



# LV1150M

## Virtual Surround System IC

### Overview

The LV1150M is a virtual surround system Bi-CMOS IC for video soundtracks and audio.

The main feature of this IC is the ability to create an audio ambience equivalent to that of a multichannel system by adding a signal to which virtual surround processing has been applied to the left and right channel input signals. It furthermore allows modification of this effect by the use of L+R and L-R passive matrix processing and adjustment of the surround processing level with a level control.

### Functions and Features

- Virtual surround function
- Passive matrix: L+R, L-R
- Adjustable surround effect level
- Bypass and virtual surround (L+R, L-R) switching function
- Output filters are provided on chip.
- On-chip  $V_{DD}$  circuit
- ADM technique based A/D and D/A converters
- Simulated stereo for monaural input signals
- Package: MFP24 (375-mil lead pitch)

### Specifications

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

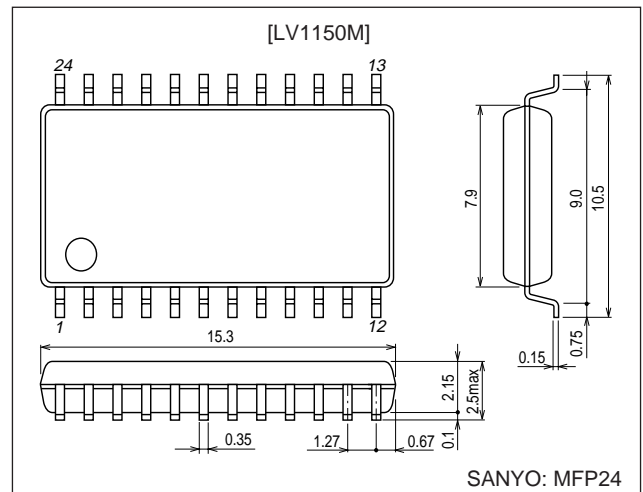
Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{CCmax}$		12	V
Allowable power dissipation	$P_{dmax}$	$T_a \leq 70^\circ\text{C}$ * With printed circuit board	500	W
Operating temperature	$T_{opr}$		-20 to +70	$^\circ\text{C}$
Storage temperature	$T_{stg}$		-40 to +125	$^\circ\text{C}$

Note: \* Printed circuit board size: 114.3 × 76.1 mm, t = 1.6 mm. Material: Glass epoxy.

