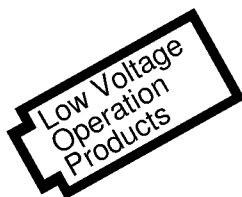


SVM7970C Series

Multi-Melody IC



- Double Sound Sources
- Dynamic Speaker Drive
- Digital Envelope Built in
- 640 Words Melody ROM
- 8 Tunes Max., 11 Tunes

■ DESCRIPTION

The SVM7970C Series is CMOS IC circuits which contain a programmed mask ROM to electronically reproduce melodies or alarm sounds. The ROM has a large capacity of 640 notes, and a maximum of 11 tunes can be played, with envelope effects from double sound sources. In addition the SVM7970C series is applicable to clocks, music boxes and gaming machines. The SVM7970C with a BUSY/END terminal is suited for a low-power-dissipation sound demonstration device incorporating a microprocessor, and a variety of other used.

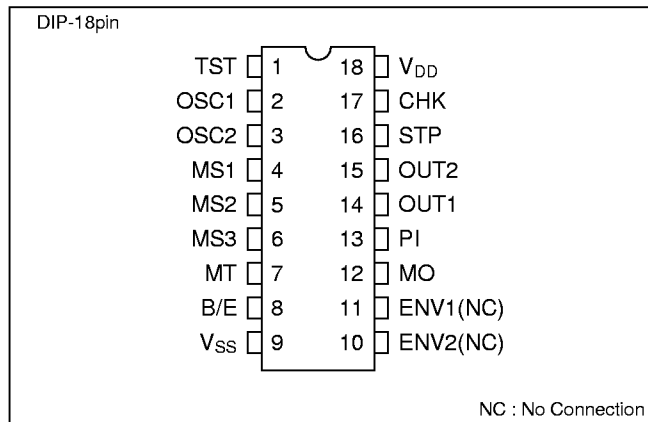
■ FEATURES

- Mask programmable up to 640 notes.
- 8 tunes (serial trigger selection or binary code selection) or 11 tunes (binary code/serial trigger selection) maximum
- Double sound sources with envelope effects (CR envelope or digital envelope)
- Level play or one-shot play selectable for each tune (by changing mask ROM)
- BUSY/END, an operating status detecting terminal, provided (mask selection)
- DC trigger or AC trigger play start mode (mask selection)
- Digital envelope built in: Exponential release can be added without using external parts. (Mask selection)
- Play can be stopped half way.
- An 8-ohm dynamic speaker can be driven by attaching external transistors.
- Permanent repetition of part of tunes possible (by changing mask ROM)
- Oscillator circuit built in: CR or crystal oscillator, external clock usable (mask selection)
- Drive voltage: 1.5V/3V or 5V (mask selection)
- Package DIP-18pin (plastic)

The block diagram illustrates the internal architecture of the TMS320C25 DSP. Key components include:

- Oscillator and Timing:** OSC1 and OSC2 inputs feed into an Oscillator, which connects to a Divider and a Tempo Generator. The Divider also receives ENV1 and ENV2 signals.
- Envelope Processing:** Two Envelope Generators (CR, DIG) receive ENV1 and ENV2 signals. Their outputs go to Envelope Mixers 1 and 2, which then feed into Scale Generators 1 and 2.
- Scale and ROMs:** Scale Generators 1 and 2 output to AS-ROM and MS-ROM respectively. These ROMs feed into Address Decoders, which then connect to Counters and further to C-ROM, SA-ROM, and other ROMs.
- Control and Test:** A Control Circuit receives signals from the Counters and other ROMs. It also interfaces with a Test Circuit and an Amplifier. The Amplifier outputs are OUT1 and OUT2.
- External Pins:** The diagram shows various external pins: OSC1, OSC2, ENV1, ENV2, MO, VDD, VSS, TST, CHK, B/E, MT, MS1, MS2, MS3, and STP.

