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AMENDENT HISTORY

Version	Date	Description
Ver 1.0	2010-05-03	First issue
Ver 1.1	2010-07-26	Modify D/A Output Current P12
Ver 1.2	2016-05-24	Modify VO1 & VO2 description

1 INTRODUCTION

The SNC88341B is a single chip 24-channel MIDI compatible wave-table/voice synthesizer. Equipped with a powerful 8-bit controller and 32 I/O pins, it provides a low-cost MIDI sound system solution. It's low power consumption and operating range makes it ideal for all battery operated devices using MIDI or voice synthesis.

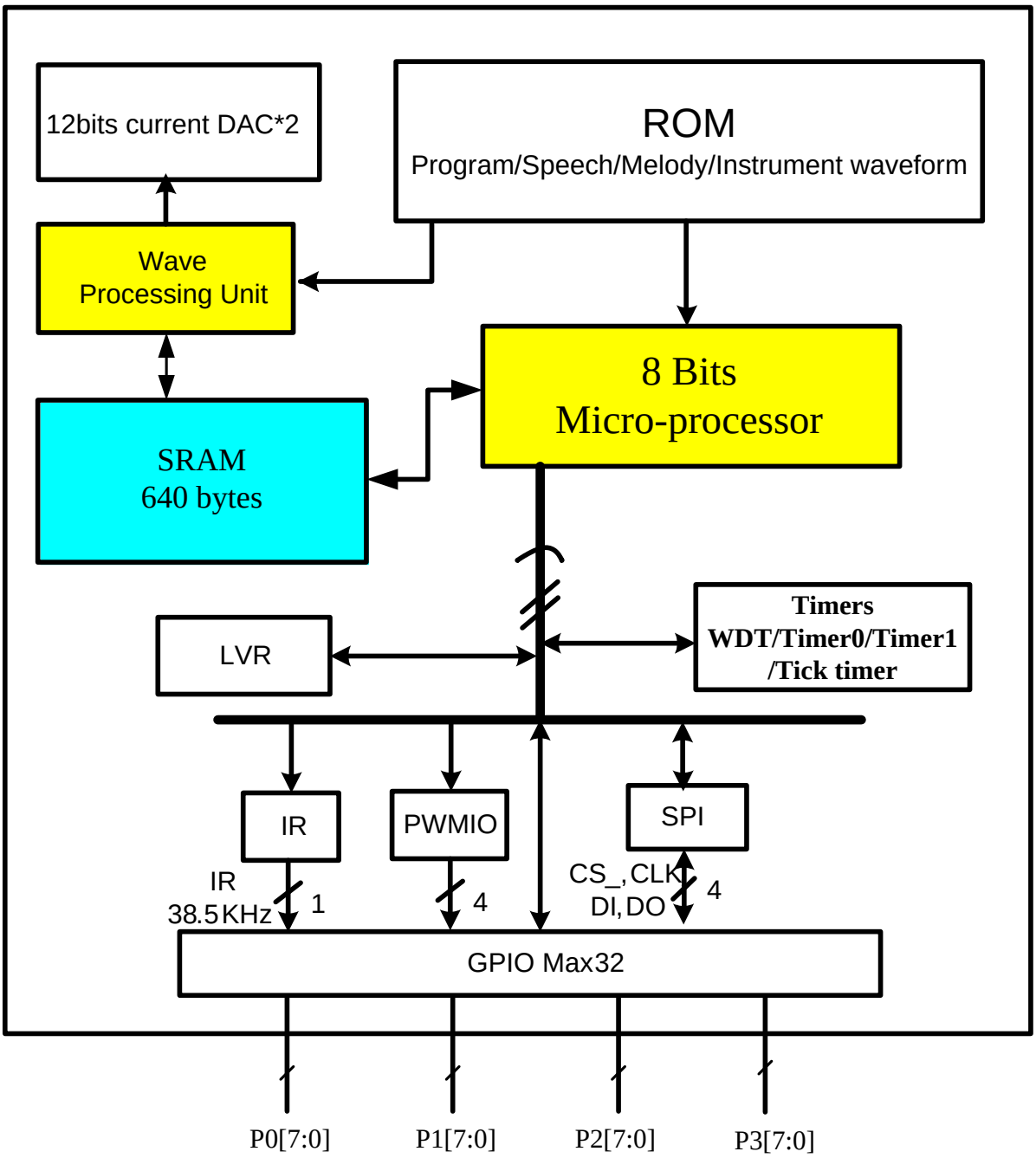
2 FEATURES

- Single Power Supply 2.4V – 5.1V
- Powerful Built-in 8-bit Controller
- Four 8-bit I/O ports
- 640*8 bits RAM
- Maximum 256k program ROM
- 688K*15 bits shared ROM for program and voice data
- Two 12-bits Current DAC
- Support 5-bits ASDPCM & 12-bits PCM
- System clock: External 16.384Mhz Crystal
- Serial Peripheral Interface (SPI) is provided
- Support play wave from SPI flash
- Support 4 PWMIO functions – Each PWMIO has 8-bit independent duty register.
- ESD improved
- Support SF2 ADSR envelope control
- 24-voice Polyphony through a high-quality speech synthesizer
- Mark Event Supported in both Wave and Melody
- Support wave mark interrupt
- Maximum 4096 wave mark
- Individual adaptive playing speed from 4k-64kHz for all 24 channels
- Automatic repetition for each channel