### Package Dimensions

unit: mm

#### 3045B-MFP24



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## LV1150M

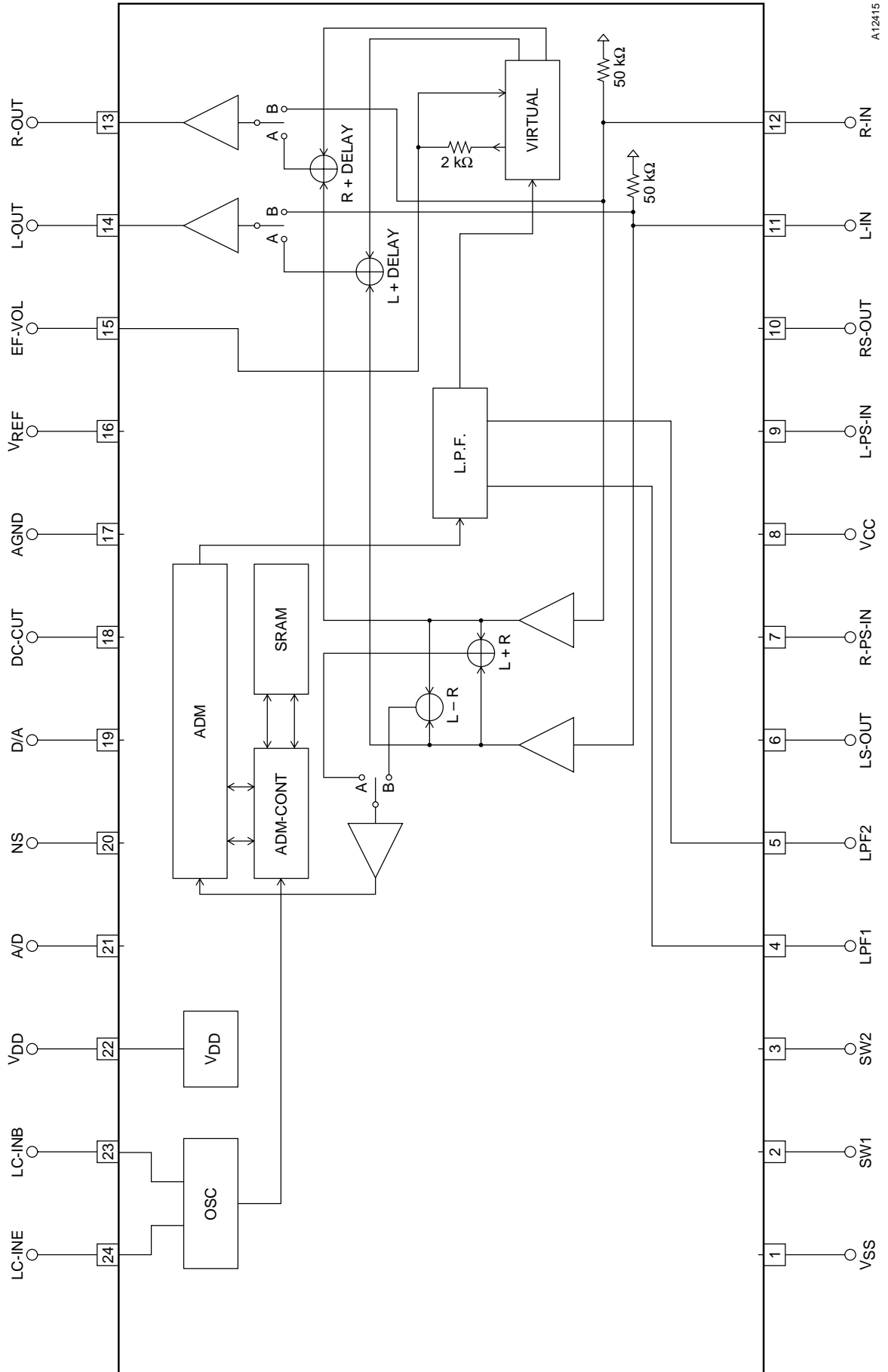
### Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		7	V
Operating supply voltage range	$V_{CCopr}$		6.5 to 10	V

### Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 7.0\text{ V}$ , $V_{IN} = -10\text{ dBm}$ , $f = 1\text{ kHz}$ , in bypass mode

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Quiescent current	$I_{CC}$		15	23	40	mA
Output noise voltage	$V_{NO}$	$R_s = 10\text{ k}\Omega$ , JIS A		-110	-90	dBm
		In virtual surround mode		-88	-80	dBm
I/O signal level deviation	$V_O$	$V_{IN} = -10\text{ dBm} = 0\text{ dB}$	-2	0	+2	dB
Total harmonic distortion	THD	400 Hz to 30 kHz bandpass filter		0.005	0.03	%
		In virtual surround mode		0.13	1.0	%
Headroom	$H \cdot R$	$V_{IN} = -10\text{ dBm} = 0\text{ dB}$ , THD = 1%	10	15		dB
		In virtual surround mode	10	12		dB

