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Applications of "Embedded - Microcontrollers"

Details	
Product Status	Active
Core Processor	ARM® Cortex®-M4
Core Size	32-Bit Single-Core
Speed	120MHz
Connectivity	I²C, IrDA, Memory Card, SPI, SSC, UART/USART, USB
Peripherals	Brown-out Detect/Reset, DMA, POR, PWM, WDT
Number of I/O	47
Program Memory Size	1MB (1M x 8)
Program Memory Type	FLASH
EEPROM Size	-
RAM Size	128K x 8
Voltage - Supply (Vcc/Vdd)	1.62V ~ 3.6V
Data Converters	A/D 11x12b; D/A 2x12b
Oscillator Type	Internal
Operating Temperature	-40°C ~ 105°C (TA)
Mounting Type	Surface Mount
Package / Case	64-LQFP
Supplier Device Package	64-LQFP (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/atsam4s16bb-an

12.6.10 Branch and Control Instructions

The table below shows the branch and control instructions.

Table 12-25. Branch and Control Instructions

Mnemonic	Description
B	Branch
BL	Branch with Link
BLX	Branch indirect with Link
BX	Branch indirect
CBNZ	Compare and Branch if Non Zero
CBZ	Compare and Branch if Zero
IT	If-Then
TBB	Table Branch Byte
TBH	Table Branch Halfword

12.8.3 Nested Vectored Interrupt Controller (NVIC) User Interface

Table 12-31. Nested Vectored Interrupt Controller (NVIC) Register Mapping

Offset	Register	Name	Access	Reset
0xE000E100	Interrupt Set-enable Register 0	NVIC_ISER0	Read/Write	0x00000000
...	...	...	...	...
0xE000E11C	Interrupt Set-enable Register 7	NVIC_ISER7	Read/Write	0x00000000
0XE000E180	Interrupt Clear-enable Register 0	NVIC_ICER0	Read/Write	0x00000000
...	...	...	...	...
0xE000E19C	Interrupt Clear-enable Register 7	NVIC_ICER7	Read/Write	0x00000000
0XE000E200	Interrupt Set-pending Register 0	NVIC_ISPR0	Read/Write	0x00000000
...	...	...	...	...
0xE000E21C	Interrupt Set-pending Register 7	NVIC_ISPR7	Read/Write	0x00000000
0XE000E280	Interrupt Clear-pending Register 0	NVIC_ICPR0	Read/Write	0x00000000
...	...	...	...	...
0xE000E29C	Interrupt Clear-pending Register 7	NVIC_ICPR7	Read/Write	0x00000000
0xE000E300	Interrupt Active Bit Register 0	NVIC_IABR0	Read/Write	0x00000000
...	...	...	...	...
0xE000E31C	Interrupt Active Bit Register 7	NVIC_IABR7	Read/Write	0x00000000
0xE000E400	Interrupt Priority Register 0	NVIC_IPR0	Read/Write	0x00000000
...	...	...	...	...
0xE000E420	Interrupt Priority Register 8	NVIC_IPR8	Read/Write	0x00000000
0xE000EF00	Software Trigger Interrupt Register	NVIC_STIR	Write-only	0x00000000

The table below shows the encodings for the TEX, C, B, and S access permission bits.

Table 12-36. TEX, C, B, and S Encoding

TEX	C	B	S	Memory Type	Shareability	Other Attributes
b000	0	0	x(1)	Strongly-ordered	Shareable	–
		1	x(1)	Device	Shareable	–
	1	0	0	Normal	Not shareable	Outer and inner write-through. No write allocate.
			1		Shareable	
		1	0	Normal	Not shareable	Outer and inner write-back. No write allocate.
			1		Shareable	
b001	0	0	0	Normal	Not shareable	Outer and inner noncacheable.
			1		Shareable	
		1	x(1)	Reserved encoding		–
	1	0	x(1)	Implementation defined attributes.		–
		1	0	Normal	Not shareable	Outer and inner write-back. Write and read allocate.
			1		Shareable	
b010	0	0	x(1)	Device	Not shareable	Nonshared Device.
		1	x(1)	Reserved encoding		–
	1	x(1)	x(1)	Reserved encoding		–
b1BB	A	A	0	Normal	Not shareable	Cached memory BB = outer policy, AA = inner policy.
			1		Shareable	

Note: 1. The MPU ignores the value of this bit.