- Volume modulation controlled by embedded multiplier
- One digital mixers with saturation control
- 1 MIPS CPU power free to user
- Low Voltage Reset
- Built-in a 8*8 Multiplex for CPU
- 2 Timers, WDT and Tick timer
  - Timers 0 with Individual pre-scaler and auto-reload function, Timer 0 with Interrupt Function
  - Timers 1 with selectable time out (1ms, 4ms, 8ms, 16ms)
  - Watch Dog timer function is provided
  - Built-in a tick timer for software melody decodes

3 PIN ASSIGNMENT

Symbol	I/O	Function Description
P00 ~ P07	I/O	Bit7 ~ Bit0 of I/O port 0
P10 ~ P17	I/O	Bit7 ~ Bit0 of I/O port 1
P20 ~ P27	I/O	Bit7 ~ Bit0 of I/O port 2
P30 ~ P37	I/O	Bit7 ~ Bit0 of I/O port 3
CVDD	P	Positive power supply for internal circuit
VDD	P	Positive power supply for I/O
GND	P	Negative power supply
VDD_DAC	P	Positive power supply for DAC
GND_DAC	P	Negative power supply for DAC
REGOUT	P	2.8V regulator output
RST	I	Chip Reset (Active low)
TestM	I	Test Pin
VO1	O	DA output1 : Left channel
VO2	O	DA output2 : Right channel
XIN	I	High speed clock crystal input
XOUT	O	High speed clock crystal output

4 Block Diagram



5 FUNCTION DESCRIPTION

5.1. ROM

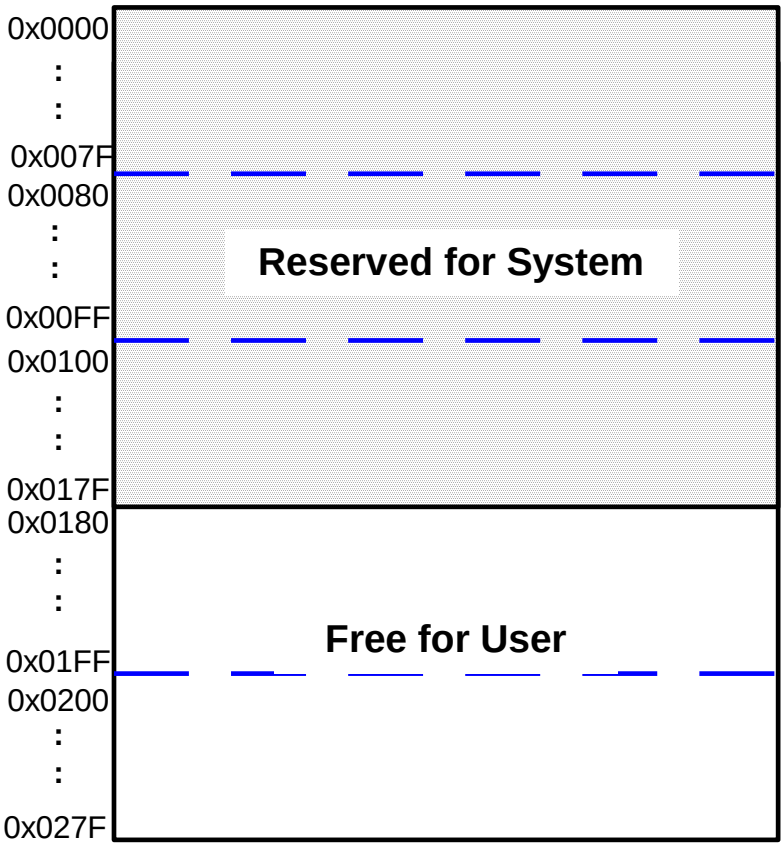
SNC88341B contains a substantial 688K*15 bits internal ROM which is shared by program and resource data. Program, voice, melodies, data, and instrument waveforms are shared within this same 688K*15 bits ROM.