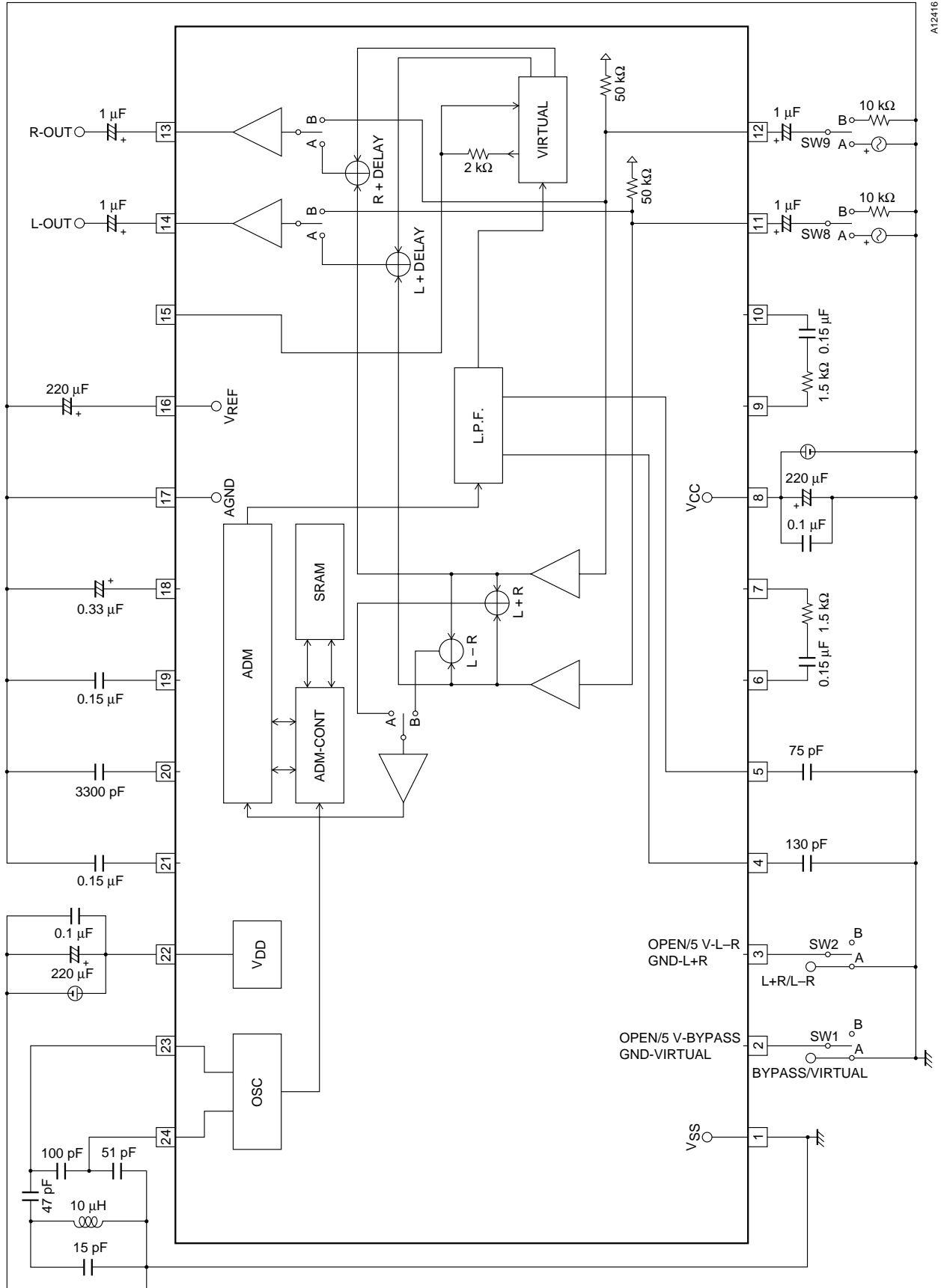
Block Diagram



A12415

# LV1150M

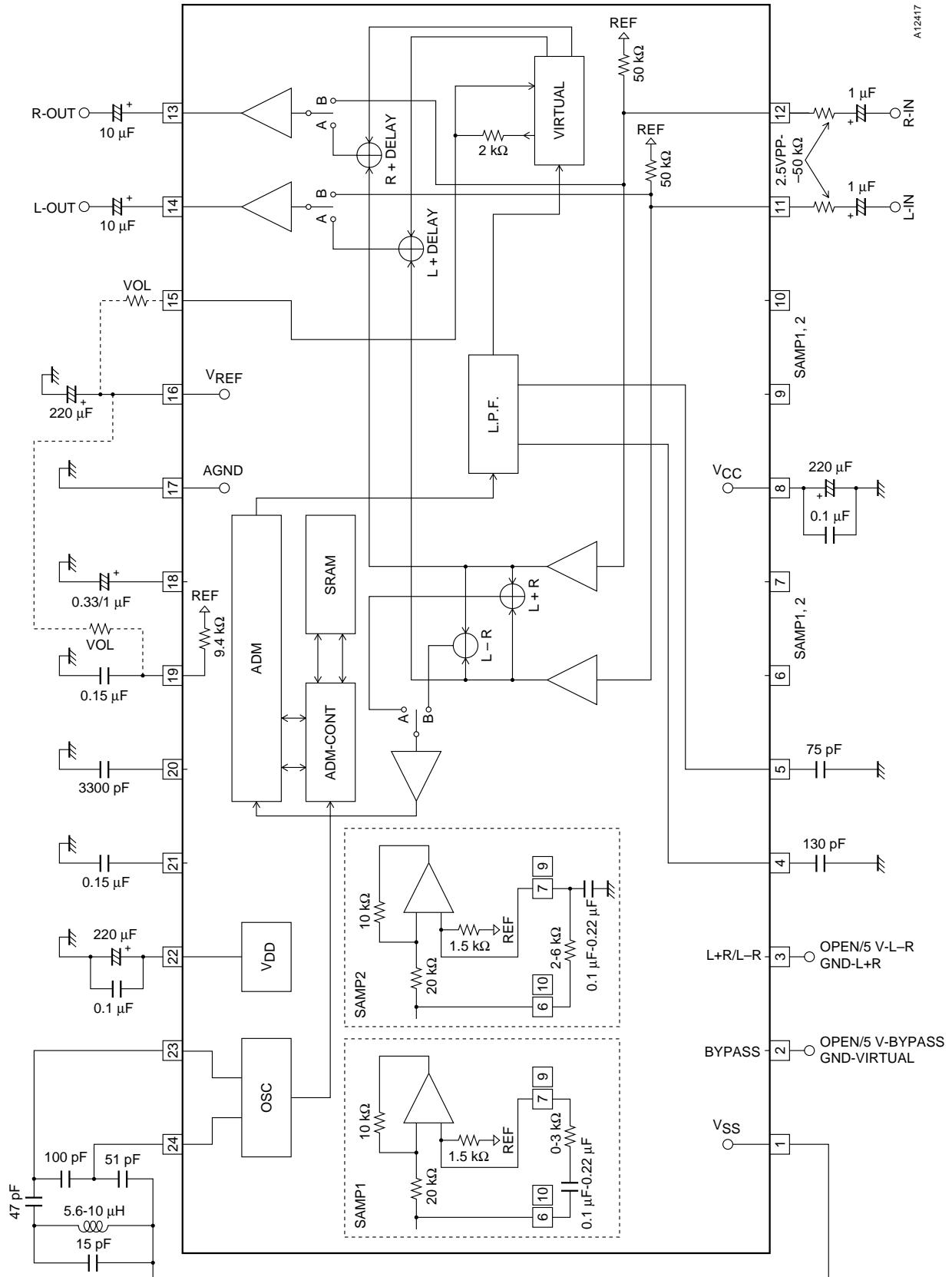
## Test Circuit



A12416

# LV1150M

## Sample Application Circuit



A12417