Table 12-37 shows the cache policy for memory attribute encodings with a TEX value is in the range 4–7.

Table 12-37. Cache Policy for Memory Attribute Encoding

Encoding, AA or BB	Corresponding Cache Policy
00	Non-cacheable
01	Write back, write and read allocate
10	Write through, no write allocate
11	Write back, no write allocate

- **TDERR: Time and/or Date Free Running Error**

Value	Name	Description
0	CORRECT	The internal free running counters are carrying valid values since the last read of the Status Register (RTC_SR).
1	ERR_TIMEDATE	The internal free running counters have been corrupted (invalid date or time, non-BCD values) since the last read and/or they are still invalid.

Table 21-3. Command Bit Coding (Continued)

DATA[15:0]	Symbol	Command Executed
0x0035	GSE	Get Security Bit
0x001F	WRAM	Write Memory
0x001E	GVE	Get Version

21.3.3 Entering Programming Mode

The following algorithm puts the device in Parallel Programming mode:

1. Apply the supplies as described in Table 21-1.
2. Apply XIN clock within t_{POR_RESET} if an external clock is available.
3. Wait for t_{POR_RESET}
4. Start a read or write handshaking.

Note: After reset, the device is clocked by the internal RC oscillator. Before clearing RDY signal, if an external clock (> 32 kHz) is connected to XIN, then the device switches on the external clock. Else, XIN input is not considered. A higher frequency on XIN speeds up the programmer handshake.

21.3.4 Programmer Handshaking

An handshake is defined for read and write operations. When the device is ready to start a new operation (RDY signal set), the programmer starts the handshake by clearing the NCMD signal. The handshaking is achieved once NCMD signal is high and RDY is high.

21.3.4.1 Write Handshaking

For details on the write handshaking sequence, refer to Figure 21-2 and Table 21-4.

Figure 21-2. Parallel Programming Timing, Write Sequence

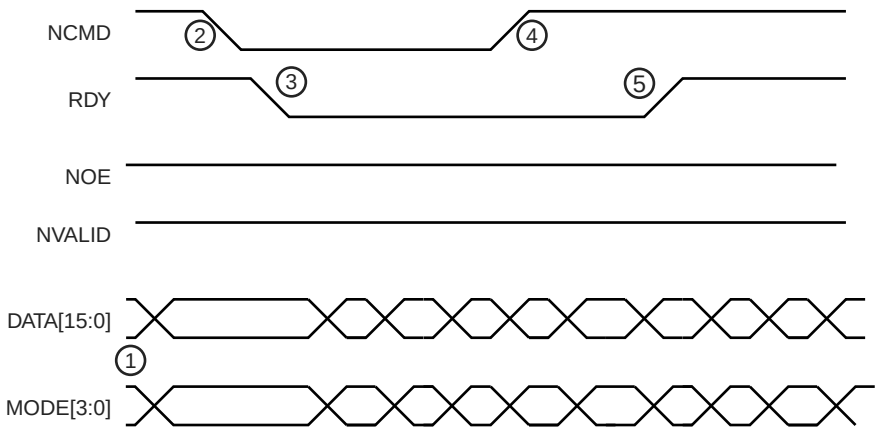


Table 21-4. Write Handshake

Step	Programmer Action	Device Action	Data I/O
1	Sets MODE and DATA signals	Waits for NCMD low	Input
2	Clears NCMD signal	Latches MODE and DATA	Input
3	Waits for RDY low	Clears RDY signal	Input

