

## Class-T Digital Audio Amplifier Evaluation Board using Digital Power Processing™ Technology **EB-TA1101B**

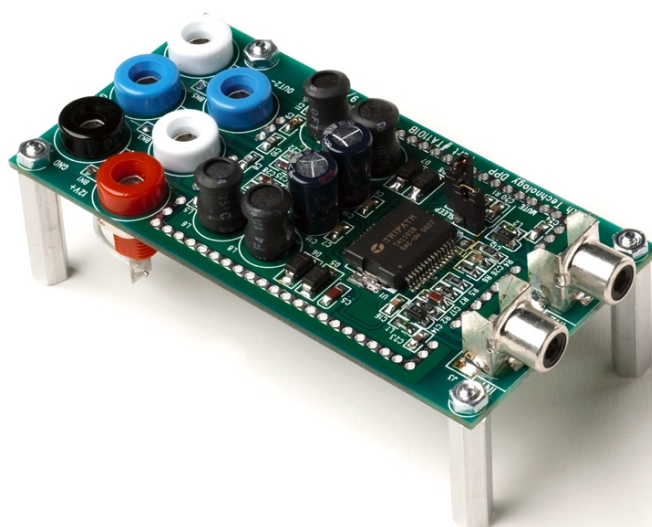
February 2001, for Board Rev E

### General Description

The EB-TA1101B evaluation board is based on the TA1101B, digital audio power amplifier from Tripath Technology. The board is designed to provide a simple and straightforward environment for the evaluation of the Tripath TA1101B. The board can be connected to a +12V supply using cables with banana connectors. Audio inputs are standard RCA jacks. The TA1101B provides amplification for two channels of audio. Signal outputs are on four banana connectors to which any 4Ω or 8Ω passive speaker may be connected.

### Features

- Class-T architecture
- Proprietary Digital Power Processing™ Technology
- Requires single +12V power source
- Output Power (per channel @  $V_S = 12V$ ):
  - 15W - 4Ω @ 10% THD+N
  - 10W - 4Ω @ 0.1% THD+N
- Easy engineering evaluation platform for Tripath Technology's TA1101B product
- "Audiophile performance" typically:
  - 0.04% THD+N, 9Wrms @ 4Ω
  - 0.18% IHF-IM, 1Wrms @ 4Ω
- Efficiency - >85% @ full power ( $R_L = 8Ω$ )
- No heat sink required up to 10W per channel
- Mute input
- Turn-on & turn-off pop suppression
- Intelligent short-circuit protection
- Intelligent over-temperature protection
- Connects to any passive 4/8Ω speakers
- Takes standard audio line output from any sound system
- 2-layer low cost board
- 30-pin Power SOP package



