HT8656
Talking Back

Features

- Operating voltage: 4.5V~5.5V
- ADM algorithm
- DRAM selection:
  - 64K
  - 256K
- Sampling rate selection:
  - 32Kb
  - 16Kb
- Auto stop recording
  - 0.5 seconds silence is detected
  - Recording capacity is full
- Built-in 2-stage microphone amplifier
- Built-in DRAM refresh circuit
- Voltage type D/A output
- Current type D/A output
- Auto record and playback
- Auto power-off
- Low power consumption

Applications

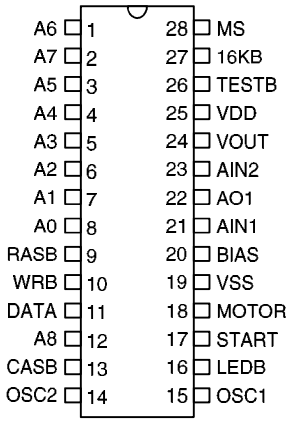
- Toys
- Education
- Games

General Description

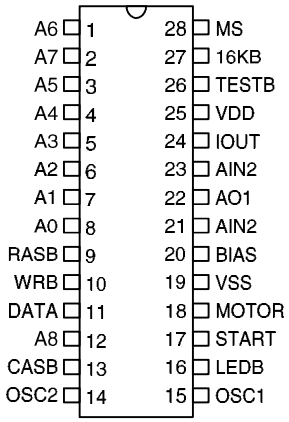
The HT8656 is a single chip CMOS LSI for talking back applications using an ADM algorithm. Functions of the IC consist of recording/playing as well as auto power off. It starts recording when a sound input is detected, and stops to play back when silence lasts 0.5 seconds during recording. The auto power off function is activated once a REC/PLAY cycle has been implemented 64 times or an interval of silence exceeds 2 minutes.

The HT8656 provides a recording capacity of 2 seconds for DRAM of 64K and 8 seconds for DRAM of 256K at a 32Kb sampling rate and double recording capacity at a 16Kb sampling rate. A higher sampling rate will result in sounds of better quality but sacrifice the recording time, and vice versa.

