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VOICE
Recording/Playback

1.0 General Description

The DL3338 is a recording/playback IC with buite-in SRAM for saving voice date . The duration of recording can be adjusted by changing the oscillation frequency. These devices can store one or two sections of message, and support both fixed and variable duration of dual messages. There is on-chip Low Pass Filter (LPF) to reduce the environment noise while recording. For low power consumption, they provide PWM output to drive speaker or buzzer directly. Except two recording/playback LED indicators, they also provide a special function of new message indicator. These devices are ideal for use in portable voice recorders, toys, and many other consumer applications.

2.0 Features

(1) Single power supply can operate from 2.4~5.5V.

(2) Oscillation mode: R oscillator.

(3) Low standby current, <1uA@3V.

(4) Built-in Low Pass Filter (LPF) circuits.

(5) Four input triggers for recording and playback.

- Rec_L: Level/Hold trigger for voice recording.

- Play_L: Level/Hold trigger for voice playback.

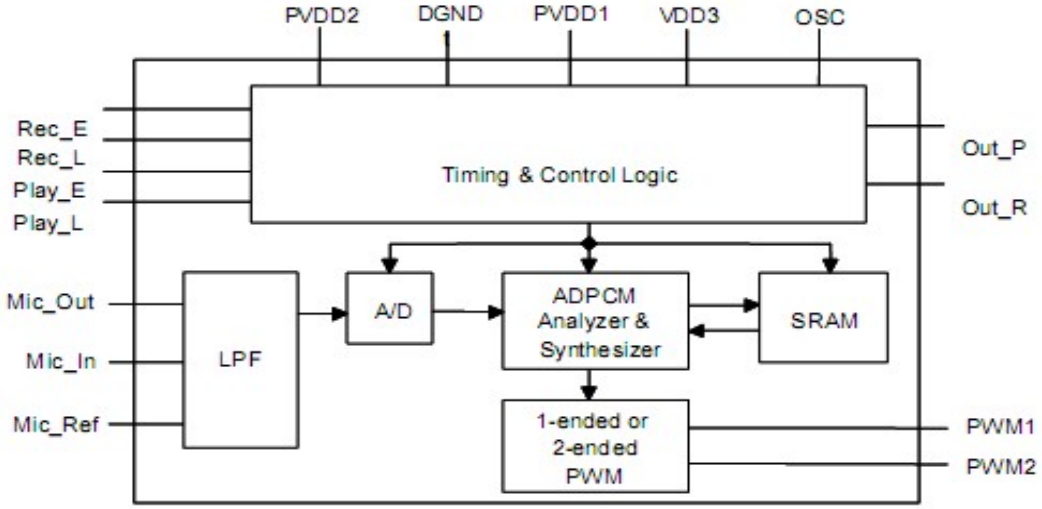
(6) Two output signal for recording/playback indicator which can drive LED or motor.

- Out_P: Active while playback only.
- Out_R: a) Active while recording.
  b) New message indicator, active before 1st-time playback, 0.5Hz flashing rate.

(7) User-selectable 1-ended/2-ended PWM output.

(8) Digital Serial Input/Output for pre-recording message and data output.

