32-BIT ARM7TDMI-BASED MCU

NUC501 Development Board

User Guide

32-BIT ARM7TDMI-BASED MCU

Revision history

version	date	page	description
A	Dec 20, 2008	--	Initial Issued
B	Jan. 06, 2009	--	Add board picture
C	Mar.12, 2009	--	Update
D	Apr.28,2009	--	Update schematic

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1 Introduction

The NUC501 DEV is an evaluation board for NUVOTON's ARM7TDMI-based NUC501 series microcontrollers. It provides a complete development environment for NUC501 microcontrollers which has 32KB internal SRAM and boot ROM ,crypto engine with OTP key, build-in 1.8V LDO , supports up to 37 GPIOs, 4-ch PWM, two UART channels , three SPI/Micro-wire channels, one I^2C channel and 20-pin JTAG ICE interface for debugging.

The user guide provides information about hardware features and information about using this development board. The picture of NUC501 DEV Board shows on Figure 1-1.
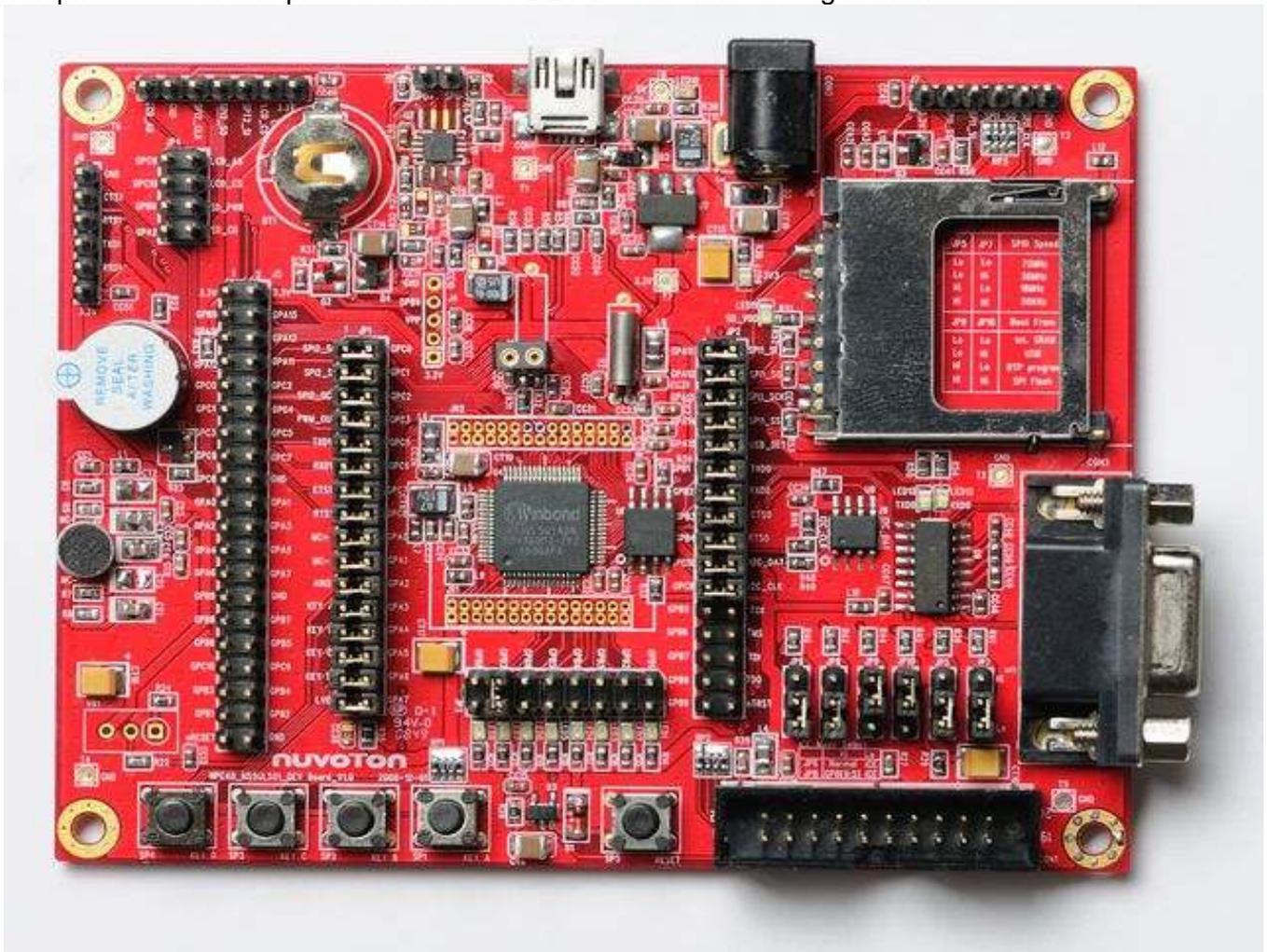

Figure 1-1 NUC501 Development board

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1.1 The NUC501 Development board

It was built around the Nuvoton's ARM7TDMI-based NUC501 MCU and provides versatile external devices such as one SPI flash for program and data storage, a SD card slot supported by SPI port1, one I^2C interface serial EEPROM, two UART ports with one RS-232 level shifter for console connection (UART Port0) and one 20-pin JTAG interface for ICE debugging.

Each GPIO pin has dedicated jumper for function selection and all are connected to a 40-pin male connector which provides users an easy way to build up application system based on this development board.

Following listed the main components of NUC501 development board:

Main Components:

1. **MCU:** Nuvoton's ARM7TDMI-based NUC501, it can run up to 108MHz operating speed.
2. **GPIO extension slot:** One GPIO slot supports all the GPIO pins interface.
3. **AUDIO:** Onboard MIC input and mono AUDIO output with AMP.
4. **I^2C EEPROM:** On board 24LC64 I^2C E^2PROMs.
5. **SPI FLASH:** On board 25X40 SPI serial FLASH for program storage.
6. **UART:** One UART port with Female type DSUB-9 connector.
7. **SD card Slot:** One SD card connector supported by SPI port1.
8. **JTAG connector:** One 20-pin JTAG ICE port for ICE connection.
9. **Key array:** 4-key array supported by GPA3~6.
10. **LED display:** Eight LED indicators connected to GPIO port B (High drive).
11. **DC power jack:** Please apply 5V/1A power adapter to CON6.
12. **LDO:** A 5V to 3.3V/1A LDO supports NUC501 and other 3.3v devices.

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1.1.1   DEV Board layout and connectors location

The following section provides board layout and peripheral connectors' information for using NUC501 DEV board. Below, shows the connectors' location of NUC501 DEV board on Figure 1-2.

Figure 1-2 NUC501 Development board's layout

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AUDIO out connector: J1

- Mono 16-bit Sigma-Delta DAC output
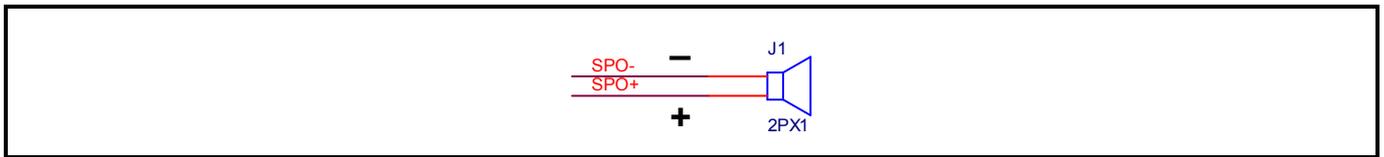
GPIO extension interface: J3

- 40 pin interface supports power, ground, reset and all GPIO pins interface.
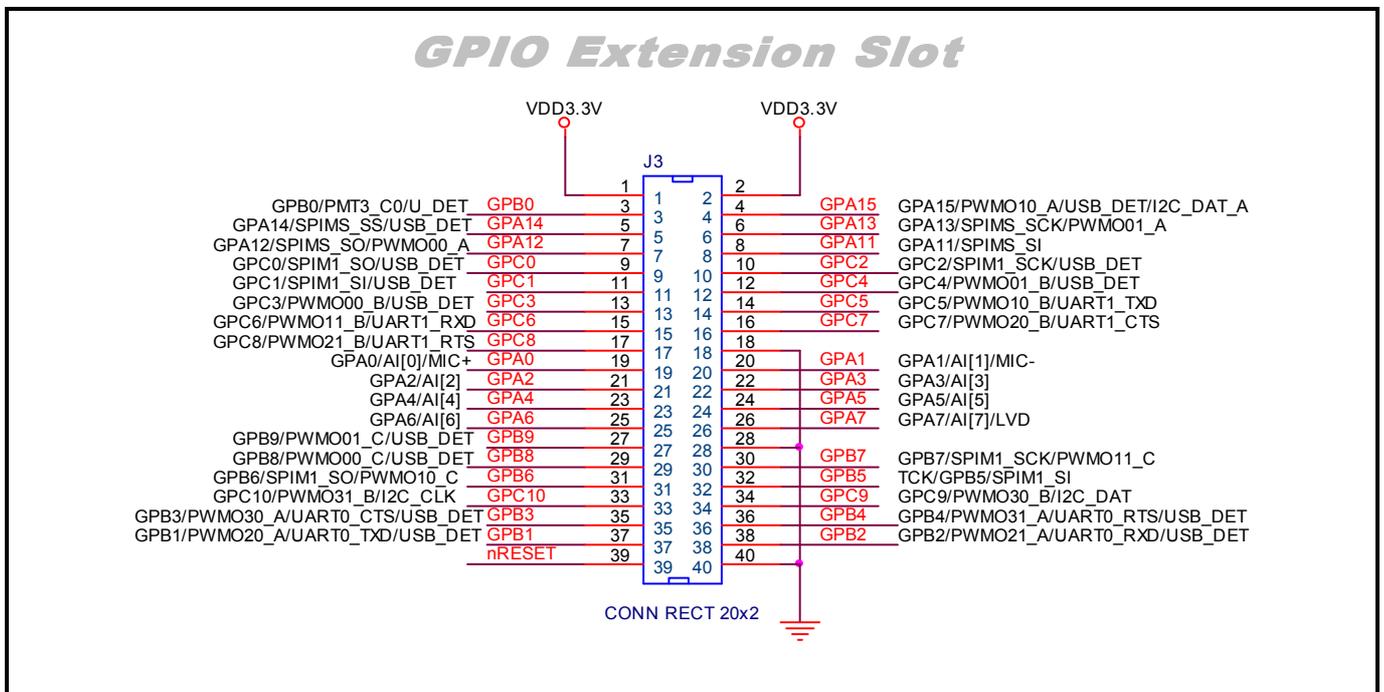
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VPP supplier board interface: J4