23.7.2 CRCCU DMA Enable Register

Name: CRCCU_DMA_EN

Address: 0x40044008

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–
23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–
15	14	13	12	11	10	9	8
–	–	–	–	–	–	–	–
7	6	5	4	3	2	1	0
–	–	–	–	–	–	–	DMAEN

- **DMAEN: DMA Enable**

0: No effect

1: Enable CRCCU DMA channel

23.7.6 CRCCU DMA Interrupt Disable Register

Name: CRCCU_DMA_IDR

Address: 0x40044018

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–
23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–
15	14	13	12	11	10	9	8
–	–	–	–	–	–	–	–
7	6	5	4	3	2	1	0
–	–	–	–	–	–	–	DMAIDR

- **DMAIDR: Interrupt Disable**

0: No effect

1: Disable interrupt

23.7.13 CRCCU Interrupt Disable Register

Name: CRCCU_IDR

Address: 0x40044044

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–
23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–
15	14	13	12	11	10	9	8
–	–	–	–	–	–	–	–
7	6	5	4	3	2	1	0
–	–	–	–	–	–	–	ERRIDR

- **ERRIDR: CRC Error Interrupt Disable**

0: No effect

1: Disable interrupt

25.8 Bus Matrix (MATRIX) (MATRIX) User Interface

Table 25-4. Register Mapping

Offset	Register	Name	Access	Reset
0x0000	Master Configuration Register 0	MATRIX_MCFG0	Read/Write	0x00000000
0x0004	Master Configuration Register 1	MATRIX_MCFG1	Read/Write	0x00000000
0x0008	Master Configuration Register 2	MATRIX_MCFG2	Read/Write	0x00000000
0x000C	Master Configuration Register 3	MATRIX_MCFG3	Read/Write	0x00000000
0x0010 - 0x003C	Reserved	–	–	–
0x0040	Slave Configuration Register 0	MATRIX_SCFG0	Read/Write	0x00010010
0x0044	Slave Configuration Register 1	MATRIX_SCFG1	Read/Write	0x00050010
0x0048	Slave Configuration Register 2	MATRIX_SCFG2	Read/Write	0x00000010
0x004C	Slave Configuration Register 3	MATRIX_SCFG3	Read/Write	0x00000010
0x0050	Slave Configuration Register 4	MATRIX_SCFG4	Read/Write	0x00000010
0x0054 - 0x007C	Reserved	–	–	–
0x0080	Priority Register A for Slave 0	MATRIX_PRAS0	Read/Write	0x00000000
0x0084	Reserved	–	–	–
0x0088	Priority Register A for Slave 1	MATRIX_PRAS1	Read/Write	0x00000000
0x008C	Reserved	–	–	–
0x0090	Priority Register A for Slave 2	MATRIX_PRAS2	Read/Write	0x00000000
0x0094	Reserved	–	–	–
0x0098	Priority Register A for Slave 3	MATRIX_PRAS3	Read/Write	0x00000000
0x009C	Reserved	–	–	–
0x00A0	Priority Register A for Slave 4	MATRIX_PRAS4	Read/Write	0x00000000
0x00A4 - 0x0110	Reserved	–	–	–
0x0114	System I/O Configuration register	CCFG_SYSIO	Read/Write	0x00000000
0x0118	Reserved	–	–	–
0x011C	SMC Chip Select NAND Flash Assignment Register	CCFG_SMCNFCS	Read/Write	0x00000000
0x0120 - 0x010C	Reserved	–	–	–
0x1E4	Write Protection Mode Register	MATRIX_WPMR	Read/Write	0x0
0x1E8	Write Protection Status Register	MATRIX_WPSR	Read-only	0x0
0x0110 - 0x01FC	Reserved	–	–	–

33.8.1 SPI Control Register

Name: SPI_CR

Address: 0x40008000

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	LASTXFER
23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–
15	14	13	12	11	10	9	8
–	–	–	–	–	–	–	–
7	6	5	4	3	2	1	0
SWRST	–	–	–	–	–	SPIDIS	SPIEN

- **SPIEN: SPI Enable**

0: No effect.

