LN2410SBC

User's Manual

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1. INTRODUCTION

1.1. Overview

The LN2410SBC is a high performance single board computer based on ARM920T (MMU included). Its ultra low power consumption, various built-in IO ports and support for Linux/WinCE/RTOS make it suitable for many industry applications.

- 266MHz clock speed
- STN/TFT display support
- Compact Flash/MMC/NAND Flash mass storage support
- Ethernet and sound support

These features provide an ideal development platform for PDA, DVR, image processing and network terminal.

1.2. LN2410SBC Specification

- Size : 110×78 mm (2.5 inch)
- CPU : S3C2410X (ARM920T) - 266MHz
- Memory :
  - NOR Type Flash : 16Mbit Flash (16bit Bus Interface)
  - NAND Type Flash : 256Mbit Flash (8bit Bus Interface), NAND Flash Boot
  - SDRAM : 512Mbit SDRAM (32bit Bus Interface) : 256Mbit×2
- MMC/SD Interface
- Compact Flash Interface (Storage type)
- 10Mbps LAN : CS8900A
- Sound output: Built-in Speaker, Audio Codec.
- Infrared sensor (Remote Receiver)
- USB Host 1ch
- USB Device 1ch
- Serial 3ch
- JTAG Port 1ch
- HDD/CD-Rom Interface

- ◆ RTC Backup Battery
- ◆ Status LED 4EA (I/O 2, LAN 2)

* STN/TFT LCD support with optional LCD pack
* LVDS TFT LCD (10.4 inch) support with optional LVDS pack

