

## ■ INTRODUCTION

SN6A513 is a series of single chip voice/dual tone melody synthesizer IC with 16\*64/8\*64 LCD direct drive capability which contains two 4-bit I/O ports, two optional 4-bit output ports and a tiny controller. By programming through the tiny controller, user's application including LCD display, section combination, trigger modes, output status, voice/melody playing and other logic functions and then be easily implemented.

## ■ FEATURES

- ◆ Single power supply 2.4V – 5.1V
- ◆ Built in a tiny controller
- ◆ Two 4-bit I/O ports, two optional 4-bit output ports are provided
- ◆ 256\*4 bits RAM for programming usage are provided
- ◆ 256\*4 bits RAM for LCD display usage are provided
- ◆ Maximum 810k\*10 program ROM is provided
- ◆ Readable ROM code data
- ◆ Built in direct 16\*64/8\*64 LCD driver
- ◆ LCD 1/4 bias, 1/5 bias; 1/8 duty, 1/16 duty
- ◆ Built in a high quality speech synthesizer
- ◆ Adaptive playing speed from 2.5k-40kHz is provided
- ◆ Built in a dual tone melody generator
- ◆ Speech/Dual tone melody mixer is provided which SN6A513 series can play speech and dual tone melody simultaneously
- ◆ Fixed current D/A output is provided to drive external connected transistor for sound output
- ◆ PWM output is provided to drive external connected piezo buzzer

■ **PIN ASSIGNMENT**

Symbol	I/O	Function Description
SEG1-SEG56	O	Seg 1- Seg 56 for LCD driver
SEG57/P53- SEG60/P50	O	Optional to be Seg57-60 or P53-P50 Seg57-60: Seg57-Seg60 for LCD driver. P53-P50: Bit3-bit0 for output port 5.
SEG61/P43- SEG64/P40	O	Optional to be Seg61-64 or P43-P40 SEG61-64: Seg61-Seg64 for LCD driver. P43-P40: Bit3-bit0 for output port 4.
COM1-COM16	O	Com1-Com16 for LCD driver.
GND	I	Negative power supply.
P33-P30	I/O	Bit 3 to bit 0 of IO port 3.
P23-P20	I/O	Bit 3 to bit 0 of IO port 2.
BU1,BU2	O	Buzzer driver outputs.
VO	O	D/A current output.
RST	I	Reset pin with internal pull low.
OSC	I	Oscillation component connection pin.
TEST	I	For testing only.
XIN,XOUT		32768 Hz Crystal connection pins.
V <sub>DD</sub>	I	Positive power supply.
VLCDR		LCD voltage adjusting pin.
VLC1-VLC4		LCD voltage bias connection pins.
WSUB	I	Well substrate of chip. Connected to the highest voltage of chip (VDD or VLCDR).

