

Class-T Digital Audio Amplifier Evaluation Board using Digital Power Processing™ Technology **EB-TA2020**

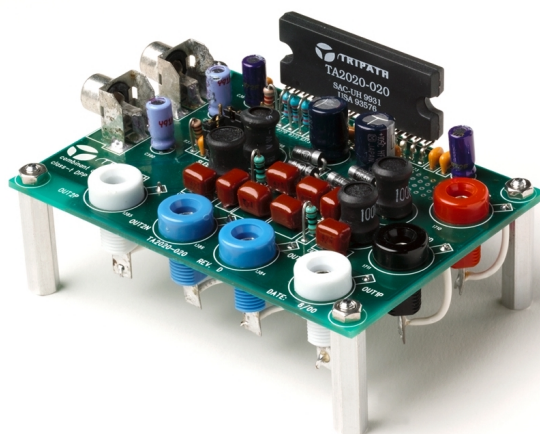
February 2001, Rev D

General Description

The EB-TA2020 evaluation platform is based on the TA2020-020 digital audio power amplifier from Tripath Technology. This board is designed to provide a simple and straightforward environment for the evaluation of the Tripath TA2020-020. The TA2020-020 provides amplification for two channels of audio and drives 4Ω and 8Ω passive loads (loudspeakers). Input, output and power connections are via standard connectors.

Features

- Class-T architecture
- Proprietary Digital Power Processing™ Technology
- Requires single 13.5V power source
- Output Power (per channel @ $V_S = 13.5V$)
 - 20W - 4Ω @ 10% THD+N
 - 12W - 4Ω @ 0.1% THD+N
- Easy engineering evaluation platform for Tripath Technology's TA2020-020 product
- "Audiophile performance" typically:
 - 0.03% THD+N, 4W @ 4Ω
 - 0.08% IHF-IM @ 4Ω
- Efficiency - >85% @ full power ($R_L = 8Ω$)
- Frequency Response: 20 Hz – 20 kHz = ± 0.5 dB
- Mute input
- Turn-on & turn-off pop suppression
- Short-circuit protection
- Intelligent over-temperature protection
- Connects to any passive 4/8Ω speakers
- Takes standard audio line output from any sound system
- Bridged outputs
- 2-layer low cost board
- 30-pin Power SOP package

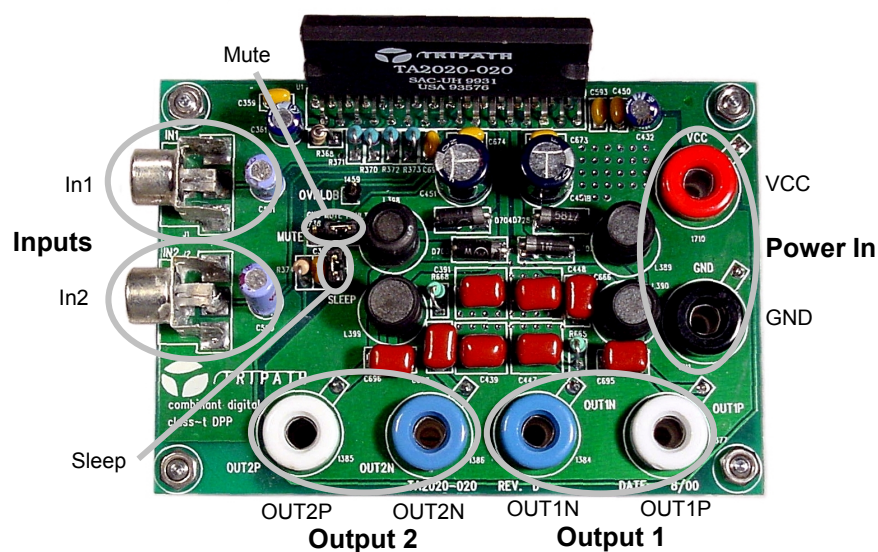


Introduction

The EB-TA2020 was designed the designer with a simple means of evaluating the performance and functionality of the TA2020, 2 x 20W amplifier IC from Tripath Technology. The EB-TA2020 is simple to operate and requires only a few things to get up and running:

- Stereo signal source
- 13.5V power supply (not to exceed 14.6V)
- Two loads (4 ohm minimum)

For more information on the TA2020, please refer to the TA2020 datasheet (www.tripath.com)



EB-TA2020 Board

Connection and Operation

Figure 1 shows the connections required for proper operation of the EB-TA2020.

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

Power Connection

The EB-TA2020 requires a +13.5V power supply (14.3V max) to operate.

Power to the board is connected via the red and black banana connectors. The positive 13.5V from the power supply is connected to the red banana connector labeled VCC. The ground connection of power attaches to the black banana connector labeled GND.

