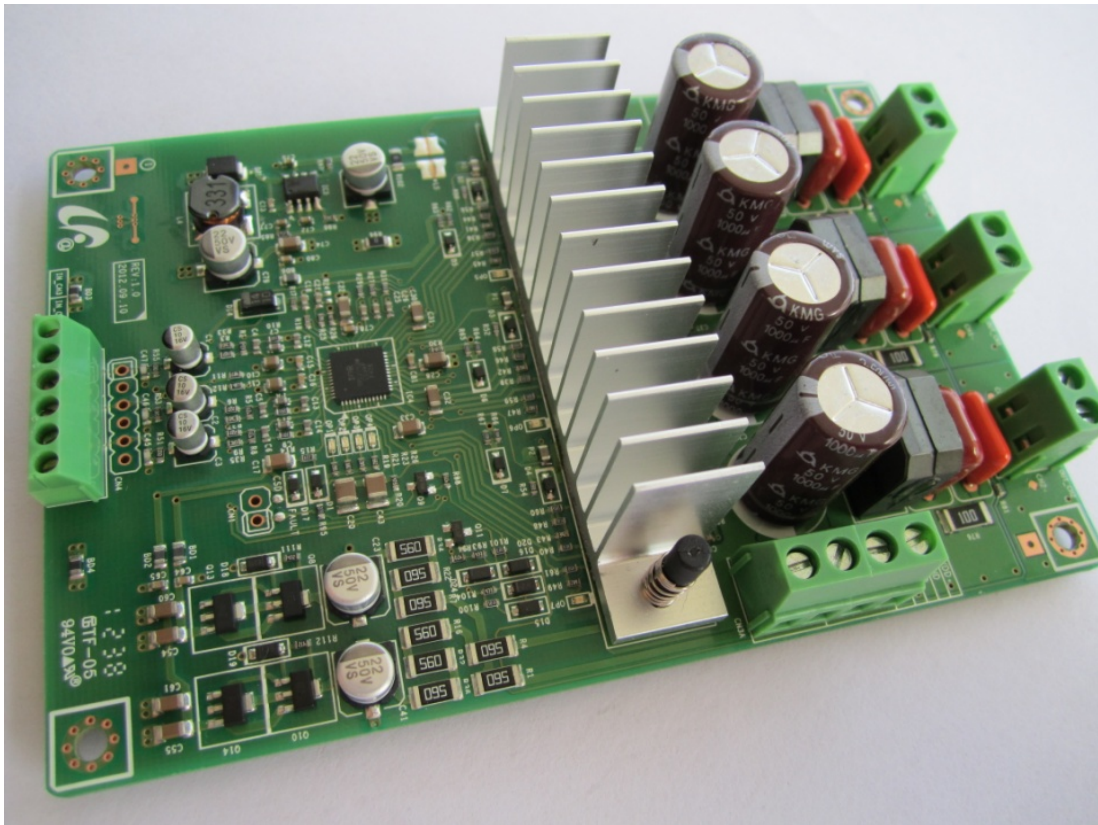

AWSAUDAMP1

120W x 3 Channel Class D Audio Power Amplifier Using the IRS2053M and IRF6665



CAUTION:

Airwavesystem suggests the following guidelines for safe operation and handling of this board;

- Avoid personal contact with exposed metal surfaces when operating board
- Turn off board when placing or removing measurement probes
- In strict accordance with this instructions to your DIY operation

Introduction

This Class D amplifier board is a DIY project that refer to IRAUDAMP11 but some parts are modified due to DIY condition.

There are some reasons for me to carry out this project:

- Simply for DIY and make Class D easier
- Class D advantages such as higher efficiency,higher performance,smaller package,etc
- 3 Channel Amplifier can make up 2.1 system,or 5.1 system by use 2 boards in real DIY
- More benefits you can find when you practice with me

This application note will show you how this DIY project will be realize.

