



# LA3550M — Monolithic Linear IC

## 1.5V Low-Frequency Reproduction (Autoloudness) IC

### Overview

The LA3550M is a low-frequency reproduction IC for use with 1.5V power supply systems and achieves optimal sound field playback in headphone stereo systems. This IC can provide 24dB of boost in the low-frequency components in the range 30 to 50Hz using external resistor and capacitor components. It also provides a boost gain control function using an external input signal and a fixed high-band boost that allow the LA3550M to provide a natural boost that gives depth to the sound appropriate to the level as well as a feeling of spaciousness. The LA3550M also provides a boost function on/off switch for easy external control.

### Features

- Includes both a control function that vary the low-band boost gain from 5.5 to 23.5dB and an output signal detection circuit, and can provide a boost effect (autoloudness) that varies with the output level simply by connecting the LA3550M to the headphone output pin.
- Superlative reduced voltage characteristics.
- Low output noise voltage.
- Low power consumption.
- Minimal number of external components.

### Functions

- Variable low-band (30 to 50Hz) boost of up to 23.5dB plus fixed 6dB high-band boost.
- Low-band boost gain control circuit.
- Output signal detection circuit.
- Built-in AGC circuit prevents clipping high-amplitude inputs during boost operation.
- Boost on/off switching function.

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# LA3550M

## Specifications

**Maximum Ratings** at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CC}$ max	No signal	4.5	V
Allowable power dissipation	$P_d$ max		150	mW
Operating temperature	$T_{opr}$		-20 to +75	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

**Operating Conditions** at  $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		1.5	V
Operating supply voltage range	$V_{CC}$ op		0.9 to 3.0	V
Recommended load resistance	$R_L$		10	$\text{k}\Omega$

**Operating Characteristics** at  $T_a = 25^\circ\text{C}$ ,  $R_g = 600\Omega$ ,  $R_L = 10\text{k}\Omega$ ,  $f_{DET} = 1\text{kHz}$ , in the specified test circuit

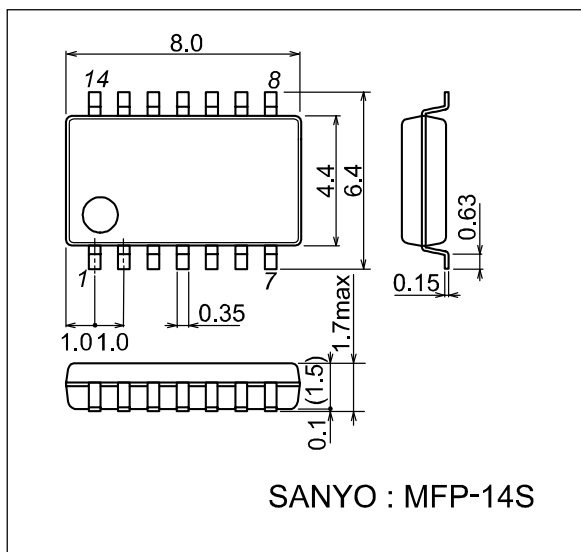
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	$I_{CCO1}$	No signal, $V_{CC} = 1.5\text{V}$ , boost off		1.4	2.0	mA
	$I_{CCO2}$	No signal, $V_{DET} = -10\text{dBm}$ , $V_{CC} = 1.5\text{V}$ , boost on		2.1	3.0	mA
Voltage gain	VG1	$V_{CC} = 1.1\text{V}$ , $f = 1\text{kHz}$ , boost off	-3.2	-1.7	-0.2	dB
	VG2	$V_{CC} = 1.1\text{V}$ , $f = 1\text{kHz}$ , boost on	-3.2	-1.7	-0.2	dB
Boost amount *	Boost1	$V_{CC} = 1.1\text{V}$ , $f = 50\text{Hz}$ , boost on, $V_{DET} = -30\text{dBm}$	21.0	23.5	26.0	dB
	Boost2	$V_{CC} = 1.1\text{V}$ , $f = 50\text{Hz}$ , boost on, $V_{DET} = -15\text{dBm}$	10.0	12.5	15.0	dB
	Boost3	$V_{CC} = 1.1\text{V}$ , $f = 50\text{Hz}$ , boost on, $V_{DET} = -10\text{dBm}$	3.0	5.5	8.0	dB
Output voltage	$V_O$	$V_{CC} = 1.5\text{V}$ , $f = 50\text{Hz}$ , boost on, $V_{IN} = -18\text{dBm}$	120	170	220	mV
Total harmonic distortion	THD	$V_{CC} = 1.1\text{V}$ , $f = 1\text{kHz}$ , boost on, $V_O = -20\text{dBm}$		0.1	1.0	%
Crosstalk	CT	$V_{CC} = 1.1\text{V}$ , $f = 1\text{kHz}$ , boost on, $V_O = -20\text{dBm}$ , $R_g = 0$		26		dB
Output noise voltage	$V_{NO}$	$V_{CC} = 1.5\text{V}$ , boost off, $R_g = 0$ , $BW = 20$ to $20\text{kHz}$		3.5	5.5	$\mu\text{V}$
Ripple rejection	$S_{VRR}$	$V_{CC} = 1.0\text{V}$ , boost on, $R_g = 0$ , $f_R = 100\text{Hz}$ , $V_R = -30\text{dBm}$	20	28		dB

\*: Assuming  $VG(2) \rightarrow 0\text{dB}$ .

