



EB-TK2051

CLASS-T DIGITAL AUDIO AMPLIFIER 2 CHANNEL TK2051 EVALUATION BOARD

Technical Information – Board Rev. 1.3

Revision 1.0 – April 2002

GENERAL DESCRIPTION

The EB-TK2051 Revision 1.3 is a stereo 50W per channel audio amplifier designed to provide a simple and straightforward environment for the evaluation of the TK2051 amplifier. For additional documentation on the TK2051, see the TK2051 Data Sheet.

APPLICATIONS

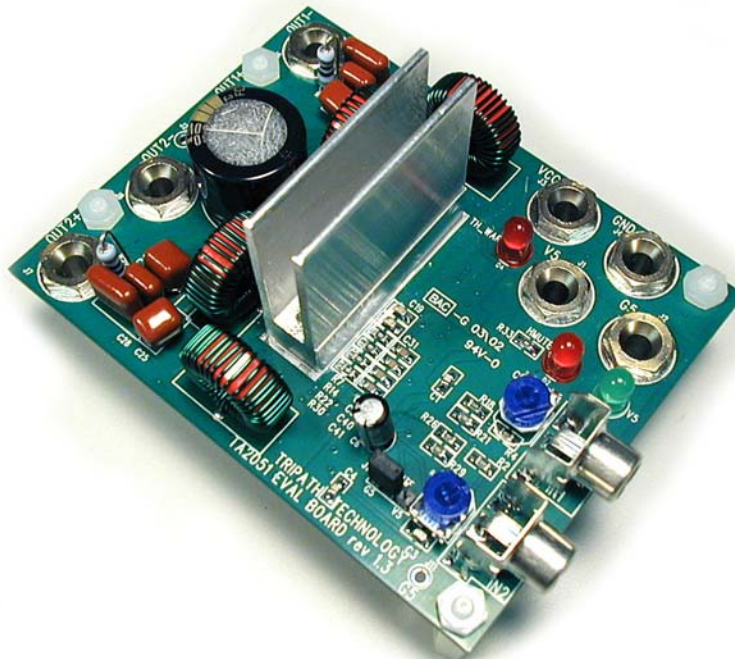
- 6Ω and 8 Ω stereo
- 4 Ω mono (parallel operation)
- Home Theater Receivers
- Multi-channel Distribution
- Powered DVD Systems
- Mini/Micro Systems