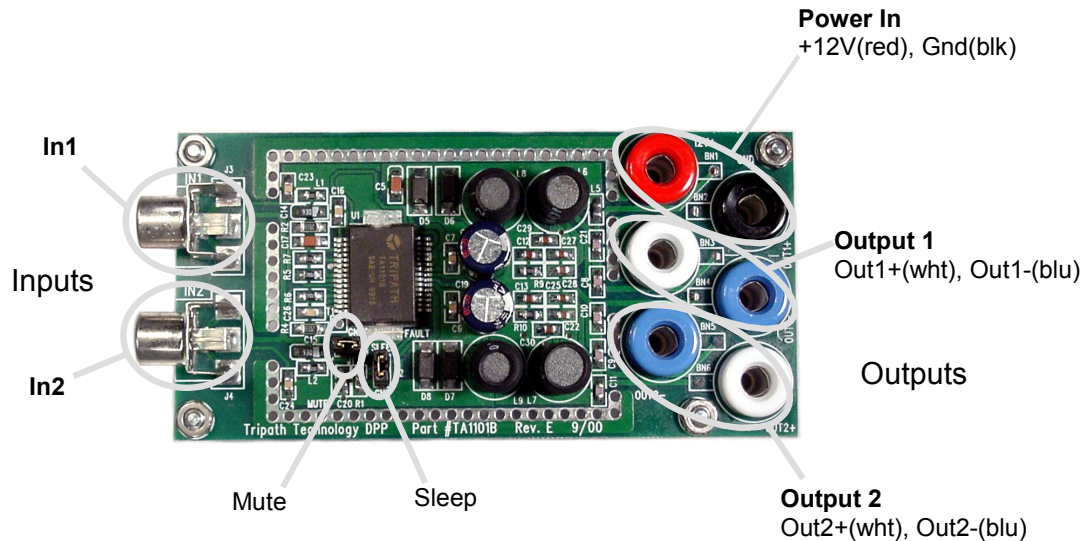
# TECHNICAL INFORMATION

## Introduction

The EB-TA1101B was designed to provide the designer with a simple means of evaluating the performance and functionality of the TA1101B 2x10W amplifier IC from Tripath Technology. The EB-TA1101B is very simple to operate and requires only a few things to get up and running:

- Stereo signal source
- 12V power supply (*not to exceed 13.2V*)
- Two loads (*4-Ohm minimum*)

For more information on the TA1101B, please refer to the TA1101B datasheet ([www.tripath.com](http://www.tripath.com)).



**EB-TA1101B Board**

## Connection and Operation

Figure 1 shows the connections required for proper operation of the EB-TA1101B.

### Input Connection

Audio input to the board is provided via two RCA female connectors.

Connector Name	Channel
IN1	Channel 1 Input
IN2	Channel 2 Input

# TECHNICAL INFORMATION

## Power Connection

The TA1101B requires a +12V power supply (13.2V max) to operate.

Power to the board is provided via the red and black female banana connectors. The positive 12V from the power supply connects to the red banana connector labeled 12V+. The ground connection of power supply attaches to the black banana connector labeled GND.

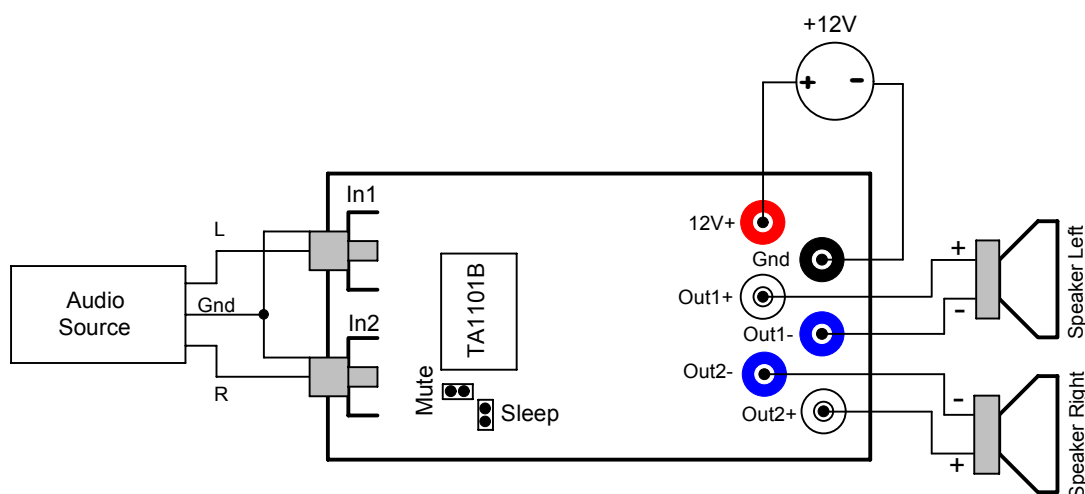


Figure 1

Connector Label	Description	Color
12V+	Positive of the 12V Power supply	Red
GND	Negative (GND) of 12V Power Supply	Black

**Warning:** Do not exceed Maximum Operating Supply Voltage of 13.2V

## Output Connection

There are four female banana connectors on the evaluation board for speaker output. The TA1101B has differential outputs (bridged) so it requires two wires per channel to connect to each speaker.