PIN CONFIGURATION



PIN DESCRIPTION

Pin No.	Symbol	Pull-down	Function
1	TST	Provided	● Test input terminal
2	OSC1	/	● Attach 1 external resistor where CR clock is used.
3	OSC2	/	● Input to OSC1 where external clock is used. OSC2 open
4	MS1	Provided	● Tune selection, tune start input terminals
5	MS2	Provided	
6	MS3	Provided	
7	MT	Provided	
8	B/E	/	● BUSY or END signal output terminal
9	VSS	/	● Power supply (0V)
10	ENV2(N.C.)	/	● Connect C ₁ , C ₂ , R ₁ , R ₂ in case of CR envelope
11	ENV1(N.C.)	/	● N.C. in case of digital envelope
12	MO	/	● Melody signal output terminal (Non-amplified)
13	PI	/	● Preamplifier input terminal
14	OUT1	/	● Preamplifier output terminal
15	OUT2	/	
16	STP	Provided	● Play output forced stop input terminal
17	CHK	Provided	● Test input terminal
18	V _{DD}	/	● 0V (+) power supply

ABSOLUTE MAXIMUM RATINGS

(V_{SS}=0V)

Rating	Symbol	Value	Unit
Supply voltage	V _{DD}	-0.3 to 7.0	V
Input/Output voltage	V _{I/O}	-0.2 to V _{DD} +0.2	V
Operating temperature	T _{opr}	-20 to 65	°C
Storage temperature	T _{stg}	-65 to 150	°C
Soldering temperature and time	T _{sol}	260°C, 10s (at lead)	—

ELECTRICAL CHARACTERISTICS

● Ta = 25°C, V_{SS} = 0V

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating voltage	V _{DD}	—	1.2	1.5	3.4	V
Input current "1" (Terminal MS1)	I _{IH2}	V _{DD} =1.5V V _{IH2} =V _{DD} Serial selection; binary code/serial trigger selection	1.5	—	15	μA
		Binary code selection Play	1.5	—	15	
Input current "1" (Terminals MS2, MS3)	I _{IH3}	V _{DD} =1.5V V _{IH3} =V _{DD} Serial trigger selection	1.5	—	15	μA
		Binary code selection Binary code/serial trigger selection Play	1.5	—	15	
Input current "1" (Terminals TST, CHK)	I _{IH4}	V _{DD} =1.5V V _{IH4} =V _{DD}	1.5	—	15	μA
Input current "1" (Terminal PI)	I _{IH5}	V _{DD} =1.5V V _{IH5} =V _{DD} Stand-by	3.0	—	—	μA
		Play	—	—	0.05	
Input current "1" (Terminal STP)	I _{IH6}	V _{DD} =1.5V V _{IH6} =V _{DD} Stand-by	—	—	0.05	μA
		Play	1.5	—	15	
Input current "1" (Terminal MT)	I _{IH7}	V _{DD} =1.5V V _{IH7} =V _{DD}	0.6	—	6.0	μA
Output current "0" (Terminal B/E)	I _{OL2}	V _{DD} =1.2V V _{OL2} =0.5V	100	—	—	μA

Characteristic	Symbol	Condition		Min.	Typ.	Max.	Unit
Output current "1" (Terminal B/E)	I _{OH2}	V _{DD} =1.2V V _{OH2} =0.7V		100	—	—	μA
Output current "1" (Terminal OUT2)	I _{OH3}	V _{DD} =1.2V V _{OH3} =0.7V	Play	150	—	750	μA
Output current "0" (Terminal OUT1)	I _{OL3}	V _{DD} =1.2V V _{OL3} =0.5V	Stand-by	—	—	1.5	μA
			Play	150	—	750	
Average current drain duriung stand-by	I _{STB}	V _{DD} =1.5V All terminals open		—	—	0.3	μA
Average current drain during play	I _{OPR}	V _{DD} =1.5V, f _{OSC} =32.768kHz V _{DD} connected to terminal MT	All terminals except MT open	—	100	200	μA
			Standard circuit connected	—	30	—	mA