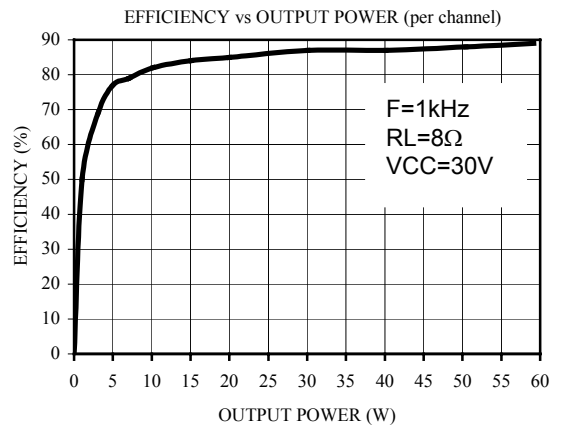
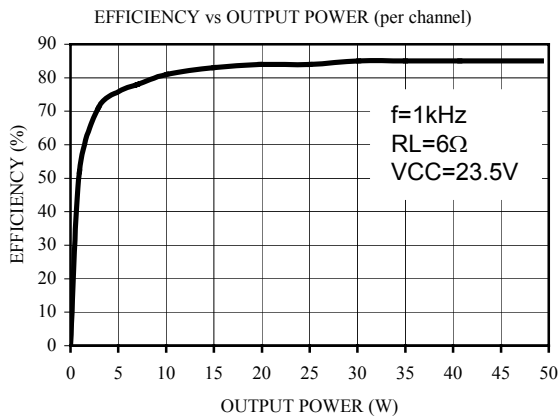
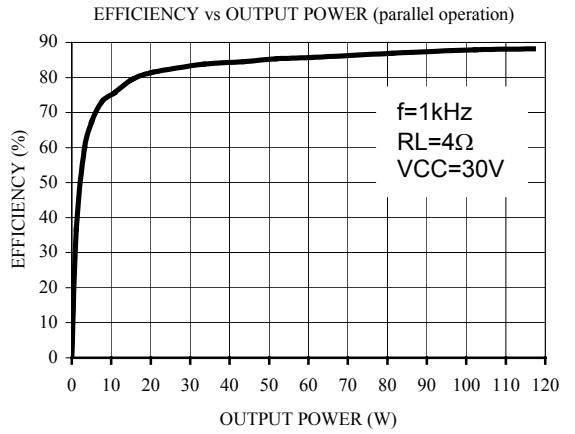
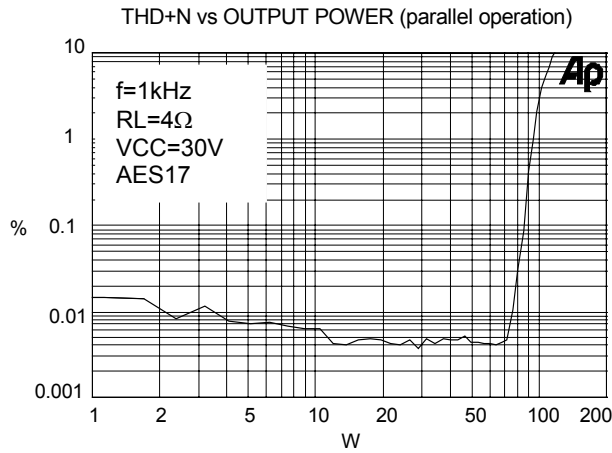
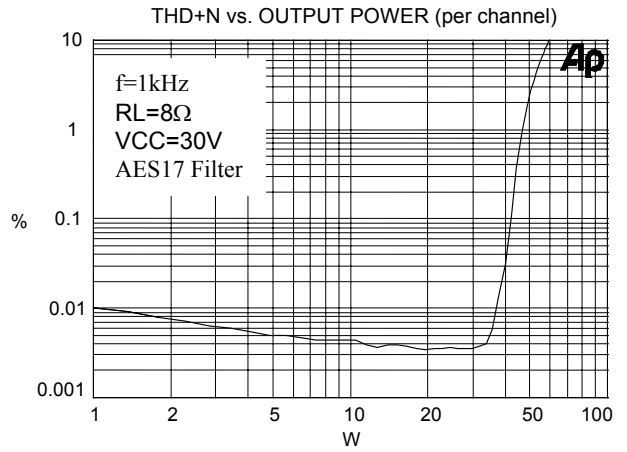
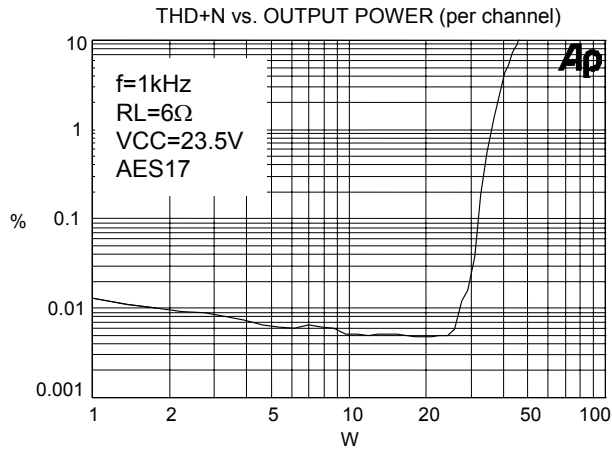
BENEFITS

- More power per cubic inch for 50W/Channel design
- Simplifies thermal management
- Signal Quality comparable to high quality, linear amplifiers
- Simple building block for multi-channel design

