

Evaluation Board for CS4811

Features

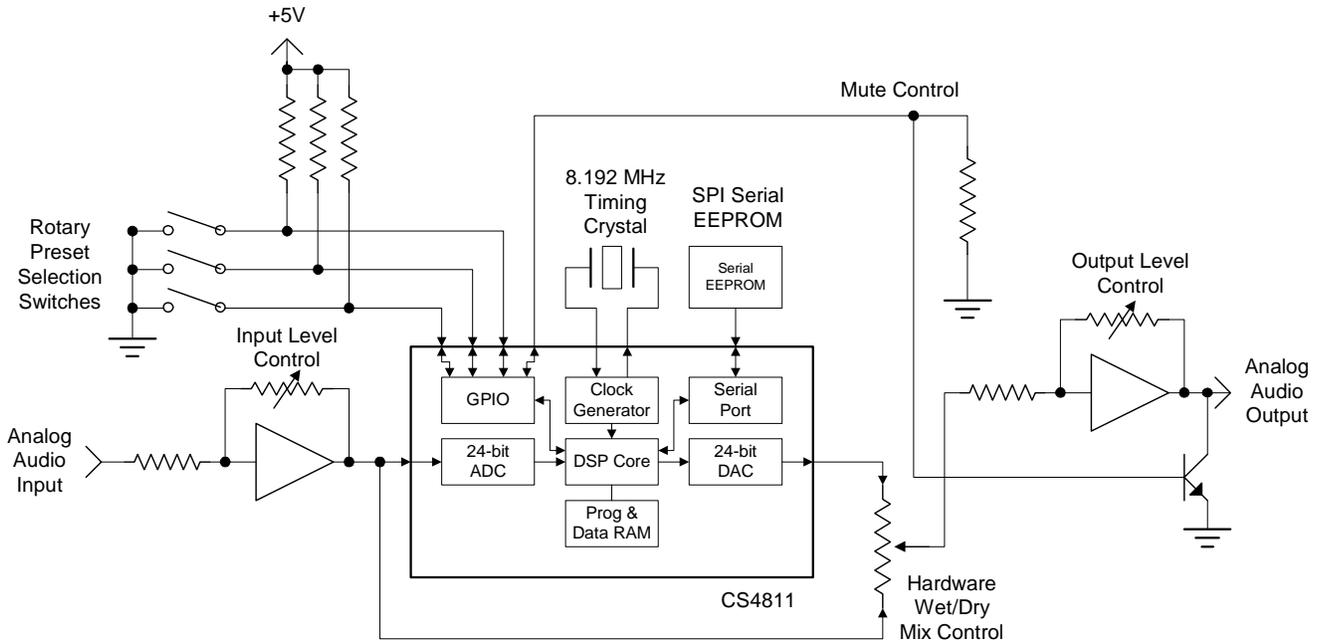
- Evaluation Platform for the CS4811 Fixed Function Multi-Effects Processor
- Stand-Alone Operation, DSP Boots from Serial EEPROM
- Selection of Up to 8 Different Presets
- On-Board Hardware Wet/Dry Mix Control
- User Adjustable Input and Output Level

Description

The CDB4811 is a stand-alone demonstration platform for the CS4811 multi-effects processor system-on-a-chip. The board is designed to showcase musical effects processing applications including spring reverb, digital reverb, delay, chorus, flange, and tremolo effects. There are different versions of the CDB4811 board, each with DSP code optimized for specific applications. Contact your local Cirrus Logic sales representative to find out about the latest versions offered.

ORDERING INFORMATION

CDB4811GTR	Guitar Effects Evaluation Kit
CDB4811MXR	Mixer Effects Evaluation Kit



Preliminary Product Information

This document contains information for a new product. Cirrus Logic reserves the right to modify this product without notice.

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Contacting Cirrus Logic Support

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1. CDB4811 SYSTEM OVERVIEW

The CDB4811 is a complete, stand-alone digital signal processing (DSP) system based on the CS4811 fixed function multi-effects audio processor. The CS4811 contains an on-chip analog-to-digital converter (ADC), digital to-analog-converter (DAC), and proprietary 24-bit audio processing core with a large amount of on-chip RAM. The CS4811's functionality (changing effects) is controlled during runtime by a rotary DIP switch, allowing up to 8 different presets to be selected. A hardware mix control allows the ratio of processed vs. input signal to be adjusted. The user can also set the level of the analog input and output to optimize the interface with external audio equipment.