1: Enables the SPI to transfer and receive data.

- **SPIDIS: SPI Disable**

0: No effect.

1: Disables the SPI.

All pins are set in Input mode after completion of the transmission in progress, if any.

If a transfer is in progress when SPIDIS is set, the SPI completes the transmission of the shifter register and does not start any new transfer, even if the SPI_THR is loaded.

Note: If both SPIEN and SPIDIS are equal to one when the SPI_CR is written, the SPI is disabled.

- **SWRST: SPI Software Reset**

0: No effect.

1: Reset the SPI. A software-triggered hardware reset of the SPI interface is performed.

The SPI is in Slave mode after software reset.

PDC channels are not affected by software reset.

- **LASTXFER: Last Transfer**

0: No effect.

1: The current NPCS is de-asserted after the character written in TD has been transferred. When SPI_CSRx.CSAAT is set, the communication with the current serial peripheral can be closed by raising the corresponding NPCS line as soon as TD transfer is completed.

Refer to Section 33.7.3.5 “Peripheral Selection” for more details.

35.6.3 UART Interrupt Enable Register

Name: UART_IER

Address: 0x400E0608 (0), 0x400E0808 (1)

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–
23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–
15	14	13	12	11	10	9	8
–	–	–	RXBUFF	TXBUFE	–	TXEMPTY	–
7	6	5	4	3	2	1	0
PARE	FRAME	OVRE	ENDTX	ENDRX	–	TXRDY	RXRDY

The following configuration values are valid for all listed bit names of this register:

0: No effect.

1: Enables the corresponding interrupt.

- **RXRDY: Enable RXRDY Interrupt**
- **TXRDY: Enable TXRDY Interrupt**
- **ENDRX: Enable End of Receive Transfer Interrupt**
- **ENDTX: Enable End of Transmit Interrupt**
- **OVRE: Enable Overrun Error Interrupt**
- **FRAME: Enable Framing Error Interrupt**
- **PARE: Enable Parity Error Interrupt**
- **TXEMPTY: Enable TXEMPTY Interrupt**
- **TXBUFE: Enable Buffer Empty Interrupt**
- **RXBUFF: Enable Buffer Full Interrupt**

36.7.14 USART Transmit Holding Register

Name: US_THR

Address: 0x4002401C (0), 0x4002801C (1)

Access: Write-only

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–

23	22	21	20	19	18	17	16
–	–	–	–	–	–	–	–

15	14	13	12	11	10	9	8
TXSYNH	–	–	–	–	–	–	TXCHR

7	6	5	4	3	2	1	0
TXCHR							

- **TXCHR: Character to be Transmitted**

Next character to be transmitted after the current character if TXRDY is not set.

- **TXSYNH: Sync Field to be Transmitted**

0: The next character sent is encoded as a data. Start frame delimiter is DATA SYNC.

1: The next character sent is encoded as a command. Start frame delimiter is COMMAND SYNC.

36.7.15 USART Baud Rate Generator Register

Name: US_BRGR

Address: 0x40024020 (0), 0x40028020 (1)

Access: Read/Write

31	30	29	28	27	26	25	24
–	–	–	–	–	–	–	–

23	22	21	20	19	18	17	16
–	–	–	–	–	FP		

15	14	13	12	11	10	9	8
CD							

7	6	5	4	3	2	1	0
CD							

This register can only be written if the WPEN bit is cleared in the USART Write Protection Mode Register.