FEATURES

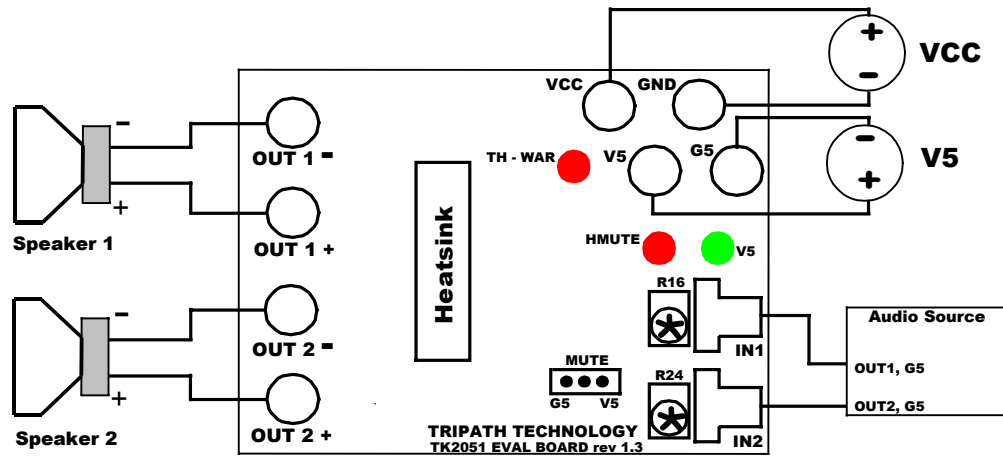
- High Continuous Power:
 - 46W @ 6Ω
 - 50W @ 8Ω
 - * 1/8 power for 1 hour followed by full power for 5 minutes.
- Low Noise Floor: <135uV A-weighted
- Low Distortion:
 - .005% THD+N, 20W, 6Ω
 - .005% THD+N, 30W, 8Ω
- High Efficiency:
 - 85% @ 46W, 6Ω
 - 89% @ 59W, 8Ω
- Over-Current Protection
- Over and Under Voltage Protection
- Over Temperature Protection





OPERATING INSTRUCTIONS

BOARD CONNECTION DIAGRAM



POWER SUPPLIES

Two external power supplies are required to operate the EB-TK2051: VCC (referenced to GND), and V5 (referenced to G5). The V5 ground (G5) must be kept separate from the VCC ground (GND). GND and G5 are joined at a common point on the EB-TK2051 with a 0Ω resistor (R1).

The Minimum and Maximum VCC supply voltages are +10V and +30V, respectively.

The V5 supply voltage is 5V. Please see the TK2051 Data Sheet for Minimum and Maximum values.

The VCC and V5 power supply connections are standard female banana plug connectors. Please refer to the Board Connection Diagram for the connector locations on the EB-TK2051.

OUTPUT

The output connections for each channel of the EB-TK2051 are made with standard female banana plug connectors. The output of the TK2051 is differential; therefore each output has a positive output (OUT1+ and OUT2+) and a NEGATIVE OUTPUT (OUT1- AND OUT2-).

Please refer to the Board Connection Diagram for the connector locations on the EB-TK2051.

INPUT

The input connection for each channel of the EB-TK2051 is made using two RCA connectors (female). The RCA connectors are labeled IN1 and IN2. These inputs share a common ground referenced to G5. Please refer to the Board Connection Diagram for the connector locations on the EB-TK2051.

JUMPER SETTINGS

There is a 3-pin header for the MUTE control of the TK2051. With the jumper placed in the G5 position the part is un-muted. When the jumper is placed in the V5 position the mute pin is pulled high (5V) and the amplifier is muted. Please refer to the Board Connection Diagram for the connector locations on the EB-TK2051.

INDICATOR LED'S

The EB-TK2051 has three LED's V5, HMUTE, and TH_WAR. The V5 LED will glow green when the 5V supply is on. The HMUTE LED will glow red and both outputs are muted when a fault occurs or the MUTE header is set to V5. Please refer to the TK2051 Data Sheet for a complete description of HMUTE. The TH_WAR LED glows red when the thermal limit of the TP2051 has been exceeded. Please refer to the Board Connection Diagram for the LED locations on the EB-TK2051.

