

HT8970 Voice Echo

Features

- Operating voltage: 4.5V~5.5V
- ADM algorithm
- Low noise
 - Echo mode:-85dB
 - Surround mode:-90dB
 - Low distortion rate
 - Echo mode: 1%
 - Surround mode: 0.2%

Applications

- Television
- Karaoke systems

- Built-in 20Kb SRAMAutomatic reset function
- Package type: 16-pin DIP/SOP

• Video disc player

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Sound equipments

General Description

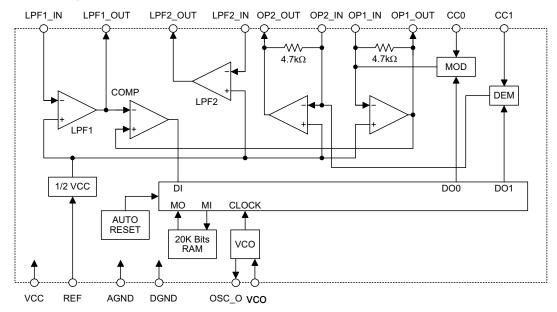
The HT8970 is an echo/surround effect processor. It is designed for various audio systems including karaoke, television, sound equipments, etc. The chip consists of a built-in pre-amplifier, VCO or Voltage Control OSC, 20Kb SRAM, A/D and D/A converters as well as delay time control logic.

Its built-in 20Kb SRAM can generate delay time effect and can control the delay time value through the external VCO resistor.

The VCO circuit can reduce external components and make it easy to adjust the delay time.



Block Diagram



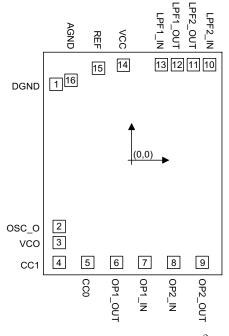
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Pin Assignment

			1			
VCC 🗆	1	16	LPF1_IN			
REF 🗆	2	15	LPF1_OUT			
AGND 🗆	3	14	LPF2_OUT			
DGND 🗆	4	13	LPF2_IN			
osc_o⊏	5	12				
VCO	6	11				
CC1	7	10	DP1_IN			
CC0 □	8	9				
HT8970 – 16 DIP/SOP						



Pad Assignment





* The IC substrate should be connected to VSS in the PCB layout artwork.

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Pad Coordinates

Unit: µm

Pad No.	X	Y	Pad No.	X	Y
1	-698.00	701.70	9	652.85	-945.30
2	-669.25	-614.45	10	720.20	882.55
3	-669.25	-762.85	11	571.80	882.55
4	-669.25	-945.30	12	423.40	882.55
5	-405.55	-945.30	13	275.00	882.55
6	-140.05	-945.30	14	-77.60	877.60
7	123.65	-945.30	15	-306.55	849.95
8	389.15	-945.30	16	-560.95	737.70



Pad Description

Pad No.	Pad Name	I/O	Internal Connection	Description
1	DGND	Ι		Digital ground
2	OSC_O	0		System oscillator output
3	VCO	Ι		System oscillator input, system frequency adjustable pin
4	CC1			Current control 1
5	CC0	_		Current control 0
6	OP1_OUT	0		OP1 output
7	OP1_IN	Ι		OP1 input
8	OP2_IN	Ι		OP2 input
9	OP2_OUT	0		OP2 output
10	LPF2_IN	Ι		Low pass filter 2 input
11	LPF2_OUT	0		Low pass filter 2 output
12	LPF1_OUT	0		Low pass filter 1 output
13	LPF1_IN	Ι		Low pass filter 1 input
14	VCC	Ι		Analog and positive power supply
15	REF	Ι		Analog reference voltage
16	AGND	Ι		Analog ground