5.2. RAM

SNC88341B contains 640 bytes RAM (640 x 8-bits). The 640 byte RAM is divided into five pages (page0~4, 128 bytes RAM for each page).

```
Org         0x250
UseMem  ds  1
```

Need not select RAMBK in directly addressing mode



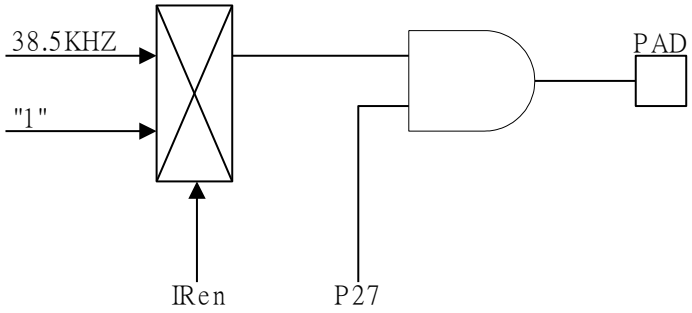
Notice: Bank 3~4 is free for user.

5.3. Power Down Mode

Entering the IC into Stop Mode will stop the system clock for power savings (<3uA @VDD=3V and <6uA @VDD=4.5V). Any transition (L→H or H→L) on any I/O pin can be used to start the system clock and return to normal operating mode.

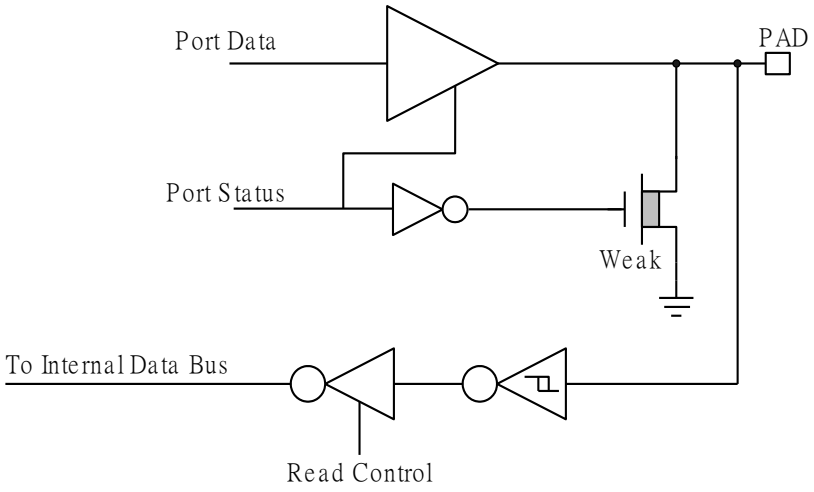
5.4. IR Function

When IR is enabled, a 38.5 KHz square wave is gated with P27. The 38.5KHz IR signal is present at the pin when P27 is set to "1".



5.5. I/O Ports

There are four 8-bit I/O ports P0, P1, P2 and P3. Any I/O can be individually programmed as either input or output. When I/O is set to input, any valid data transition (H→ L or L→H) of each I/O port can wake-up the chip from power-down mode.



I/O Port Configuration

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

5.6. Sampling Rate Counters

Each voice channel of 24 is equipped with an independent sampling rate counter to allow individual sample rate play back per channel. Channel sample rate play back can be dynamically set from 4KHz to 64KHz. Each sampling rate counter is updated on a period of 0.125uS. This architecture yields a high-quality music/voice synthesis that sounds very close to its original source when played through the same amplifier and speaker circuitry.