● Ta = 25°C, V_{SS} = 0V

Characteristic	Symbol	Condition		Min.	Typ.	Max.	Unit	
Operating voltage	V _{DD}	—		1.5	5.0	5.5	V	
Input current "1" (Terminal MS1)	I _{IH2}	V _{DD} =5.0V V _{IH2} =V _{DD}	Serial trigger selection; binary code/serial trigger selection	7.0	—	70.0	μA	
			Binary code selection	Play	7.0	—		70.0
Input current "1" (Terminals MS2, MS3)	I _{IH3}	V _{DD} =5.0V V _{IH3} =V _{DD}	Serial trigger selection	7.0	—	70.0	μA	
			Binary code selection; Binary code/serial trigger selection	Play	7.0	—		70.0
Input current "1" (Terminals TST, CHK)	I _{IH4}	V _{DD} =5.0V V _{IH4} =V _{DD}		7.0	—	70.0	μA	
Input current "1" (Terminal PI)	I _{IH5}	V _{DD} =5.0V V _{IH5} =V _{DD}	Stand-by	500	—	—	μA	
			Play	—	—	0.1		
Input current "1" (Terminal STP)	I _{IH6}	V _{DD} =5.0V V _{IH6} =V _{DD}	Stand-by	—	—	0.1	μA	
			Play	7.0	—	70.0		
Input current "1" (Terminal MT)	I _{IH7}	V _{DD} =5.0V V _{IH7} =V _{DD}		3.0	—	30.0	μA	
Output current "0" (Terminal B/E)	I _{OL2}	V _{DD} =4.5V V _{OL2} =0.5V		100	—	—	μA	
Output current "1" (Terminal B/E)	I _{OH2}	V _{DD} =4.5V V _{OH2} =4.0V		100	—	—	μA	
Output current "1" (Terminal OUT2)	I _{OH3}	V _{DD} =4.5V V _{BE} =0.7V		Play	0.8	—	4.0	mA
Output current "0" (Terminal OUT1)	I _{OL3}	V _{DD} =4.5V V _{BE} =0.7V	Stand-by	—	—	7.0	μA	
			Play	0.8	—	4.0	mA	
Average current drain during stand-by	I _{STB}	V _{DD} =5.0V All terminals open		—	—	0.5	μA	
Average current drain during play	I _{OPR}	V _{DD} =5.0V, f _{OSC} =32.768Hz V _{DD} connected to terminal MT		All terminals except MT open	—	0.4	1.0	mA

Note: The above characteristics are for Type A to T. In case of Type U to X, MS1 changes to MS3 and vice versa.

■ OSCILLATION CHARACTERISTICS (CR Oscillation)

