========== CONTENTS ==========

1. INTRODUCTION 3

2. FEATURES 3

3. PIN ASSIGNMENT 4

4. BLOCK DIAGRAM 4

5. FUNCTION DESCRIPTIONS 5

5.1 OSCILLATOR 5
5.2 ROM 5
5.3 RAM 5
5.4 POWER DOWN MODE 5
5.5 SAMPLING RATE COUNTER 5
5.6 AUTO REPEAT FUNCTION 5
5.7 I/O PORTS 5
5.8 IR FUNCTION 6
5.9 WATCH DOG TIMER 6
5.10 PUSH-PULL OUTPUT 7
5.11 EVENT MARK 7

6. ABSOLUTE MAXIMUM RATING 8

7. ELECTRICAL CHARACTERISTICS 8

8. APPLICATION CIRCUIT 9

8.1 I/F OF PROGRAMMING MODE 9
8.1.1. Serial Program I/F 9
8.1.2. Parallel Program I/F 10
8.2 GENERAL APPLICATION 11
8.2.1. In 5V application : 11
(1) CSP connect to VDDIO (CSP=1 : SNC21085P) 11
(2) VDDIO/RVIN short together and connect to source power 11
(3) RVOUT/CVDD short together, but not connect to VDDIO/RVIN/source power. 11
8.2.2. In 3V application : 12
(1) CSP connect to VDDIO (CSP=1 : SNC21085P) 12
(2) VDDIO/RVIN/RVOUT/CVDD short together and connect to source power 12
8.3 MOTOR APPLICATION 13

AMENDENT HISTORY

Version	Date	Description
Ver1.0	May 10, 2010	First issue.

1. INTRODUCTION

SNC21085P is a one-channel voice synthesizer One Time Program IC with Push-Pull direct drive circuit. It built-in a 4-bit tiny controller with three 4-bit I/O ports. By programming through the tiny controller in SNC21085P, user's varied applications including voice section combination, key trigger arrangement, output control, and other logic functions can be easily implemented.

