4*100W @4Ω TK2050
Class-D Audio Amplifier Board
User's Guide

4*100W @4Ω TK2050 Class-D Audio Amplifier Board

Notice: Please read this manual prior to using the product and follow the steps to keep the product in a good working status and long life. We assume no liability for any damage caused by users themselves.

Warning: Never expose the product in the rain and other wet locations.

Safety Precautions: Please protect the product well since it is a high-power device. Keep the metal objects away from the amplifier board to avoid danger. Make sure quality power supply is used, or there may be some problems.

Caution: Please read carefully the manual and check if the amplifier board is good or not before use the product. DC 12V power supply and one-hour working time are recommended for the first use. There must be a certain space for the heat removal since this product is a high-power device which is prevented from working in an extreme condition for a long time. Never touch the heat sinks for too long time, or your hand will be scalded.

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NOTES:

Product Version : Ver 1.1

Document Version : Ver 1.0

Chapter 1. Overview

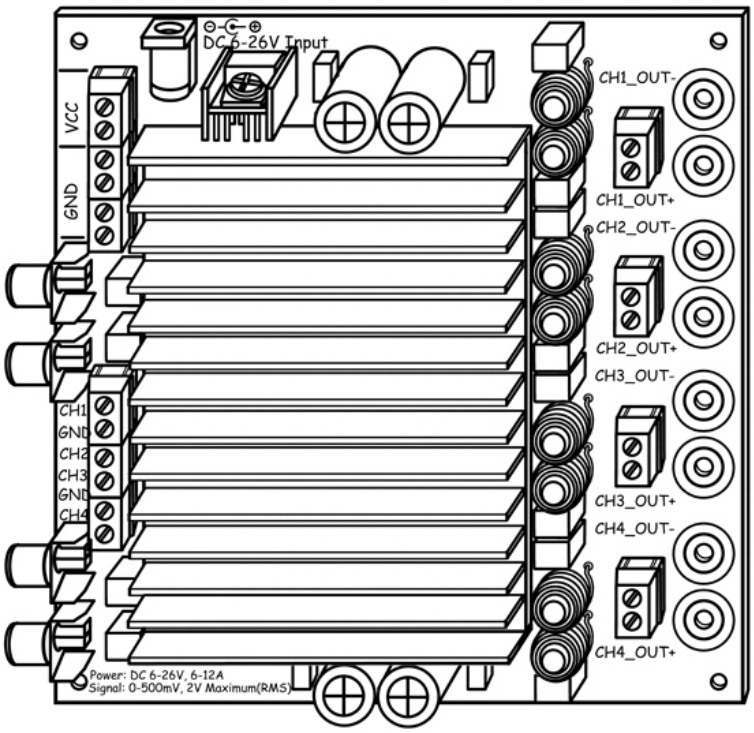
1.1 Overview

Welcome to use this self-made 4*100W audio amplifier board which is a perfect class-D architecture integrated TC2000 and TP2050 chips to achieve the single-channel 100W power output. With high efficiency, it especially is available for the outdoor venues where power supply is always in consideration. Moreover, integrated with TC2000 and TP2050 chips of Tripath, this board also supports four-channel amplification and can be powered by any DC power supply ranging from 10 to 32V, which can be used to drive any 4Ω or 8Ω passive speakers.

TC2000 is a dual channel audio controller produced by Tripath using its patent Digital Power Processing technology (DPP^{TM}). Combined with switching power output stages TP2050, it can achieve class-T audio power amplification and 50W continuous average power per channel, as well as lower THD+N and higher S/N ratio.

For 100W power output, this amplifier board integrates two TC2000 chips and four TP2050 chips so that it supports four-channel audio amplification of up to 100W each. Resistance capacity components of high quality are used to gain the perfect timber, finally realize high S/N ratio, low THD+N, wide frequency response range etc.

FIGURE 1-1 PRODUCT DIAGRAM



Note: This diagram above is used for reference only.

1.2 Features

Operating voltage range: 10V—30V, the maximum voltage of power supply is 32V
Frequency response: 20Hz—20KHz(±3dB)
Signal/Noise Ratio：100dB (A-Weighted)
High Output Power
30W @ 6Ω, < 1% THD+N
40W @ 8Ω, < 3% THD+N
100W @ 4Ω, < 10.0% THD+N
High Efficiency
86% @ 60W 8Ω
82% @ 46W 6Ω
90% @ 100W 4Ω
Audiophile Quality Sound
0.007% THD+N @ 30W 8Ω
0.005% THD+N @ 70W 4Ω
Line level analogue audio input
Over/under voltage turn off
Over current protection
Over temperature protection