Connector Label	Description	Color
Out1+	Positive output of Channel 1	White
Out1-	Negative output of Channel 1	Blue
Out2+	Positive output of Channel 2	White
Out2-	Negative output of Channel 2	Blue

# TECHNICAL INFORMATION

## Jumper Settings

There are two jumpers on the EB-TA1101B board, which should both be connected (shorted) for normal operation. Jumper, J1 connects the FAULT output to the MUTE pin, allowing the part to Mute itself when a Fault condition (over-current, etc.) is detected. Jumper, J2 connects the SLEEP pin to GND, effectively disabling SLEEP for normal operation. If J2 is removed, the part will go into SLEEP mode.

Jumper	Purpose
J1	Connects FAULT to MUTE
J2	Connects SLEEP to GND

## Gain Settings

The TA1101B amplifier gain can be adjusted by modifying external resistor values. R2 and R5 are used to set the gain for Channel 1, while R4 and R6 set the gain for Channel 2.

The equation for the gain setting is:

$$A_V = 12 \cdot \left( \frac{R_f}{R_i} \right)$$

Where,

$$\text{For channel 1: } A_{V\_Ch1} = 12 \cdot \left( \frac{R371}{R370} \right) \quad \text{For channel 2: } A_{V\_Ch2} = 12 \cdot \left( \frac{R372}{R373} \right)$$

For a more detailed description, please refer to the TA1101B data sheet.

## Performing Measurements on the EB-TA1101B

The TA1101B operates by generating a high frequency switching signal based on the audio input. This signal is sent through a low-pass filter that recovers an amplified version of the audio input. The frequency of the switching pattern is spread spectrum in nature and typically varies between 100kHz and 1MHz, which is well above the 20Hz – 20kHz audio band. The pattern itself does not alter or distort the audio input signal, but it does introduce some inaudible components.

The measurements of certain performance parameters, particularly noise related specifications such as THD+N, are significantly affected by the design of the low-pass filter used on the output as well as the bandwidth setting of the measurement instrument used. Unless the filter has a very sharp roll-off just beyond the audio band or the bandwidth of the measurement instrument

# TECHNICAL INFORMATION

is limited, some of the inaudible noise components introduced by the TA1101B amplifier switching pattern will degrade the measurement.

One feature of the TA1101B is that it does not require large multi-pole filters to achieve excellent performance in listening tests, usually a more critical factor than performance measurements. Though using a multi-pole filter may remove high-frequency noise and improve THD+N type measurements (when they are made with wide-bandwidth measuring equipment), these same filters degrade frequency response. The EB-TA1101B Evaluation Board has a simple two-pole output filter with excellent performance in listening tests.

(See Application Note 4 for more information on bench testing with Tripath Class-T amplifiers)