5.7. Wave Processing Unit (WPU)

The Wave Processing Unit (WPU) in SNC88341B provides up to 24 voice/music channels. A high-performance multi-channel music synthesizer is built-in to provide high-quality wave-table melody playback. Most of standard MIDI format can be accessed through the MIDI to Melody convert software. The voice playing can support 12-bits PCM and 5-bits ASDPCM compression format. Each channel has its own volume control and has a main volume control as well.

5.8. Auto Repetition

Each voice channel of 24 is equipped with a hardware auto repeat function. Auto repeat functions are normally used to implement sustain in instrument synthesis but can even be used to repeat any voice data of arbitrary length.

5.9. Serial Peripheral Interface (SPI)

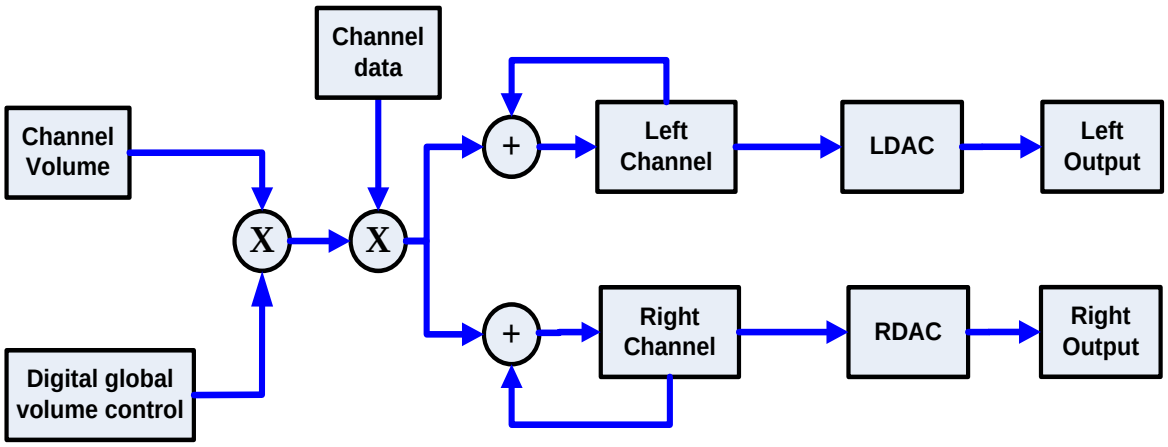
The SPI (serial peripheral interface) is a synchronous serial bus that provides good support for communication with SPI-compatible peripheral devices, such as serial EEPROM, serial flash, and etc.

5.10. PWMIO

SNC88341B have support 4 PWMIO (P2.0, P2.1, P2.2, P2.7). Each I/O has 8-bit independent duty register, and the 8-bit register are comparing with 8 bits counter. If set use PWM IO function and internal counter start at 000H, the mapping I/O will set High. The 8 bits counter increment until the corresponding duty register, and then will reset the mapping IO pin.