1.3 Applications

Active Subwoofers
Home Theater Receiver
Multi-channel Distribution
Active DVD System
Mini/Micro Systems

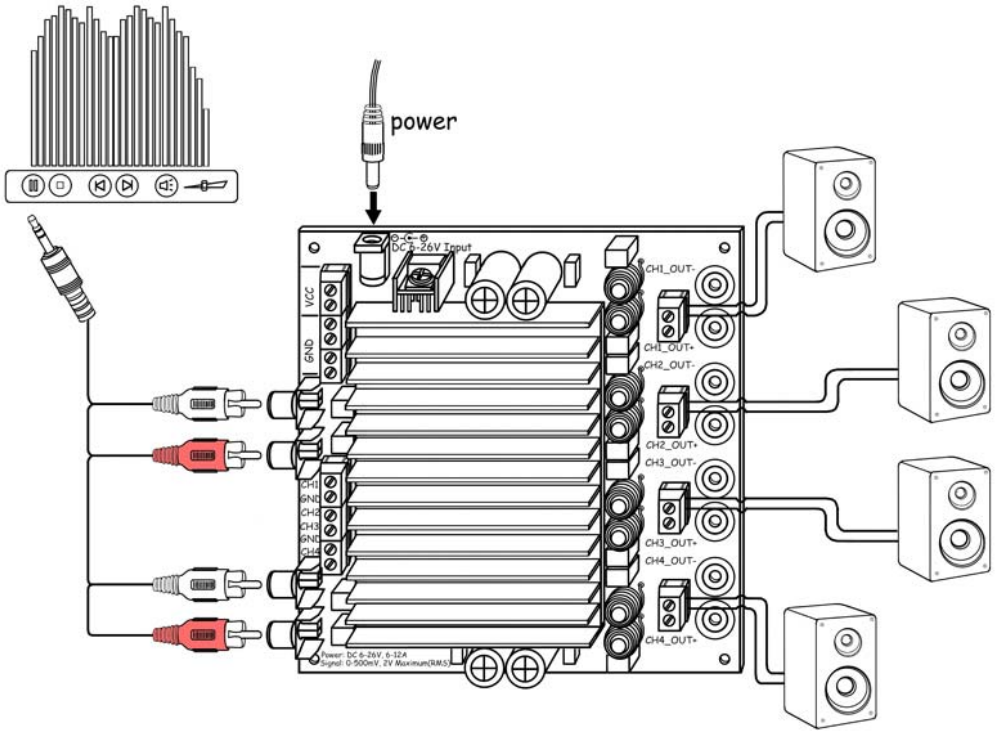
1.4 Benefits

Mounting holes are available for easy installation and fix.
Several wiring methods facilitate connection.
The design of power supply allows you to connect more amplifier board.
Excellent heat sink eliminates your worry over heat dissipation.

1.5 Quick Start

Suggested connection is shown in figure 1-2.

FIGURE 1-2 CONNECTION SCHEMATIC



Note: Please observe the following steps to complete verification so as to ensure the products are intact during transit.

1. Open the amplifier package and make sure the product is intact (No missing or damaged components and no deformation)
2. Please observe the connection diagram when connecting the amplifier board. Use a nearby sound source, such as MP3 or CD player to have a trial. This amplifier board can be deemed as qualified if you can hear the sound corresponding to that sound source.

Chapter 2. Hardware Detail

2.1 Power Connection

To power the amplifier board, use jack or terminal blocks. Pay more attention to the positive and negative of the power supply when wiring.

TABLE 2-1 POWER CONNECTION

Connector Mark			Description
Jack	J15		DC 10-30V power supply
Terminal Blocks	J13	VCC	The positive of DC 10-30V power supply
	J14	GND	The negative of DC 10-30V power supply

Note:
1. You are allowed to use only one way to power the amplifier board at a time.
2. The maximum voltage of power supply shall not exceed 32V.

2.2 Input Connections

You may use RCA connectors to input audio signal.

TABLE 2-2 INPUT CONNECTION

Connector Mark		Channel
RCA connector	J18	Channel 1 Input
	J19	Channel 2 Input
	J20	Channel 3 Input
	J21	Channel 4 Input
Terminal Blocks	J16	Channel 1 Input
		Channel 2 Input
	J17	Channel 3 Input
		Channel 4 Input

Note: Never input the audio signals through RCA connectors and terminal blocks at a time.

2.3 Output Connections

You can use either terminal blocks or banana connectors to output audio signal. Two pairs of banana connectors are provided for free.

