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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

AVR078: STK524 User's Guide (Mega32M1 Mega32C1)

1. Introduction

The STK524 kit is made of the STK524 board, AVRCANAdapt and AVRLINAdapt boards.

The STK524 board is a top module for the STK500 development board from Atmel Corporation. It is designed to support the ATmega32M1, ATmega32C1 products and future compatible derivatives.

AVRCANAdapt is a hardware driver for CAN network featuring the Atmel AT6660 CAN driver while the AVRLINAdapt is the hardware driver for LIN, featuring the Atmel AT6661 LIN driver.

The STK524 includes connectors and hardware allowing full utilization of the new features of the ATmega32M1 and ATmega32C1, while the Zero Insertion Force (ZIF) socket allows easy to use of TQFP32 package for prototyping.

This user guide acts as a general getting started guide as well as a complete technical reference for advanced users.

Notice that in this guide, the word AVR is used to refer to the target components (ATmega32M1, ATmega32C1 and derivatives). ATmega32M1 and ATmega32C1 will be also used to refer one of the products from this family.
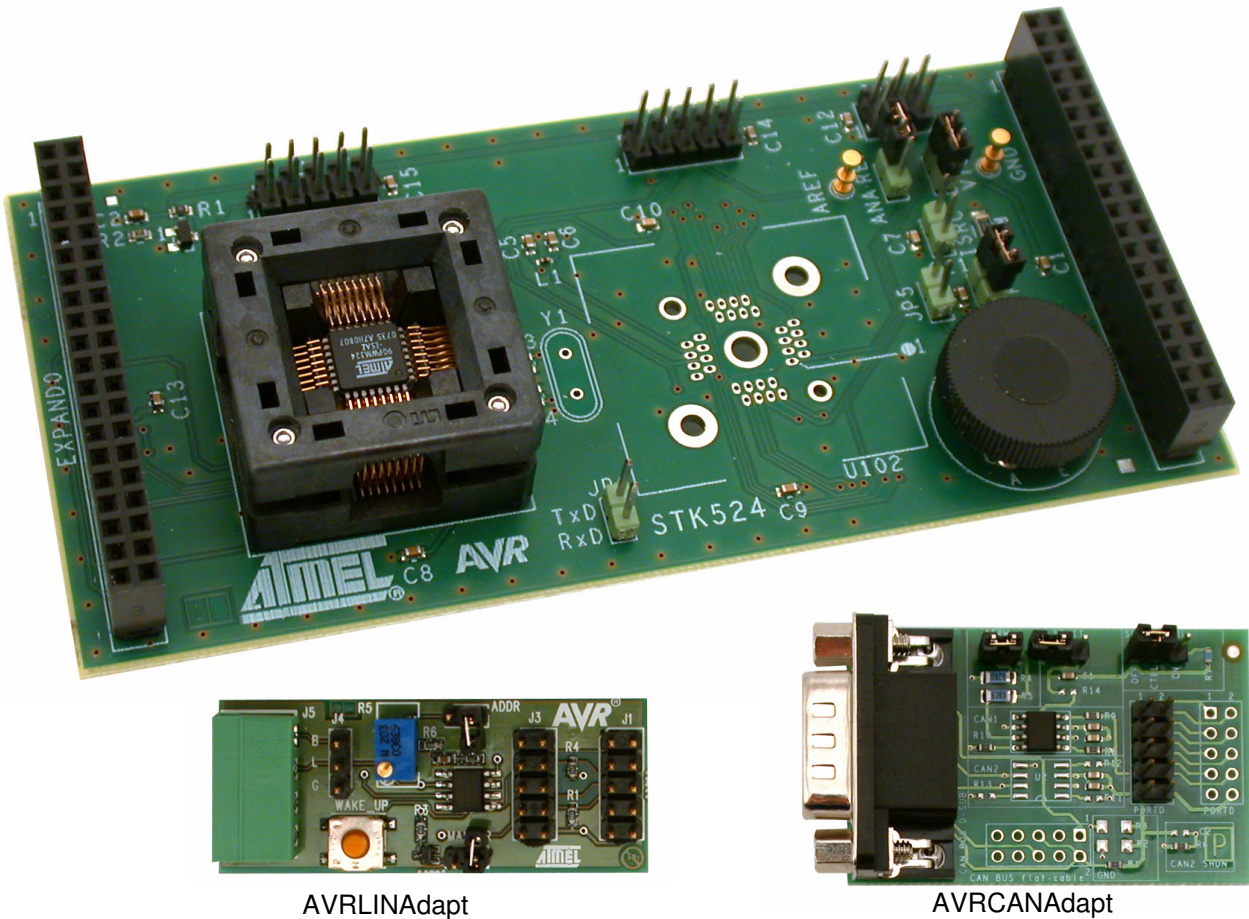
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Application Note

Figure 1-1. STK524 Top Module for STK500 with LIN & CAN buses adapters

AVRLINAdapt

AVRCANAdapt

2. Features

- STK524 is a New Member of the Successful STK500 Starter Kit Family.
- Supports the ATmega32M1 and ATmega32C1.
- CAN Interface thru Port using hardware bridge included
- LIN Interface thru Port using hardware bridge included
- Supported by AVR Studio® 4.
- Zero Insertion Force Socket for TQFP32 Package.
- High Voltage Parallell Programming.
- Serial Programming.
- 6 Pin Connector for On-chip Debugging using JTAGICE mkII or AVR Dragon emulators.
- Potentiometer for the Demo Application.
- Quick Reference to all Jumpers in the Silk-Screen of the PCB.

3.   Using the STK524 Top Module

3.1   Connecting the STK524 to the STK500 Starter Kit

Connect the STK524 to the STK500 expansion header 0 and 1. It is important that the top module is connected in the correct orientation as shown in Figure 3-1. The EXPAND0 written on the STK524 top module should match the EXPAND0 written beside the expansion header on the STK500 board.

Figure 3-1.   Connecting STK524 to the STK500 Board
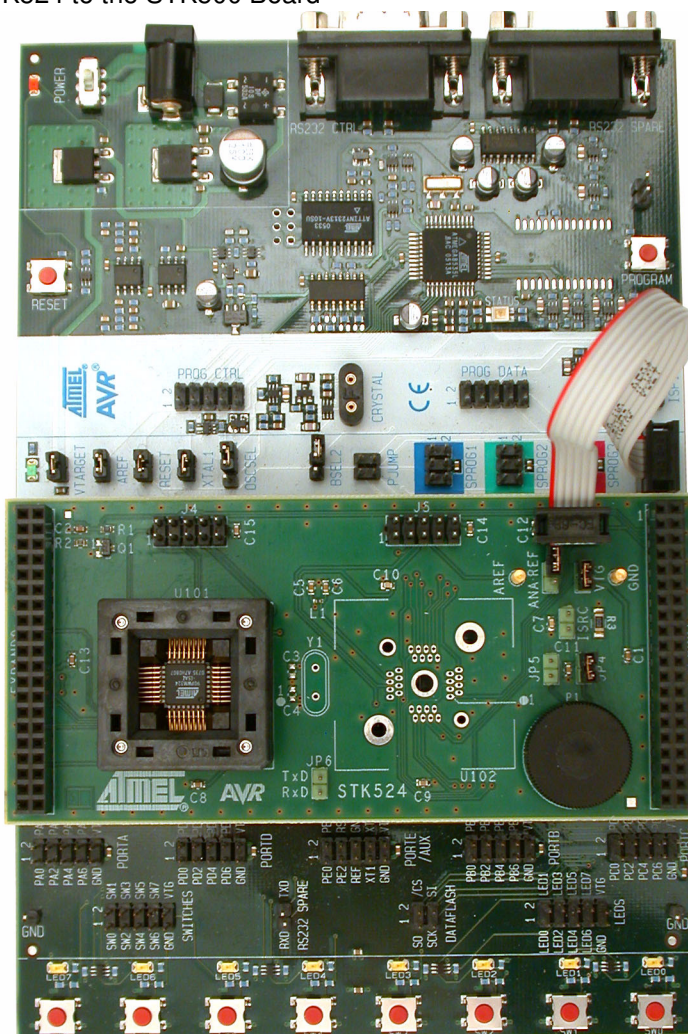
Note: Connecting the STK524 with wrong orientation may damage the board.