## EMI and Shielding

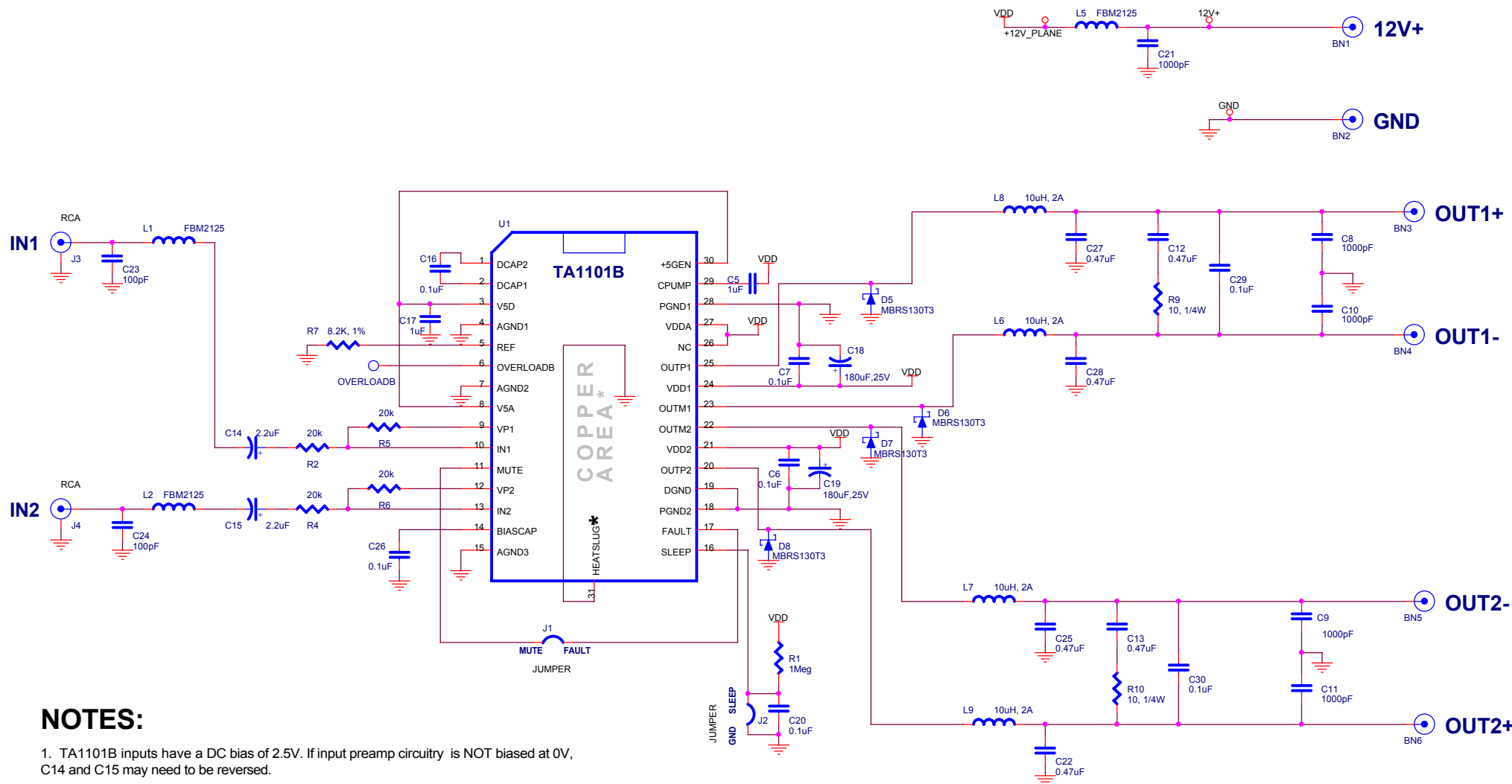
The TA1101B evaluation board has perforated holes around the amplifier and associated circuitry so that an EMI shield can be soldered directly to the board. Due to the spread-spectrum nature of the Class-T amplifier (the energy is spread across a wider spectrum, instead of being concentrated at a single frequency), we have found that specific EMI shielding is typically not necessary for most applications where the amplifier board is mounted inside a chassis. However, a shield perimeter is still provided for use in more sensitive applications.

(See Application Note 11 for more information on EMI)

## Contact Information

For more information on Tripath products, please visit our web site at: [www.tripath.com](http://www.tripath.com)

**TRIPATH TECHNOLOGY, INC.**  
3900 Freedom Circle  
Santa Clara, California 95054  
408-567-3000



## NOTES:

- TA1101B inputs have a DC bias of 2.5V. If input preamp circuitry is NOT biased at 0V, C14 and C15 may need to be reversed.
- The MUTE function can be optionally tied to the FAULT pin to allow for an automatic reset in the event of an over current FAULT.