Pin Assignment

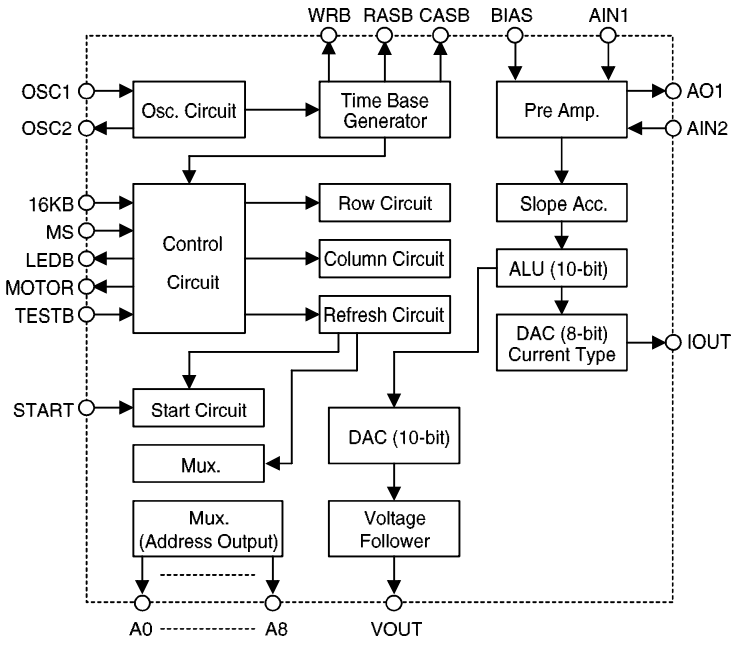


HT8656A – 28 DIP

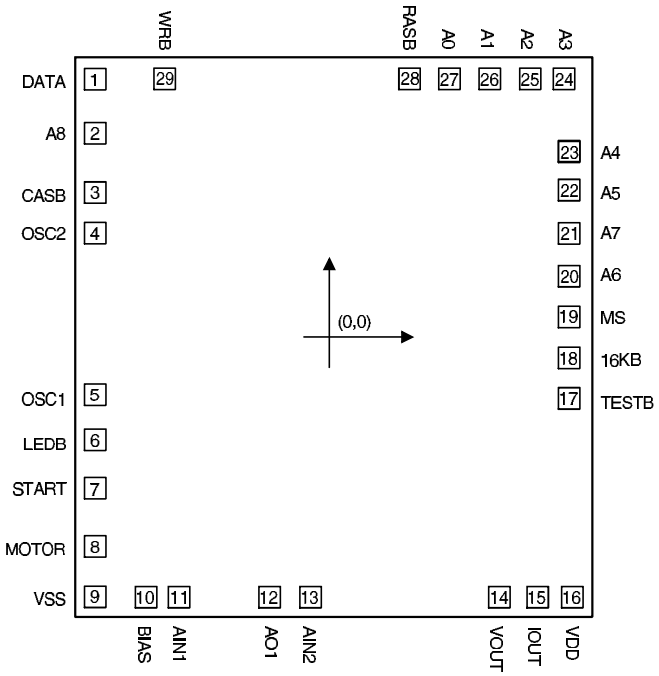


HT8656B – 28 DIP

Block Diagram



Pad Coordinates



Chip size: $3276.6 \times 3530.6\ (\mu m)^2$

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

Unit: μm

Pad No.	X	Y	Pad No.	X	Y
1	–1488.19	1613.92	16	1488.19	–1615.19
2	–1488.19	1277.87	17	1488.19	–377.19
3	–1488.19	906.53	18	1488.19	–124.71
4	–1488.19	653.80	10	1488.19	130.30
5	–1488.19	–355.60	20	1488.19	384.05
6	–1488.19	–635.51	21	1488.19	651.51
7	–1488.19	–937.26	22	1488.19	1089.41
8	–1488.19	–1378.46	23	1488.19	1363.73
9	–1396.75	–1615.19	24	1436.88	1615.19
10	–1170.43	–1615.19	25	1226.57	1615.19
11	–964.69	–1615.19	26	973.84	1615.19
12	–399.03	–1615.19	27	723.65	1615.19
13	–145.29	–1615.19	28	473.20	1615.19
14	1033.27	–1615.19	29	–1052.83	1615.19
15	1239.01	–1615.19			

Pin Description

Pin No.	Pin Name	I/O	Internal Connection	Description
1, 2	A6, A7	O	CMOS	DRAM address output
3~8	A5~A0	O	CMOS	DRAM address output
9	RASB	O	CMOS	DRAM row address strobe
10	WRB	O	CMOS	DRAM write enable
11	DATA	I/O	CMOS	DRAM data input/output
12	A8	O	CMOS	DRAM address output
13	CASB	O	CMOS	DRAM column address strobe
14	OSC2	O	—	Oscillator output
15	OSC1	I	—	Oscillator input
16	LEDB	O	NMOS Open Drain	LED indicator: Idle: LED is turned on Record: LED flashes Play: LED is turned off
17	START	O	NMOS Open Drain	System start pin
18	MOTOR	O	CMOS	Motor drive output (active high) when playing back
19	VSS	I	—	Negative power supply (GND)
20	BIAS	I	—	For internal AMP bias de-coupling
21	AIN1	I	—	Internal AMP first stage input (inverted)
22	AO1	O	—	Internal AMP first stage output
23	AIN2	I	—	Internal AMP second stage input (inverted)
24	IOUT (8656A)	O	—	Voltage type audio output for an external power AMP
24	IOUT (8656B)	O	—	Current type audio output for an external transistor
25	VDD	I	—	Positive power supply
26	TESTB	I	Pull-High	For IC test only
27	16KB	I	Pull-High	32Kbps/16Kbps sampling rate selection: Open/high: 32Kbps Low: 16Kbps
28	MS	I	Pull-High	64K/256K DRAM size selection: Open/high: 64K Low: 256K

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)

