- Quartz or ceramic resonator oscillators: 3 to 20 MHz main power with Failure Detection and optional low power 32.768 kHz for RTC or device clock
- High precision 8/12 MHz factory trimmed internal RC oscillator with 4 MHz default frequency for device start-up. In-application trimming access for frequency adjustment
- Slow Clock Internal RC oscillator as permanent low-power mode device clock
- PLL up to 240 MHz for device clock
- Temperature Sensor
- Up to 23 peripheral DMA (PDC) channels

- Low Power Modes
  - Sleep and Backup modes, down to 0.7 µA in Backup mode
  - Low-power RTC
- Peripherals
  - Up to 3 USARTs with ISO7816 , IrDA®(only USART0), RS-485, and SPI Mode
  - Up to 4 2-wire UARTs
  - Up to 3 Two Wire Interfaces (TWI)
  - 1 SPI
  - 2 Three-channel 16-bit Timer/Counter with capture, waveform, compare and PWM mode. Quadrature Decoder Logic and 2-bit Gray Up/Down for Stepper Motor
  - 1 Four-channel 16-bit PWM
  - 32-bit Real-time Timer and RTC with calendar and alarm features
- I/Os
  - Up to 79 I/O lines with external interrupt capability (edge or level sensitivity), debouncing, glitch filtering and on-die Series Resistor Termination. Individually Programmable Open-drain, Pull-up and Pull-down resistor and Synchronous Output
  - Three 32-bit Parallel Input/Output Controllers
- Analog
  - One 10-bit ADC up to 510 ksamples/sec, with Digital Averaging Function providing Enhanced Resolution Mode up to 12-bit, Up to 16-channels
  - One 10-bit DAC up to 1 MSamples/sec
  - Internal voltage reference, 3V typ
- Packages
  - 100-lead LQFP, 14 x 14 mm, pitch 0.5 mm/100-ball TFBGA, 9 x 9 mm, pitch 0.8 mm/100-ball VFBGA 7 x 7 mm, pitch 0.65 mm
  - 64-lead LQFP, 10 x 10 mm, pitch 0.5 mm/64-pad QFN 9 x 9 mm, pitch 0.5 mm
  - 48-lead LQFP, 7 x7 mm, pitch 0.5 mm/48-pad QFN 7 x 7 mm, pitch 0.5 mm

1.1 Configuration Summary

The SAM4N series devices differ in memory size, package and features. Table 1-1 summarizes the configurations of the device family.

Table 1-1. Configuration Summary

Feature	SAM4N16C	SAM4N16B	SAM4N8C	SAM4N8B	SAM4N8A
Flash	1024 Kbytes	1024 Kbytes	512 Kbytes	512 Kbytes	512 Kbytes
SRAM	80 Kbytes	80 Kbytes	64 Kbytes	64 Kbytes	64 Kbytes
Package	LQFP100 TFBGA100 VFBGA100	LQFP64 QFN64	LQFP100 TFBGA100 VFBGA100	LQFP64 QFN64	LQFP48 QFN48
Number of PIOs	79	47	79	47	34
10-bit ADC	17 ch (1)	11 ch (1)	17 ch (1)	11 ch (1)	9 ch (1)
10-bit DAC	1 ch	1 ch	1 ch	1 ch	-
16-bit Timer	6	6(2)	6	6(2)	6(2)
PDC Channels	23	23	23	23	23
USART/ UART	3/4	2/4	3/4	2/4	1/4
SPI	4(3)	3(3)	4(3)	3(3)	2(3)
TWI	3	3	3	3	3
PWM	7(4)	4(4)	7(4)	4(4)	4(4)

Notes:
1. Included Temperature Sensor.
2. Only 3 channels output.
3. USARTs with SPI mode are taken into account.
4. Timer Counter in PWM mode is taken into account.