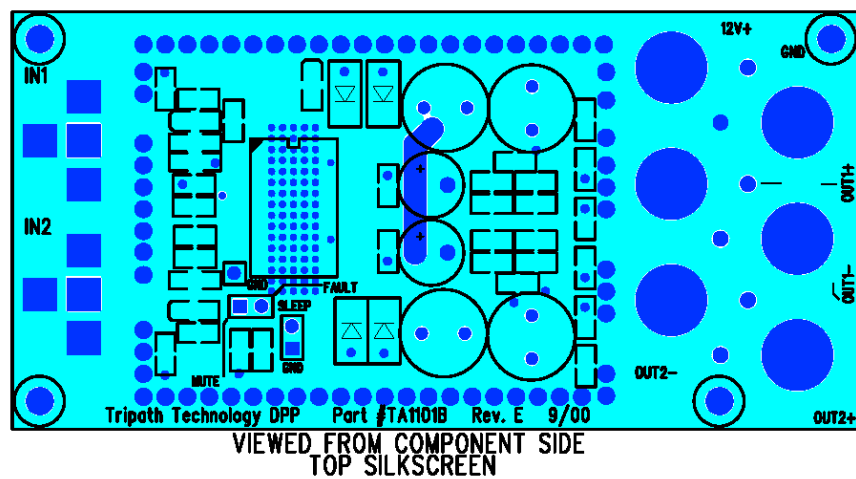
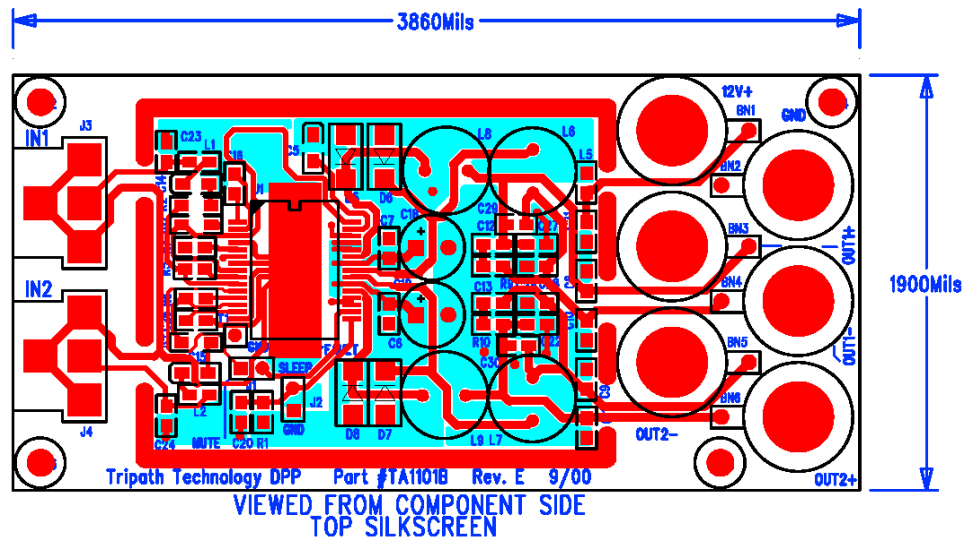
\* 3 sq. in. of 1oz. copper directly under TA1101B on solder side of PC board with a 5 x 16 array of 14mil vias.

<http://www.tripath.com>

Tripath Technology, Inc.		
Title		
TA1101B Evaluation Board		
Size	Document Number	Rev
B		E
Date:	Monday, February 12, 2001	Sheet 1 of 1

