ANALOG DEVICES

ADP1043A Daughter Card Evaluation Board

ADP1043ADC1-EVALZ PRD1274

FEATURES

ADP1043A Daughter Card with I2C interface
Retrofit controller to any topology or existing design
Software GUI
Low component count

ADP1043A EVALUATION BOARD OVERVIEW

The daughter card evaluation board allows the ADP1043A to be quickly evaluated in any existing switching power supply application. Using the daughter card and its accompanying software, the IC can be interfaced to any PC running Windows 2000/NT/XP/Vista via the computers USB port.

The daughter card can be connected to any existing ADP1043A evaluation board or reference design.

It can also be connected to any power supply as a replacement for the existing controller. The daughter card has a connector through which the pin outs of the ADP1043A can be probed. The software GUI allows control and read/write functionality of the ADP1043 internal registers to modify, for example, the PWM settings or over current protection limits.

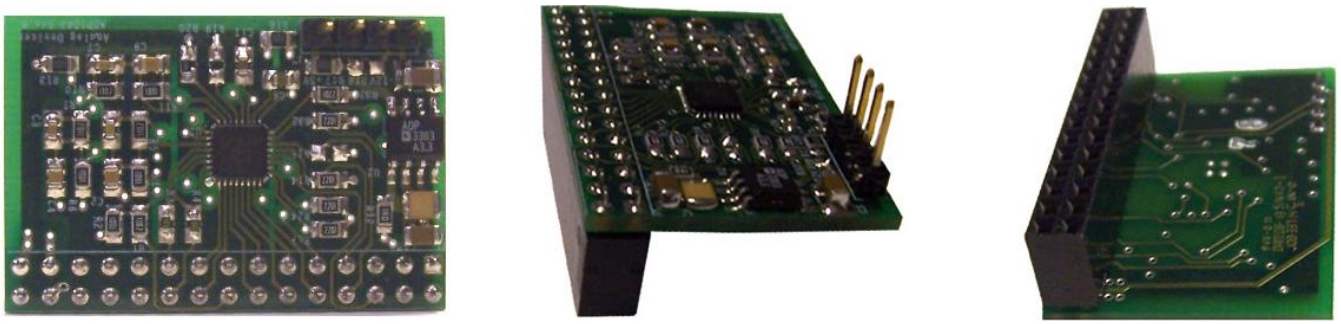

Figure 1 - Daughter card with pin outs of ADP1043A

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REVISION HISTORY

09/15/2010 - Revision 1.0: SPM
09/21/2010 - Revision 2.0: SPM with MS feedback
10/04/2010 - Revision 3.0: MS feedback implemented