## Package Dimensions

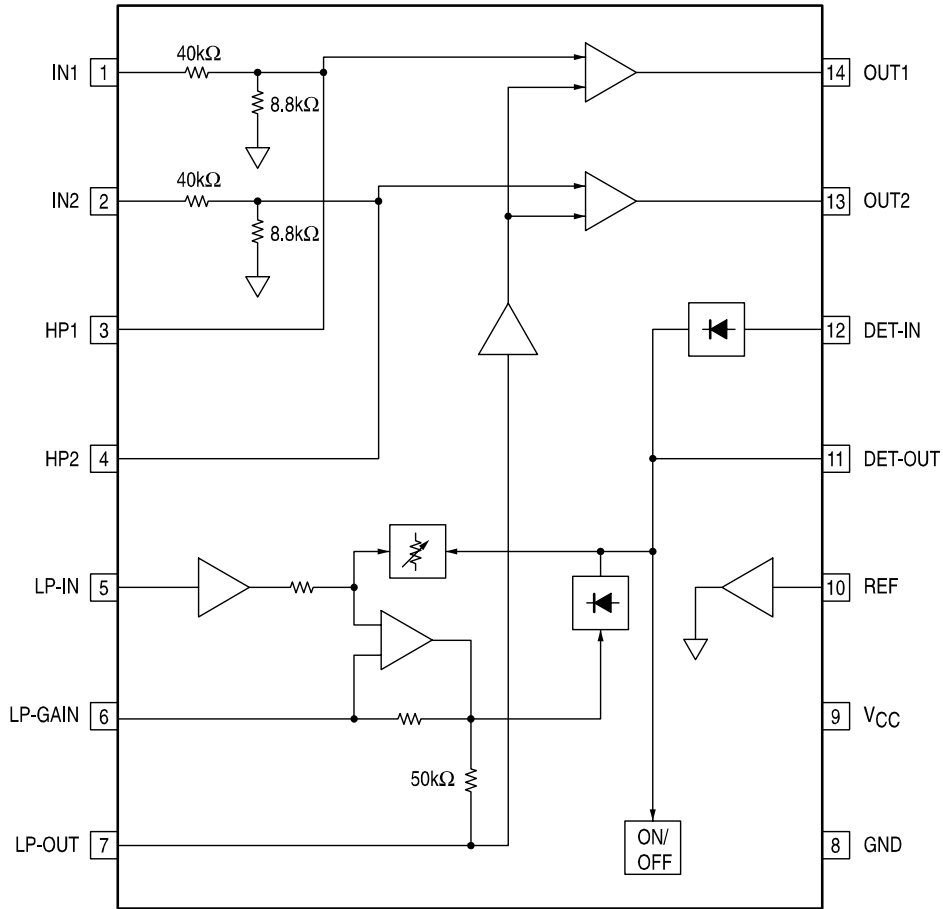
unit : mm

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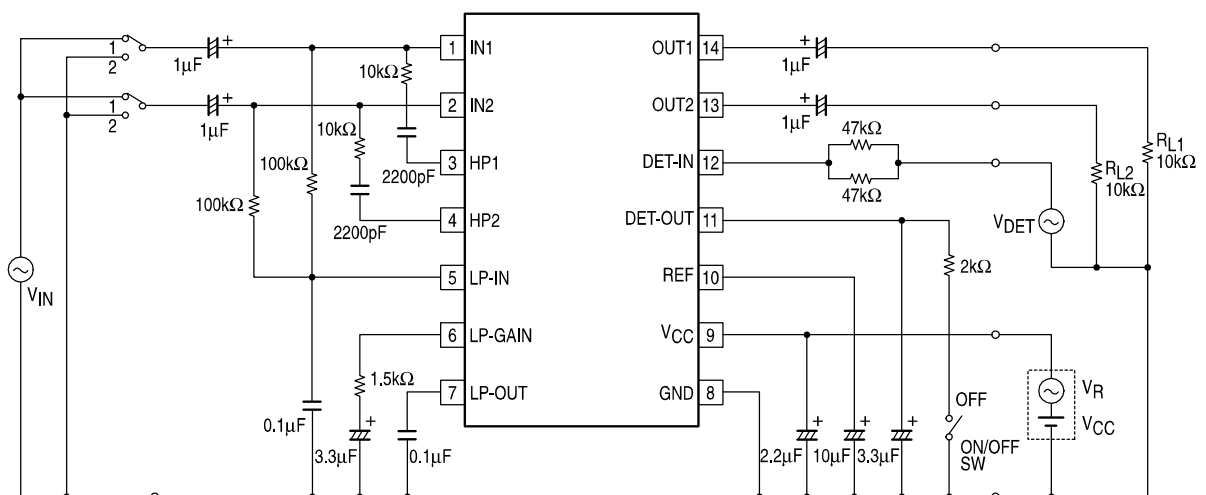
# LA3550M