3.1.1   Placing a ATmega32M1 or ATmega32C1 on the STK524

The STK524 contains a ZIF socket for a TQFP32 package. Care should be taken so that the device is mounted with the correct orientation. Figure 3-2 shows the location of pin1 for the ZIF socket.

Figure 3-2. Pin1 on ZIF Socket

Pin1
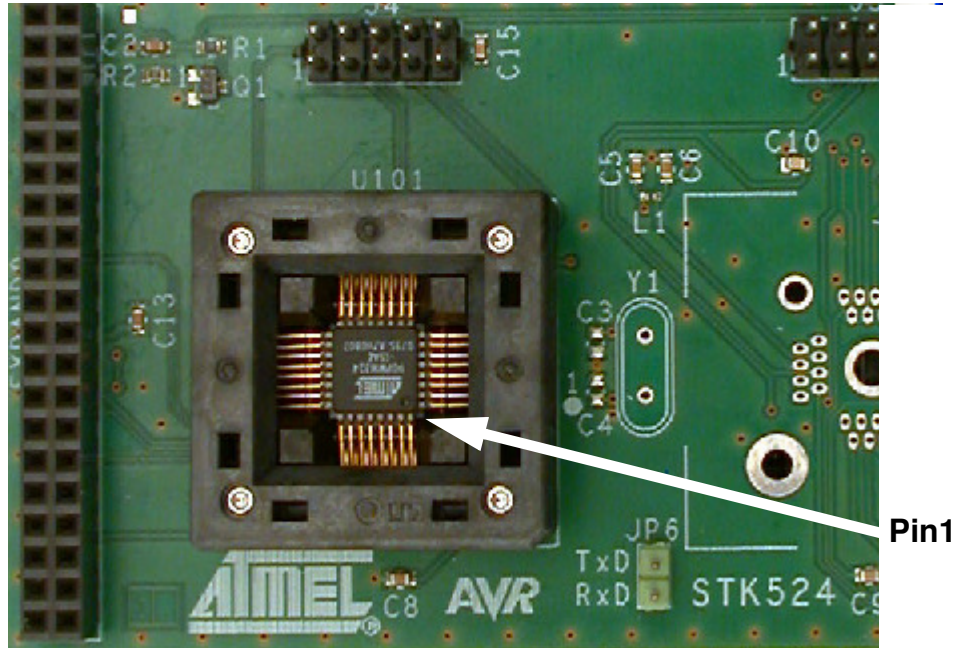
Caution: Do not mount a ATmega32M1 or ATmega32C1 on the STK524 at the same time as an AVR is mounted on the STK500 board. None of the devices might work as intended.

3.2 AVRLINAdapt & AVRCANAdapt description

LIN bus & CAN bus need electrical drivers to be used with ATmega32M1/C1. 2 bus adapters : AVRCANAdapt & AVRLINAdapt are provided for this usage.

3.2.1 AVRLINAdapt

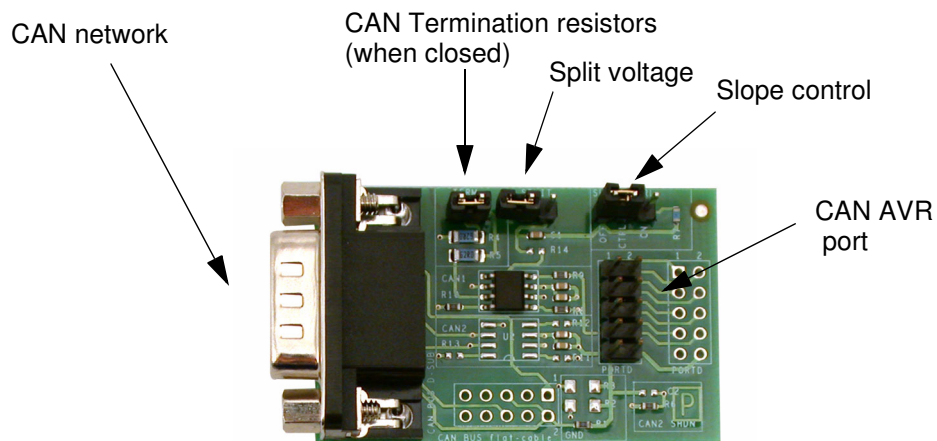**Figure 3-3.** LIN bus adapter.
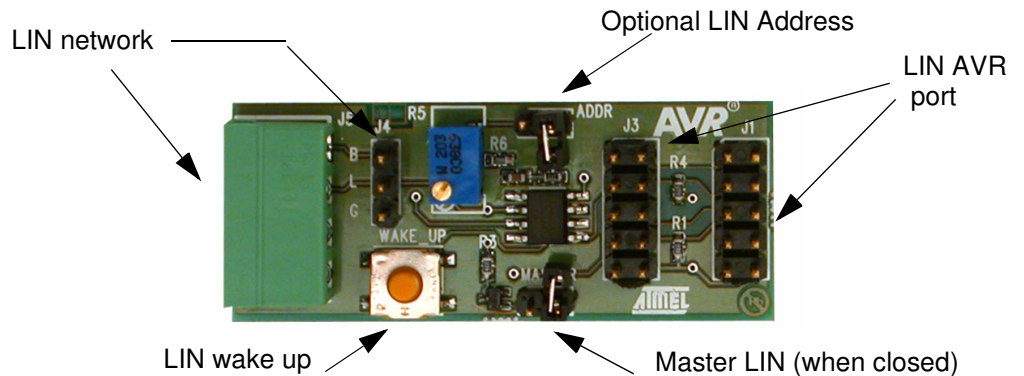
Note: When Optional LIN address jumper is closed, a LIN address can be defined using the potentiometer.

3.2.2   AVRCANAdapt

See STK501CAN extension user's guide for more detailed information

Figure 3-4.   CAN bus adapter.

### 3.3   Connecting the AVRLINAdapt & AVRCANAdapt to STK524

LIN bus & CAN bus are accessible thru the add-on boards provided in the kit : AVRLINAdapt & AVRCANAdapt. These could be connected either to J4 or J5. Connect them on both J4 & J5 to access LIN & CAN buses as shown in Figure 3-5.

