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AMENDENT HISTORY

Version	Date	Description
Ver 1.0	March 22, 2012	First issue
Ver 1.1	June 06, 2012	Change VOL setting
Ver 1.2	August 20, 2015	1. Update LVD characteristics 2. Update VOL description
Ver 1.3	September 21, 2015	1. Update VOL output volume

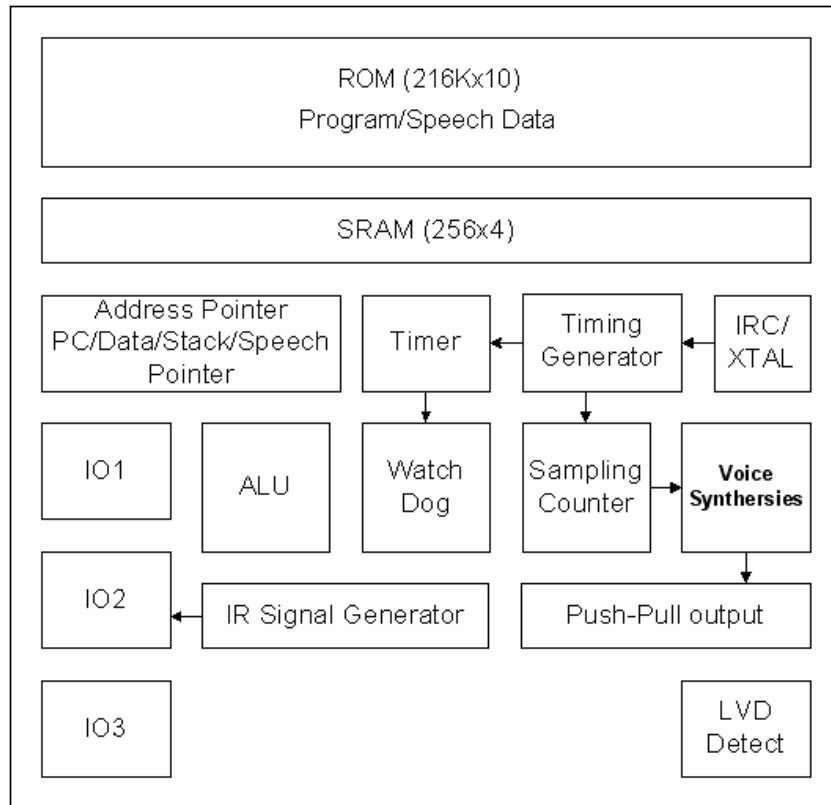
1. INTRODUCTION

SNC36085 is a 85 seconds single chip 4-channel voice synthesizer IC which contains I/O pins and a tiny controller. By programming through the tiny controller, users' applications including section combinations, trigger modes, output status, high performance melody, multiple voices, and other logic functions can be implemented.

2. FEATURES

- ◆ Single power supply 1.9V – 5.5V
- ◆ Built in a tiny controller
- ◆ 85 seconds voice capacity are provided (@6KHZ sample rate)
- ◆ 256*4 bits RAM are provided
- ◆ ROM Size
 - Maximum 216K*10 bits ROM size
 - 64K program ROM is provided
- ◆ I/O Ports
 - Three 4-bit I/O ports P1, P2, P3 and the driving/sink current of P3.2 & P3.3 is up to 8mA/16mA
 - Xin and Xout are shared with P10 and P11, respectively.
 - The IO pins P3.3 can be modulated with 38.5Khz carry signal to implement IR function.
- ◆ Voice Synthesizer:
 - Four independent voice channels
 - Wavetable Melody Synthesizer is supported.
 - Support 4-bits / 5bits (optional) SONiX-ASDPCM and 10-bit PCM algorithm
- ◆ Adaptive playing speed from 4k-40kHz is provided for all 4 channels individually
- ◆ Automatic repetition for every channel
- ◆ A 6-bit*10-bit Multiplier is embed to modulate the volume of synthesized voices
- ◆ Built in a 7-level volume control Analog Push-Pull Direct Drive circuit.
- ◆ 12 bit Push-Pull DA output.
- ◆ System clock: 2MHz (Option of Internal RC or Crystal)
- ◆ Low Voltage Detect circuit
- ◆ Built-in Watch Dog function

