ATAVRAUTO300

User Guide

ATMEL®

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# Section 1

Introduction

Congratulations on your purchase of the ATAVRAUTO300 board. This board includes all necessary elements for designers to quickly develop code related to LIN communication implementing the ATmega88 and for prototyping and testing of new designs.

1.1 Overview

This document describes the ATAVRAUTO300 dedicated to the ATmega88 AVR micro controller. This board is designed to allow an easy evaluation of the product using demonstration firmware.

To increase its demonstrative capabilities, this stand alone board has numerous on-board resources (LIN, push buttons).

Figure 1-1. ATAVRAUTO300
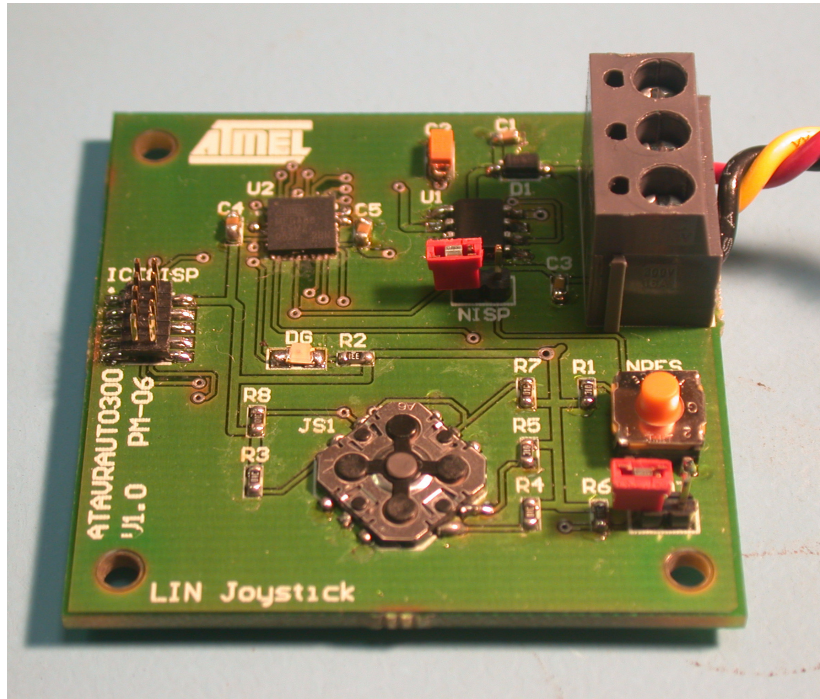
1.2   **ATAVRAUTO300 features**   The ATAVRAUTO300 provides the following features:

- ATmega88 QFN32
- AVR Studio software interface[1],
- Power supply
  - Regulated 5V
  - From LIN connector (LIN network power supply)
- JTAG connector:
  - for on-chip In Situ Programming (ISP)
  - for on-chip debugging using JTAG ICE
- Serial interface:
  - 1 LIN interface 1.3 and 2.0 compliant (Software library available on the Atmel website for LIN 1.3).
- On-board resources:
  - 1 LIN transceiver with internal regulator
  - Joystick (4 + 1 ways)
- System clock:
  - Internal RC oscillator
- Dimension: 45 mm x 45 mm

Notes: 1. The ATmega88 is supported by AVR Studio, version 4.12 or higher. For up-to-date information on this and other AVR tool products, please consult our web site. The newest version of AVR Studio, AVR tools and this user guide can be found in the AVR section of the Atmel web site, http://www.atmel.com.

