



MICROPHONE PREAMPLIFIER WITH LOUDSPEAKER DRIVER AND REGULATOR

Features

- 2 low noise amplifiers...8nV/Hz typ at 1kHz
- 2 high drive loudspeaker amplifiers...125mA drive into 8Ω speaker
- "no click" mute function
- low power consumption
- low drop out regulator
- stable reference voltage
- thermal shutdown circuitry
- two lower power shutdown modes
- diagnostic output indicates fault conditions
- minimal external components
- 18 pin DIP or SO

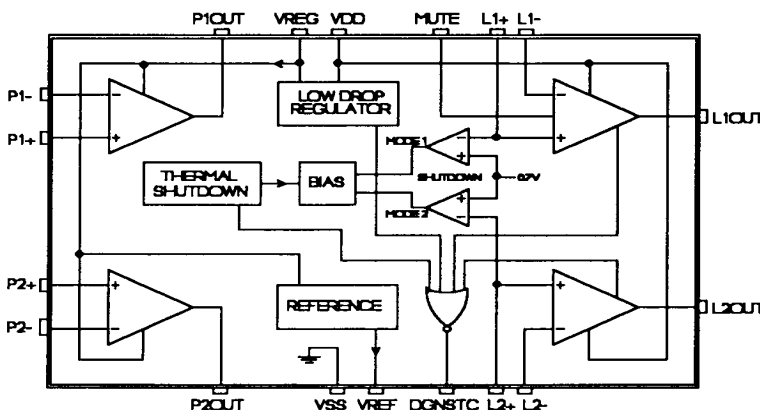
Applications

- portable telephones
- low cost audio systems
- power supplies and monitoring
- sensor interfacing

Description

WM8013 is designed primarily for microphone preamplification and loudspeaker drive in telecommunication applications. Two low noise operational amplifiers, ideally suited to microphone preamplification, can be externally configured. Two further amplifiers have 125mA output drive capability intended for loudspeaker drive, with a pin programmable 'no click' mute function. The output stages of these amplifiers are supplied from the unregulated supply, minimising modulation of the regulated supply. An on chip regulator provides 5V supply, and stable 2.5V bandgap reference. Thermal shutdown circuitry protects device from excessive current conditions in loudspeaker amplifiers or regulator. Two lower power shutdown modes are available, mode 1 shuts all functions off including reference and regulator, whilst mode 2 leaves reference, regulator and thermal shutdown active. A diagnostic pin provides indication of fault conditions - loudspeaker outputs in current limit, excessive regulator load or thermal shutdown imminent. The amplifiers contained on this device can also be used for power supply supervisory functions, either as operational amplifiers or as comparators. The WM8013 is characterised over commercial and industrial temperature ranges.

Block Diagram



Pin Configuration

	V		
VSS	1	18	VREF
VREG	2	17	P2-
P1-	3	16	P2+
P1+	4	15	P2OUT
P1OUT	5	14	L2+
L1+	6	13	L2-
L1-	7	12	L2OUT
L1OUT	8	11	VDD
MUTE	9	10	DGNSTC

Electrical characteristics at free-air temperature, 25°C

Parameter	Min	Typ	Max	Units
<u>Preamplifiers</u>				
Input offset voltage		0.5	5	mV
Input bias current		100	500	nA
Unity gain bandwidth	1	3		MHz
Open loop gain		60		dB
Power supply rejection		100		dB
Output current drive		1		mA
Equivalent input noise voltage		8		nV/√Hz
<u>Loudspeaker Amplifiers</u>				
Input offset voltage		0.5	5	mV
Input bias current		100	500	nA
Unity gain bandwidth	1	3		MHz
Open loop gain		60		dB
Power supply rejection		60		dB
Output current drive		125		mA
Mute input pull-down current		2		μA
Mute input control range		$V(L1+) \pm 1.0$		V
Mute input upper clamp		VDD-0.8		V
Mute attenuation	50			dB
Shutdown mode thresholds		0.7		V
<u>Regulator</u>				
Output voltage (VDD = 12V, IL = 1mA @ 25°C)	4.75	5	5.25	V
Output voltage over temperature range	4.65	5	5.35	V
Line regulation (VDD = 5.6V to 12V)		25		mV
Load regulation (IL = 0 to 20mA)		25		mV
Output current, IL			80	mA
Dropout voltage at 80mA		0.6		V
<u>Bandgap Reference</u>				
Bandgap voltage	2.375	2.5	2.625	V
Temperature stability		50		ppm/°C
<u>Thermal Shutdown</u>				
Junction shutdown temperature		140		°C
<u>Diagnostic</u>				
Junction temperature		135		°C
Loudspeaker output current limit		180		mA
Regulator output current limit		135		mA
Output sink current (active)		200		μA
Output leakage (non active)		1		μA

Parameter	Min	Typ	Max	Units
General				
Supply voltage, VDD	5.2		12	V
Quiescent current (operational)		6.5		mA
(shutdown mode 1)		70		μ A
(shutdown mode 2)		3.0		mA

Note : Other options allowing pre-configured gain for all amplifiers can be made available. Contact main office for details.

Ordering Information

Part	Package	Temp. Range
WM8013CN	18 pin plastic DIP	0 to 70°C
WM8013CD	18 pin SO (0.3")	0 to 70°C
WM8013IN	18 pin plastic DIP	-25 to 85°C
WM8013ID	18 pin SO (0.3")	-25 to 85°C

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