HT8955A
Voice Echo

Features

- Operating voltage: 5.0V
- Long delay time
  - 0.8 seconds (SEL=VSS, 256K DRAM)
  - 0.2 seconds (SEL=VDD/open, 64K DRAM)
- 25kHz sampling rate
- Continuous variable delay time
- Built-in pre-amplifier
- Low distortion
- High S/N ratio
- Wide frequency response
- PCM 10-bit A/D and D/A converters
- 24-pin DIP package

Applications

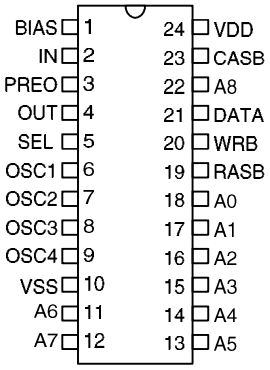
- Mixers
- Karaoke systems
- Echo generators
- Sound effect generators

General Description

The HT8955A is a CMOS LSI digital audio signal delay processor. It is designed for audio system applications including echo generators, karaoke systems, sound effect generators, etc.

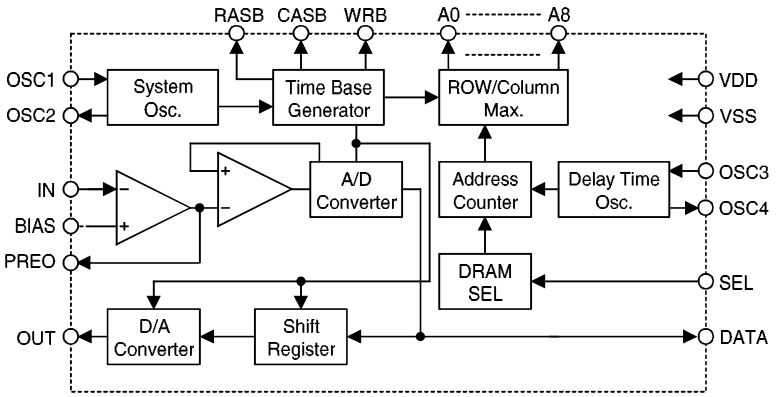
The chip consists of a built-in pre-amplifier, on-chip oscillator, DRAM interface, 10-bit A/D and D/A converters as well as control logic. It provides continuously adjustable delay time up to 0.8/0.2 seconds at a sampling rate of 25kHz when combined with an external DRAM (41256/4164). The HT8955A is superior to a conventional BBD delay unit in its low distortion, high S/N ratio and long delay time. Its sophisticated low pass filter will not end in the normal applications due to the high sampling rate (25~50kHz). Hence, the HT8955A is excellent for audio delay system applications. It is offered in a 24-pin dual-in-line package.

Pin Assignment



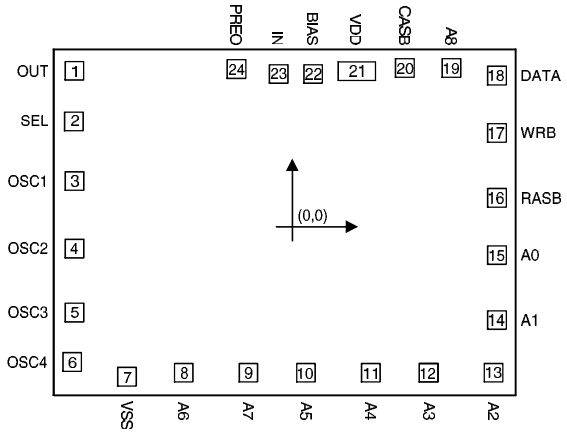
HT8955A
– 24 DIP

Block Diagram



Pad Coordinates

Unit: μm



Pad No.	X	Y	Pad No.	X	Y
1	–1138.00	796.50	14	1141.50	–547.00
2	–1141.00	523.50	15	1141.50	–197.50
3	–1136.50	201.50	16	1141.50	111.50
4	–1136.50	–163.00	17	1141.50	461.00
5	–1137.00	–507.00	18	1141.50	770.50
6	–1149.00	–774.00	19	896.00	811.00
7	–854.50	–853.50	20	645.00	810.50
8	–548.00	–831.50	21	435.00	794.00
9	–198.50	–831.50	21	335.00	794.00
10	111.50	–831.50	22	150.00	779.00
11	461.00	–831.50	23	–35.00	779.00
12	773.00	–831.50	25	–264.00	806.00
13	1122.50	–831.50			