J4 and J5 share the same definition mentioned in the table below :

Table 3-1.   CAN & LIN J4, J5 description :

Pin #	Pin Name
1	Not connected
2	Not connected
3	RxLIN
4	TxLIN
5	ISRC
6	TxCAN
7	RxCAN
8	NLSP
9	GND
10	VTG

Figure 3-5. Connecting AVRLINAdapt & AVRCANAdapt to STK524

CAN network   **LIN network**   **LIN network**   **CAN network**
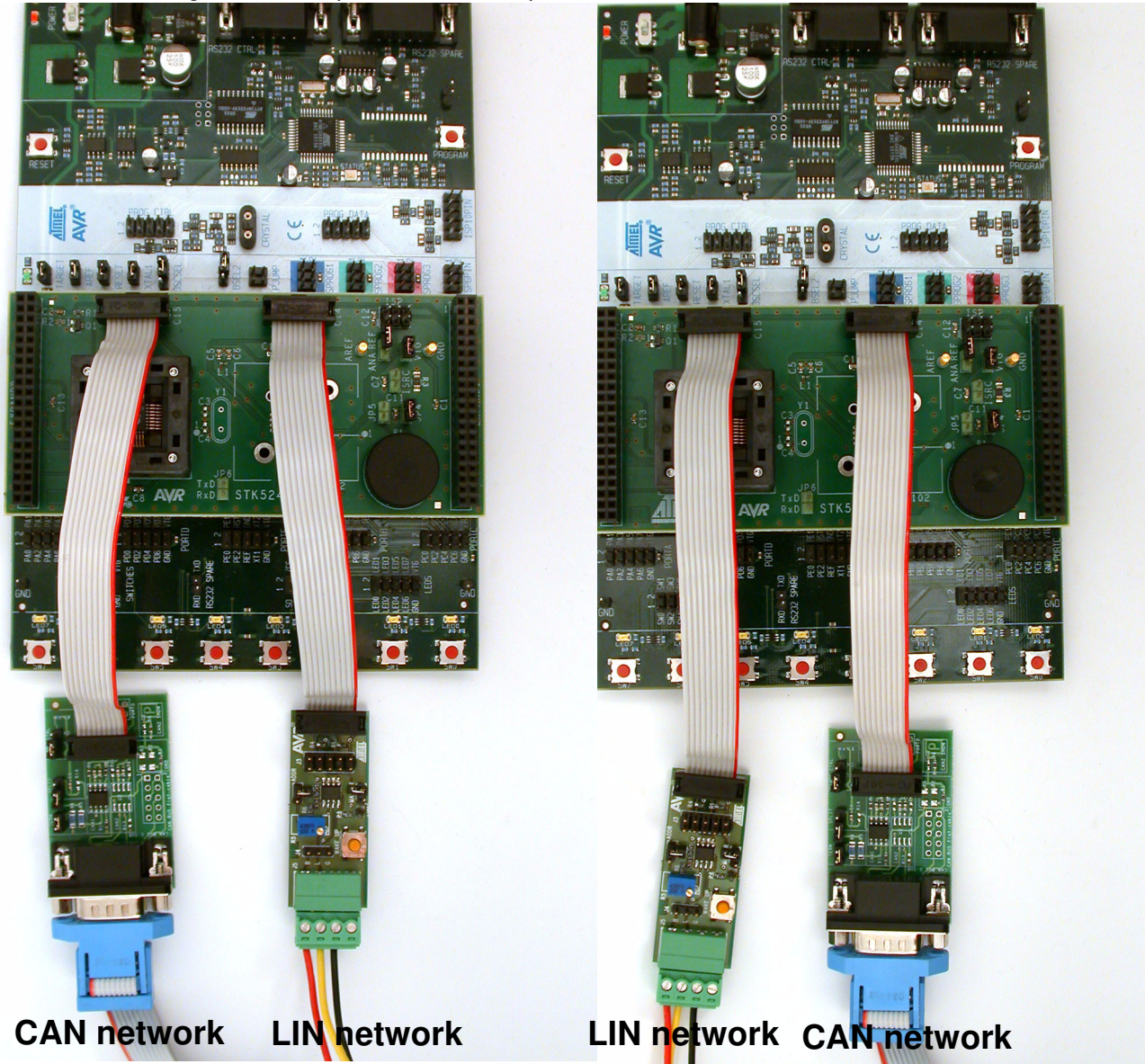
**Note:** It is recommended to mount a 8 MHz crystal when using CAN interface on the STK524.

4. Programming the AVR

The AVR (ATmega32M1, ATmega32C1) can be programmed using both serial SPI and High-voltage Parallel Programming. This section will explain how to connect the programming cables to successfully use one of these two modes. The AVR Studio STK500 software is used in the same way as for other AVR parts

Note: The ATmega32M1 and ATmega32C1 also support Self Programming, See AVR109 application note for more information on this topic.

4.1   Serial In-System Programming

Figure 4-1.   Serial In-System Programming
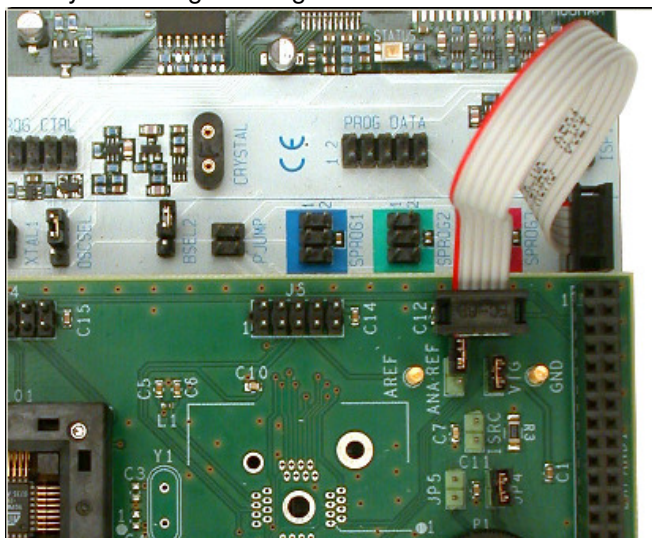
To program the ATmega32M1 or ATmega32C1 using ISP Programming mode, connect the 6-wire cable between the ISP6PIN connector on the STK500 board and the ISP connector on the STK524 board as shown in Figure 4-1. The device can be programmed using the Serial Programming mode in the AVR Studio4 STK500 software.

The STK500 & STK524 jumpers must follow the configuration:

Table 4-1. In-System programming jumper settings for ATmega32M1/C1

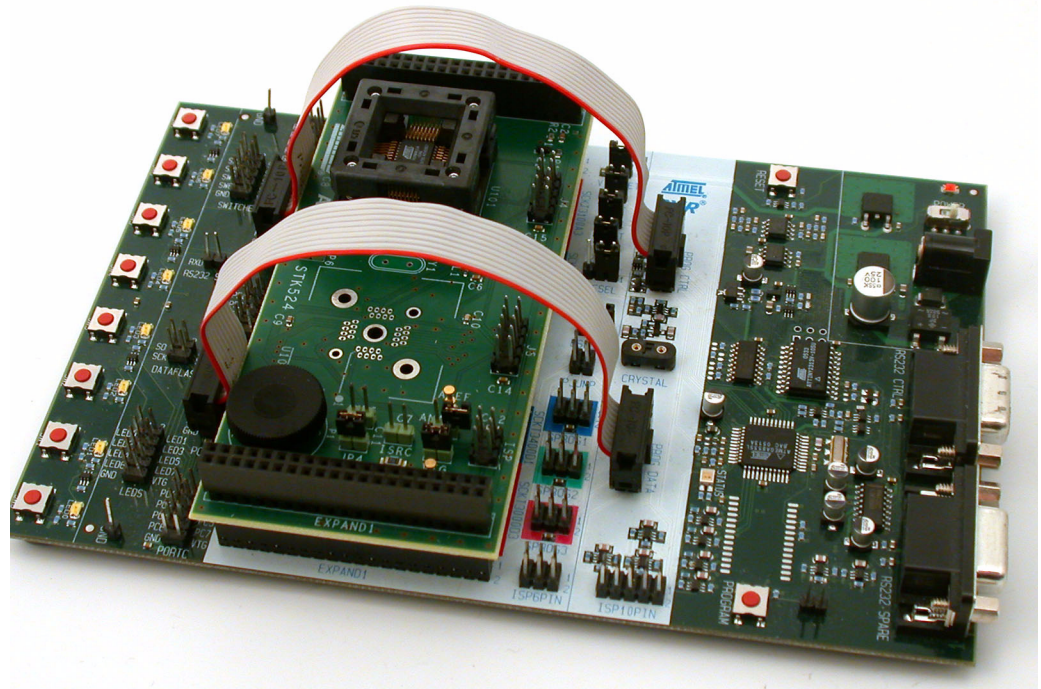| STK500	
VTARGET	Mounted
AREF	Optional
RESET	Opened
XTAL1	Mounted
OSCSEL	Mounted, pin 1 and 2
BSEL2	Optional
PJUMP	Optional
STK524	
VTG	Mounted

Note: See STK500 User Guide for information on how to use the STK500 front-end software for ISP Programming.

