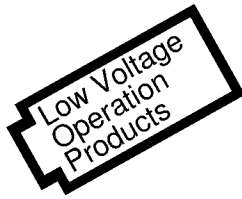


# 7910 Series

## Multi-Melody IC



- Clear Electronic Sound
- Usable for Wide-ranged Application
- Low Power Dissipation & Supply Voltage

### DESCRIPTION

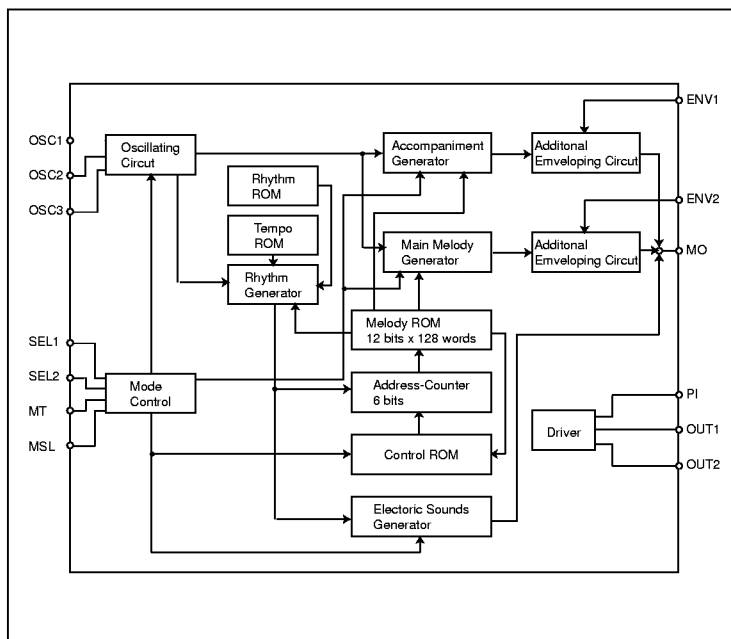
The series 7910 is a CMOS IC which plays prearranged melodies and alarm sounds electronically. Built-in oscillation circuit generates acoustic pulses, then melodies and alarm sounds are formed with only a few external discrete parts including resistor, capacitor, speaker etc. Thus the 7910 can enjoy various applications such as replacement for conventional music box and alarm sound generator.

NOTE: These are ongoing user service products.

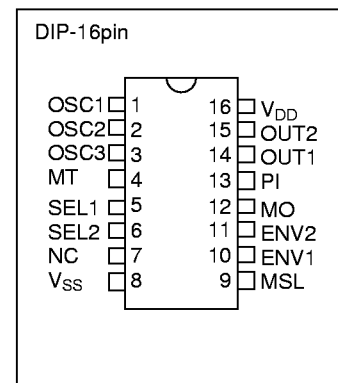
### FEATURES

- Melody ..... 2 or 1
- Musical interval ..... Temperament or pure temperament
- Sound ..... 2 series, 2.5 octave  
Compound interval or accompaniment are possible. (One octave interval)
- Tempo ..... 16 kinds (Prest to Largo). Two tempos in one piece.
- Note ..... Basic note ♩ ♪ ♫ ♬ ♭ ♮, and also possible for ♩ ♪ ♫ ♬
- Rest ..... According to note
- Repeat ..... Continuous performance of pieces, and repeats (8 times at most) of a piece.
- Beginning ..... Always starts at the beginning of piece.
- Alarm Chime ..... Two (not always equipped)
- Input signal ..... 1 start signal, 3 selective signals.
- Envelope ..... External CR (2 series)
- Volume control ..... From external circuit (volume etc.)
- Oscillation ..... C, R oscillator (C, R external connection)
- Voltage ..... 1.5V
- Package ..... DIP-16pin (plastic)