3.0 Block Diagram

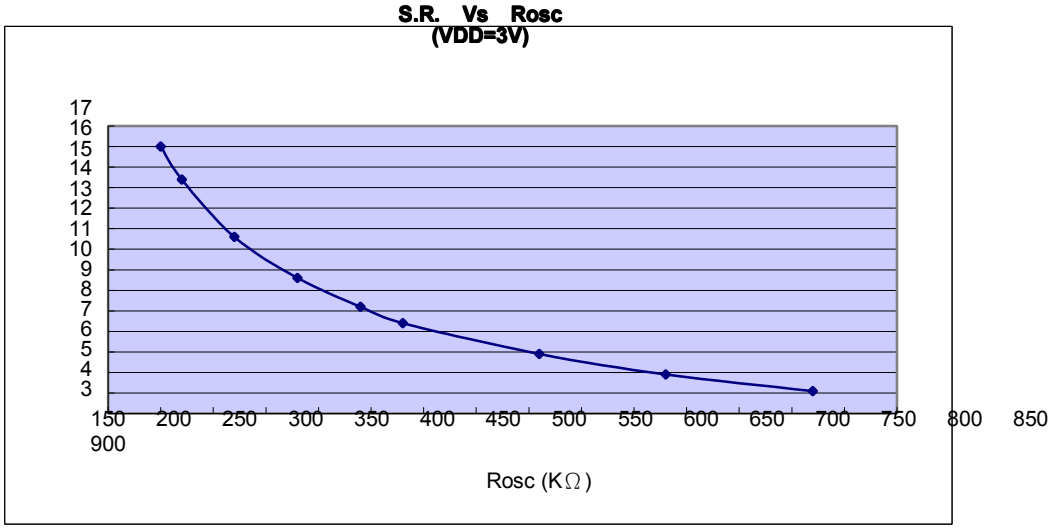


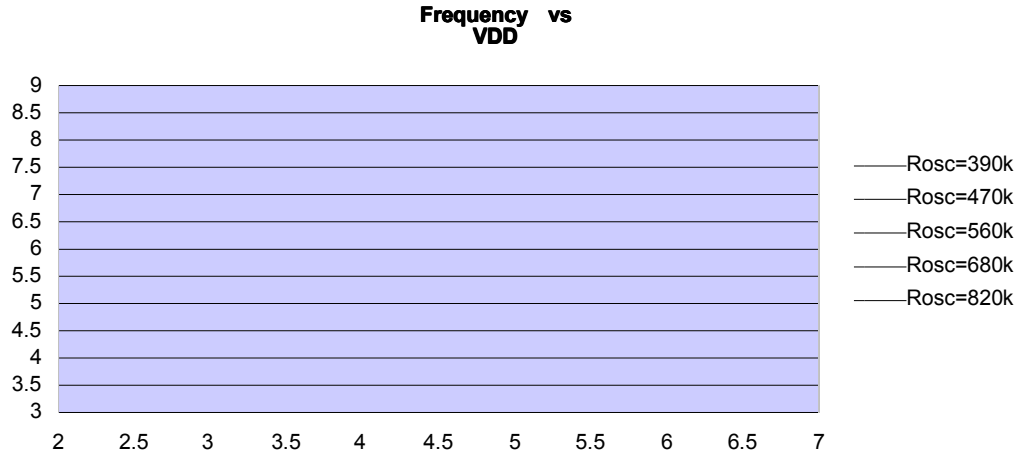
4.0 Pad Description

Pad Name	Pin Attr.	Description
VDD1~3	Power	Possitive power
GND1~3	Power	Negative power
OSC	I	R oscillator input
PWM1	O	PWM1 output. / Connect this pin to GND when 1-ended PWM output.
PWM2	O	PWM2 output. / 1-ended PWM output.
Mic_Ref	I	Microphone input as voltage reference
Mic_In	I	Microphone input as MIC pre-amplifier
Mic_Out	O	Microphone output as MIC pre-amplifier
	I	Trigger input for recording, *Edge*/Unhold/Irretrigger mode. (i.e. One-shot)
Rec_L	I	Trigger input for recording, *Level*/Hold mode.
	I	
Play_L	I	Trigger input for playback, *Level*/Hold mode.
Test	I	Test pin for internal test.
Out_P	O	Playback indicator, low active.
Out_R	O	Recording indicator, low active.
PVDD2	Power	Possitive power
DGND	Power	Negative power