1.3. Function Block Diagram

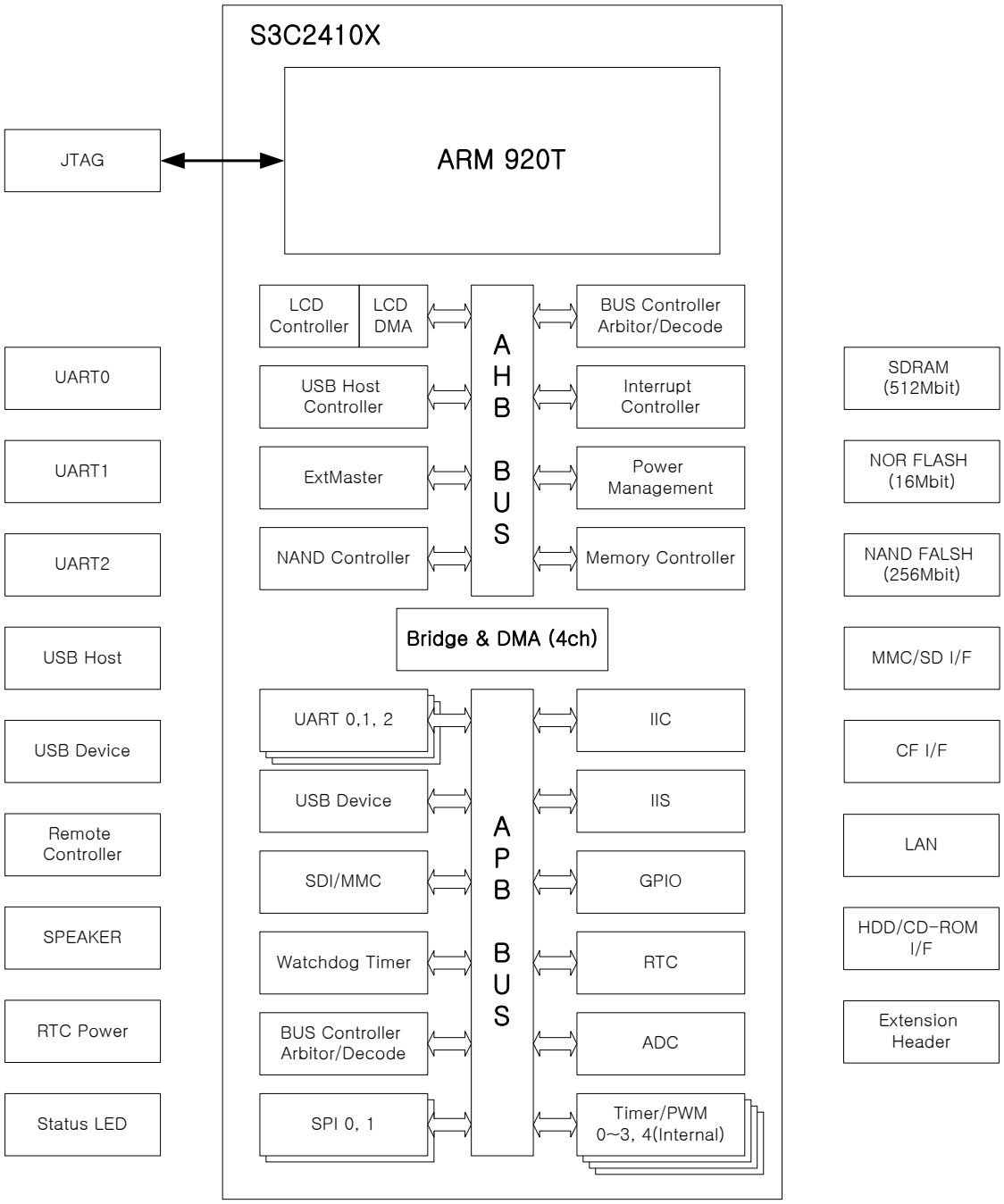


Fig. 1-1

2. Board Configuration

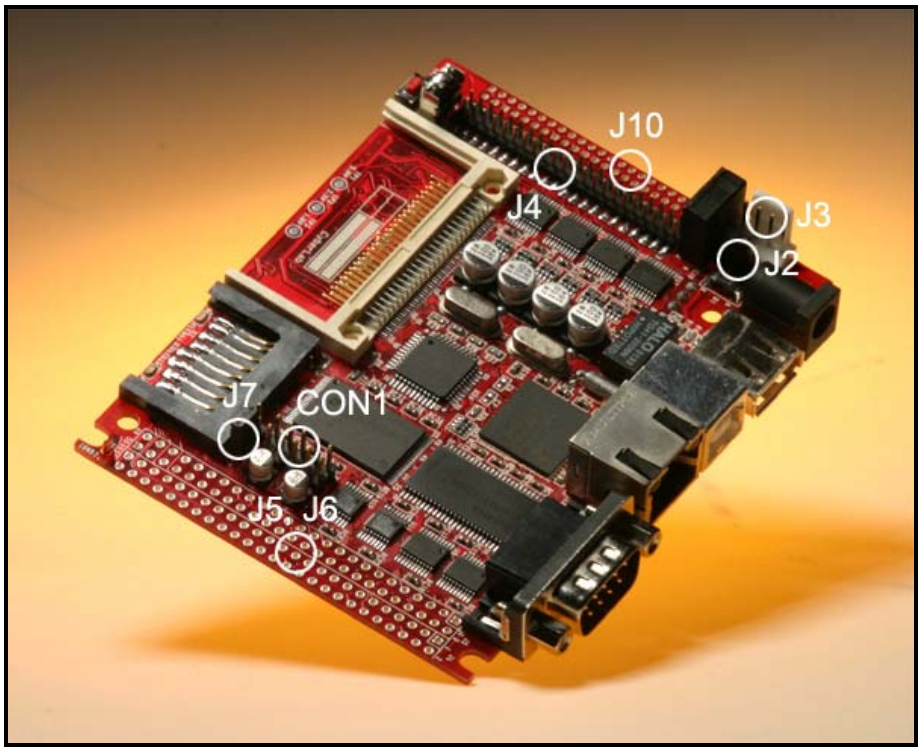


Fig. 2-1

2.1. Main Power Selection

The main power of LN2410SBC can be provided selectively.

Jumper	State		Description
J2	(1-2)	USB	supplied from USB host
	(2-3)	DC	supplied from external power connector J1 or J3

Table 2-1 Main Power selection

* Shaded is Default Setting Value

◆ If pins (1-2) of J2 are connected, power will be supplied from PC USB host port. Due to its limitation to 500mA, an external power supply should be used for optional LCD pack.

◆ If pins (2-3) of J2 are connected, power will be supplied from external power supply through J1 or J3 connector.

- Through J1 connector:

As show in Fig. 2-2, 5 volt should be provided through the hall of which diameter is 2.1mm. A SMPS supplying 5V/1A DC can be used.

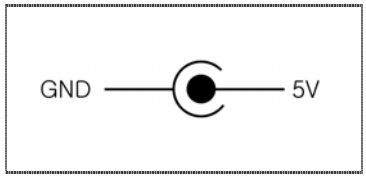


Fig. 2-2

- Through J3 connector :

The J3 was designed to provide power to external devices. However it can be used as an input power terminal to the board as well. Its description is shown in Fig. 2-3 and Table 2-2.