TABLE 2-3 OUTPUT CONNECTION

Connector Mark		Description
Banana Connectors	J4	Negative Output of Channel 1
	J5	Positive Output of Channel 1
	J6	Negative Output of Channel 2
	J7	Positive Output of Channel 2
	J8	Negative Output of Channel 3
	J9	Positive Output of Channel 3
	J10	Negative Output of Channel 4
	J12	Positive Output of Channel 4
Terminal blocks	J1	Output of Channel 1
	J2	Output of Channel 2
	J3	Output of Channel 3

	J11	Output of Channel 4

Note:

1. Please refer to the instruction of circuit board connection for details.
2. Never connect more than one group of speakers to the audio output.
3. Never connect CH1_OUT- 、CH2_OUT-、CH3_OUT- and CH4_OUT- together since they belong to different NETs.

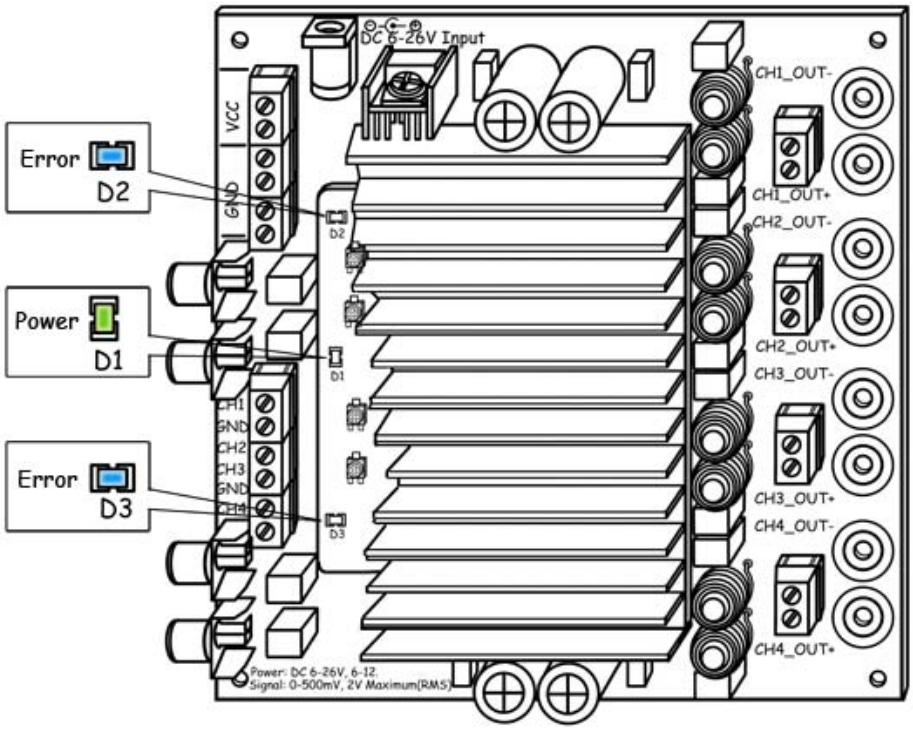
2.4 DC Offset

If it is not quite necessary, DO NOT trim the output offset by adjusting “R13”, “R28”, “R41” and “R56” on the board since the output offset has been regulated to a range of ±10mV.

Note: Never adjust these potentiometer unless necessary, improper adjustment may damage your speakers.

2.5 LED Indicators

The amplifier has three LED indicators, one of which is marked as “Power（D1）”, the other two as “Hmute（D2）” and “Hmute (D3)”. “Power（D1）” will be illuminated in green on power-up and “Hmute（D2、D3）” will be illuminated in blue when the board is in a mute mode or error occurs. Please refer to TK2050 Data Sheet for a detailed description of HMUTE and the Board Connection Diagram for the LED location on the amplifier board.



2.6 Volume Control

No potentiometer is provided for manually adjusting the volume. The volume control of sound source like MP3 or PC can be used to adjust the volume of the audio output or a 50KΩ potentiometer can be installed by users themselves, but it may cause signal attenuation.

Please be aware that audio clippings may occur to some portable players because of the audio source not the amplifier itself. The sensitivity of this amplifier is 0.775VRMS and the audio signal of the same level should be input.

Note: Never adjust these potentiometer unless necessary, it may damage your speakers.

2.7 Notes

In order to protect amplifier board and extend its service lifetime, please read the following warnings carefully since warranties will be voided if you do not observe the following warnings:

Warning 1:

Quality-related issues caused by potentiometers installed by buyers.

Warning 2:

In order to achieve a better sound quality, please use stable power supply since a bad or unstable power supply may worsen the sound quality or even cripple the amplifier board.