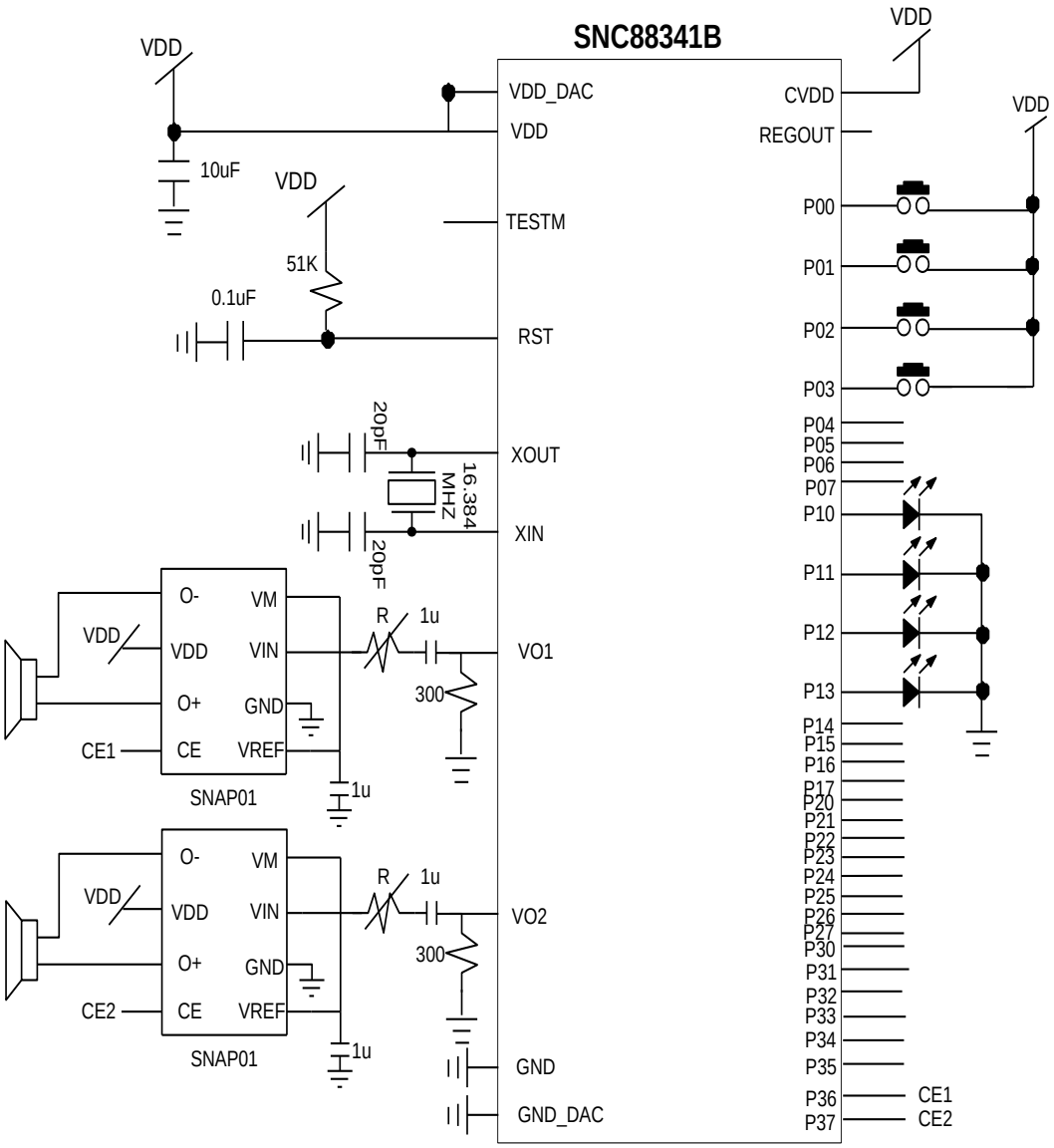
5.11. Volume Control

There are two ways to control volume of SNC88341B which is **channel volume control (8bits) and Digital global volume control.**