2. CS4811 AUDIO PROCESSOR

The processor is capable of self-loading its program from an external serial EEPROM memory at power-up through the control port. In this application the control port uses SPI format. Since the CS4811 is RAM based, it can be configured for different signal processing applications by storing a different Crystal supplied application code module into the external memory.

3. ANALOG INPUT

The analog input to the on-chip ADC (J1) is single ended, with an adjustable voltage gain of -60 to +34 dB. Adjusting the 12-turn INPUT ATTEN potentiometer clockwise will increase the input gain. For best signal-to-noise performance the input gain should be increased until just before audible clipping is encountered with a maximum level input signal. Substantial input clipping is indicated when LED D3 is lit (CLIP). The full scale input of the ADC (driven single ended) is 1.77V RMS (5 V p-p). The ADC input signal is anti-aliased with a passive filter, $F_c = 480$ kHz, as shown in the schematic diagram of Figure 1. The ADC input is protected against overvoltage by diodes D1 and D2.

4. ANALOG OUTPUT

The processed output signal is mixed with the amplified input signal with potentiometer VR3 (MIX). Turning MIX clockwise increases the amount of the processed (wet) signal that appears at the output. The mixed output is then buffered with an output stage that has a variable gain of -60 to +6 dB adjusted via 12-turn potentiometer VR2 (GAIN TRIM). Turning GAIN TRIM clockwise increases the output gain. The best signal-to-noise ratio is obtained when the full scale output of the CDB4811 matches the full scale (non-clipped) amplitude capabilities of the downstream circuitry (ideally 5 V p-p or 1.77 V RMS). The signal-to-noise ratio will decrease when the gain of the output buffer is greater than one.

The differential analog output from the CS4811 DAC is buffered with a 2-pole active butterworth filter U2A, $F_c = 16$ kHz, $A_v = 0.83$ V/V. The purpose of the filter is to convert the output to single ended prior to mixing, attenuate out-of-band noise generated by the DAC, and limit the signal swing to 5 V p-p.

Q3 acts as a shunt to attenuate any loud pops that may occur during power up/down. Q3 is controlled by a digital output pin on the CS4811 that is asserted at power-up and de-asserted after the DSP has booted.

5. CONTROL

Rotary DIP switch S1 is used to control various aspects of the CS4811 code functionality such as selecting different musical effects presets. Moving a switch to the ON position sets that bit position to zero (low). Header JP2, FOOTSWITCH, is provided to connect an external switch to the system. The header is connected in parallel with S1 switch 3. A 10 k pull-up is attached to the round pad of the FOOTSWITCH header, the other pad is connected to ground. To use the FOOTSWITCH input, connect an external SPST switch between the two ter-

minals of JP2, and place S1 switch 3 to the OFF position.

Please see the CS4811 firmware code application documents for details of any specific functions which may be assigned to the S1 DIP switch. If S1 functionality is not discussed in the application document then it is not supported.

6. POWER SUPPLY

Power is attached to the board through a 2.5 mm power connector J3, positive is the center contact. An unregulated 9 VDC, 0.5 A wall transformer is supplied with the board.

An on-board voltage regulator supplies 200 mA@5 V to the system from an 8 to 12 VDC input. An external power resistor can be used to limit the input voltage to the board in applications where a 12 V supply is not available. In applications where 5 V is available, the regulator can be removed and a shorting jumper installed at R27. If this modification is done, care must then be taken not to plug the 9 VDC transformer into the board or the CS4811 may be damaged.

7. LAYOUT

The reference filter capacitor C9 must be kept as close as practical to the device, the CMFILT+ signal trace (pin 93) and CMFILT- ground return trace (pin 94) should be on the top side of the board and as short as possible. Keep other traces away from this node, as any noise coupled into the CMFILT+ pin will appear at the DAC outputs with little or no attenuation. If the board environment is noisy, a 0.1 uf capacitor should be added in parallel with C9 to help eliminate noise coupling.

Mount the 0.047 uf surface mount power supply decoupling capacitors as close to the device as possible. Again, keep the traces to these capacitors and the device supply pins and ground pins on the top side of the board and as short as practical.

The anti-aliasing filter capacitor C2 should be mounted as close to the device as practical. The AC shorting capacitor C4 should also be close to the device. All digital traces should be kept away from the analog input and output sections of the board.