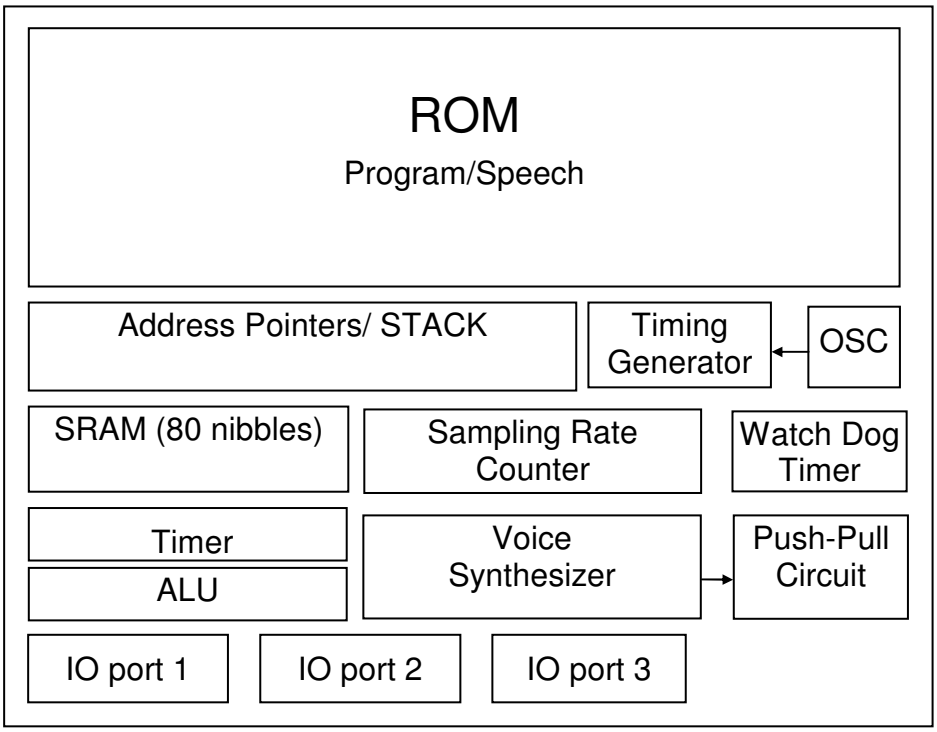
2. FEATURES

- Single power supply 2.4V – 5.5V
- System Clock is 2MHz, the instruction cycle is 4us
- 85 seconds voice capacity are provided (@6KHZ sample rate)
- Built in a 4-bit tiny controller
- I/O Port
  - Three 4-bit I/O ports P1, P2 and P3 are provided
  - The driving/sink current of P3.2 & P3.3 is up to 8mA/16mA
  - The IO pins P3.3 or P2.3 can be modulated with 38.5Khz carry signal to implement IR function.
  - Without PWM IO
- 80*4 bits RAM are provided
- Maximum 16k program ROM is provided
- 256K*10 shared ROM for voice data and program
- Readable ROM code data
- Built-in one channel High Quality speech synthesizer
- Adaptive playing speed from 2.5k-20kHz is provided
- Automatic repetition
- Support 5-bit ADPCM and 10 bit PCM format
- Built in an 8-level volume control Push-Pull Direct Drive circuit output, can directly connected to Speaker for sound output
- 12 bit Push-Pull DA output.
- Event Mark function supported
- Low-Voltage Detect circuit
- Watch Dog Timer Reset function.

3. PIN ASSIGNMENT

Symbol	I/O	Function Description
P10~P13	I/O	I/O port 1: IO
P20~P23	I/O	I/O port 2: IO
P30~P33	I/O	I/O port 3: IO
RST	I	Reset Chip (Active H)
TEST	I	Test Pin
OSC	I	Oscillation component connection pin
DAON	O	Push-Pull output 1
DAOP	O	Push-Pull output 2
VDDIO	I	Positive power supply
GNDIO	I	Negative power supply
CVDD	I	Positive power supply
CGND	I	Negative power supply
RVIN	I	Regulator VIN
RVOUT	O	Regulator VOUT
RGND	I	Regulator GND
VPP0	I	OTP Programming Voltage
VPP1	I	OTP Programming Voltage
VPP2	I	OTP Programming Voltage
CSP	I	Chip Select Pin (1: 21085P)

4. Block Diagram



5. FUNCTION DESCRIPTIONS

5.1 Oscillator

System clock define 2 MHz, the source provided by external resistor ring oscillator.

5.2 ROM

SNC21085P contains a substantial maximum 256K words (10-bit) internal ROM, which is shared by program and resource data. Program, voice and data are shared within this same 256K words ROM.

5.3 RAM

SNC21085P contains maximum 80 nibble RAM (80 x 4-bits). The 80 nibble RAM is divided into eight pages (page 0 to page 4, 16 nibble RAM on each page). In our programming structure, users can use the instructions, PAGE n (n=0 to 4) to switch and indicate the RAM page. Besides, users can use direct mode, M0 ~ M15 in the data transfer type instructions, to access all 16 nibbles of each page.

5.4 Power Down Mode

“End” instruction makes the IC entering into Stop Mode will stop the system clock for power savings (<3uA @VDD=3V and <6uA @VDD=4.5V.) Any valid data transition (L→H or H→L) occurring on any IO pin can be used to start the system clock and return to normal operating mode.