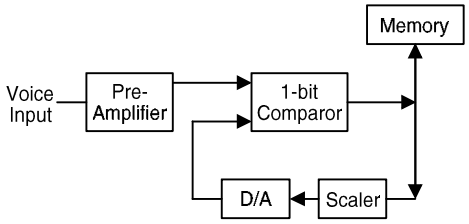
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
		V_{DD}	Conditions				
V_{DD}	Operating Voltage	—	—	4.5	—	5.5	V
I_{DD}	Operating Current	5V	No load, f_{OSC}=640kHz	—	1.5	3.0	mA
I_{STB}	Standby Current	5V	—	—	600	800	μA
I_O	Max. AUD Source Current	5V	V_{OH}=0.6V	–1.5	–3.0	—	mA
I_{OL}	MOTOR Source Current	5V	V_{OH}=4.5V	–1	–3.5	—	mA
I_{OL}	LED Sink Current	5V	V_{OL}=0.5V	3.0	5.0	—	mA
V_{IH}	"H" Input Voltage	—	—	0.7V_{DD}	—	V_{DD}	V
V_{IL}	"L" Input Voltage	—	—	0	—	0.3V_{DD}	V
V_{OUT}	Max. VOUT Output Voltage	5V	R_L>50kΩ	—	1.5	—	V_{P-P}
f_{OSC}	Oscillating Frequency	5V	R_{OSC}=43kΩ	—	640	—	kHz

Functional Description

The HT8656 is a single chip LSI with an external DRAM. It is designed for talking back applications. The recording length of the IC is determined by the data rate along with the size of an external memory. Sounds coming from an external microphone are coded through an internal ADM algorithm and saved in an external memory until the memory is full or an interval of silence lasts over 0.5 seconds. Once recording is terminated, the IC will play back the recorded sounds automatically.

Record function

The HT8656 provides two kinds of sampling rate and DRAM size selection to determine the recording capacity. The recording capacity is determined as shown on the following table.



DRAM Type (MS)	Sampling Rate (16KB)	Recording Capacity
64Kb	32Kb	2 seconds
64Kb	16Kb	4 seconds
256Kb	32Kb	8 seconds
256Kb	16Kb	16 seconds

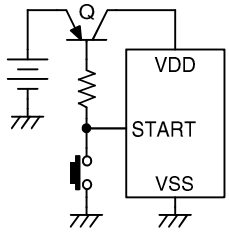
Recording starts whenever a sound input is detected. It then stops once a 0.5 seconds silence is detected or the recording capacity is full. After that, talking back comes into play.

Play function

The HT8656 stops to play back the recorded sounds when an interval of silence lasts 0.5 seconds during recording. Its sampling rate is the same as the rate of recording sounds.

Power control

The HT8656 provides a START pin for power control. The START pin is of high impedance and switch Q is turned off initially. After the START pin is triggered, it will remain at a low level and switch Q is turned on. The START pin is of high impedance and the chip's power is switched off when a REC/PLAY cycle has been implemented 64 times or an interval of silence lasts over 2 minutes.



