

■ INTRODUCTION

SN69040 is a single chip voice/dual tone melody synthesizer IC with 4*32 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 applications 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 - 5V
- ◆ Built in a tiny controller
- ◆ Two 4-bit I/O ports and two optional 4-bit output ports are provided
- ◆ Built in 40K*10 ROM
- ◆ 256*4 bits RAM for programming usage are provided
- ◆ 32*4 bits RAM for LCD display usage are provided
- ◆ Maximum 16k program ROM is provided
- ◆ Readable ROM code data
- ◆ Built in direct 4*32 LCD driver
- ◆ LCD 1/3 bias, 1/4 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 SN69040 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-SEG24	O	segment 1~24 for LCD driver
SEG25/P53-SEG28/P50	O	Optional to be SEG25-SEG28 or P53-P50 SEG25-28: segment25~28 for LCD driver. P53-P50: Bit3-bit0 for output port 5.
SEG29/P43-SEG32/P40	O	Optional to be SEG29~SEG32 or P43-P40 SEG29~32: segment29~32 for LCD driver. P43~P40: Bit3-bit0 for output port 4.
COM1-COM4	O	Com1-Com4 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 _{DD}	I	Positive power supply.

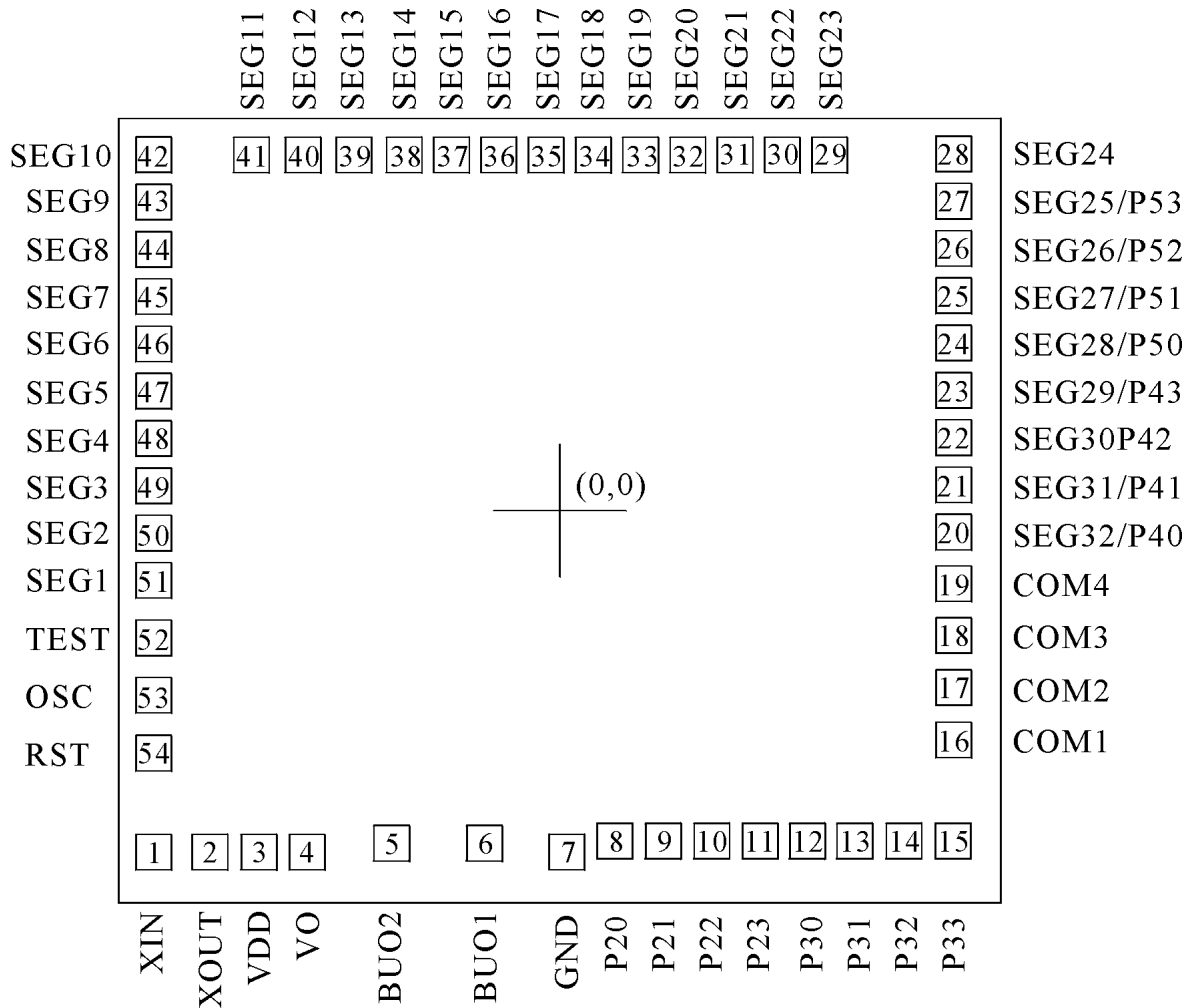
■ **ABSOLUTELY MAXIMUM RATING**

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	μA	$V_{DD}=3V$, both system clk and 32768 Hz clk are off
Standby current 2	I_{SBY2}	-	20	50	μA	$V_{DD}=3V$, system clk is off, 32768 Hz clk is on for LCD display and timer.
Operating Current	I_{OPR}	-	350	500	μA	$V_{DD}=3V$, no load
Input current of ,P2,P3	I_{IH}	-	3.0	10.0	μA	$V_{DD}=3V, V_{IN}=3V$
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	-	μA	$V_{DD}=3V, V_O=0.4V$
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**



SN69040

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

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