5.5 Sampling Rate Counter

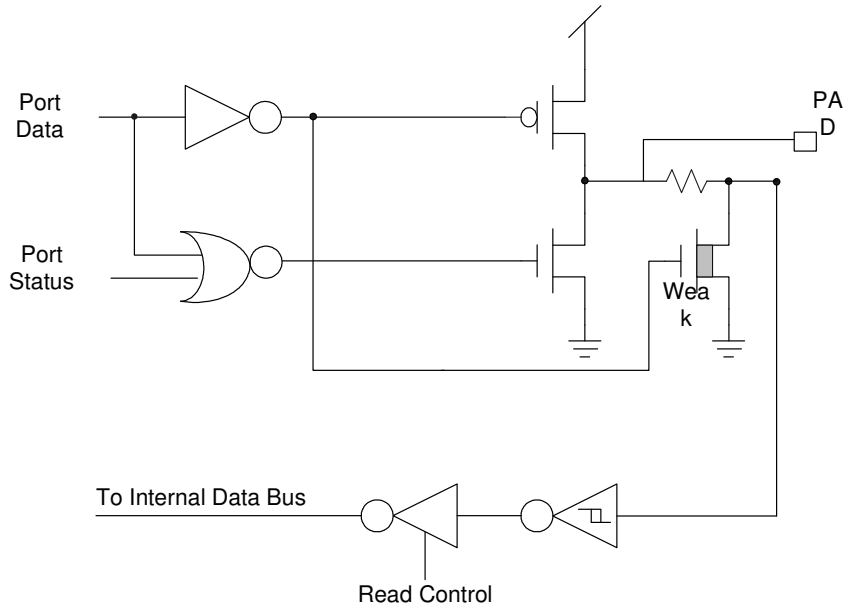
The unique sampling rate counter is designed in voice channel to be able to play diverse voices at different sample playing rates. The playing rate can be adaptively set up among from the wide ranges of 2.5KHz to 20KHz. This architecture yields a high-quality voice synthesis that sounds very close to its original source when played through the same amplifier and speaker circuitry.

5.6 Auto Repeat Function

A voice section can be repeated by the built-in special hardware of SNC21085P without any software effort. The function activated by setting the corresponding bit of a control register. Once the control register was setting, the channel will continue to play the voice section (the Next Section).

5.7 I/O Ports

There are three 4-bit I/O ports P1, P2 and P3. Any I/O can be individually programmed as either input pull low or output. Any valid data transition (H→ L or L→H) of P1, P2 and P3 can reactivate the chip when it is in power-down stage.



I/O Port Configuration

Note:

(1) ***Weak N-MOS can serve as pull-low resistor.***

(2) ***The driving/sink current of P3.3 & P3.2 is up to 8mA/16mA***

5.8 IR Function

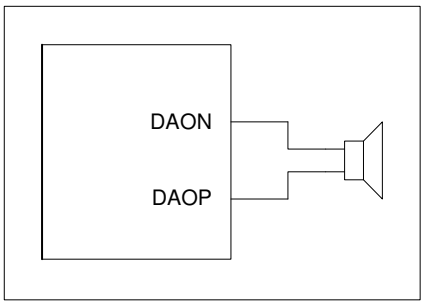
Bit 3 of Mode Register is applied to control the IR function. P33 can be modulated with 38.5KHz square wave before sent out to P3.3 or P2.3 pin. P3.3 and P2.3 out is controlled by Mode1.1. If Mode1.1 set 1 IR is use P2.3, set “0” is use P3.3. The IR signal can be achieved by this modulated signal.

5.9 Watch Dog Timer

SNC21085P built-in an internal WDT (Watch Dog Timer). This Watchdog timer would issue resets signal to this chip if it is not cleared before reaching terminal count (1sec). The watchdog timer is enabled at reset and cannot be disabled.

5.10 Push-Pull Output

An 8-level volume control Push-Pull DAC circuit is built-in SNC21085P. The maximum resolution of Push-Pull DAC is 12 bits. Two huge output stage circuits are designed in SNC21085P. With this advanced circuit, the chip is capable of driving speaker directly without external transistors.



Push-Pull Output

5.11 Event Mark

This is a new function for SNC21085P series, it allows user to add a special mark in wave data by the voice edit tool "CoolEdit", "Goldwav", "SoundForge". User can insert event tags in anywhere of his wave file and can easy to get this special code to do his special action during voice playing. That means, it should be easily to control the I/O (such as LED or Motor) and other actions to synchronize with voice.