3. Block Diagram



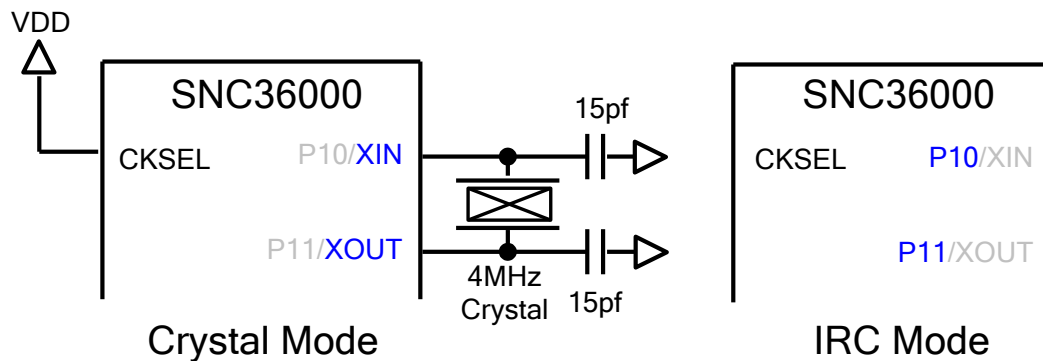
4. PIN ASSIGNMENT

Symbol	I/O	Function Description
P10/XIN	I/O	Bit0 of IO port 1 / Crystal In
P11/XOUT	I/O	Bit1 of IO port 1 / Crystal Out
P13, P12	I/O	Bit3 ~ Bit2 of I/O port 1
P23, P22, P21, P20	I/O	Bit3 ~ Bit0 of I/O port 2
P33, P32, P31, P30	I/O	Bit3 ~ Bit0 of I/O port 3
CKSEL	I	Clock type select 'L' or floating → RC oscillator 'H' →Crystal
RST	I	RST=1 → Reset Chip (Active H)
CVDD	P	Positive power supply for CPU
CGND	P	Negative power supply for CPU
VDDIO	P	Positive power supply for I/O
GNDIO	P	Negative power supply for I/O
DAOP	O	Positive Output of Push Pull
DAON	O	Negative Output of Push Pull

5. FUNCTION DESCRIPTIONS

5.1. Oscillator

SNC36085 series accepts crystal oscillator / ceramic resonator or built in internal RC type oscillator (selected by pin CKSEL) for system clock. The typical circuit diagrams for oscillator are listed as follows.



5.2. ROM

SNC36085 contains 216K word (10-bit) internal ROM. Program, voices, melodies, data, and instrument waveforms share the same ROM with the others.

5.3. RAM

SNC36085 series contains 256 nibble RAM. The 256 nibble RAM is separated into eight pages (page 0, page1... page 15). An implicit page indicator is utilized to specify page address. Eight instructions, PAGE0, PAGE1... PAGE15 can switch the page indicator. All 16 nibbles of each page can be accessed by direct mode (to specify M0 ~ M15 in the data transfer type instructions.)

5.4. Power Down Mode

“End” instruction will let SNC36085 series enter power down mode and consumer very little amount of current. After SNC36085 enters power down mode, any valid data transition (L→H or H→L) occurring on any input ports or IO ports (P1, P2 and P3) lead SNC36085 series back to normal operation mode.

5.5. Sampling Rate Counters

4 independent sampling rate counters are dedicated to 4 individual voice channels to play voices with different playing rates. The playing rate is programmable from 4KHz to 40KHz. The resolution of sampling period of each sampling rate counter is 0.25 uS. This feature helps SNC36000 series play sounds with accurate pitches in the case of music instrument synthesis.

5.6. Auto repetition

Auto repetition function helps SNC36000 series realize a “looping” sound automatically by hardware without any software effort. Auto repetition function is a very useful mechanism to implement “Sustain” sound in instrument synthesis. All 4 channels are equipped with this function. Arbitrary lengths of looping sound are accepted by SNC36000 series.

5.7. Push-Pull output

A Push-Pull Direct Drive circuit is built-in SNC36085. The maximum resolution of Push-Pull is 12 bits. Two huge output stage circuits are designed in SNC36085. With this advanced circuit, the chip is capable of driving speaker directly without external transistors.