OUTPUT OFFSET NULL

There are two potentiometers, R16 (Channel 1) and R24 (Channel 2) that are used to manually trim the output offset to 0Vdc. Please refer to the Board Connection Diagram for the potentiometer locations on the EB-TK2051. The Evaluation board is shipped with the offset nulled within +/-10mV.

GAIN SETTING

The gain of the EB-TK2051 Rev 1.3 is set to 15V/V. The gain of the TK2051 is the product of the TC2000 (control stage) gain and the TP2051 (power stage) gain. The control stage gain is set to unity. Before changing the gain of the EB-TK2051, please refer to the Amplifier Gain section of the EB-TK2051 Data Sheet.

Performing Measurements on the EB-TK2051 Rev 1.3:

The TK2051 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 TK2051 amplifier switching pattern will degrade the measurement by including out of band (audio) energy.

One feature of the TK2051 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-TK2051 has a simple two-pole output filter with excellent performance in listening tests. (See Application Note 4 for additional information on bench testing)

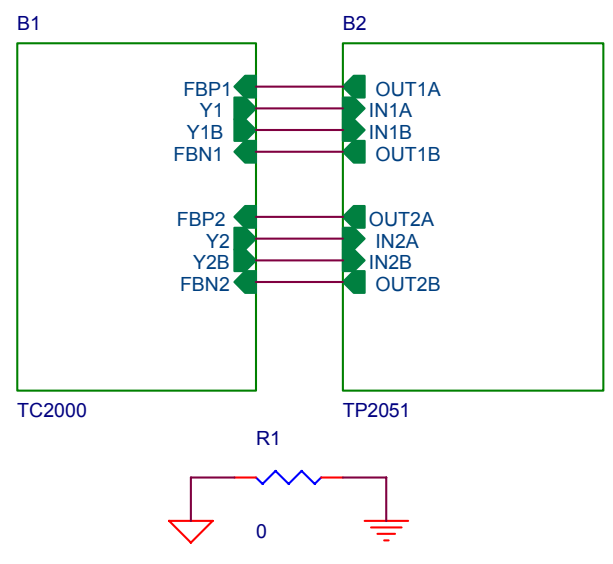
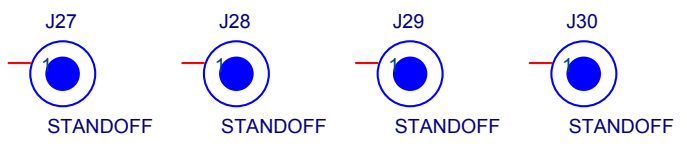
Contact Information

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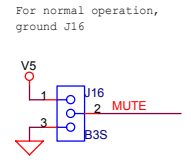
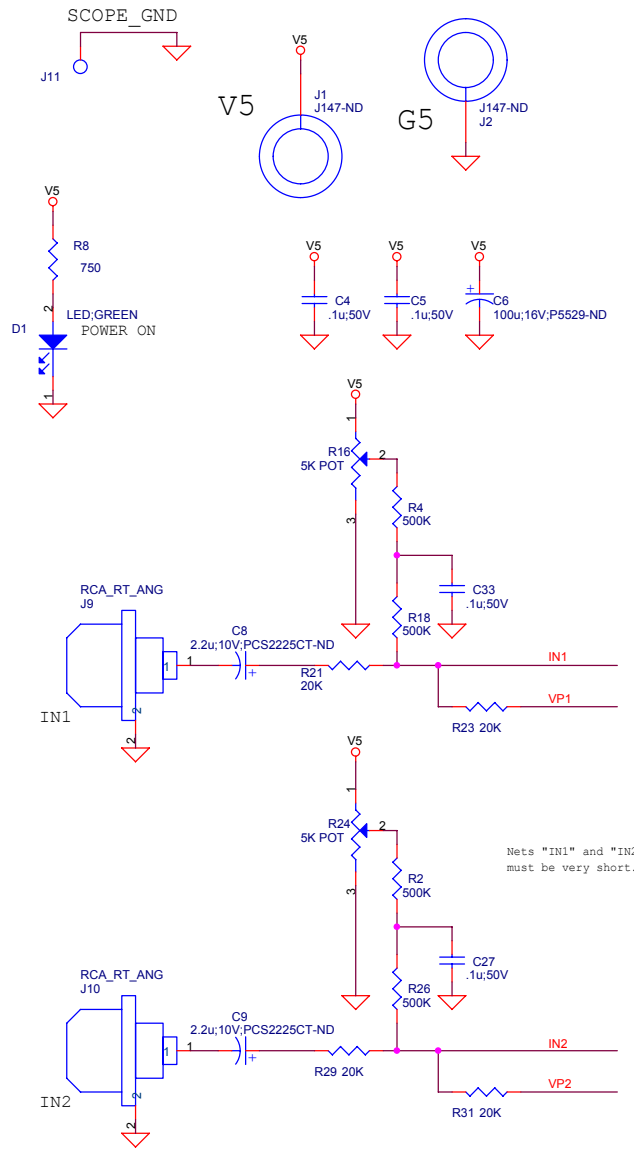
For more Sales Information, please visit us @ www.tripath.com/cont_s.htm