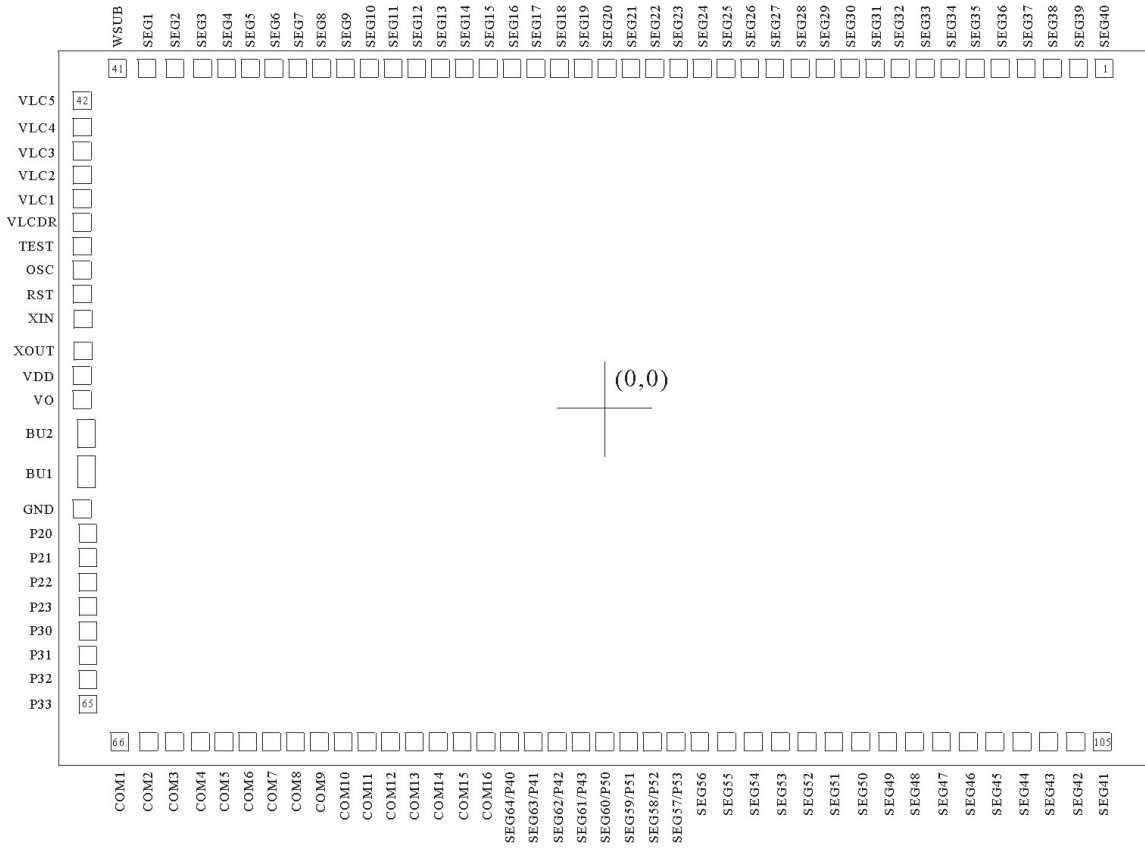
■ **ABSOLUTELY MAXIMUM RATING**

Items	Symbol	Min	Max	Unit.
Supply Voltage	$V_{DD-V}$	-0.3	6.0	V
Input Voltage	$V_{IN}$	$V_{SS}-0.3$	$V_{DD}+0.3$	V
Operating Temperature	$T_{OP}$	-20.0	70.0	°C
Storage Temperature	$T_{STG}$	-55.0	125.0	°C

■ **ELECTRICAL CHARACTERISTIC**

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	$V_{DD}$	2.4	3.0	5.1	V	
Standby current 1	$I_{SBY1}$	-	-	1.0	$\mu A$	$V_{DD}=3V$ , both system clk and 32768 Hz clk are off
Standby current 2	$I_{SBY2}$	-	20	50	$\mu A$	$V_{DD}=3V$ , system clk is off, 32768 Hz clk is on for LCD display and timer.
Operating current	$I_{OPR}$	-	350	500	$\mu A$	$V_{DD}=3V$ , no load
Input current of ,P2,P3	$I_{IH}$	-	3.0	10.0	$\mu A$	$V_{DD}=3V, V_{IN}=3V$
Drive current of P2,P3,P4,P5	$I_{OD}$	-1.5	-2	-	mA	$V_{DD}=3V, V_O=2.6V$
large Sink current of P2,P3,P4,P5	$I_{OS1}$	2.0	3	-	mA	$V_{DD}=3V, V_O=0.4V$
Small Sink current of P2,P3,P4,P5	$I_{OS2}$	-	0.4	-	$\mu A$	$V_{DD}=3V, V_O=0.4V$
D/A output current	$I_{VO}$	2.0	3.0	4.0	mA	$V_{DD}=3V, V_O=0.7V$
Buzzer drive current	$I_{BZD}$		-15		mA	$V_{DD}=3V, V_O=1.5V$
Buzzer sink current	$I_{BZS}$		15		mA	$V_{DD}=3V, V_O=1.5V$
Oscillation resistor	R	-	1.0	-	MHZ	$V_{DD}=3V$
Oscillation Freq.	$F_{OSC}$	-	1.0	-	MHZ	$V_{DD}=3V$

■ **BONDING PAD**



**SN6A513**

Note: The substrate MUST be connected to Vss in PCB layout.

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