Operating Principles

1. Modes

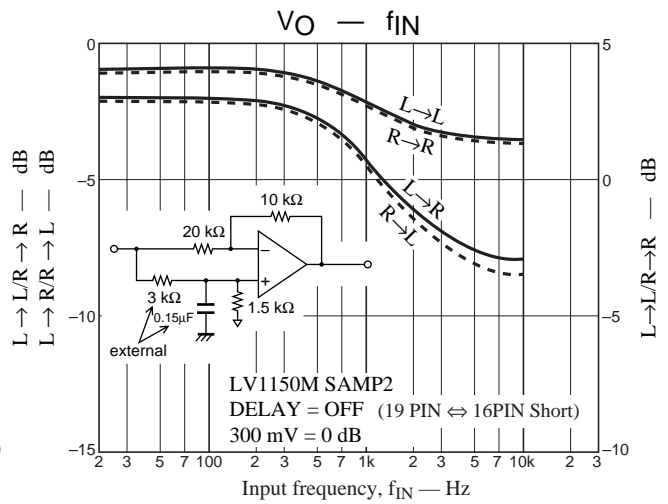
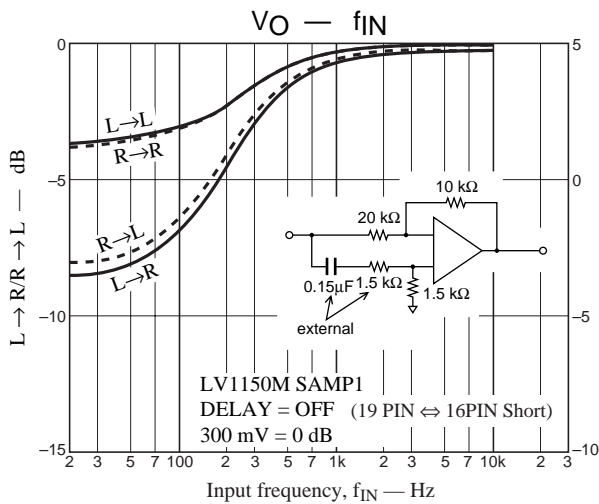
The mode can be set using DIP switches on pins 2 and 3.