For more Technical Information, please visit us @ www.tripath.com/data.htm



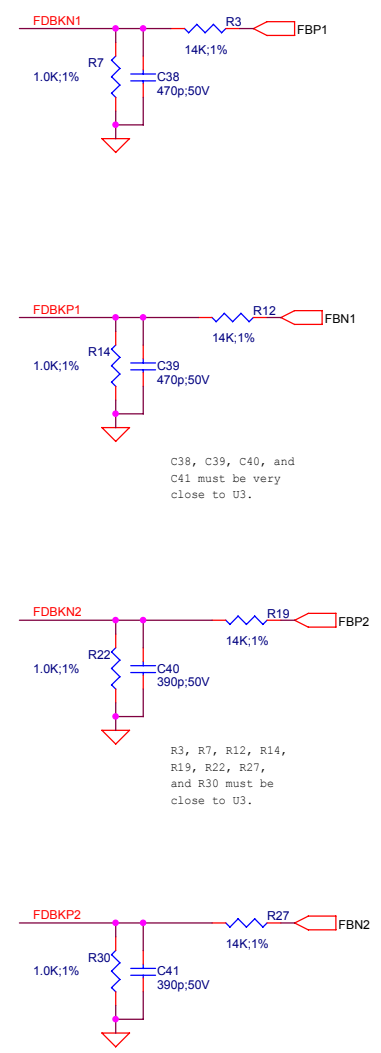
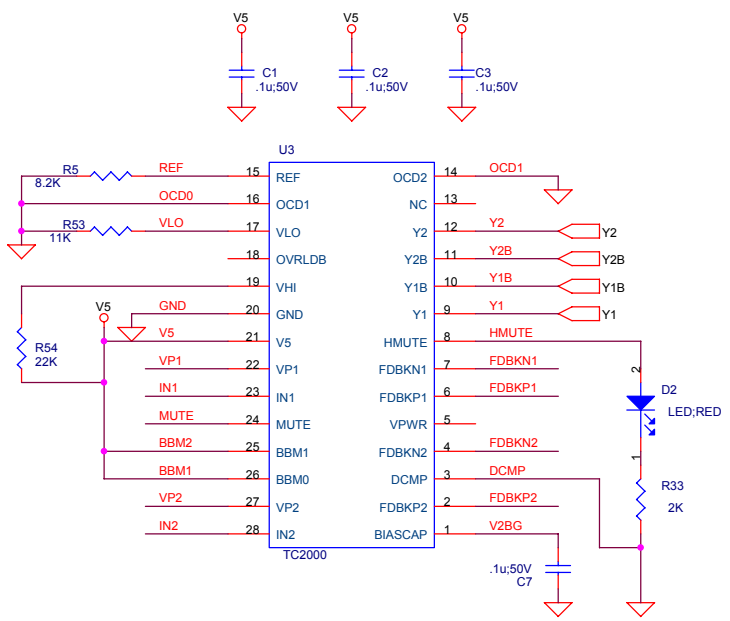
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For normal operation, ground J16