Absolute Maximum Ratings

Supply Voltage	0.3V to 6V
Input Voltage	.V _{SS} –0.3V to V _{DD} +0.3V

Storage Temperature	–50°C to 125°C
Operating Temperature	20°C to 70°C

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

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 $Ta=25^{\circ}C$

Electrical Characteristics

Shal	Devenation	Т	est Conditions	М	T	М	TT *4
Symbol	Parameter	V _{DD} Conditions		Min.	Тур.	Max.	Unit
V _{CC}	Operating Voltage			4.5	5.0	5.5	V
I _{CC}	Operating Current	5V		—	15	30	mA
G _V	Voltage Gain	5V	$R_L=47k\Omega$		-0.9	2.5	dB
V _{OMAX}	Maximum Output Voltage	5V	THD=10%	0.9	1.8		Vrms
THD	Total Harmonic Distortion	5V	30kHz L.P.F.		0.7	1.5	%
No	Output Noise Voltage	5V	DIN Audio		-85	-60	dBV
PSRR	Power Supply Rejection Ratio	5V	$\begin{array}{c} \Delta V_{CC} = -20 dBV \\ (0.1 Vrms) \\ f = 100 Hz \end{array}$		-40	-30	dB

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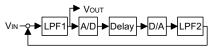
Functional Description

The HT8970 is an echo/surround effect generator with built-in 20Kb SRAM. It ensures low distortion as well as low noise for processing audio signal delay. The chip provides two playing modes (echo and surround) and the playing function block diagrams are shown as follows.

• Surround mode









49.8	38.3	31.9	26.77	23.3	20.54	18.08	kΩ
2M	$2.5 \mathrm{M}$	3M	3.5M	4M	4.5nm	5M	MHz
327.6	262	218.4	187.2	163.8	145.6	131	ms
1.6	1.3	1.0	0.72	0.7	0.64	0.5	%
						-	
16.07	14.29	12.98	11.97	11	9.99	9.22	kΩ
$5.5 \mathrm{M}$	$6\mathrm{M}$	$6.5 \mathrm{M}$	7M	7.5M	8M	8.5M	MHz
119.1	109.2	100.8	93.6	87.36	81.89	77.08	ms
0.47	0.38	0.36	0.35	0.3	0.29	0.28	%
8.5	7.54	6.66	6.12	5.5	4.85	4.4	kΩ
9M	10M	11M	12M	13M	14M	15M	MHz
72.79	65.52	59.56	54.59	50.39	46.79	43.68	ms
0.25	0.245	0.23	0.22	0.19	0.185	0.165	%
						<u></u>	,
3.98	3.64	3.26	2.92	2.69	2.48	2.28	kΩ
16M	17M	18M	19M	20M	21M	22M	MHz
40.94	38.54	36.39	34.48	32.75	31.19	29.78	ms
0.165	0.15	0.14	0.14	0.13	0.12	0.11	%
	2M 327.6 1.6 1.6 5.5M 119.1 0.47 8.5 9M 72.79 0.25 3.98 16M 40.94	2M 2.5M 327.6 262 1.6 1.3 16.07 14.29 5.5M 6M 119.1 109.2 0.47 0.38 8.5 7.54 9M 10M 72.79 65.52 0.25 0.245 3.98 3.64 16M 17M 40.94 38.54	2M 2.5M 3M 327.6 262 218.4 1.6 1.3 1.0 16.07 14.29 12.98 5.5M 6M 6.5M 119.1 109.2 100.8 0.47 0.38 0.36 8.5 7.54 6.66 9M 10M 11M 72.79 65.52 59.56 0.25 0.245 0.23 3.98 3.64 3.26 16M 17M 18M 40.94 38.54 36.39	2M2.5M3M3.5M327.6262218.4187.21.61.31.00.721.61.31.00.7216.0714.2912.9811.975.5M6M6.5M7M119.1109.2100.893.60.470.380.360.358.57.546.666.129M10M11M12M72.7965.5259.5654.590.250.2450.230.2216M17M18M19M40.9438.5436.3934.48	2M2.5M3M3.5M4M327.6262218.4187.2163.81.61.31.00.720.716.0714.2912.9811.97115.5M6M6.5M7M7.5M119.1109.2100.893.687.360.470.380.360.350.38.57.546.666.125.59M10M11M12M13M72.7965.5259.5654.5950.390.250.2450.230.220.193.983.643.262.922.6916M17M18M19M20M40.9438.5436.3934.4832.75	2M2.5M3M3.5M4M4.5nm327.6262218.4187.2163.8145.61.61.31.00.720.70.6416.0714.2912.9811.97119.995.5M6M6.5M7M7.5M8M119.1109.2100.893.687.3681.890.470.380.360.350.30.298.57.546.666.125.54.859M10M11M12M13M14M72.7965.5259.5654.5950.3946.790.250.2450.230.220.190.1853.983.643.262.922.692.4816M17M18M19M20M21M40.9438.5436.3934.4832.7531.19	2M 2.5M 3M 3.5M 4M 4.5nm 5M 327.6 262 218.4 187.2 163.8 145.6 131 1.6 1.3 1.0 0.72 0.7 0.64 0.5 16.07 14.29 12.98 11.97 11 9.99 9.22 5.5M 6M 6.5M 7M 7.5M 8M 8.5M 119.1 109.2 100.8 93.6 87.36 81.89 77.08 0.47 0.38 0.36 0.35 0.3 0.29 0.28 8.5 7.54 6.66 6.12 5.5 4.85 4.4 9M 10M 11M 12M 13M 14M 15M 72.79 65.52 59.56 54.59 50.39 46.79 43.68 0.25 0.245 0.23 0.22 0.19 0.185 0.165 3.98 3.64 3.26 2.92 2.69 2.48 <