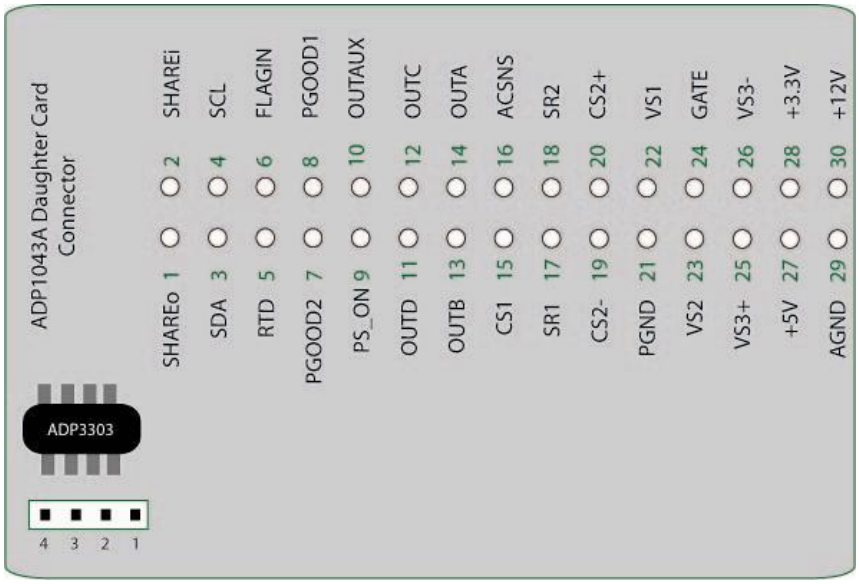

Figure 2 - Simplified Block Diagram

EVALUATION BOARD HARDWARE

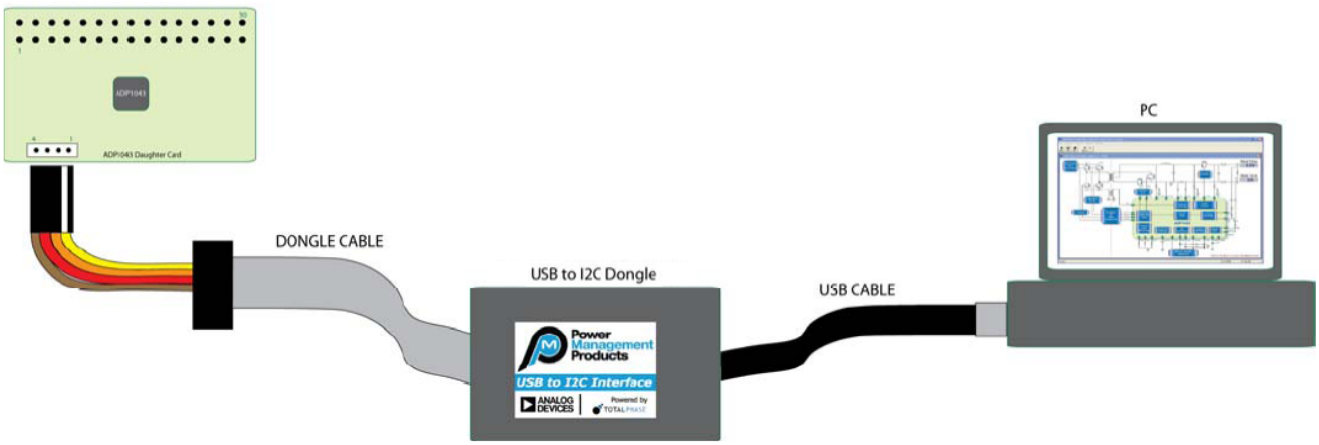

Figure 3 - Connection diagram of daughter card to PC via I2C interface (USB dongle)

CONNECTORS

The pin outs of the USB dongle are given below:

Pin	Evaluation Board Function
1	5V
2	SCL
3	SDA
4	Ground

Table 1 - I2C connector pin out descriptions

Figure 4 – I2C connector (pin1 on left)

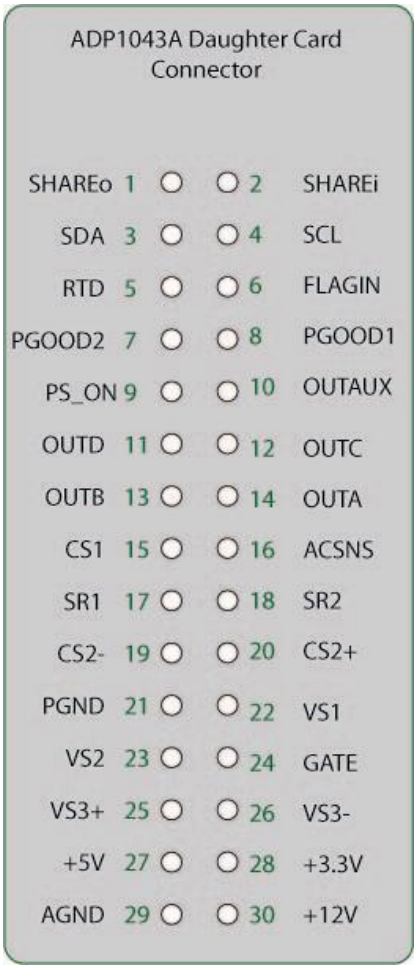

Figure 5 - Detailed description of pin outs

REFURNISHING AND EXISTING DESIGN WITH ADP1043A DAUGHTER CARD

To evaluate the IC with an existing power supply, a jumper cable can be used. Figure 6 and Figure 7 demonstrate how a jumper cable is connected on one end to the daughter card and the other end to the respective function of the pin on the power supply.

Care must be taken to ensure that the traces/wires that are connected at their respective sensing points are short and are not routed through any high frequency traces (switching nodes) of the power stage that would result in poor signal integrity due to noise injection or EMI. A spread of wires must definitely be avoided as this increases the probability of injected noise due to bigger loop areas and common impedance coupling between the power ground and the analog and digital grounds.

Note: The ADP1043A provides control and logic signals for the power switches. External drivers need to be used to turn on/off the switches in the power stage of the design.

