

Speech Synthesizer (Voice ROM)

FEATURES

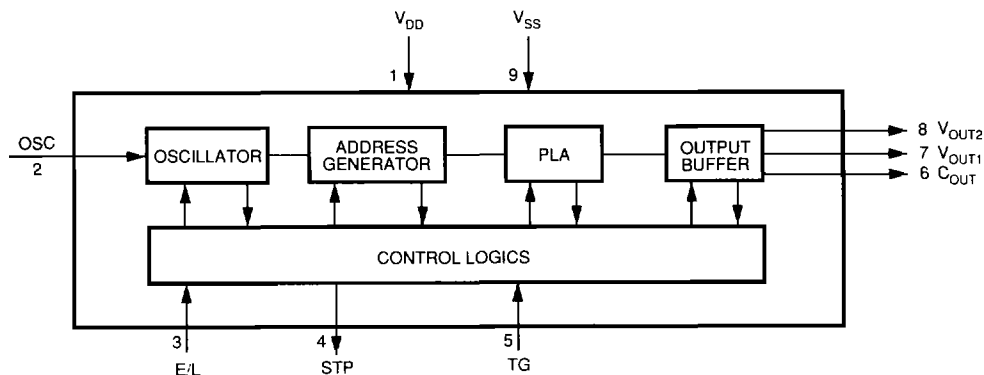
- Single power can operate at 2.4V through 5V.
- Direct drive buzzer and one current output to drive speaker.
- Total maximum duration is 1.5/2.8 seconds, speech + mute is about 6 seconds.
- Automatic power down.
- Repeat function that can repeat up to 8 times.
- Cascade function that can extend the speech duration by $2.8 \times n$ seconds with n pieces of MSS0281.
- Bonding option for edge trigger (CDS photo-resistor application) or level trigger.

DESCRIPTION

The MSS0281 is a single-chip speech synthesizing CMOS VLSI that can synthesize voice and other sounds up to 2.8 seconds. The chip contains most of the necessary circuitry such as the RC oscillator, ROM, D/A, buzzer buffer, control and timing logic. Sound generation is possible with a minimum of external components. Several chips can be cascaded to reach longer voice duration (longer than 1.5/2.8 seconds). Customer speech data will be edited and programmed into ROM by changing only one mask during the device fabrication. MOSEL provides sound analysis, digitizing and editing from customer provided audio tapes.

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BLOCK DIAGRAM



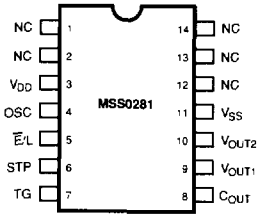
MSS0151/ 0281

PIN DESCRIPTIONS (DIE BONDING PADS)

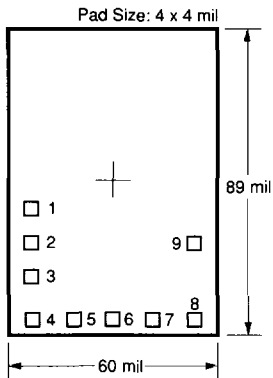
PIN NO.	SYMBOL	FUNCTION
1	V_{DD}	Positive power supply
2	OSC	RC oscillator input
3	E/L	Open, edge trigger; pull high, level trigger
4	STP/TST	One-shot stop signal output/Test mode, active high; (for production test only)
5	TG	Trigger input, active high
6	C_{OUT}	Current output for driving speaker
7	V_{OUT1}	Speech signal voltage output (for buzzer)
8	V_{OUT2}	Speech signal voltage output (for buzzer)
9	V_{SS}	Negative power supply

Note: Substrate is V_{DD}

PIN CONFIGURATION



BONDING DIAGRAM



1. V_{DD} (-575 , -299.7)
2. OSC (-575 , -497.7)
3. E/L (-575 , -738)
4. STP (-548 , -936)
5. TG (-275.5 , -936)
6. C_{OUT} (12.2 , -936)
7. V_{OUT1} (272 , -936)
8. V_{OUT2} (548 , -936)
9. V_{SS} (575 , -481.5)