- 5 pins interface for connecting VPP supplier board. It's for OTP memory burning use.
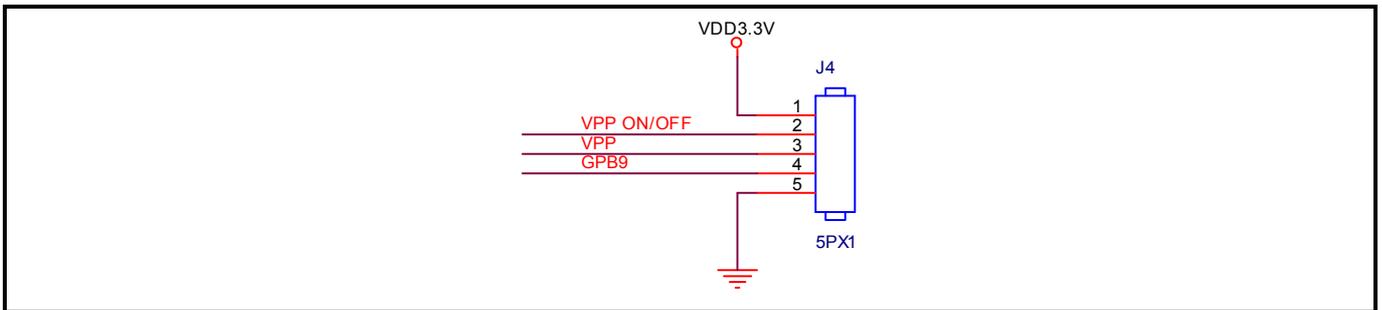
SPI Port 2 connector: J5

- SPI Port 2 interface + two I/O pins for MPU type LCM connection.
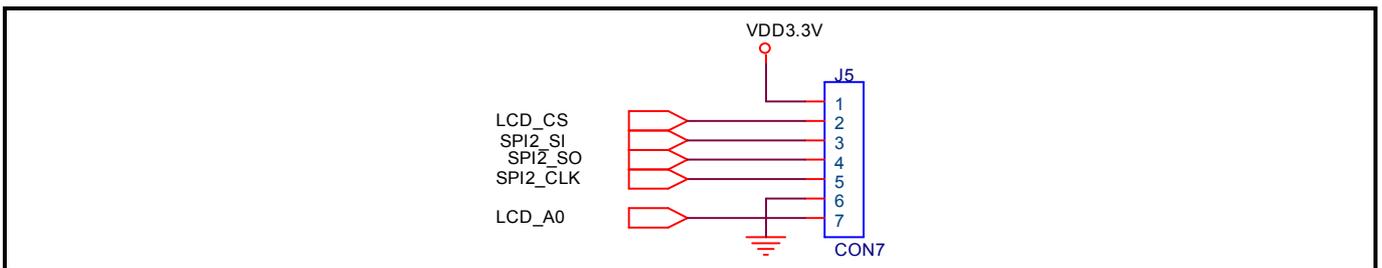
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SD card slot: J6

● SD card interface (SPI mode only) connected to SPI port1.
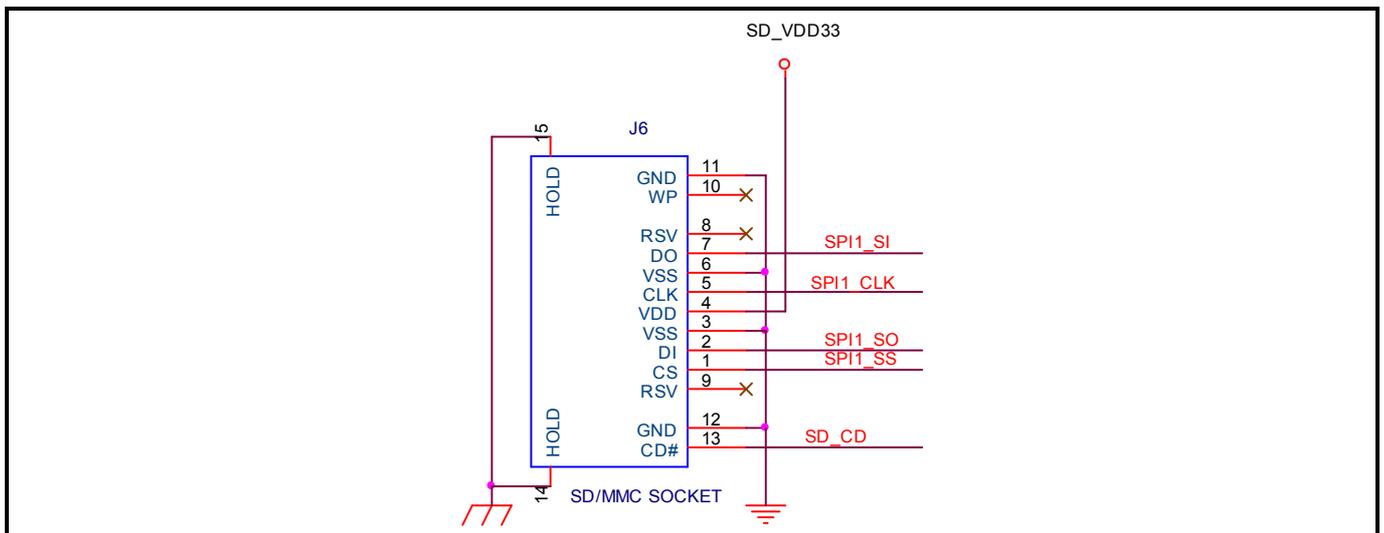
SPI Port 1 connector: J7

● SPI port 1 shared with SD card interface.
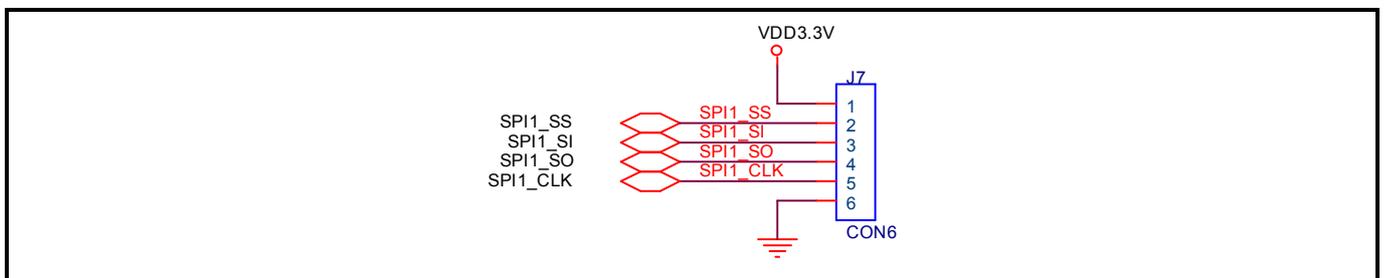
UART Port1 connector: J8

● UART port1 with CTS/RTS flow control interface. No level shifter supported onboard for RS-232 level shifting.
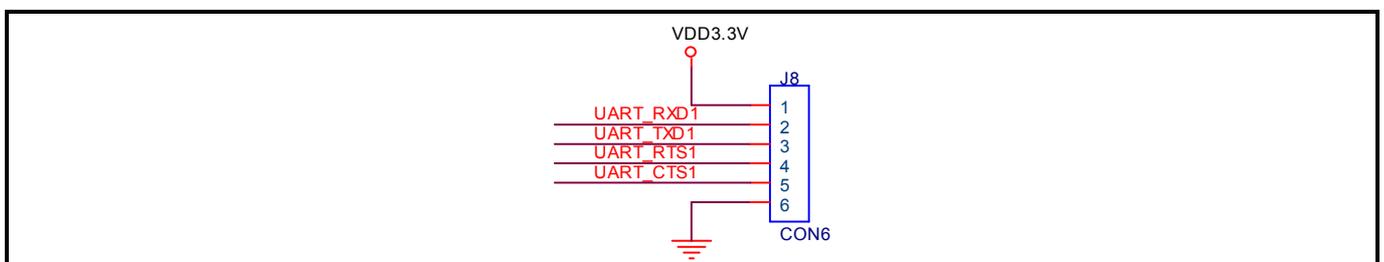
I2C connector: J9

- I2C signals, connected to an EEPROM 24LC64 onboard.
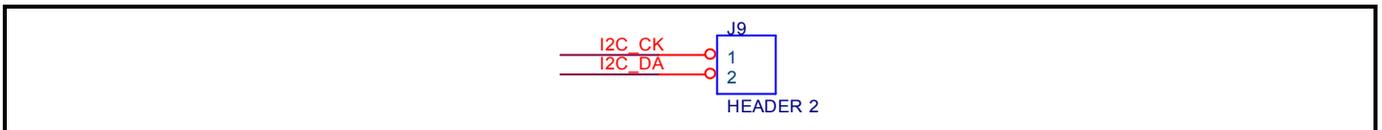
20-way JTAG connector: CON1

- 20-way JTAG interface.
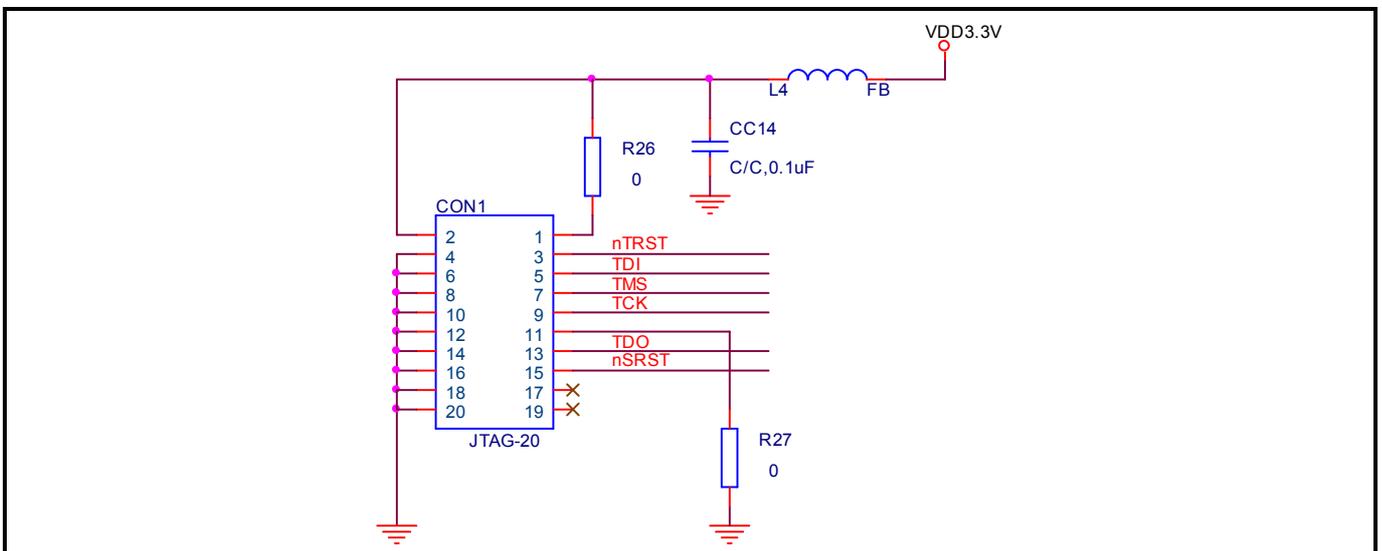
Power adapter input: CON2