Section 2

Using the ATAVRAUTO300

2.1   Overview
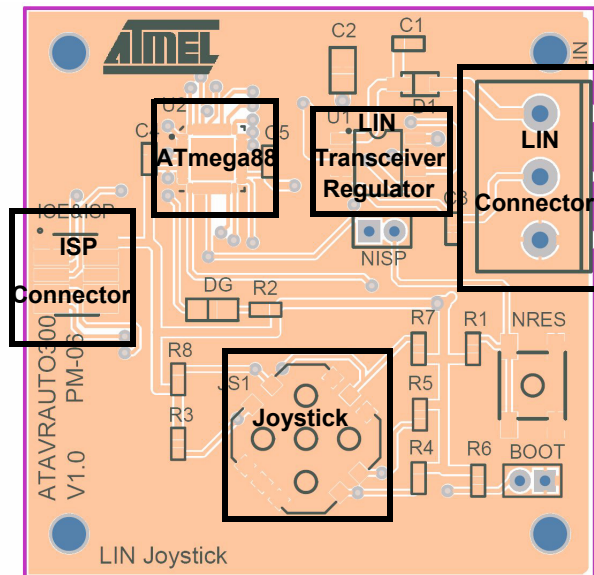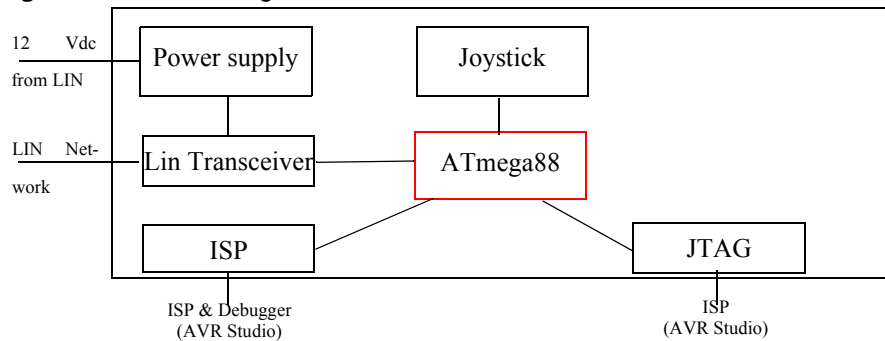
Figure 2-1. Board Overview

Figure 2-2. Block Diagram

2.2   Power Supply

The on-board power supply circuitry is supplied through the LIN connector.

2.2.1   LIN powered   The LIN connector power line is used to provide VBAT to the ATAVRAUTO300 LIN transceiver.

A LIN network has to be connected to have your LIN interface working (Input supply from 8 up to 18V DC, see Figure 2-3 on page 5).

2.3   Oscillator Sources

The ATAVRAUTO300 allows only one oscillator source:

■ Internal RC oscillator

Note: The "Divide by 8" Fuse is configured by default. The first step in the demonstration application is to clear the prescaler to have the internal RC oscillator running at 8MHz:

```
CLKPR = (1<<CLKPCE); //! Clear Prescaler
CLKPR = 0;
```

2.3.1   Internal RC oscillator

A LIN Slave node with a run-time oscillator calibration can be used with the internal RC oscillator.

At ambient temperature and normal Vcc, the internal oscillator is precise enough to be compliant with LIN 1.3 and 2.0 specifications. For wider temperature and/or power ranges, a run-time calibration of the internal RC oscillator can be used as explained in the application note "AVR140 ATmega48/88/168 family run-time calibration of the Internal RC oscillator" available on the ATMEL website

2.4   On-board resources

2.4.1   LIN & Power supply

The LIN screwed connector allows the user to select his own connector.
Note: The LIN power supply input is reverse voltage protected.

LIN transceiver control is realized by the microcontroller. Network management depends on the micro controller's ports configuration.