Applications

- AV receivers
- Home theater systems
- Mini component stereos
- Powered speakers
- Sub-woofers
- Musical Instrument amplifiers
- Automotive amplifiers

Features

Output Power :	158W x 3 channels (4Ω, THD+N=1%) 195W x 3 channels (4Ω, THD+N=10%)
Residual Noise :	220uV, IHF-A weighted, AES-17 filter
Distortion :	0.04% THD+N @ 60W, 4Ω (SMPS Power Source)
Efficiency :	90% @ 120W, 4Ω, single-channel driven, Class D stage
Multiple Protection Features :	Over-current protection (OCP) Over-voltage protection (OVP), Under-voltage protection (UVP) Over-temperature protection (OTP)

Specifications

1. General Operation Conditions (unless otherwise noted)

No	Item	Typical	Min,Max Ratings
1	Supply Voltages	$\pm 35V$	$\pm 18V$ to $\pm 41.6V$
2	Load Impedance	4 Ω	4 Ω - 8 Ω
3	Self-Oscillating Frequency	500kHz	-
4	Gain Setting	28 dB	-
5	Total Idle Power Consumption	6 W	No input signal
6	Channel Efficiency	90 %	Single-channel driven, 120W

2. Audio Performance

Test Conditions: Supply = $\pm 35V$, 4 Ω Resistive Load, 1KHz Reference Frequency

No	Item	Measurement Condition	Unit	Spec
1	Output Power	Freq:1KHz, THD+N=1%	W	158
2	Distortion	Freq:1KHz,1W	%	0.02
3	S/N Ratio	Freq:1KHz,1W	dB	76
4	Separation	Freq:1KHz,1W	dB	75
5	Freq Response	20Hz-35kHz,1W	dB	± 3
6	Residual Noise:	22Hz - 20kHz,AES17	μV	220