- 5V/1A power adapter input connector.
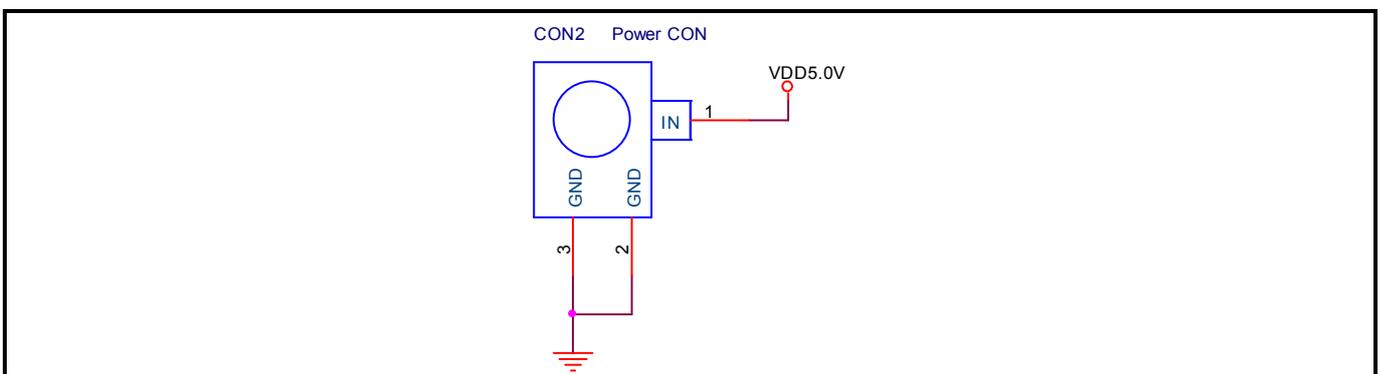
UART Port 0 connector: CON3

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● UART port 0 with RS-232 level shifter for debug console.
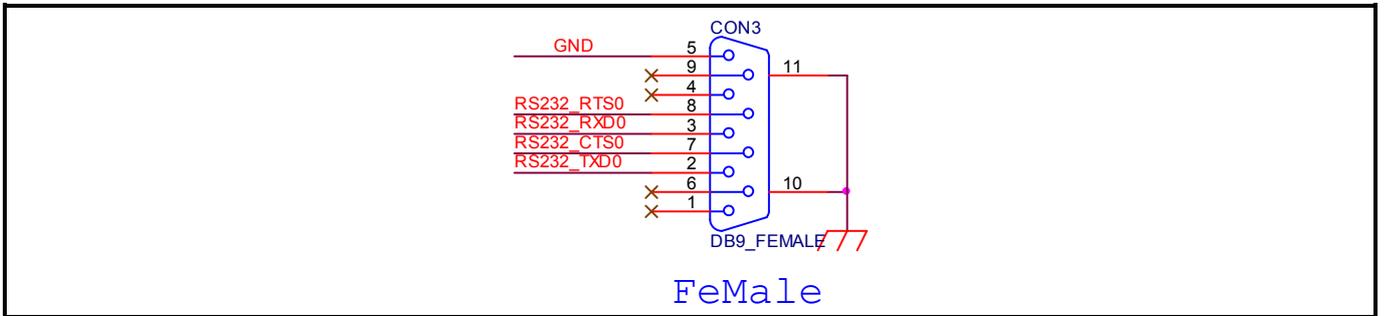
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USB Device connector: CON4

- Mini-B type USB connector. USB BUS power can be the main power source for whole system.
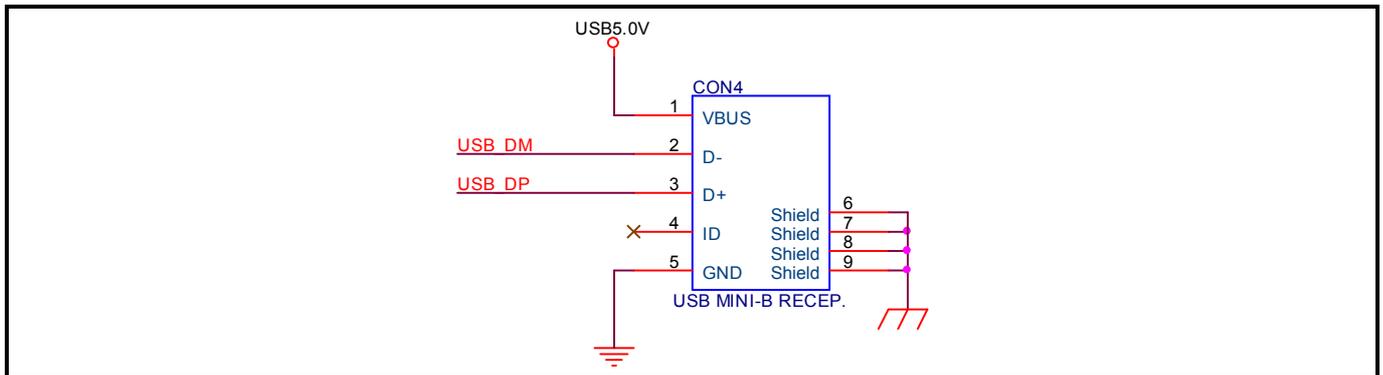
NUC501AD Target module interface: JR1, JR2

- Total 60 pins interface for NUC501AD target module board connection.
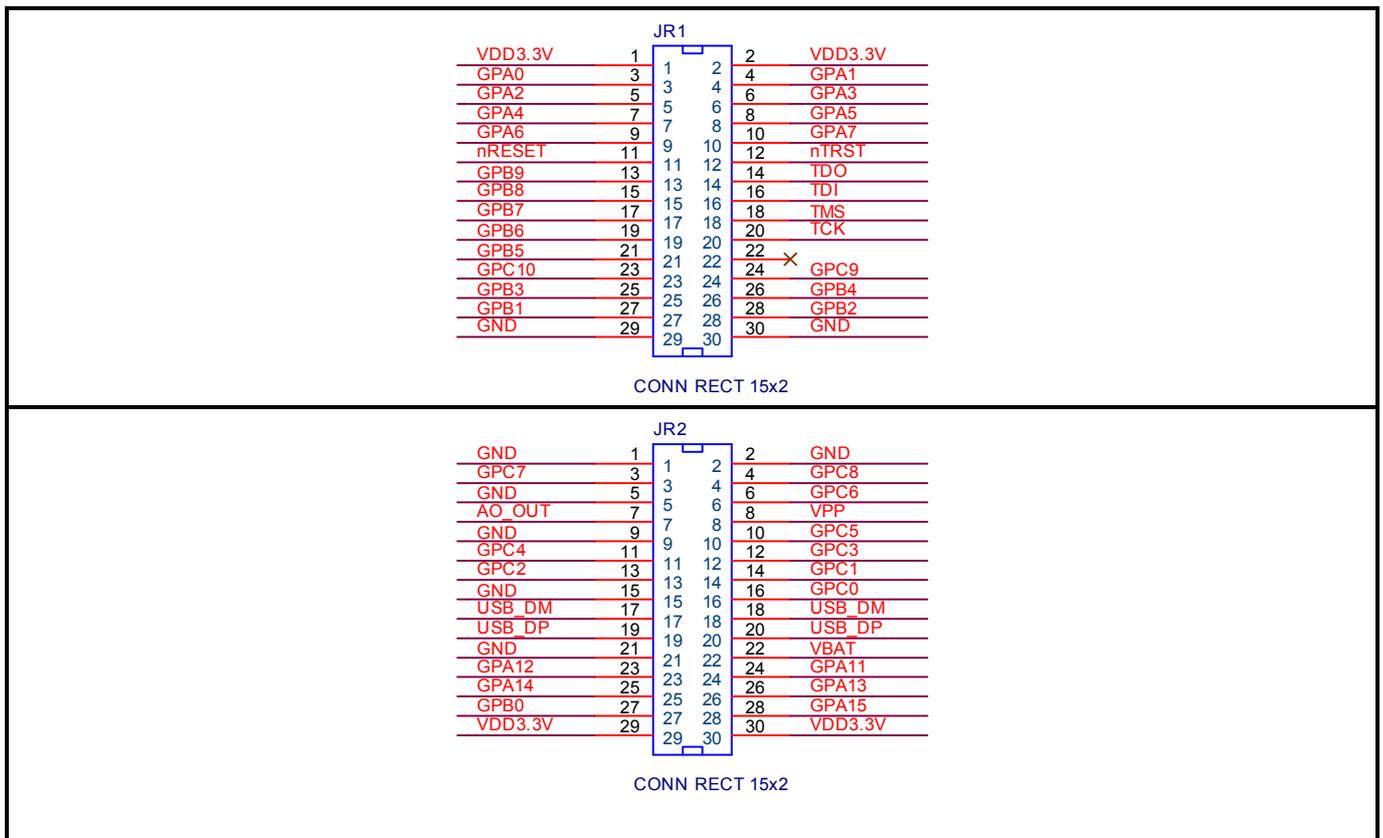
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1.2 The NUC501AD Target Board

It provides NUC501AD LQFP48 package chip, 12MHz and 32.768 KHz crystals and SPI booting flash. All GPIO signals connected to 60-pin interface connector JR1 and JR2 to provide user an easy way to build-up development system. Please refer below picture for NUC501AD CPU board on Figure 1-3.

Figure 1-3

1.2.1   Target Board layout and connectors

The following section provides NUC501AD Target board layout and peripheral connector information. Below, shows the connectors' location on Figure 1-4.
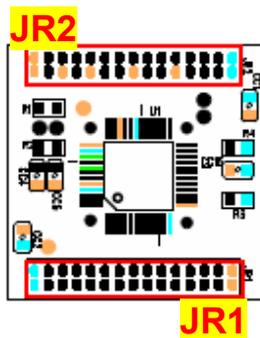
Figure 1-4

DEV board interface: JR1, JR2
- 60 pins interface for DEV board connection.

