IC for Headphone Stereos
Monolithic IC MM1376

Outline

This IC was developed for use in 3V headphone stereos, and combines all the basic audio circuitry for headphone stereos on a single chip.
Recently hearing impairment caused by the high volumes of headphone stereos has become a problem, and there has been strong demand for functions for limiting loud volumes in the sets themselves. This IC incorporates an ALC circuit and has functions to hold the output from the headphone to a fixed level; it also eliminates the ordinary electronic governor circuit in order to accommodate trends toward thinner sets, as seen in the adoption of BSL motors.

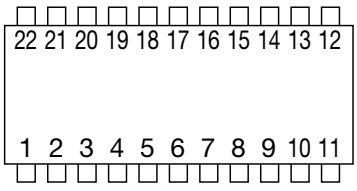
Package

1. Configuration: Pre-and power amps, ALC circuit
2. Internal tape selector: A selector switch allows the user to select between normal and metal tapes.
3. Internal OCL circuit: No need for large-capacitance output capacitor
4. Preamp off function: Preamp alone can be turned off for connection to radio etc.
5. MM1376CF amp gain takes Dolby noise reduction into account

Package

SOP-22

Pin Assignment



SOP-22

1	COM1	12	Power output
2	Preamp non-inverted input	13	V_{CC}
3	Preamp inverted input	14	Ripple filter
4	Metal switching output	15	Preamp off
5	Preamp output	16	Tape selector
6	Power input	17	Power input
7	Rectifier pin	18	Preamp output
8	ALC control	19	Metal switching output
9	Power output	20	Preamp inverted input
10	COM2	21	Preamp non-inverted input
11	GND1	22	GND2

Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Operating temperature	T_{OPR}	–10~+65	℃
Storage temperature	T_{STG}	–40~+125	℃
Power supply current	V_{CC}	–0.3~+7.5	V
Power consumption	Pd	350	mW

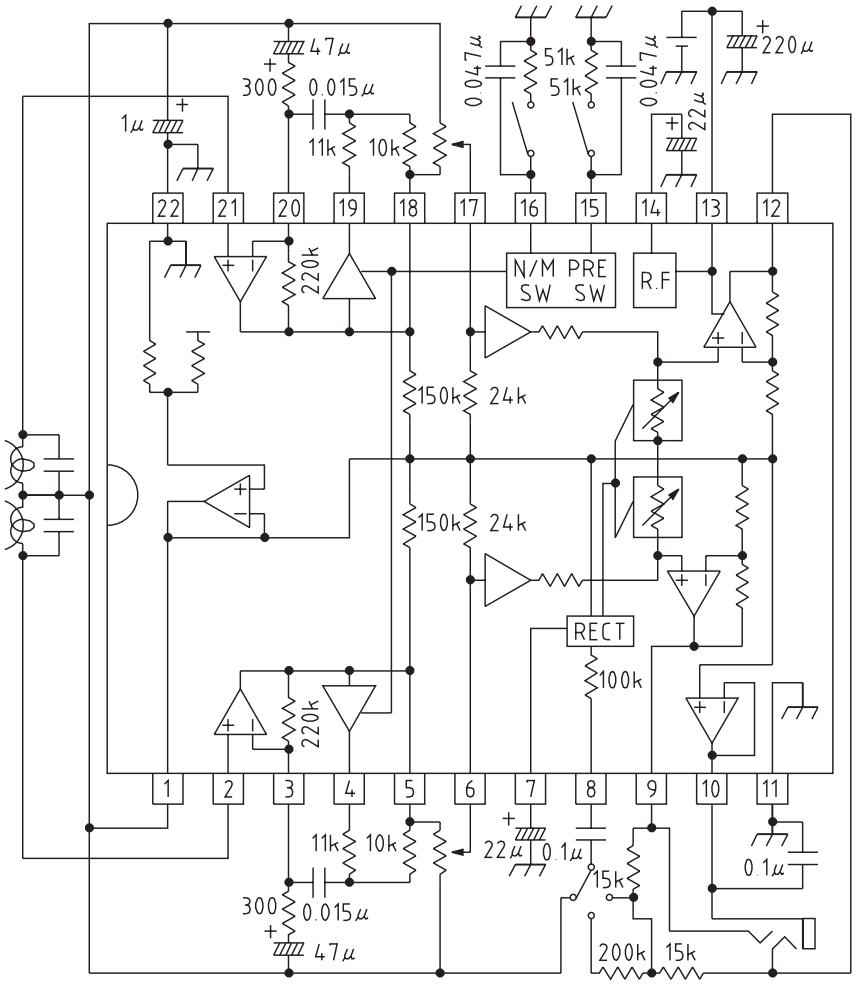
Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	T_{OPR}	−10~65	℃
Operating voltage	V_{OPR}	2.0~5.0	V