Physical Specifications

Dimension	135mm(L) x 90mm(W) x 30mm(H)
Weight	0.2kgm

Connection Setup

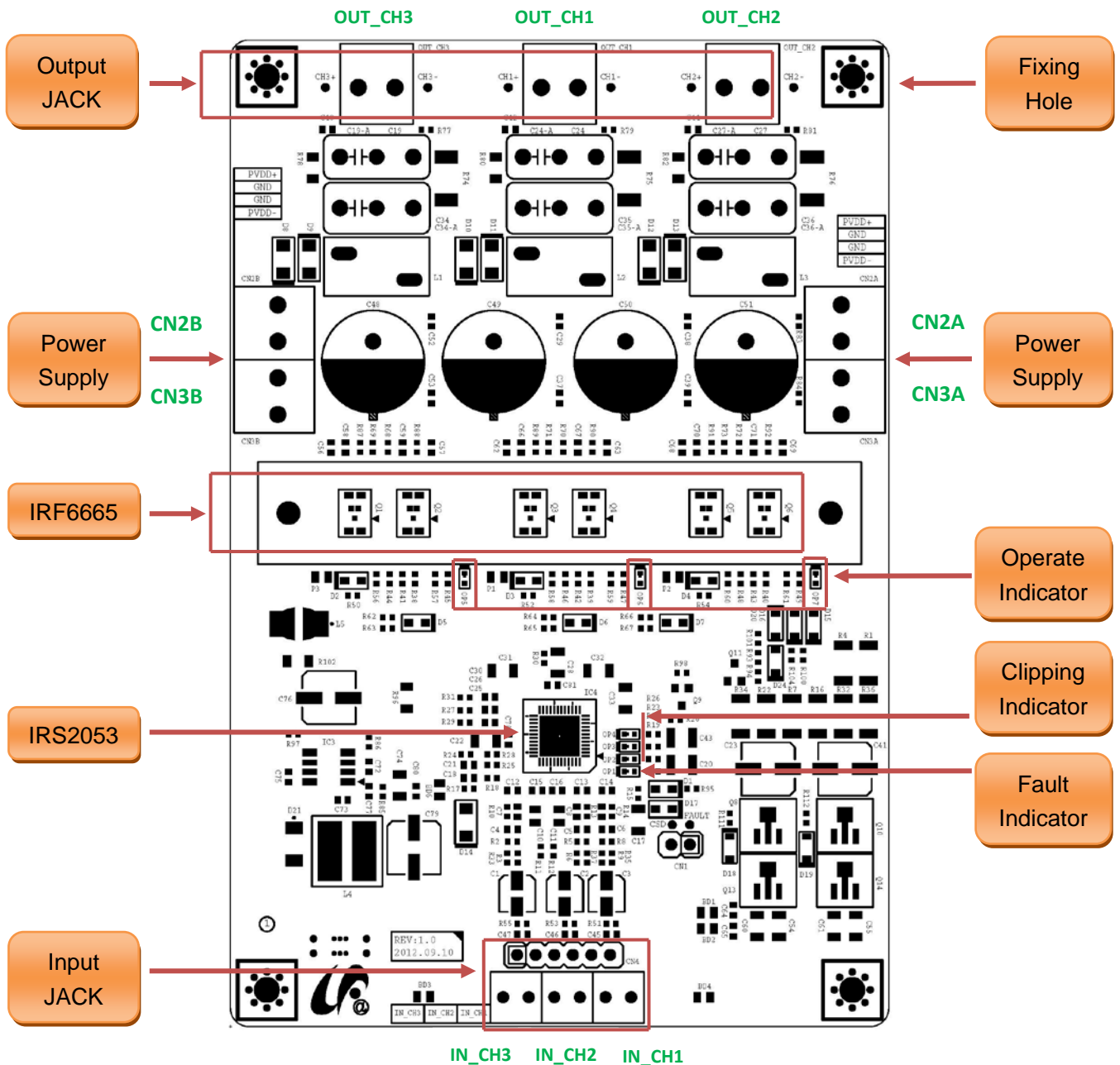


Figure 1

Connector Description

No	Locations	Description
1	IN_CH1 - 3	Input for Channel1 - 3
2	OUT_CH1 - 3	Output for Channel1 - 3
3	CN2A/CN2B	Positive supply (PVDD+)
4	CN3A/CN3B	Negative supply (PVDD-)
5	CN4	6P Header Connector (Optional for analog input)
6	CN1	System fault indication output for MCU detect (Optional)

Setup Procedures

1. Connect your speaker to output connectors (OUT_CH1, OUT_CH2, OUT_CH3 as show on Figure 1)
2. Connect the Audio Signal to input connectors (IN_CH1, IN_CH2, IN_CH3 as show on Figure 1)
3. **TURN OFF** your dual power supply before connecting to this board.
4. Connect the dual power supply to the power connectors (CN2A,CN3A as show on Figure 1)
5. Turn ON the dual power supply, \pm PVDD must be applied and removed at the same time.
6. The RED LED (**OP5,OP6,OP7**) should turn ON immediately and stay ON.
7. Play your music and set audio signal to input,you will hear the audio output from speaker.
8. IF fault condition occurred,RED LED (**OP1**) will turn ON immediately and stay ON.skip to next step.
9. CN2A&CN3A,CN2B&CN3B are power connectors, but CN2B&CN3B are optional,not fix in this board.

Troubleshooting

Any fault condition except board damage will result in RED LED (**OP1**) turn ON,check the following:

1. Over-voltage protection (OVP), bus voltage between GND and -PVDD exceed 41.6V.
2. Under-voltage protection (UVP), bus voltage between GND and -PVDD under 18.6V.
3. Over-temperature protection (OTP), if the temperature of FET rises above 115°C.

Test data

1. THD+N

Test Conditions: Supply \pm 35V,4 Ω Resistive Load, 1KHz Reference Frequency

Power (W)	0.1	0.2	0.5	1	2	5	10	20	40	60	80	100	120	150	170	200
THD+N (%)	0.0578	0.0430	0.0328	0.0209	0.0159	0.0137	0.0166	0.0225	0.0290	0.0395	0.0525	0.0703	0.0922	0.534	3.52	11.47

2. Frequency Response

Test Conditions: Supply \pm 35V,4 Ω Resistive Load, 1KHz Reference Frequency

Frequency	10	20	50	100	500	1K	2K	5K	10K	15K	20K	25K	30K	35K	50K	100K
dB	-1.22	-0.36	-0.07	-0.02	0	0	-0.01	-0.07	-0.26	-0.54	-0.90	-1.36	-1.92	-2.60	-5.18	-12.56

Design Application

- 1. Gain Setting**
- 2. Self-Oscillation Frequency**
- 3. Over Current Protection**
- 4. Over Temperature Protection**
- 5. DC Offset Protection**
- 6. Fault Output**
- 7. CLIP Output**
- 8. Dead Time Design**
- 9. Over & Under Voltage Protection**
- 10. Grounding**