Table 2-1. LIN resources

Function	Port	State	Description
LIN_NSLP	PD2	Low	LIN transceiver in Sleep mode
		High	LIN transceiver in normal mode
NRES_LIN	PC6	Low	Perform MCU reset when NISP Jumper is inserted
		High	No Action

Figure 2-3. LIN transceiver and power supply
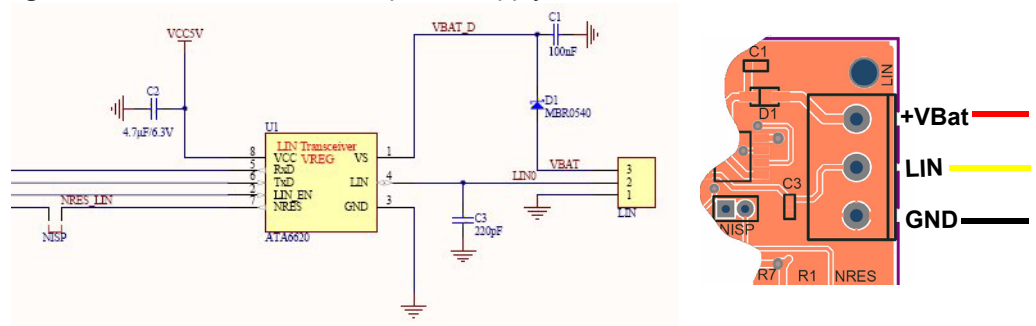
Note: The LIN transceiver under voltage protection can be disable by removing the jumper NISP.

Note: The NISP jumper has to be removed when programming.

2.4.2   Joystick

The 4+1 ways joystick offers an easy user interface implementation for DC, BLCD, step-per motor and LED applications in the ATAVRAUTOEK1 Evaluation Kit.

Pushing the push-button causes the corresponding pin if the micro controller is to be pulled low, while releasing (not pressed) causes a high state on the pin of the microcontroller.
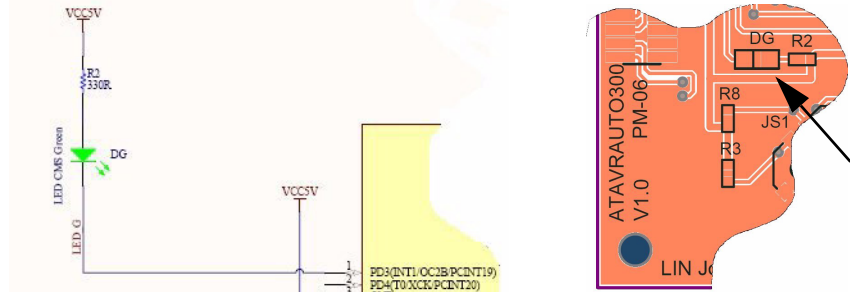
Figure 2-4. Joystick schematic
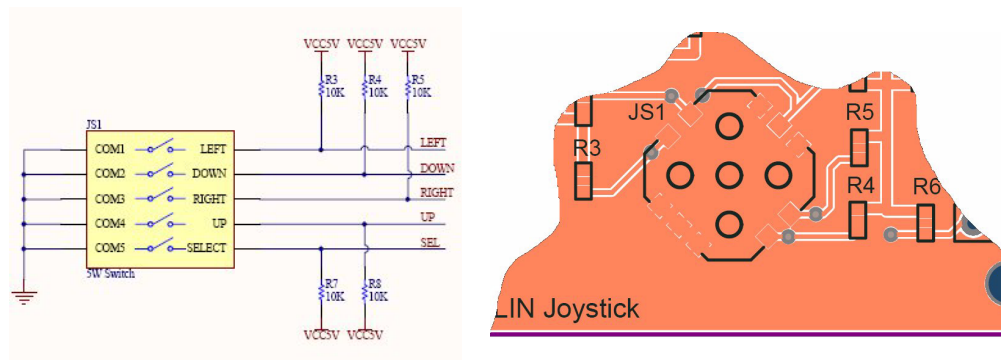
2.4.3   LED