2. SAM4N8/16 Block Diagram

Figure 2-1. SAM4N8/16 100-pin Version Block Diagram

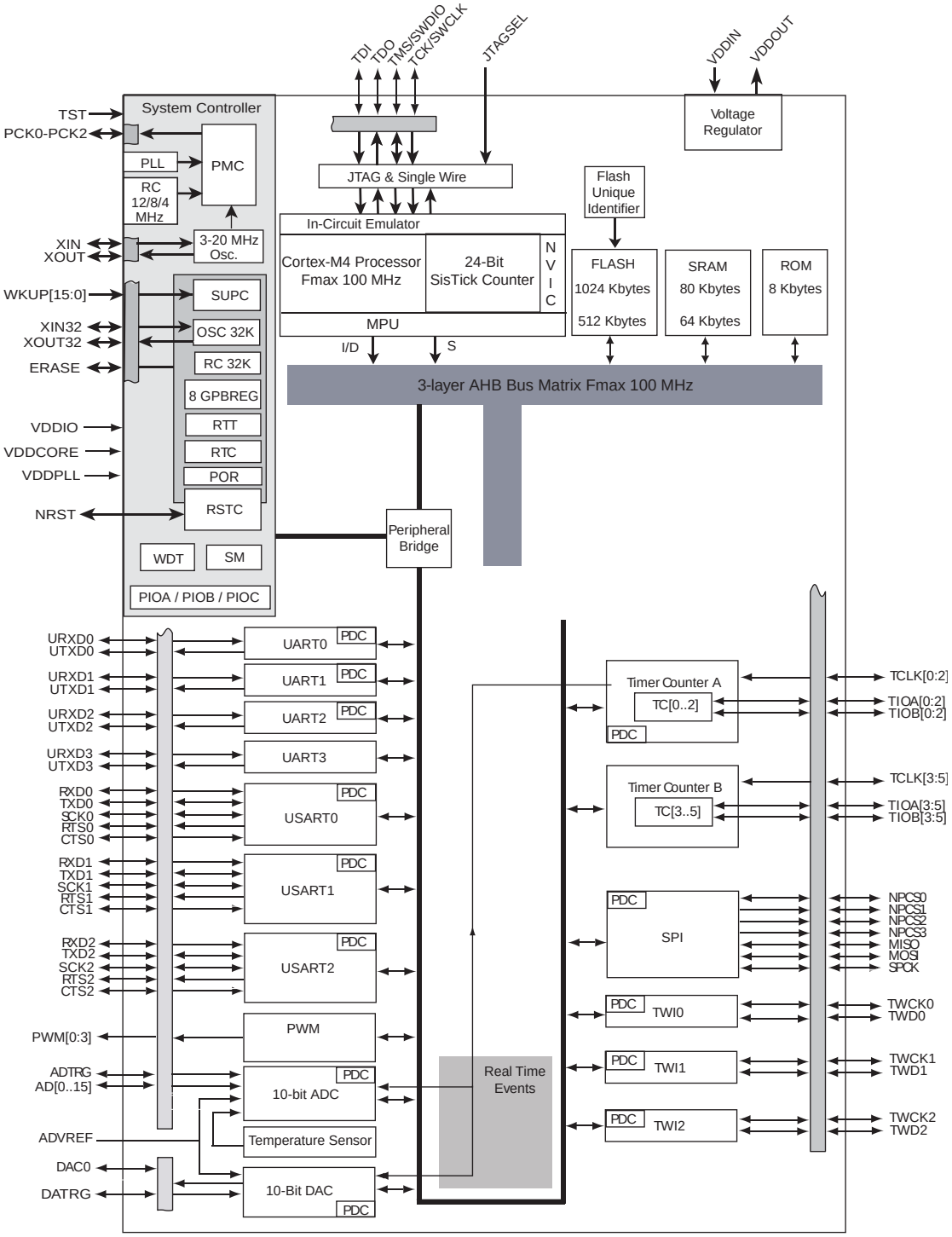


Figure 2-2. SAM4N8/16 64-pin Version Block Diagram

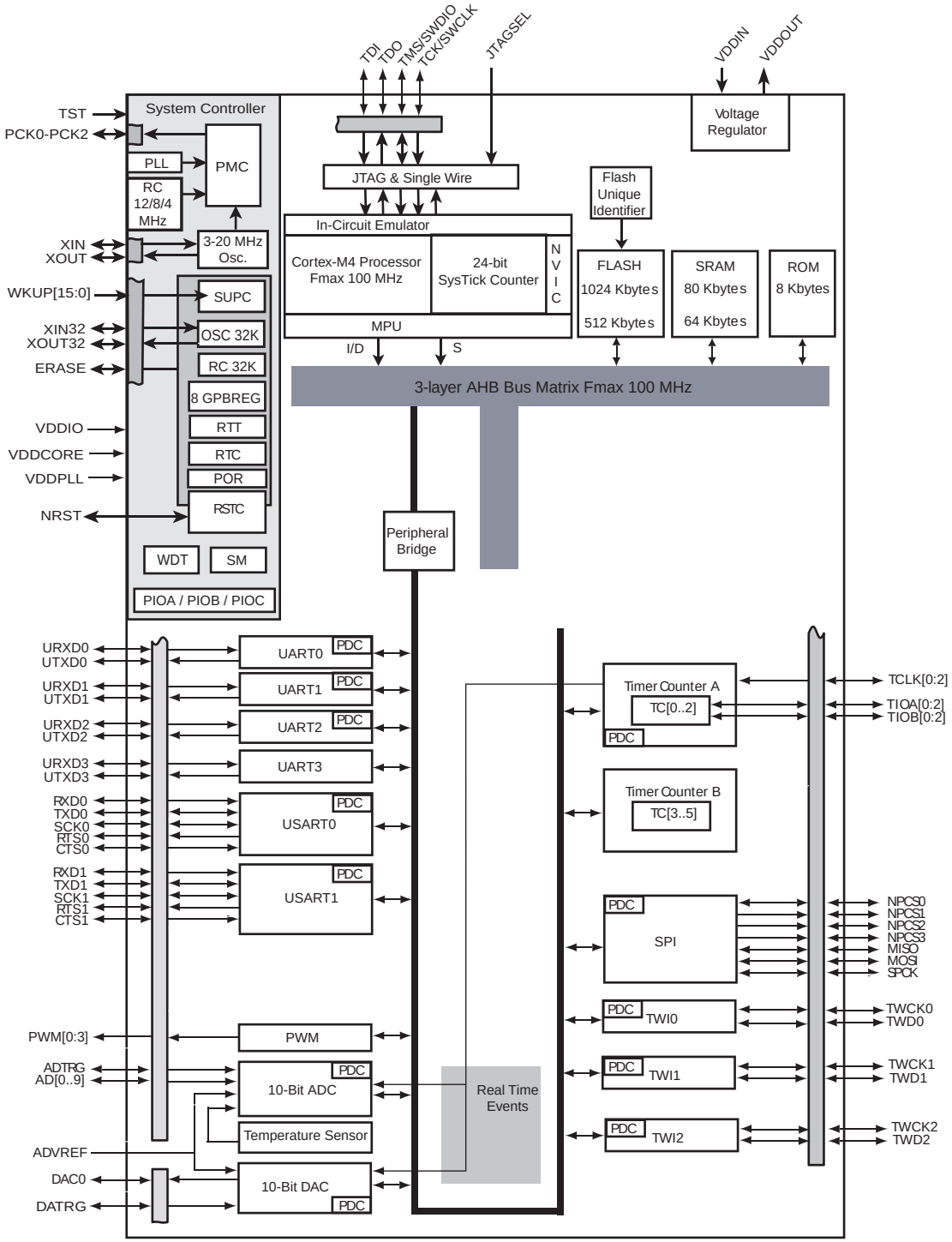
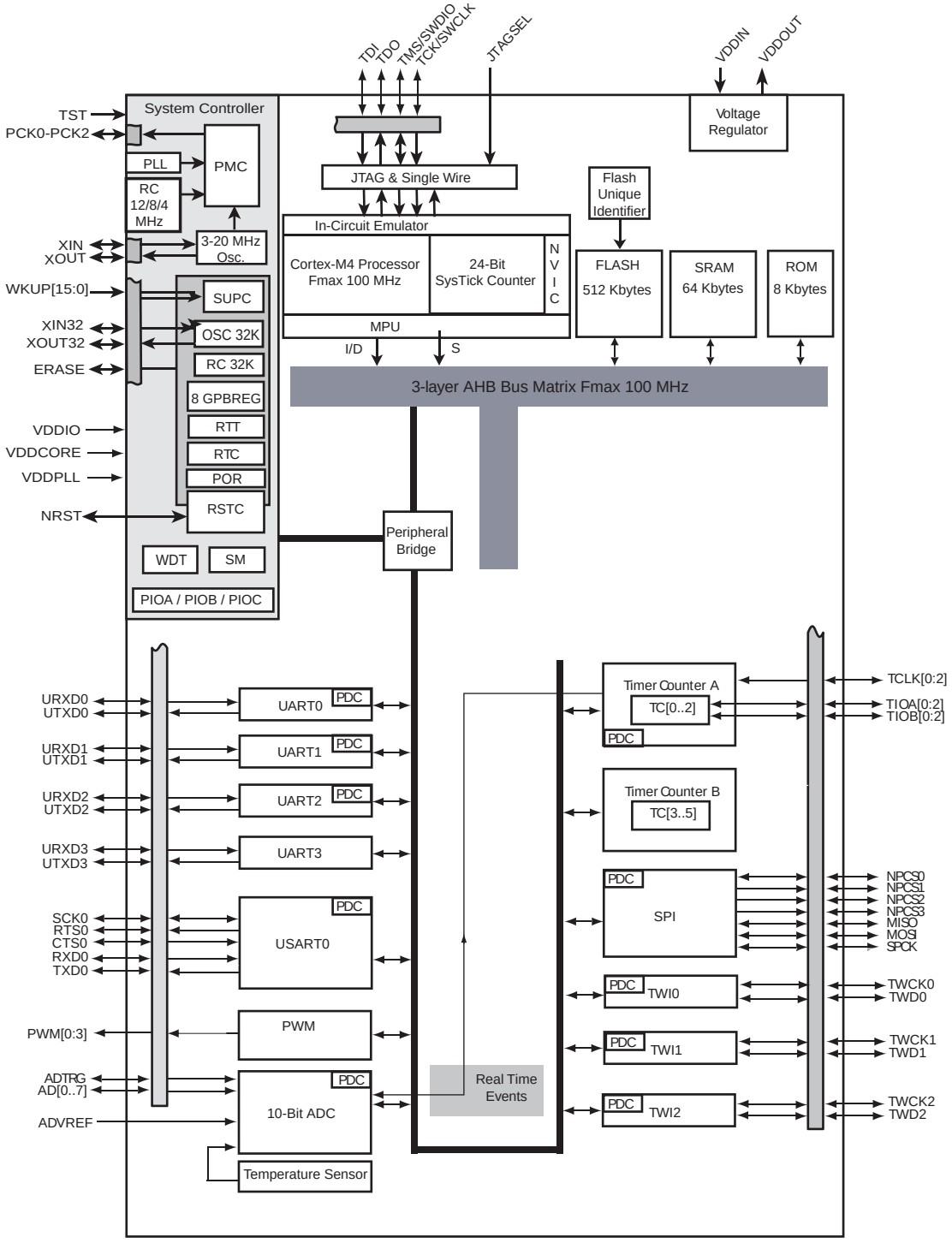


Figure 2-3. SAM4N8 48-pin Version Block Diagram



3. Signals Description

Table 3-1 gives details on the signal name classified by peripheral.

Table 3-1. Signal Description List

Signal Name	Function	Type	Active Level	Voltage Reference	Comments
Power Supplies					
VDDIO	Peripherals I/O Lines Power Supply	Power			1.62V to 3.6V
VDDIN	Voltage Regulator, ADC and DAC Power Supply	Power			1.6V to 3.6V
VDDOUT	Voltage Regulator Output	Power			1.2V Output
VDDPLL	Oscillator Power Supply	Power			1.08V to 1.32V
VDDCORE	Core Chip Power Supply	Power			1.08V to 1.32V Connected externally to VDDOUT
GND	Ground	Ground			
Clocks, Oscillators and PLLs					
XIN	Main Oscillator Input	Input		VDDIO	
XOUT	Main Oscillator Output	Output			
XIN32	Slow Clock Oscillator Input	Input		VDDIO	
XOUT32	Slow Clock Oscillator Output	Output			
PCK0 - PCK2	Programmable Clock Output	Output			
ICE and JTAG					
TCK	Test Clock	Input		VDDIO	No pull-up resistor
TDI	Test Data In	Input		VDDIO	No pull-up resistor
TDO	Test Data Out	Output		VDDIO	
TRACESWO	Trace Asynchronous Data Out	Output		VDDIO	
SWDIO	Serial Wire Input/Output	I/O		VDDIO	
SWCLK	Serial Wire Clock	Input		VDDIO	
TMS	Test Mode Select	Input		VDDIO	No pull-up resistor
JTAGSEL	JTAG Selection	Input	High	VDDIO	Pull-down resistor
Flash Memory					
ERASE	Flash and NVM Configuration Bits Erase Command	Input	High	VDDIO	Pull-down (15 kΩ) resistor
Reset/Test					
NRST	Microcontroller Reset	I/O	Low	VDDIO	Pull-Up resistor
TST	Test Mode Select	Input		VDDIO	Pull-down resistor
Universal Asynchronous Receiver Transmitter - UARTx					
URXDx	UART Receive Data	Input			
UTXDx	UART Transmit Data	Output			