5.0 DC Characteristics (at Rosc=560kΩ, SR=6kHz)

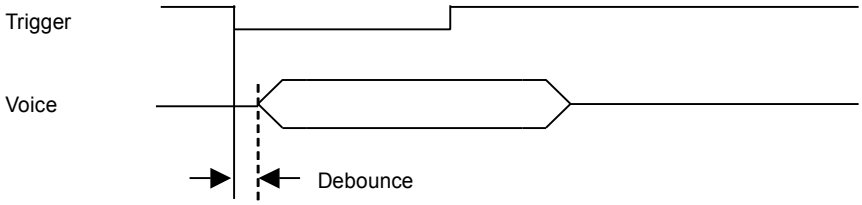
Symbol	Parameter		VDD	Min.	Typ.	Max.	Unit	Condition
VDD	Operating voltage		-	2.4	3	5.5	V	Depending on Freq.
I_{sb1}	Supply current	Standby1	3	-	-	1	uA	Sleep mode, Message Indicator OFF.
			4.5	-	-	2		
I_{sb2}		Standby2	3	-	3.5	-	uA	Sleep mode, Message Indicator ON, No load.
			4.5	-	7.5	-		
I_{op1}		Operating1	3	-	0.8	-	mA	Recording, No load
			4.5	-	4.2	-		
I_{op2}		Operating2	3	-	0.2	-	mA	Playback, No load
			4.5	-	0.3	-		
I_{il}	Input current (Internal pull-high 300kΩ)		3	-	6	-	uA	Vil=0v
			4.5	-	17	-		
I_{ol}	Output-low current (Open-drain)		3	-	24	-	mA	Vol=0.75V
			4.5	-	52	-		Vol=1.50V
I_{PWM}	PWM output current		3	-	40	-	mA	Load=8 ohms
			4.5	-	60	-		
dF/F	Frequency stability			-5	-	5	%	$\frac{Fosc(5.5v- 2.4v)}{Fosc (5.5v)}$
dF/F	Fosc lot variation			-10	-	10	%	Different lot wafer





6.0 Timing Diagram

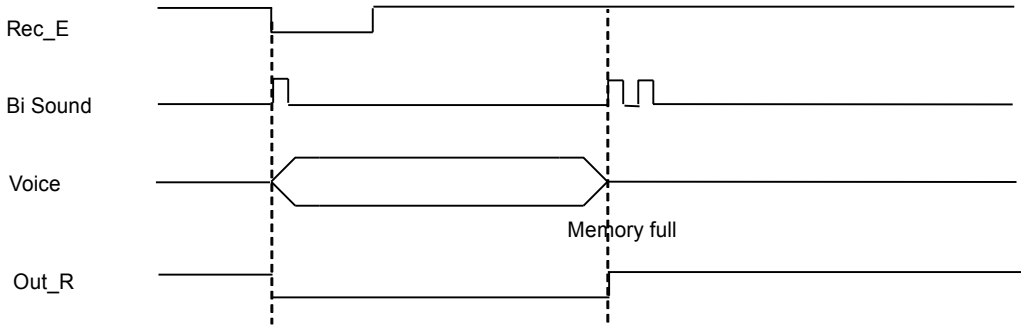
(1) Debounce Time

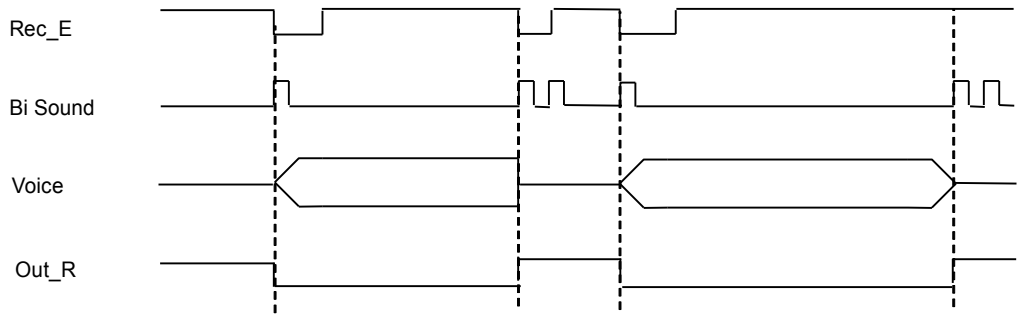


※ Debounce time is configured by 6 kHz S.R and the value is fixed. That is, Slow debounce=20ms. **(No Fast debounce)**