Electrical Characteristics (Except where noted otherwise, Ta=25℃, V_{CC}=3V, f=1kHz, R_L1=10kΩ, R_L2=16Ω)

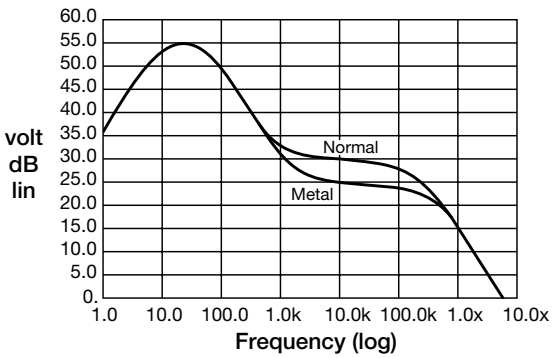
Item		Measurement conditions		Min.	Typ.	Max.	Units
Consumption current		V_{IN}=0V		6	14	22	mA
Preamp unit							
Open-circuit gain					72		dB
Closed-circuit gain Ⅰ	Normal	Vo=−10dBm, f=1kHz		31	33.5	36	dB
	Metal			29.5	32	34.5	
Closed-circuit gain Ⅱ	Normal	Vo=−10dBm, f=5kHz		28	30.5	33	dB
	Metal			23	25.5	28	
Maximum output voltage		THD=10%		0.30	0.45		Vrms
Total harmonic distortion ratio		V_{OUT}=−10dBm			0.05	0.5	%
Output noise voltage	Normal	Rg=2.2k, BPF (400~30kHz)		30	75	150	μVrms
	Metal			20	45	100	
Crosstalk between channels		Rg=2.2kΩ, V_{OUT}=−10dBm		50	70		dB
Ripple rejection		V_{CC}=3V, V_R=−20dBm, f_R=100Hz Rg=2.2kΩ		45	55		dB
Output voltage with preamp off		V_{IN}=100mVrms, Pre off			−80	−60	dBm
ALC (off) + power amp							
Voltage gain		P_{OUT}=5mW	CF	24	26	28	dB
			DF	30	32	34	
Voltage gain difference between channels				−2	0	2	dB
Maximum output current		THD=10%, R_L=16Ω		30	50		mW
Total harmonic distortion ratio		P_{OUT}=5mW			0.5	1.5	%
Crosstalk between channels		P_{OUT}=5mW		35	45		dB
Output noise voltage		Rg=0Ω, BPF (400~30kHz)	CF		85	200	μVrms
			DF		135	250	
Ripple rejection		V_{CC}=3V, V_R=−20dBm f_R=100Hz, Rg=0Ω	CF	35	45		dB
			DF	35	40		
Input resistance				19	24	29	kΩ
ALC (on) + power amp							
Power amp output voltage		V_{IN}=−40dBm		−34	−30	−26	dBm
ALC initiation input voltage			CF		−56		dBm
			DF		−62		
ALC width		Input width for output from start of up to +4dB		30	40		dB
ALC total harmonic distortion		V_{IN}=−40dBm			0.5	1.5	%
Noise of preamp+power amp+ALC		Rg=2.2kΩ (Pre amp), Noise of preamp+power amp	CF		1.5	6	mVrms
			DF		2.8	6	

Application Circuits



Characteristics

Preamp Gain- Frequency



ALC + power amp (32 dB) VIN–VOUT RL=16ohm