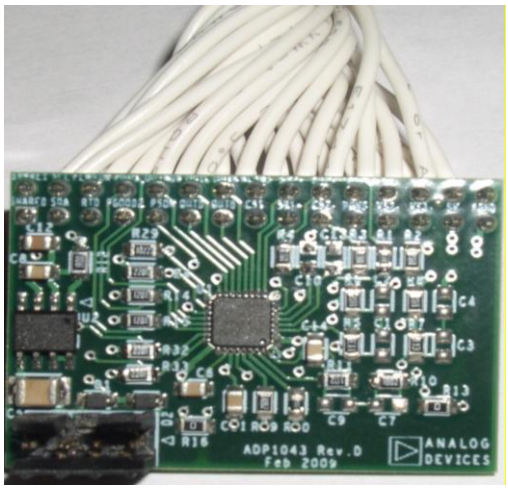

Figure 6 – Daughter card connection

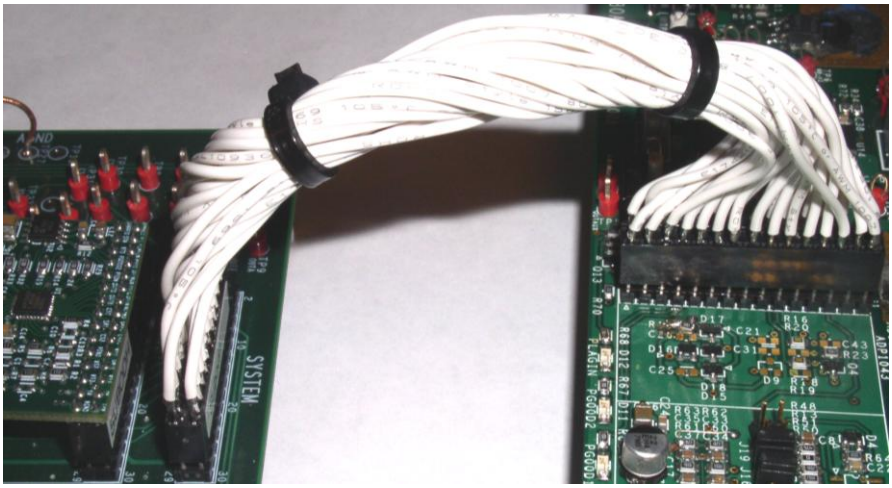

Figure 7 – Example of a retrofitted system with daughter card on left and power stage on the right.