## Block Diagram



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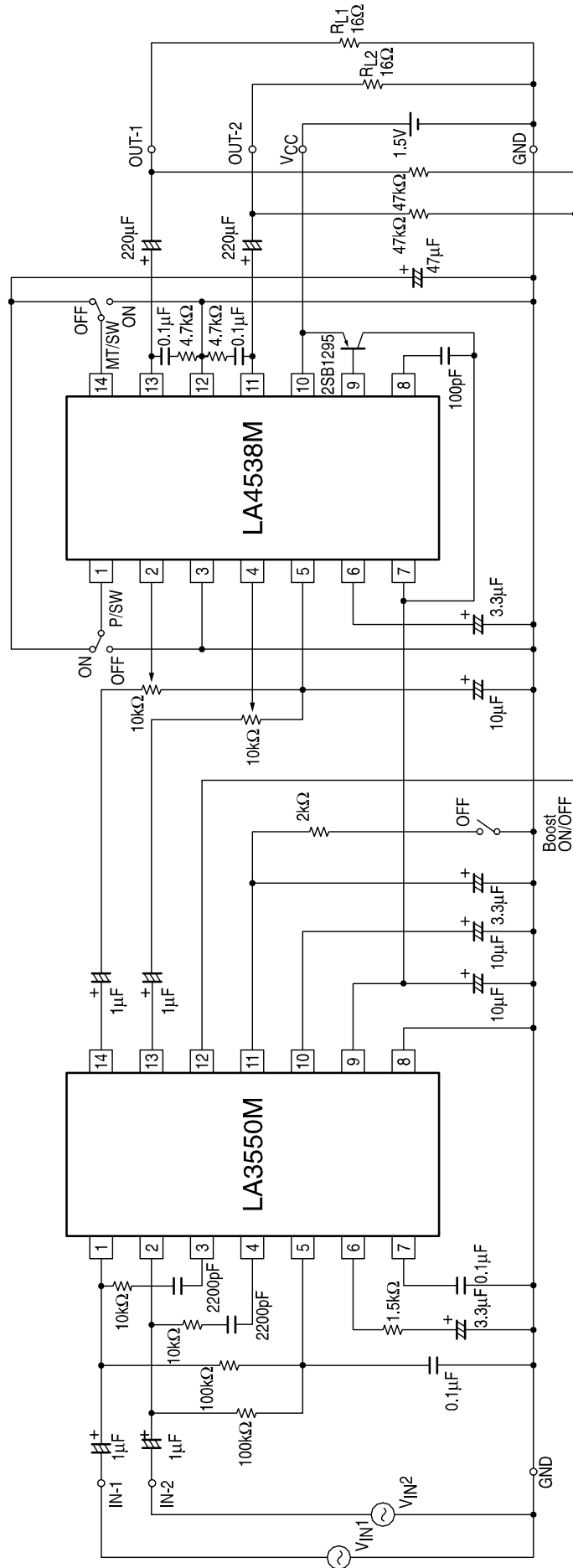
## Test Circuit Diagram



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## Application Circuit Example

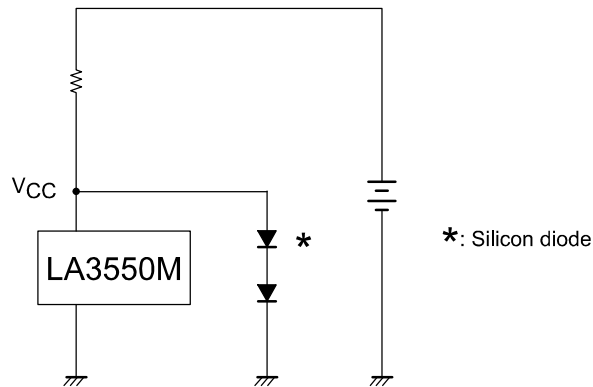


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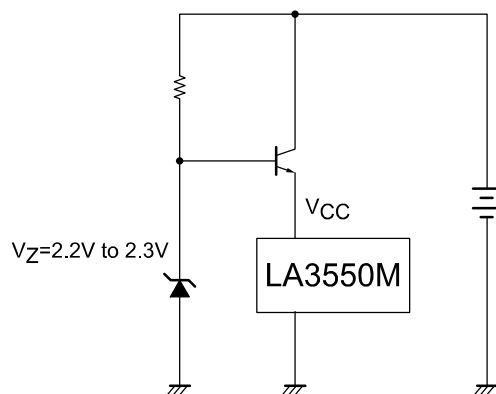
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## Usage Notes

When used in an end product with a 3V  $V_{CC}$ , the supply voltage must be dropped to 1.7V or lower using a circuit such as on of the following.



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