

OVERVIEW

The SM1155 series are CMOS melody LSIs that, together with a battery and piezoelectric buzzer. They also feature an oscillator stop function in non-play mode and a variable pull-down resistance function that responds to input levels in order to reduce power consumption, reduce cost, and extend battery life, making them ideal in a wide range of applications including the hold sound for telephones and toys.

FEATURES

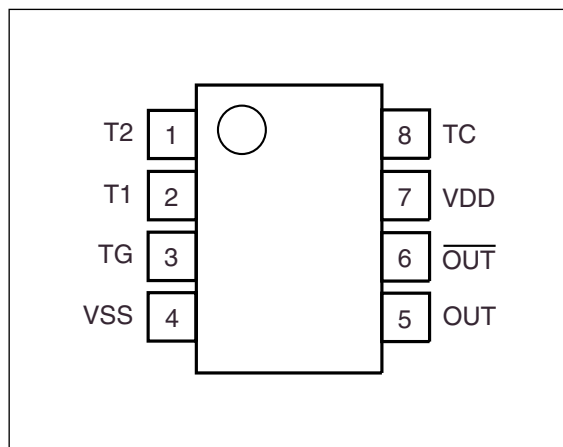
- Requires few external components
- 1.2 to 3.6V wide operating voltage range
- Low power consumption
- Melody modes: Level hold 1
- Oscillator stop function in non-play mode
- Power saving pull-down resistor built-in
- RC oscillator circuit
- Power-ON initialization function
- Wide pitch dynamic range (G₃ to D₇)
- 8-pin SOP package

ORDERING INFORMATION

Device	Package
SM1155xxx1S	8-pin SOP

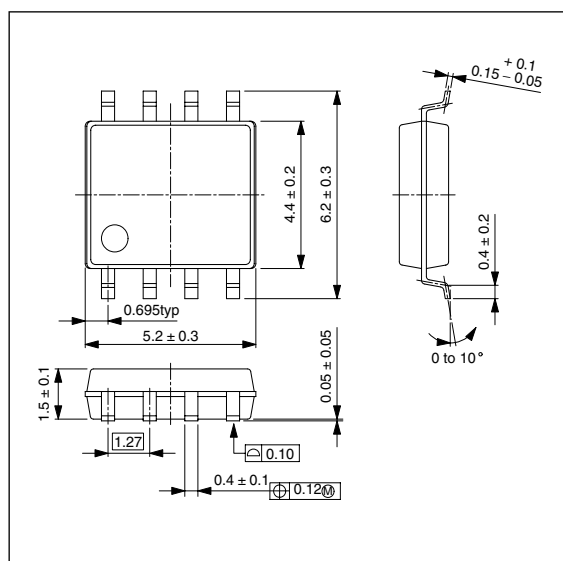
PINOUT

(Top view)



PACKAGE DIMENSIONS

(Unit: mm)



PAD DESCRIPTION

Number	Name	I/O	Function
1	T2	-	Test pins (must be open)
2	T1		
3	TG	Ip ¹	Melody mode control input H: Play L/ Open: Non-play
4	VSS	-	Ground
5	OUT	O	Piezoelectric speaker driver outputs. Both pins are LOW in non-play mode. OUT is LOW and $\overline{\text{OUT}}$ is HIGH during output for a musical rest note. Both pins are HIGH during the gap between musical notes.
6	$\overline{\text{OUT}}$		
7	VDD	-	Supply. The rear surface of the chip is V_{DD} level.
8	TC	-	Test pins (must be open)

1. Built-in pull-down resistor (the resistance of the pull-down resistor varies with the applied voltage, as described in the Electrical Characteristics).

SPECIFICATIONS

Absolute Maximum Ratings

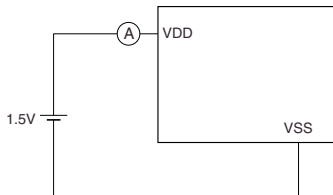
Parameter	Symbol	Condition	Rating	Unit
Supply voltage range	$V_{DD} - V_{SS}$		-0.3 to 5.0	V
Input voltage range	V_{IN}		$V_{SS} - 0.2$ to $V_{DD} + 0.2$	V
Operating temperature range	T_{opr}		-20 to 80	°C
Storage temperature range	T_{stg}		-55 to 125	°C