Note: Beware not having AVRLINAdapt connected to either J4 or J5 when doing In-System Programming.
ISP and LIN share PD3 for MOSI_A & TXLIN, PE2 for SCK_A & RXLIN. Data received on MOSI_A are output on TXLIN. RXLIN received data from TXLIN in regards of the LIN protocol, then conflict occurs on SCK_A line.

4.2 High-voltage Programming

Figure 4-2. High-voltage (Parallel) Programming

To program the AVR using High-voltage (Parallel) Programming, connect the PROGCTRL to PORTD and PROGDATA to PORTB on the STK500 as shown in Figure 4-2. Make sure that the TOSC-switch is placed in the XTAL position.

The STK500 & STK524 jumpers must follow the configuration :

Table 6-1. High-Voltage programming jumper settings for ATmega32M1/C1

STK500	
VTARGET	Mounted
AREF	Optional
RESET	Mounted
XTAL1	Mounted
OSCSEL	Mounted, pin 1 and 2
BSEL2	Mounted
PJUMP	Open
STK524	
VTG	Mounted

The device can now be programmed using the High-voltage Programming mode in AVR Studio STK500 software.

Note: See the STK500 User Guide for information on how to use the STK500 front-end software in High-voltage Programming mode.

Note: For the High-voltage Programming mode to function correctly, the target voltage must be higher than 4.5V.
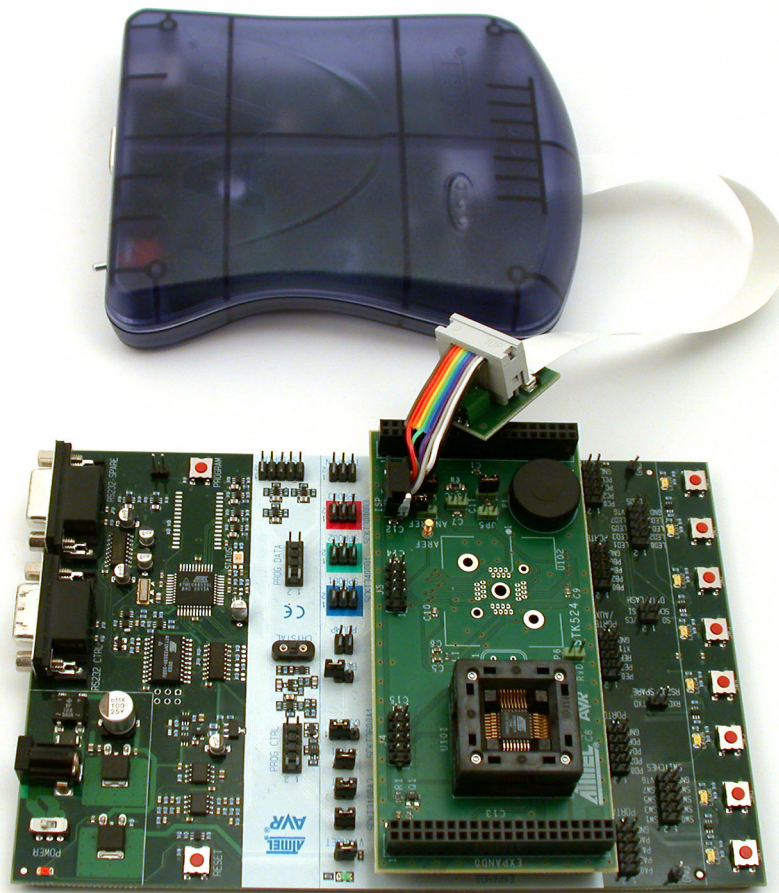
4.3   JTAGICE mkII Connector

See the following document :

"JTAGICE mkII Quick Start Guide" which purpose is "Connecting to a target board with the AVR JTAGICE mkII".

This note explains which signals are required for ISP and which signals are required for debugWIRE.

Figure 4-3 shows how to connect the JTAGICE mkII probe on the STK524 board.

Figure 4-3. Connecting JTAGICE mkII to the STK524

The ISP connector is used for the ATmega32M1/C1 built-in debugWire interface. The pin out of the connector is shown in Table 4-2 and is compliant with the pin out of the JTAG ICE available from Atmel. Connecting a JTAGICE mkII to this connector allows On-chip Debugging of the ATmega32M1/C1.

More information about the JTAGICE mkII and On-chip Debugging can be found in the AVR JTAGICE mkII User Guide, which is available at the Atmel web site, www.atmel.com.

Note: Remove the RESET jumper on the STK500 to work run properly JTAGICE mkII.

Table 4-2. STK524 ISP/DW Connector Pinout

Squid Cable Colours	Target pins	STK524 ISP pinout		Target pins	Squid Cable Colours
grey	MISO	1	2	VTG	purple
black	SCK	3	4	MOSI	red
green	RESET	5	6	GND	brown

Note: MISO, MOSI & SCK lines can be disconnected when the product is in debugging mode. These can be used then for application purpose.

4.4 STK524 Jumpers, Leds & Test Points

Table 4-3. STK524 Jumpers

Jumper	Function	Description
JP1	VTG	Useful to measure the VCC and AVCC current
JP2	ANA REF	Connect STK500 REF circuit to AVR AREF
JP3	ISRC	Closed to have a 1K resistor on ISRC pin [1]
JP4	POT_SUPPLY	Always closed, enable to supply potentiometer
JP5	POT	JP5.2 is output of potentiometer to connect either on signal port on STK500 or ADC input.
JP6	TxD RxD	UART lines to connect to TxD & RxD line on STK500, see Figure 4.5 UART connection

[1] : Let it opened if the address resistor of the AVRLINAdapt is selected. See "LIN bus adapter." on page 4

Table 4-4. STK524 Test Points

Test Point	Function	Description
T1	GND	Electrical ground of the STK524 board
T2	AREF	AREF pin of the AVR