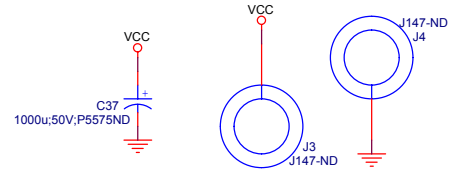
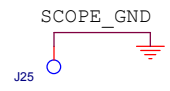
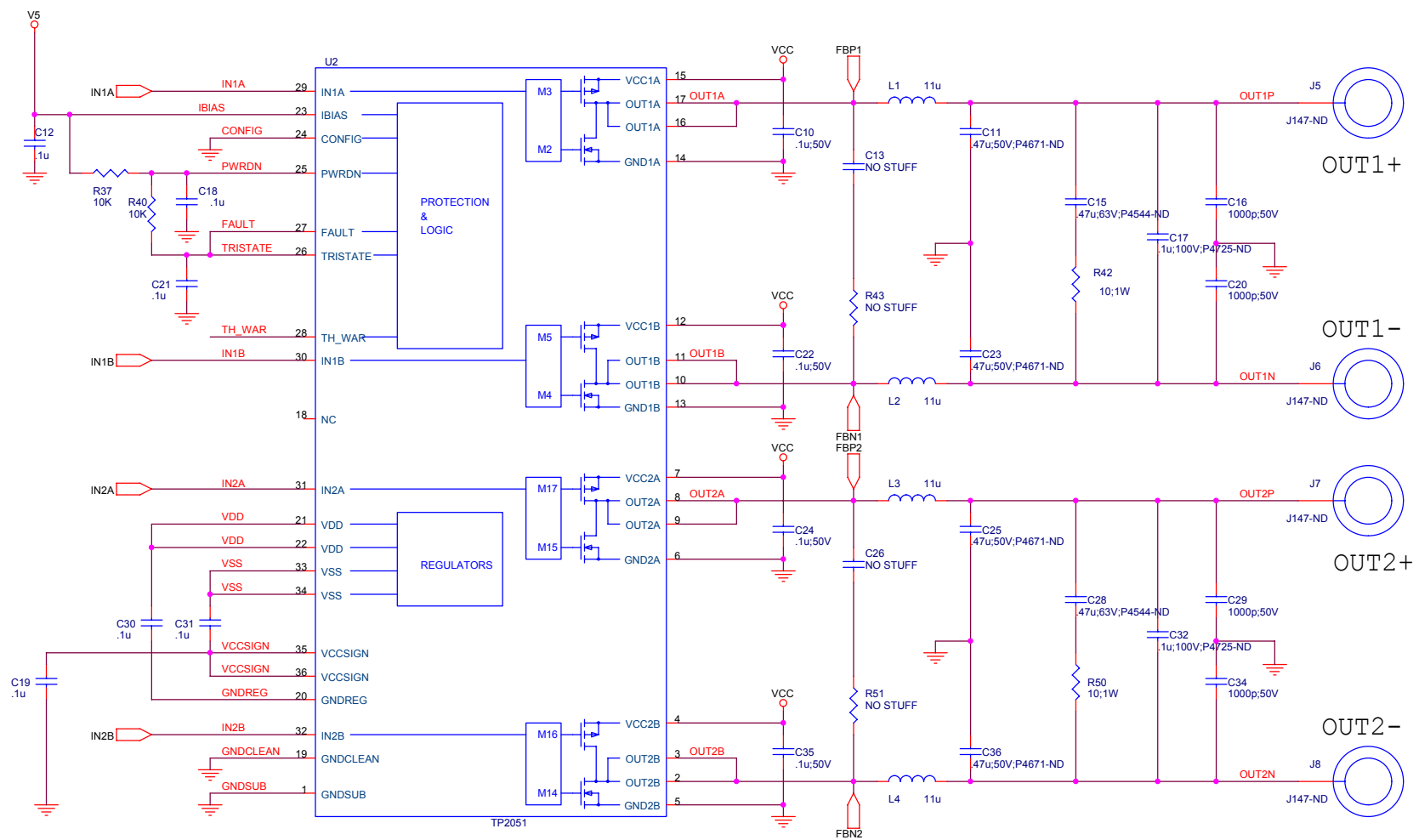
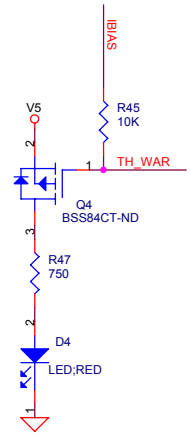
Nets "IN1" and "IN2" must be very short.