Electrical Characteristics

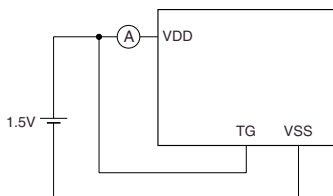
$T_a = 25^\circ\text{C}$, $V_{SS} = 0\text{V}$, $V_{DD} = 1.5\text{V}$

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
Operating voltage	V_{DD}		1.2	1.5	3.6	V
Current consumption ¹	I_{DD1}	Non-play mode	-	0.01	0.3	μA
Current consumption ²	I_{DD2}	Melody modes: OUT, $\overline{\text{OUT}}$ open	-	25	50	μA
TG LOW-level input voltage	V_{IL}		-	-	$V_{SS} + 0.2$	V
TG HIGH-level input voltage	V_{IH}		$V_{DD} - 0.2$	-	-	V
TG LOW-level input current	I_{IL}	$V_{IL} = 0.4\text{V}$	1.4	3.0	6.0	μA
TG HIGH-level input current	I_{IH}	$V_{IH} = 1.5\text{V}$	1.4	3.0	6.0	μA
OUT, $\overline{\text{OUT}}$ LOW-level output current	I_{OL}	$V_{OL} = 0.75\text{V}$	2.0	-	-	mA
OUT, $\overline{\text{OUT}}$ HIGH-level output current	I_{OH}	$V_{OH} = 0.75\text{V}$	2.0	-	-	mA
Internal oscillator frequency	f_{OSC}	$f_0 = 50\text{kHz}$	-20	-	+20	%

1. Measurement circuit



2. Measurement circuit



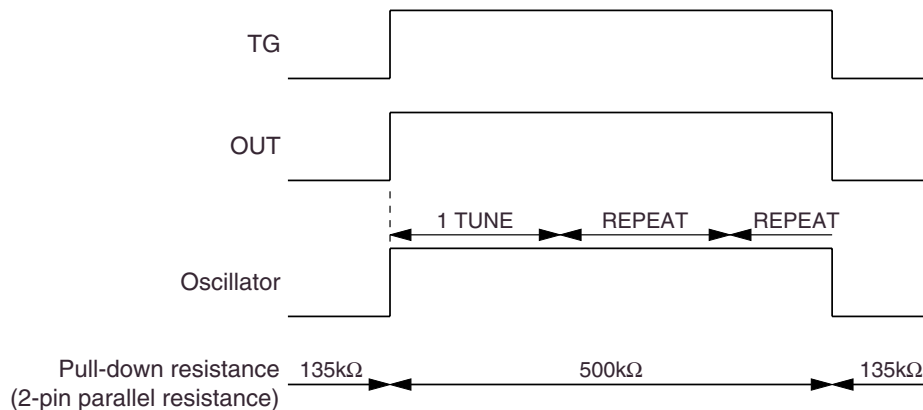
FUNCTIONAL DESCRIPTION

Melody Modes

When TG goes HIGH (V_{DD}), melody play starts.

Level hold 1

When TG goes HIGH, melody play starts and continues while TG is held HIGH. When TG goes open circuit or LOW, melody play stops, even if during mid melody.



Power-save Function

As shown in the preceding timing diagrams, the oscillator stops during non-play mode and the pull-down resistance value changes in response to both HIGH-level and LOW-level inputs (power-save pull-down resistor) to reduce power consumption and extend battery life.

Non-play oscillator stop function

When melody play ends, regardless of the state of TG, the internal oscillator stops and is placed in a standby state. In this state, the current consumption, including input pin pull-down resistor current ($I_{IH \text{ max}}$), does not exceed 3.3μA.

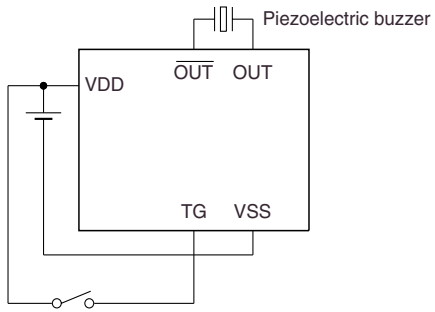
Power-save pull-down resistor

The resistance of the TG input pull-down resistor changes in response to the input voltage. The pull-down resistance is 500kΩ when the input is HIGH, and the pull-down resistance is 135kΩ when the input is LOW.