A ground fill is used on both top and bottom layers to minimize noise coupling and ground trace impedance. Separate analog and digital grounds are not needed and should not be used. The PCB layout for the board appears in Figures 3, 4, and 5.

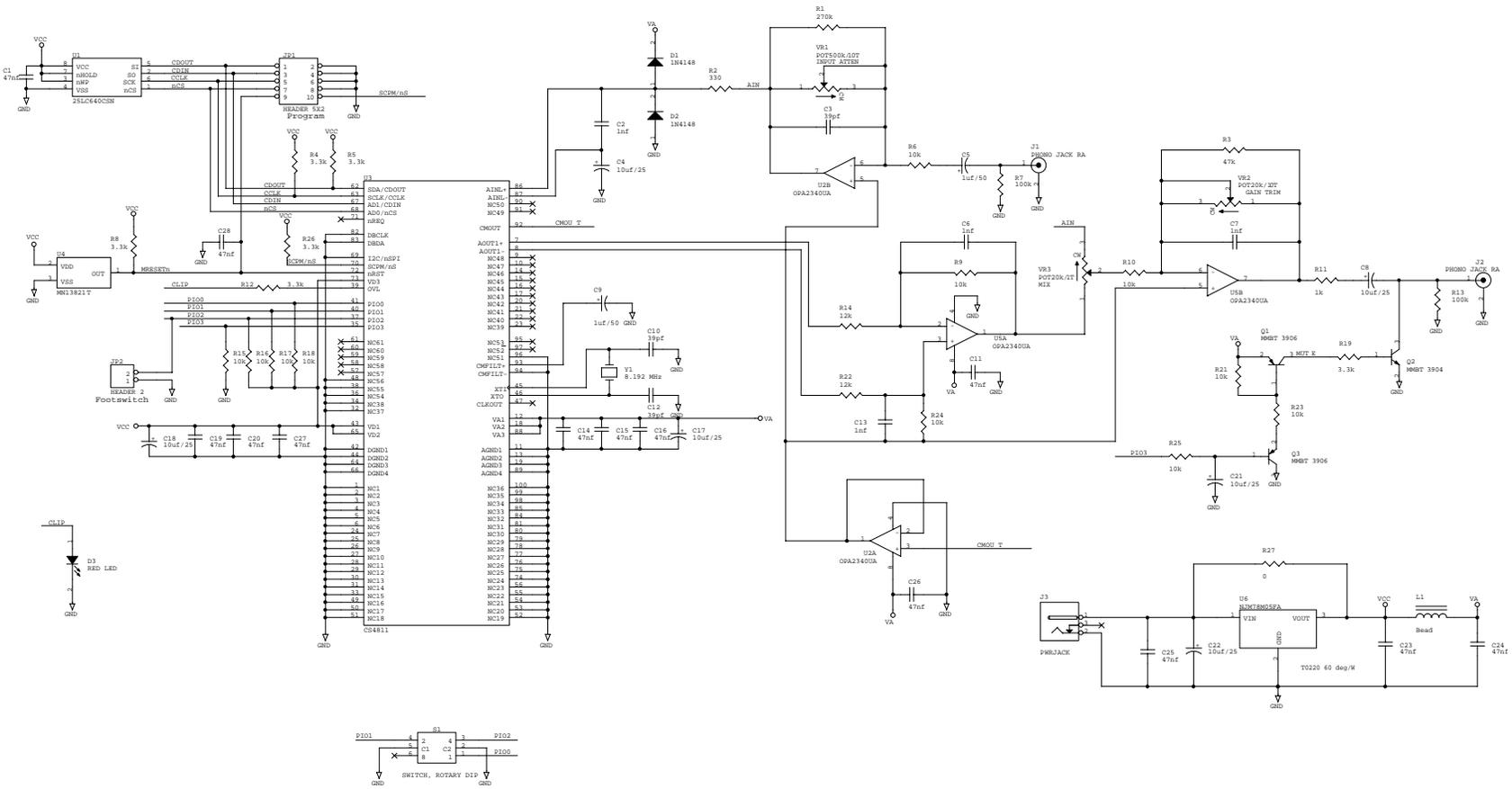


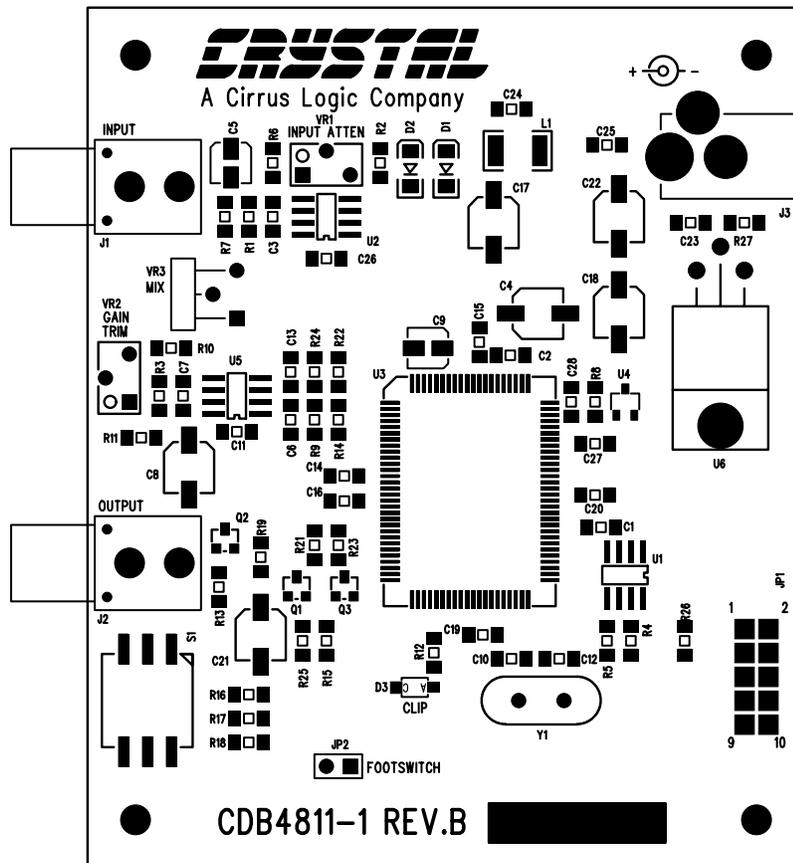
Figure 1. Schematic Diagram



CS4811 REVERB DEMO Revised: Tuesday, May 10, 2000								
CDB4811 Revision: B								
Cirrus Logic								
4210 S. Industrial Dr.								
Austin, TX 78744								
Bill Of Materials May 10,2000 11:27:21								
Item	Quantity	Reference	Value	Mfg	Mfg Part Number	Description	Footprint	Notes
1	13	C1,C11,C14,C15,C16,C19,C20,C23,C24,C25,C26,C27,C28	47nf	PANASONIC	ECU-V1H473KBW	CAP, CERAMIC, 47NF, 50V, 10%, X7R, 1206	CSN_1206	NO POP C27
2	4	C2,C6,C7,C13	1nf	PANASONIC	ECU-V1H102JCH	CAP, CERAMIC, 1NF, 100V, 5%, NPO, 1206	CSN_1206	
3	3	C3,C10,C12	39pf	PANASONIC	ECU-V1H390JCM	CAP, CERAMIC, 39PF, 100V, 5%, NPO, 1206	CSN_1206	
4	6	C4,C8,C17,C18,C21,C22	10uf/25	PANASONIC	ECE-V1EA100SR	CAP, ELECT, 10UF, 25V, 10%, AL, SM	CSP_ELEC_208SQ	
5	2	C9,C5	1uf/50	PANASONIC	ECE-V1HA010SR	CAP, ELECT, 1UF, 50V, 10%, AL, SM	CSP_ELEC_170SQ	
6	2	D1,D2	1N4148	VISHAY	LL4148DIC	DIODE, HS SWITCHING, MELF, SOD-80	SOD-80	