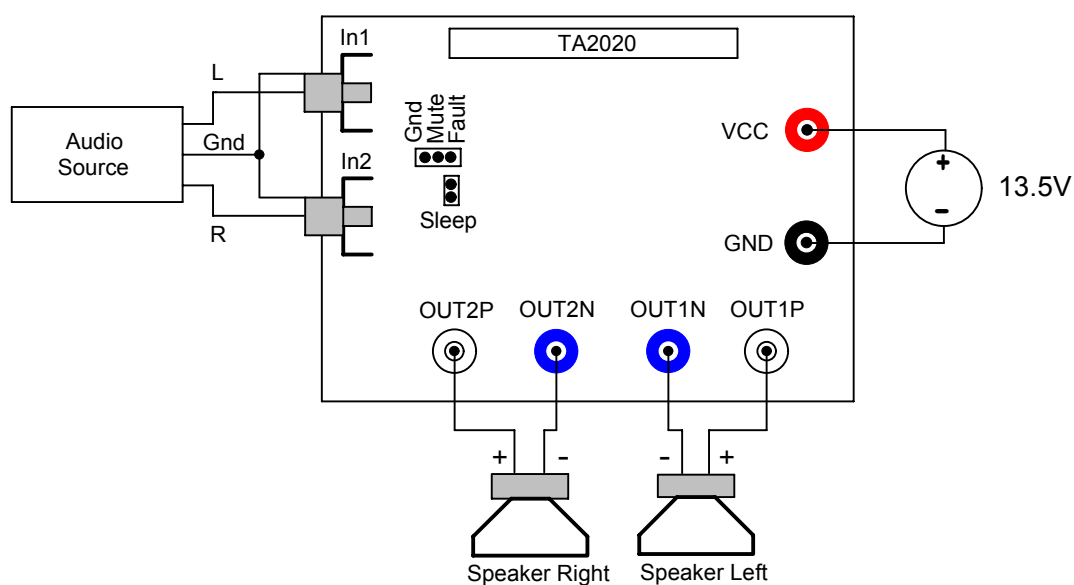


Figure 1

Connector Label	Description	Color
VCC	Positive of the 13.5V Power supply	Red
GND_P	Negative (GND) of 13.5V Power Supply	Black

Warning: Do not exceed Maximum Operating Supply Voltage (Vs) of 14.6V

Output Connection

There are four banana connectors on the evaluation board for speaker output. The TA2020-020 has differential outputs, and so it requires two wires per channel to connect to each speaker.

Connector Label	Description	Color
OUT1P	Positive output of Channel 1	White
OUT1N	Negative output of Channel 1	Blue
OUT2P	Positive output of Channel 2	White
OUT2N	Negative output of channel 2	Blue

Jumper Setting

There are two jumpers on the board that control the MUTE and SLEEP functions. These jumpers should be in place at all times for normal operation. The MUTE jumper connects the fault output pin to the mute input pin. If the jumper is removed, the part will enter MUTE mode. With the jumper in place, if the part enters an over-current or over-temperature fault condition, the output will be muted.

With the SLEEP jumper removed, the TA2020-020 goes into sleep mode when no input signal is present. With the jumper in place, the SLEEP mode is disabled.

Gain Setting

The EB-TA2020 amplifier gain can be adjusted by changing the external resistors R370-R373. R370 and R371 are used to set the gain for channel 1. R372 and R373 are used to 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 TA2020 data sheet.

Performing Measurements on the EB-TA2020

The TA2020 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 is limited, some of the inaudible noise components introduced by the TA2020 amplifier switching pattern will degrade the measurement.