Table 3-1. Signal Description List

Signal Name	Function	Type	Active Level	Voltage Reference	Comments
PIO Controller - PIOA - PIOB - PIOC					
PA0 - PA31	Parallel IO Controller A	I/O		VDDIO	Pulled-up input at reset
PB0 - PB14	Parallel IO Controller B	I/O		VDDIO	Pulled-up input at reset
PC0 - PC31	Parallel IO Controller C	I/O		VDDIO	Pulled-up input at reset
Universal Synchronous Asynchronous Receiver Transmitter USARTx					
SCKx	USARTx Serial Clock	I/O			
TXDx	USARTx Transmit Data	I/O			
RXDx	USARTx Receive Data	Input			
RTSx	USARTx Request To Send	Output			
CTSx	USARTx Clear To Send	Input			
Timer/Counter - TCx					
TCLKx	TC Channel x External Clock Input	Input			
TIOAx	TC Channel x I/O Line A	I/O			
TIOBx	TC Channel x I/O Line B	I/O			
Pulse Width Modulation Controller- PWMC					
PWM	PWM Waveform Output for channel	Output			
Serial Peripheral Interface - SPI					
MISO	Master In Slave Out	I/O			
MOSI	Master Out Slave In	I/O			
SPCK	SPI Serial Clock	I/O			
NPCS0	SPI Peripheral Chip Select 0	I/O	Low		
NPCS1 - NPCS3	SPI Peripheral Chip Select	Output	Low		
Two-Wire Interface- TWIx					
TWDx	TWIx Two-wire Serial Data	I/O			
TWCKx	TWIx Two-wire Serial Clock	I/O			
Analog					
ADVREF	ADC and DAC Reference	Analog			
10-bit Analog-to-Digital Converter - ADCC					
AD0 - AD15	Analog Inputs	Analog			
ADTRG	ADC Trigger	Input			
Digital-to-Analog Converter - DAC					
DAC0	DAC Channel Analog Output	Analog			
DACTRG	DAC Trigger	Input			

Table 3-1. Signal Description List

Signal Name	Function	Type	Active Level	Voltage Reference	Comments
Fast Flash Programming Interface					
PGMEN0-PGMEN2	Programming Enabling	Input		VDDIO	
PGMM0-PGMM3	Programming Mode	Input		VDDIO	
PGMD0-PGMD15	Programming Data	I/O		VDDIO	
PGMRDY	Programming Ready	Output	High	VDDIO	
PGMNVALID	Data Direction	Output	Low	VDDIO	
PGMNOE	Programming Read	Input	Low	VDDIO	
PGMCK	Programming Clock	Input		VDDIO	
PGMNCMD	Programming Command	Input	Low	VDDIO	

4. Package and Pinout

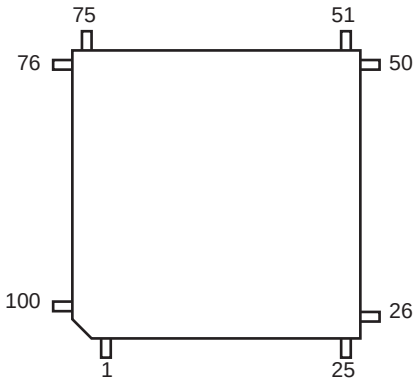
SAM4N devices are pin-to-pin compatible with SAM3N4.

Table 4-1. SAM4N Packages

	100 Pins/ Balls	64 Pins/ Balls	48 Pins/balls
SAM4N16	LQFP,TFBGA and VFBGA	LQFP and QFN	-
SAM4N8	LQFP,TFBGA and VFBGA	LQFP and QFN	LQFP and QFN

4.1 Overview of the 100-lead LQFP Package

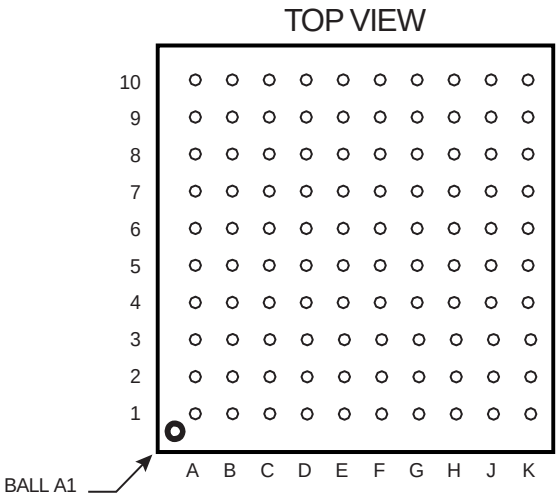
Figure 4-1. Orientation of the 100-lead LQFP Package



4.2 Overview of the 100-ball TFBGA Package

The 100-ball TFBGA package has a 0.8 mm ball pitch and respects the Green Standards. Its dimensions are 9 x 9 x 1.1 mm.

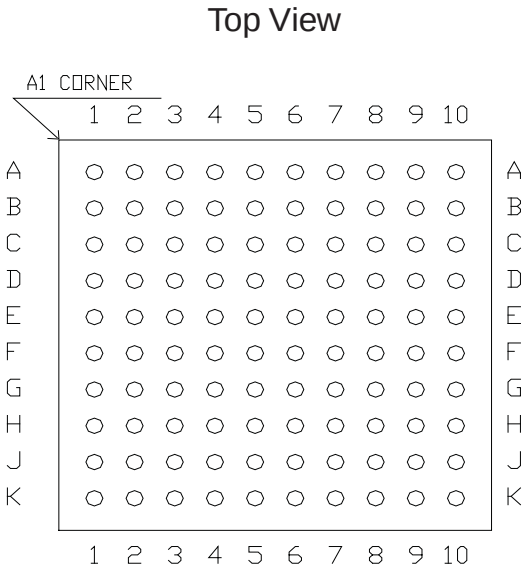
Figure 4-2. Orientation of the 100-ball TFBGA Package



4.3 Overview of the 100-ball VFBGA Package

The 100-ball VFBGA package has a 0.65 mm ball pitch and respects the Green Standards. Its dimensions are 7x 7x 1 mm.

Figure 4-3. Orientation of the 100-ball VFBGA Package



4.4 100-lead LQFP, TFBGA and VFBGA Pinout

Table 4-2. SAM4N8/16 100-lead LQFP Pinout

1	ADVREF	26	GND	51	TDI/PB4	76	TDO/TRACESWO/ PB5
2	GND	27	VDDIO	52	PA6/PGMNOE	77	JTAGSEL
3	PB0/AD4	28	PA16/PGMD4	53	PA5/PGMRDY	78	PC18
4	PC29/AD13	29	PC7	54	PC28	79	TMS/SWDIO/PB6
5	PB1/AD5	30	PA15/PGMD3	55	PA4/PGMNCMD	80	PC19
6	PC30/AD14	31	PA14/PGMD2	56	VDDCORE	81	PA31
7	PB2/AD6	32	PC6	57	PA27	82	PC20
8	PC31/AD15	33	PA13/PGMD1	58	PC8	83	TCK/SWCLK/PB7
9	PB3/AD7	34	PA24	59	PA28	84	PC21
10	VDDIN	35	PC5	60	NRST	85	VDDCORE
11	VDDOUT	36	VDDCORE	61	TST	86	PC22
12	PA17/PGMD5/ AD0	37	PC4	62	PC9	87	ERASE/PB12
13	PC26	38	PA25	63	PA29	88	PB10
14	PA18/PGMD6/ AD1	39	PA26	64	PA30	89	PB11
15	PA21/AD8	40	PC3	65	PC10	90	PC23
16	VDDCORE	41	PA12/PGMD0	66	PA3	91	VDDIO
17	PC27	42	PA11/PGMM3	67	PA2/PGMEN2	92	PC24
18	PA19/PGMD7/ AD2	43	PC2	68	PC11	93	PB13/DAC0
19	PC15/AD11	44	PA10/PGMM2	69	VDDIO	94	PC25
20	PA22/AD9	45	GND	70	GND	95	GND
21	PC13/AD10	46	PA9/PGMM1	71	PC14	96	PB8/XOUT
22	PA23	47	PC1	72	PA1/PGMEN1	97	PB9/PGMCK/XIN
23	PC12/AD12	48	PA8/XOUT32/ PGMM0	73	PC16	98	VDDIO
24	PA20/AD3	49	PA7/XIN32/ PGMNVALID	74	PA0/PGMEN0	99	PB14
25	PC0	50	VDDIO	75	PC17	100	VDDPLL