7	1	D3	RED LED	CHICAGO MIN	CMD28-21SRC/TR8/T1	DIODE, LED, RED, 1MA, SM	LED_CMD28-21	
8	1	JP1	HEADER 5X2	NA	NA	HEADER, MALE, 5X2SM	HDR5X2SM	NO POP
9	1	JP2	HEADER 2	NA	NA	HEADER, 2 PIN, 0.1 IN CENTER	HDR2X1	NO POP
10	2	J1,J2	PHONO JACK RA	A/D ELECT	ARJ2018	PHONO JACK, RA, GOLD	CON_RCA_RA	
11	1	J3	PWRJACK	CUI STACK	PJ202A	JACK, POWER, PWB, SM	CON_PJ-202A	
12	1	L1	Bead	PANASONIC	EXC-ML45A910U	FERRITE BEAD, 1812	IND_1812	
13	2	Q3,Q1	MMBT3906	MOTOROLA	MMBT3906LT1	BJT, PNP, GENERAL PURPOSE, SOT23	SOT23	
14	1	Q2	MMBT3904	MOTOROLA	MMBT3904LT1	BJT, NPN, GENERAL PURPOSE, SOT23	SOT23	
15	1	R1	270k	PANASONIC	ERJ-8GEYJ274	RES, THICK FILM, 270K, 1/8W, 5%, 1206	RES_1206	NO POP
16	1	R2	330	PANASONIC	ERJ-8GEYJ331	RES, THICK FILM, 330, 1/8W, 5%, 1206	RES_1206	
17	1	R3	47k	PANASONIC	ERJ-8GEYJ473	RES, THICK FILM, 47K, 1/8W, 5%, 1206	RES_1206	
18	6	R4,R5,R8,R12,R19,R26	3.3k	PANASONIC	ERJ-8GEYJ332	RES, THICK FILM, 3.3K, 1/8W, 5%, 1206	RES_1206	
19	11	R6,R9,R10,R15,R16,R17,R18,R21,R23,R24,R25	10k	PANASONIC	ERJ-8GEYJ103	RES, THICK FILM, 10K, 1/8W, 5%, 1206	RES_1206	
20	2	R13,R7	100k	PANASONIC	ERJ-8GEYJ104	RES, THICK FILM, 100K, 1/8W, 5%, 1206	RES_1206	
21	1	R11	1k	PANASONIC	ERJ-8GEYJ102	RES, THICK FILM, 1K, 1/8W, 5%, 1206	RES_1206	
22	2	R14,R22	12k	PANASONIC	ERJ-8GEYJ123	RES, THICK FILM, 12K, 1/8W, 5%, 1206	RES_1206	