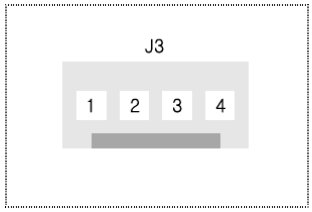


Fig. 2-3

Pin Number	Description
1	12V
2	GND
3	GND
4	5V

Table 2-2 J3 Pin Description

2.2. Sound Selection

The sound output is selected by J7.

Pin Number			
J7	(1-2)	BUZZER	Using TIMER
	(2-3)	IIS SOUND	Using CODEC

Table 2-3 Sound Selection

* Shaded is Default Setting Value

When IIS SOUND is selected, mono CODEC signal will be amplified by built-in audio amplifier and drive the built-in speaker. Non amplified audio signal is available through J6 for external speaker or headphone.

2.3. SDRAM Chip Select(CS) Selection

By connecting 22 ohm register to R13 or R14, the SDRAM can be located either Bank 6 or Bank 7 respectively.

2.4. Boot ROM Selection

The S3C2410X can boot from internal NAND flash memory as well as external boot ROM or flash memory. The LN2410SBC has 16Mbit NOR type Flash (AM29LV160D) as an external flash. And the selection between the two flash memory is made by R9 and R10 when power up.

R9	R10	Description
ON (0 Ω)	OFF (OPEN)	Boot from NOR Flash(U5 : AM29LV160D) NAND Flash : 3-Step Address
ON (0 Ω)	ON (0 Ω)	Boot from NAND Flash(U10 : K9F5608) * 3-Step Address
OFF (OPEN)	ON (0 Ω)	Boot from NAND Flash(U10 : K9F5608) * 4-Step Address
OFF (OPEN)	OFF (OPEN)	Boot from NOR Flash(U5 : AM29LV160D) NAND Flash : 4-Step Address

Table 2-4 Boot ROM Selection

* Shaded is Default Setting Value

3. Memory Map

3.1. Nor Flash Booting Mode

The LN2410SBC has 16Mbit NOR type Flash (AM29LV160D) memory which contains bootstrap code for ARMDown. User application can be placed from 0x0001_0000.

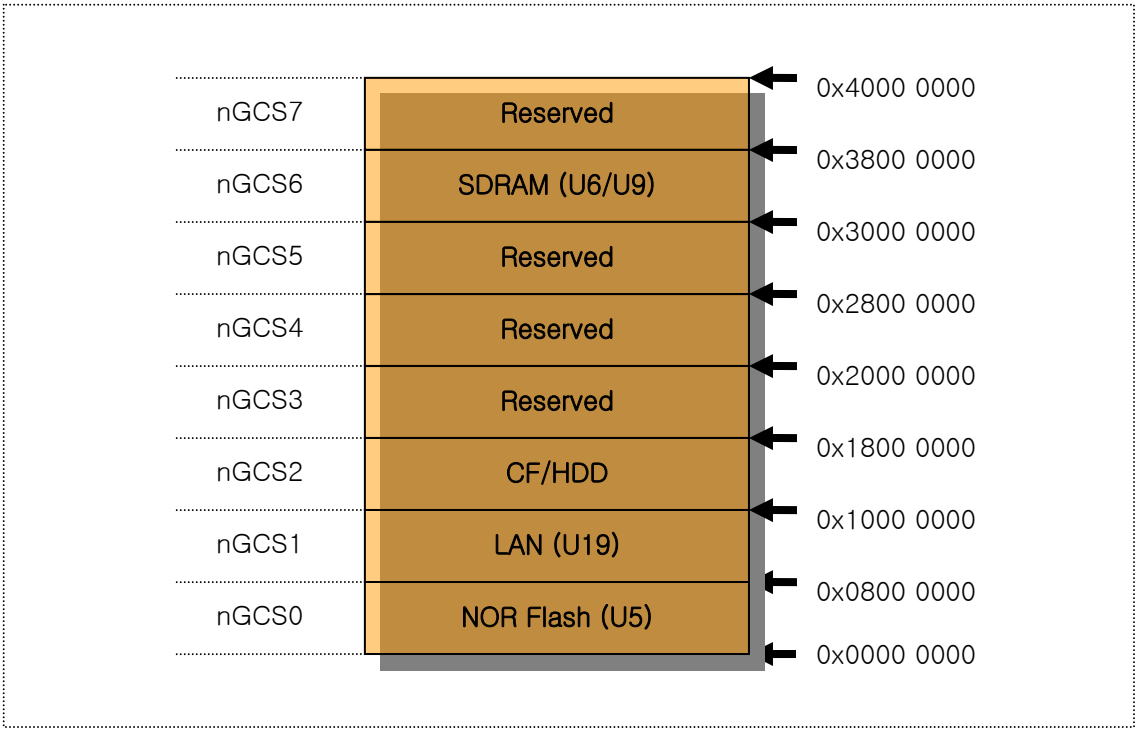


Fig. 3-1 Memory Map (NOR Booting Mode)