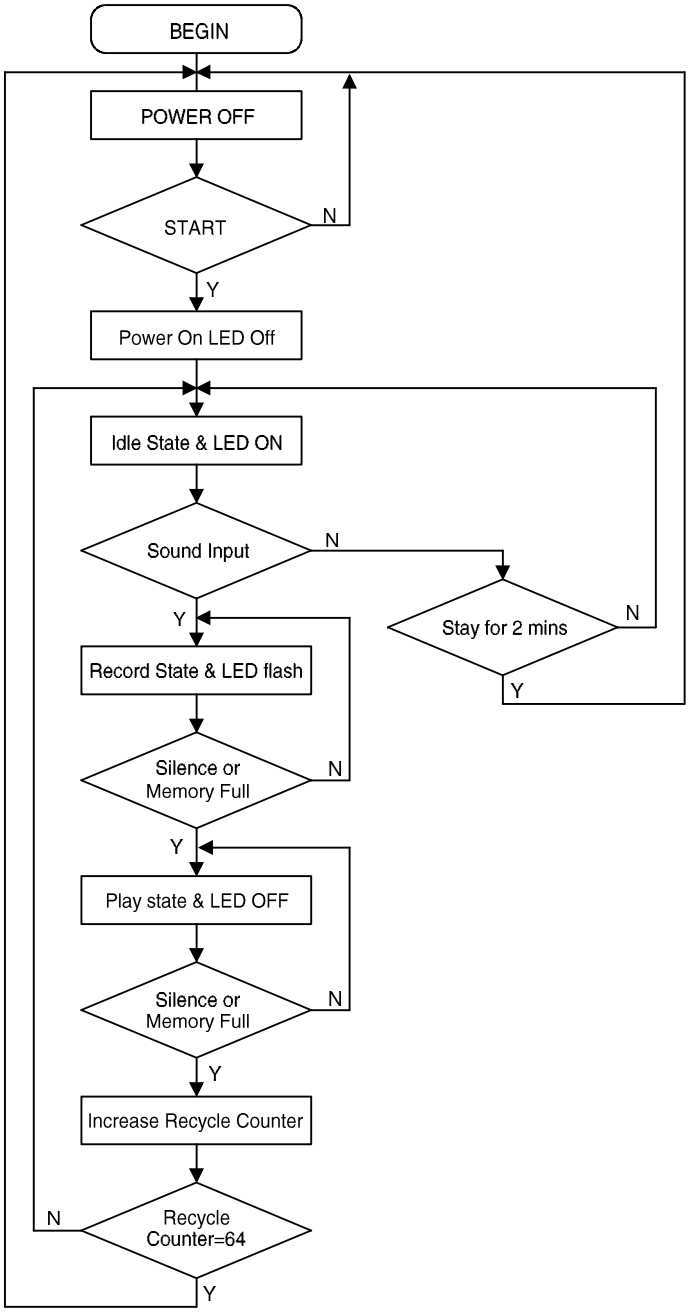
Motor

The HT8656 provides a motor driving pin. The motor is turned on during playing but off once talking back is terminated.

LED

The LED pin displays the status of the HT8656. LED is switched ON when the IC is in the standby state. Its intensity varies inversely with the sound volume when the IC is in the recording state. In the playing state, the LED is switched OFF.