Rosc-fosc-Delay_time-Distortion Cross table

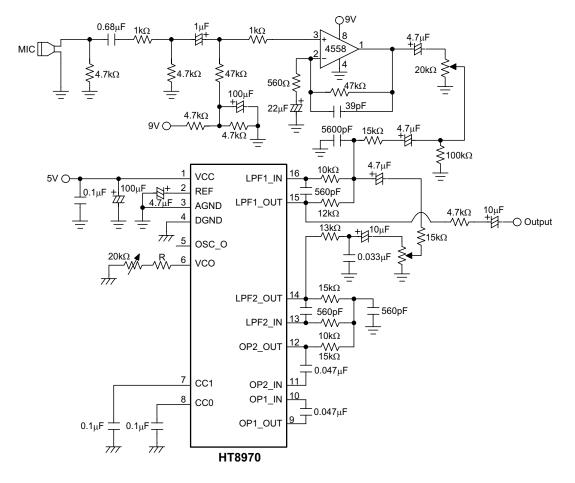
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Application Circuits

Echo mode



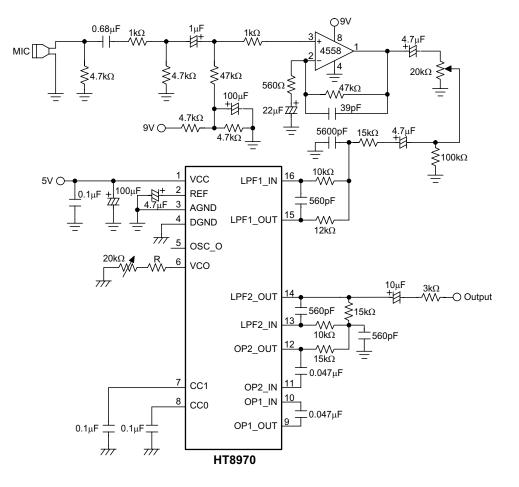
Note: $\frac{1}{-}$: Analog ground, $\frac{1}{777}$: Digital ground

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Surround mode



Note: $\frac{1}{2}$: Analog ground, $\frac{1}{2}$: Digital ground

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