3.2. NAND Flash Booting Mode

In NAND boot mode, the 4KB of the Flash memory is copied to SRAM starting 0x0000_0000 before booting. Therefore, NOR flash memory can be accessed from 0x0000_0400.

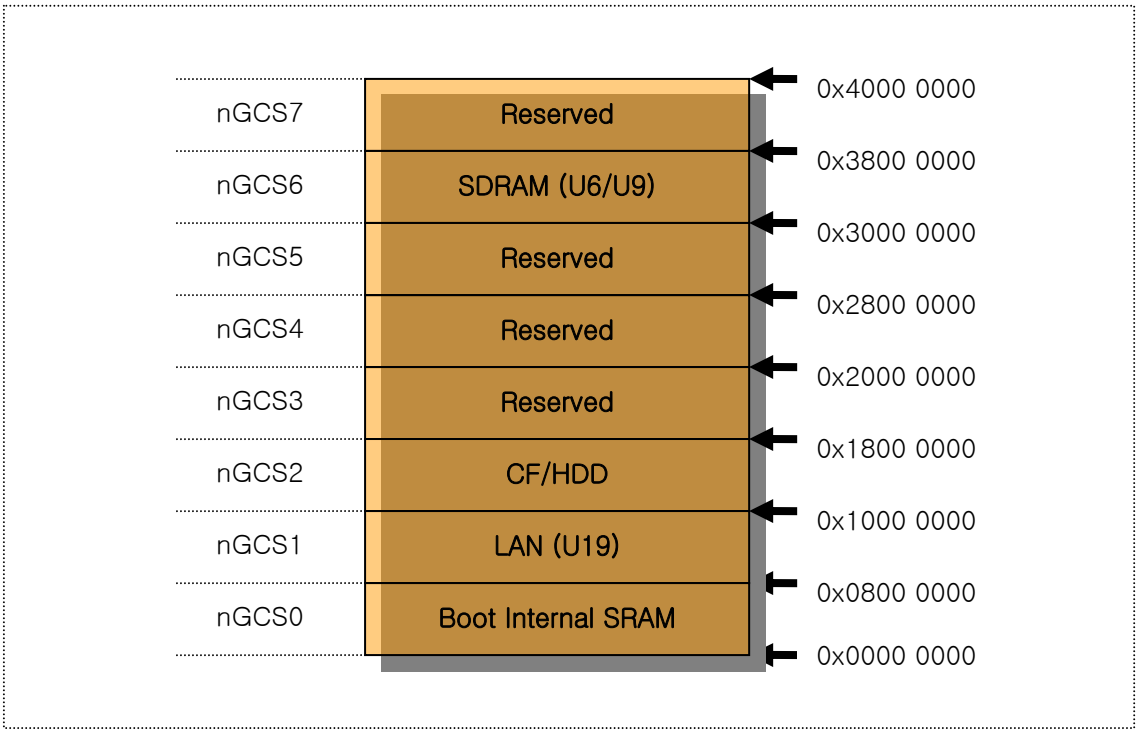


Fig. 3-2 Memory Map (NAND Booting Mode)

4. Example Code Tutorials

4.1. Overview

Each example folder consists of project file, C or assembly file, library and binary image. They were built under CodeWarrior for ARM Embedded System (Rev 1.2) from Metrowerks.

4.2. IO_Port

This example tests I/O ports using Status LED (D2, D3).

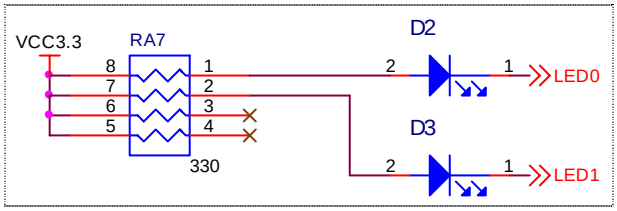


Fig. 4-1 I/O Port

Status LED D2, D3 are connected to GPB5, GPB6 of S3C2410X respectively. After setting GPB5 and GPB6 as output port, write “1” to turn on the LED and “0” to turn off.