Table 4-3. SAM4N8/16 100-ball TFBGA Pinout

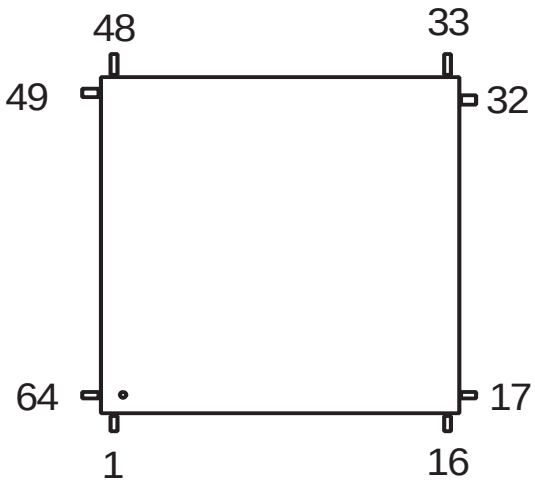
A1	PB1/AD5	C6	TCK/SWCLK/PB7	F1	PA18/PGMD6/ AD1	H6	PC4
A2	PC29	C7	PC16	F2	PC26	H7	PA11/PGMM3
A3	VDDIO	C8	PA1/PGMEN1	F3	VDDOUT	H8	PC1
A4	PB9/PGMCK/XIN	C9	PC17	F4	GND	H9	PA6/PGMNOE
A5	PB8/XOUT	C10	PA0/PGMEN0	F5	VDDIO	H10	TDI/PB4
A6	PB13/DAC0	D1	PB3/AD7	F6	PA27	J1	PC15/AD11
A7	PB11	D2	PB0/AD4	F7	PC8	J2	PC0
A8	PB10	D3	PC24	F8	PA28	J3	PA16/PGMD4
A9	TMS/SWDIO/PB6	D4	PC22	F9	TST	J4	PC6
A10	JTAGSEL	D5	GND	F10	PC9	J5	PA24
B1	PC30	D6	GND	G1	PA21/AD8	J6	PA25
B2	ADVREF	D7	VDDCORE	G2	PC27	J7	PA10/PGMM2
B3	GND	D8	PA2/PGMEN2	G3	PA15/PGMD3	J8	GND
B4	PB14	D9	PC11	G4	VDDCORE	J9	VDDCORE
B5	PC21	D10	PC14	G5	VDDCORE	J10	VDDIO
B6	PC20	E1	PA17/PGMD5/ AD0	G6	PA26	K1	PA22/AD9
B7	PA31	E2	PC31	G7	PA12/PGMD0	K2	PC13/AD10
B8	PC19	E3	VDDIN	G8	PC28	K3	PC12/AD12
B9	PC18	E4	GND	G9	PA4/PGMNCMD	K4	PA20/AD3
B10	TDO/TRACESWO/ PB5	E5	GND	G10	PA5/PGMRDY	K5	PC5
C1	PB2/AD6	E6	NRST	H1	PA19/PGMD7/ AD2	K6	PC3
C2	VDDPLL	E7	PA29/AD13	H2	PA23	K7	PC2
C3	PC25	E8	PA30/AD14	H3	PC7	K8	PA9/PGMM1
C4	PC23	E9	PC10	H4	PA14/PGMD2	K9	PA8/XOUT32/ PGMM0
C5	ERASE/PB12	E10	PA3	H5	PA13/PGMD1	K10	PA7/XIN32/ PGMNVALID

Table 4-4. SAM4N8/16 100-ball VFBGA Pinout

A1	ADVREF	C6	PC9	F1	VDDOUT	H6	PA12/PGMD0
A2	VDDPLL	C7	TMS/SWDIO/PB6	F2	PA18/PGMD6/AD1	H7	PA9/PGMM1
A3	PB9/PGMCK/XIN	C8	PA1/PGMEN1	F3	PA17/PGMD5/AD0	H8	VDDCORE
A4	PB8/XOUT	C9	PA0/PGMEN0	F4	GND	H9	PA6/PGMNOE
A5	JTAGSEL	C10	PC16	F5	GND	H10	PA5/PGMRDY
A6	PB11	D1	PB1/AD5	F6	PC26	J1	PA20/AD3
A7	PB10	D2	PC30	F7	PA4/PGMNCMD	J2	PC12/AD12
A8	PC20	D3	PC31	F8	PA28	J3	PA16/PGMD4
A9	PC19	D4	PC22	F9	TST	J4	PC6
A10	TDO/TRACESWO/ PB5	D5	PC5	F10	PC8	J5	PA24
B1	GND	D6	PA29/AD13	G1	PC15/AD11	J6	PA25
B2	PC25	D7	PA30/AD14	G2	PA19/PGMD7/AD2	J7	PA11/PGMM3
B3	PB14	D8	GND	G3	PA21/PGMD9/AD8	J8	VDDCORE
B4	PB13/DAC0	D9	PC14	G4	PA15/PGMD3	J9	VDDCORE
B5	PC23	D10	PC11	G5	PC3	J10	TDI/PB4
B6	PC21	E1	VDDIN	G6	PA10/PGMM2	K1	PA23
B7	TCK/SWCLK/PB7	E2	PB3/AD7	G7	PC1	K2	PC0
B8	PA31	E3	PB2/AD6	G8	PC28	K3	PC7
B9	PC18	E4	GND	G9	NRST	K4	PA13/PGMD1
B10	PC17	E5	GND	G10	PA27	K5	PA26
C1	PB0/AD4	E6	GND	H1	PC13/AD10	K6	PC2
C2	PC29	E7	VDDIO	H2	PA22/AD9	K7	VDDIO
C3	PC24	E8	PC10	H3	PC27	K8	VDDIO
C4	ERASE/PB12	E9	PA2/PGMEN2	H4	PA14/PGMD2	K9	PA8/XOUT32/PGMM0
C5	VDDCORE	E10	PA3	H5	PC4	K10	PA7/XIN32/PGMNVALID

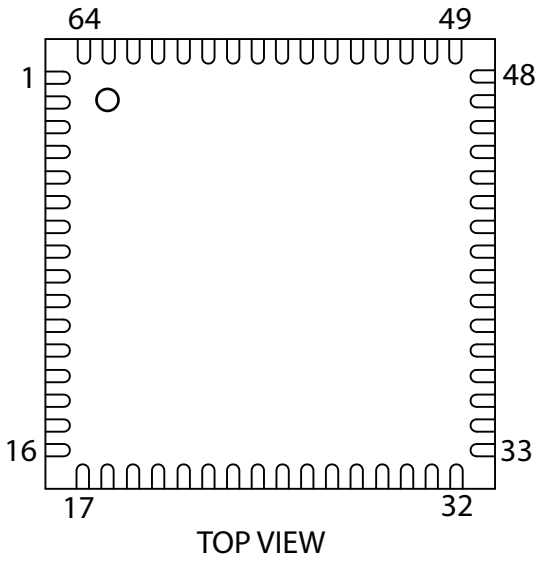
4.5 Overview of the 64-lead LQFP Package

Figure 4-4. Orientation of the 64-lead LQFP Package



4.6 Overview of the 64-lead QFN Package

Figure 4-5. Orientation of the 64-lead QFN Package



4.7 64-lead LQFP and QFN Pinout

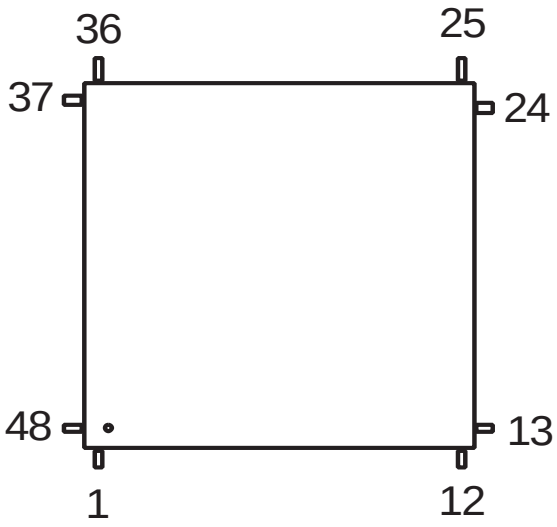
Table 4-5. 64-pin SAM4N8/16 Pinout

1	ADVREF	17	GND	33	TDI/PB4	49	TDO/TRACESWO/PB5
2	GND	18	VDDIO	34	PA6/PGMNOE	50	JTAGSEL
3	PB0/AD4	19	PA16/PGMD4	35	PA5/PGMRDY	51	TMS/SWDIO/PB6
4	PB1/AD5	20	PA15/PGMD3	36	PA4/PGMNCMD	52	PA31
5	PB2/AD6	21	PA14/PGMD2	37	PA27/PGMD15	53	TCK/SWCLK/PB7
6	PB3/AD7	22	PA13/PGMD1	38	PA28	54	VDDCORE
7	VDDIN	23	PA24/PGMD12	39	NRST	55	ERASE/PB12
8	VDDOUT	24	VDDCORE	40	TST	56	PB10
9	PA17/PGMD5/AD0	25	PA25/PGMD13	41	PA29	57	PB11
10	PA18/PGMD6/AD1	26	PA26/PGMD14	42	PA30	58	VDDIO
11	PA21/PGMD9/AD8	27	PA12/PGMD0	43	PA3	59	PB13/DAC0
12	VDDCORE	28	PA11/PGMM3	44	PA2/PGMEN2	60	GND
13	PA19/PGMD7/AD2	29	PA10/PGMM2	45	VDDIO	61	XOUT/PB8
14	PA22/PGMD10/AD9	30	PA9/PGMM1	46	GND	62	XIN/PGMCK/PB9
15	PA23/PGMD11	31	PA8/XOUT32/PGMM0	47	PA1/PGMEN1	63	PB14
16	PA20/PGMD8/AD3	32	PA7/XIN32/XOUT32/PGMNVALID	48	PA0/PGMEN0	64	VDDPLL

Note: The bottom pad of the QFN package must be connected to ground.

