

SINGLE TONE MELODY WITH LED BLINKING C-MOS

■ GENERAL DESCRIPTION

The NJU502 series is a single tone melody with LED blinking function C-MOS IC incorporated with 64 notes ROM.

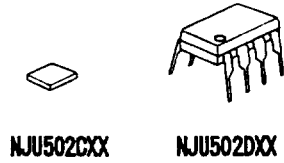
It plays the melody with LED blinking using a piezo buzzer, 3V battery and LED(s).

The NJU502 has 3 kinds of playing modes and these modes can be selected by either bonding or soldering option.

After melody playing, the LSI shifts mode to the power saving mode with oscillation stop to realize the long battery life.

The NJU502 series is suitable for melody greeting cards, toys, telephone rests and so on.

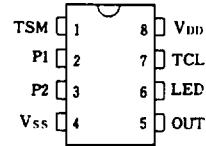
■ PACKAGE OUTLINE



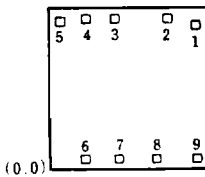
■ FEATURES

- Operating Voltage — 2.0 ~ 3.6V
- Low Current Consumption
- 3 kinds of Playing Modes
 - Bonding or Soldering Option
- CR Oscillation Circuits On-chip
- LED Blinking Function
- Piezo Buzzer Direct Drive
- Minimum External Components
- Power Saving Function
 - Oscillation Stop After Replay
 - Value Shifted Pull-down Resistance
- Package Outline : DIP / DMP / CHIP 8
- C-MOS Technology

■ PIN CONFIGURATION



■ PAD LOCATION



■ COORDINATES

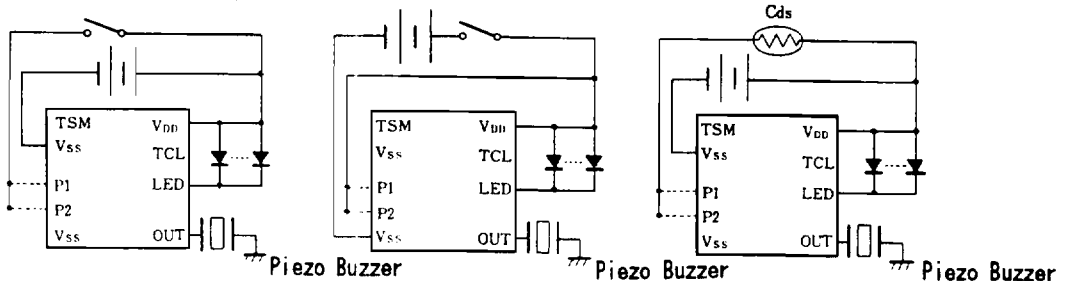
UNIT: μm

No.	PAD Name	X	Y
1	TSM(NC)	1830	1780
2	V _{SS}	1540	1870
3	P ₁	870	1870
4	P ₂	460	1870
5	V _{SS}	130	1840
6	OUT	460	130
7	LED	870	130
8	TCL(NC)	1320	130
9	V _{DD}	1830	130

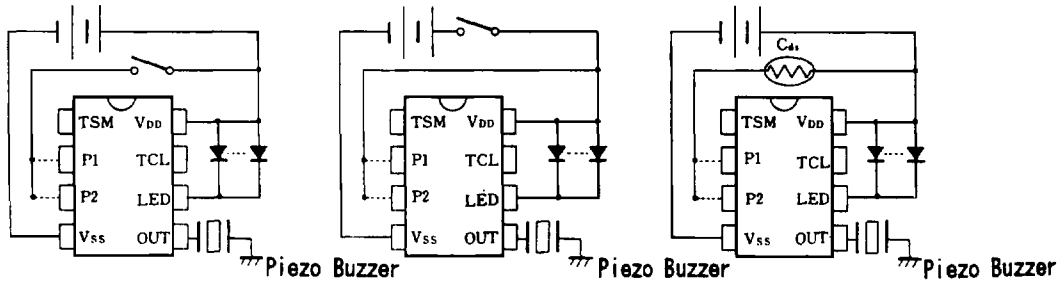
CHIP SIZE: 1.96X2.00mm

CHIP THICKNESS: 400 $\mu\text{m} \pm 30 \mu\text{m}$

■ APPLICATION CIRCUITS (CHIP FORM)



■ APPLICATION CIRCUITS (PACKAGE FORM)



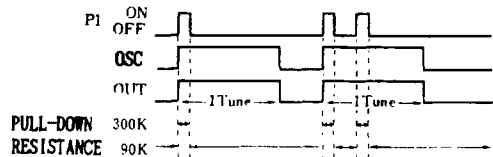
■ PLAYING MODE

The NJU502 series have following three kinds of playing mode selected by P1 and/or P2 terminal.

