EPSON

7910 Series

Multi-Melody IC

Low Voltage Operation Products

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

■ DESCRIPTION

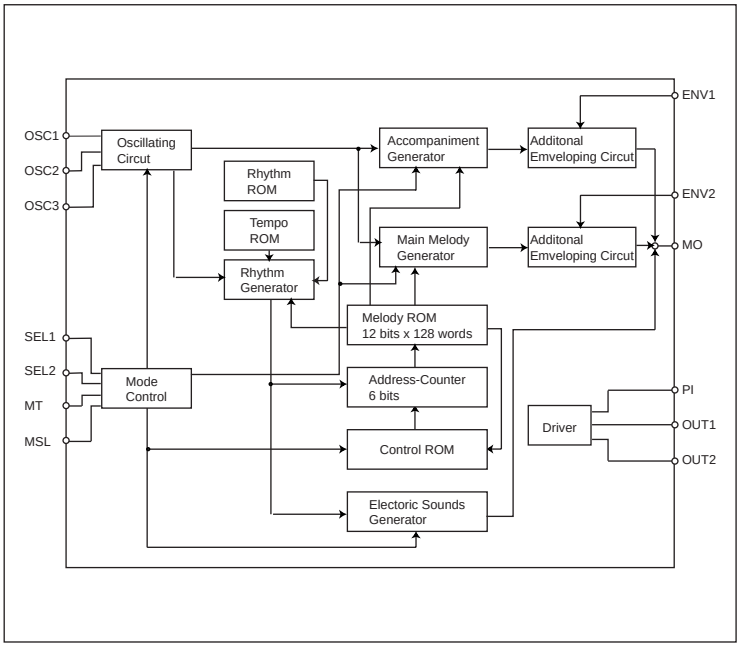
The series 7910 is a CMOS IC which plays prearranged melodies and alarm sounds electronically. Built-in oscillation circuit generates acoustic pulses, then melodies and alarm sounds are formed with only a few external discrete parts including resistor, capacitor, speaker etc. Thus the 7910 can enjoy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

NOTE: These are ongoing user service products.

■ FEATURES

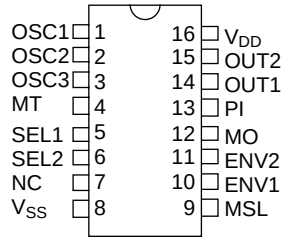
- ●Melody ..... 2 or 1
- ●Musical interval ..... Temperament or pure temperament
- ●Sound ..... 2 series, 2.5 octave
  Compound interval or accompaniment are possible.(One octave interval)
- ●Tempo ..... 16 kinds(Prest to Largo). Two tempos in one piece.
- ●Note ..... Basic note 𝅗𝅥 ♩ ♪ ♪ ♪ , and also 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

DIP-16pin



■ PIN DESCRIPTION

Pin Name	Pin No.	Functions	Pin Name	Pin No.	Functions
OSC1 OSC2 OSC3	1 2 3	Connected with Capacitor (Co), resistor (R_3,R_4) regulates the oscillation frequency.	ENV1 ENV2	10 11	Connected with C_1, R_1, C_2 and R_2 regulates the time-constant of envelope.
MT	4	Performance starts on setting this terminal Hi.	MO	12	Un-amplified output of melody.
			PI	13	Input the pulse from MO into pre-amplifier.
SEL1 SEL2 MSL	5 6 9	Input switches for selecting melodies.	OUT1 OUT2	14 15	Output terminals of pre-amplifier. Connected to the bipolar transistors for speaker drive.

■ ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V)

Rating	Symbol	Value	Unit
Supply voltage	V_{DD}	-0.3 to 5.0	V
Input/Output voltage	$V_{I/O}$	-0.2 to V_{DD}+0.2	V
Operating temperature	T_{opr}	-20 to 65 (V_{DD}=1.5V)	˚C
Storage temperature	T_{stg}	-65 to 150	˚C
Soldering temperature and time	T_{sol}	260˚C, 10s (at lead)	—

■ ELECTRICAL CHARACTERISTICS

(V_{SS}=0V, Ta=25˚C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	V_{DD}	—	1.25	1.5	2	V
High level input voltage(1)	V_{IH1}	MSL, SEL1, SEL2	V_{DD}-0.1	V_{DD}	V_{DD}	V
High level input voltage(2)	V_{IH2}	MT	V_{SS}+1	V_{DD}	V_{DD}	V
Low level input voltage	V_{IL}	—	V_{SS}	V_{SS}	V_{SS}+0.1	V
High level input current	I_{IH}	V_{DD}=1.5V V_{IH}=V_{DD}	1.5	—	15	µA
Low level input current	I_{IL}	V_{DD}=1.5V V_{IL}=V_{SS}	—	—	0.05	µA
Low level output current	I_{OL}	V_{DD}=1.25V V_{OL1}=0.5V	150	—	—	µA
High level output current	I_{OH}	V_{DD}=1.25V V_{OH1}=0.7V	150	—	—	µA
Scatter of output current	$\frac{I_{OH}}{I_{OL}}$	V_{DD}=1.25V	0.2	—	5	—
Rise time of enveloping circuit	t_r	V_{DD}=1.5V C_1=C_2=4.7µF R_1=R_2=120kΩ	—	—	5	ms
Average operating current	I_{DDO}	MI=V_{DD}=1.5V OUT1, OUT2 Terminal open	—	70	100	µA
Stand-by current (Oscillation halting)	I_{DDS}	V_{DD}=1.5V	—	2	20	µA
Delay time for play-start	t_1	f_{OSC}=47.5kHz V_{DD}=1.5V	—	—	0.4	s
Delay time for play-stop	t_2	f_{OSC}=47.5kHz V_{DD}=1.5V	0.2	—	0.5	s
Chattering period of switch	t_{ch}	f_{OSC}=47.5kHz V_{DD}=1.5V	—	—	𝅘𝅥𝅯𝅘𝅥𝅯 one beat	—