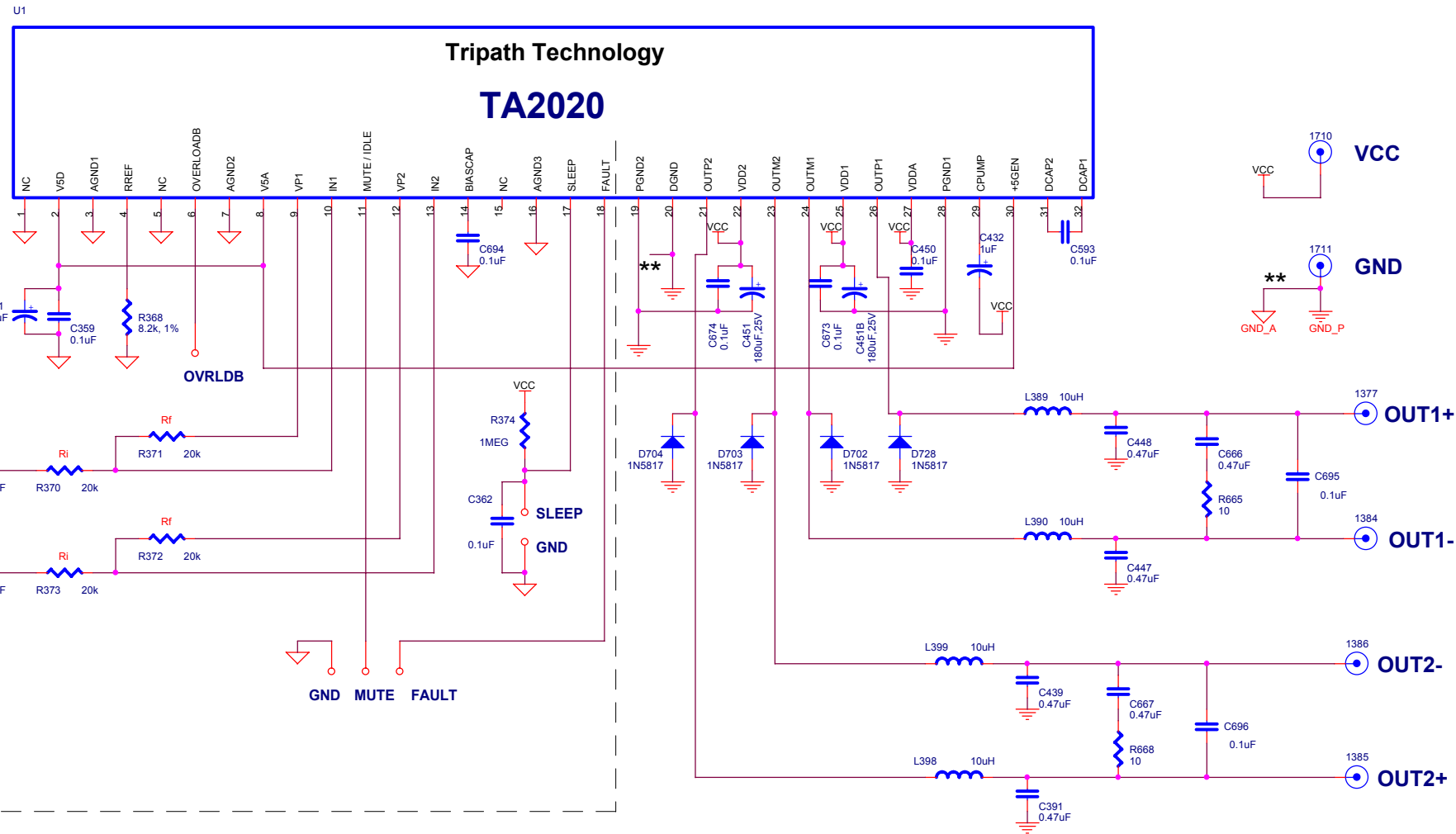
One feature of the TA2020 is that it does not require large multi-pole filters to achieve excellent performance in listening tests, usually a more critical factor than performance measurements. Though using a multi-pole filter may remove high-frequency noise and improve THD+N type measurements (when they are made with wide-bandwidth measuring equipment), these same filters degrade frequency response. The EB-TA2020 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)

CONTACT INFORMATION

For more information on Tripath products, visit our web site at: www.tripath.com

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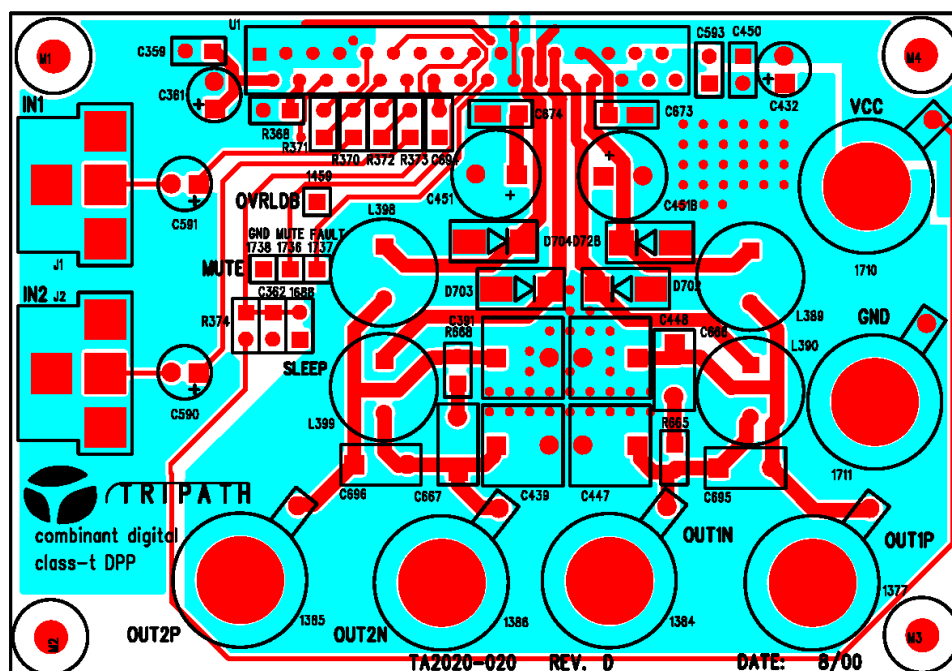