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1.3 The VPP Supplier Board

It provides the 6.5V and 1.8V voltage for OTP memory burring. GPB9 is the voltage control pin that high signal switching this board to supply 6.5V for OTP burring and low signal switching this board to supply 1.8V voltage. Below, shows board picture on Figure 1-5.
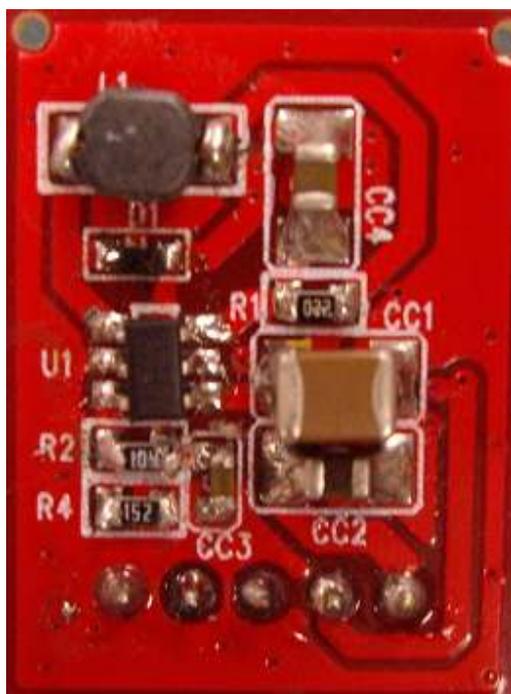
Figure 1-5 VPP supplier board

1.3.1   VPP Board layout and connectors

The following section provides VPP Supplier board layout and peripheral connector information. Below shows the connectors location on Figure 1-8.

VPP Supplier interface: P1
- 5 pins interface for DEV board connection. VPP and VPP ON/OFF signals are shorted.

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VDD (VDD can accept 3.3V or 5V)

P1

Pin	Signal
1	
2	VPP ON/OFF
3	VPP
4	GPB9
5	

5PX1
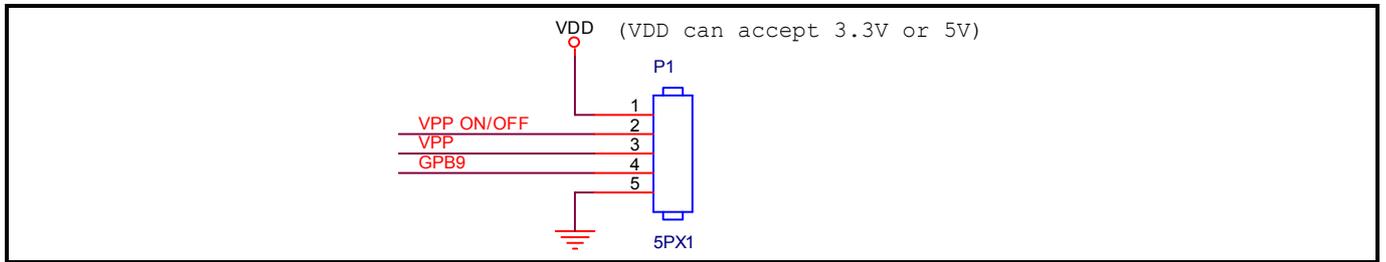
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2 Getting Started

There are a few hardware jumpers need to be set for selecting corresponding configuration you want. The following sections provide multi-function I/O information and all the jumper settings for configuring your NUC501 DEV board. Due to many IP function are sharing the same I/O pins in NUC501 series MCU, so please be carefully to set onboard jumpers to avoid conflict between functions.
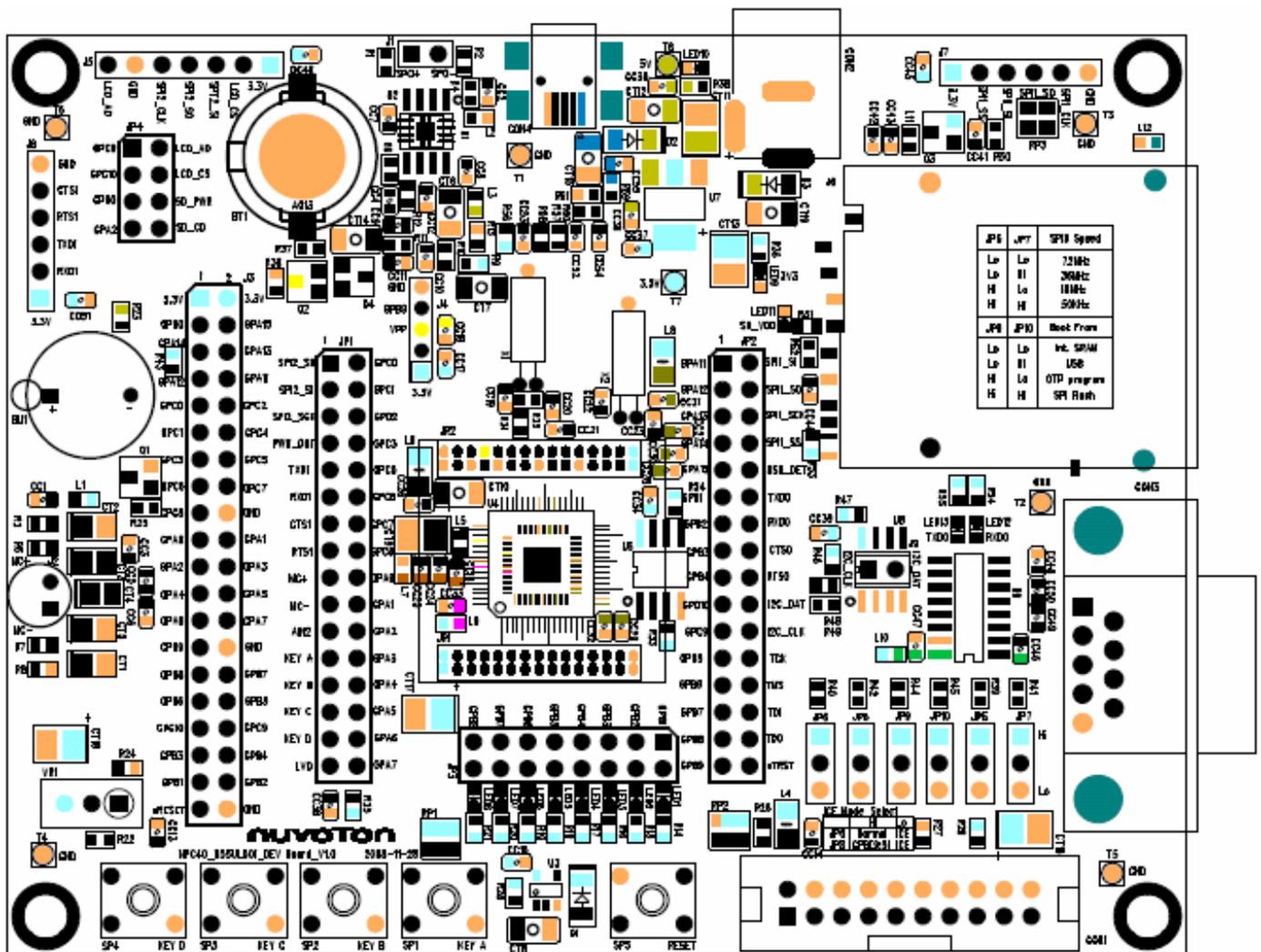
Figure 1-6 NUC501 Development board

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2.1 NUC501 I/O pin function list

GPA function list

Default Function Name	Alternative Function 1	Alternative Function 2	Alternative Function 3	Alternative Function 4
GPIO				
GPA[0]	AI[0]	MIC+		
GPA[1]	AI[1]	MIC-		
GPA[2]	AI[2]			
GPA[3]	AI[3]			
GPA[4]	AI[4]			
GPA[5]	AI[5]			
GPA[6]	AI[6]			
GPA[7]	AI[7]	LVD		
GPA[8]	SPI0_SS(Master) SPI0_SCK			Power on set (IBR)
GPA[9]	SPI0_SO			Power on set (IBR)
GPA[10]	SPI0_SI			
GPA[11]	SPI1_SI			
GPA[12]	SPI1_SO	PWMO00_A		Power on set (IBR)
GPA[13]	SPI1_SCK	PWMO01_A		Power on set (48/64)
GPA[14]	SPI1_SS(Slave)	USB_DET		
GPA[15]	PWMO10_A	USB_DET	I2C_DATA_A	

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GPB function list

Default Function Name	Alternative Function 1	Alternative Function 2	Alternative Function 3	Alternative Function 4
GPIO				
GPB[0]	PWMO11_A	USB_DET	I2C_CLK_A	
GPB[1]	PWMO20_A	USB_DET	UART0_TXD	Power on set (ICE)
GPB[2]	PWMO21_A	USB_DET	UART0_RXD	
GPB[3]	PWMO30_A	USB_DET	UART0_CTS	
GPB[4]	PWMO31_A	USB_DET	UART0_RTS	Power on set (SPI_S0)
TCK	GPB[5]	SPI2_SI_A		
TMS	GPB[6]	SPI2_SO_A	PWMO10_C	
TDI	GPB[7]	SPI2_SCK_A	PWMO11_C	
TDO	GPB[8]	USB_DET	PWMO00_C	Power on set (SPI_S1)
nTRST	GPB[9]	USB_DET	PWMO01_C	

GPC function list

Default Function Name	Alternative Function 1	Alternative Function 2	Alternative Function 3	Alternative Function 4
GPIO				
GPC[0]	SPI2_SO_B	USB_DET		
GPC[1]	SPI2_SI_B	USB_DET		
GPC[2]	SPI2_SCK_B	USB_DET		
GPC[3]	PWMO00_B	USB_DET		
GPC[4]	PWMO01_B	USB_DET		
GPC[5]	PWMO10_B	UART1_TXD		
GPC[6]	PWMO11_B	UART1_RXD		
GPC[7]	PWMO20_B	UART1_CTS		
GPC[8]	PWMO21_B	UART1_RTS		
GPC[9]	PWMO30_B	I2C_DATA_B		
GPC[10]	PWMO31_B	I2C_CLK_B		

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2.2 Jumper settings

The following section describes all the jumpers on NUC501 DEV board, NUC501AD CPU board and VPP supplier board.

2.2.1   Power-On Settings

The power-on setting is used to configure the chip to enter the specified state when the chip is power-up or reset. Since each pin of power-on-setting pins has an internal pulled-up resistor. If the application needs to set the configuration to "0", the proper pull-down resistor must be added for the relative configuration pins.

Pin Name	Descriptions	Register Bit Mapping
GPB[8] GPB[4]	**SPI flash speed selection (SCLK)** 00 : 72 MHz 01 : 36 MHz 10 : 18 MHz 11 : 50 KHz	**SYS_CFG[6:5]**
GPB[1]	<u>**ICE Mode configuration setting**</u> "0" ICE mode enable and the disable the cipher function "1" Normal mode	**SYS_CFG[4]**
GPA[13]	<u>**LQFP48 ICE mode configuration setting**</u> "0" 48-pins package and GPB[9:5] for ICE connection "1" 48-pins package and GPB[9:5] use the normal function	**SYS_CFG[3]**

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GPA[12] **GPA[9]** **GPA[8]**	• 3'b000 : SRAM BIST mode • 3'b001 : USB PHY test mode • 3'b010 : Analog test mode • 3'b011 : ARM7TDMI test mode • 3'b100 : Boot from SRAM • 3'b101 : Boot from USB • 3'b110 : OTP program mode • 3'b111 : Boot from SpiMemory	**SYS_CFG[2:0]**

Following list the Power-on setting jumpers on NUC501 DEV board. Please mapping to above table for power-on mode configuration.