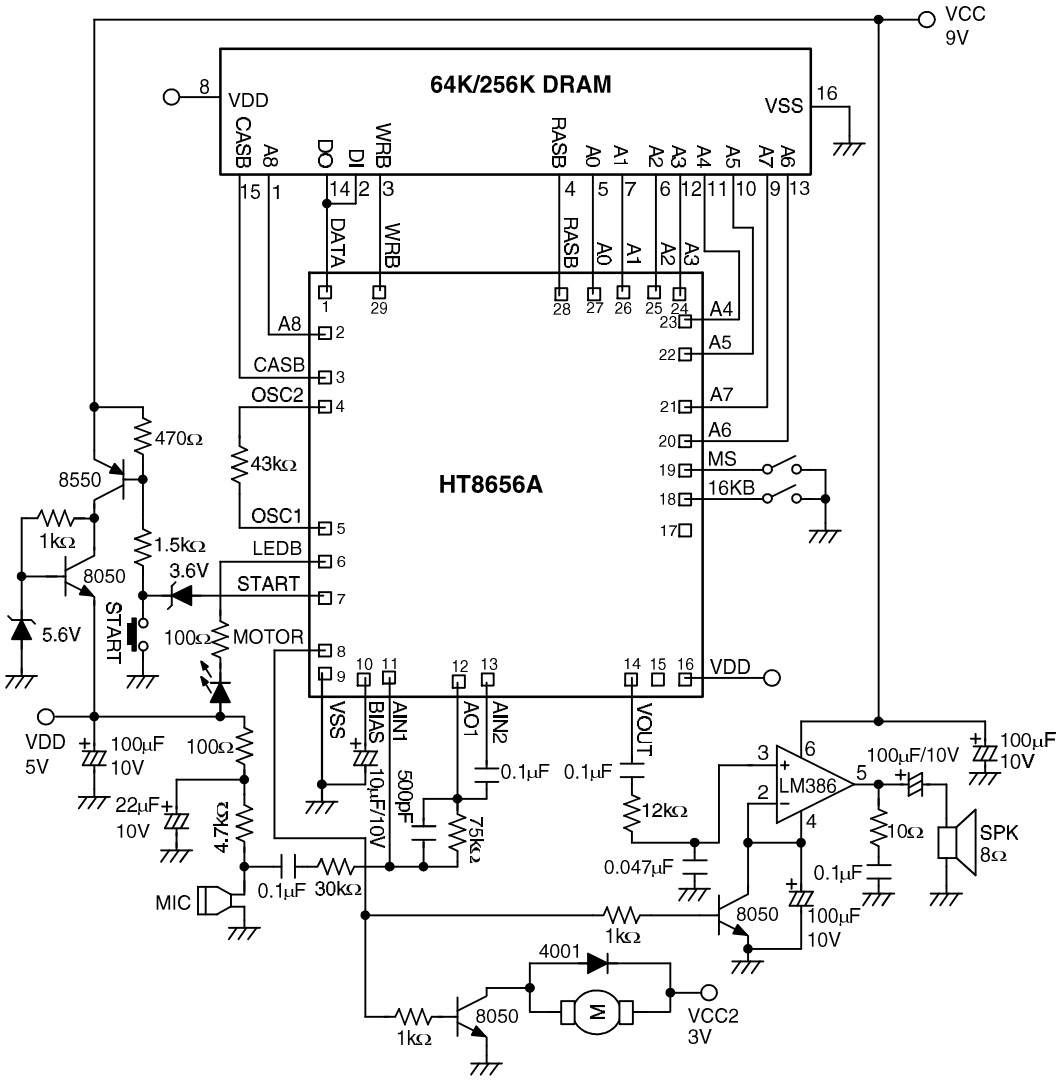
Flowchart


BEGIN
POWER OFF
START
N
Y
Power On LED Off
Idle State & LED ON
Sound Input
N
Y
Stay for 2 mins
N
Y
Record State & LED flash
Silence or Memory Full
N
Y
Play state & LED OFF
Silence or Memory Full
N
Y
Increase Recycle Counter
Recycle Counter=64
N
Y