C38, C39, C40, and C41 must be very close to U3.

R3, R7, R12, R14, R19, R22, R27, and R30 must be close to U3.

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TA2051 EVAL BOARD Revised: 04/12/02					
Revision: 1.3					
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Item	Quantity	Reference	Part		
1	13	C1,C2,C3,C4,C5,C7,C10, C19,C22,C24,C27,C33,C35	.1u;50V	CAP0805	
2	1	C6	100u;16V;P5529-ND	cape\100\200	
3	2	C8,C9	2.2u;10V;PCS2225CT-ND	CAP3216	
4	2	C11,C25, C23, C37	.47u;50V;P4671-ND	CAP200W	
5	5	C12,C18,C21,C30,C31	.1u	CAP0805	
6	0	C26,C13 (NO STUFF)	1000p;100V;NPO;PCC1970CT-ND	CAP0805	must be 100V NPO
7	2	C15,C28	.47u;63V;P4544-ND	CAP7.5\10X4	
8	4	C16,C20,C29,C34	1000p;50V	CAP0805	ok to substitute 100V;NPO
9	2	C32,C17	.1u;100V;P4725-ND	CAP200W	
10	1	C37	560u;50V;P10329-ND	CAPE\300\700	
11	2	C38,C39	470pF;50V; PCC471CGCT-ND	CAP0805	
13	2	C40,C41	390pF;50V; PCC391CGCT-ND	CAP0805	
14	2	D2,D4	LED, RED	LED	
15	1	D1	LED, GREEN	LED	
16	6	J1,J3,J5,J6,J7,J8	J147-ND	BANANA_PLT_A	
17	2	J4,J2	J147-ND	BANANA_PLT_AG	
18	2	J9,J10	RCA_RT_ANG	RCA	
19	2	J25,J11	5011K-ND	sip-1p_loop	
20	1	J16	B3S	SIP-3P	
21	4	J27,J28,J29,J30	STANDOFF	STANDOFF_440	3/4"
22	4	L1,L2,L3,L4	11u	T600-06 CORE	American Cores AW600-06-40T-24-V
23	1	Q4	BSS84CT-ND	SOT23_FC	
24	1	R1	0	RES0805	
25	4	R3,R12,R19,R27	14K;1%	RES0805	must be 1%
26	1	R5	8.2K	RES0805	
27	4	R7,R14,R22,R30	1.0K;1%	RES0805	must be 1%
28	2	R8,R47	750	RES0805	
29	2	R24,R16	5K POT		

30	4	R2,R4,R26,R18	500K	RES0805	
31	4	R21,R23,R29,R31	20K	RES0805	
32	3	R37,R40,R45	10K	RES0805	
33	1	R33	2K	RES0805	
34	2	R50,R42	10;1W;P10W-1BK-ND	R1/4WA	must be 1W through hole
35	0	R43,R51(NO STUFF)	40;1/4W	R1/4WA	must be 1/4W through hole
36	1	R53	11K	RES0805	
37	1	R54	22K	RES0805	
38	1	U2	TP2051	TP2051	supplied by Tripath
39	1	U3	TC2000	SO28	supplied by Tripath