The code provided was designed to flash the LEDs . The ports initialization is done in boot code and LED_Display() in myLIB.C is called from Main.c .

4.3. UART_Port

The S3C2410X UART (Universal Asynchronous Receiver and Transmitter) provides three serial I/O ports (Uart 0/1/2). Among them RxD0, TxD0, nRTS0, nCTS0 for Uart0 are connected to the serial connector. The signals for Uart 1/2 (RxD1, TxD1, RxD2, TxD2) are available through J6 connector.

Ex02)Uart shows the UART usage by displaying variables on the serial terminal. The UART related functions are defined in myLIB.c and called from Main.c.

Ex03)Calc is a simple calculator which gets the input, 1+2 for example, and displays its result, 3, to serial terminal. The ARMDown built-in serial console or Hyperterminal can be used for serial terminal.

4.4. TIMER

The S3C2410X has five 16-bit timers as shown in Fig 6-2.

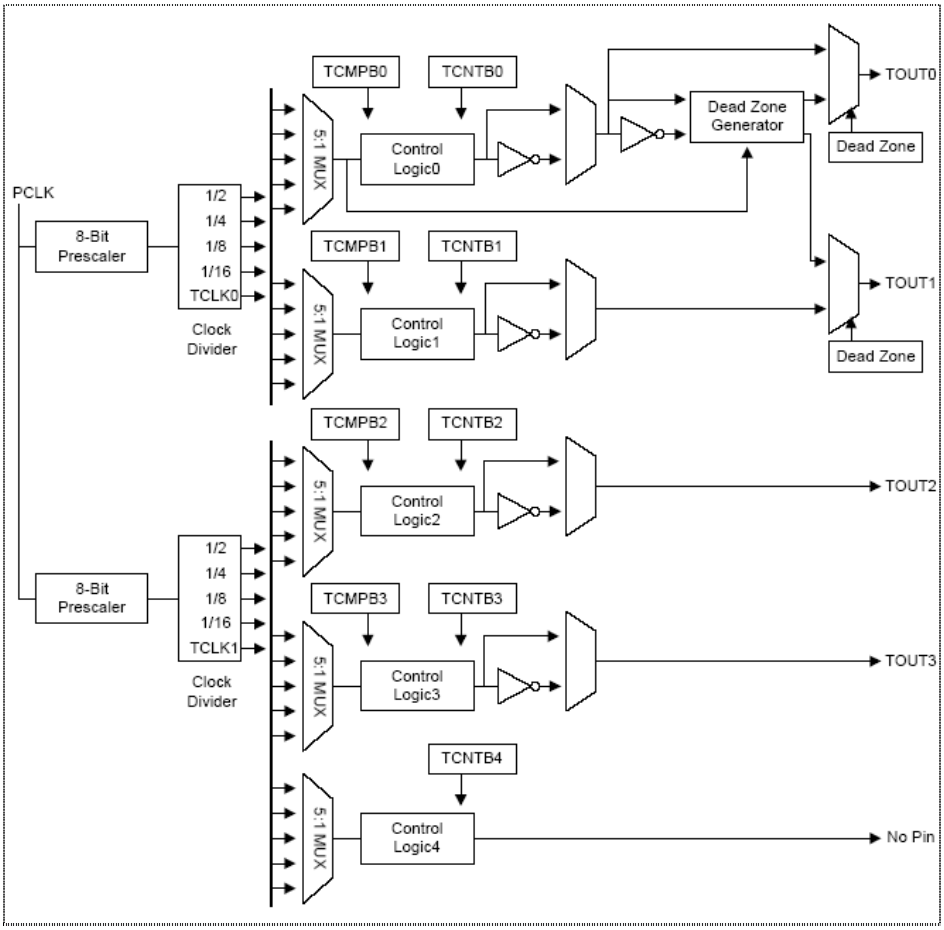


Fig. 4-2 16 bit Timer Block Diagram

The timer input clock PCLK, which ¼ of main clock (MCLK: 266MHz) goes through 8bit prescaler and 4bit clock divider before being counted.

Ex04)TIMER was designed to flash LED in every second using Timer0. It also displays timer count register (rTCNTO0) on the serial terminal. Other timers can be programmed in similar way.

4.5. WDT (Watch Dog Timer)

The S3C2410X watchdog timer is used to generate the reset signal when the system malfunctions. It can be used as a normal 16bit interval timer as well.