SPI0 Speed Configuration

VDD3.3V JP5
GPB8 — R39 —
4.7K
3PX1

GPB8/GPB4	SPI Speed
(0,0)	72MHz
(0,1)	36MHz
(1,0)	18MHz
(1,1)	50KHz

VDD3.3V JP7
GPB4 — R41 —
4.7K
3PX1

ICE Mode configuration setting

VDD3.3V JP6
GPB1 — R40 —
4.7K
3PX1

High:normal mode

Low:ICE mode enable and the disable the cipher function

LQFP48 ICE mode configuration setting

VDD3.3V

GPA13 — R42 — JP8
4.7K

1 — *High:48-pins package and GPB[9:5] use the normal function*
2
3 — *Low:48-pins package and GPB[9:5] for ICE connection*
3PX1

Booting Mode setting

VDD3.3V

GPA9 — R44 — JP9
4.7K

1
2
3
3PX1

VDD3.3V

GPA12 — R43 —
4.7K

VDD3.3V

GPA8 — R45 — JP10
4.7K

1
2
3
3PX1
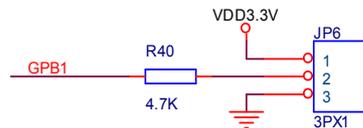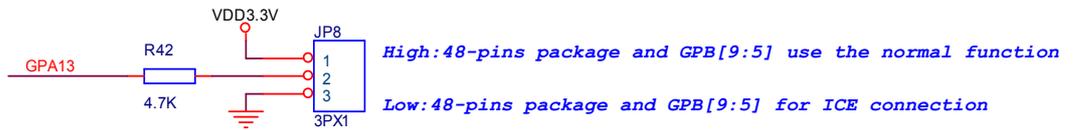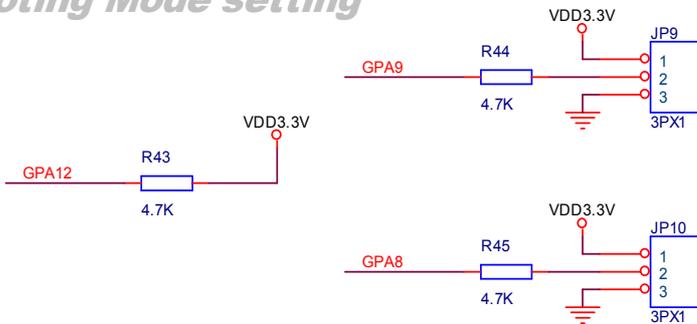
GPA12=1 GPA9/GPA8	Function
(0/0)	Boot from SRAM
(0/1)	Boot from USB
(1/0)	OTP program mode
(1/1)	Boot from SPI

2.2.2 GPIO Jumpers

JP1 jumpers:

The jumpers group JP1 is for SPI port2, UART port1, nIRQ ,PWM_out and MIC input function, bellow describes the pin functions and location. Please make sure jumpers status when using those functions.
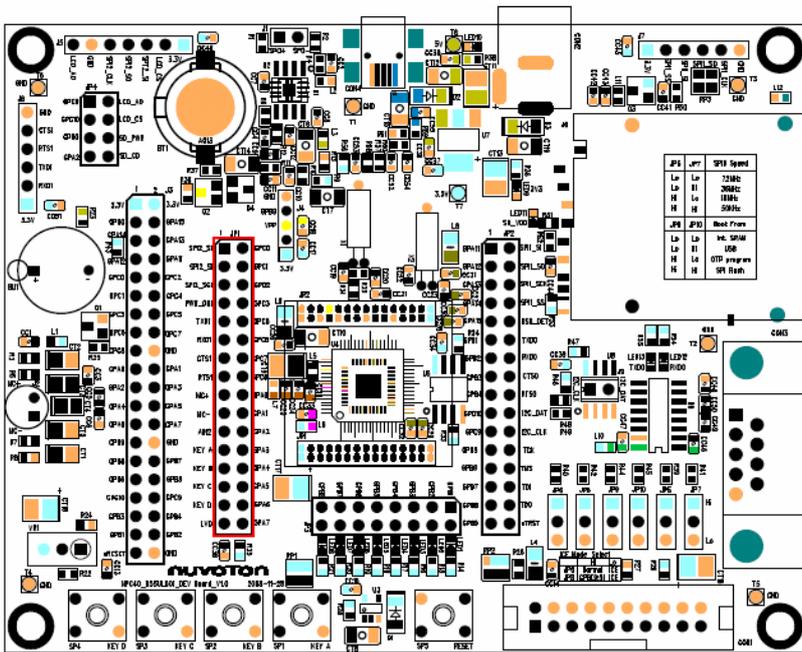
Jumper Open	Short 1-2
GPC0	**SPI2_SO**
GPC1	**SPI2_SI**
GPC2	**SPI2_SCL**
GPC3	**PWM_OUT**
GPC5	**UART_TXD1**
GPC6	**UART_RXD1**
GPC7	**UART_CTS1**
GPC8	**UART_RTS1**
GPA0	**MC+**
GPA1	**MC-**
GPA2	**AIN2**
GPA3	**nIRQ0**
GPA4	**nIRQ1**
GPA5	**nIRQ2**
GPA6	**nIRQ3**
GPA7	**LVD**

JP1

Signal	Pin		Pin	Signal
GPC0	2		1	SPI2_SO
GPC1	4		3	SPI2_SI
GPC2	6		5	SPI2_SCK
GPC3	8		7	PWM_OUT
GPC5	10		9	UART_TXD1
GPC6	12		11	UART_RXD1
GPC7	14		13	UART_CTS1
GPC8	16		15	UART_RTS1
GPA0	18		17	MC+
GPA1	20		19	MC-
GPA2	22		21	AIN2
GPA3	24		23	nIRQ0
GPA4	26		25	nIRQ1
GPA5	28		27	nIRQ2
GPA6	30		29	nIRQ3
GPA7	32		31	LVD

JUMPER16

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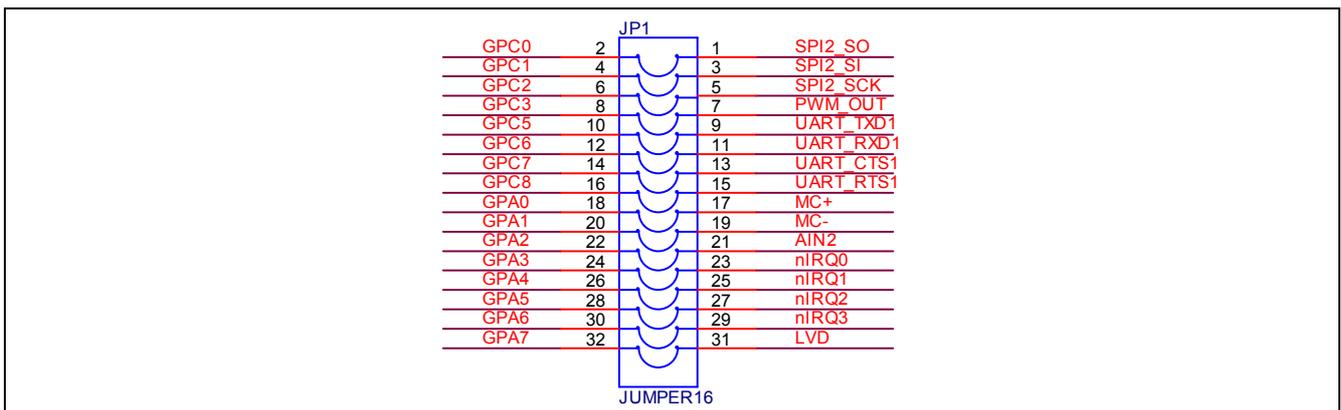
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JP2 jumpers:

The jumper group JP2 is for JTAG, SPI port1, UART port0, I2C and USB detection functions, bellow describes the pin functions and location. Please make sure jumpers status when using those functions.
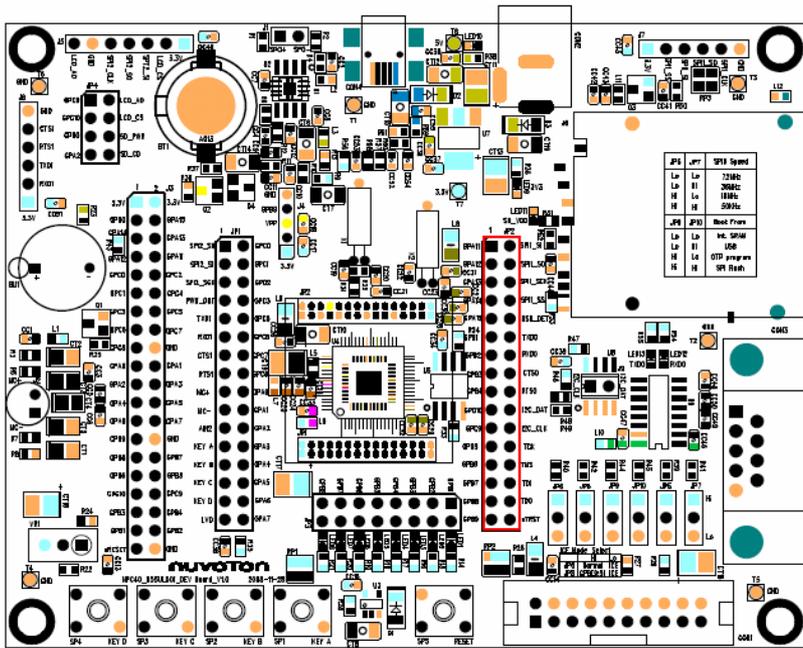
Jumper Open	Short 1-2
GPA11	**SPI1_SI**
GPA12	**SPI1_SO**
GPA13	**SPI1_SCK**
GPA14	**SPI1_SS**
GPA15	**USB_DET**
GPB1	**UART_TXD0**
GPB2	**UART_RXD0**
GPB3	**UART_CTS0**
GPB4	**UART_RTS0**
GPC10	**I2C_DATA**
GPC9	**I2C_CLK**
GPB5	**TCK**
GPB6	**TMS**
GPB7	**TDI**
GPB8	**TDO**
GPB9	**nTRST**