4.5 UART connection

The STK524 includes a Rx/Tx 2-pin header which enables to connect the ATmega32M1/C1 UART Tx/Rx lines to Tx/Rx lines of STK500 as shown on Figure 4-3.
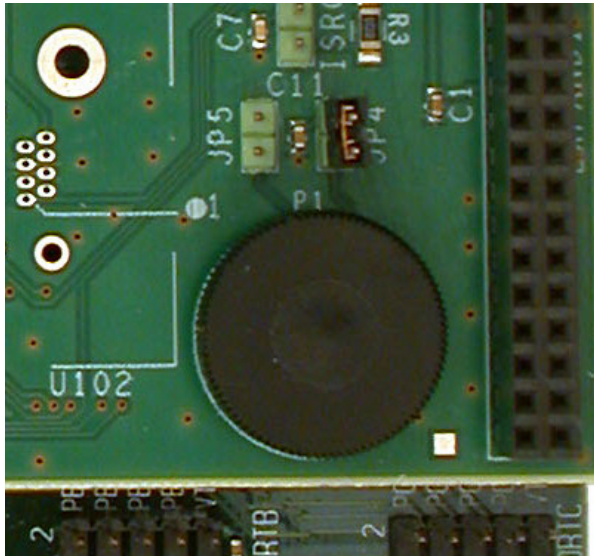
Figure 4-4. UART connection
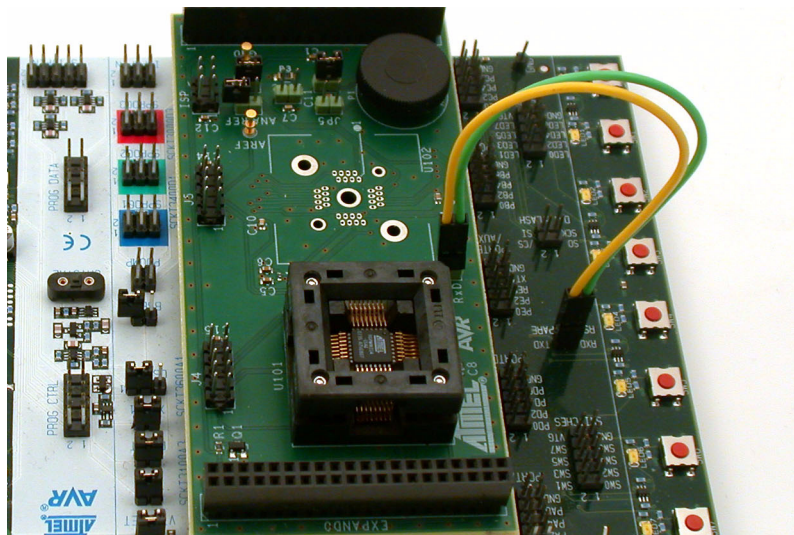
4.6 Potentiometer

The STK524 includes a potentiometer. To use the potentiometer, please mount JP4 and use JP5.2 line as Potentiometer output.

The potentiometer is supplied by AREF and it delivers a voltage to JP5.2. This line can be connected to any Port lines or ADC input on the STK500.

Figure 4-5. Potentiometer

4.7 Extra functions

The STK524 includes a footprint for a ZIF socket to evaluate QFN32 package. Socket is not mounted but can be populated using the PN : QFN32 bt-0,65-01-00 from ENPLAS

5. Technical Specifications

System Unit	
Physical Dimensions	56 x 119 x 27 mm
Weight	70 g
Operating Conditions	
Voltage Supply	1,8V - 5,5V
Temperature	0°C - 50°C

6. Technical Support

For Technical support, please contact avr@atmel.com. When requesting technical support, please include the following information:

- **Which target AVR device is used (complete part number).**
- **Target voltage and speed.**
- **Clock source and fuse setting of the AVR.**
- **Programming method (ISP or High-voltage).**
- **Hardware revisions of the AVR tools, found on the PCB.**
- **Version number of AVR Studio. This can be found in the AVR Studio help menu.**
- **PC operating system and version/build.**
- **PC processor type and speed.**
- **A detailed description of the problem.**

7. Complete Schematics

On the following pages the complete schematics and assembly drawing of the STK524 revision A, AVRLINAdapt, AVRCANAdapt/STK501CAN extension are shown.
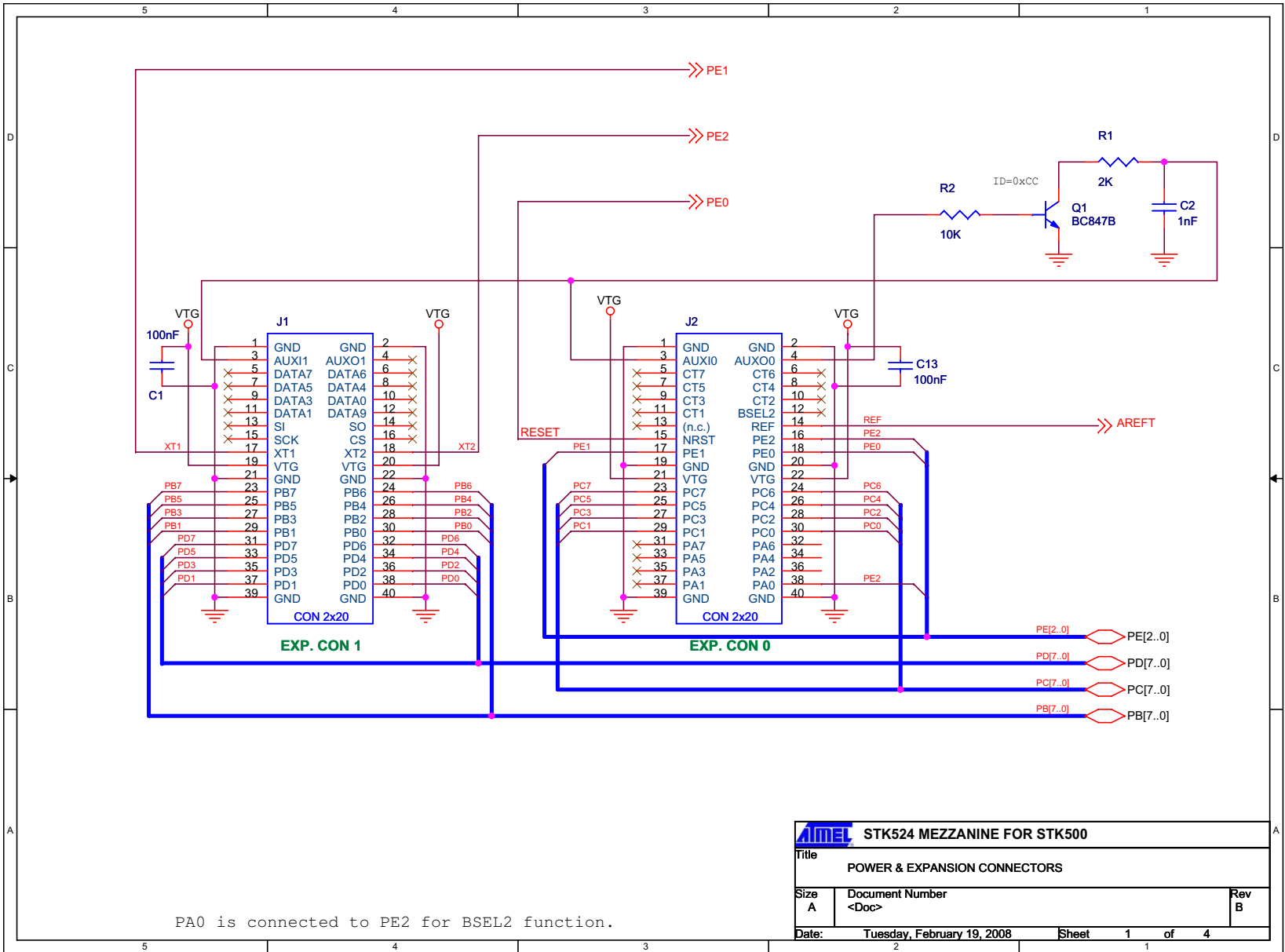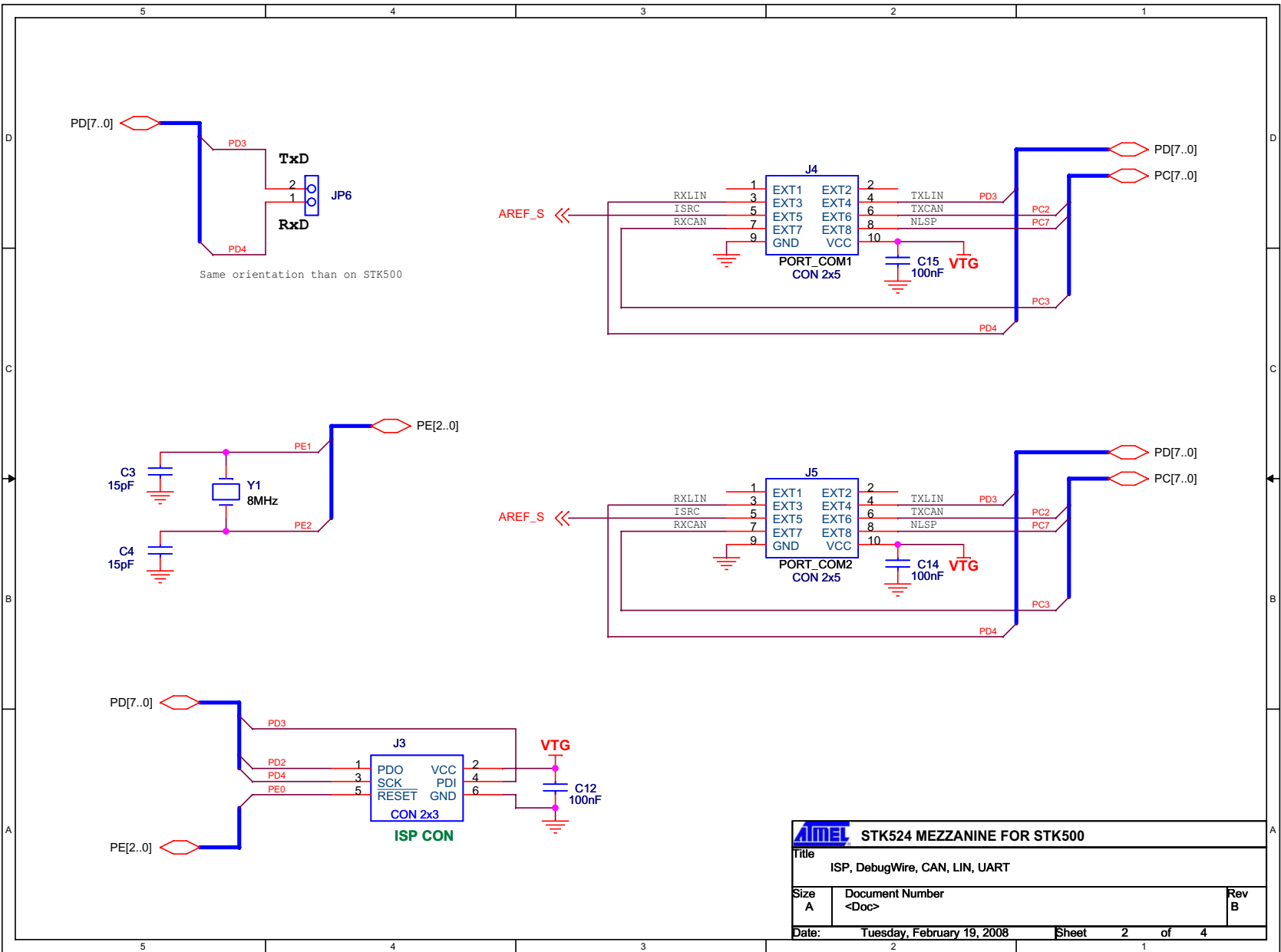
Figure 6-1. Schematics, 1 of 4