- **CD: Clock Divider**

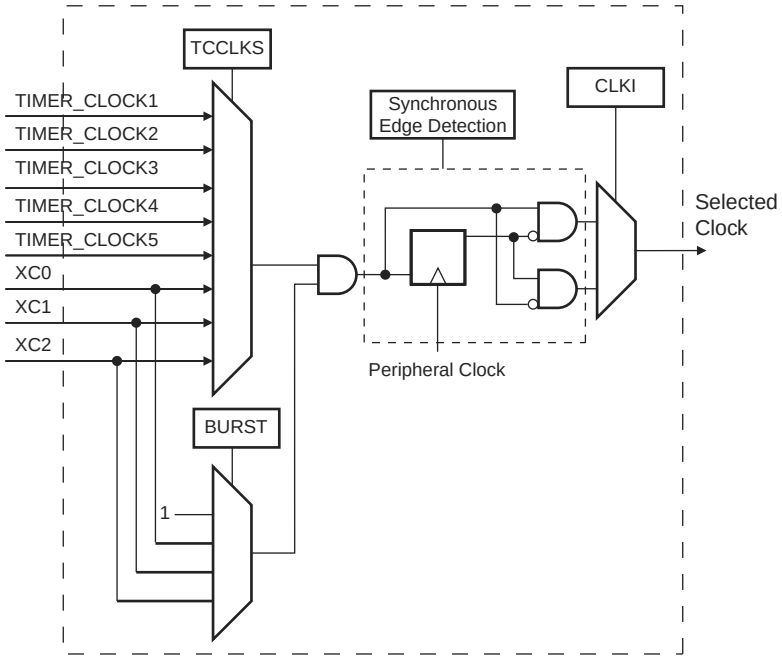
	USART_MODE ≠ ISO7816			
	SYNC = 0		**SYNC = 1 or USART_MODE = SPI (Master or Slave)**	**USART_MODE = ISO7816**
CD	**OVER = 0**	**OVER = 1**		
0	Baud Rate Clock Disabled			
1 to 65535	CD = Selected Clock / (16 × Baud Rate)	CD = Selected Clock / (8 × Baud Rate)	CD = Selected Clock / Baud Rate	CD = Selected Clock / (FI_DI_RATIO × Baud Rate)

- **FP: Fractional Part**

0: Fractional divider is disabled.

1–7: Baud rate resolution, defined by FP × 1/8.

Figure 37-3. Clock Selection



37.6.4 Clock Control

The clock of each counter can be controlled in two different ways: it can be enabled/disabled and started/stopped. See Figure 37-4.

- The clock can be enabled or disabled by the user with the CLKEN and the CLKDIS commands in the TC Channel Control Register (TC_CCR). In Capture mode it can be disabled by an RB load event if LDBDIS is set to 1 in the TC_CMR. In Waveform mode, it can be disabled by an RC Compare event if CPCDIS is set to 1 in TC_CMR. When disabled, the start or the stop actions have no effect: only a CLKEN command in the TC_CCR can re-enable the clock. When the clock is enabled, the CLKSTA bit is set in the TC_SR.
- The clock can also be started or stopped: a trigger (software, synchro, external or compare) always starts the clock. The clock can be stopped by an RB load event in Capture mode (LDBSTOP = 1 in TC_CMR) or an RC compare event in Waveform mode (CPCSTOP = 1 in TC_CMR). The start and the stop commands are effective only if the clock is enabled.

40.5.1 USB Device Transceiver

The USB device transceiver is embedded in the product. However, discrete components are required for each of the following actions:

- to monitor VBUS voltage
- for line termination
- to disconnect the host for reduced power consumption

40.5.2 VBUS Monitoring

VBUS monitoring is required to detect host connection. VBUS monitoring is done using a standard PIO with internal pull-up disabled. When the host is switched off, it should be considered as a disconnect, the pull-up must be disabled in order to prevent powering the host through the pull-up resistor.

When the host is disconnected and the transceiver is enabled, then DDP and DDM are floating. This may lead to over consumption. A solution is to enable the integrated pull-down by disabling the transceiver (UDP_TXVC.TXVDIS = 1) and then remove the pull-up (UDP_TXVC.PUON = 0).

A termination serial resistor must be connected to DDP and DDM. The resistor value is defined in the electrical specification of the product (R_{EXT}).