6. ABSOLUTE 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}	0	55.0	°C
Storage Temperature	T_{STG}	-55.0	125.0	°C

7. ELECTRICAL CHARACTERISTICS

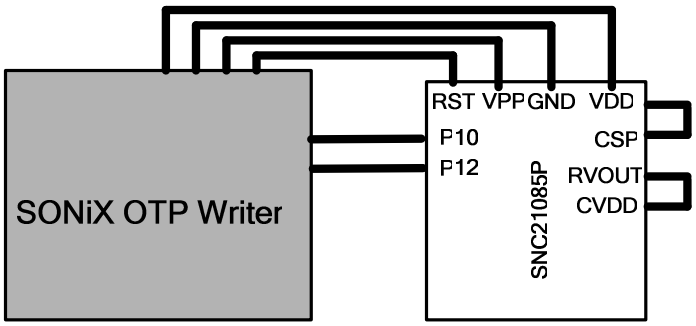
Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	V_{DD}	2.4	3.0	5.5	V	
Program Mode Voltage (OTP)	VPP	7.25	7.5	7.75	V	OTP Programming Voltage In Normal Mode Vpp can be floating.
Standby current*	I_{SBY}	-	5.0	-	*u*A	V_{DD}=3V, no load
Operating Current*	I_{OPR}	-	5	-	mA	V_{DD}=3V, no load
Input current of P1, P2, P3	I_{IH}	-	3.0	-	*u*A	V_{DD}=3V,V_{IN}=3V
Drive current of P10~P1.3, P20~P2.3, P3.0, P3.1	I_{OD}	3	4	-	*m*A	V_{DD}=3V,V_O=2.4V
Sink Current of P10~P1.3, P20~P2.3, P3.0, P3.1	I_{OS}	4	6	-	*m*A	V_{DD}=3V,V_O=0.4V
Drive current of P3.2, P3.3	I_{OD}	6	8	-	*m*A	V_{DD}=3V,V_O=2.4V
Sink current of P3.2, P3.3	I_{OS}	10	16	-	*m*A	V_{DD}=3V,V_O=2.4V
Push-Pull current	I_{PP}	-	70	-	*m*A	VDD=3V, Output 1K Sin wave.
Oscillation Freq.	F_{OSC}	1.98	2.05	2.12	MHz	V_{DD}=3V Temp.=25℃ @Rosc = 220 Kohm Min : -3% Max : +3%

* Notes : Include SNC21085P Core IC + OTP

8. APPLICATION CIRCUIT

8.1 I/F of Programming mode

8.1.1.Serial Program I/F.



If user would like to program BIN file into OTP by SONIX OTP Writer V1.0 with **serial programming** way. There are total **6** pins programming pins are necessary.

Also, there are some points for serial program

(1) VPP should connect to VPP0/VPP1/VPP2

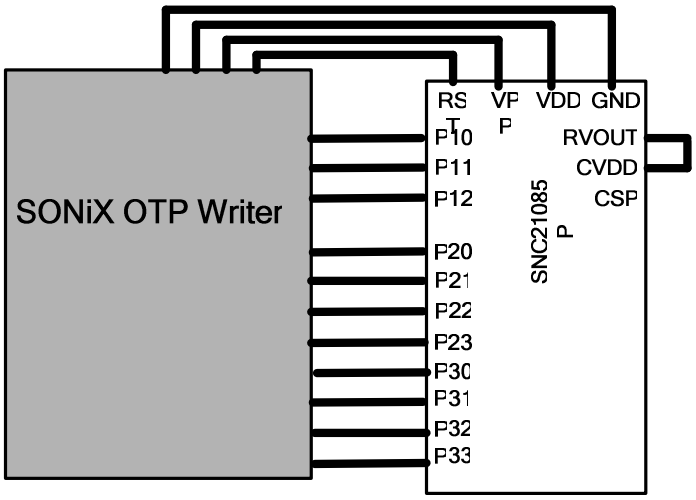
(2) VDD should connect to VDDIO/RVIN

(3) RVOUT/CVDD should short together

(4) GND should connect to GNDIO/CGND/ RGND

(5) CSP should connect to VDD on user's PCB.