The ATAVRAUTO300 includes one green LED implemented on one I/O pin. It is connected to the "PortD Pin3" of the ATmega48/88/168. To turn On the LED, the corresponding port pin must drive a low level. To turn Off the LED, the corresponding port pin must drive a high level.
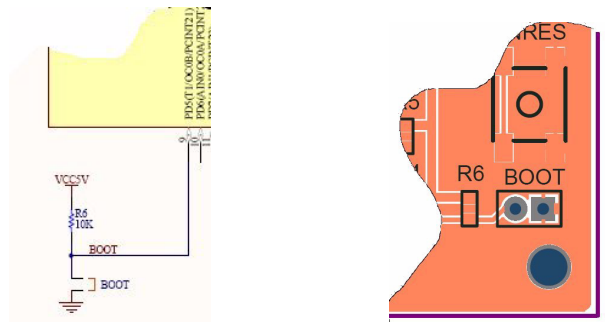
Figure 2-5. LED schematic

2.4.4   BOOT

An additional jumper (BOOT) has been added. This jumper is available for custom use.

For example: the BOOT jumper can be used to switch from the application to the bootloader by firmware (Not implemented in the example) by reading pin 5 of PortD.

Figure 2-6. BOOT Jumper

2.5   In-System Programming

The ATmega88 can be programmed using specific SPI serial links. This sub section will explain how to connect the programmer.

The Flash, EEPROM memory (and all Fuse and Lock Bit options ISP-programmable) can be programmed individually or with the sequential automatic programming option.

*

Note: If debugWire fuse is enabled, AVR ISP can't be used. If debugWire fuse is disable, JTAGICE mkII have to be used in ISP mode to enable debugWire fuse.

Note: When programming, the NISP jumper has to be removed.

2.5.1 Using the ATAVRAUTO900 adaptor

The AVR ISP programmer is a compact and easy-to-use In-System Programming tool for developing applications with ATmega88. Due to the small size, it is also an excellent tool for field upgrades of existing applications. It is powered by the ATAVRAUTO300 and an additional power supply is thus not required.

The AVR ISP programming interface is integrated in AVR Studio®.

An additional adaptor has to be used to program the board using ISP or JTAG mode. The 10 pins connector is used for the JTAGICE mkII device and the 6 pins connector is used for the AVRISP device. To plug the ATAVRAUTO900 connector to the board, the arrow (on the adaptor) has to be in front of the point (on the board).

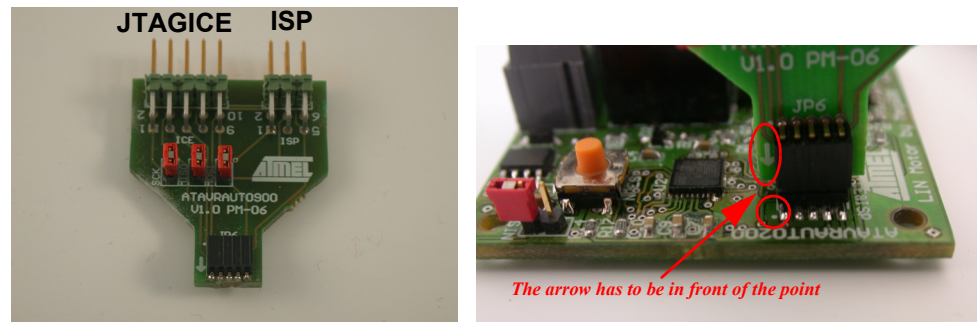*Figure 2-7.* ATAVRAUTO900 Connection.

Table 2-2. ICE Connector

PIN	Function
1	TCK
2	GND
3	TDO
4	VCC
5	TMS
6	NRES
7	VCC
8	NC
9	TDI
10	GND

Table 2-3. ISP Connector

PIN	Function
1	MISO
2	VCC
3	SCK
4	MOSI
5	NRES
6	GND

2.5.2   Programming with AVR ISP Programmer

The AVR ISP programmer is a compact and easy-to-use In-System Programming tool for developing applications with ATmega88. Due to its small size, it is also an excellent tool for field upgrades of existing applications. It is powered by the ATAVRAUTO300 and an additional power supply is thus not required. The AVR ISP programming interface is integrated in AVR Studio. To program the device using AVR ISP programmer, connect the AVR ISP to the adaptor (ATAVRAUTO900)and connect the adaptor to the connector of the ATAVRAUTO300.