- **FREERUN: Free Run Mode**

Value	Name	Description
0	OFF	Normal Mode
1	ON	Free Run Mode: Never wait for any trigger.

- **PRESCAL: Prescaler Rate Selection**

PRESCAL = ($f_{peripheral\ clock}$ / ($2 \times f_{ADCCLK}$)) – 1.

- **STARTUP: Startup Time**

Value	Name	Description
0	SUT0	0 periods of ADCCLK
1	SUT8	8 periods of ADCCLK
2	SUT16	16 periods of ADCCLK
3	SUT24	24 periods of ADCCLK
4	SUT64	64 periods of ADCCLK
5	SUT80	80 periods of ADCCLK
6	SUT96	96 periods of ADCCLK
7	SUT112	112 periods of ADCCLK
8	SUT512	512 periods of ADCCLK
9	SUT576	576 periods of ADCCLK
10	SUT640	640 periods of ADCCLK
11	SUT704	704 periods of ADCCLK
12	SUT768	768 periods of ADCCLK
13	SUT832	832 periods of ADCCLK
14	SUT896	896 periods of ADCCLK
15	SUT960	960 periods of ADCCLK

- **SETTLING: Analog Settling Time**

Value	Name	Description
0	AST3	3 periods of ADCCLK
1	AST5	5 periods of ADCCLK
2	AST9	9 periods of ADCCLK
3	AST17	17 periods of ADCCLK

- **ANACH: Analog Change**

Value	Name	Description
0	NONE	No analog change on channel switching: DIFF0, GAIN0 and OFF0 are used for all channels.
1	ALLOWED	Allows different analog settings for each channel. See ADC_CGR and ADC_COR registers.

- **TRACKTIM: Tracking Time**

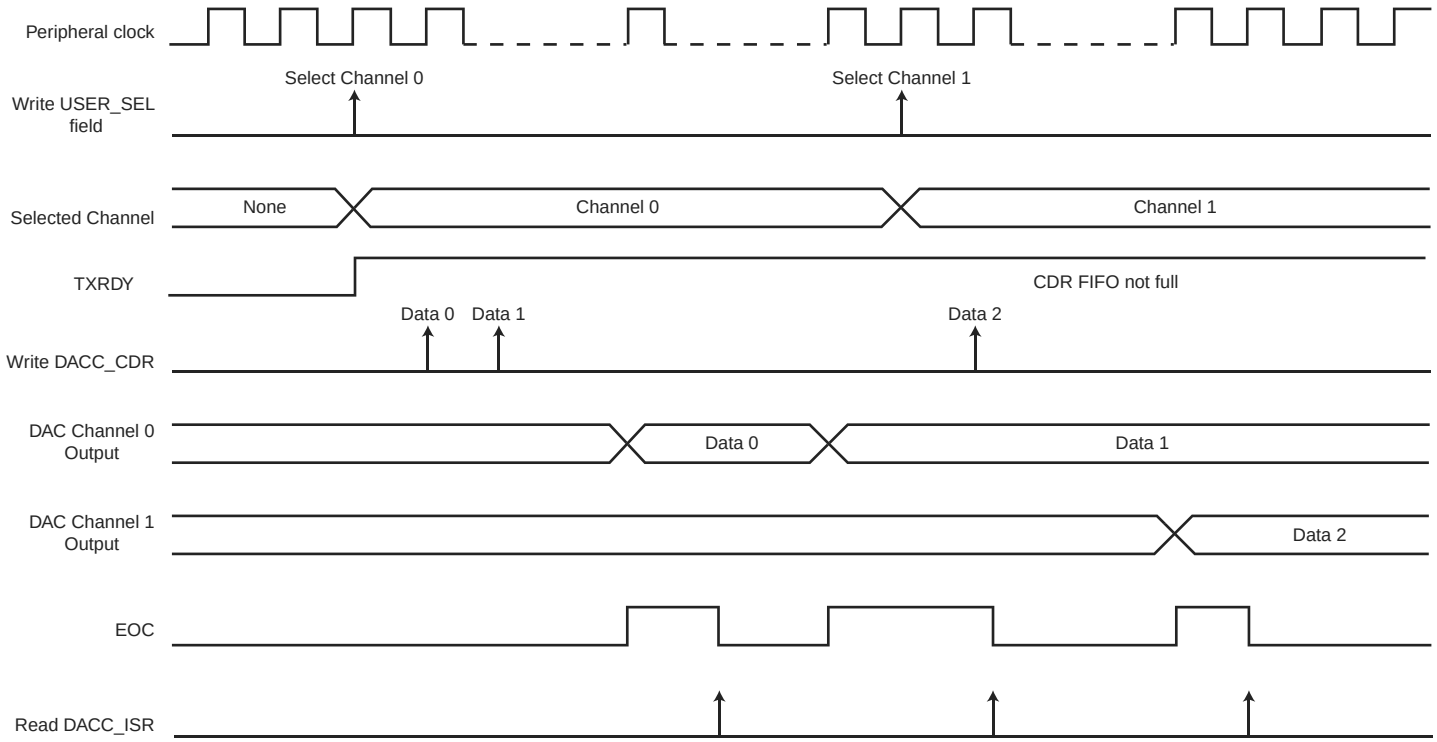
Tracking Time = (TRACKTIM + 1) × ADCCLK periods