5.8. Volume Control Function

Bit0~Bit2 of VOL Register is applied to control the volume of voice. The relationship between output current and mode2 register is listed in the following table. Bit3 of VOL register provide for VOL Output division 2.

VOL[2]	VOL[1]	VOL[0]	Output Volume
0	0	0	2/16 (-18db)
0	0	1	3/16 (-14.5db)
0	1	0	4/16 (-12db)
0	1	1	6/16 (-8.51db)
1	0	0	8/16 (-6db)
1	0	1	12/16 (-2.5db)
1	1	0	16/16 (0db)

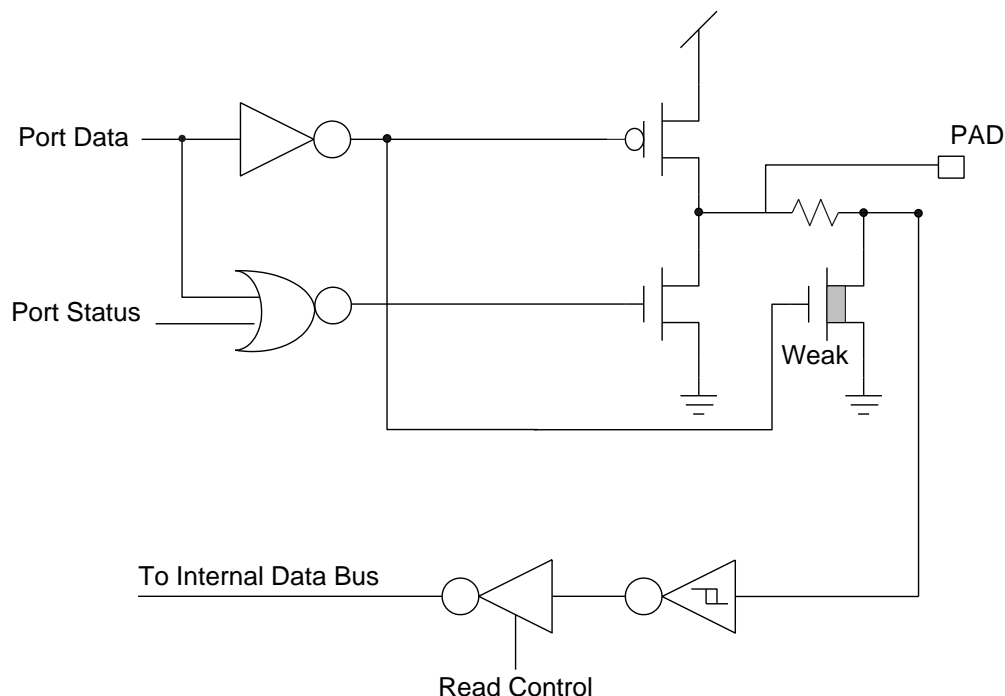
The Default value of VOL is #1110B(Maximum Volume)

5.9. Watch Dog

This is a new function for SNC36000 series. The WDT is cascade after system timer. When user reset system timer will issue a clear signal to WDT also. It would send a reset signal to chip if user doesn't reset any system timer before it reach terminate count (128 ms) when chip is in active mode.

5.10. I/O Ports

P1/P2/P3 are three 4-bit I/O ports. Any bit of P1/P2/P3 can be programmed to be input or output individually. 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 (P10~P13, P20~P23, P30~P33)

Note: All weak N-MOS's can serve as pull-low resistors.

5.11. Pull-Low Resister Control

This function provides user to control Pull-Low register of all I/O ports that can be disabled by user command. With the help of this function, input floating and input pull low is supported.

5.12. IR Function

P33 can be modulated with 38.5KHz square wave before sent out to P33 pin.
The IR signal can be achieved by this modulated signal.