Note: Substrate is V_{DD} Unit: μM

ABSOLUTE MAXIMUM RATINGS

SYMBOL	RATING	UNITS
$V_{DD} - V_{SS}$	-0.5 ~ +7.0	V
V_{IN} (TG - E/L)	$V_{SS} - 0.3 < V_{IN} < V_{DD} + 0.3$	V
V_{OUT} (STP)	$V_{SS} < V_{OUT} < V_{DD}$	V
T (Operating)	-10 ~ +60	°C
T (Storage)	-55 ~ +125	°C

DC ELECTRICAL CHARACTERISTICS

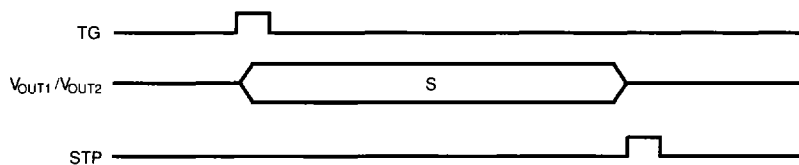
PARAMETER NAME	PARAMETER		TEST CONDITIONS	MSS0151/0281			UNITS
				MIN.	TYP.	MAX.	
V_{DD}	Operating Voltage			2.4	4.5	5	V
I_{SB}	Supply	Stand by	$V_{DD} = 4.5V$	-	-	0.1	μA
I_{OP}	Current	Operating	I/O Open	-	-	70	
V_{IH}	Input Voltage (TG)		$V_{DD} = 4.5V$	4	4.5	5	V
V_{IL}				-0.3	0	0.3	
I_{IH}	Input Current (TG)		$V_{DD} = 4.5V$	-	-	5	μA
I_{IL}				-	0	-	
I_{IH}	Input Current (E/L)		$V_{DD} = 4.5V$	-	-	10	μA
I_{IL}				-	0	-	
I_{OH}	O/P Current	Drive	$V_{DD} = 4.5V, V_{O/P} = 4V$	-	-5	-	mA
I_{OL}	(V_{OUT1}, V_{OUT2})	Sink	$V_{DD} = 4.5V, V_{O/P} = 0.5V$	-	5	-	
I_{OH}	Output Current (STP)		$V_{DD} = 4.5V, V_{O/P} = 4V$	-	-1	-	mA
I_{OL}			$V_{DD} = 4.5V, V_{O/P} = 0.5V$	-	1	-	
T_{STP}	Pulse Width (STP)		$V_{DD} = 4.5V$	-	-	5	μS
I_{CO}	Output Current (C_{OUT})		$V_{DD} = 4.5V$	-	-1	-	mA
$\Delta F/F$	Frequency Stability		$F_{OSC}(4.5V) - F_{OSC}(4V)$	-	-	5	%
			$F_{OSC}(4.5V)$				
$\Delta F/F$	Frequency Variation		$V_{DD} = 4.5V, R_{OSC} = 1.2M\Omega$	-	-	15	%

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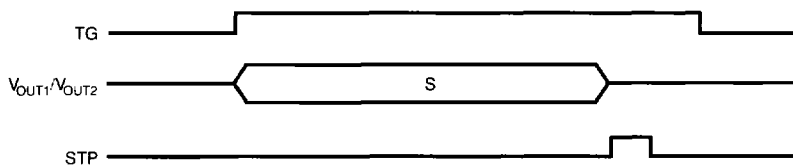
TIMING WAVEFORMS

