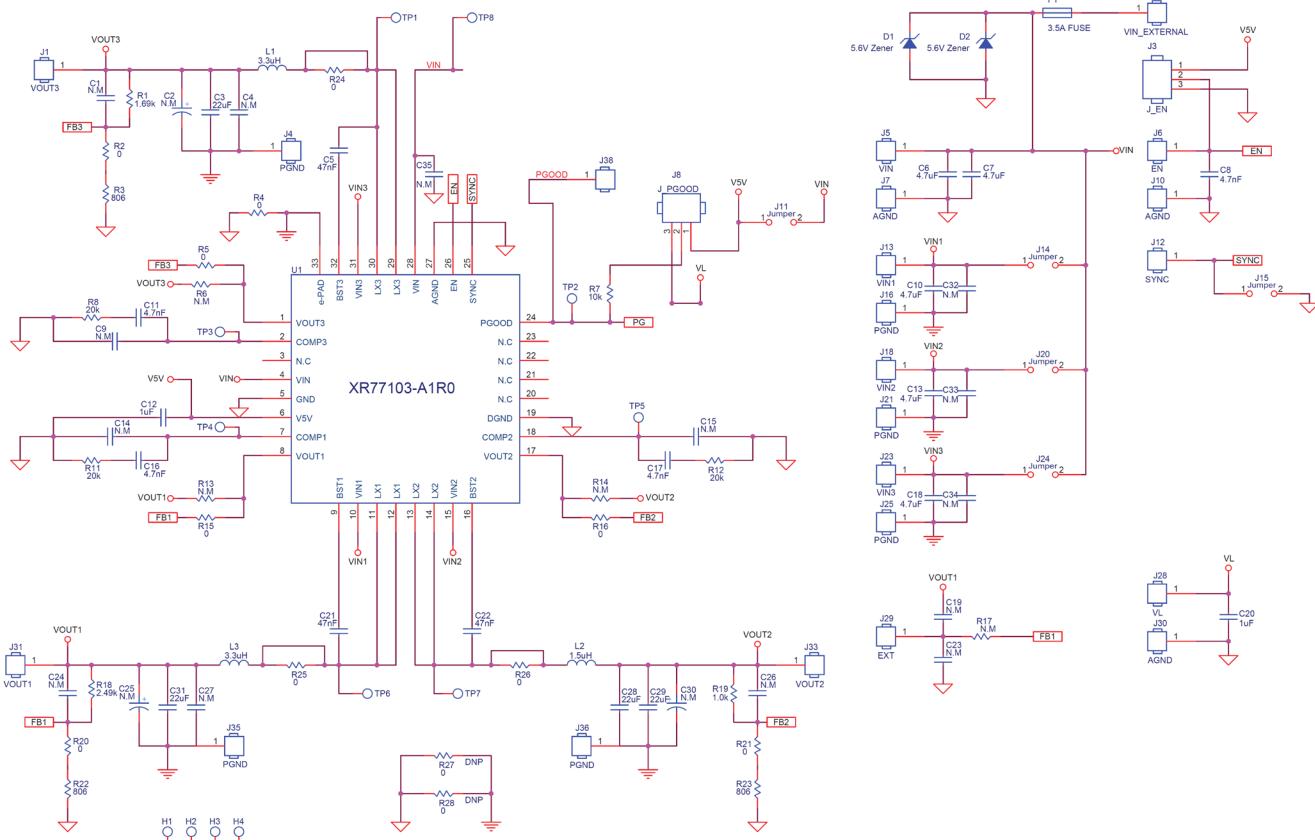
#### PROGRAMMING THE OUTPUT VOLTAGE

$V_{OUT}$  can be programmed by changing R1 according to:

$$R_{top} = R_{bottom} \times \left( \frac{V_{OUT}}{0.8} - 1 \right)$$



## EVALUATION BOARD SCHEMATICS



**Universal PMIC 3 Output Buck Regulator****XR77103EVB-A1R0 BILL OF MATERIALS**

Reference Designator	Qty.	Manufacturer	Manufacturer Part Number	Size	Component
PCB	1	Exar	XR77103		XR77103 EVB PCB
U1	1	Exar	XR77103-A1R0		
L1, L3	2	EATON	HCM0703-3R3-R	6.86 x 6.47mm	Inductor 3.3uH 6A 30mOHM SMD
L2	1	VISHAY	IHL2525CZER1R5M01	6.86 x 6.47mm	Inductor 1.5uH 9A 15mOHM SMD
C3, C28, C29, C31	4	MURATA	GRM31CR61C226KE15K	1206	CAP CER 22uF 16V X5R 1206 10%
C5,C21,C22	3	MURATA	GRM188R71H473KA61D	0603	CAP CER 47nF 50V X7R 10%
C6,C7,C10,C13,C18	5	MURATA	GRM21BR71E475KA73L	0805	CAP CER 4.7uF 25V X7R 10%
C8, C11,C16,C17	4	MURATA	GRM188R71H472KA01D	0603	CAP CER 4.7nF 50V X7R 10%
C12	1	MURATA	GRM188R71A105KA61D	0603	CERAMIC CAP., 1uF, 10V, X7R, 10%
R1	1	PANASONIC	ERJ-3EKF1691V	0603	Resistor 1.69K Ohm, 1/10W, 1%,SMD
R2, R4, R5, R15, R16, R20, R21	7	PANASONIC	ERJ-3GEY0R00V	0603	Resistor 0.00 Ohm, Jumper, 1/10W, SMD
R3, R22, R23	3	PANASONIC	ERJ-3EKF8060V	0603	Resistor 806 Ohm, 1/10W, 1%,SMD
R7	1	PANASONIC	ERJ-3EKF1002V	0603	Resistor 10.0K Ohm, 1/10W,1%,SMD
R8,R11,R12	3	PANASONIC	ERJ-3EKF2002V	0603	Resistor 20.0K Ohm, 1/10W,1%,SMD
R18	1	PANASONIC	ERJ-3EKF2491V	0603	Resistor 2.49K Ohm, 1/10W, 1%,SMD
R19	1	PANASONIC	ERJ-3EKF1001V	0603	Resistor 1.0K Ohm, 1/10W, 1%,SMD
F1	1	Vishay	MFU1206FF03500P100	1206	Fuse Board Mount 3.5A,63VDC
J1, J4, J5, J6, J7, J10, J12, J13, J16, J18, J21, J23, J25, J29, J31, J33, J35, J36, J38, J39	20	Wurth Elektronik	61300111121	2.54mm	Header 1 pin
J3,J8	2	Wurth Elektronik	61300311121	2.54mm	Header 3 pin
J11, J14, J15, J20, J24	5	Wurth Elektronik	61300211121	2.54mm	Jumper 2 pin