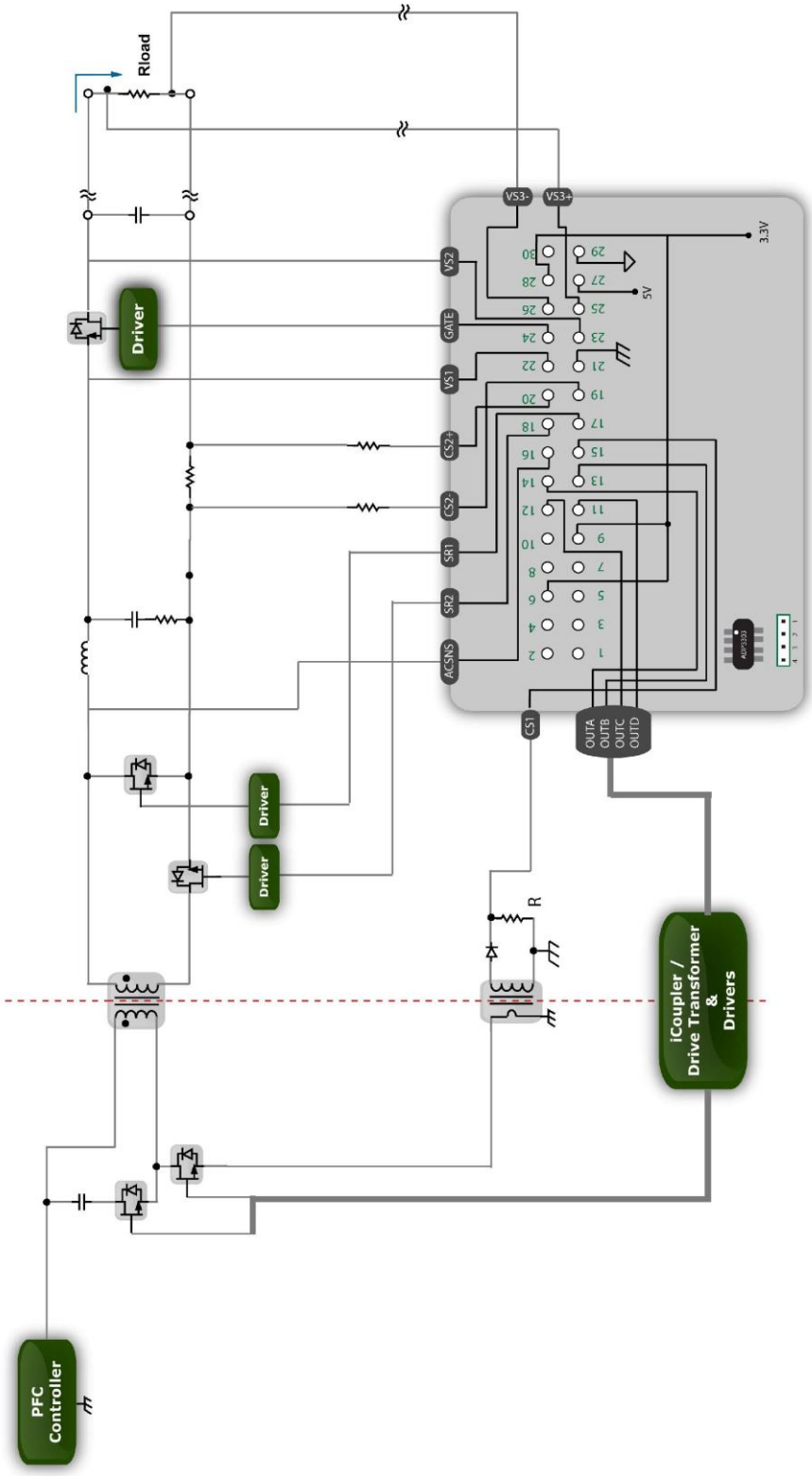

Figure 8 - Block diagram of power stage and interconnection with daughter card

ADDITIONAL KEY POINTS AND CHECKLIST:

1. The daughter card is powered using the USB cable. The 3.3V LDO present on the PCB converts the 5V to 3.3V which supplies power to the ADP1043A. Alternately an isolated power supply 5V or 12V (referenced to AGND) may be used and connected to pins on the daughter card. The I2C connecter also has the SDA and SCL pins which are used for serial communication to the ADP1043A using the software GUI.

2. The RTD pin is referenced to AGND and the thermistor must be ideally placed close to the hottest part of the power stage for monitoring over temperature. Leave open if not used.

3. Connect the FLAGIN pin to 3.3V if this function is not required or set the flag to ignore in the Flags and Settings window in the GUI.

4. Connect PS_ON to 3.3V using a switch or permanently connected to 3.3V. If permanently connected then the power supply can be turned on using software PS_ON in the GUI.

5. OUTA, OUTB, OUTC, OUTD, and OUTAUX, are the PWMs used for the primary power switches while SR1 and SR2 are the PWMs used for the secondary side synchronous rectifiers.

6. The ACSNS flag is set when the ACSNS pin reads a value less than 0.45V. The flag is configurable.

7. CS2+ and CS2- (differential input) must be connected across the current sense resistor. Care must be taken not to exceed 150mV as it exceeds the maximum range of the ADC.

8. The voltage dividers for sensing the output voltage (VS1, VS2, and VS3) are on the daughter card. VS1 and VS2 are referenced to PGND whereas VS3+ and VS3- are differential inputs. VS3- must be connected to PGND. The voltage divider must be configured to provide 1V at the divider at the nominal output voltage to provide enough range for trimming. Care must be taken not to exceed 1.55V as it exceeds the maximum range of the ADC.

9. The GATE pin must be left open if the OrFET functionality is not used.

10. The CS1 signal is referenced to PGND. Care must be taken not to exceed 1.55V as it exceeds the maximum range of the ADC. The CS1 fast OCP comparator is set to trip at 1.2V. When using a current sense transformer the resistor R (*see Figure 8) is sized* by the equation: $R = V\_CS1 \times N2 / (N1 \times I_{PRIMARY\_PEAK})$.