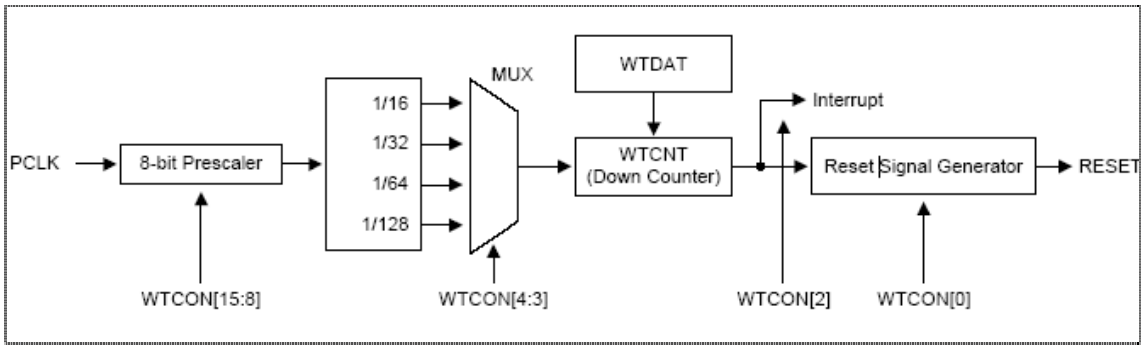


Fig. 4-3 Watch Dog Timer Block Diagram

4.6. RTC (Real Time Clock)

The S3C2410X has a Real Time Clock and Ex06)RTC displays the clock to the serial console. The RTC registers are programmed from Rtc_Set() function in BCD format.

An external 32.768 KHz crystal is used for RTC to create 1 second time tick. A backup battery on LN2410SBC supplies power when the system power is off. Figure 6-4 shows power switching between backup battery and external power supply. With external power 1.8 volt is applied to VCCRTC.

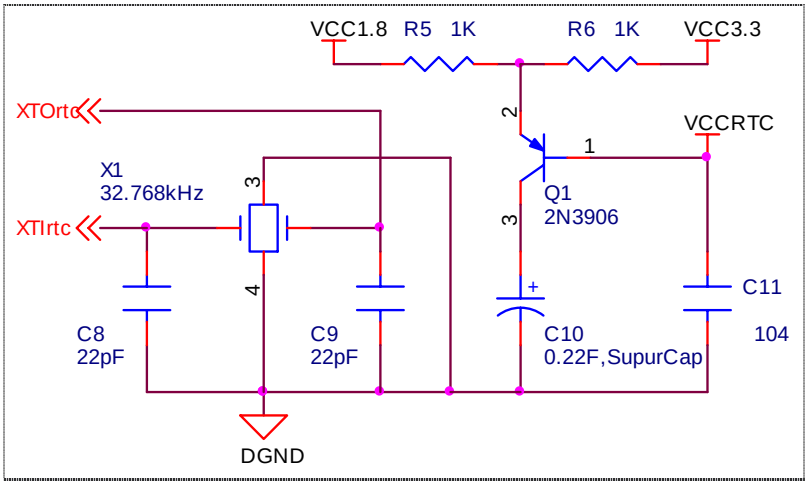


Fig. 4-4

4.7. ADC (Analog to Digital Converter)

The S3C2410X has 8-channel 10 bit CMOS ADC built in. The analog signals, AIN0/1/2/3/4/5/6/7 are to be provided through extension connector J6. The AIN5/7 are dedicated to touch screen interface, therefore, shouldn't be used for other purpose.

Ex07)ADC reads ADC_DATA of each channel and displays them on the serial terminal.

Ex21)Touch shows how to implement touch screen using ADC

5. Reference

5.1. Documentations

- ArmDown User's Manual
- Samsung S3C2410X User's Manual
- Samsung S3C2410X Application Note
- ARM920T Technical Reference Manual
- ARM Developer Suite User's Manual

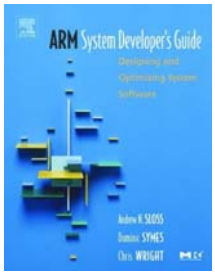
5.2. Books

- ARM System-On-Chip Architecture (Second Edition)

  By S.Furber / Addison-Wesley

- ARM Architecture Reference Manual (Second Edition)

  By David Seal / Addison-Wesley

- ARM System Developer's Guide (First Edition)

  By Andrew Sloss, Dominic Symes, Chris Wright / Morgan Kaufmann