***Figure 2-8.*** Programming with AVR ISP programmer using ATAVRAUTO900
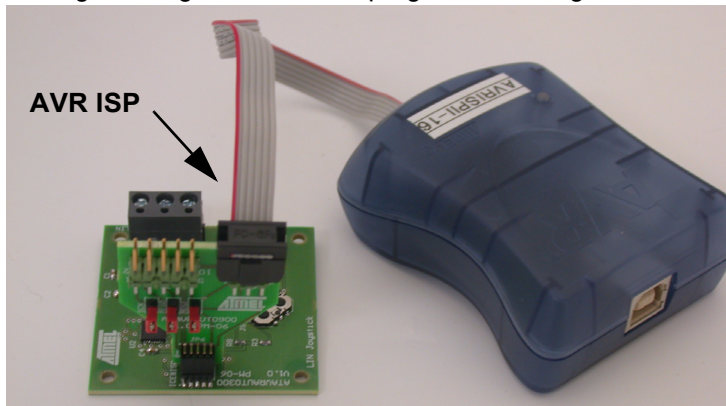
Note: See AVR Studio on-line documentation for more information.

2.5.3   Programming with AVR JTAGICEmkII

The ATmega48/88/168 can be programmed using specific JTAG link: 3-wire debug-WIRE interface. To use the AVR JTAGICEmkII with an ATAVRAUTO300 the ATAVRAUTO900 adaptor has to be used. Then the JTAG probe can be connected to the ATAVRAUTO300 as shown in the following Figure 2-9.

To use the JTAGICEmkII in ISP mode the 3 jumpers "SCK", "MISO" and "MOSI" of the adaptor (ATAVRAUTO900) should be connected.

Figure 2-9. JTAGICE mkII probe connecting through debugWIRE interface
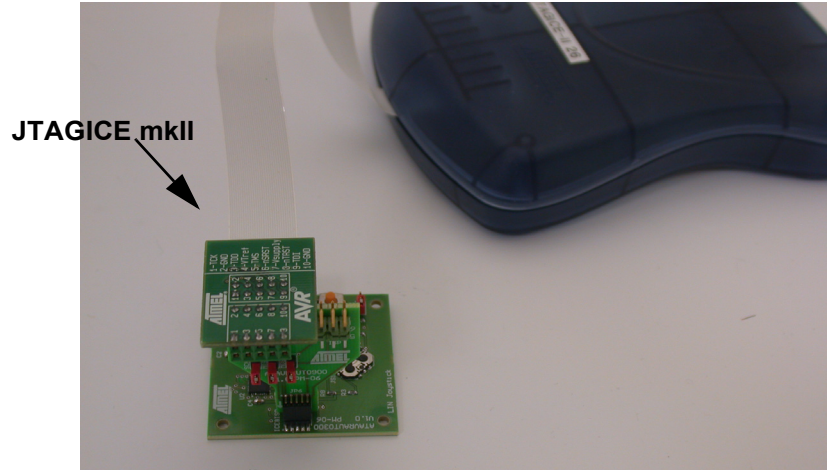
Note: When the debugWIRE Enable (DWEN) Fuse is programmed and Lock bits are unprogrammed, the debugWIRE system within the target device is activated. RESET pin is configured as communication gateway between ATmega48/88/168 and JTAG. JTAGICE mkII must have control over it.

Note: See AVR Studio® on-line Help for information.

2.6   Debugging

2.6.1   Debugging with AVR JTAGICEmkII

The ATAVRAUTO300 can be used for debugging with JTAG ICE MK II.

Connect the JTAG ICE mkII as shown in Figure 2-9 for debugging, please refer to AVR Studio® Help information.