11. An external 12V connection can be provided to pin 30 of the daughter card to provide power for the switch drivers.

SCHEMATIC

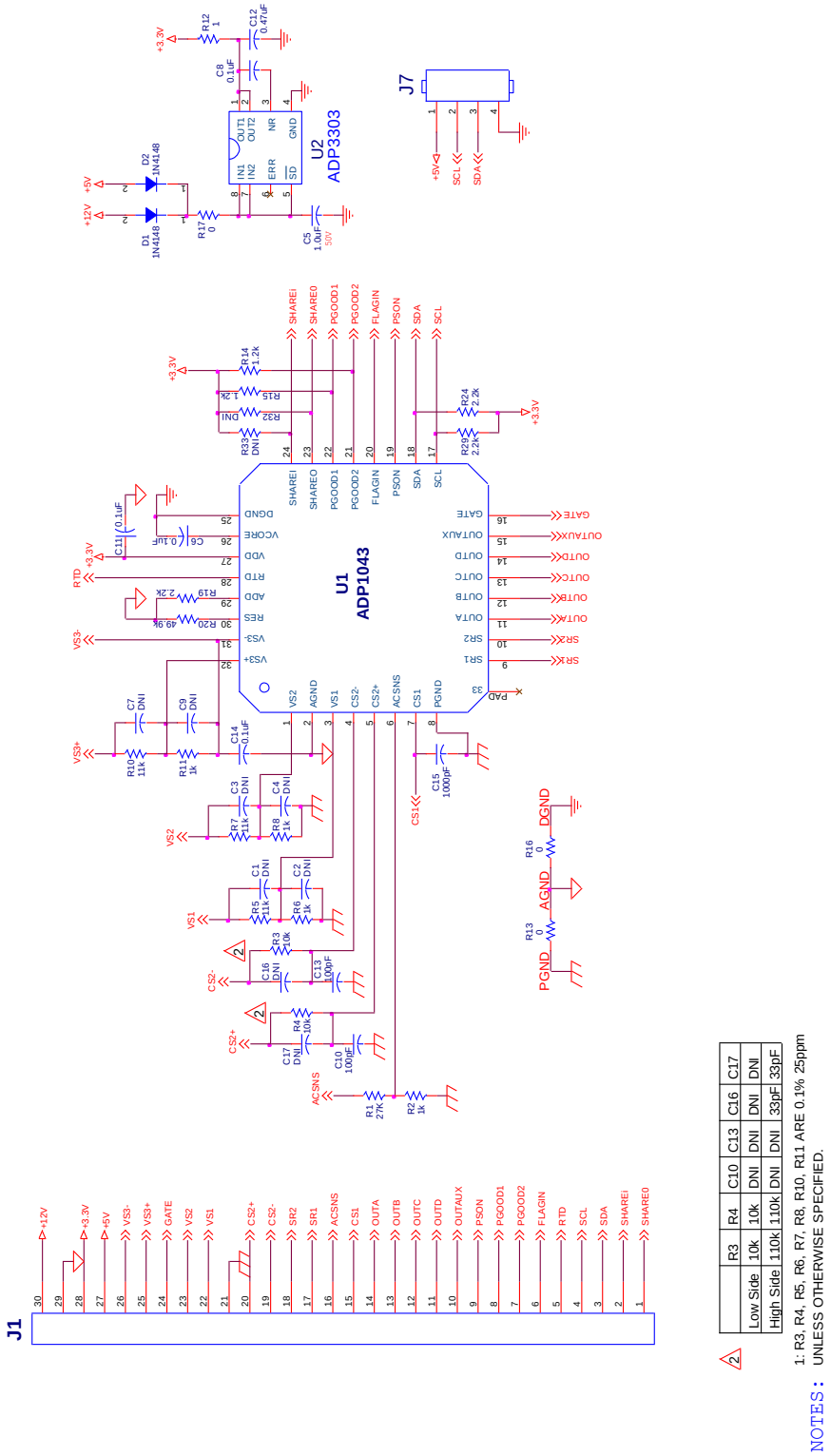

Figure 9 – Daughter card schematic

LAYOUT

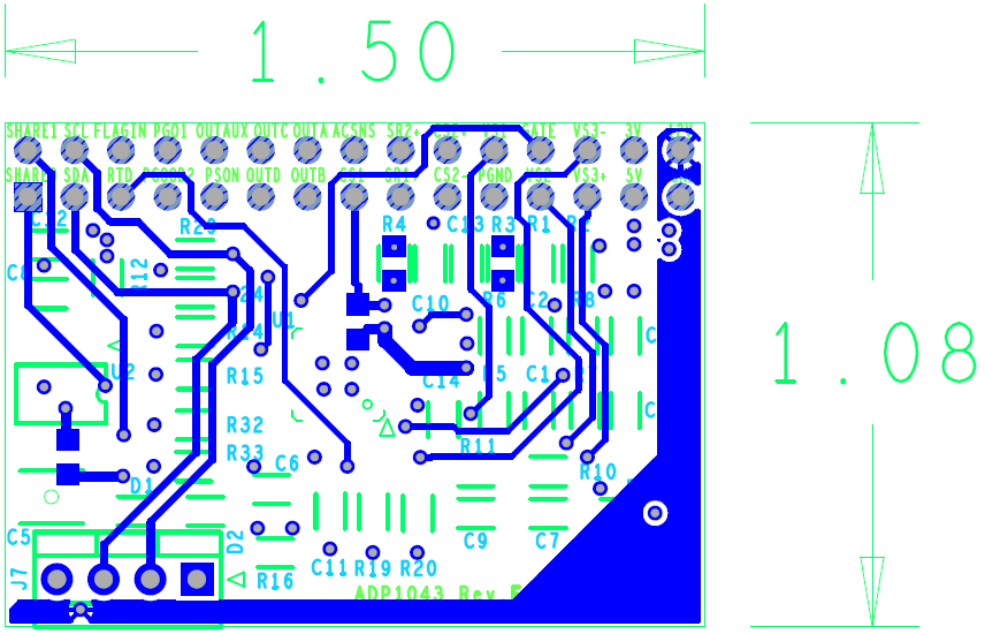

Figure 10 - Bottom Layer, dimensions in inches

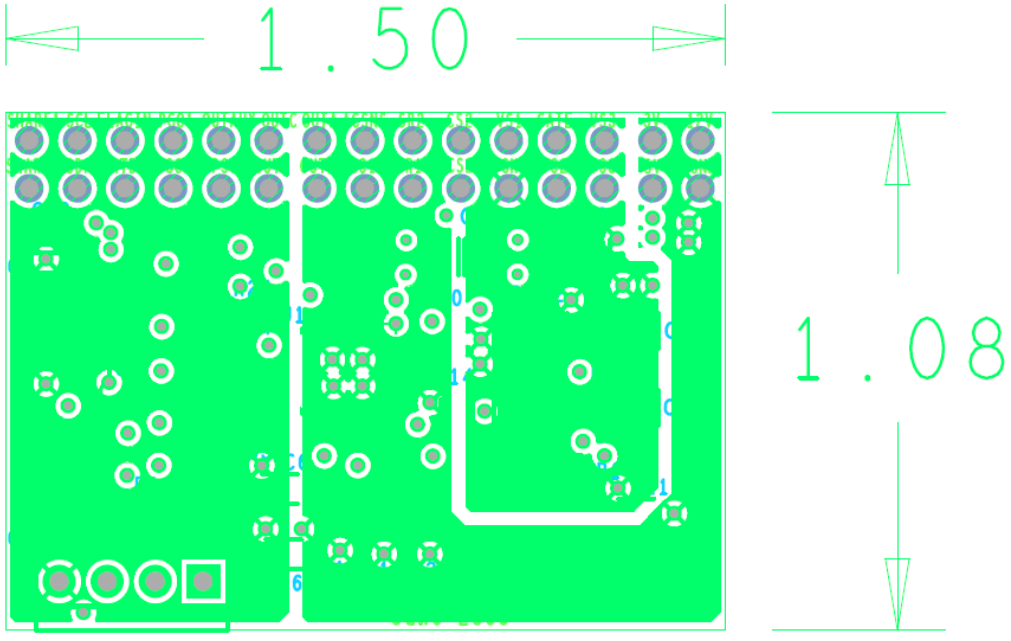

Figure 11 - GND Layer, dimensions in inches

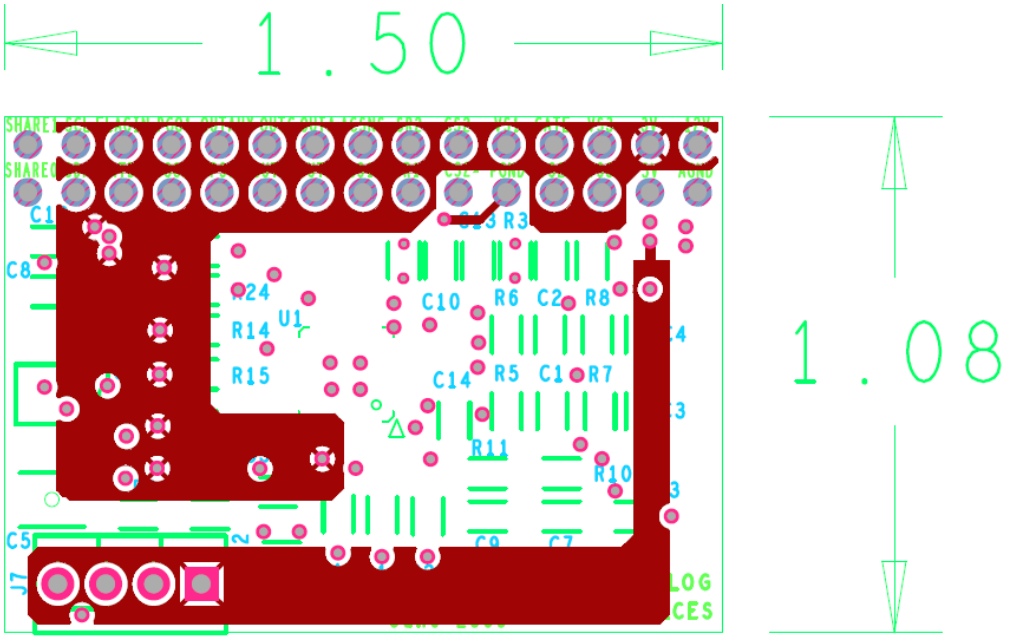

Figure 12 - Power Layer, dimensions in inches

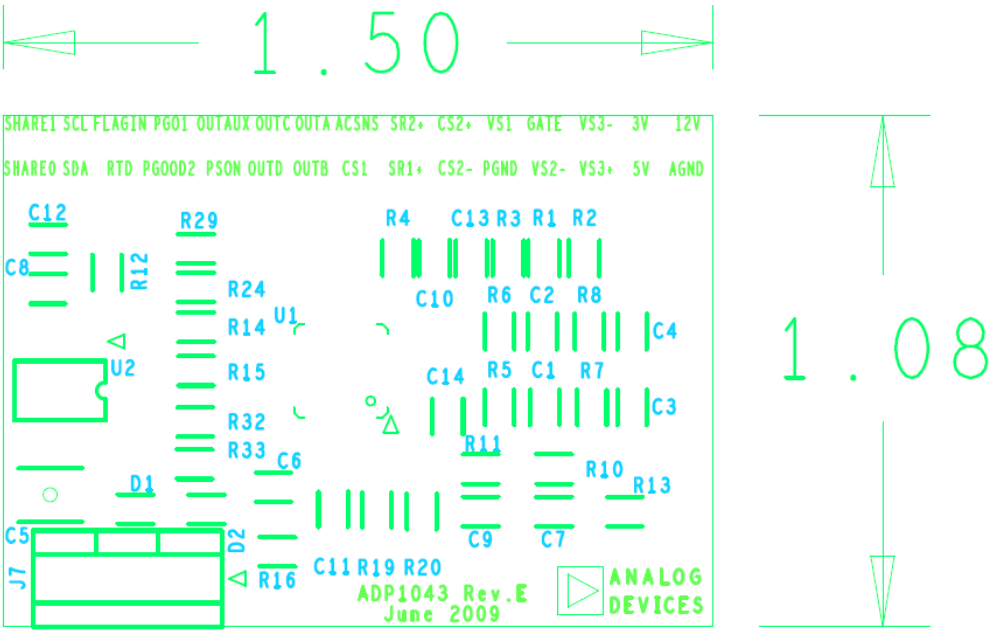

Figure 13 - Figure 53 - Silkscreen Layer, dimensions in inches

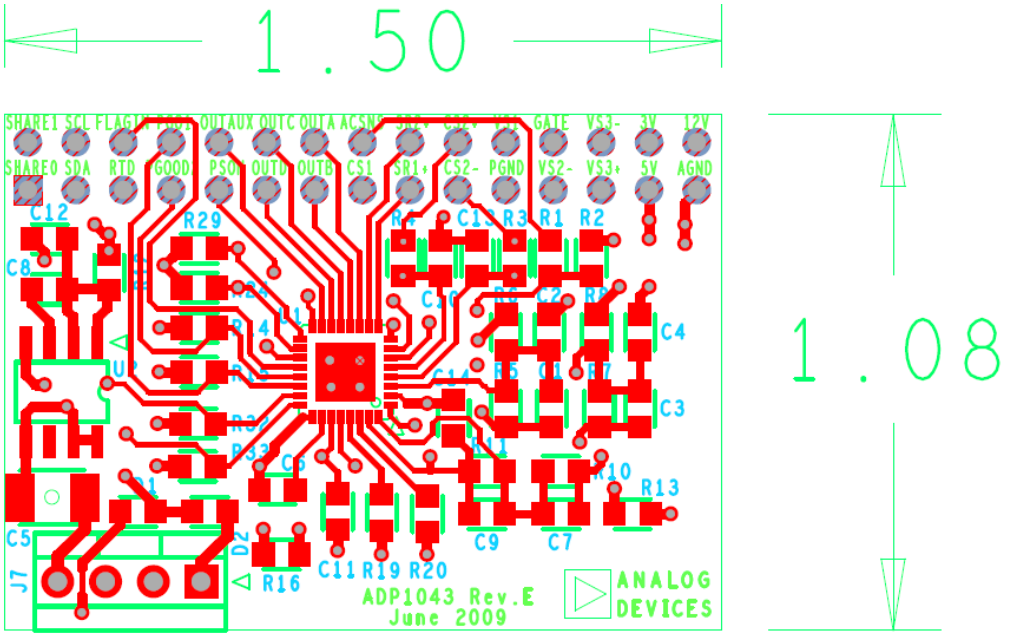

Figure 14 - Figure 54 - Figure 53 - Top Layer, dimensions in inches