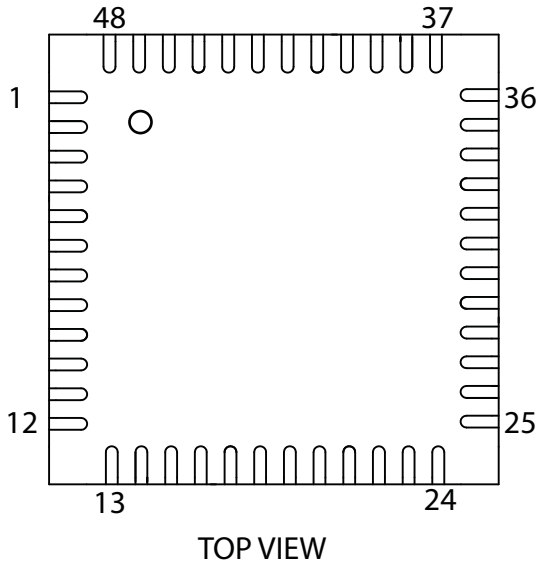
4.8 Overview of the 48-lead LQFP Package

Figure 4-6. Orientation of the 48-lead LQFP Package



4.9 Overview of the 48-lead QFN Package

Figure 4-7. Orientation of the 48-lead QFN Package



4.10 48-lead LQFP and QFN Pinout

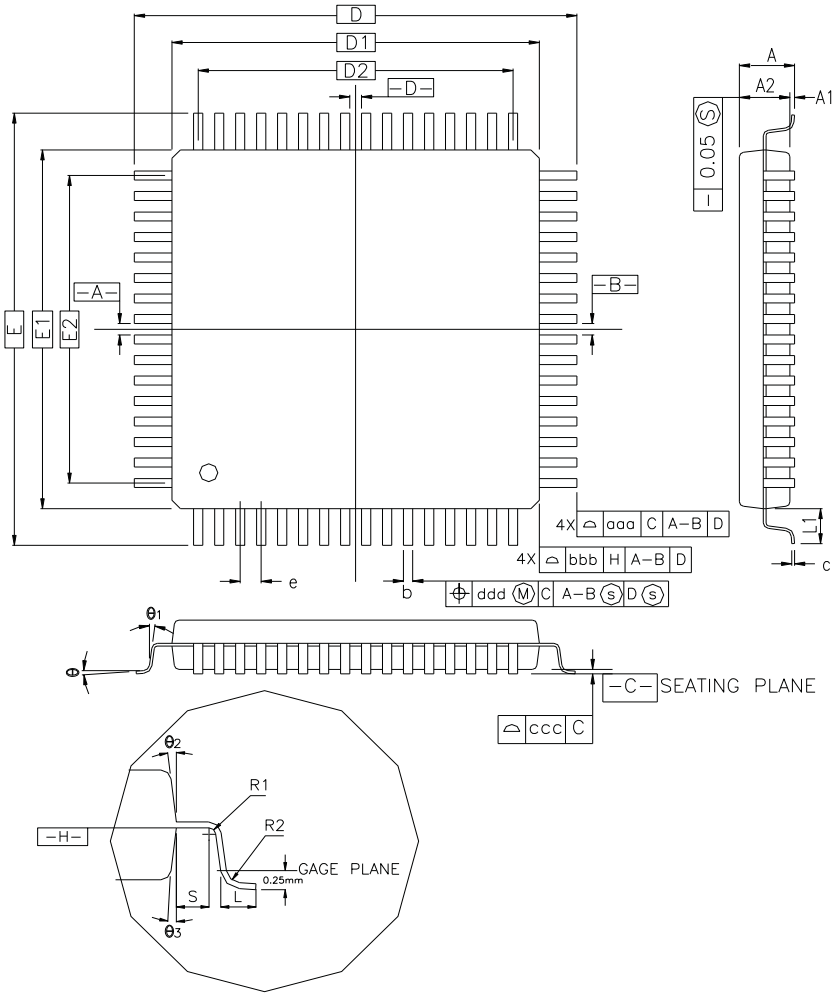
Table 4-6. 48-pin SAM4N8 Pinout

1	ADVREF	13	VDDIO	25	TDI/PB4	37	TDO/TRACESWO/ PB5
2	GND	14	PA16/PGMD4	26	PA6/PGMNOE	38	JTAGSEL
3	PB0/AD4	15	PA15/PGMD3	27	PA5/PGMRDY	39	TMS/SWDIO/PB6
4	PB1/AD5	16	PA14/PGMD2	28	PA4/PGMNCMD	40	TCK/SWCLK/PB7
5	PB2/AD6	17	PA13/PGMD1	29	NRST	41	VDDCORE
6	PB3/AD7	18	VDDCORE	30	TST	42	ERASE/PB12
7	VDDIN	19	PA12/PGMD0	31	PA3	43	PB10
8	VDDOUT	20	PA11/PGMM3	32	PA2/PGMEN2	44	PB11
9	PA17/PGMD5/AD0	21	PA10/PGMM2	33	VDDIO	45	XOUT/PB8
10	PA18/PGMD6/AD1	22	PA9/PGMM1	34	GND	46	XIN/P/PB9/GMCK
11	PA19/PGMD7/AD2	23	PA8/XOUT32/PG MM0	35	PA1/PGMEN1	47	VDDIO
12	PA20/AD3	24	PA7/XIN32/PGMN VALID	36	PA0/PGMEN0	48	VDDPLL

Note: The bottom pad of the QFN package must be connected to ground.

5. SAM4N Mechanical Characteristics

Figure 5-1. 100-lead LQFP Package Mechanical Drawing



COTROL DIMENSIONS ARE IN MILLIMETERS.

SYMBOL	MILLIMETER			INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.60	—	—	0.063
A_1	0.05	—	0.15	0.002	—	0.006
A_2	1.35	1.40	1.45	0.053	0.055	0.057
D	16.00 BSC.			0.630 BSC.		
D_1	14.00 BSC.			0.551 BSC.		
E	16.00 BSC.			0.630 BSC.		
E_1	14.00 BSC.			0.551 BSC.		
R_2	0.08	—	0.20	0.003	—	0.008
R_1	0.08	—	—	0.003	—	—
θ	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
L_1	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	12.00			0.472		
E2	12.00			0.472		
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		

Note : 1. This drawing is for general information only. Refer to JEDEC Drawing MS-026 for additional information.

Table 5-1. Device and LQFP Package Maximum Weight

SAM4N	800	mg

Table 5-2. LQFP Package Reference

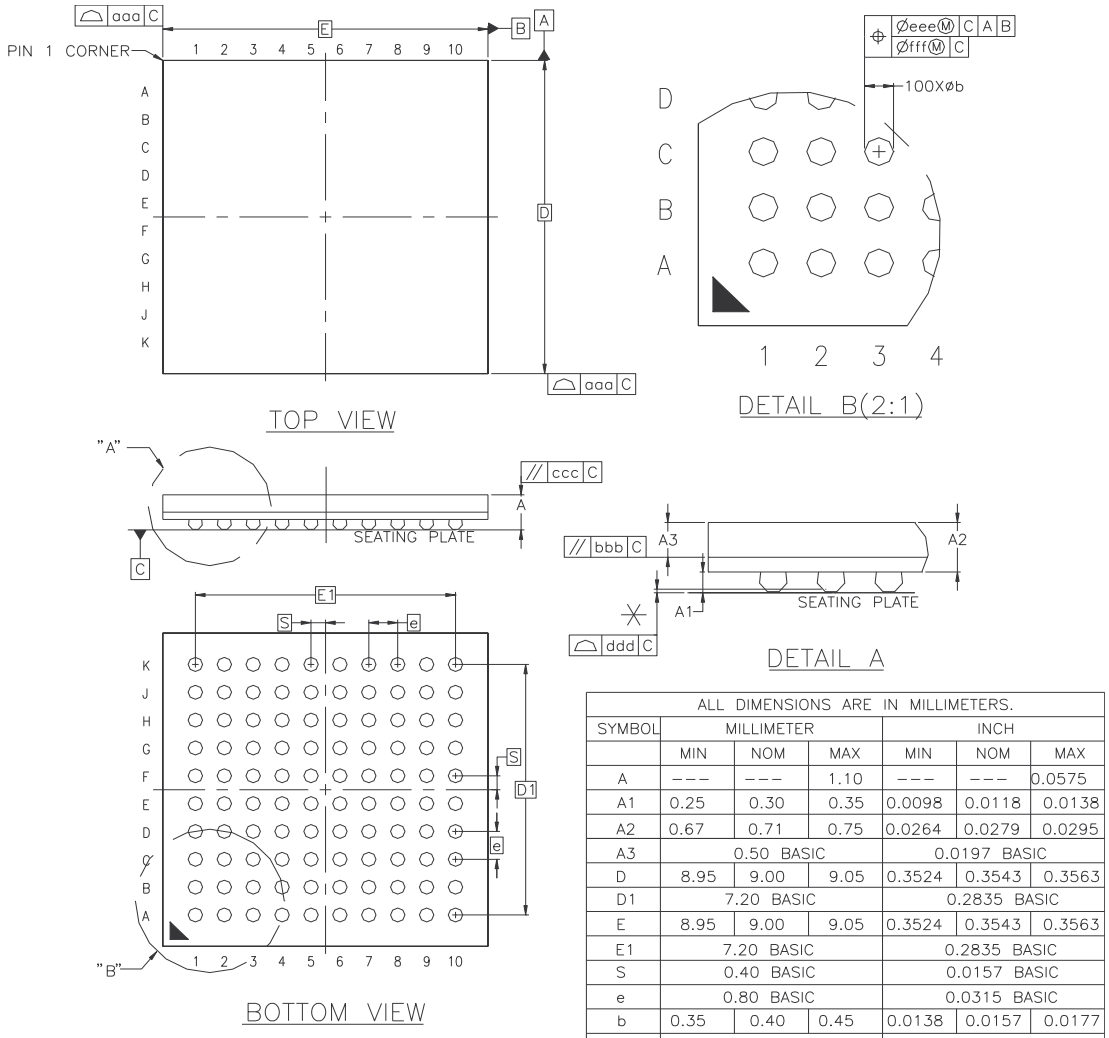
JEDEC Drawing Reference	MS-026
JESD97 Classification	e3