- Bypass/virtual: switches between bypass and virtual modes.
- L+R/L-R: Switches the virtual mode effect.

Since this switching is independent of the bypass function, it has no effect in bypass mode.

2. Other notes

- The level of the virtual effect can be changed by the values of the external resistors connected to pins 15 and 19. (See the sample application circuit diagram.) Note that the effect is maximum when these pins are open.
- There are two options that may be attached to pins 6 and 7 and pins 9 and 10. (See the sample application circuit diagram.) High boost (SAMP1) and low boost (SAMP2) effects can be acquired using external circuits on these pins. (See the charts.)



Pin Descriptions

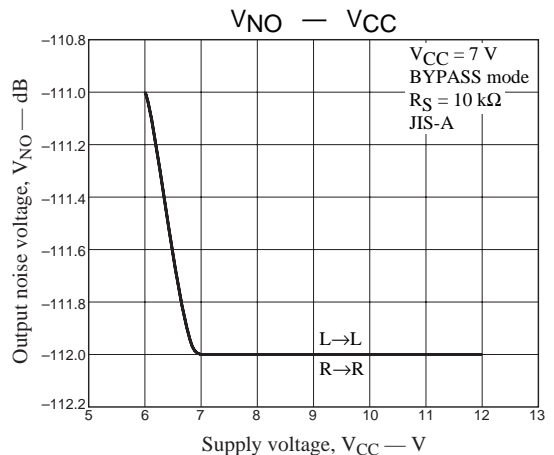
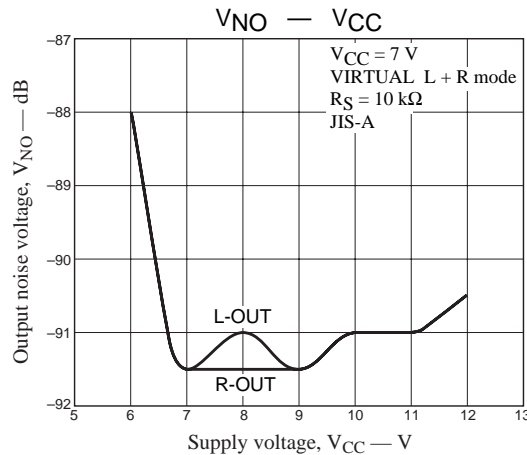
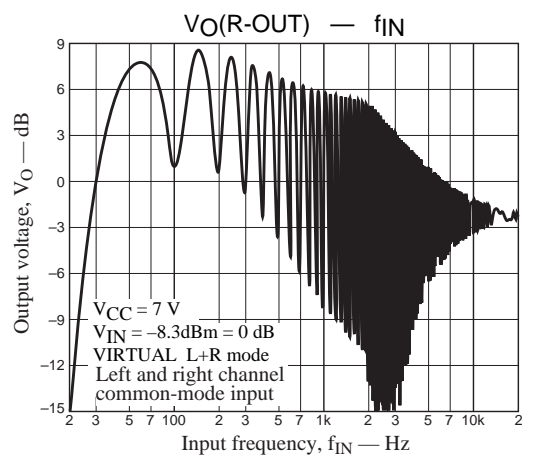
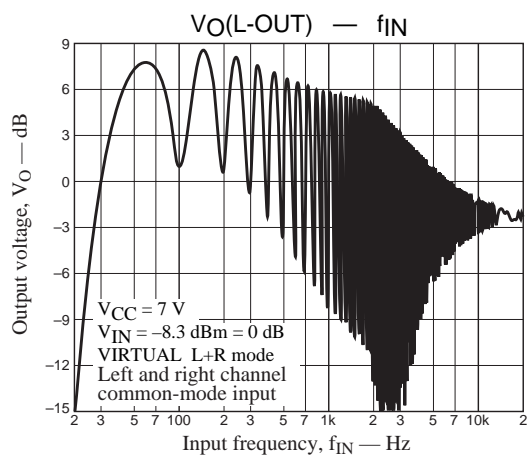
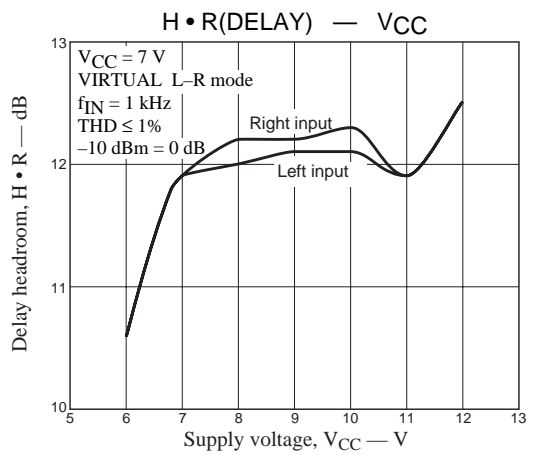
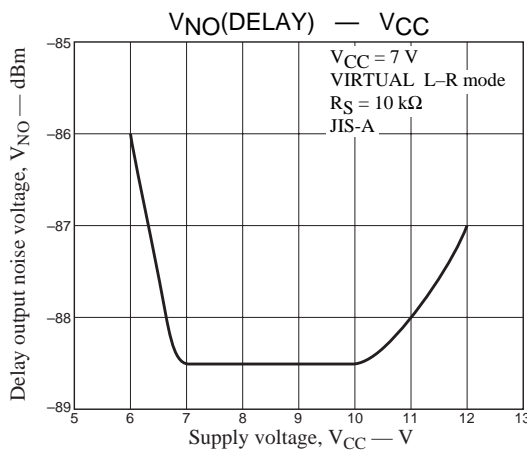
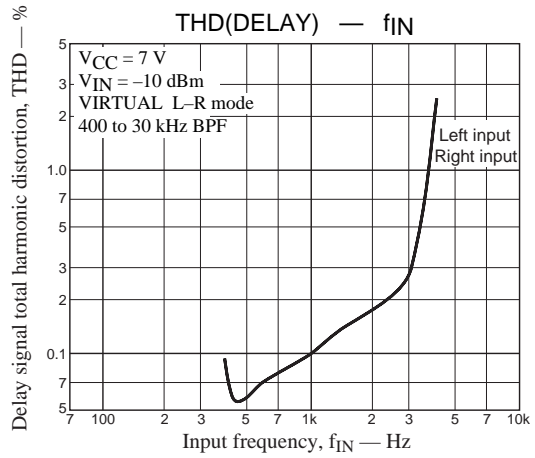
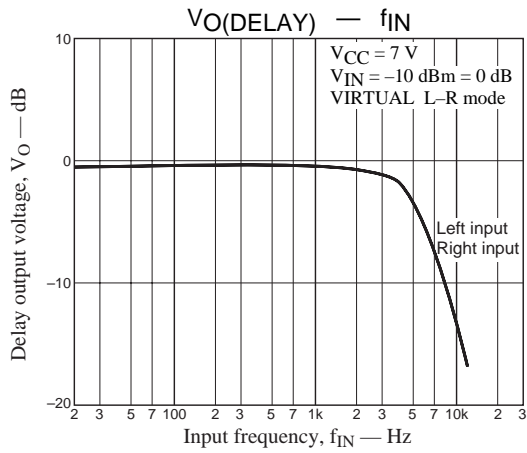
Pin No.	Pin	Pin voltage (V)	Function	Equivalent circuit
2	SW1	0/0.7	Bypass/virtual switching	
3	SW1		L+R/L-R switching	
4 5	LPF1 LPF2	$1/2V_{CC}$	Low-pass filter capacitor connection	
6 10	LS-OUT RS-OUT	$1/2V_{CC}$	Surround signal outputs	
7 9	R-PS-IN L-PS-IN	$1/2V_{CC}$	Virtual surround processing signal inputs.	