A maximum speed mode is available by setting the MAXS bit in the DACC_MR. In this mode, the DACC no longer waits to sample the end-of-cycle signal coming from the DACC block to start the next conversion. An internal counter is used instead, thus gaining two peripheral clock periods between each consecutive conversion.

Warning: If the maximum speed mode is used, the EOC interrupt of the DACC_IER should not be used as it is two peripheral clock periods late.

The accuracy of the analog voltage resulting from the data conversion process cannot be guaranteed due to leakage. To ensure accuracy, the channel must be refreshed on a regular basis. A value is correctly refreshed if the correct sampling period is selected (see DACC electrical characteristics) and the software or PDC is able to sustain writing to DACC_CDR at the rate imposed by the trigger period.

Figure 43-2. Conversion Sequence



43.6.7 Register Write Protection

To prevent any single software error from corrupting DACC behavior, certain registers in the address space can be write-protected by setting the WPEN bit in the DACC Write Protection Mode Register (DACC_WPMR).

If a write access to a write-protected register is detected, the WPVS flag in the DACC Write Protection Status Register (DACC_WPSR) is set and the field WPVSRC indicates the register in which the write access has been attempted.

The WPVS bit is automatically cleared after reading the DACC_WPSR.

The following registers can be write-protected:

- DACC Mode Register
- DACC Channel Enable Register
- DACC Channel Disable Register
- DACC Analog Current Register

Table 45-13. 64-lead LQFP Package Dimensions (in mm)

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
R1	0.08	–	–	0.003	–	–
q	0°	3.5°	7°	0°	3.5°	7°
θ_1	0°	–	–	0°	–	–
θ_2	11°	12°	13°	11°	12°	13°
θ_3	11°	12°	13°	11°	12°	13°
c	0.09	–	0.20	0.004	–	0.008
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00 REF			0.039 REF		
S	0.20	–	–	0.008	–	–
b	0.17	0.20	0.27	0.007	0.008	0.011
e	0.50 BSC.			0.020 BSC.		
D2	7.50			0.285		
E2	7.50			0.285		
Tolerances of Form and Position						
aaa	0.20			0.008		
bbb	0.20			0.008		
ccc	0.08			0.003		
ddd	0.08			0.003		

Table 45-14. Device and LQFP Package Maximum Weight

SAM4S	750	mg

Table 45-15. LQFP Package Reference

JEDEC Drawing Reference	MS-026
JESD97 Classification	e3

Table 45-16. LQFP Package Characteristics

Moisture Sensitivity Level	3

48.2.5 PIO

Issue: PB4 Input Low-level Voltage Range

The undershoot is limited to -0.1V.