Chip size: 2170×2200 $(\mu m)^2$

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

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
1	BIAS	O	OP Non-inverted	Internal pre-amplifier bias Connects to a decoupling capacitor
2	IN	I	OP Inverted	Audio signal input pin (inverted)
3	PREO	O	OP OUTPUT	Pre-amplifier output pin
4	OUT	O	—	Delayed audio signal output pin
5	SEL	I	Pull-High	DRAM type selection: VDD or Open: 64Kb VSS: 256Kb
6	OSC1	I	—	System oscillator input
7	OSC2	O	—	System oscillator output
8	OSC3	I	—	Delay time control oscillator input
9	OSC4	O	—	Delay time control oscillator output
10	VSS	I	—	Negative power supply (GND)
11	A6	O	CMOS OUT	Connects to DRAM A6
12	A7	O	CMOS OUT	Connects to DRAM A7

Pin No.	Pin Name	I/O	Internal Connection	Description
13	A5	O	CMOS OUT	Connects to DRAM A5
14	A4	O	CMOS OUT	Connects to DRAM A4
15	A3	O	CMOS OUT	Connects to DRAM A3
16	A2	O	CMOS OUT	Connects to DRAM A2
17	A1	O	CMOS OUT	Connects to DRAM A1
18	A0	O	CMOS OUT	Connects to DRAM A0
19	RASB	O	CMOS OUT	Connects to DRAM RASB
20	WRB	O	CMOS OUT	Connects to DRAM WRB
21	DATA	I/O	CMOS I/O	Data I/O pin
22	A8	O	CMOS I/O	Connects to DRAM A8
23	CASB	O	CMOS I/O	Connects to DRAM CASB
24	VDD	I	—	Positive power supply

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.

Electrical Characteristics

(Ta=25°C)

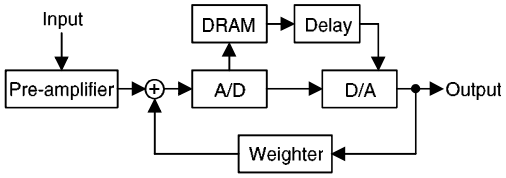
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	4.5	5.0	5.5	V
I_{OP}	Operating Current	5V	No load, f_{OSC}=640kHz	—	2.5	8	mA
A_V	Pre-amplifier Voltage Gain	5V	R_L>100kΩ Open loop	—	2000	—	V/V
A_V	Comparator Voltage Gain	5V	R_L>100kΩ Open loop	—	2000	—	V/V
V_{IL}	"L" Input Voltage	—	—	0	—	$0.3V_{DD}$	V

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{IH}	"H" Input Voltage	—	—	$0.7V_{DD}$	—	V_{DD}	V
V_{OMAX}	Maximum Output Voltage	5V	R_L>470kΩ	1	1.5	—	V
Td	Maximum Delay Time	5V	SEL=open, 25kHz sampling rate	0.15	0.2	—	s
Td		5V	SEL=VSS, 25kHz sampling rate	0.6	0.8	—	s
S/N	Signal to Noise Ratio	5V	V_O=1V, 400Hz BW=10kHz	—	55	—	dB
THD	Total Harmonic Distortion	5V	V_O=1V, 400Hz BW=7kHz	—	0.5	—	%

Functional Description

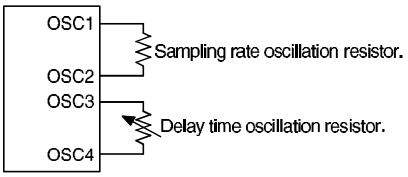
The HT8955A is a single chip LSI with an external DRAM. It is designed for processing audio signal delay. The chip includes a built-in pre-amplifier, 10-bit A/D and D/A converters. The A/D and D/A converters ensure low distortion as well as high S/N ratio of the audio delay system. The chip also provides two sets of oscillation circuit for system sampling rate and audio echo delay time.