BILL OF MATERIALS

Item	Part Ref	Part Description	Package	Manufacturer	Mfg Part No
1	C1	DNI		Murata	GRM32RR71H105KA01L
2	C2	DNI			
3	C3	DNI			
4	C4	DNI			
5	C5	CAPACITOR CERAMIC 1.0UF 50V 10% X7R	1210	Murata	GRM32RR71H105KA01L
6	C6	CAPACITOR CERAMIC 0.1UF 10% 50V X7R	805	AVX	08055C104KAT2A
7	C7	DNI			
8	C8	CAPACITOR CERAMIC 0.1UF 10% 50V X7R	805	AVX	08055C104KAT2A
9	C9	DNI			
10	C10	DNI			
11	C11	CAPACITOR CERAMIC 0.1UF 10% 50V X7R	805	AVX	08055C104KAT2A
12	C12	CAPACITOR CERAMIC 0.47UF 5% 17V X7R	805	AVX	0805YC474JAT2A
13	C13	DNI			
14	C14	CAPACITOR CERAMIC 0.01UF 10% 100V X7R	805	AVX	08051C103KAT2A
15	C15	CAPACITOR CERAMIC 1000pF 10% 100V X7R	603	Murata	GRM188R72A102KA01D
16	J1	CONNETOR HEADER FEMALE 30PS .1" DL TIN	Fmal Socket	Sullins Connector Solutions	PPTC152LFBN-RC
17	J7	CONNECTOR HEADER 4POS SGL PCB 30 GOLD	Header-4POS	FCI	69167-104HLF
18	R1	RESISTOR 27.0K OHM 1/8W 1% SMD	805	Any	
19	R2	RESISTOR 1.00K OHM 1/8W 1% SMD	805	Any	
20	R3	RESISTOR 10.0K OHM 1/10W .1% +/-25ppm SMD	805	Any	
21	R4	RESISTOR 10.0K OHM 1/10W .1% +/-25ppm SMD	805	Any	
22	R5	RESISTOR 11.0K OHM 1/10W .1% +/-25ppm SMD	805	Any	
23	R6	RESISTOR 1.00K OHM 1/10W .1% +/-25ppm SMD	805	Any	
24	R7	RESISTOR 11.0K OHM 1/10W .1% +/-25ppm SMD	805	Any	
25	R8	RESISTOR 1.00K OHM 1/10W .1% +/-25ppm SMD	805	Any	
26	R10	RESISTOR 11.0K OHM 1/10W .1% +/-25ppm SMD	805	Any	
27	R11	RESISTOR 1.00K OHM 1/10W .1% +/-25ppm SMD	805	Any	