### BLOCK DIAGRAM



### PIN CONFIGURATION



## ■ PIN DESCRIPTION

Pin Name	Pin No.	Functions	Pin Name	Pin No.	Functions
OSC1	1	Connected with Capacitor (Co), resistor (R3,R4) regulates the oscillation frequency.	ENV1	10	Connected with C <sub>1</sub> , R <sub>1</sub> , C <sub>2</sub> and R <sub>2</sub> regulates the time-constant of envelope.
OSC2	2		ENV2	11	
OSC3	3		Performance starts on setting this terminal Hi.	MO	12
MT	4	PI		13	Input the pulse from MO into pre-amplifier.
SEL1	5	Input switches for selecting melodies.	OUT1	14	Output terminals of pre-amplifier.
SEL2	6		OUT2	15	Connected to the bipolar transistors for speaker drive.
MSL	9				


## ■ ABSOLUTE MAXIMUM RATINGS

(V<sub>SS</sub>=0V)

Rating	Symbol	Value	Unit
Supply voltage	V <sub>DD</sub>	-0.3 to 5.0	V
Input/Output voltage	V <sub>I/O</sub>	-0.2 to V <sub>DD</sub> +0.2	V
Operating temperature	T <sub>opr</sub>	-20 to 65 (V <sub>DD</sub> =1.5V)	°C
Storage temperature	T <sub>stg</sub>	-65 to 150	°C
Soldering temperature and time	T <sub>sol</sub>	260°C, 10s (at lead)	—

## ■ ELECTRICAL CHARACTERISTICS

(V<sub>SS</sub>=0V, T<sub>a</sub>=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V <sub>DD</sub>	—	1.25	1.5	2	V
High level input voltage(1)	V <sub>IH1</sub>	MSL, SEL1, SEL2	V <sub>DD</sub> -0.1	V <sub>DD</sub>	V <sub>DD</sub>	V
High level input voltage(2)	V <sub>IH2</sub>	MT	V <sub>SS</sub> +1	V <sub>DD</sub>	V <sub>DD</sub>	V
Low level input voltage	V <sub>IL</sub>	—	V <sub>SS</sub>	V <sub>SS</sub>	V <sub>SS</sub> +0.1	V
High level input current	I <sub>IH</sub>	V <sub>DD</sub> =1.5V V <sub>IH</sub> =V <sub>DD</sub>	1.5	—	15	μA
Low level input current	I <sub>IL</sub>	V <sub>DD</sub> =1.5V V <sub>IL</sub> =V <sub>SS</sub>	—	—	0.05	μA
Low level output current	I <sub>OL</sub>	V <sub>DD</sub> =1.25V V <sub>OL1</sub> =0.5V	150	—	—	μA
High level output current	I <sub>OH</sub>	V <sub>DD</sub> =1.25V V <sub>OH1</sub> =0.7V	150	—	—	μA
Scatter of output current	$\frac{I_{OH}}{I_{OL}}$	V <sub>DD</sub> =1.25V	0.2	—	5	—
Rise time of enveloping circuit	t <sub>r</sub>	V <sub>DD</sub> =1.5V C <sub>1</sub> =C <sub>2</sub> =4.7μF R <sub>1</sub> =R <sub>2</sub> =120kΩ	—	—	5	ms
Average operating current	I <sub>DDO</sub>	MI=V <sub>DD</sub> =1.5V OUT1, OUT2 Terminal open	—	70	100	μA
Stand-by current (Oscillation halting)	I <sub>DDS</sub>	V <sub>DD</sub> =1.5V	—	2	20	μA
Delay time for play-start	t <sub>1</sub>	f <sub>osc</sub> =47.5kHz V <sub>DD</sub> =1.5V	—	—	0.4	s
Delay time for play-stop	t <sub>2</sub>	f <sub>osc</sub> =47.5kHz V <sub>DD</sub> =1.5V	0.2	—	0.5	s
Chattering period of switch	t <sub>ch</sub>	f <sub>osc</sub> =47.5kHz V <sub>DD</sub> =1.5V	—	—		—

■ OSCILLATION CHARACTERISTICS

(V<sub>SS</sub>=0V, Ta=25°C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f <sub>osc</sub>	Standard constant V <sub>DD</sub> =1.5V	-	47.5	-	kHz
Oscillation self-start voltage	V <sub>STA</sub>	Standard constant	1.25	-	-	V
Oscillation stop voltage	V <sub>STP</sub>	Standard constant	-	-	1.25	V

■ FUNCTIONS

MELODY IC 7910 series has 3 kinds of tune selection methods charted as follows.