Table 5-3. LQFP Package Characteristics

Moisture Sensitivity Level	3

This package respects the recommendations of the NEMI User Group.

Figure 5-2. 100-ball TFBGA Package Drawing



ALL DIMENSIONS ARE IN MILLIMETERS.						
SYMBOL	MILLIMETER			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	---	---	1.10	---	---	0.0575
A1	0.25	0.30	0.35	0.0098	0.0118	0.0138
A2	0.67	0.71	0.75	0.0264	0.0279	0.0295
A3	0.50 BASIC			0.0197 BASIC		
D	8.95	9.00	9.05	0.3524	0.3543	0.3563
D1	7.20 BASIC			0.2835 BASIC		
E	8.95	9.00	9.05	0.3524	0.3543	0.3563
E1	7.20 BASIC			0.2835 BASIC		
S	0.40 BASIC			0.0157 BASIC		
e	0.80 BASIC			0.0315 BASIC		
b	0.35	0.40	0.45	0.0138	0.0157	0.0177
aaa	0.15			0.0059		
bbb	0.20			0.0079		
ccc	0.20			0.0079		
ddd	0.12			0.0047		
eee	0.15			0.0059		
fff	0.08			0.0031		

Table 5-4. TFBGA Package Reference - Soldering Information (Substrate Level)

Ball Land	Diameter 0.35 mm
Soldering Mask Opening	350 µm

Table 5-5. Device and 100-ball TFBGA Package Maximum Weight

SAM4N	140	mg

Table 5-6. 100-ball TFBGA Package Characteristics

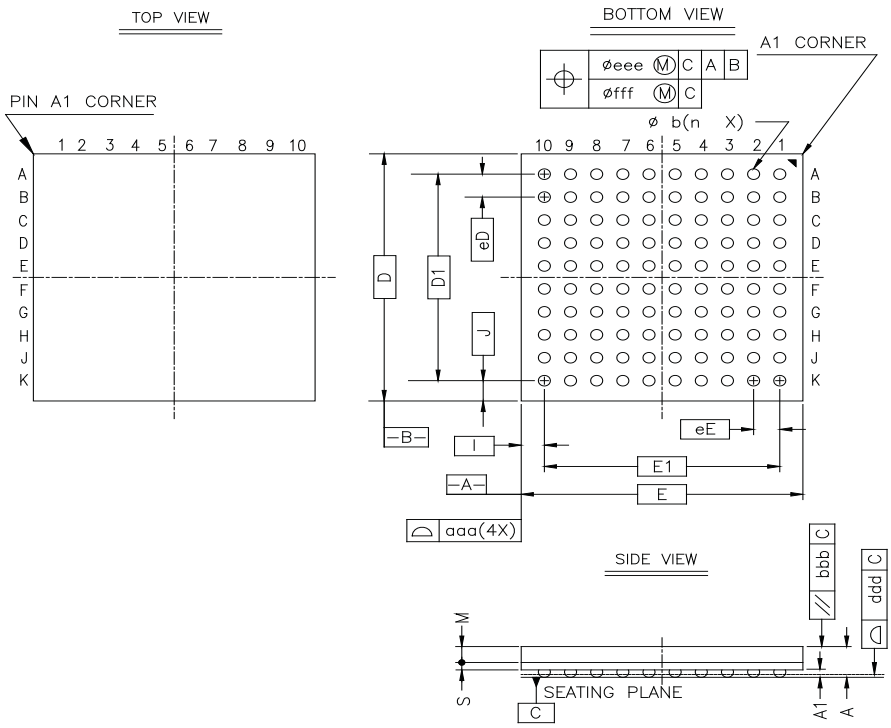
Moisture Sensitivity Level	3

Table 5-7. 100-ball TFBGA Package Reference

JEDEC Drawing Reference	MO-275-DDAC-01
JESD97 Classification	e8

This package respects the recommendations of the NEMI User Group.

Figure 5-3. 100-ball VFBGA Package Drawing



		Symbol	Common Dimensions
Package :			VFBGA
Body Size:	X	E	7.000±0.100
	Y	D	7.000±0.100
Ball Pitch :	X	eE	0.650
	Y	eD	0.650
Total Thickness :		A	1.000 MAX
Mold Thickness :		M	0.450 Ref.
Substrate Thickness :		S	0.210 Ref.
Ball Diameter :			0.300
Stand Off :		A1	0.160 ~ 0.260
Ball Width :		b	0.270 ~ 0.370
Package Edge Tolerance :		aaa	0.100
Mold Flatness :		bbb	0.100
Coplanarity:		ddd	0.080
Ball Offset (Package) :		eee	0.150
Ball Offset (Ball) :		fff	0.080
Ball Count :		n	100
Edge Ball Center to Center :	X	E1	5.850
	Y	D1	5.850
Corner Ball Center to Package Edge:	X	I	0.575
	Y	J	0.575

Table 5-8. VFBGA Package Reference - Soldering Information (Substrate Level)

Ball Land	Diameter 0.27 mm
Soldering Mask Opening	275 µm

Table 5-9. Device and 100-ball VFBGA Package Maximum Weight

SAM4N	75	mg

Table 5-10. 100-ball VFBGA Package Characteristics

Moisture Sensitivity Level	3

Table 5-11. 100-ball VFBGA Package Reference

JEDEC Drawing Reference	MO-275-BBE-1
JESD97 Classification	e8

This package respects the recommendations of the NEMI User Group.

Figure 5-4. 64-lead LQFP Package Drawing

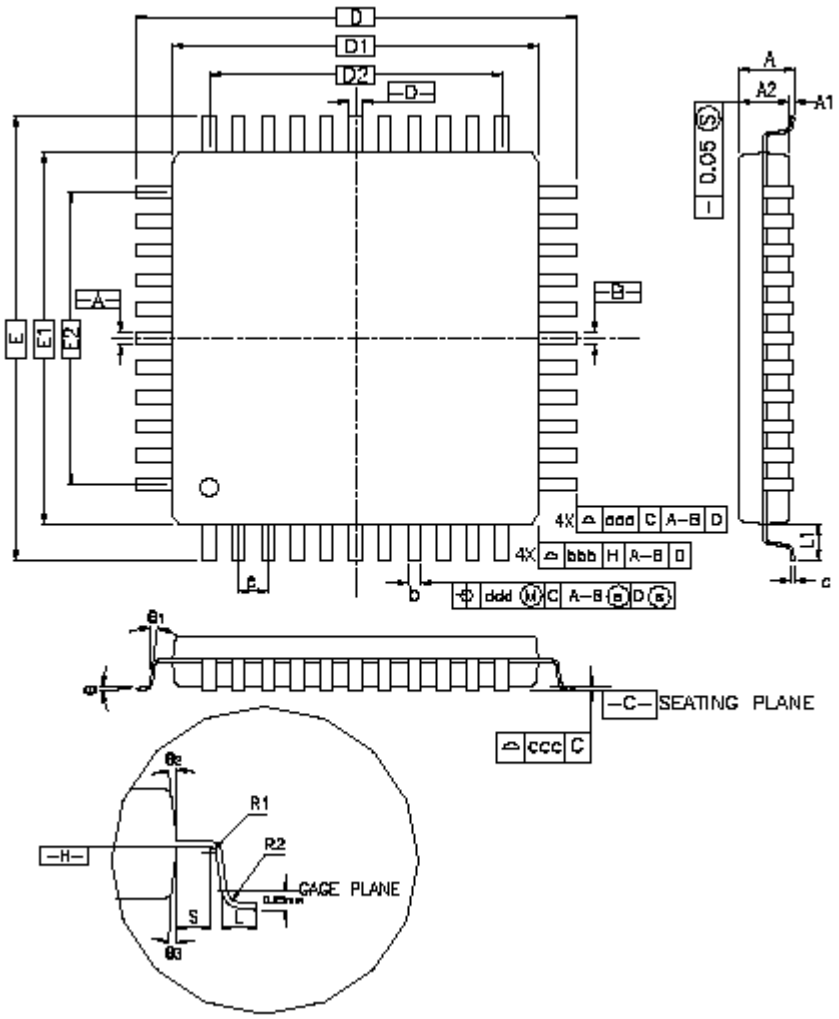


Table 5-12. 64-lead LQFP Package Dimensions (in mm)