In normal operating conditions, the V_{IL} minimum value on PB4 is limited to 0V.

Workaround: The voltage on PB4 with respect to ground must be in the range -0.1V to + VDDIO + 0.4V instead of -0.3V to + VDDIO + 0.4V for all other input pins, as shown in Table 44.1 “Absolute Maximum Ratings”.

The minimum V_{IL} on PB4 must be 0V instead of -0.3V for all other input pins, as shown in Table 44.3 “DC Characteristics”.

Table 49-6. SAM4S Datasheet Rev. 11100F 29-Jan-14 Revision History (Continued)

Doc. Date	Changes
	Section 43. “Digital-to-Analog Converter Controller (DACC)” Section 43.7.7 “DACC Interrupt Enable Register”, Section 43.7.8 “DACC Interrupt Disable Register” and Section 43.7.9 “DACC Interrupt Mask Register”: modified bit descriptions. Rework of all “refresh” related paragraphs, Section 43.7.3 “DACC Channel Enable Register” and Section 43.6.7 “DACC Timings”. Modified description for ”REFRESH: Automatic Refresh Period” field in Section 43.7.2 “DACC Mode Register”. Re-worked Section 43.6.8 “Register Write Protection” and associated registers and bit/field descriptions in Section 43.7.12 “DACC Write Protection Mode Register” and Section 43.7.13 “DACC Write Protection Status Register”.
	Section 44. “Electrical Characteristics” Added Section 44.2 “Recommended Operating Conditions”. Section 44.4 “Power Consumption”: Added power consumption values for SAM4S4/SAM4S2. Updated Section 44.4.1 “Backup Mode Current Consumption”. Removed Supply Ripple Voltage parameter from Table 44-30, “3 to 20 MHz Crystal Oscillator Characteristics” Table 44-32 ”XIN Clock Electrical Characteristics (In Bypass Mode)”: Added $C_{PARASTANDBY}$ AND $R_{PARASTANDBY}$ parameters. Updated and re-worked Section 44.8 “12-bit ADC Characteristics”: Updated Section 44.9 “12-bit DAC Characteristics”. Removed Max Voltage Ripple parameter from Table 44-55, “Analog Power Supply Characteristics”. Added Refresh Time to Table 44-56, “Channel Conversion Time and DAC Clock”. In Section 44.12 “AC Characteristics” modified ● Table 44-64, “SPI Timings”. ● Table 44-65, “SSC Timings” ● Table 44-66, “SMC Read Signals - NRD Controlled (READ_MODE = 1)” ● Table 44-68, “SMC Write Signals - NWE Controlled (WRITE_MODE = 1)” ● Table 44-69, “SMC Write Signals - NCS Controlled (WRITE_MODE = 0)” ● Table 44-70, “USART SPI Timings” Table 44-71 ”Two-wire Serial Bus Requirements”: Added parameter t_{BUF} Section 44.12.9 “Embedded Flash Characteristics”: modified Table 44-72, “Embedded Flash Wait State at 105°C”. Table 44-73, “AC Flash Characteristics”: Full Chip Erase: Added values for 256 Kbytes and 128 Kbytes. Added new parameter Page Program Time.
	Section 45. “Mechanical Characteristics” Table 45-20 ”64-ball WLCSP Package Dimensions (in mm)” Added body size for SAM4S4 for WLCSP64 package. Figure 45-8 ”48-lead LQFP Package Drawing” and corresponding characteristics added. Figure 45-9 ”48-lead QFN Package Drawing” and corresponding characteristics added.
	Section 48. “Errata” Added Section 48.3 “Errata SAM4S4/S2 Rev. A Parts”.
	Section 47. “Ordering Information” Added information on carrier type availability. Updated Table 47-1 ”Ordering Codes for SAM4S Devices”. Added new ordering codes for SAM4S4 and SAM4S2 devices.