6. ABSOLUTE MAXIMUM RATING

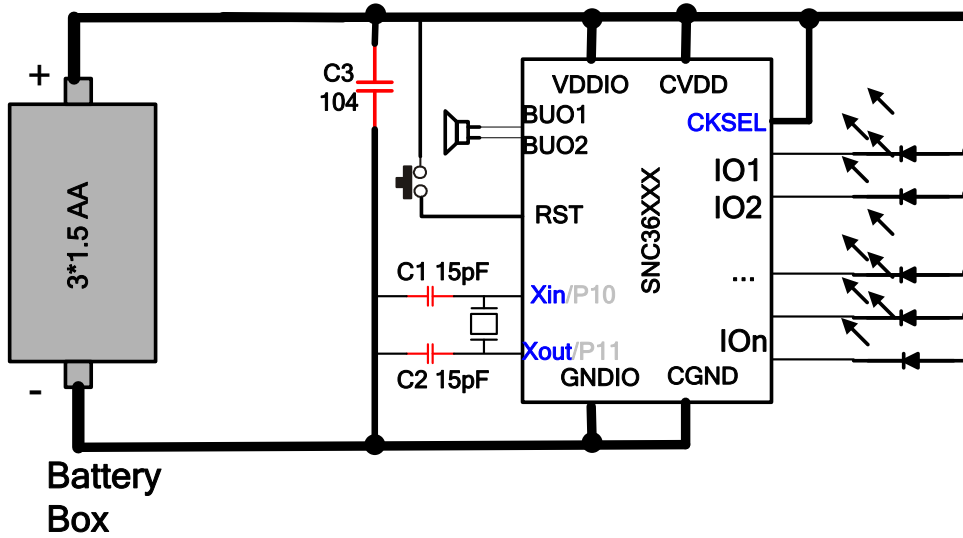
Items	Symbol	Min	Max	Unit.
Supply Voltage	$V_{DD}-V$	-0.3	6.0	V
Input Voltage	V_{IN}	$V_{SS}-0.3$	$V_{DD}+0.3$	V
Operating Temperature	T_{OP}	0	55.0	°C
Storage Temperature	T_{STG}	-55.0	125.0	°C

7. ELECTRICAL CHARACTERISTICS

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	V_{DD}	1.9	3.0	5.5	V	
Standby Current	I_{SBY}	-	1.0	2.0	uA	$V_{DD}=3V$, no load $V_{DD}=4.5V$, no load
Operating Current	I_{OPR}	-	350	-	uA	$V_{DD}=3V$, no load
Input Current of P10~P13, P20~P23, P30~P33	I_i	-	3	-	uA	$V_{DD}=3V$
Drive Current of P10~P13, P20~P23, P30~P31	I_{OD}	-	4	-	mA	$V_{DD}=3V, V_O=2.4V$
Sink Current of P10~P13, P20~P23, P30~P31	I_{OS}	-	6	-	mA	$V_{DD}=3V, V_O=0.4V$
Drive Current of P32~P33	I_{OD}	-	8	-	mA	$V_{DD}=3V, V_O=2.4V$
Sink Current of P32~P33	I_{OS}	-	16	-	mA	$V_{DD}=3V, V_O=0.4V$
Push-Pull current	I_{PP}	-	70	-	mA	$V_{DD}=3V$, Output 1K Sine wave.
Push-Pull current	I_{PP}	-	100	-	mA	$V_{DD}=4.5V$, Ouput 1K Sine wave
Oscillation Freq.(IRC)	F_{OSC}	1.94	2	2.06	MHz	$V_{DD}=3V$, Temp.=25°C Min : -3% Max : +3%
Low Voltage Detect Level		1.55	1.7	1.85	V	

