

Class D Audio Amplifier

Table of component models use in the DesignKit

Code	Classification	Part No.	Manufacturer	SPEC
IC1	Class D Audio Amplifier IC	IRS2092	International Rectifier	
FET1, FET2	Power MOSFET	IRFIZ24N	International Rectifier	$V_{DSS}=55V, I_D=14A$
D1, D2	Diode	MUR120RLG	On semiconductor	200V, 1A
L1	Inductor	7G14N-220-RB	SAGAMI	22uH, 5.2A
C1	Aluminum Electrolytic Capacitor	EKMG500ELL100ME11D	Nippon Chemi-Con	10uF, 50V
C16, C18		EKMG500ELL222MLP1S	Nippon Chemi-Con	2200uF, 50V
C6	Film Capacitor	AMZ0050J102	NISSEI ELECTRIC	1nF
C12		MMC250K474	NISSEI ELECTRIC	0.47uF, 250V
C13		MMC400K104	NISSEI ELECTRIC	0.1uF, 400V
C14		MMH250K684	NISSEI ELECTRIC	0.68uF, 250V
C3	Ceramic Capacitor	RPER11H103K2K1A01B	MURATA	10nF, 50V
C11, C15, C17		RPER11H104K2K1A01B	MURATA	0.1uF, 50V
Speaker		F120A	FOSTEX	8 ohm, ~20kHz

Simulation files are stored in folders, as shown in list below.

Simulation

1. Efficiency Evaluation.....
2. THD Evaluation.....
3. Frequency Response Evaluation.....
4. Waveforms Evaluation.....
5. Voltage gain of the amplifier – G_v
6. Self-Oscillating Frequency.....
7. Dead-time Evaluation.....
8. Turn-on transient.....
9. Component stresses.....
10. Power losses in the MOSFETs (Standard model)
11. Power loss in the MOSFETs (Professional Model)
12. Short Circuit vs. Switching Output Shutdown.....
13. Short Circuit Response.....

Folder Name

- Efficiency
- THD
- FrqRsp
- Waveforms
- Gv
- OSC
- DT
- StartUp
- Stress
- FET(STD)
- FET(PRO)
- Short
- ShrtRsp

※ Please copy the folder named “Simulations” to your PC. Library files (.lib) are added already.

Design document: Class D Audio Amplifier Using IRS2092

Contents

1. Specification
 - Efficiency
 - THD
 - Frequency Response
 - Note: $P_o[W]$ vs. $V_{in}[V_{PEAK}]$
2. Waveforms Evaluations
3. Simulated vs. Measured Waveforms
4. Voltage Gain – G_V
5. Self Oscillation Frequency
6. Dead time
7. Turn on transient
8. Components stress
9. Power loss in the MOSFETs
 - Standard Model
 - Professional Model
 - Standard vs. Professional Model
10. Short circuit vs. switching output shutdown
11. Short Circuit Response
12. Capacitor Models
13. Simulated Performance of the circuit with different FETs
14. Simulation Index

Get Started with DesignKit: Class D Audio Amplifier Using IRS2092

Contents

1. DesignKit Simulations folders
2. How the initial condition are set?
3. Example of Using Design Kit
4. How to Estimate Design %Efficiency?
5. How to Estimate Output THD?
6. How to Estimate Frequency Response?
7. How to Create Reference Waveforms?
8. Change R_{IN} (R_2) and simulate to see change in G_V
9. Use Design Kit to select proper VR value
10. Use Design Kit to Predict Spike Voltage vs. Dead-time setting
11. Use Design Kit to Develop the Design (Change the FETs)
12. MOSFET Professional Model