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
A	–	–	1.60	–	–	0.063
A1	0.05	–	0.15	0.002	–	0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
D	12.00 BSC			0.472 BSC		
D1	10.00 BSC			0.383 BSC		
E	12.00 BSC			0.472 BSC		
E1	10.00 BSC			0.383 BSC		
R2	0.08	–	0.20	0.003	–	0.008
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 5-13. Device and LQFP Package Maximum Weight

SAM4N	750	mg

Table 5-14. LQFP Package Reference

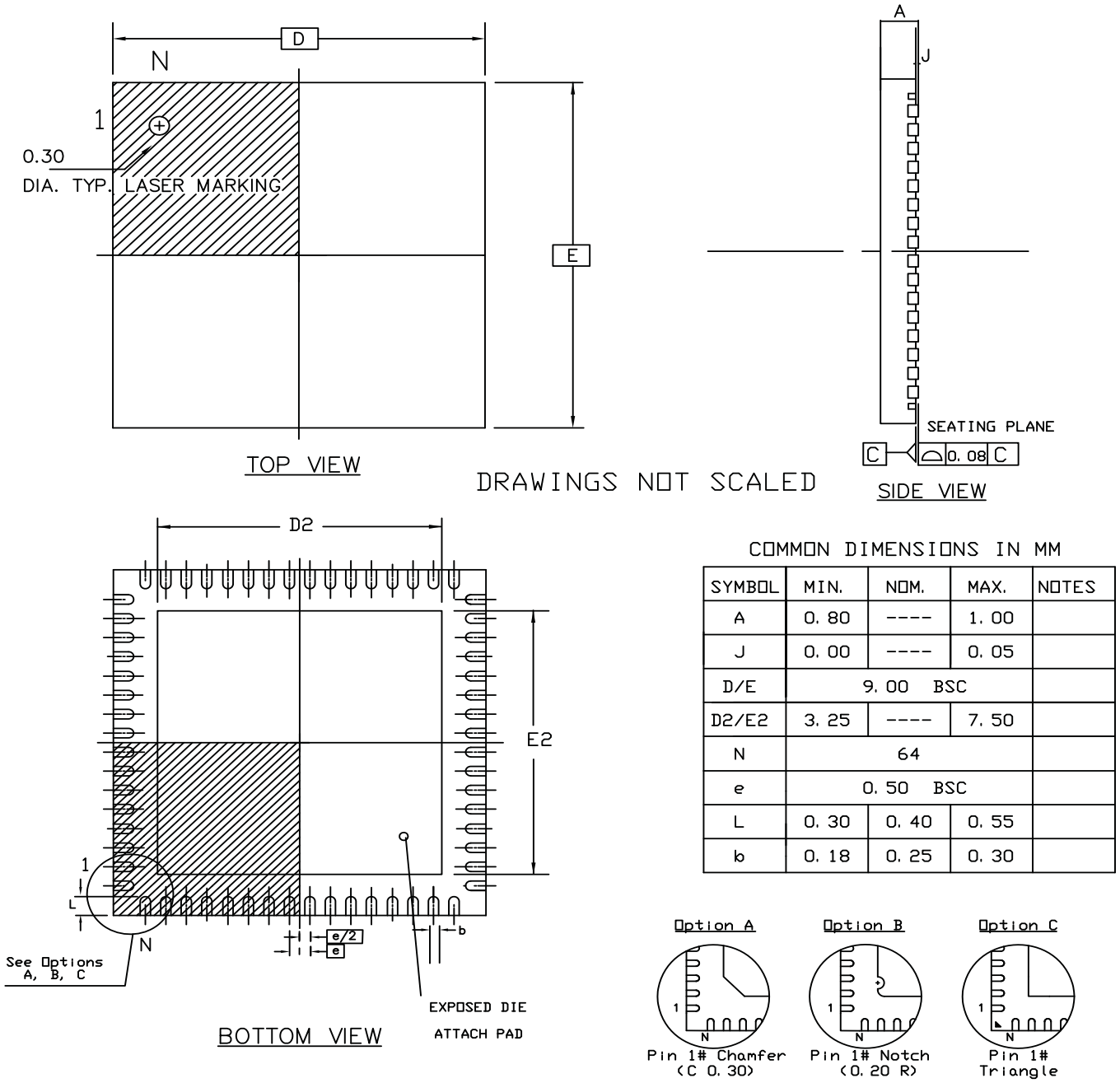
JEDEC Drawing Reference	MS-026
JESD97 Classification	e3

Table 5-15. LQFP Package Characteristics

Moisture Sensitivity Level	3

This package respects the recommendations of the NEMI User Group.

Figure 5-5. 64-pad QFN Package Drawing



COMMON DIMENSIONS IN MM

SYMBOL	MIN.	NOM.	MAX.	NOTES
A	0.80	----	1.00	
J	0.00	----	0.05	
D/E		9.00 BSC		
D2/E2	3.25	----	7.50	
N		64		
e		0.50 BSC		
L	0.30	0.40	0.55	
b	0.18	0.25	0.30	

Table 5-16. 64-pad QFN Package Dimensions (in mm)

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
A	–	–	090	–	–	0.035
A1	–	–	0.05	–	–	0.001
A2	–	0.65	0.70	–	0.026	0.028
A3		0.20 REF			0.008 REF	
b	0.23	0.25	0.28	0.009	0.010	0.011
D		9.00 BSC			0.354 BSC	
D2	6.95	7.10	7.25	0.274	0.280	0.285
E		9.00 BSC			0.354 BSC	
E2	6.95	7.10	7.25	0.274	0.280	0.285
L	0.35	0.40	0.45	0.014	0.016	0.018
e		0.50 BSC			0.020 BSC	
R	0.125	–	–	0.0005	–	–
Tolerances of Form and Position						
aaa		0.10			0.004	
bbb		0.10			0.004	
ccc		0.05			0.002	

Table 5-17. Device and QFN Package Maximum Weight (Preliminary)

SAM4N	280	mg

Table 5-18. QFN Package Reference

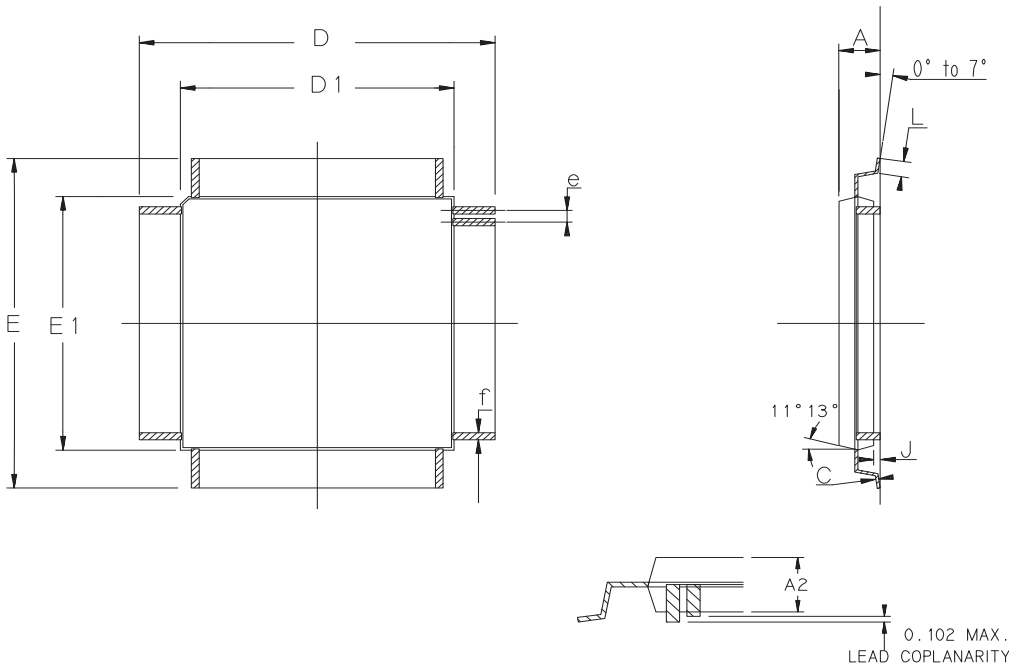
JEDEC Drawing Reference	MO-220
JESD97 Classification	e3

Table 5-19. QFN Package Characteristics

Moisture Sensitivity Level	3

This package respects the recommendations of the NEMI User Group.