Application Circuits

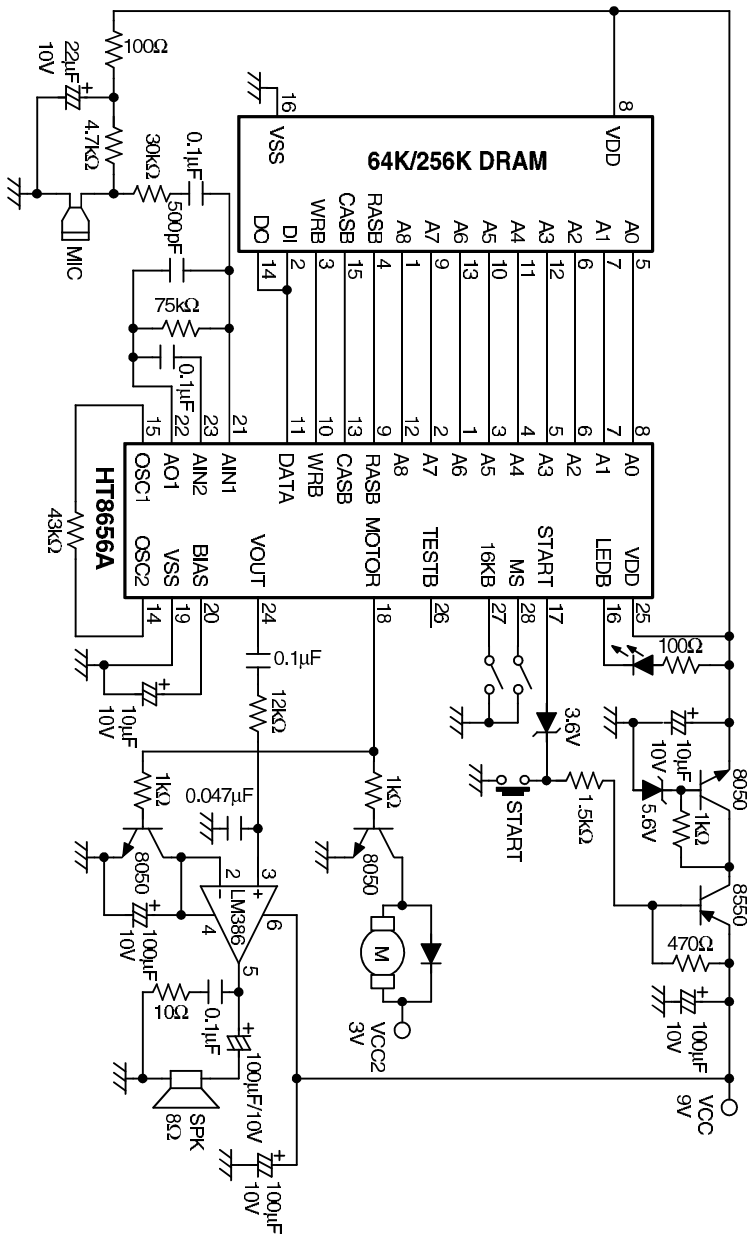
LM386 output

- Dice form



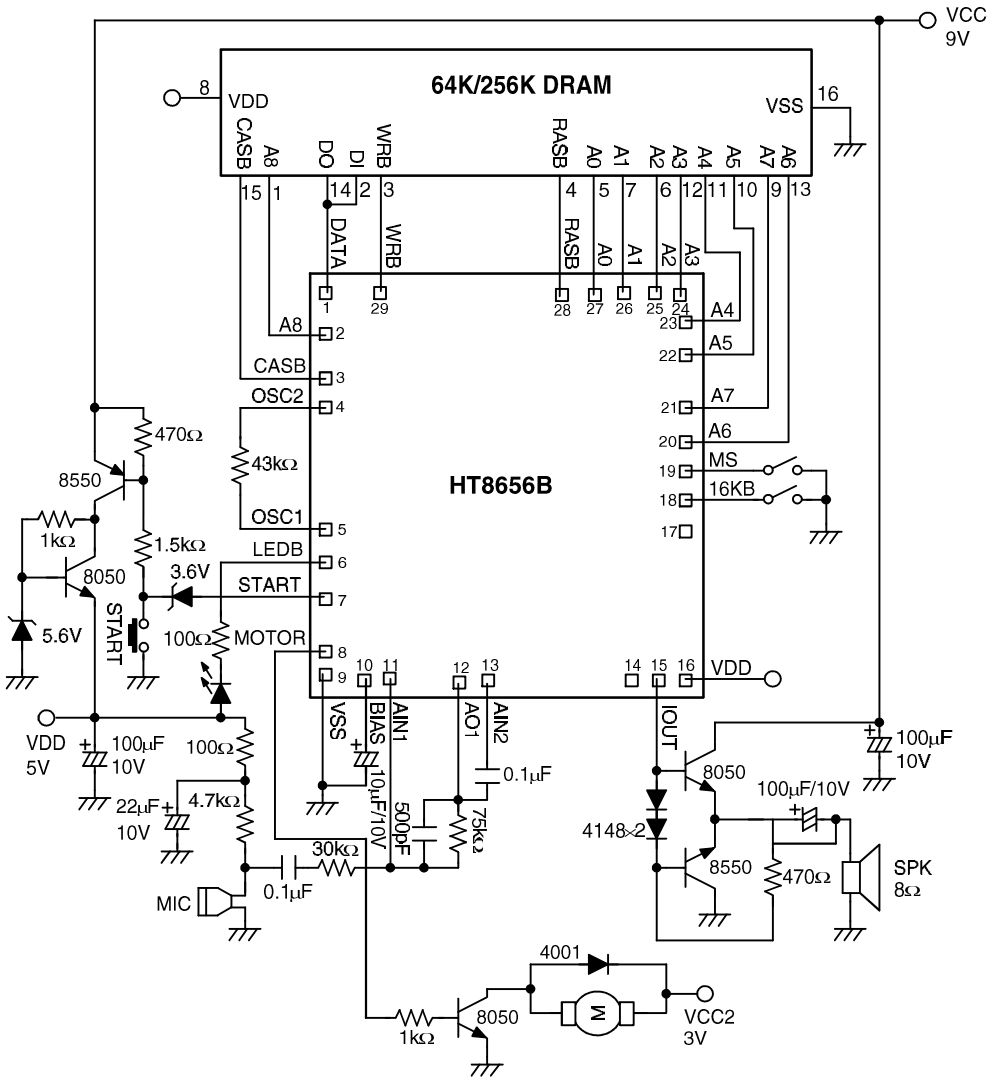
* The IC substrate should be connected to VDD in the PCB layout artwork.

• Package form



two transistor output

• Dice form



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

• Package form

