IC for Headphone Stereos (with volume-limiting circuit) Monolithic IC MM1336

Outline

This IC was developed for use in 3V headphone stereos. In addition to the basic functions required by headphone stereos, it incorporates a circuit for limiting volume. In some parts of Europe 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 trend is expected to gain momentum in the U.S. as well.

This IC uses an internal ALC circuit to suppress headphone stereo output, avoiding the above problem.

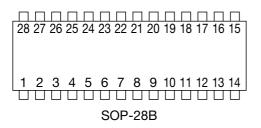
Features

- 1. Configuration: Pre-and power amps, ALC circuit, motor control
- 2. Internal tape selector: A selector switch allows the user to select between normal and metal tapes.
- 3. Internal OCL circuit: There is no need for a capacitor for high-volume output, so sets can be kept thin.
- 4. With preamp off pin while connected to radio
- Designed for low shock noise
 Reduced noise occurring when the power supply is turned on and off

Package

SOP-28B (MM1336CF, MM1336DF)

Pin Assignment



1	COM1	15	VS
2	PIN1	16	С
3	PNF1	17	Vcc2
4	PBU1	18	OUT2
5	POUT1	19	Vcc1
6	IN1	20	RF
7	RECT	21	Pre OFF
8	AVNF	22	N/M
9	OUT1	23	IN2
10	COM2	24	POUT2
11	GND1	25	PBU2
12	GND2	26	PNF2
13	PCOUT	27	PIN2
14	PHASE	28	GND3

Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Operating temperature	Topr	-20~+65	°C
Storage temperature	Tstg	-40~+125	°C
Power supply current	Vcc	-0.3~+7.5	V
Power consumption	Pd	700	mW

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	Topr	-20~65	$^{\circ}$ C
Operating voltage	Vopr	2.0~5.0	V

Electrical Characteristics (Except where noted otherwise, Vcc=3V, Ta=25°C, f=1kHz, RL1=10kΩ, RL2=16Ω)

Item		Symbol	Measurement conditions		Тур.	Max.	Units	
Consumption current		Icc	V _{IN} =0V, when motor is off		12	20	mA	
Preamp unit								
Open-circuit gain		Gvo			72		dB	
Closed-circuit gain I	Normal	Gvc	Vo=-10dBm, f=1kHz	31	33.5	36	dB	
	Metal	avc		29.5	32	34.5		
Closed sixouit gain II	Normal	Gvc	Vo=-10dBm, f=5kHz	28	30.5	33	dB	
Closed-circuit gain II	Metal			23	25.5	28		
Maximum output v	oltage	Vom	THD=10%	0.30	0.45		Vrms	
Total harmonic distortion ratio		THD	Vout=-10dBm		0.05	0.5	%	
Output noise voltage	Normal	Vno	Rg=2.2k, BPF (400~30kHz)	30	75	150	μVrms	
	Metal	V 11O	Rg=2.2R, D1 1 (400~30R112)	20	45	100	μντms	
Crosstalk between o	hannels	$C \cdot T$	Rg=2.2kΩ, Vout=-10dBm	50	70		dB	
Ripple rejection rate		RR	$V_{CC}=3V$, $V_{R}=-20dBm$, $f_{R}=100Hz$, $Rg=2.2k\Omega$	45	55		dB	
Output voltage with preamp off		Vooff	V _{IN} =100mVrms, Pre off		-80	-60	dBm	
ALC (off) + power amp								
Voltage gain		Gv	Pout=5mW	24	26	28	dB	
Voltage gain difference between channels		$\triangle GV$		-2	0	2	dB	
		2CH		-2	U	2	uD	
Maximum output current		Pom	THD=10% R _L =16Ω	30	50		mW	
Total harmonic distortion ratio		THD	Pout=5mW		0.5	1.5	%	
Crosstalk between channels		$C \cdot T$	Pout=5mW	35	45		dB	
Output noise voltage		Vn	Rg=0Ω, BPF (400~30kHz)		85	200	μVrms	
Ripple rejection rate		RR	$V_{CC}=3V$, $V_{R}=-20dBm$, $f_{R}=100Hz$, $Rg=0\Omega$	35	45		dB	
Input resistance		Ri		19	24	29	kΩ	
ALC (on) + power amp								
Power amp output voltage		VOA	V _{IN} =-40dBm	-34	-30	-26	dBm	
ALC initiation input voltage		VINA			-56		dBm	
ALC width		WALC	Input width for output from start of up to +4dB	30	40		dB	
ALC total harmonic distortion		THD	V _{IN} =-40dBm		0.5	1.5	%	
Noise of preamp+power amp+ALC		Vnto	Rg=2.2kΩ (preamp)		1.5	6	mVrms	

Item	Symbol	Measurement conditions	Min.	Тур.	Max.	Units
Motor control unit						
Consumption current	Id	A2 measurement I _M =0mA		1.5	3.5	mA
Startup current	IMS	At Rv=1.5Ω	500			mA
Reference voltage	VS	At SW1=OFF, I _M =100mA	0.09	0.10	0.11	V
		VS fluctuation rate for Vcc between				
Reference voltage fluctuation I	⊿VS1	1.8 and 3.5V with Vcc=3.0		0.1	0.5	%/V
		V as reference, I _M =100mA				
		VS fluctuation rate for I _M between				
Reference voltage fluctuation II	∠VS2	25 and 200 mA with		0.005	0.05	%/mA
		I _M =100 mA as reference				
		VS fluctuation rate for Ta between				
Reference voltage fluctuation III	∠VS3	−10 and 50°C with		0.01		%/°C
		Ta=25°C as reference				
Output saturation voltage	VoSAT	IM=200mA, V8 measurement, SW2=on		0.2	0.3	V
Bridge ratio	K	∠V7/∠V6 measurement	9	10	11	
		K fluctuation rate for Vcc between				
Bridge ratio fluctuation I	⊿K1	1.8 and 3.5V with		0.1	0.2	%/V
		Vcc=3V as reference				
		K fluctuation rate for Im between				
Bridge ratio fluctuation II	∠K2	25 and 250mA with		0.05	0.2	%/mA
		I _M =100mA as reference				
		K fluctuation rate for Ta between				
Bridge ratio fluctuation III	∠K3	−10 and 60°C with		0.01		%/°C
		Ta=25°C as reference				

Block Diagram