I. Edge Mode

1. Edge trigger

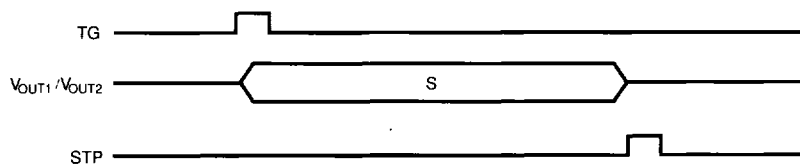


2. Level trigger

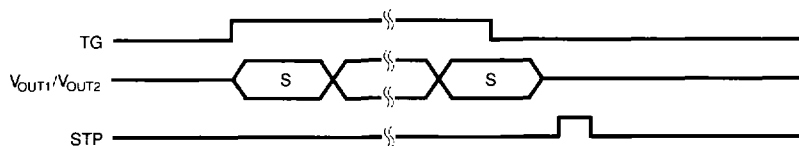


II. Level Mode

1. Edge trigger

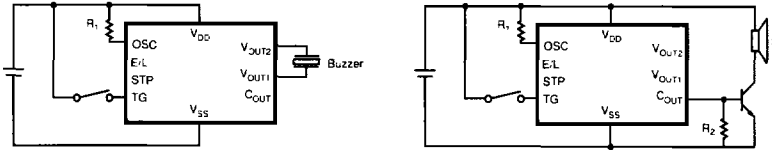


2. Level trigger



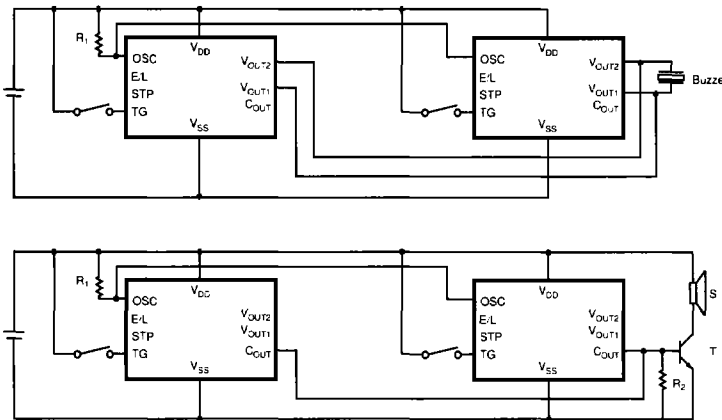
APPLICATION CIRCUITS

1. Typical application



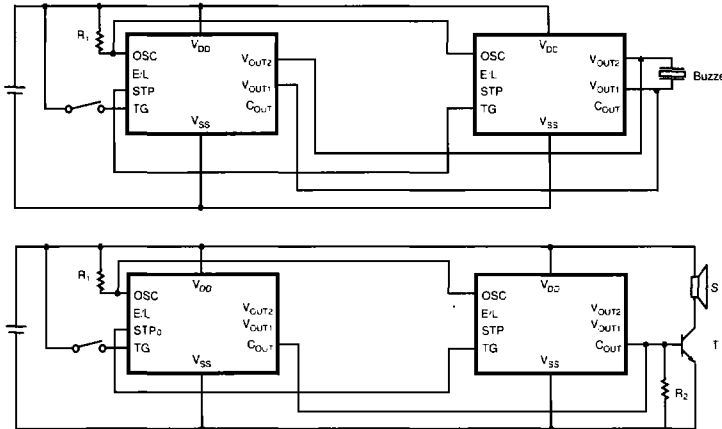
2. Parallel application

(Could extend up to desired voice sections in parallel arrangement)



3. Cascade application

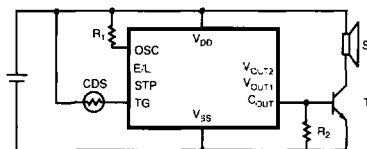
(Could extend to desired voice length in serial arrangement)



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APPLICATION CIRCUITS

4. CDS Application



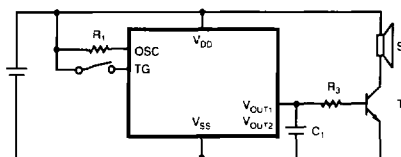
Notes:

a. R1 (resistor) = 1.2M Ω , R2 = 470 Ω , T (transistor) = $\beta > 150$, S (speaker) = 1/4W, 8 Ω , CDS = Resistance variation range (50K to 1.5M); all typical.

b. Piezzo buzzer resonant frequency is around 1KHz.

c. It is recommended to add a capacitor (0.1 μ f typical) between trigger pad and ground for noise immunity purpose.

5. Use V_{OUT1} to drive speaker.



Note:

R3 = 1K typical, C1 = 0.1 μ f typical.