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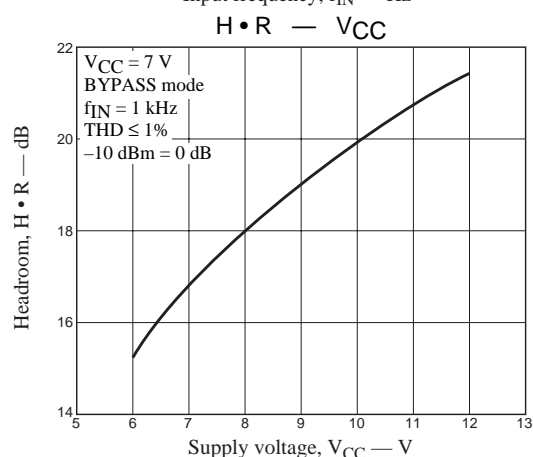
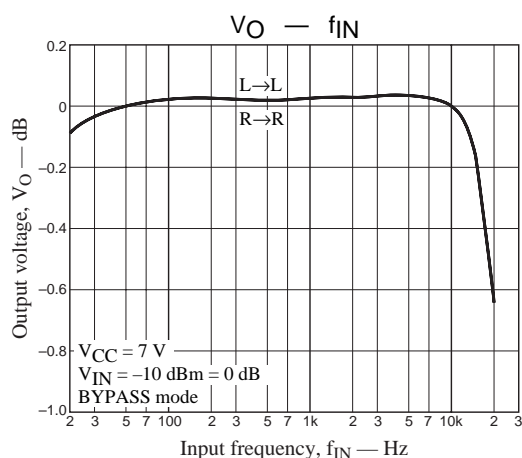
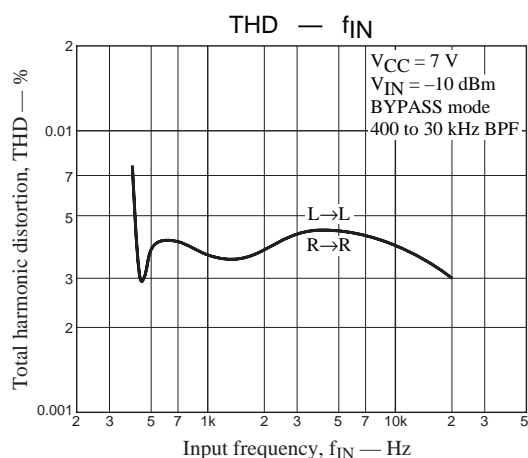
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Pin No.	Pin	Pin voltage	Function	Equivalent circuit
11 12	L-IN R-IN	$1/2V_{CC}$	Signal inputs	<p style="text-align: right;">A12422</p>
13 14	R-OUT L-OUT	$1/2V_{CC}$	Signal outputs	<p style="text-align: right;">A12423</p>
15	EF-VOL	$1/2V_{CC}$	Virtual surround control	<p style="text-align: right;">A12424</p>
16	V <sub>REF</sub>	$1/2V_{CC}$	V <sub>REF</sub> amplifier reference	<p style="text-align: right;">A12425</p>
18	DC-CUT	$1/2V_{CC}$	DC cut capacitor connection	<p style="text-align: right;">A12426</p>
19 21	D/A A/D	$1/2V_{CC}$	A/D (D/A) converter integrator capacitor connection	<p style="text-align: right;">A12427</p>
20	NS	$1/2V_{CC}$	A/D noise shaper capacitor connection	<p style="text-align: right;">A12428</p>
23 24	LC-INB LC-INE	0/5V	Clock control	<p style="text-align: right;">A12429</p>







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