Warning 3:

Never equip a pre-amplifier to the audio input since the amplifier itself has powerful amplification ability and a high signal input will burn out the amplifier chip.

Warning 4:

In order to protect amplifier and speaker, please turn the volume output to the minimum when hooking up the amplifier and you may readjust the volume when you are sure that the amplifier is functioning properly.

Chapter 3. Electrical Characteristics

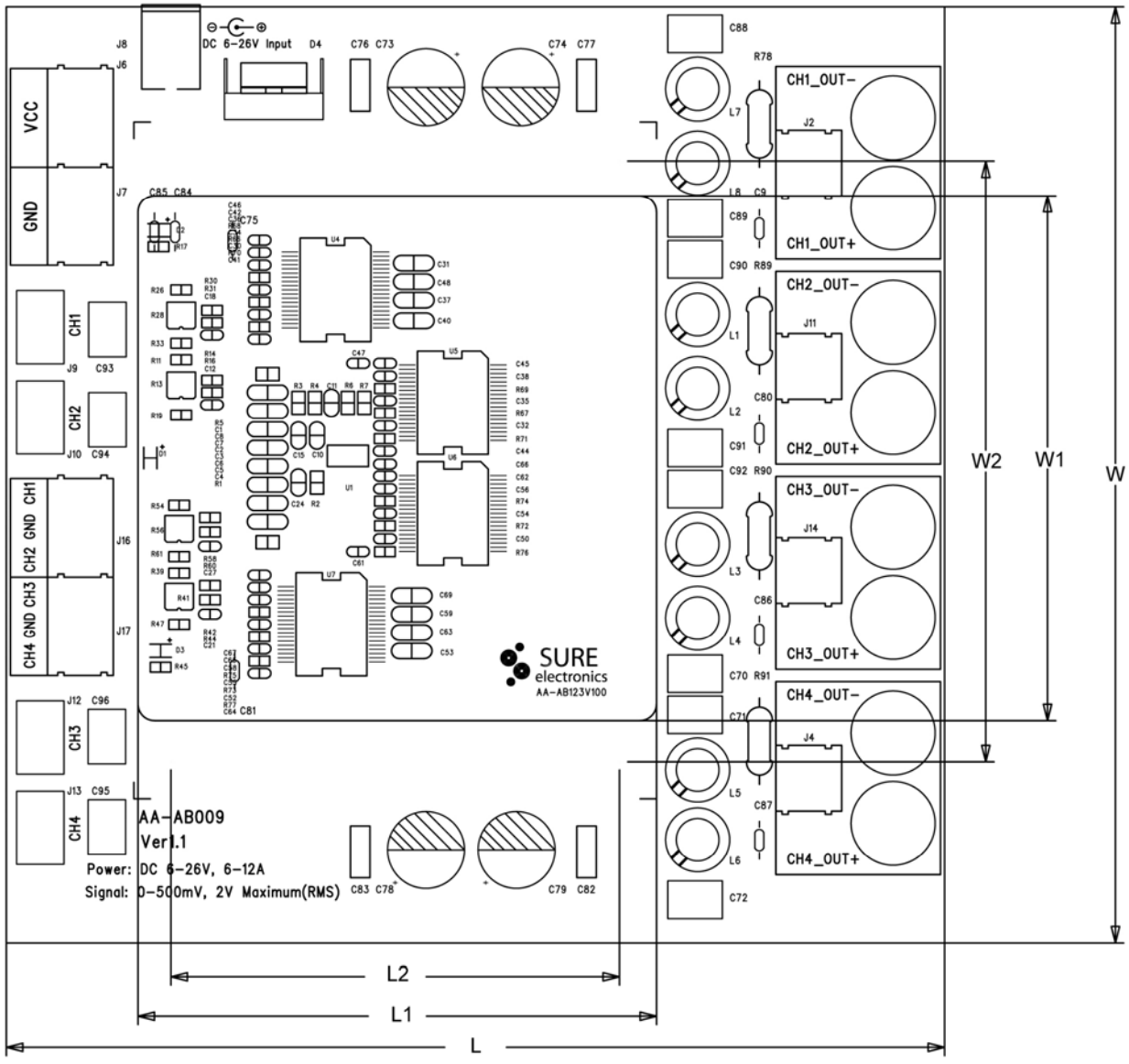
Following table lists all typical data. For full specification, please refer to the Tripath data sheet of TK2050 chip.