- NOTES:
1. Ground plane is split into two. Both halves are joined at one point.
 2. The MUTE function can be optionally tied to the FAULT pin to allow for an automatic reset in the event of an over current FAULT.
 3. TA2020 inputs have a DC bias of 2.5V. If input preamp circuitry is NOT biased at 0V, C590 and C591 may need to be reversed.

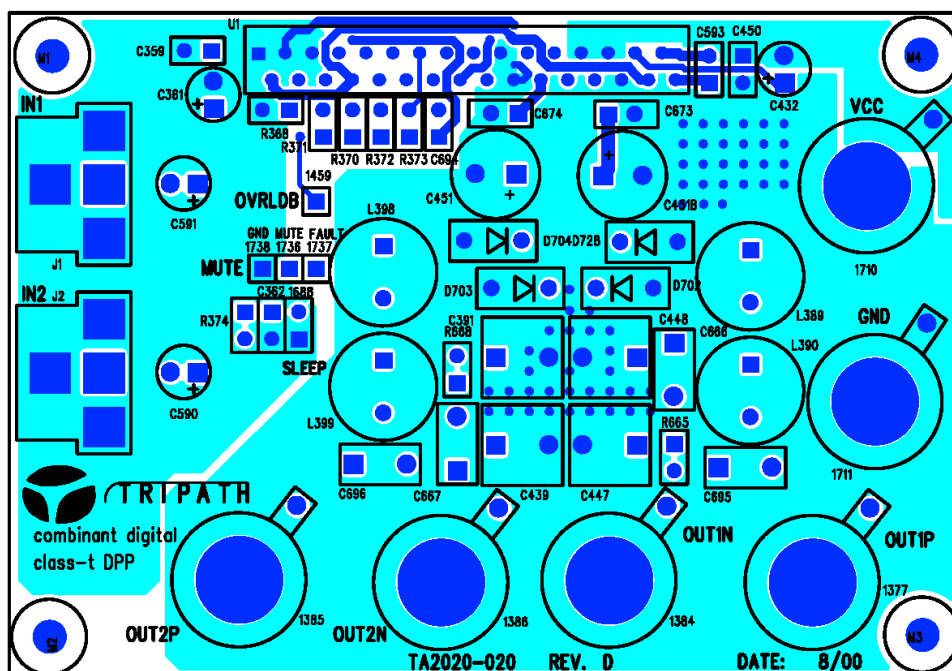
** Connect GND_POWER from PIN 20 to GND_A PIN 3 with a single trace.

Tripath Technology Inc.			
EB-TA2020 Evaluation Board			
Size B	Document Number <Doc>	Rev D	
Date: Thursday, August 31, 2000	Sheet 1	of 1	

EB-TA2020 Revision: D						
Bill Of Materials						
Quantity	Reference	Value	Description	Mfgr / Part#		Comment
1	R368	8.2k, 1%	Resistor			
4	R370,R371,R372,R373	20k	Resistor			input, feedback resistors
1	R374	1MEG	Resistor			
2	R668,R665	10, 1/4W	Resistor			Ouput Zobel resistor
9	C359,C362,C450,C593,C673, C674,C694,C695,C696	0.1uF	Capacitor			
2	C432,C361	1uF	Capacitor			
4	C391,C439,C447,C448	0.47uF	Capacitor			main output filter cap
2	C451B,C451	180uF,25V	Capacitor	Panasonic	HFQ series	Low ESR, high temp electrolytic
2	C591,C590	2.2uF	Capacitor			input coupling cap
2	C667,C666	0.47uF	Capacitor			
4	L389,L390,L398,L399	10uH	Inductor	ISI RL622-100K		Output series inductor
4	D702,D703,D704,D728	1N5817	Diode	On Semi	1N5817	output protection diode
1	U1	TA2020	IC	Tripath Technology	TA2020-020	
2	J1, J2		Connector			RCA input jack
6	1377, 1384, 1385, 1386, 1710, 1711		Connector	Johnson Components	101-09XX-001	PCB mount female banana
1	1736, 1738, 1738		Header			Header, 3-pin 0.1"
1	1459, 1688		Header			Header, 2-pin 0.1"



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