8.1.2. Parallel Program I/F



If user would like to program BIN file into OTP by SONIX OTP Writer V1.0 with **parallel programming** way. There are total **15** pins programming pins are necessary.

Also, there are some points for parallel program

(1) VPP should connect to VPP0/VPP1/VPP2

(2) VDD should connect to VDDIO/RVIN

(3) RVOUT/CVDD should short together

(4) GND should connect to GNDIO/CGND/ RGND

(5) CSP should be floating during parallel program. (but after programming it should be connect to VDD for selecting SNC21085P).

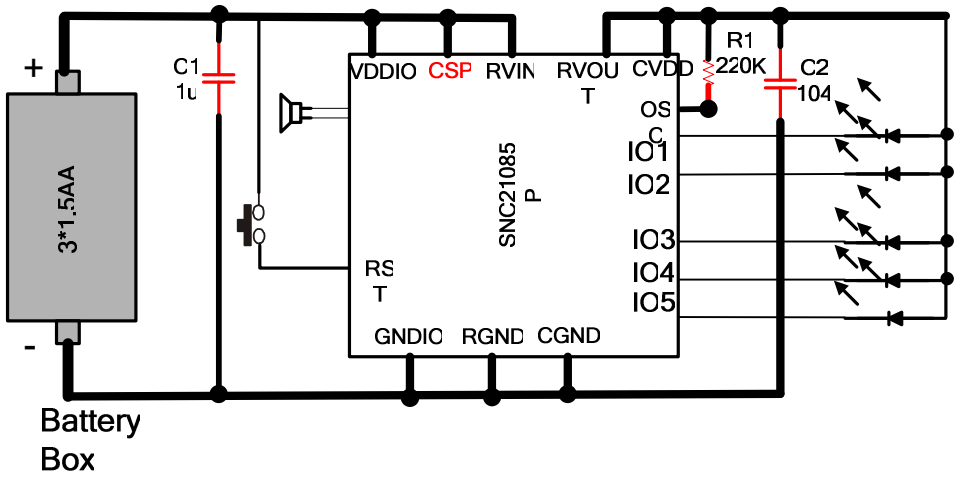
8.2 General application

8.2.1.In 5V application :

(1) CSP connect to VDDIO (CSP=1 : SNC21085P)

(2) VDDIO/RVIN short together and connect to source power

(3) RVOUT/CVDD short together, but not connect to VDDIO/RVIN/source power.

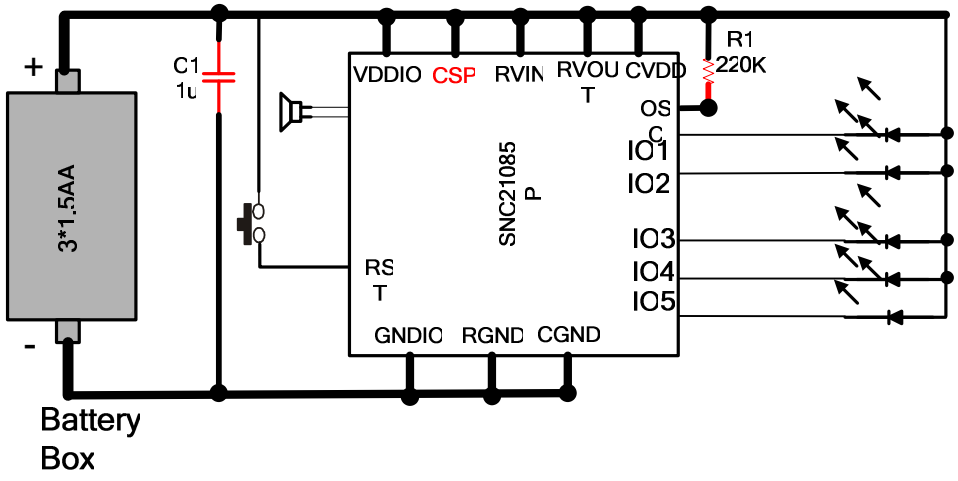


It is suggested to add a capacitor (C1 and C2), 1u and 104, it will keep power stable with general application. And this capacitor is strongly suggested to be as close to the chip as possible.