Parameter	Min.	Typ.	Max.
Supply Voltage	10V	24V	30V
Over-current Shutdown*	7A	12A	16A
Signal/Noise Ratio	90dB(A-Weighted)	100dB(A-Weighted)	-
THD+N	-	0.010% THD+N @ 70W 4Ω 0.007% THD+N @ 30W 8Ω	-
Frequency Response		20HZ—20KHz（±3dB）	-
Input Sensitivity	0.720V	0.771V	0.800V
Channel Separation*	80dB	95dB	-
Efficiency* (Vcc=32V)	-	86% @ 117W 4Ω 82% @ 46W 6Ω 88% @ 60W 8Ω	-
Output power 4 ohm*@30V rail	-	50W <0.01THD+N 100W<10% THD+N	-
Output power 8 ohm*@30V rail	-	35W<0.01THD+N 60W<10% THD+N	-
Offset Voltage (adjustable)	-10mV	0mV	10mV
Input Impedance	20K ohms	22K ohm	-
Minimum Load	3.2 ohm	-	-
Power Stage Gain	14V/V	16V/V	18V/V
Thermal Warning*	-	130ºC	-
Thermal Shutdown*	-	150ºC	-

Note: *The chip specifications from Tripath Data Sheet of TK2050 chip. Some has been regulated according to the actual situation.