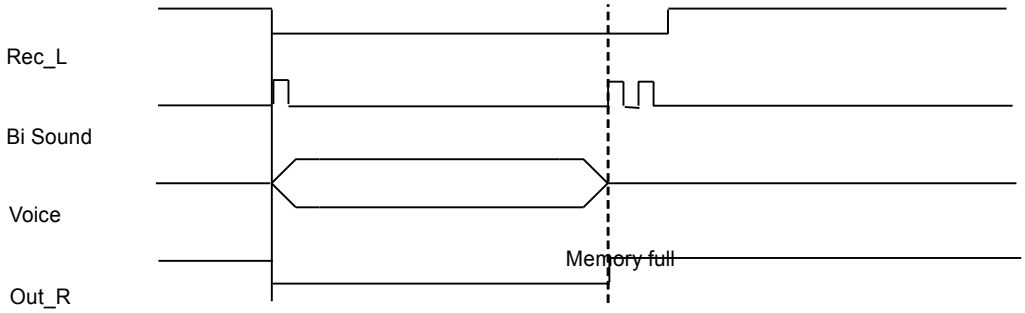
(2) Recording Mode

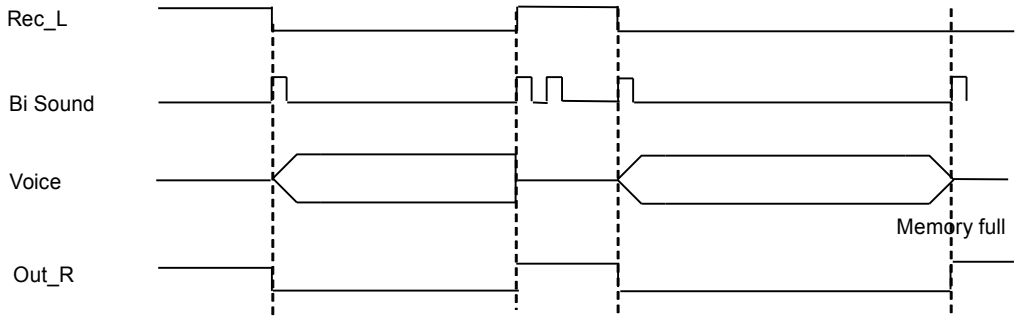
(a). Edge Trigger





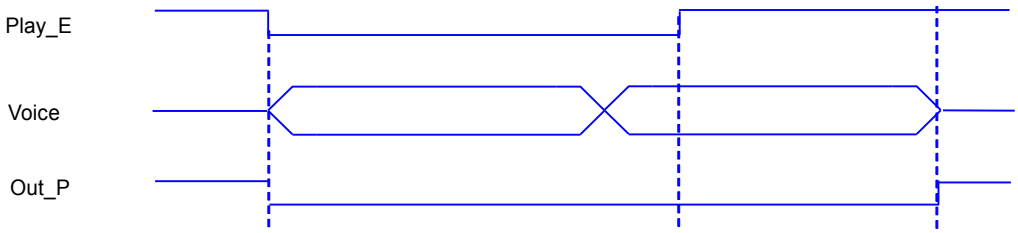
(b). Level Trigger



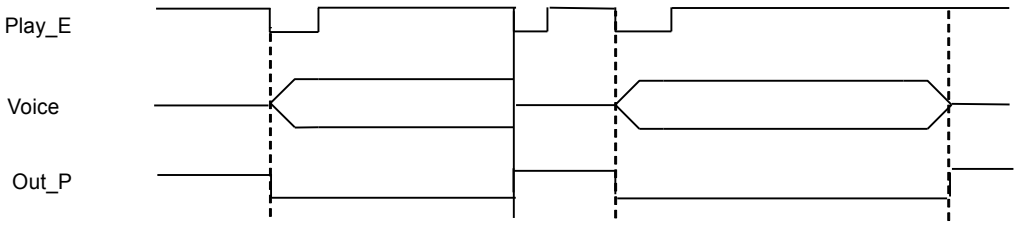


(3) Playback Mode

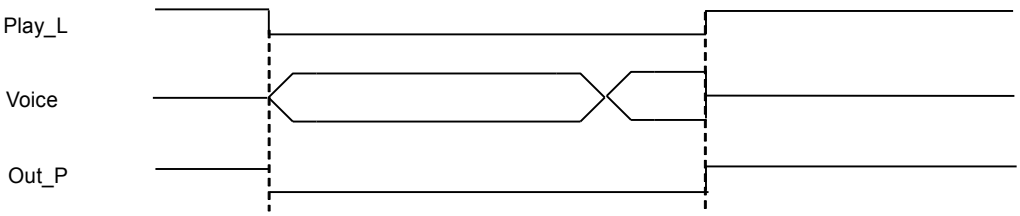
(a). Edge Trigger

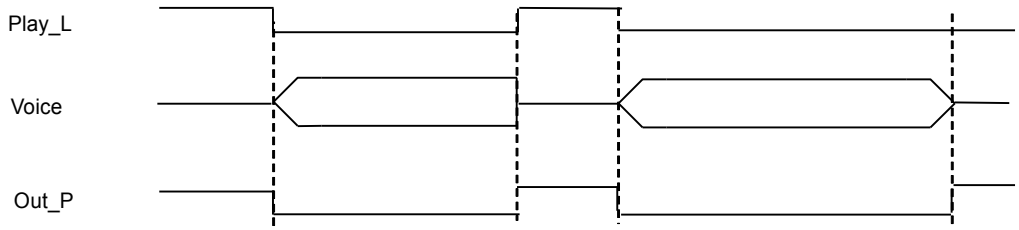


* Voice will be played continuously if keeping key pressed.