Playing function block diagram



System oscillator

The HT8955A provides two oscillators, one for the sampling rate and one for echo delay time. The sampling rate oscillator requires an external resistor between the OSC1 and OSC2 pins. A higher sampling rate (25~50kHz) can thus be derived by adjusting the oscillation resistor without having a sophisticated low pass filter. The delay time oscillator, on the other hand, demands an external resistor between the OSC3 and OSC4 pins. By altering the oscillation resistor, its delay time can be continuously adjusted up to 0.8/0.2 seconds at a 25kHz sampling rate for DRAM of 256Kb/64Kb.



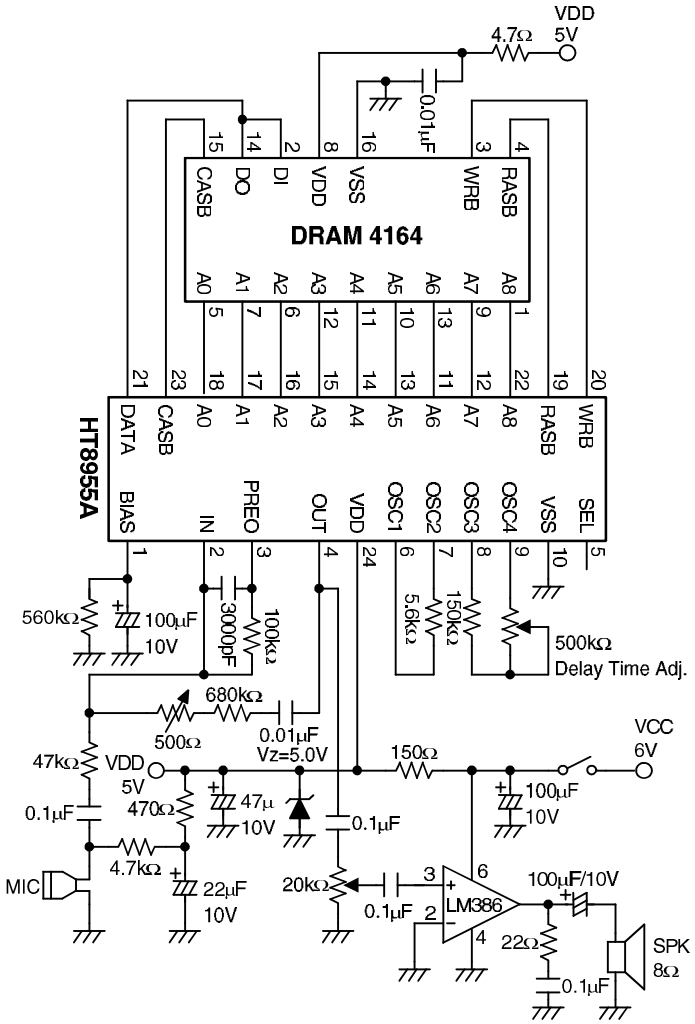
DRAM selection

The HT8955A can interface with a DRAM for storing delay signals. The type along with the maximum delay time of DRAM is determined by the status of the SEL pin as shown:

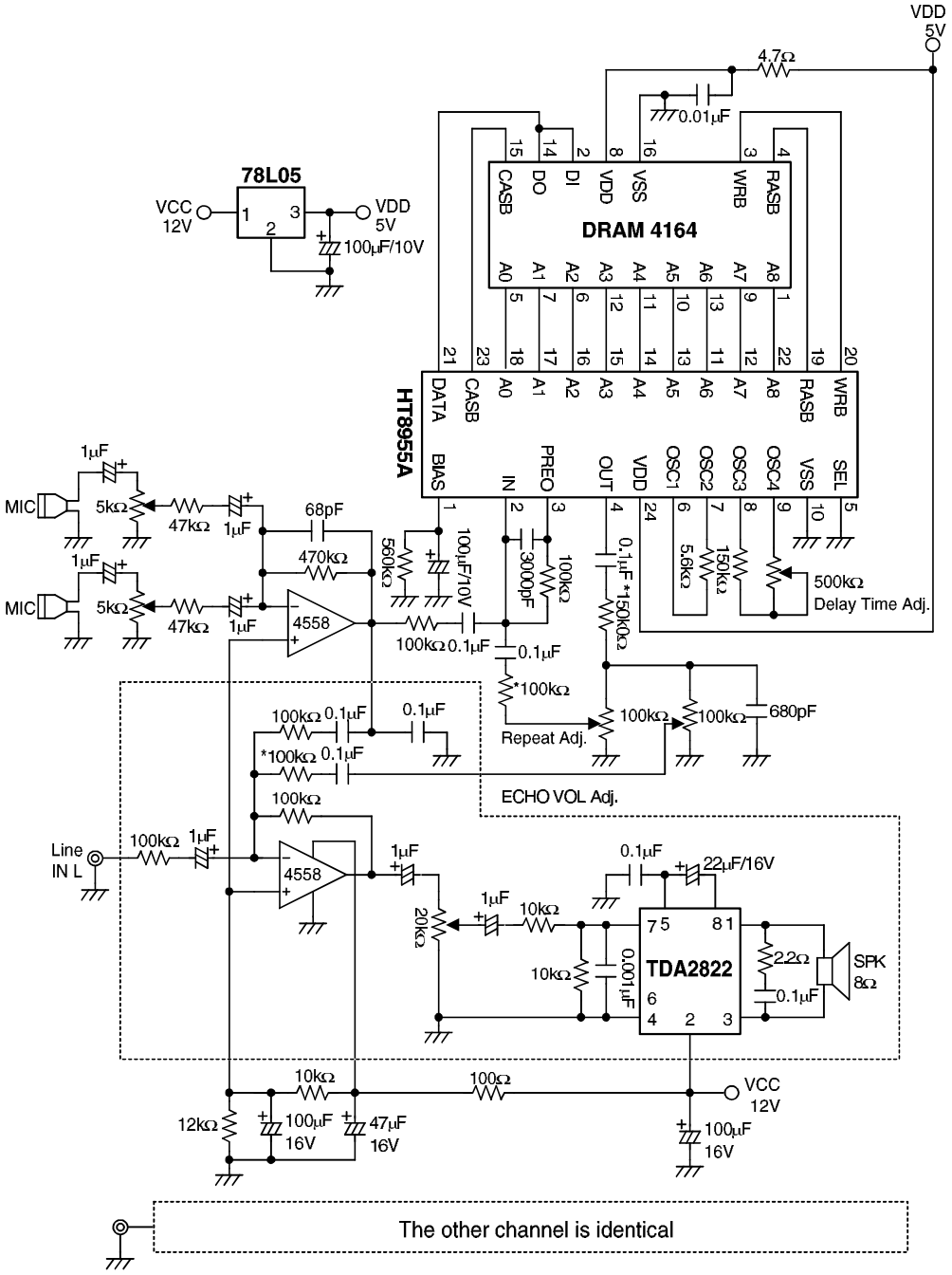
SEL Connection	DRAM Type	Delay Time
VDD or Open	64Kb	0.2 seconds
VSS	256Kb	0.8 seconds