Chapter 4. Mechanical Drawing

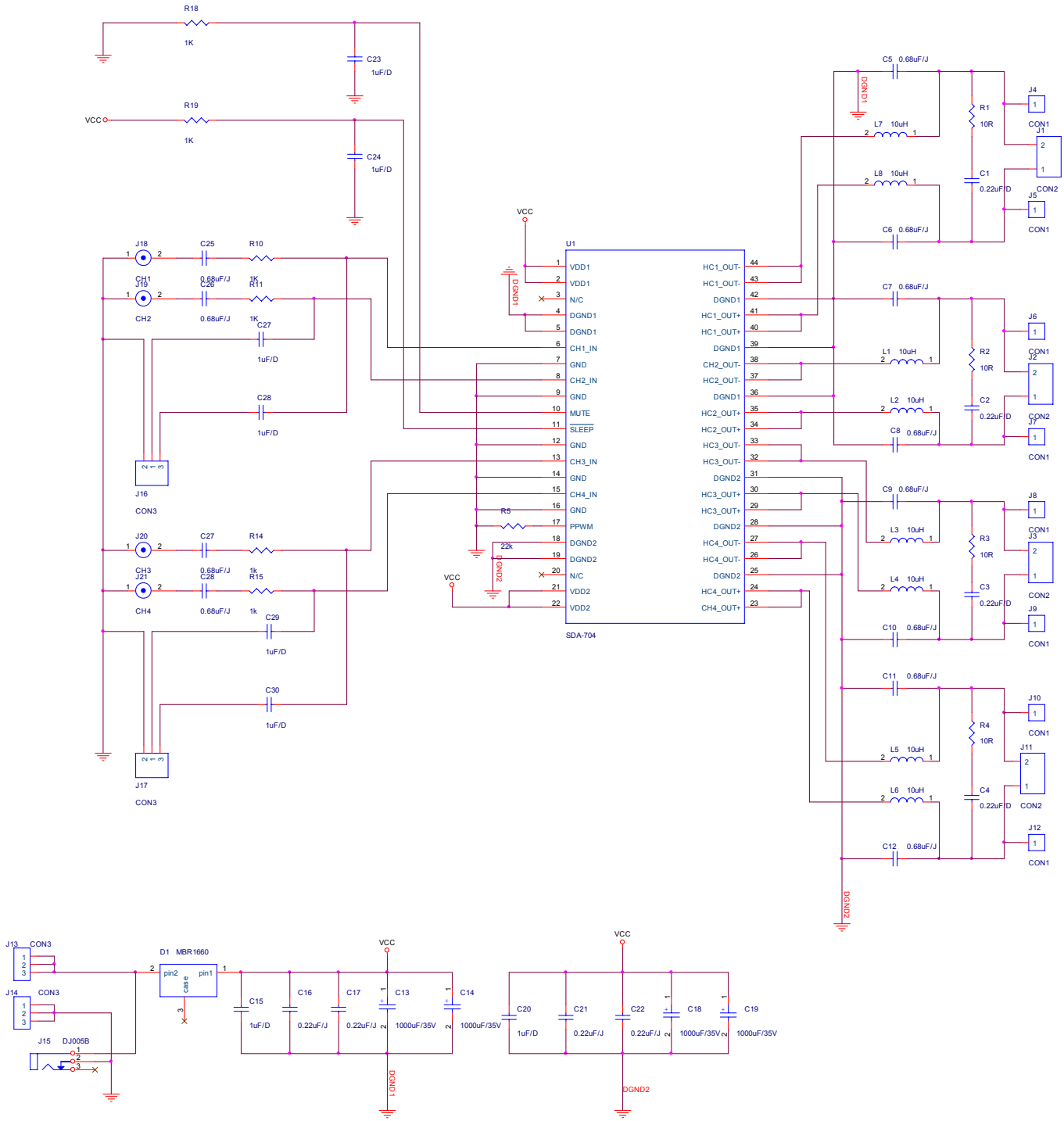
FIGURE 4-1 MECHANICAL DRAWING



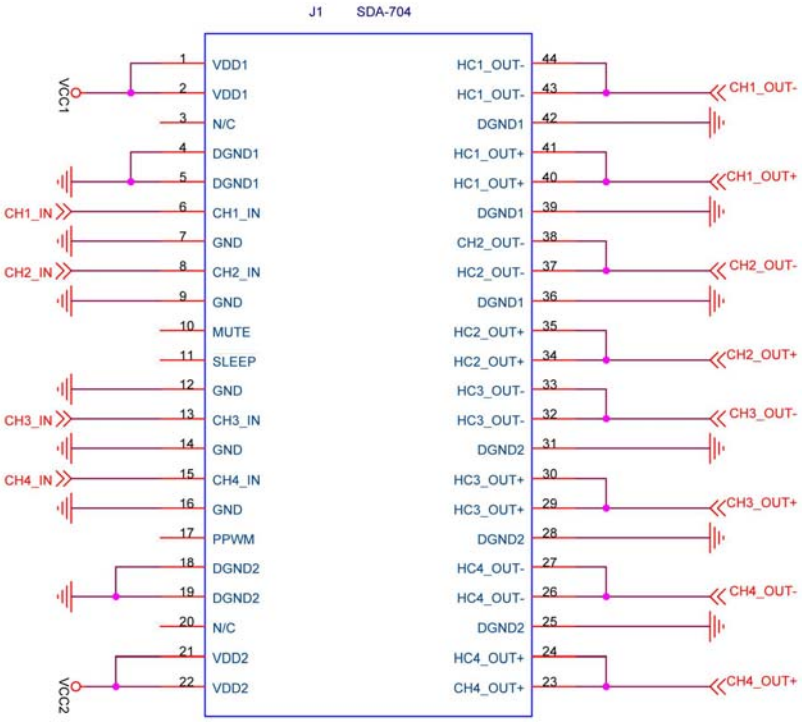
Symbol	L	L1	L2	W	W1	W2
Inch	5.70	3.15	2.73	5.70	3.20	3.66
mm	144.78	80.01	69.34	144.78	81.28	92.96

