APPLICATION NOTE

Migration Guide from ATA6613C to ATA6614Q

ATAN0081

Features

- Atmel® ATA6612C
- Atmel ATA6613C
- Atmel ATA6614Q

Description

This document outlines important considerations when migrating from the Atmel ATA6612C/ATA6613C to the Atmel ATA6614Q regarding the SBC and microcontroller part.

For detailed information on the devices, please refer to the corresponding datasheets.

The Atmel ATA6614Q is designed to be pin- and function-compatible with the Atmel ATA6612C/ATA6613C, but because of improvements mentioned in this application note there may be a need for minor software modifications in the application when migrating from Atmel ATA6612C/ATA6613C to the Atmel ATA6614Q. No hardware modifications are necessary.

1. General Information

This application note summarizes the relevant differences when migrating from Atmel® ATA6612C/ATA6613C to Atmel ATA6614Q. For detailed information on the devices, please see the corresponding datasheets.

2. General Porting Considerations for the Microcontroller

To make the porting process as easy as possible, we recommend that you always refer to the registers and bit positions using their defined names, because absolute addresses and values may vary from device to device. When porting a design, it is often enough to simply include the correct definition file. Some examples are shown below.

Examples of register/bit names

```
PORTE |= (1 << PORTE5); /* Set pin 5 on port E high */
DDRE &= ~(1 << PORT5); /* Set pin 5 on port E as an input */

/* Configure USI */
USICR = ((1 << USISIE) | (1 << USIOIE));
```

To avoid conflicts with added features and register functionality, never access registers that are marked as reserved. Reserved bits should always be written to “0” if accessed. This ensures forward compatibility, and added features will stay in their default states when unused.

2.1 Register and Bit Names

Some register bits have been added in development work between the Atmel ATA6612C/ATA6613C and the Atmel ATA6614Q, but none of the existing bits have been removed or moved to different locations.

2.2 Memory Size

The Atmel ATmega328P, which is included in the Atmel ATA6614Q, has twice as much Flash program memory, EEPROM, and internal SRAM respectively, compared to the Atmel ATmega168, which is included in the Atmel ATA6613C. For a comparison of the devices, see Table 2-1.

Table 2-1. Comparison of Memory Sizes

	Atmel ATA6612C	Atmel ATA6613C	Atmel ATA6614Q
Flash [bytes]	8192	16384	32768
EEPROM [bytes]	512	512	1024
SRAM [bytes]	1024	1024	2048

2.3 Interrupt Vectors

The interrupt vectors in the Atmel ATmega88, Atmel ATmega168, and Atmel ATmega328p are generally the same except that each interrupt vector occupies two instruction words in the Atmel ATmega168 and the Atmel ATmega328p and one instruction word in the Atmel ATmega88.

2.4 Low-frequency Crystal/Timer/Counter Oscillator

The low-frequency crystal oscillator of the Atmel® ATA6614Q is optimized for very low power consumption so that the crystal driver strength is reduced compared to the Atmel ATA6612C/ATA6613C. This means that when selecting a crystal, its load capacitance and equivalent series resistance (ESR) must be taken into consideration. Both values are specified by the crystal vendor. The internal capacitance of the ATA6614Q low-frequency oscillator is typically 6pF, but the tracks to the crystal will add some additional capacitance. Table 2-2 shows the ESR recommendations for the Atmel ATA6614Q.

Table 2-2. ESR Recommendation for 32.768kHz Crystals for the Atmel ATA6614Q

Crystal CL [pF]	Max ESR(1)[kΩ]
6.5	75
9	65
12.5	30

Note: 1. The values stated are for an oscillator allowance safety margin of 5. Because the oscillator's transconductance is temperature compensated, a safety margin of 4 can be used, resulting in a maximum ESR of 90kΩ, 80kΩ, and 40kΩ respectively.

The start-up times are increased as shown in Table 2-3.

Table 2-3. Start-up Times with 32.768kHz Crystals

Crystal CL [pF]	Start-up Time(2) [ms] ATA6612C/13C	Start-up Time(2) [ms] ATA6614Q
6.5	-	600
9	300	700
12.5	400	1700

Note: 1. Crystals usually require ~3000ms before they are completely stable with any oscillator design. The time stated is before the crystal is running with a sufficient amplitude and frequency stability.

Only the low-frequency oscillator is affected by this change. There are no special considerations for the other oscillators included.

3. Differences between the SBCs

The current consumption of the Atmel® ATA6630 has been improved compared to the Atmel ATA6624C, resulting in lower current consumption for the Atmel ATA6614Q compared to the Atmel ATA6612C and the Atmel ATA6613C. For more information, see the datasheets.

3.1 ESD According to IBEE LIN EMC Test Spec. 1.0 Based on IEC 61000-4-2 Heading 2

The Atmel ATA6630 (Atmel ATA6614Q) has improved ESD immunity compared to the Atmel ATA6624 (Atmel ATA6612C/ATA6613C) for this test. It is rated for ±8kV min. while the Atmel ATA6612C and the Atmel ATA6613C are rated for a minimum of ±6kV.

3.2 Wake-up Source Recognition

The Atmel ATA6630 uses a different way to indicate the wake-up source. The software has to be adjusted to use the changed/new signals.

Table 3-1. Fail-safe Source Indication for the Atmel ATA6612C/ATA6613C

Fail-safe Source	TXD	RXD
LIN wake-up (pin LIN)	High	Low
Local wake-up (at pin WAKE, pin KL_15)	Low	Low

Table 3-2. Fail-safe Source Indication for the Atmel ATA6614Q

Fail-safe Source	TXD	RXD
LIN wake-up (pin LIN)	Low	Low
Local wake-up (at pin WAKE, pin KL_15)	Low	High
VS_{th} (battery) undervoltage detection	High	Low

Table 3-3. Fail-safe Mode Indication after a Reset (NRES was Low) Shows the Reset Source at TXD and RXD Pins for the Atmel ATA6614Q

Fail-safe Source	TXD	RXD
VCC undervoltage	High	Low
Watchdog reset	High	High

3.3 TXD Time-out Timer

The timings for the TXD dominant time-out timer have changed. To allow lower bit rates, the minimum time at which a time-out is detected has been increased. Table 3-4 shows the exact timings for the devices.

Table 3-4. TXD Time-out Time

Type	Min	Typical	Max
ATA6612C/ATA6613C (ATA6624)	6ms	13ms	20ms
ATA6614Q (ATA6630)	27ms	55ms	70ms

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