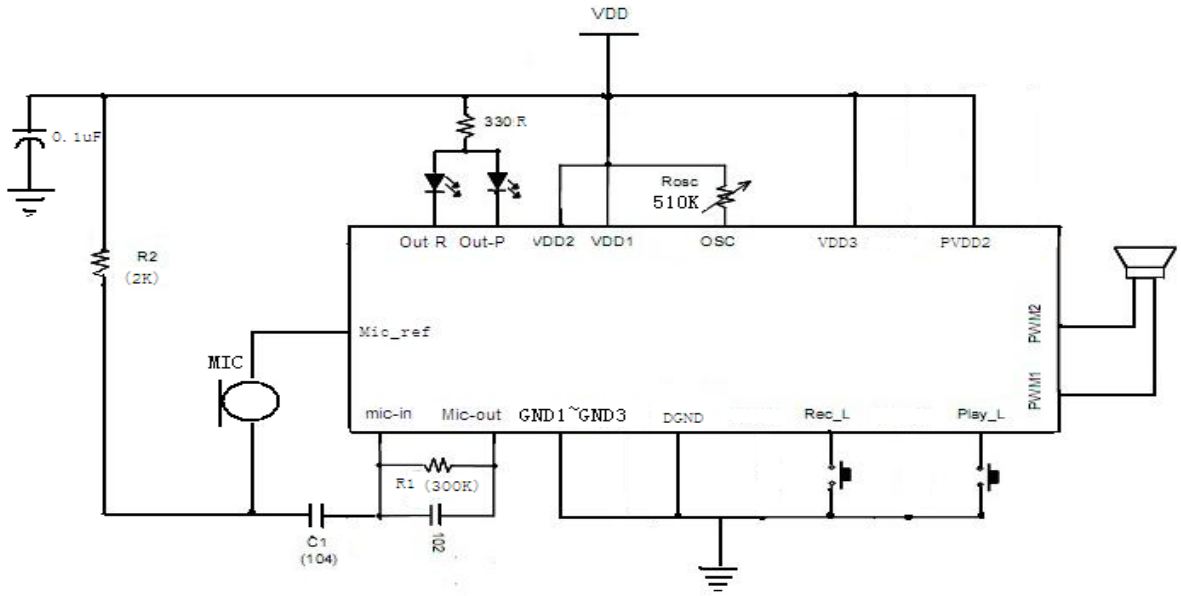
(b). Level Trigger





7.0 Application Circuit

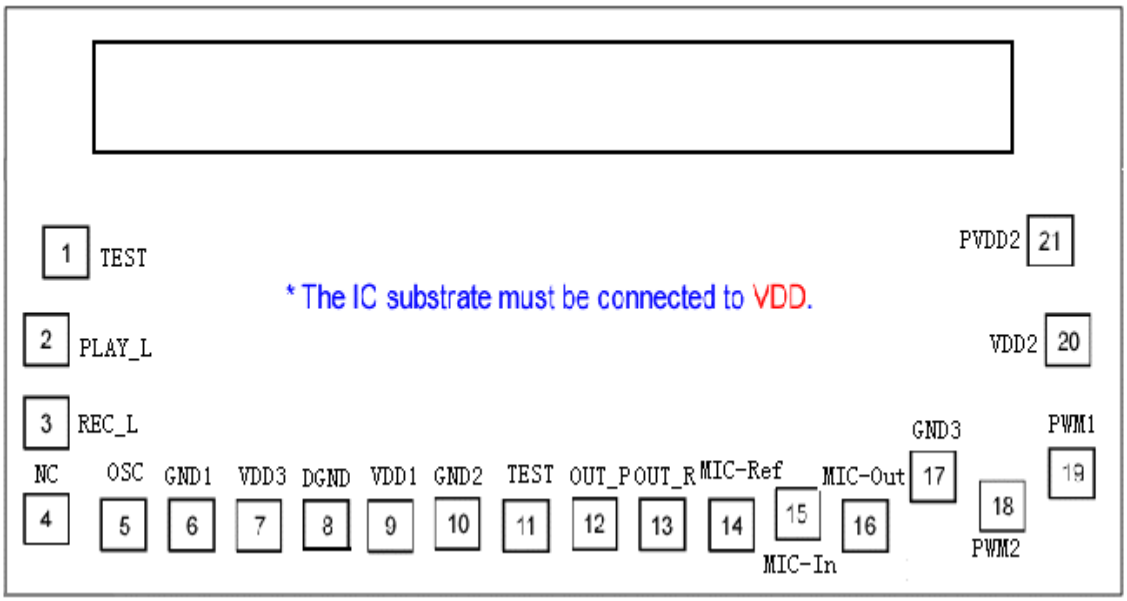
PWM Direct Drive (MIC_SPK Alone, 2-Ended PWM)



* R1 is used to control the gain of OP-Amp. A bigger R1 value will lead to larger voice volume. (100K~300KΩ)
* R2 is used to match the different microphone. A bigger R2 value will lead to larger voice volume and noise. (2K~4.7KΩ)

* C1 is used to control the gain and noise. A bigger C1 value will lead to larger voice volume and noise. (0.033u~0.1uF)

8.0 Bonding Diagram



(0, 0)

Pad #	Pad Name	X	Y	Pad #	Pad Name	X	Y
1	TEST	85	465	12	Out_P	1000	85
2	Play_L	85	345	13	Out_R	1116	85
3	Rec_L	85	225	14	Mic_Ref	1238	85
4	NC	71	85	15	Mic_In	1363	85
5	OSC	198	85	16	Mic_Out	1474	85
6	GND1	308	85	17	GND3	1584	104
7	VDD3	424	85	18	PWM2	1695	108
8	DGND	540	85	19	PWM1	1816	108
9	VDD1	657	85	20	VDD2	1819	309
10	GND2	767	85	21	PVDD2	1794	425
11	NC	877	85				