Section 3

Technical Specifications

- System Unit
  - Physical Dimensions..L=45 x W=45 x H=8 mm
  - Weight ....14 g
- Operating Conditions
  - Internal Voltage Supply..... .... 5.0V
  - External Voltage Supply..7V -18V

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Section 4

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, JTAG or specific Boot-Loader)
- 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

Section 5

Complete Schematics

On the next pages, the following documents of ATAVRAUTO300 are shown:

■ Complete schematics,

■ Bill of materials,

■ Assembly drawing.

Figure 5-1. ATAVRAUTO300 schematics

Figure 5-2. ATAVRAUTO300 bill of materials

Bill of Materials

LIN Joystick - ATAVRAUTO300

Source Data From:	LIN Joy.PrjPcb
Project:	LIN Joy.PrjPcb
Variant:	None

Creation Date	08/11/2006	19:10:47
Print Date:	02-Jan-07	1:57:00 PM

Designator	Descriptions	Reference	Fabricant	Fournisseur	Code Commande	Unite de Vente	Quantity	Prix UDV	LibRef	Footprint
C1	100nF	X7R 16V	Phycomp	FARNELL	432210	10	1	0.63	Cap 100nF 0603 X7R 16V	0603
C4	100nF	X7R 16V	Phycomp	FARNELL	432210	10	1	0.63	Cap 100nF 0603 X7R 16V	0603
C5	100nF	X7R 16V	Phycomp	FARNELL	432210	10	1	0.63	Cap 100nF 0603 X7R 16V	0603
C3	220pF	X7R 50V	Phycomp	FARNELL	722133	25	1	1	Cap 220pF 0603 X7R 50V	0603
C2	4.7µF/6.3V	X5R	MURATA	FARNELL	9522999	10	1	3.1	Cap 4.7µF 0805 6.3V	0805
LIN	Bornier 1X3	20.101/3	IMO	FARNELL	9632689	5	1	1.75	Bornier 1X3 24A	IMO3 5mm
ICE&ISP	ICE&ISP Header	M50-3600542	HARWIN	FARNELL	1022310	5	1	3.1	AVR ICE ISP PIN Header 2X5	PIN Header 2x5 1.27mm
U1	ATA6620	ATA6620	ATMEL	ATMEL	ATA6620	1	1	0	ATA6620	SO8
U2	ATMEGA88	ATmega88-15AZ	ATMEL	ATMEL	ATmega88-15AZ	1	1	0	ATMEGA88	QFN5X5-32 NO VIA
BOOT	2mm V	M22-2010205	HARWIN	FARNELL	671915	10	1	1.12	Jump 2 Vert - 2mm	SIL2V2mm
NISP	2mm V	M22-2010205	HARWIN	FARNELL	671915	10	1	1.12	Jump 2 Vert - 2mm	SIL2V2mm
JS1	5W Switch	EVQ-Q3AA15	Panasonic	DIGIKEY	P12330SCT-ND	1	1	3.61	5 direction Touch switch	5W Switch
NRES	Bouton poussoir CMS	KSC421JLFS	ITT CANNON	FARNELL	1201417	1	1	0.42	BP SPNO CMS	BP SPNO
DG	LED CMS Green	HSMG-C170	Agilent	FARNELL	5790852	5	1	0.8	LED CMS Green	LED CMS Agilent
D1	MBR0540	MBR0540T1G	ON	FARNELL	9566923	1	1	0.65	Schottky 40V 500mA MBR0540	SOD123
R1	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R3	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R4	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R5	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R6	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R7	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R8	10K	RC21	Phycomp	FARNELL	9233504	50	1	1.9	Res 10K 0603 1%	0603
R2	330R	RC22H	Phycomp	FARNELL	9238425	50	1	2.17	Res 330R 0603 1%	0603