PA0 is connected to PE2 for BSEL2 function.

	STK524 MEZZANINE FOR STK500		
Title	POWER & EXPANSION CONNECTORS		
Size A	**Document Number** <Doc>		**Rev** B
Date:	Tuesday, February 19, 2008	**Sheet** 1 of 4	

Figure 6-2. Schematics, 2 of 4

PD[7..0]

PD3
TxD
2
1
JP6
RxD
PD4

Same orientation than on STK500

C3
15pF
Y1
8MHz
C4
15pF

PE1
PE[2..0]
PE2

PD[7..0]

PD3
PD2
PD4
PE0

J3
PDO   VCC
SCK   PDI
RESET GND
CON 2x3
ISP CON

1
3
5
2
4
6

VTG
C12
100nF

PE[2..0]

J4
RXLIN   1 EXT1   EXT2   2 TXLIN   PD3
ISRC   3 EXT3   EXT4   4   PC2
AREF_S 5 EXT5   EXT6   6 TXCAN   PC7
RXCAN   7 EXT7   EXT8   8 NLSP
        9 GND   VCC   10
PORT_COM1
CON 2x5

C15
100nF
VTG

PD[7..0]
PC[7..0]

PC3
PD4

J5
RXLIN   1 EXT1   EXT2   2 TXLIN   PD3
ISRC   3 EXT3   EXT4   4   PC2
AREF_S 5 EXT5   EXT6   6 TXCAN   PC7
RXCAN   7 EXT7   EXT8   8 NLSP
        9 GND   VCC   10
PORT_COM2
CON 2x5

C14
100nF
VTG

PD[7..0]
PC[7..0]