23	1	R27	0	PANASONIC	ERJ-8GEYJ000	RES, THICK FILM, 0, 1/8W, 5%, 1206	RES_1206	NO POP
24	1	S1	SWITCH, ROTARY D	GRAYHILL	94HA08W	SWITCH, DIP, ROTARY, OCTAL, SM	SW-DIPROT4_SM	
25	1	U1	25LC640CSN	MICROCHIP	25LC640CSN	IC, EEPROM, SERIAL, SPI, 64KBIT, SO8	SO8-150	
26	2	U5,U2	OPA2340UA	BURRBROWN	OPA2340UA	IC, OPAMP, DUAL, SO8	SO8-150	
27	1	U3	CS4811	CRYSTAL	CS4811CM	DSP/CODEC, MONO, 100MQFP	QFP100_14X20	
28	1	U4	MN13821T	PANASONIC	MN13821T	IC, VOLTAGE DETECTOR, OD, 4.4-4.7V, SC59A	SC59A	
29	1	U6	NJM78M05FA	NJR	NJ78M05FA	IC, VOLTAGE REGULATOR, TO220	TO-220AB	
30	1	VR1	POT500k/10T	BOURNS	3266W-504	POTENTIOMETER, 500K, LIN, 10TURN, TOPADJ, TH	POT-BRNS-3266W	
31	1	VR2	POT20k/10T	BOURNS	3266W-203	POTENTIOMETER, 20K, LIN, 10TURN, TOPADJ, TH	POT-BRNS-3266W	
32	1	VR3	POT20k/1T	BOURNS	3352H-203	POTENTIOMETER, 20K, LIN, 1TURN, TOPADJ, TH	POT-BRNS-3352H	
33	1	Y1	8.192MHz	VISHAY	XT49S-20 8.192M	CRYSTAL, PARALLEL CUT, 8.192MHZ, 20PF, HC49	TL_HC49S	
100	1			CUI STACK	DPD090050-P-5	Wall Transformer, 9VDC, 500mA, unregulated,	2.1mm fem	
101	4			Keystone	4801K-ND	Hex threaded standoff, Nylon, 4-40 x 0.375"		
102	4			Building Fast	4644-ND	machine screw, pan head, Nylon, 4-40 x 0.375"		
103	1	S1		Grayhill	947706-005	knob, gray with black arrow		INSTALL ON S1