JP2

GPA11	1	2	SPI1_SI
GPA12	3	4	SPI1_SO
GPA13	5	6	SPI1_SCK
GPA14	7	8	SPI1_SS
GPA15	9	10	USB_DET
GPB1	11	12	UART_TXD0
GPB2	13	14	UART_RXD0
GPB3	15	16	UART_CTS0
GPB4	17	18	UART_RTS0
GPC10	19	20	I2C_DATA
GPC9	21	22	I2C_CLK
GPB5	23	24	TCK
GPB6	25	26	TMS
GPB7	27	28	TDI
GPB8	29	30	TDO
GPB9	31	32	nTRST
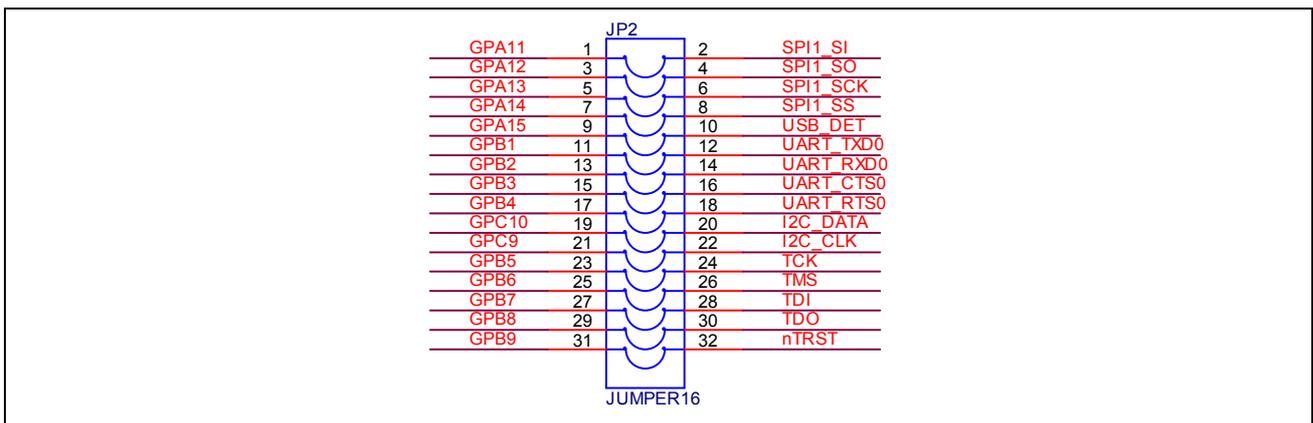
JUMPER16

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JP3 jumpers:

The jumpers group JP3 is for LED indicators control settings, bellow describes the pin functions and location. Please make sure jumpers status when using those functions.
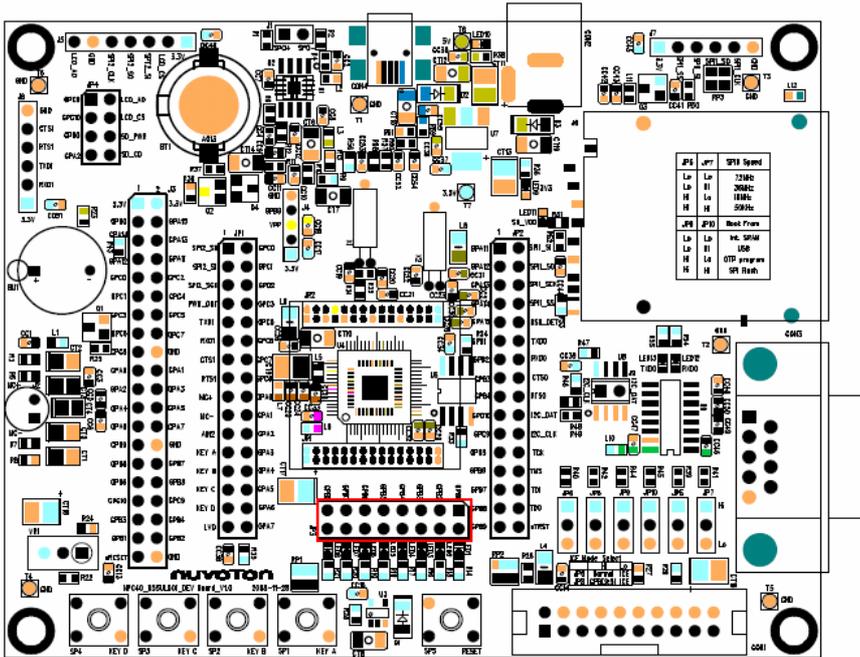
Jumper Open	Short 1-2
GPB1	**LED_CTRL1**
GPB2	**LED_CTRL2**
GPB3	**LED_CTRL3**
GPB4	**LED_CTRL4**
GPB5	**LED_CTRL5**
GPB6	**LED_CTRL6**
GPB7	**LED_CTRL7**
GPB8	**LED_CTRL8**
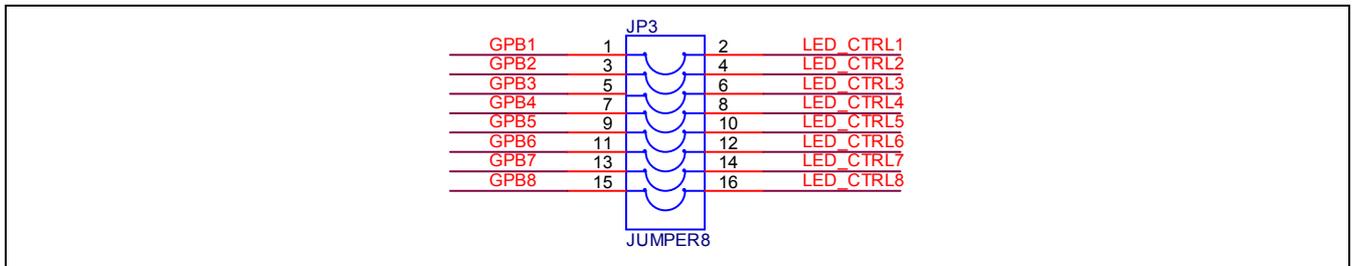
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JP4 jumpers:

The jumpers group JP4 is for LCD and SD card control signals settings, bellow describes the pin functions and location.
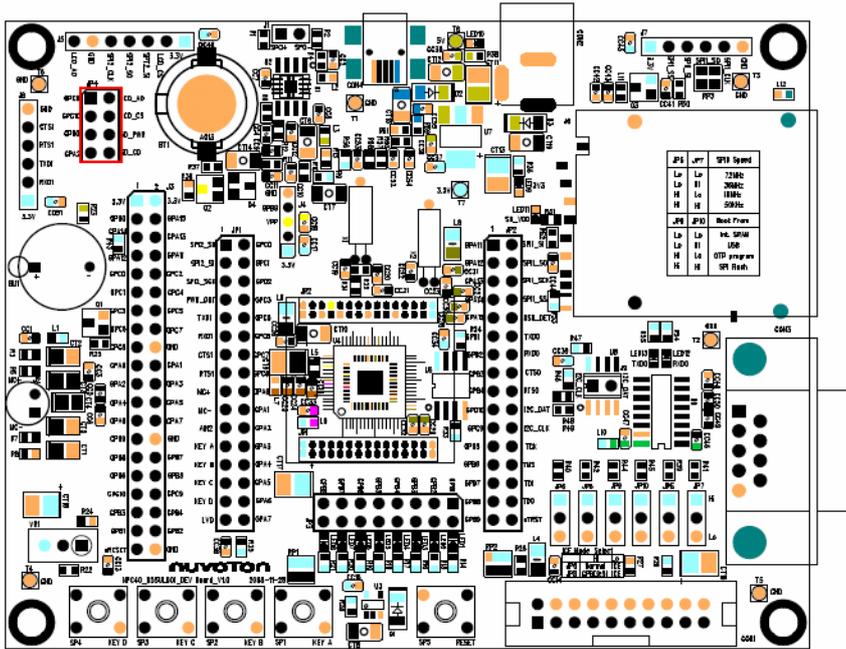
Jumper Open	Short 1-2
GPC9	**LCD_A0**
GPC10	**LCD_CS**
GPB0	**SD_PWR**
GPA2	**SD_CD**

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3   Schematic

/// NUC501 DEV Board Ver1.1 ///

NUC501
NUC501AD
VPP CON.
SPI0M0 Boot Flash
CPU Board Interface

JTAG&RESET
JTAG 20-Way CON.
RC Reset circuit

Power Parts
USB VBUS in
5V Power adapter in
3.3V/1A LDO
1.5V Battery(AG13)

Powe-ON Settings
Booting Mode Select
LQFP48 ICE Mode Select
ICE Mode Select
SPIM0 Speed Select

USB&UART
USB MiniB CON.
UART Port 0/1

SPI&I2C
SPIMS/SPIM1
I2C
SD Card Slot

HMI
External INT
PWM Out
LED indicator
Analog input ch.2

AUDIO
MIC In
AUDIO out

I/O Jumpers
GPIO Extension Slot
GPIO Jumpers

Title: NUC501/TOP Block
Size B   Document Number <Doc>   Rev A
Date: Monday, April 27, 2009   Sheet 1 of 10

/// Audio ///

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/// HMI ///

External INT
(nIRQ[0..3])

LED indicator
(GPB[1..8] High drive pins)

PWM OUT
(GPC3)

ANI2
(GPA2)

/// I/O Jumpers ///

GPIO Port A/B/C   Function Select

GPIO Extension Slot

SPIM1

PWM Out
UART Port 1

MIC
AIN2
IRQ

Low Voltage Dectect

SPIMS

USB Dectect
UART Port 2

I2C

JTAG

LED Control

LCD Control

SD Control

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Title: NUC501/I/O Jumpers
Size: B   Document Number: <Doc>   Rev: A
Date: Monday, April 27, 2009   Sheet 4 of 10

/// JTAG&RESET ///

JTAG-ICE

Reset Circuit

Title
NUC501/JTAG&RESET

| Size | Document Number | Rev |
| B | <Doc> | A |

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/// NUC501 ///

GPA[0..15]
GPB[0..9]
GPC[0..10]

nRESET
USB_DP
USB_DM
nTRST
TDI
TMS
TCK
TDO
AO_OUT

JR1 — CONN RECT 15x2

JR2 — CONN RECT 15x2

VCC_CORE VPP VDD3.3V

Source
Q2
Si2301ADS
(P-FET)
Drain
Gate

(VDD can accept 3.3V or 5V)

VPP ON/OFF
VPP
GPB9

J4 VDD3.3V
CC17 C/C,1uF
R30 10K
SPX1

CC19 C/C,20pF
X1 12MHz
R32 10M
CC20 C/C,20pF
R31 22 X12MO
X12MI

CC22 C/C,20pF
X2 32.768KHz
CC23 C/C,20pF
X32KO
X32KI

U4 — NUC501BD 64 LQFP

GPA3 / GPA[3]
GPA4 / GPA[4]
GPA5 / GPA[5]
GPA6 / GPA[6]
GPA7 / GPA[7]
nRESET / nRESET
GPB9 / GPB[9]
GPB8 / GPB[8]
TDO / TDO
TDI / TDI
GPB7 / GPB[7]
TMS / TMS
GPB6 / GPB[6]
TCK / TCK
GPB5 / GPB[5]