PC3
PD4

	STK524 MEZZANINE FOR STK500		
Title			
	ISP, DebugWire, CAN, LIN, UART		
Size	Document Number		Rev
A	<Doc>		B
Date:	Tuesday, February 19, 2008	Sheet 2 of 4	
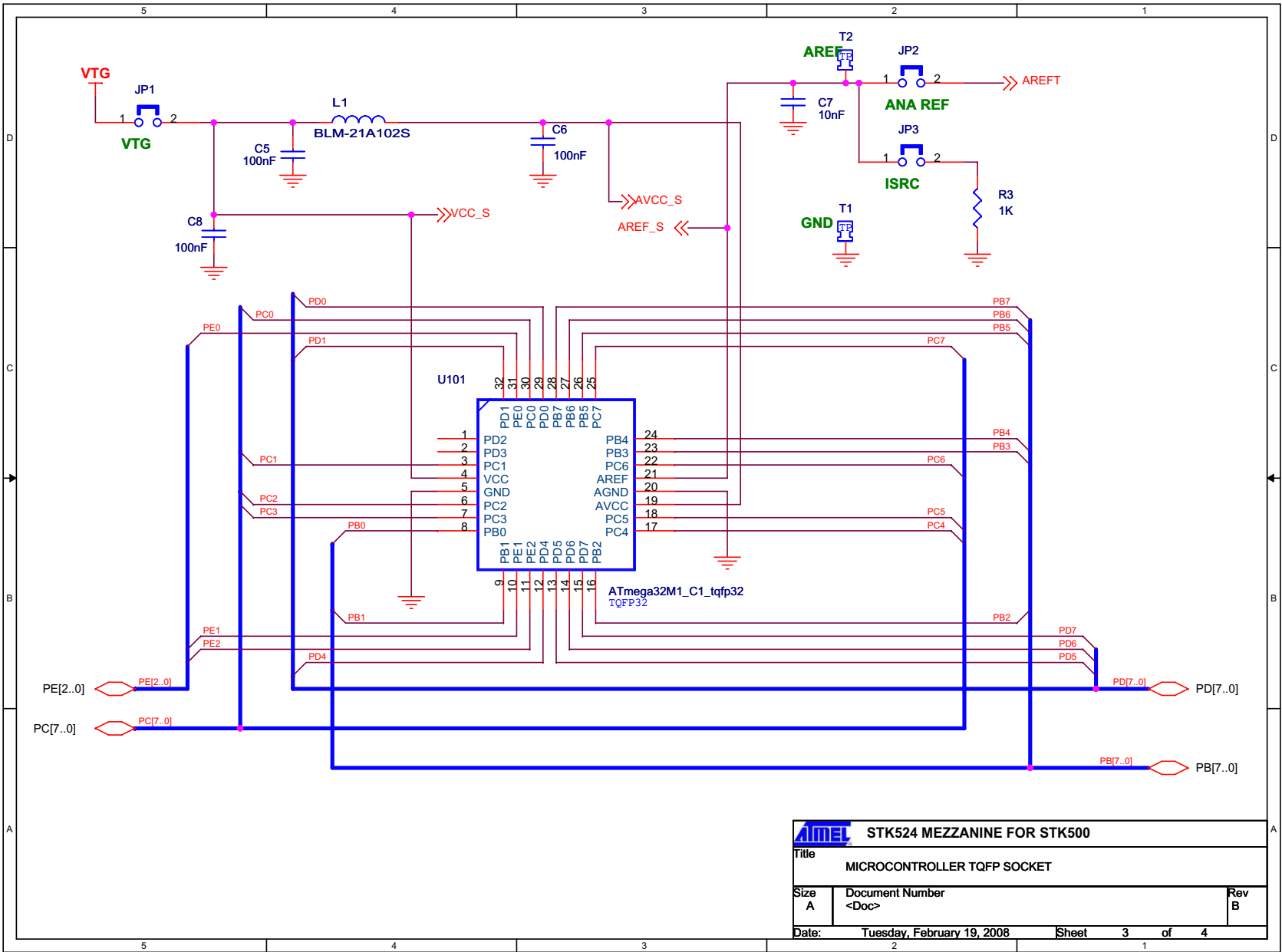
Figure 6-3. Schematics, 3 of 4

STK524 MEZZANINE FOR STK500

Title
MICROCONTROLLER TQFP SOCKET

Size A	Document Number <Doc>		Rev B
Date:	Tuesday, February 19, 2008	Sheet 3 of 4	

Figure 6-4. Schematics, 4 of 4

	STK524 MEZZANINE FOR STK500	
Title	MICROCONTROLLER QFN32 SOCKET	
Size A	Document Number <Doc>	Rev B
Date:	Tuesday, February 19, 2008	Sheet 4 of 4

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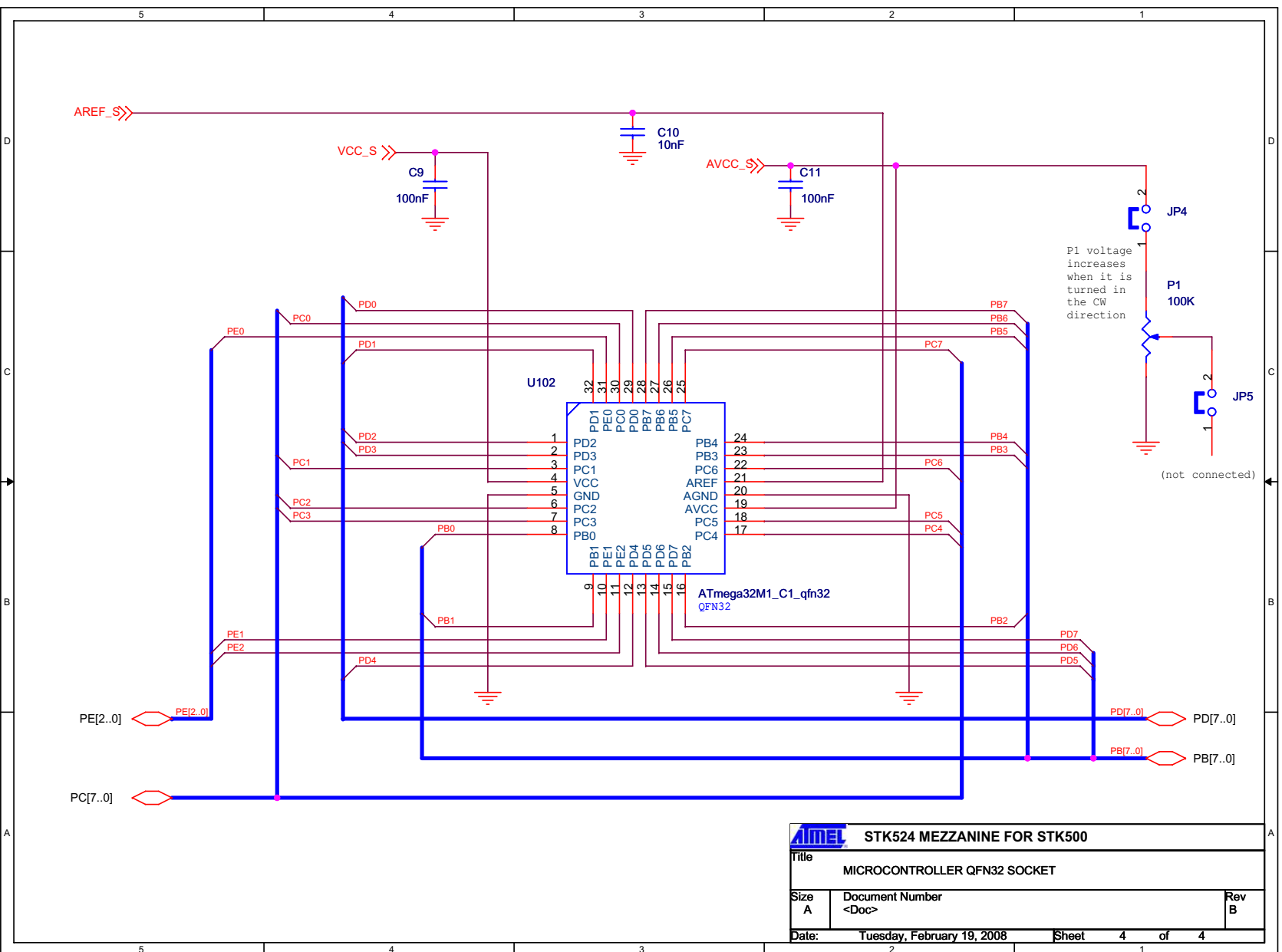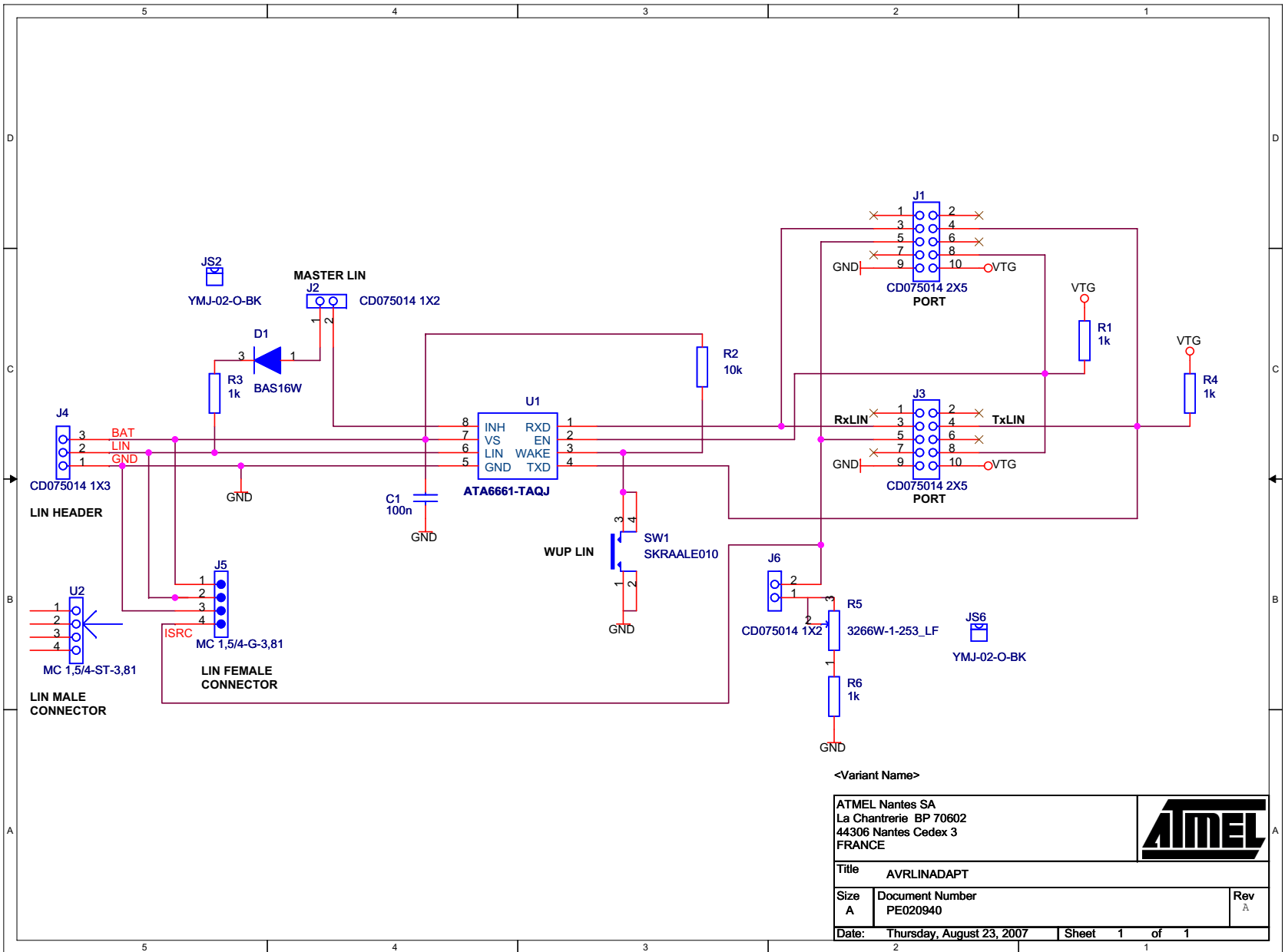
Figure 6-5. ATAVRLINADAPT