● Ta=25°C, V_{SS}=0V

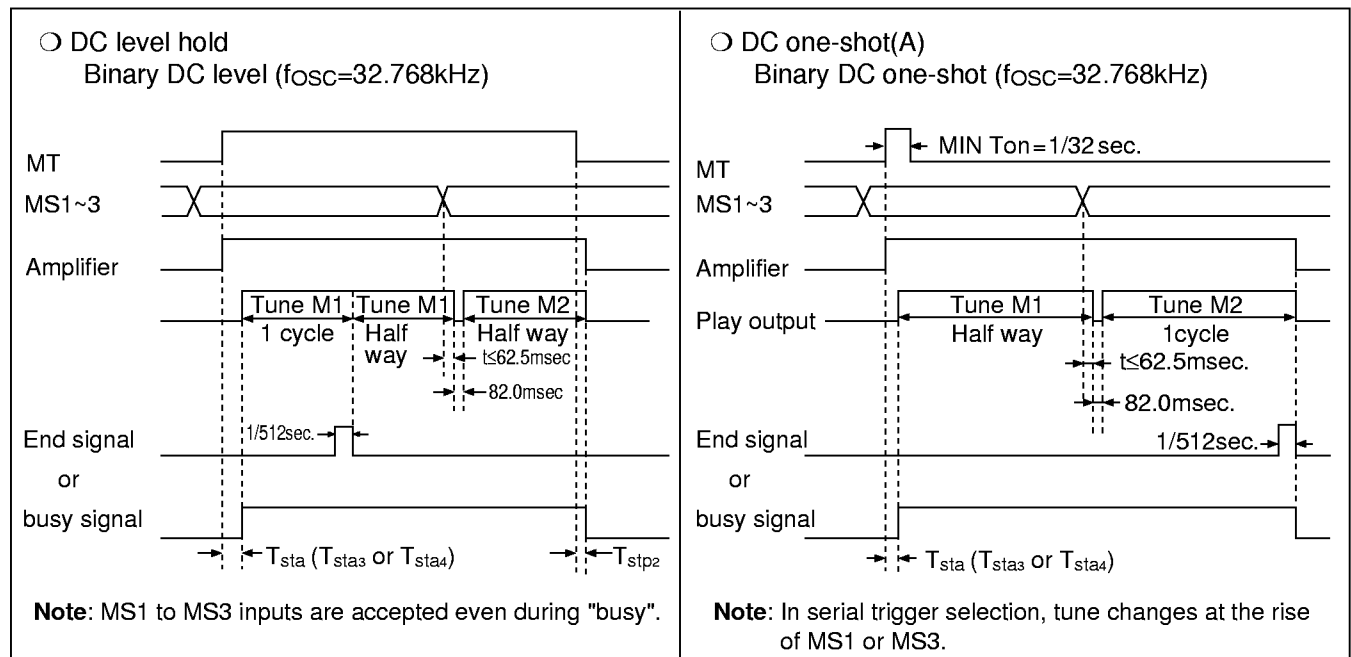
Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillator frequency	f _{OSC}	V _{DD} =1.5V VR ₁ =750kΩ	—	32.768	—	kHz
Oscillator self-start voltage	V _{STA}	VR ₁ =750kΩ	1.2	—	—	V
Oscillator stop voltage	V _{STP}	VR ₁ =750kΩ	—	—	1.2	V

● Ta=25°C, V_{SS}=0V

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Oscillator frequency	f _{OSC}	V _{DD} =5.0V VR ₁ =950kΩ	—	32.768	—	kHz
Oscillator self-start voltage	V _{STA}	VR ₁ =950kΩ	1.2	—	—	V
Oscillator stop voltage	V _{STP}	VR ₁ =950kΩ	—	—	1.2	V

Note: All specification of the device are subject to change without notice.

■ TIMING CHART



■ TUNE SELECTION AND PLAY START PROCEDURES (Mask selection)

Tune selection	Envelope Start signal (MT)	Digital envelope		CR envelope		No. of tunes	Model
		AC input signal	DC input signal	AC input signal	DC input signal		
MT Play start Binary code selection by MS1, MS2, MS3		I	J	K	L	8 tunes maximum (binary code selection)	SVM7972 SVM7973
MT Play start MS1 Tune selection (serial) MS2 MS3 Tune selection(binary)		M	N	O	P	11 tunes maximum (binary code/serial trigger selection)	SVM7974 SVM7975
MT Tune selection (serial) and play start MS1 No Connection MS2 MS3 Tune selection (binary)		Q	R	S	T		
MT Play start MS1 MS2 Tune selection (binary) MS3 Tune selection (serial) and play start		U	V	W	X		

Note:

AC input signal at V_{SS} level for non-play, or right case for play.

DC input signal at V_{SS} level for non-play, or at V_{DD} level for play.



■ TUNE SELECTION ($f_{OSC}=32.768kHz$)

- Binary Code Selection
(SVM7973 Types I to L)

MS3	MS2	MS1	Terminal Order of tunes
OP	OP	OP	1
OP	OP	H	2
OP	H	OP	3
OP	H	H	4
H	OP	OP	5
H	OP	H	6
H	H	OP	7
H	H	H	8

OP: Terminal open or V_{SS} level
H: V_{DD} level

- Binary Code/Serial Trigger
Selection
(SVM7975 Types M to T)

MS3	MS2	Terminal Order of tunes
OP	OP	1 to 8
OP	H	9
H	OP	10
H	H	11

Note:

Serial trigger selection is made by terminal MS1 or MT regardless of binary code selection by terminal MS2 or MS3.