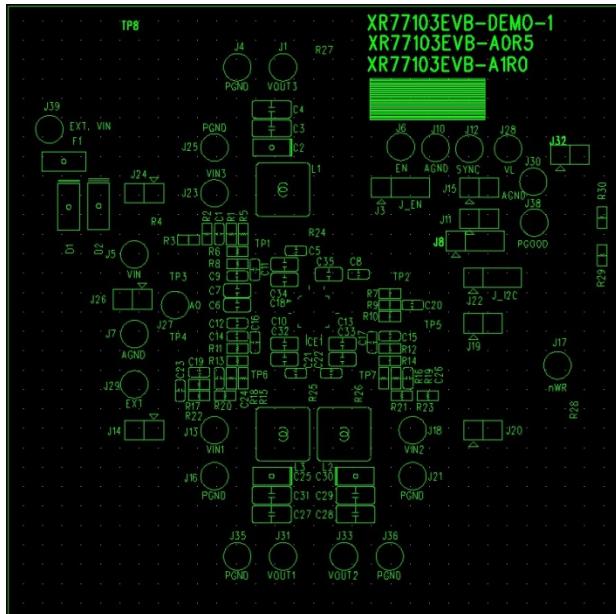
**EVALUATION BOARD LAYOUT**

Figure 3: Assembly Top

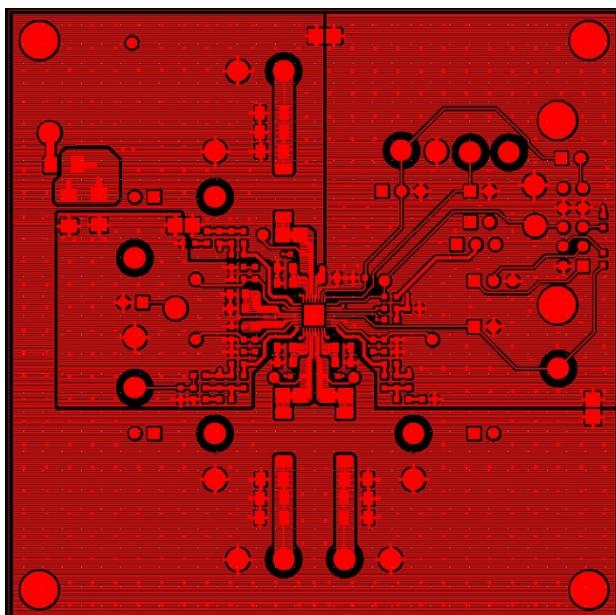


Figure 4: Top

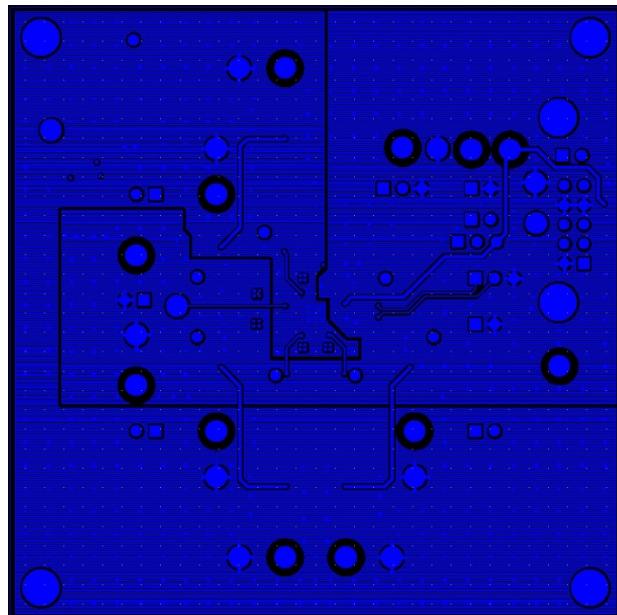


Figure 5: Bottom

## Universal PMIC 3 Output Buck Regulator

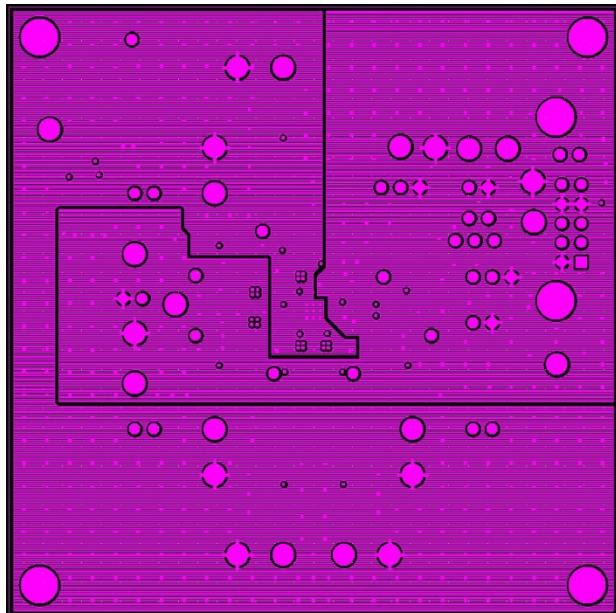


Figure 6: Layer 2

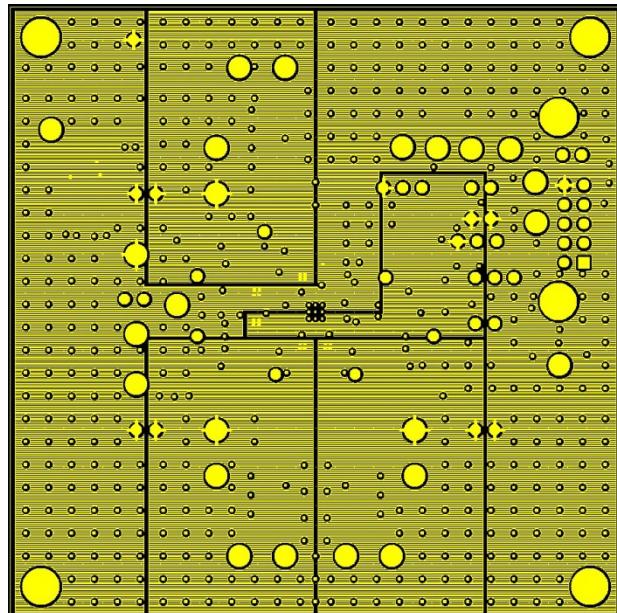


Figure 7: Layer 3

**Universal PMIC 3 Output Buck Regulator****DOCUMENT REVISION HISTORY**

Revision	Date	Description
1A	04/26/16	Initial release of document

**BOARD REVISION HISTORY**

Board Revision	Date	Description
REV. 2.0	09/21/15	Initial release of evaluation board

**FOR FURTHER ASSISTANCE**

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