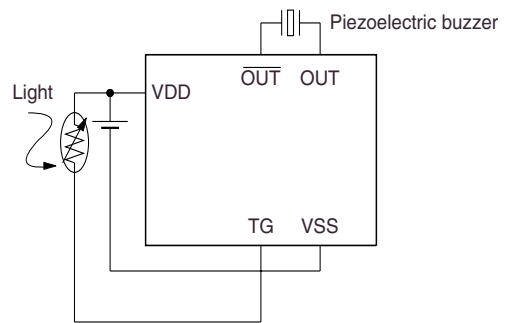
Furthermore, if a light-dependent resistor (CdS) cell is employed as a switch (the pull-down resistance is maximum when the CdS resistance is minimum (light) and the pull-down resistance is minimum when the CdS resistance is maximum (dark)), the combined resistance can be increased, decreasing current consumption.

TYPICAL APPLICATION

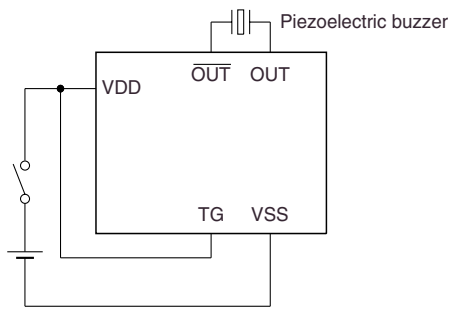
The circuits below represent the standard connections for SM1155 series devices.



Circuit 1



Circuit 3



Circuit 2

SONG LIST

NPC performs all actions required by the copyright guidelines and rules laid down by the Japanese Society for Rights of Authors, Composers and Publishers (JASRAC). Accordingly, for products intended solely for sale within Japan, copyright permission is not required when submitting an order request, except in special circumstances.

For products intended for sale outside of Japan, it is the responsibility of the customer to obtain permission to use a melody by following all relevant copyright rules and regulations for the countries concerned. NPC does not undertake the copyright permission process for overseas countries.

Device	Song Title	Version	Composer	Time [s]
SM1155	Its a small world	AAA	Sherman Richard M/Sherman Robert B	45.97
SM1155	Twinkle Twinkle Little Star	AAM ¹	–	25.86
SM1155	Bolero	AAN ¹	Ravel Maurice Joseph	19.83
SM1155	Baroque Hoedown	AAP ¹	Kingsley Gershon/Perrey Jean Jacques	20.69
SM1155	Mickey Mouse March	AAQ ¹	Dodd Jimmie	31.03

1. The sample of this version is available anytime.

Note. The copyrights of music described in this list have been the public domain or being managed by JASRAC in Japan.

Please pay your attention to the following points at time of using the products shown in this document.

The products shown in this document (hereinafter "Products") are not intended to be used for the apparatus that exerts harmful influence on human lives due to the defects, failure or malfunction of the Products. Customers are requested to obtain prior written agreement for such use from SEIKO NPC CORPORATION (hereinafter "NPC"). Customers shall be solely responsible for, and indemnify and hold NPC free and harmless from, any and all claims, damages, losses, expenses or lawsuits, due to such use without such agreement. NPC reserves the right to change the specifications of the Products in order to improve the characteristic or reliability thereof. NPC makes no claim or warranty that the contents described in this document dose not infringe any intellectual property right or other similar right owned by third parties. Therefore, NPC shall not be responsible for such problems, even if the use is in accordance with the descriptions provided in this document. Any descriptions including applications, circuits, and the parameters of the Products in this document are for reference to use the Products, and shall not be guaranteed free from defect, inapplicability to the design for the mass-production products without further testing or modification. Customers are requested not to export or re-export, directly or indirectly, the Products to any country or any entity not in compliance with or in violation of the national export administration laws, treaties, orders and regulations. Customers are requested appropriately take steps to obtain required permissions or approvals from appropriate government agencies.

The logo for NPC (Seiko NPC Corporation) consists of the letters 'NPC' in a bold, black, sans-serif font. The 'N' and 'P' are connected at the top, and the 'C' is positioned to the right of the 'P'.

SEIKO NPC CORPORATION

1-9-9, Hatchobori, Chuo-ku,
Tokyo 104-0032, Japan
Telephone: +81-3-5541-6501
Facsimile: +81-3-5541-6510
<http://www.npc.co.jp/>
Email: sales@npc.co.jp

NC0722AE 2008.08