28	R12	RESISTOR 0.0 OHM 1/8W 5% SMD	805	Any	
29	R13	RESISTOR 0.0 OHM 1/8W 5% SMD	805	Any	
30	R14	RESISTOR 1.00K OHM 1/8W 1% SMD	805	Any	
31	R15	RESISTOR 1.00K OHM 1/8W 1% SMD	805	Any	
32	R16	RESISTOR 0.0 OHM 1/8W 5% SMD	805	Any	
33	R17	RESISTOR 0.0 OHM 1/8W 5% SMD	805	Any	
34	R18	DNI			
35	R19	RESISTOR 10.0K OHM 1/8W 1% SMD	805	Any	
36	R20	RESISTOR 49.9K OHM 1/8W 1% SMD	805	Any	
37	R24	RESISTOR 2.20K OHM 1/8W 1% SMD	805	Any	
38	R29	RESISTOR 2.20K OHM 1/8W 1% SMD	805	Any	
39	R32	DNI			
40	R33	DNI			
41	U1	I.C. Secondary Side Power Supply Controller	LFCSP-32	ADP1043A	Analog Devices
42	U2	I.C. LDO LINEAR REGULATOR 200MA 3.3V	SOIC-8	ADP3303	Analog Devices

Table 2 - Bill of Materials

NOTES