Figure 6-6. STK501 CAN Add On

AVR078
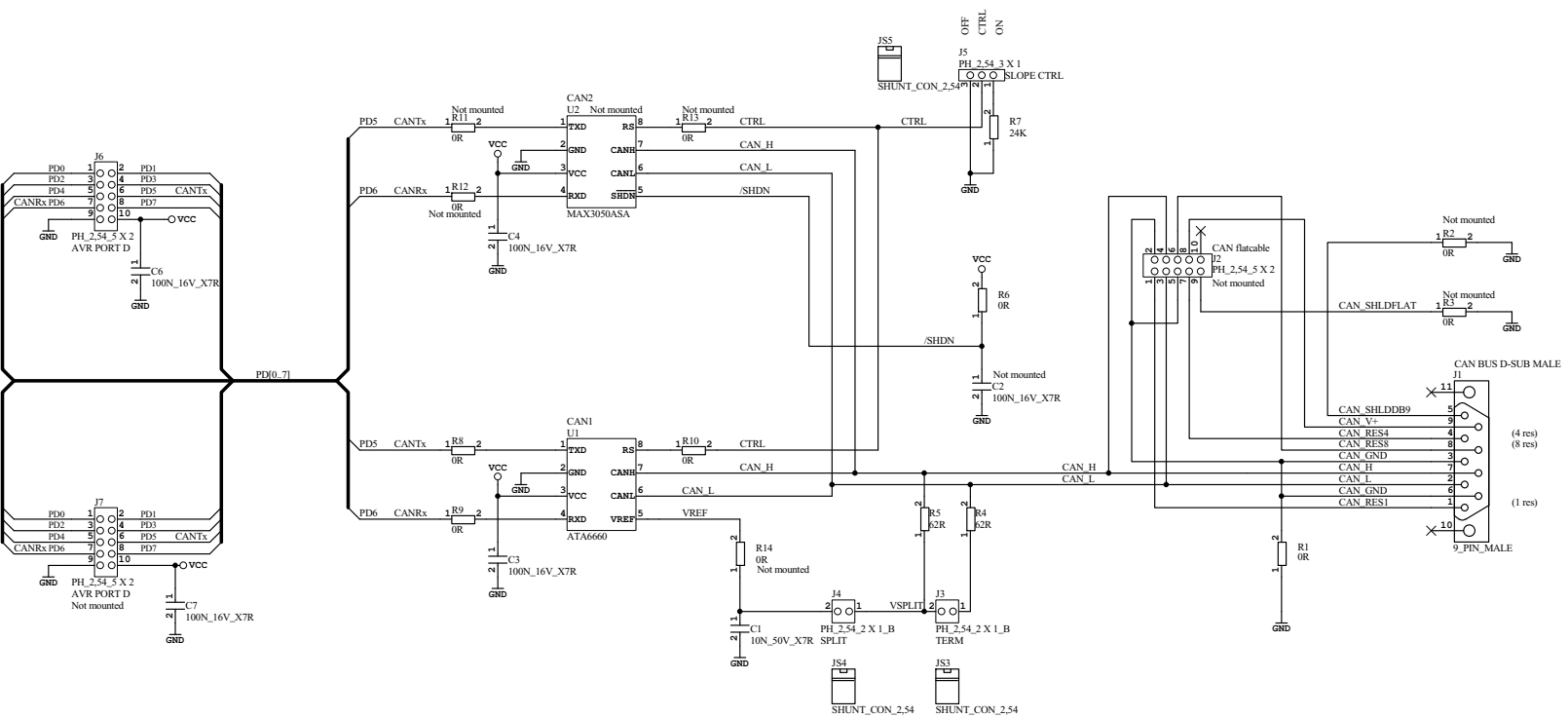
Headquarters

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 95131
USA
Tel: 1(408) 441-0311
Fax: 1(408) 487-2600

International

Atmel Asia
Room 1219
Chinachem Golden Plaza
77 Mody Road Tsimshatsui
East Kowloon
Hong Kong
Tel: (852) 2721-9778
Fax: (852) 2722-1369

Atmel Europe
Le Krebs
8, Rue Jean-Pierre Timbaud
BP 309
78054 Saint-Quentin-en-
Yvelines Cedex
France
Tel: (33) 1-30-60-70-00
Fax: (33) 1-30-60-71-11

Atmel Japan
9F, Tonetsu Shinkawa Bldg.
1-24-8 Shinkawa
Chuo-ku, Tokyo 104-0033
Japan
Tel: (81) 3-3523-3551
Fax: (81) 3-3523-7581

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