Figure 2. Bill of Materials

CRYSTAL SEMICONDUCTOR CORPORATION
CDB4811-1 REV.B



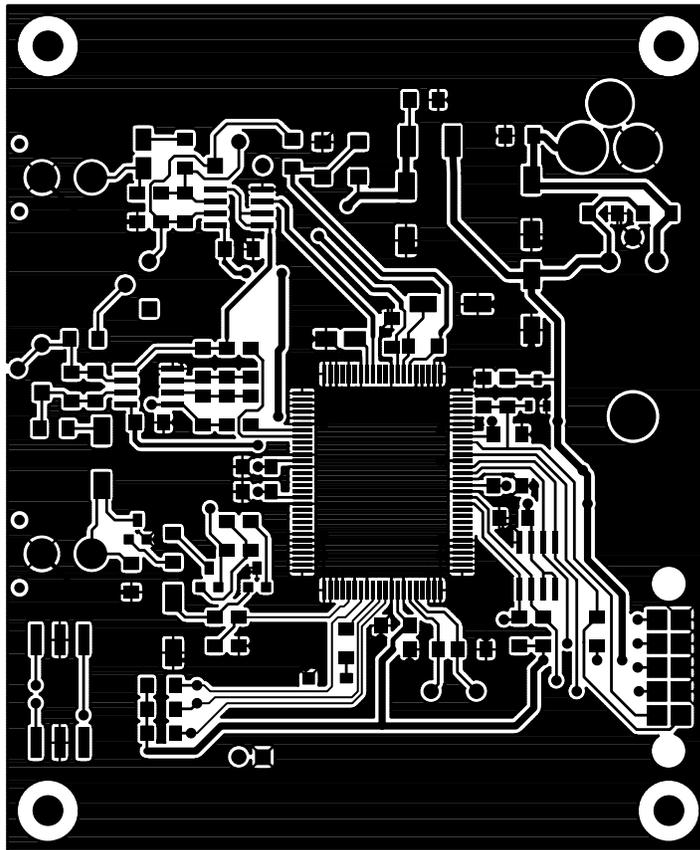
TOP SIDE

SILKSCREEN TOP

ASSEMBLY DRAWING TOP

Figure 3. Silkscreen and Pads

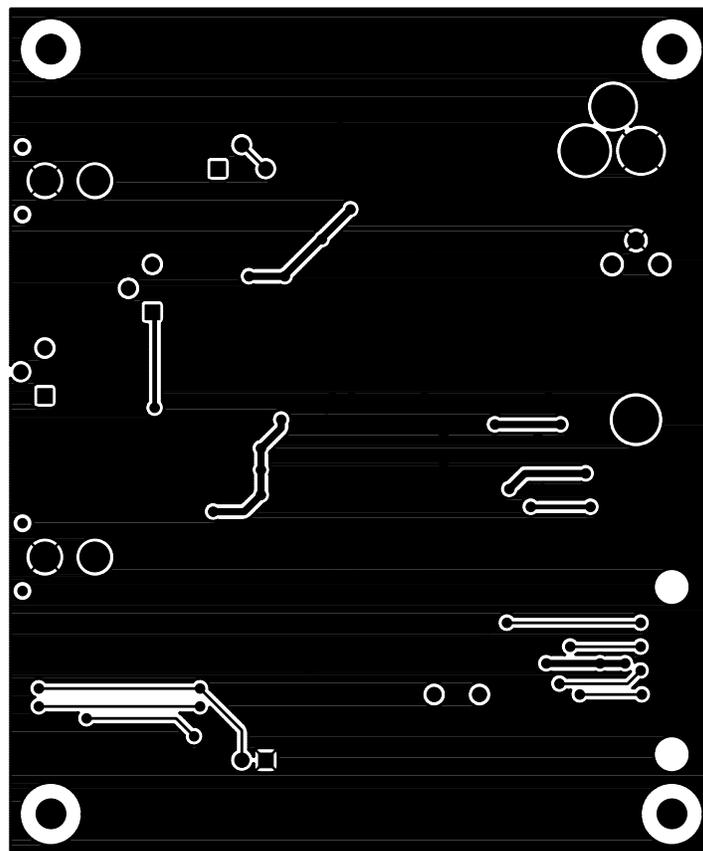
CRYSTAL SEMICONDUCTOR CORPORATION
CDB4811-1 REV.B



TOP SIDE

Figure 4. Top Layer

CRYSTAL SEMICONDUCTOR CORPORATION
CDB4811-1 REV.B



BOTTOM SIDE

Figure 5. Bottom Layer

SMART
Analog™