Application Circuits

Low cost echo

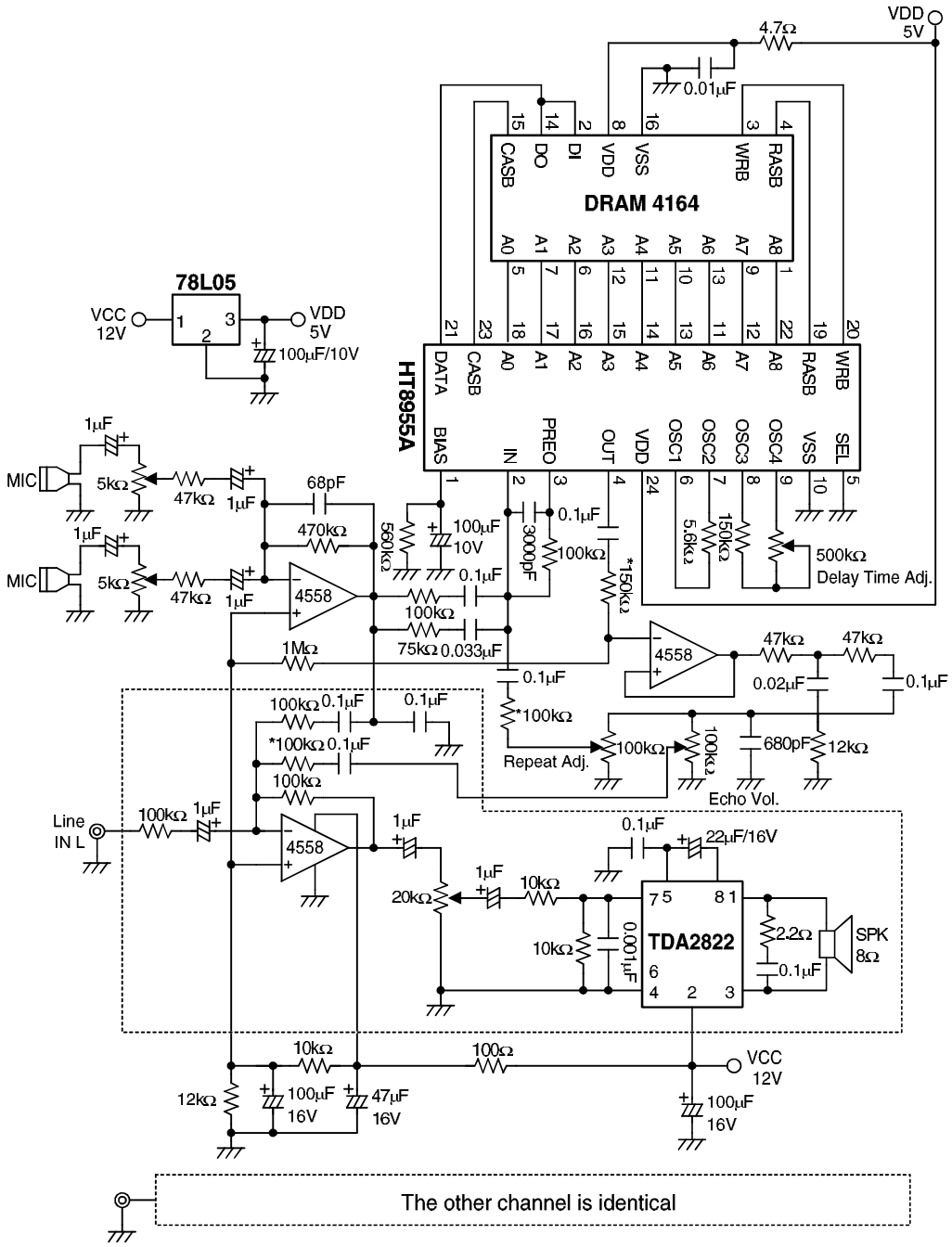


Basic KARAOKE system



*Note: In practical applications, the value of the marked part may be adjusted to the desired effect

Basic KARAOKE system with pre-emphasis



*Note: In practical applications, the value of the marked part may be adjusted to the desired effect