GPC[4] 48 GPC4
GPC[3] 47 GPC3
X12MO 46 X12MO
X12MI 45 X12MI
GPC[2] 44 GPC2
GPC[1] 43 GPC1
GPC[0] 42 GPC0
41 GND
USB_DM 40 USB_DM
USB_DP 39 USB_DP
DVDD33 38 DVDD33
VBAT 37 VBAT
X32KO 36 X32KO
X32KI 35 X32KI
SPI0_SS(M) 34 SPI0_SS(M)
GPA[8] 33 GPA8 SPI0_SCK

AO_VREF CC16 C/C,0.1uF

VPP CC18 C/C,1uF

VBAT CC21 C/C,0.1uF

SPI0(Boot)

VDD3.3V VDD3.3V
R33 4.7K
R34 4.7K VDD3.3V

U8 — SPI-FLASH
SPI0_SS(M) 1 CS   VCC 8
SPI0_SI   2 DO   HOLD 7
            3 WP   CLK 6 SPI0_SCK
            4 GND   DI 5   SPI0_SO
W25X40L

CC34 C/C,0.1uF GND

LDOVDD L6 VDD3.3V
CC26 C/C,0.1uF CT1FB T/C,10uF/10V GND

AO_VREF18
CC24 C/C,0.1uF AGND
CC25 C/C,1uF L7 FB

VCC_CORE L5 VCC_CORE
CT9 T/C,47uF/10V

VDD3.3V DVDD33
CC27 CC28 CC29 CC30 CC31 CC3FB
DVDD33 L8 VDD3.3V AVDD33 L9 FB VDD3.3V
AVDD33 CC33 C/C,0.1uF

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/// Power parts ///

Power Good indicator

GREEN_LED LED9   R36   220   VDD3.3V
GREEN_LED LED10 R38   330   VDD5.0V

5V/500mA USB_BUS Power

USB5.0V

D2
RB161M-20

U7
AMC1117-3.3v
IN GND OUT

3.3V/1A LDO

VDD5.0V   VDD3.3V

CON2   Power CON

5V Power Adpater

IN

D3
RB161M-20

R35 100

LVD

CT19   CC35   CT11   CT12   CC36   CC37   CT13   CC38
T/C,10uF/10V C/C,0.1uF T/C,47uF/10V T/C,10uF/10V C/C,0.1uF C/C,0.1uF T/C,22uF/10V   C/C,0.1uF

GND

AG13 BATTERY for RTC

VCC_CORE

D4
R37   VBAT
                       VBAT
100   BAT54C SOT-23

BT1   CT14
AG13   T/C,10uF/10V

Testing Pad

T1   T2   T3   T4   T5   T6   T7   T8
TPAD TPAD TPAD TPAD TPAD TPAD TPAD TPAD

VDD3.3V VDD5.0V

Switch power source form BATTERY to VCC_CORE(1.8V) when system power ON.

Title: NUC501/Power Parts
Size: B   Document Number: <Doc>   Rev: A
Date: Tuesday, March 03, 2009   Sheet 7 of 10
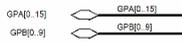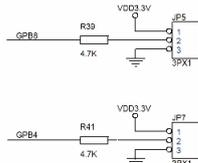
/// Power-ON Settings ///

GPA[0..15] ← GPA[0..15]
GPB[0..9] ← GPB[0..9]

SPI0 Speed Configuration

GPB8 — R39 — 4.7K — VDD3.3V JP5 3PX1

GPB8/GPB4	SPI Speed
(0,0)	72MHz
(0,1)	36MHz
(1,0)	18MHz
(1,1)	56KHz

GPB4 — R41 — 4.7K — VDD3.3V JP7 3PX1

ICE Mode configuration setting

GPB1 — R40 — 4.7K — VDD3.3V JP6 3PX1

High:normal mode

Low:ICE mode enable and the disable the cipher function

LQFP48 ICE mode configuration setting

GPA13 — R42 — 4.7K — VDD3.3V JP8 3PX1
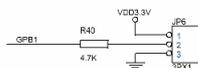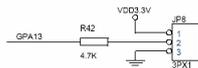
High:48-pins package and GPB[9:5] use the normal function

Low:48-pins package and GPB[9:5] for ICE connection

Booting Mode setting
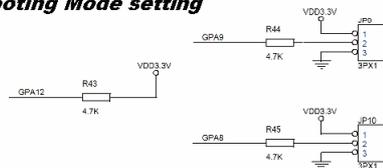
GPA9 — R44 — 4.7K — VDD3.3V JP9 3PX1

GPA12 — R43 — 4.7K — VDD3.3V

GPA8 — R45 — 4.7K — VDD3.3V JP10 3PX1

GPA12=1 GPA9/GPA8	Function
(0/0)	Boot from SRAM
(0/1)	Boot from USB
(1/0)	OTP program mode
(1/1)	Boot from SPI

Title: **NUC501/Power-ON Settings**

Size	Document Number	Rev
B	<Doc>	A

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/// SPI&I2C ///

I2C Port

SPI Port 2

SPI Port 1

EEPROM
ADDRESS:0H

U8
24LC64

A0	VCC
A1	WP
A2	SCL
GND	SDA

R46 2.2K
R47 2.2K

I2C_CK
I2C_DA

J9
HEADER 2

R48 22
R49 22

I2C_CLK
I2C_DATA

VDD3.3V
CC39
C/C,0.1uF

SD_VDD33

SPI1_CLK
SPI1_SI
SPI1_SO
SPI1_SS

RP3 8P4R-4.7K

LCD_CS
SPI2_SI
SPI2_SO
SPI2_CLK
LCD_A0

J5
CON7

VDD3.3V
CC40
C/C,1uF

SD_PWR
R50 33

SI2301ADS
(P-FET)
Q3
Source
Gate
Drain

L11 FB
SD_VDD33

LED11
R51 220
GREEN_LED

CC41 CC42 CC43
C/C,0.1uF C/C,1uF C/C,0.1uF

SD/MMC SOCKET
J6

GND	
WP	
RSV	
DO	
VSS	
CLK	
VDD	
VSS	
DI	
CS	
RSV	
GND	
CD#	

HOLD
HOLD

SPI1_SI
SPI1_CLK
CC44 TBD
R52 22
SPI1_SO
SPI1_SS
SD_CD

VDD3.3V
CC45
C/C,1uF

SPI1_SS
SPI1_SI
SPI1_SO
SPI1_CLK

J7
CON6

L12 FB

SD_CD
SD_CD
R53 100K
VDD3.3V

nuvoton

Title
NUC501/SPI&I2C

Size B
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/// **USB&UART** ///

UART_TXD[0..1]   UART_TXD[0..1]
UART_RXD[0..1]   UART_RXD[0..1]
UART_CTS[0..1]   UART_CTS[0..1]
UART_RTS[0..1]   UART_RTS[0..1]

USB_DM   USB_DM
USB_DP   USB_DP
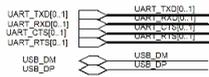
RS-232 Transceiver

UART Port 0

UART0 TX/RX indicators
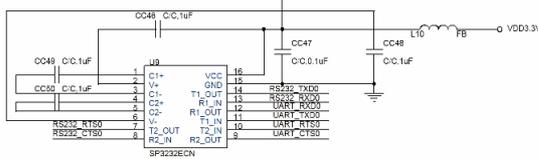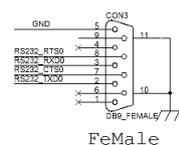
USB Device
USB_DP pull high for Full Speed Device
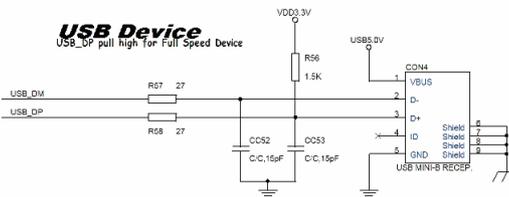
UART Port 1
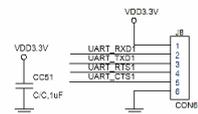
USB Dectect
(GPA15)
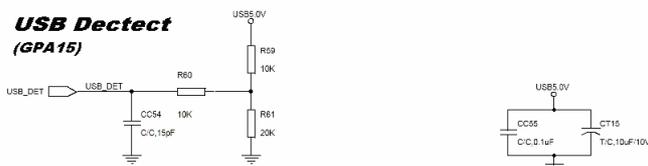
32-BIT ARM7TDMI-BASED MCU