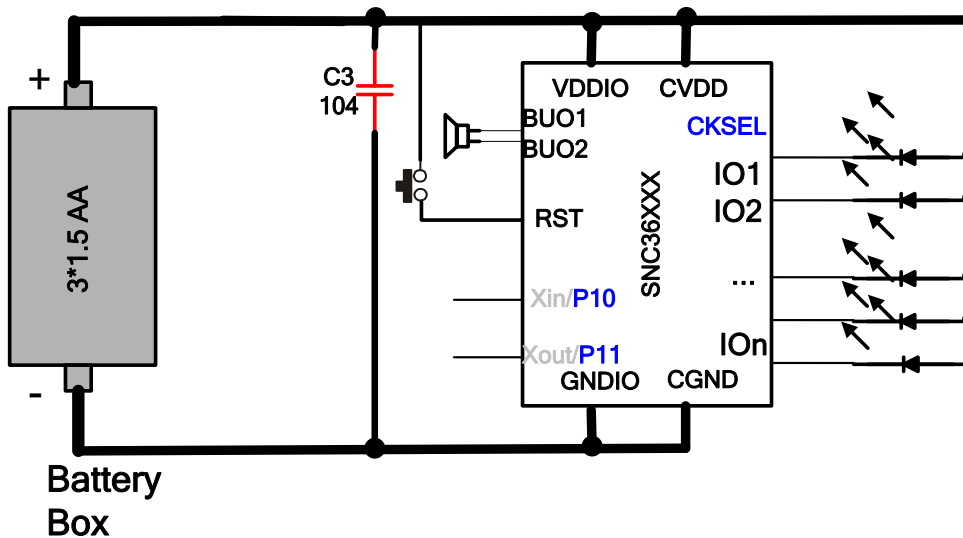
8. APPLICATION CIRCUIT

8.1. Crystal Mode



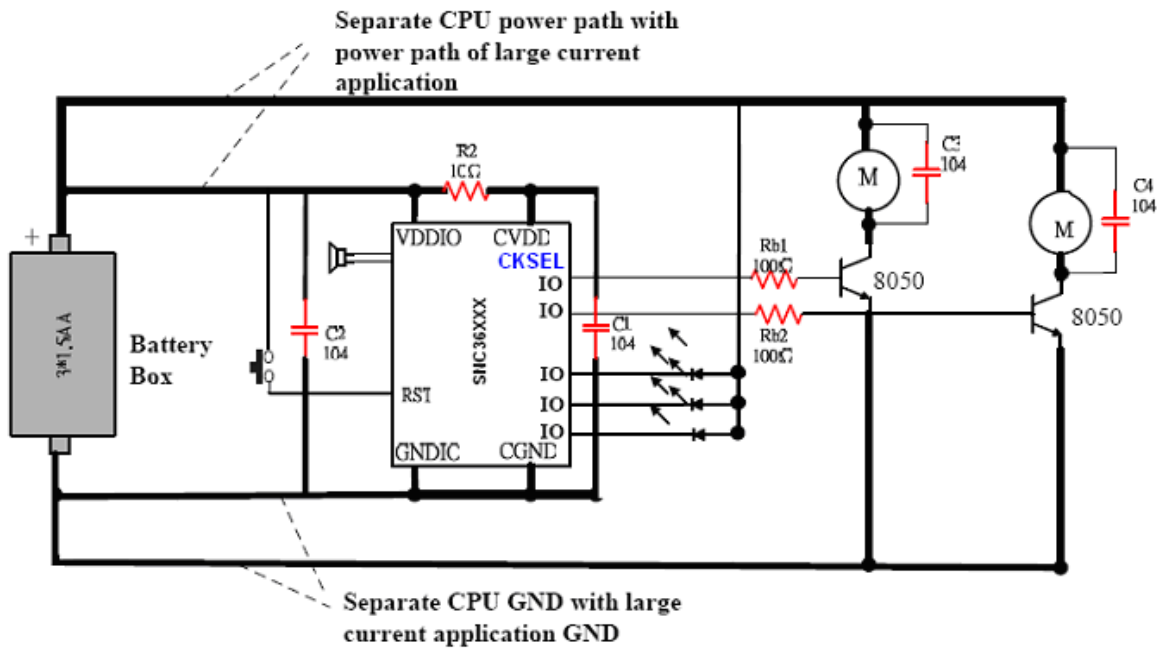
It is suggested to add a capacitor (C3), 104, between VDD with GND to keep power stable with general application. And this capacitor is strongly suggested to be as close to the chip as possible.

8.2. IRC Mode



It is suggested to add a capacitor (C3), 104, between VDD with GND to 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 SNC36000series IC with motor applications.

- (1) The capacitor C1 (104) C2 (104) is strongly suggested to be as close to the chip as possible.
- (2) Separate IC power path with large current application power path to avoid affect IC working by power drop from large current application.
- (3) R2 (10Ω) separate VDDIO and CVDD.
- (4) Let power cable thicker, especially for large current application.
- (5) C3 and C4 (104) are connected at the positive point and negative point of the motor.

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