Starting performance, MT terminal to be V<sub>DD</sub> level always.

●1. Spec. of IC ..... 2 tunes + 2 electronic sounds

Type: 7910I, 7910CE, 7910CF, 7910CG, 7910CH, 7910CN, 7910CP, 7910CR, 7910CS, 7910CU, 7910CV, 7910CW, 7910CQ

	SEL1	SEL2	MSL
Tune 1	OP	OP	L
Tune 2	OP	OP	H
Electronic sound 1 (Buzzer)	OP	H	—
Electronic sound 2 (Chime)	H	OP	—
Tune 1 test performance	H	H	L
Tune 2 test performance	H	H	H

●2. Spec. of IC ..... 2 tunes + no electronic sound

Type: 7910G, 7910K, 7910N, 7910O, 7910P, 7910Q

	SEL1	SEL2
Tune 1	OP	OP
Tune 2	OP	H
Tune 1 test performance	H	H
Tune 2 test performance	H	OP

\*Connection of SEL1 is not necessary If test performance is not need.

●3. Spec. of IC ..... 1 tune + 2 electronic sounds

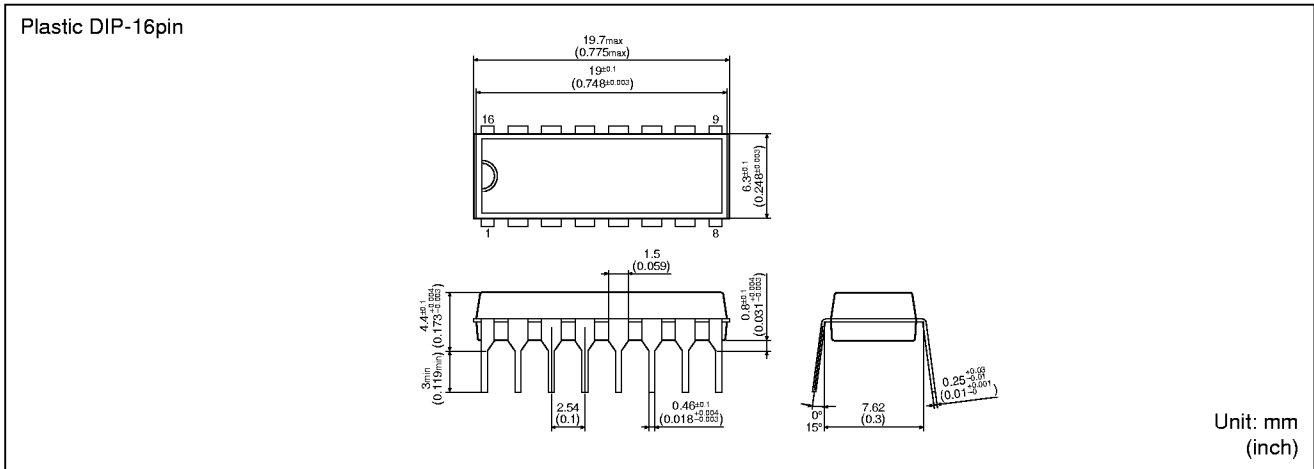
Type: 7910C, 7910T

	SEL1	SEL2
Tune	OP	OP
Electronic sound 1 (Buzzer)	OP	H
Electronic sound 2 (Chime)	H	OP
Tune test performance	H	H

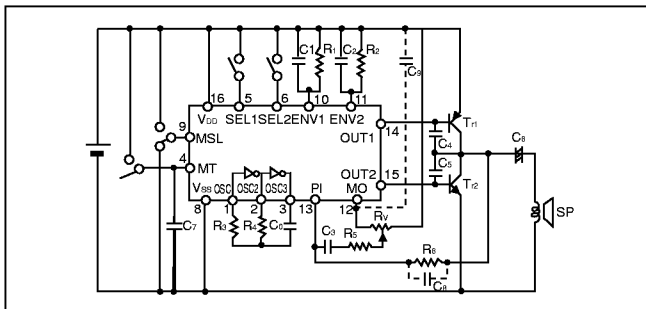
Notes:

1. In case of spec. 2 and 3, connection of MSL terminal is not necessary.
2. Explanation of Mark  
OP: Terminal is Open, H: V<sub>DD</sub> level, L:V<sub>SS</sub> level
3. Function of input terminals
  1. The terminals SEL1 and SEL2 are always pulled down to V<sub>SS</sub> level
  2. When SEL1 and SEL2 are Hi, it operates as TEST MODE. In this case tempo of performance is accelerated eight times as fast as normal one.
  3. As the terminal MSL is an open input terminal and has neither Pull-up nor Pull-down, they always must be kept at V<sub>SS</sub> or V<sub>DD</sub> level.

## PACKAGE DIMENSIONS



## BASIC EXTERNAL CONNECTION



### Attention

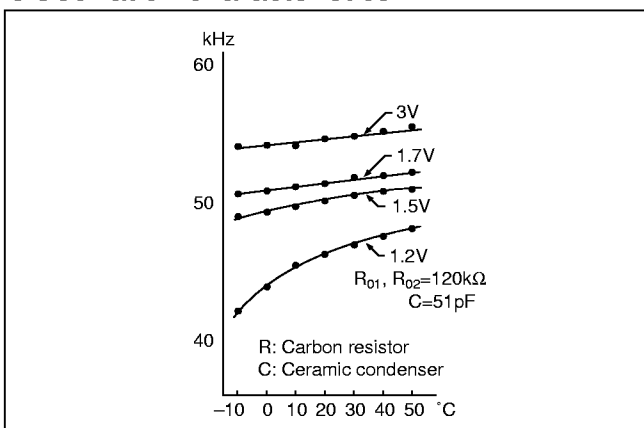
- Oscillation frequency ( $f_{osc}$ ) changes according to variation of  $R_3$ ,  $R_4$ ,  $C_0$  but stability of frequency will be worse.
- In case of Values of  $R_3$ ,  $R_4$ ,  $C_0$  are fixed, difference of ( $f_{osc}$ ) among discrete circuit will happen.
- We feel melody differently variation of  $C_1$ ,  $C_2$ ,  $R_1$ ,  $R_2$ .
- Value adjustment is done by  $V_r$ .
- If  $C_4$  and  $C_5$  are too small, there will oscillation at the part of low frequency amplifier circuit.
- It is possible that fluctuation of oscillation frequency become larger with increase of battery impedance. In that case, connecting condenser between  $V_{DD}$  and  $V_{SS}$  is desirable.
- Putting  $C_8$  or  $C_9$  into the circuit, the sounds get softer, whereas volume gets smaller.

## <Recommendable conditions of discrete parts>

Symbol of parts	Recommendable value	Unit
C <sub>0</sub>	51	pF
C <sub>1</sub> , C <sub>2</sub>	4.7	μF
R <sub>1</sub> , R <sub>2</sub>	120	kΩ
R <sub>3</sub> , R <sub>4</sub>	131	kΩ
C <sub>3</sub>	0.047 to 0.1	μF
R <sub>V</sub>	Variable resistance to 50	kΩ
R <sub>5</sub>	51 to 150	kΩ
R <sub>6</sub>	510	kΩ
C <sub>4</sub>	0.01 to 0.047	μF
C <sub>5</sub>	0.001 or nothing	μF
T <sub>r1</sub>	(PNP)2SA 683(2SA684)	—
T <sub>r2</sub>	(NPN)2SC 1383(2SC1384)	—
C <sub>6</sub>	100 to 300	μF
C <sub>7</sub>	0.1	μF
C <sub>8</sub> , C <sub>9</sub>	0.001	μF

## CHARACTERISTICS CURVE

### ●Oscillation characteristics



### ●Output frequency characteristics