Schematic diagram — NUC501AD
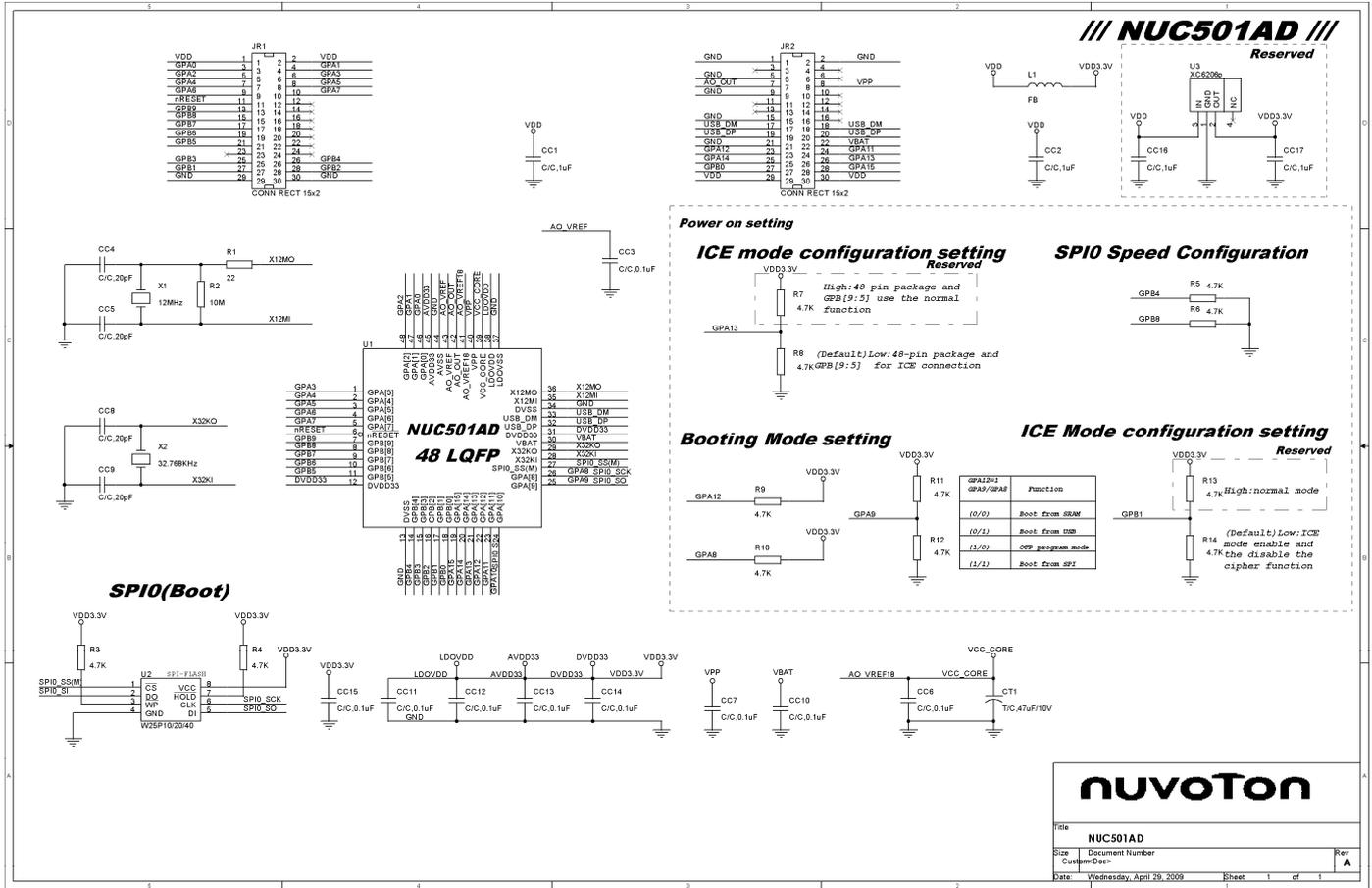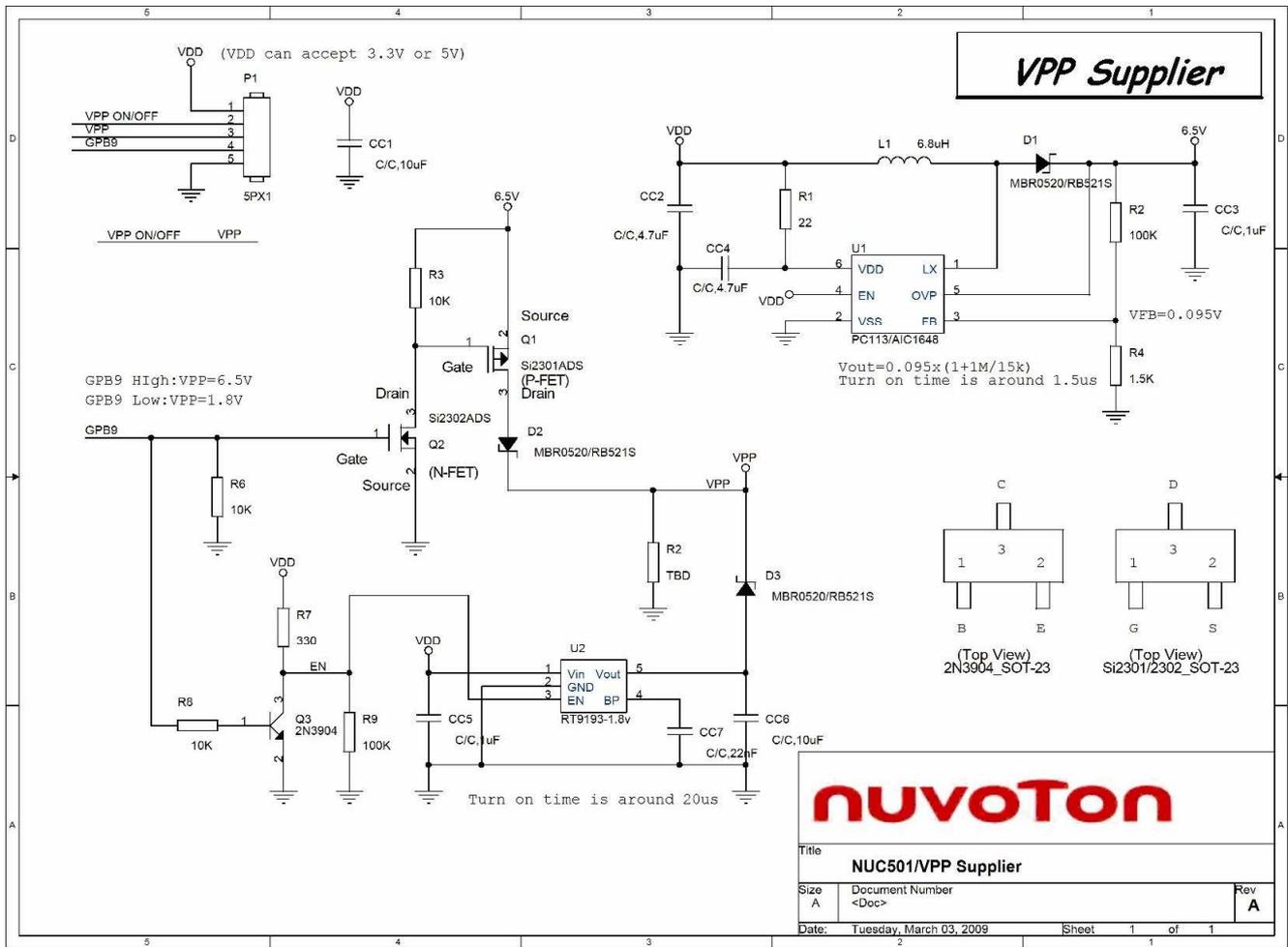
4 BOM List

NUC501 Development Board BOM List:

NUC501/TOP Block Revised: Friday, March 06, 2009 Revision: A
Bill Of Materials   March 13,2009   10:59:47   Page1

Item	Quantity	Reference	Part
1	1	BT1	AG13
2	1	BU1	Buzzer
3	25	CC1,CC8,CC12,CC14,CC15, CC16,CC21,CC24,CC26,CC27, CC28,CC29,CC30,CC31,CC33, CC34,CC35,CC36,CC37,CC38, CC39,CC41,CC43,CC47,CC55	C/C,0.1uF
4	3	CC2,CC4,CC7	C/C,0.22uF
5	2	CC6,CC3	C/C,300pF
6	13	CC9,CC17,CC18,CC25,CC32, CC40,CC42,CC45,CC46,CC48, CC49,CC50,CC51	C/C,1uF
7	1	CC10	C/C,22nF
8	1	CC13	C/C,0.01uF
9	4	CC19,CC20,CC22,CC23	C/C,20pF
10	1	CC44	TBD
11	3	CC52,CC53,CC54	C/C,15pF
12	1	CON1	JTAG-20
13	1	CON2	Power CON
14	1	CON3	DB9_FEMALE
15	1	CON4	USB MINI-B RECEP.
16	3	CT1,CT3,CT4	T/C,4.7uF/10V
17	7	CT6,CT8,CT10,CT12,CT14, CT15,CT19	T/C,10uF/10V
18	1	CT7	T/C,100uF/10V
19	2	CT9,CT11	T/C,47uF/10V
20	4	CT13,CT16,CT17,CT18	T/C,22uF/10V
21	1	D1	1N4148
22	2	D2,D3	RB060L-40
23	1	D4	BAT54C SOT-23
24	2	JP1,JP2	JUMPER16
25	1	JP3	JUMPER8
26	1	JP4	JUMPER6
27	6	JP5,JP6,JP7,JP8,JP9,JP10	3PX1
28	2	JR1,JR2	CONN RECT 15x2
29	1	J1	2PX1

30	1	J2	MICROPHONE
31	1	J3	CONN RECT 20x2
32	1	J4	5PX1
33	1	J5	CON7
34	1	J6	SD/MMC SOCKET
35	2	J8,J7	CON6
36	1	J9	HEADER 2
37	13	LED1,LED2,LED3,LED4,LED5, LED6,LED7,LED8,LED9, LED10,LED11,LED12,LED13	GREEN_LED
38	12	L1,L2,L3,L4,L5,L6,L7,L8, L9,L10,L11,L12	FB
39	1	Q1	2N3904
40	2	Q3,Q2	Si2301ADS
41	3	RP1,RP2,RP3	8P4R-4.7K
42	2	R2,R1	160K
43	2	R8,R3	3.3K
44	4	VR1,R4,R6,R61	20K
45	5	R5,R7,R22,R26,R27	0
46	1	R10	240
47	1	R12	15K
48	11	R14,R15,R16,R17,R18,R19, R20,R21,R23,R36,R51	220
49	3	R24,R35,R37	100
50	1	R25	12K
51	5	R28,R29,R30,R59,R60	10K
52	4	R31,R48,R49,R52	22
53	1	R32	10M
54	9	R33,R34,R39,R40,R41,R42, R43,R44,R45	4.7K
55	1	R38	330
56	2	R47,R46	2.2K
57	1	R50	33
58	1	R53	100K
59	2	R55,R54	1K
60	1	R56	1.5K
61	2	R57,R58	27
62	5	SP1,SP2,SP3,SP4,SP5	SW
63	8	T1,T2,T3,T4,T5,T6,T7,T8	TPAD
64	1	U1	TPA6203A1DRB
65	1	U2	GPY0030B
66	1	U3	74VHC1G08
67	1	U4	NUC501BD
68	1	U6	W25X40L
69	1	U7	RT9164A-3.3v

70	1	U8	24LC64
71	1	U9	SP3232ECN
72	1	X1	12MHz
73	1	X2	32.768KHz

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NUC501DN CPU Board BOM List:

NUC501AD Revised: Friday, March 13, 2009 Revision: A
Bill Of Materials   March 13,2009   10:57:24   Page1
Item   Quantity Reference   Part
_____

Item	Quantity	Reference	Part
1	4	CC1,CC2,CC16,CC17	C/C,1uF
2	9	CC3,CC6,CC7,CC10,CC11, CC12,CC13,CC14,CC15	C/C,0.1uF
3	4	CC4,CC5,CC8,CC9	C/C,20pF
4	1	CT1	T/C,47uF/10V
5	2	JR1,JR2	CONN RECT 15x2
6	1	L1	FB
7	1	R1	22
8	1	R2	10M
9	12	R3,R4,R5,R6,R7,R8,R9,R10, R11,R12,R13,R14	4.7K
10	1	U1	NUC501AD
11	1	U2	W25X40
12	1	U3	XC6206p
13	1	X1	12MHz
14	1	X2	32.768KHz

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VPP supplier Board BOM List:

NUC501/VPP Supplier   Revised: Tuesday, March 03, 2009 Revision: A
Bill Of Materials   March 3,2009   15:49:08   Page1
Item   Quantity Reference   Part
_____

Item	Quantity	Reference	Part
1	2	CC6,CC1	C/C,10uF
2	2	CC2,CC4	C/C,4.7uF
3	2	CC5,CC3	C/C,1uF
4	1	CC7	C/C,22nF
5	3	D1,D2,D3	MBR0520/RB521S
6	1	L1	6.8uH
7	1	P1	5PX1
8	1	Q1	Si2301ADS
9	1	Q2	Si2302ADS
10	1	Q3	2N3904
11	1	R1	22
12	2	R2,R9	100K
13	1	R2	TBD
14	3	R3,R6,R8	10K
15	1	R4	1.5K
16	1	R7	330
17	1	U1	PC113/AIC1648
18	1	U2	RT9193-1.8v

32-BIT ARM7TDMI-BASED MCU

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