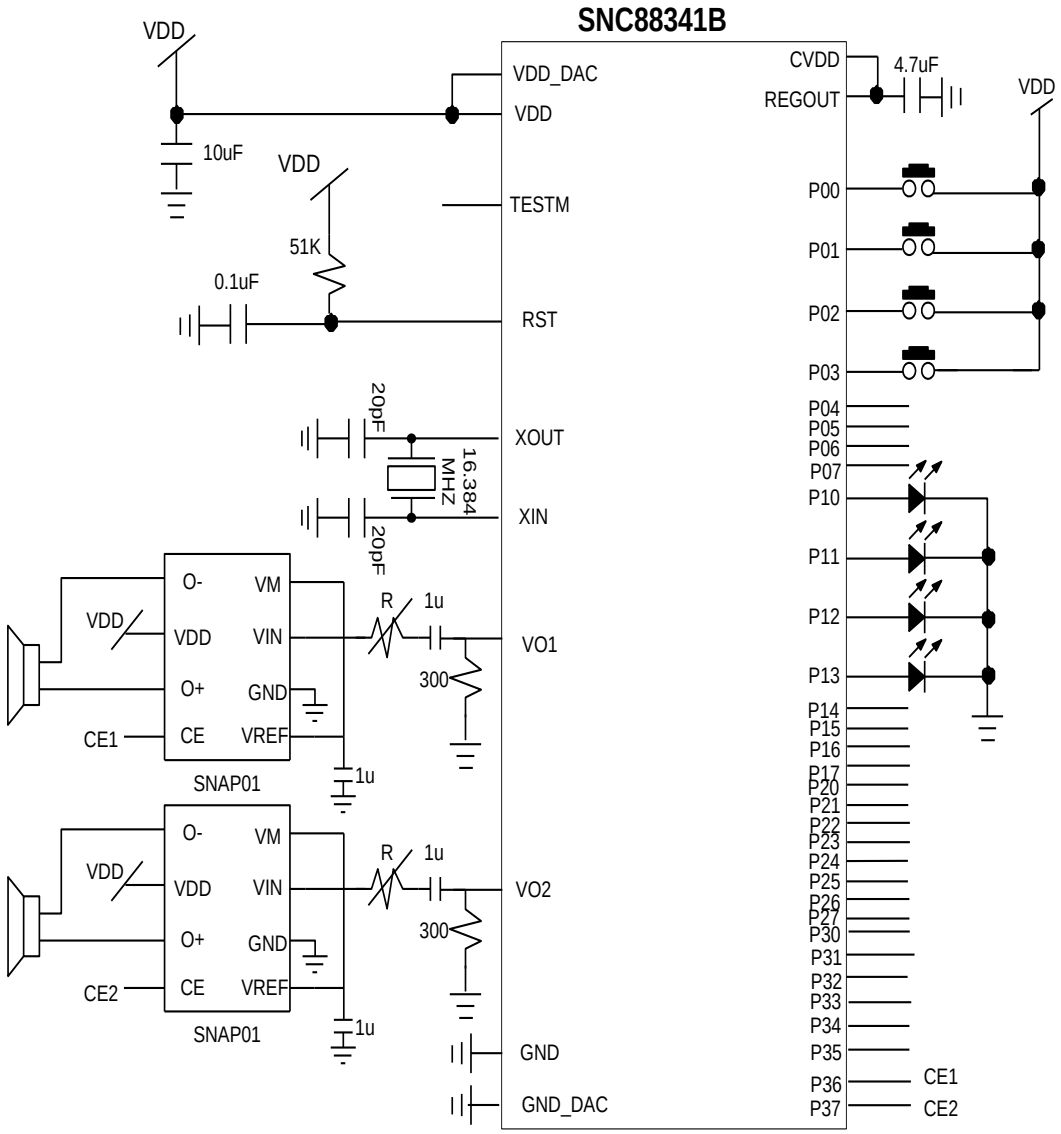
6 APPLICATION CIRCUIT

- **Power Supply: 3.0V**
- **System Clock: 16.384M Crystal**
- **Voice output: Current DAC Output**



Notice: SNAP01 Gain=75K/(5K+R)

- **Power Supply: 4.5V**
- **System Clock: 16.384M Crystal**
- **Voice output: Current DAC Output**



Notice: SNAP01 Gain=75K/(5K+R)

Note:

VO1 is Left channel
VO2 is Right channel.

7 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	^{o}C
Storage Temperature	T_{STG}	-55.0	125.0	^{o}C

8 ELECTRICAL CHARACTERISTICS

Item	Sym.	Min.	Typ.	Max.	Unit	Condition
Operating Voltage	V_{DD}	2.4	-	5.1	V	
Standby Current	I_{SBY}	-	3 5	-	*u*A	V_{DD}=3V V_{DD}=4.5V
Operating Current	I_{OPR}	-	4 5	-	mA	V_{DD}=3V, no load V_{DD}=4.5V, no load
Input pull low impedance of P0~P3	Ri	-	0.8M	-	Ω	V_{DD}=3V
I/O port Drive Current	I_{OD}	- -	4 8	- -	*m*A	V_{DD}=3V, V_O=2.6V V_{DD}=5V, V_O=4.2V
I/O port Sink Current	I_{OS}	- -	6 10	- -	*m*A	V_{DD}=3V, V_O=0.4V V_{DD}=5V, V_O=0.8V
D/A Output Current	I_{VO}		8 8		*mA*	V_{DD}=3V, DA=0XFFF V_{DD}=5V, DA=0XFFF
IR Carrier Frequency	Fir	-	38.5	-	KHz	

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