Figure 5-6. 48-lead LQFP Package Drawing



	MM		INCH	
	Min	Max	Min	Max
A	–	1.60	–	.063
C	0.09	0.16	.004	.006
A2	1.35	1.45	.053	.057
D	9.00 BSC		.354 BSC	
D1	7.00 BSC		.276 BSC	
E	9.00 BSC		.354 BSC	
E1	7.00 BSC		.276 BSC	
J	0.05	0.15	.002	.006
L	0.45	0.75	.018	.030
e	0.50 BSC		.0197 BSC	
f	0.17	0.27	.007	.011

Table 5-20. 48-lead LQFP Package Dimensions (in mm)

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
A	–	–	1.60	–	–	0.063
A1	0.05	–	0.15	0.002	–	0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
D	9.00 BSC			0.354SC		
D1	7.00 BSC			0.276 BSC		
E	9.00 BSC			0.354 BSC		
E1	7.00 BSC			0.276 BSC		
R2	0.08	–	0.20	0.003	–	0.008
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	5.50			0.217		
E2	5.50			0.217		
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 5-21. Device and LQFP Package Maximum Weight

SAM4N	190	mg

Table 5-22. LQFP Package Characteristics

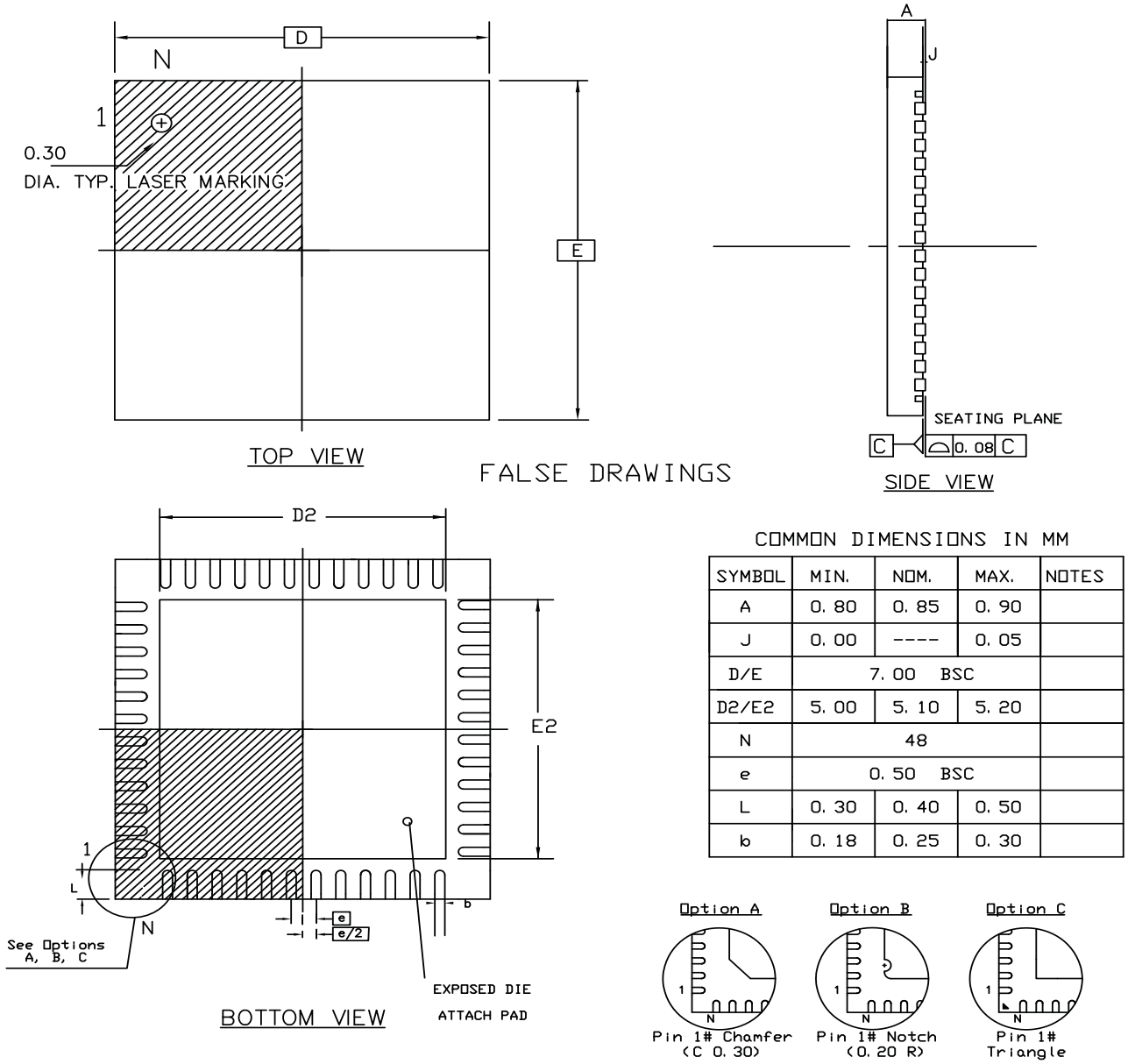
Moisture Sensitivity Level	3

Table 5-23. LQFP Package Reference

JEDEC Drawing Reference	MS-026
JESD97 Classification	e3

This package respects the recommendations of the NEMI User Group.

Figure 5-7. 48-pad QFN Package Drawing



COMMON DIMENSIONS IN MM

SYMBOL	MIN.	NOM.	MAX.	NOTES
A	0.80	0.85	0.90	
J	0.00	----	0.05	
D/E		7.00 BSC		
D2/E2	5.00	5.10	5.20	
N		48		
e		0.50 BSC		
L	0.30	0.40	0.50	
b	0.18	0.25	0.30	

Table 5-24. 48-pad QFN Package Dimensions (in mm)

Symbol	Millimeter			Inch		
	Min	Nom	Max	Min	Nom	Max
A	–	–	090	–	–	0.035
A1	–	–	0.05	–	–	0.002
A2	–	0.65	0.70	–	0.026	0.028
A3		0.20 REF			0.008 REF	
b	0.18	0.20	0.23	0.007	0.008	0.009
D		7.00 BSC			0.276 BSC	
D2	5.45	5.60	5.75	0.215	0.220	0.226
E		7.00 BSC			0.274 BSC	
E2	5.45	5.60	5.75	0.215	0.220	0.226
L	0.35	0.40	0.45	0.014	0.016	0.018
e		0.50 BSC			0.020 BSC	
R	0.09	–	–	0.004	–	–
Tolerances of Form and Position						
aaa		0.10			0.004	
bbb		0.10			0.004	
ccc		0.05			0.002	

Table 5-25. Device and QFN Package Maximum Weight

SAM4N	142	mg

Table 5-26. QFN Package Characteristics

Moisture Sensitivity Level	3

Table 5-27. QFN Package Reference

JEDEC Drawing Reference	MO-220
JESD97 Classification	e3

This package respects the recommendations of the NEMI User Group.

6. Ordering Information

Table 6-1. Ordering Codes for SAM4N Devices

Ordering Code	MRL	Flash (Kbytes)	RAM (Kbytes)	Package	Conditioning	Package Type	Temperature Operating Range
ATSAM4N16CA-CFU	A	1024	80	VFBGA 100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N16CA-CFUR	A	1024	80	VFBGA 100	Reel	Green	
ATSAM4N16CA-CU	A	1024	80	TFBGA100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N16CA-CUR	A	1024	80	TFBGA100	Reel	Green	
ATSAM4N16CA-AU	A	1024	80	QFP100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N16CA-AUR	A	1024	80	QFP100	Reel	Green	
ATSAM4N16BA-AU	A	1024	80	QFP64	Tray	Green	Industrial -40°C to 85°C
ATSAM4N16BA-AUR	A	1024	80	QFP64	Reel	Green	
ATSAM4N16BA-MU	A	1024	80	QFN64	Tray	Green	Industrial -40°C to 85°C
ATSAM4N16BA-MUR	A	1024	80	QFN64	Reel	Green	
ATSAM4N8CA-CFU	A	512	64	VFBGA 100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8CA-CFUR	A	512	64	VFBGA 100	Reel	Green	
ATSAM4N8CA-CU	A	512	64	TFBGA100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8CA-CUR	A	512	64	TFBGA100	Reel	Green	
ATSAM4N8CA-AU	A	512	64	QFP100	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8CA-AUR	A	512	64	QFP100	Reel	Green	
ATSAM4N8BA-AU	A	512	64	QFP64	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8BA-AUR	A	512	64	QFP64	Reel	Green	
ATSAM4N8BA-MU	A	512	64	QFN64	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8BA-MUR	A	512	64	QFN64	Reel	Green	
ATSAM4N8AA-AU	A	512	64	QFP48	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8AA-AUR	A	512	64	QFP48	Reel	Green	
ATSAM4N8AA-MU	A	512	64	QFN48	Tray	Green	Industrial -40°C to 85°C
ATSAM4N8AA-MUR	A	512	64	QFN48	Reel	Green	

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	First Issue	

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