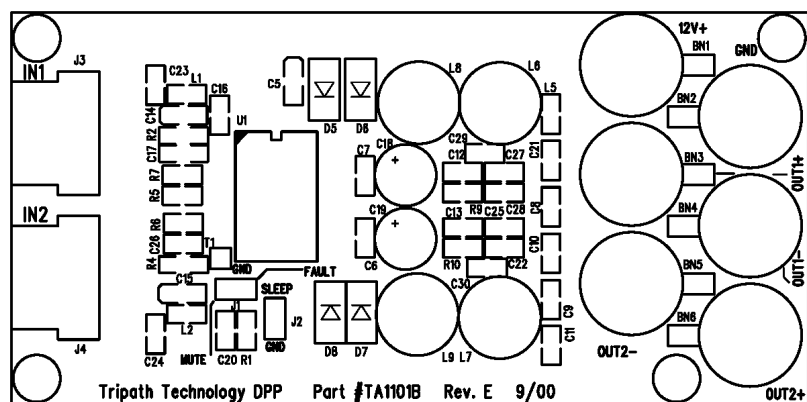
EB-TA1101B Revision: E						
Bill Of Materials						
Quantity	Reference	Value	Description	Mfgr/Part#		COMMENT
2	R10,R9	10, 1/4W	Resistor			Zobel resistor
1	R7	8.2K, 1%	Resistor			
4	R2, R4, R5, R6	20k	Resistor			Feedback resistor
1	R1	1Meg	Resistor			
7	C6,C7,C16,C20,C26, C29, C30	0.1uF	Capacitor			
6	C12, C13, C22,C25,C27,C28	0.47uF	Capacitor			main output filter cap
5	C8,C9,C10,C11,C21	1000pF	Capacitor			
2	C23,C24	100pF	Capacitor			
2	C18,C19	180uF,25V	Capacitor	Panasonic	HFQ	Low ESR, high temp aluminum elect.
2	C17,C5	1uF	Capacitor			
2	C15,C14	2.2uF	Capacitor			Input coupling cap
4	L6,L7,L8,L9	10uH, 2A	Inductor	ISI RL622	or TOKO 8RDY	Output series inductor.
3	L1,L2,L5	FBM2125	Ferrite bead	Taiyo-yuden	FBMJ2125 HM330-T	Ferrite bead, 33ohms (100MHz)
4	D5,D6,D7,D8	MBRS130T3	Diode	On Semi	MBRS130T3	Output protection diode
1	U1	TA1101B	IC	Tripath	TA1101B	
6	BN1, BN2, BN3, BN4, BN5, BN6		Connector	Johnson Components	101-09XX-001	PCB mount female banana
2	J3, J4		Connector			RCA input jack
2	J1, J2		Header			Header, 2-pin 0.1"

# TECHNICAL INFORMATION

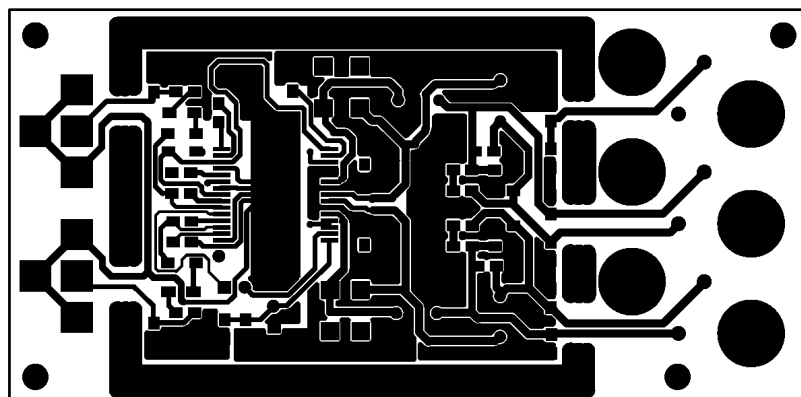




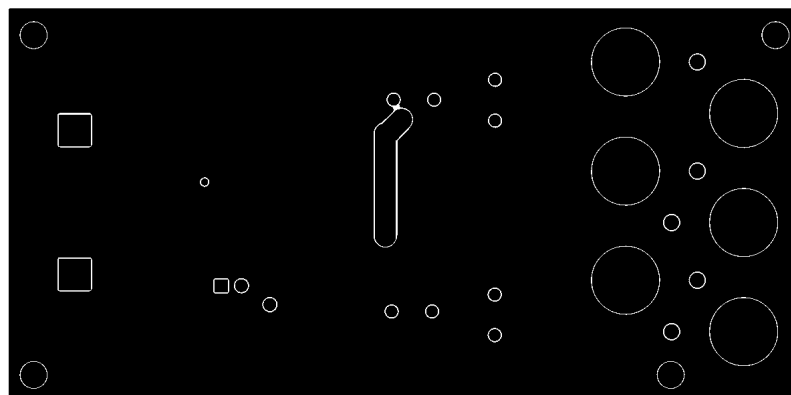
## TECHNICAL INFORMATION



VIEWED FROM COMPONENT SIDE  
TOP SILKSCREEN



VIEWED FROM COMPONENT SIDE  
TOP ETCH



VIEWED FROM COMPONENT SIDE  
HOT3 MOTT08