■ OSCILLATION CHARACTERISTICS

(V_{SS}=0V, Ta=25˚C)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillation frequency	f_{osc}	Standard constant V_{DD}=1.5V	-	47.5	-	kHz
Oscillation self-start voltage	V_{STA}	Standard constant	1.25	-	-	V
Oscillation stop voltage	V_{STP}	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_{DD} 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

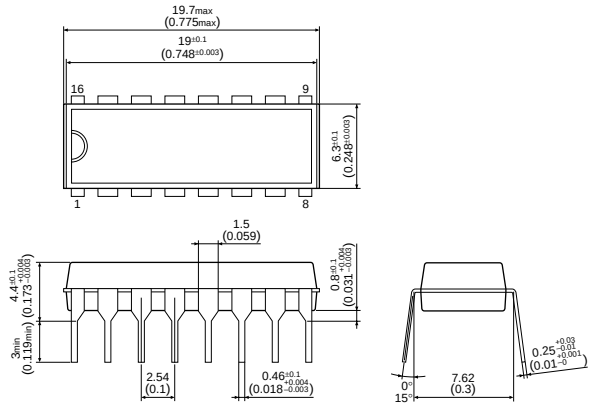
	SEL1	SEL2
Tune	OP	OP
Electronic sound 1 (Buzzer)	OP	H
Electronic sound 2 (Chime)	H	OP
Tune test performance	H	H

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_{DD} level, L:V_{SS} level
3. Function of input terminals
   1. The terminals SEL1 and SEL2 are always pulled down to V_{SS} 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_{SS} or V_{DD} level.

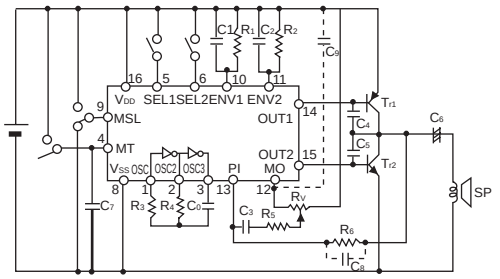
■ PACKAGE DIMENSIONS

Plastic DIP-16pin



Unit: mm
(inch)

■ BASIC EXTERNAL CONNECTION



Attention

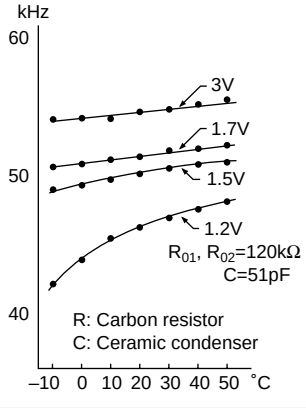
1. Osillation frequency (f_{OSC}) changes according to variation of R_3, R_4, C_0 but stability of frequency will be worse.
2. In case of Values of R_3, R_4, C_0 are fixed, difference of (f_{OSC}) among discrete circuit will happen.
3. We feel melody differently variation of C_1, C_2, R_1, R_2.
4. Value adjustment is done by V_r.
5. If C_4 and C_5 are too small, there will oscillation at the part of low frequency amplifier circuit.
6. 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.
7. Putting C_8 or and C_9 into the circuit, the sounds get softer, whereas volume gets smaller.

<Recommendable conditions of discrete parts>

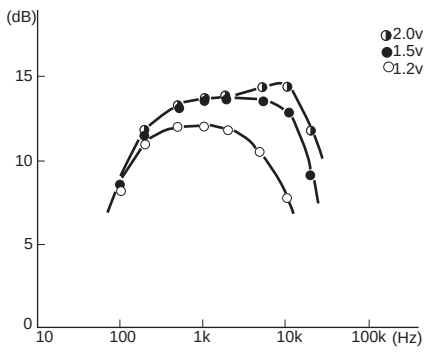
Symbol of parts	Recommendable value	Unit
C_0	51	pF
C_1, C_2	4.7	µF
R_1, R_2	120	kΩ
R_3, R_4	131	kΩ
C_3	0.047 to 0.1	µF
R_V	Variable resistance to 50	kΩ
R_5	51 to 150	kΩ
R_6	510	kΩ
C_4	0.01 to 0.047	µF
C_5	0.001 or nothing	µF
Tr_1	(PNP)2SA 683(2SA684)	—
Tr_2	(NPN)2SC 1383(2SC1384)	—
C_6	100 to 300	µF
C_7	0.1	µF
C_8, C_9	0.001	µF

■ CHARACTERISTICS CURVE

●Oscillation characteristics



●Output frequency characteristics



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