Chapter 5. Appendix

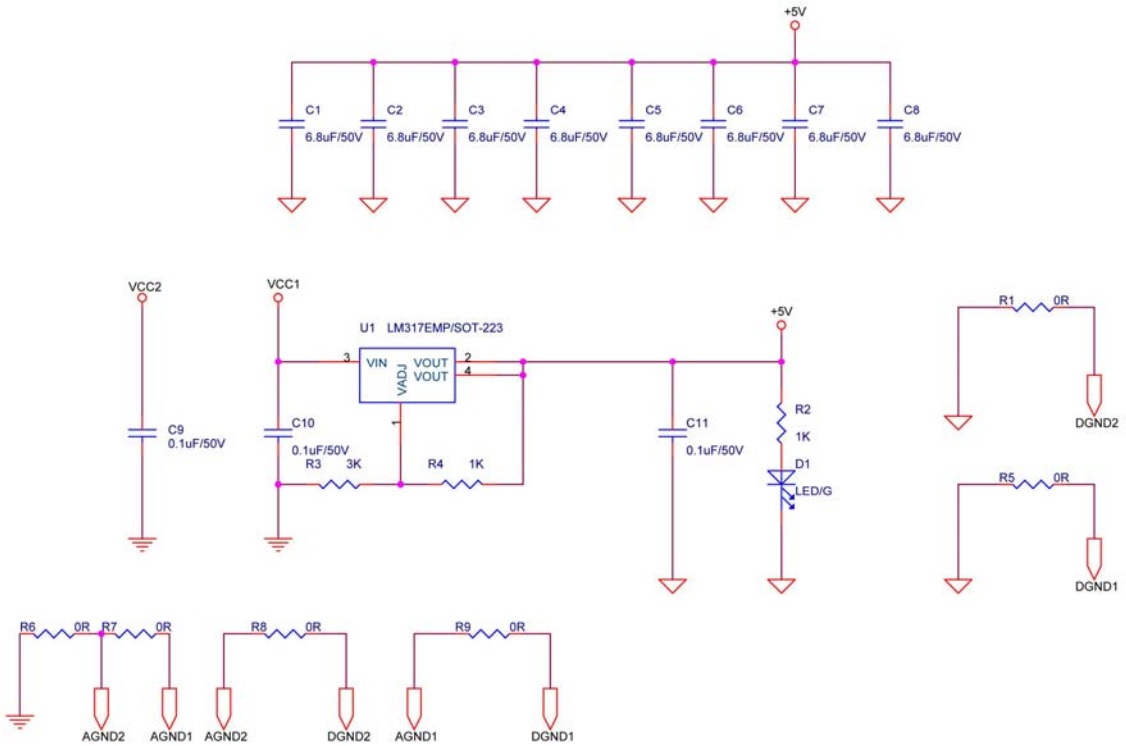
5.1 Schematics 1



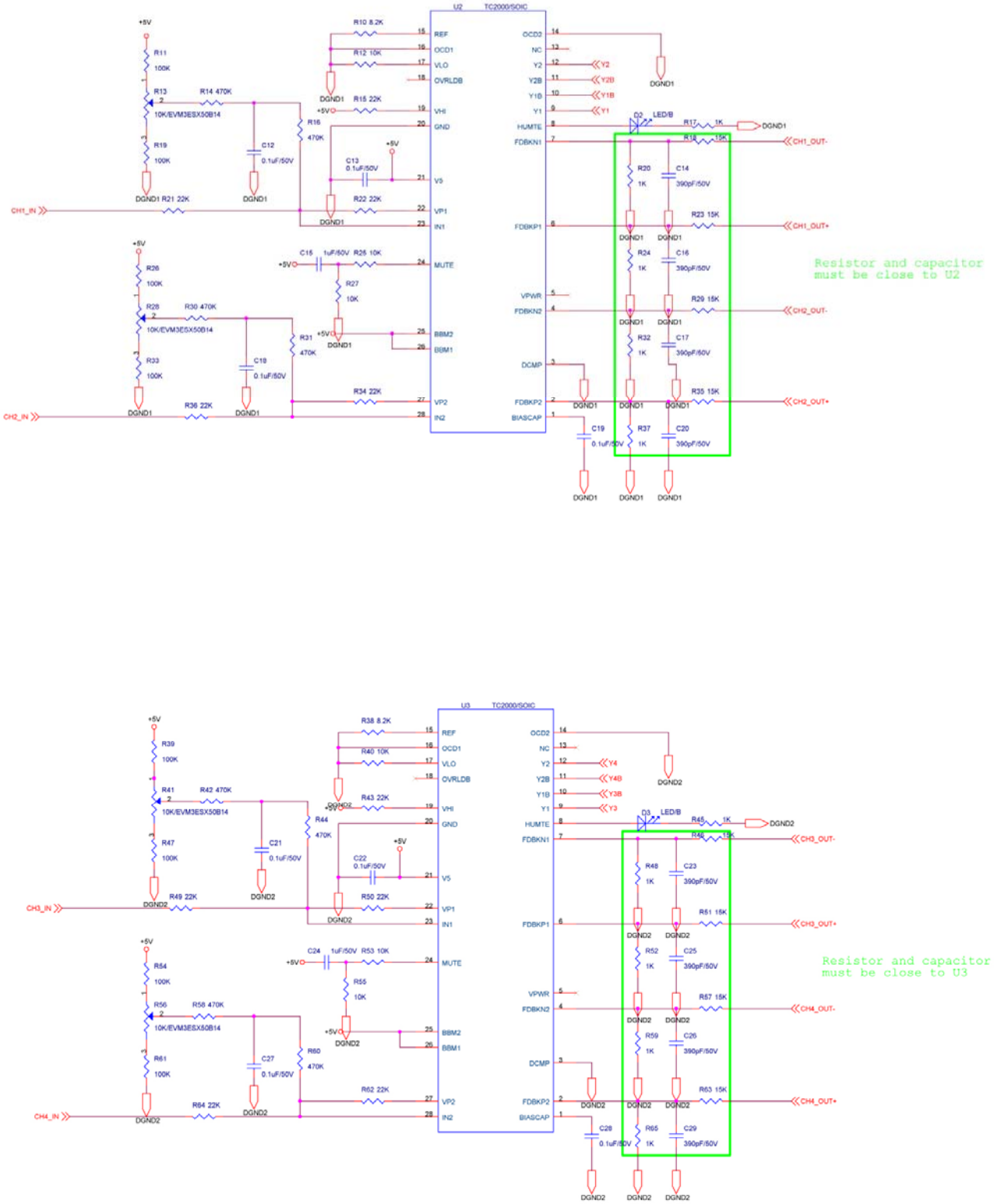
5.2 Schematic 2_Jack



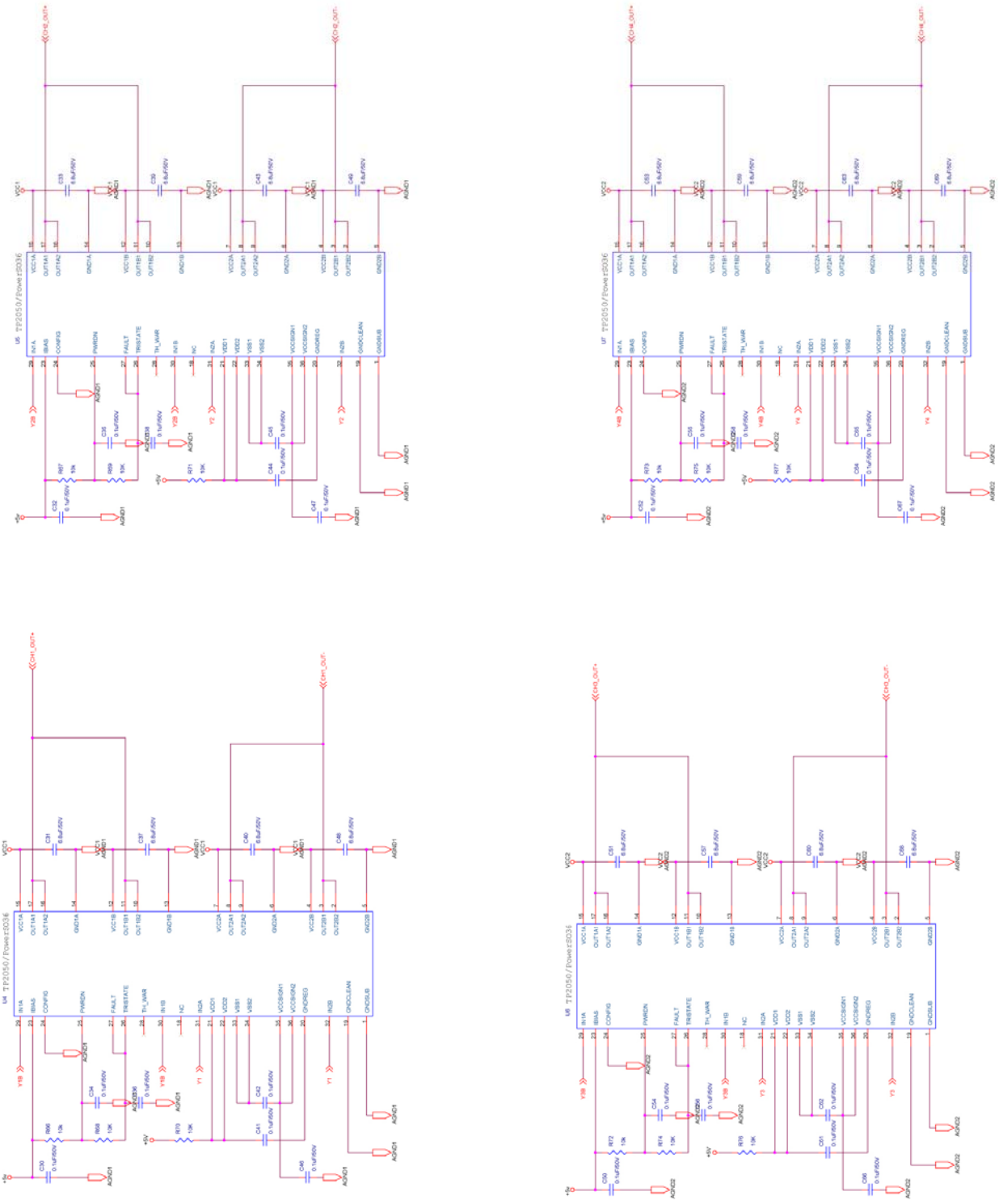
5.3 Schematic 3_Power



5.4 Schematic 4 _ TC2000



5.5 Schematic 5 _ TP2050



Note: The above schematics are used for reference only. There might be a tiny difference in production batch.

Chapter 6. Contact Us

Sure Electronics Co., Ltd.
5F, Zone A,
Qinhuai Technology Innovation Center
105-2 DaMing Rd (ZIP:210022)
Nanjing
P.R.China
Tel: +86-13601408832 (For technical questions only)
+86-25-66606340 (English service, from GMT1-10AM)
Fax: +86-25- 66606341-866
Website: www.sure-electronics.com
www.sure-electronics.net