OP: Terminal open or V_{SS} level
H: V_{DD} level

- (SVM7975 Types U to X)

MS2	MS1	Terminal Order of tunes
OP	OP	1 to 8
OP	H	9
H	OP	10
H	H	11

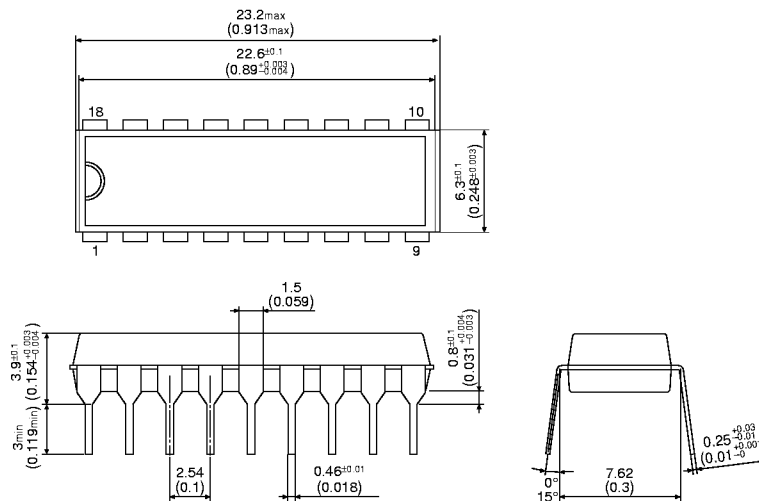
Note:

Serial trigger selection is made by terminal MS3 regardless of binary code selection by terminal MS1 or MS2.

OP: Terminal open or V_{SS} level
H: V_{DD} level

■ PACKAGE DIMENSIONS

Plastic DIP-18pin



Unit: mm
(inch)

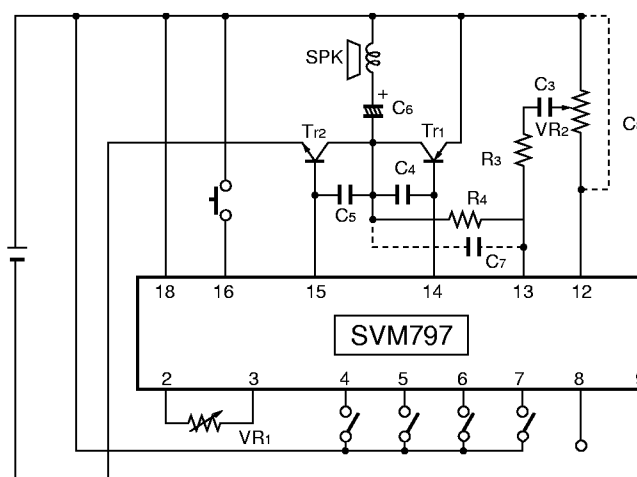
■ LINE UP (Mask selection)

Model	Oscillation (32kHz)	Tune selection
SVM7973	CR self OSC.	Binary code selection
SVM7975	CR self OSC.	Binary code / serial trigger selection

■ BASIC EXTERNAL CONNECTION

SVM7973, 7975: DC input, digital envelope standard circuit (DIP-18pin)

Examples of application: Toys, music boxes



RECOMMENDED CONDITIONS FOR DISCRETE PARTS

Symbol	Limits(Parts)	Unit	Symbol	Limits(Parts)	Unit
SPK	8Ω dynamic speaker	-	R4	510	kΩ
Tr1	(PNP)2SA683(2SA684)	-	C1	4.7	μF
Tr2	(NPN)2SC1383(2SC1384)	-	C2	4.7	μF
VR1	0 to 1 (Typ.0.95:at 5.0V Typ.0.75:at 1.5V)	MΩ	C3	0.1	μF
			C4	0.0033 to 0.001	μF
VR2	0 to 500	kΩ	C5	0.001 (or open)	μF
R1	120	kΩ	C6	100 to 300	μF
R2	120	kΩ	C7	0.001	μF
R3	50 to 150	kΩ	C8	0.001	μF