P1	P2	Playing Mode
○		One-shot 1 (Edge trigger type)
	○	One-shot 2 (Level control type)
○	○	Level hold

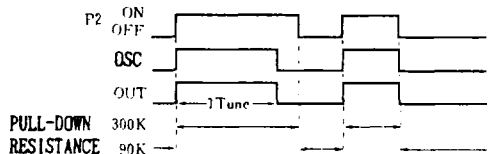
(1) One-shot 1

Melody is playing once when the P1 input turns on, then automatically stops at its end. The P1 input is disregarded during the play.



(2) One-shot 2

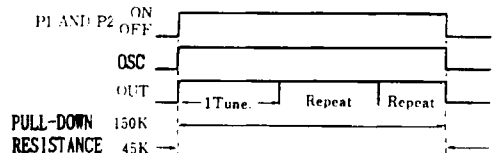
When the P2 input is remaining on over the one play cycle, melody is played once then automatically stops at its end. When the P2 input is turned off before the melody end, the melody stops half-way.



(3) Level hold

Melody is repeated while the both inputs of P1 and P2 remaining on.

Its stops when both inputs of P1 and P2 are turned off.



Note 1 : Turn on level of P1 and P2 is V_{DD} .

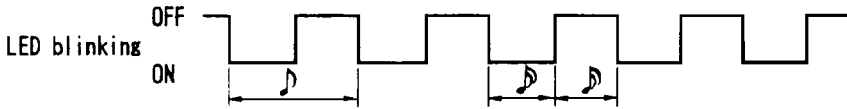
Note 2 : Minimum pulse width of all inputs are required over than 64 msec as chatter free time.

Note 3 : LED Blinking during play by eight note cycle.

LED BLINKING FUNCTION

LED Blinking

LED blinks during the playing, and the blinking period is 1/8 musical note.



LED is out of relations to the playing musical note and usually blinking by 1/8 musical note period.

POWER SAVE FUNCTION

- (1) Oscillation Stop Function.....Oscillation stops automatically when melody stops.
The current consumption is less than $0.3\mu\text{A}$ while no playing.
- (2) Input Current on P1 and P2.....Variable Pull-down resistance of P1 and P2 is controlled by switch conditions is as follows:
 - During making (V_{DD})..... $300\text{K}\Omega/1$ Input
 - During breaking (V_{SS})..... $90\text{K}\Omega/1$ Input
 This function is especially effective for Cds using application.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{DD}-V_{SS}$	- 0.3 ~ + 5.0	V
Input Voltage	V_{IN}	$V_{SS}-0.2 \sim V_{DD}+0.2$	V
Operating Temperature	T_{OPR}	- 30 ~ + 85	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	- 65 ~ + 125	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS

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

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Operating Voltage	V_{DD}		1.2	1.5	3.6	V
Stand-by Current	I_{DD1}	No Play, P1, P2 Open		0.01	0.6	μA
Operating Current	I_{DD2}	Playing, OUT, LED Open		120	250	μA
Input Current	I_{IL}	P1, P2	$V_{IL}=0.8\text{V}$	9.0	18	μA
	I_{IH}		$V_{IH}=2.2\text{V}$	9.0	18	
Output Current (1)	I_{OL1}	OUT	$V_{OL}=0.75\text{V}$	2.0		mA
	I_{OH1}		$V_{OH}=0.75\text{V}$	2.0		
Output Current (2)	I_{OL2}	LED	$V_{OL}=1.0\text{V}$	8.0		mA
	I_{OH2}		$V_{OH}=2.0\text{V}$	8.0		
Oscillation Frequency	f_o		80	100	120	kHz
Osc. Stop Voltage	V_{DS}				2.0	V

■ MUSICAL SPECIFICATION

(1) TEMPO

NJU502 series can take from any one of following 15 different tempos.

♩ =	Tempo
43.5	LARGO
46.4	
49.7	
53.5	ADAGIO
58	
63.3	
69.6	ANDANTE
77.3	
87	
99.4	MODERATO
116	
139	ALLEGRETTO
174	
232	
348	PREST

(2) NOTE/REST

The following 8 different notes and rest are provided. Other kinds of note and rests may also be played by using TIE function.

音 符	休 符

(3) JUMP FUNCTION

Jump function saves the number of notes programmed by repeating the same part.

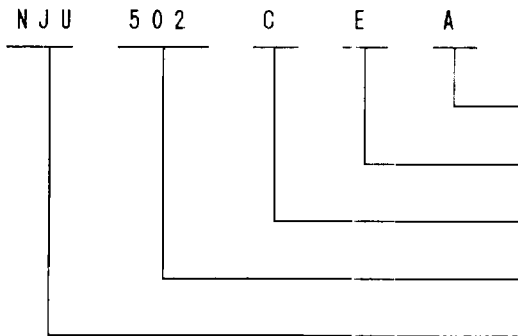
Maximum 7 jumps are available.

(4) COMPASS & SCALE

NJU502 series can play 15 kinds of scales over 3 1/2 octave of G3 to D7 or G4 to D8.

■ ORDERING INFORMATION

The NJU502 series is named by following rules:



Music title

Music field

Package outline (C: Chip, D: DIP, M: DMP)

Device name

The mark of NJRC C-MOS products