8.2.2.In 3V application :

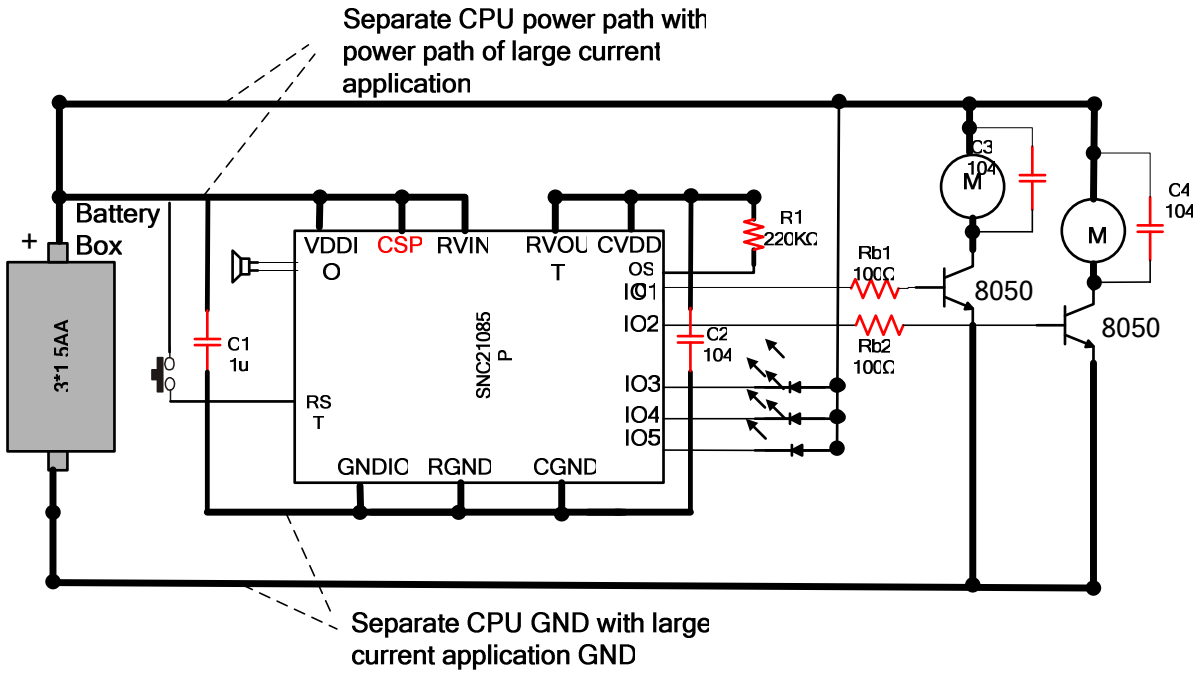
(1) CSP connect to VDDIO (CSP=1 : SNC21085P)

(2) VDDIO/RVIN/RVOUT/CVDD short together and connect to source power



It is suggested to add a capacitor (C1), 1u , it will keep power stable with general application. And this capacitor is strongly suggested to be as close to the chip as possible.

8.3 Motor application



There are some suggestions about PCB layout when user use SNC26120P IC with motor applications.

(1) The capacitor C1 (1u) C2 (104) is strongly suggested to be as close to the chip as possible.
(2) It had better let OSC components (R) get close to IC chip.

(3) OSC components had better get far away large current applications.

(4) Separate IC power path with large current application power path to avoid affect IC working by power drop from large current application.

(5) Let power cable thicker, especially for large current application.

(6) C3 and C4 (104) are connected at the positive point and negative point of the motor.

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