Figure 5-3. ATAVRAUTO300 assembly drawing
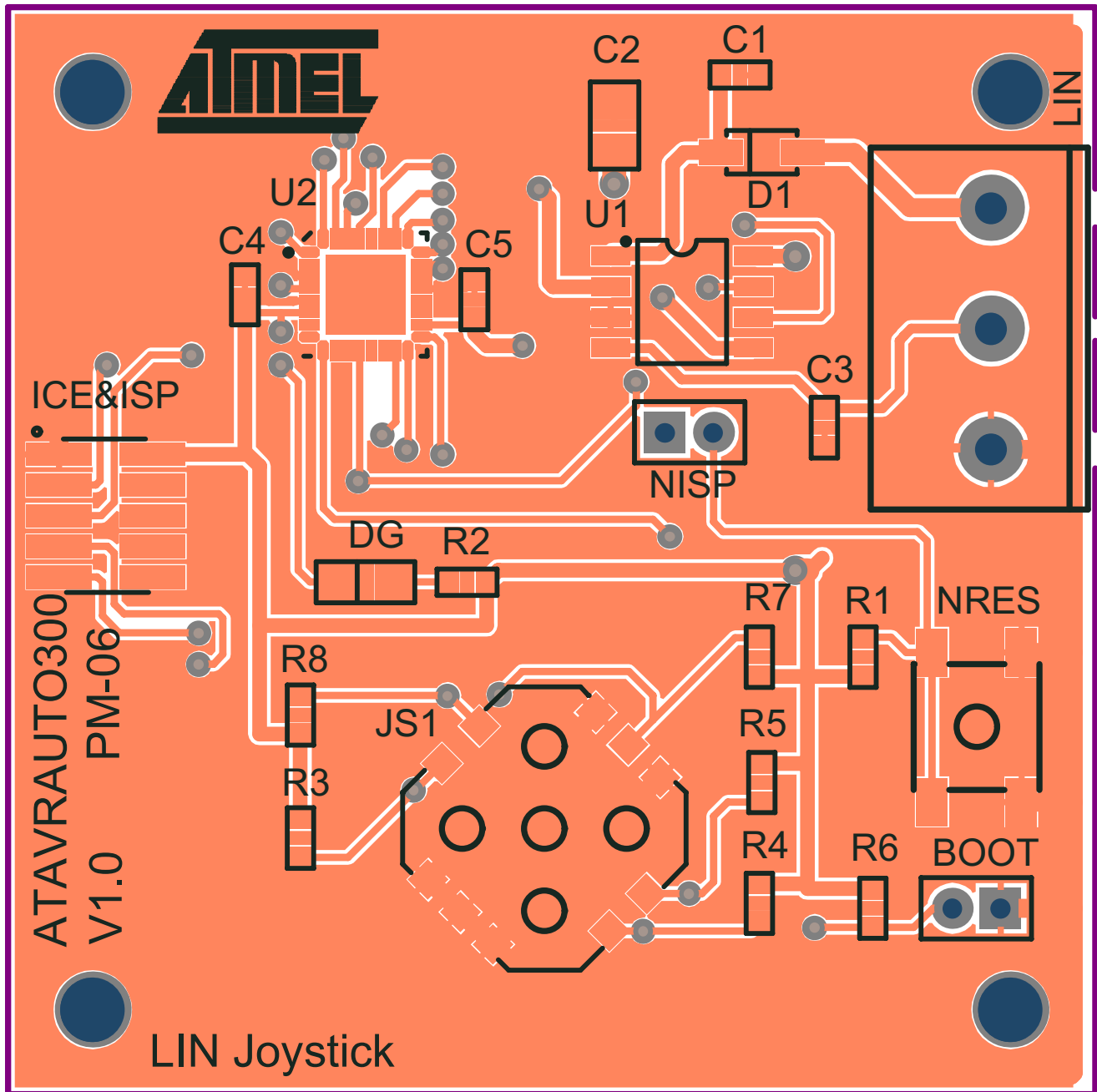
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