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Description

The Atmel SAMA5D3 series is a high-performance, power-efficient embedded MPU based on the ARM® Cortex®-A5 processor, achieving 536 MHz with power consumption levels below 0.5 mW in low-power mode. The device features a floating point unit for high-precision computing and accelerated data processing, and a high data bandwidth architecture. It integrates advanced user interface and connectivity peripherals and security features.

The SAMA5D3 series features an internal multi-layer bus architecture associated with 39 DMA channels to sustain the high bandwidth required by the processor and the high-speed peripherals. The device offers support for DDR2/LPDDR/LPDDR2 and MLC NAND Flash memory with 24-bit ECC.

The comprehensive peripheral set includes an LCD controller with overlays for hardware-accelerated image composition, a touchscreen interface and a CMOS sensor interface. Connectivity peripherals include Gigabit EMAC with IEEE1588, 10/100 EMAC, multiple CAN, UART, SPI and I2C. With its secure boot mechanism, hardware accelerated engines for encryption (AES, TDES) and hash function (SHA), the SAMA5D3 ensures anti-cloning, code protection and secure external data transfers.

The SAMA5D3 series is optimized for control panel/HMI applications and applications that require high levels of connectivity in the industrial and consumer markets. Its low-power consumption levels make the SAMA5D3 particularly suited for battery-powered devices.

There are five SAMA5D3 devices in this series. [Table 1-1 “SAMA5D3 Device Differences”](#) shows the differences in the embedded features. All other features are available on all derivatives; this includes the three USB ports as well as the encryption engine and secure boot features.

1. Features

- Core
 - ARM® Cortex®-A5 Processor with ARM v7-A Thumb2® Instruction Set
 - CPU Frequency up to 536 MHz
 - 32 Kbyte Data Cache, 32 Kbyte Instruction Cache, Virtual Memory System Architecture (VMSA)
 - Fully Integrated MMU and Floating Point Unit (VFPv4)
- Memories
 - One 160 Kbyte Internal ROM Single-cycle Access at System Speed, Embedded Boot Loader: Boot on 8-bit NAND Flash, SDCard, eMMC, serial DataFlash®, selectable Order
 - One 128 Kbyte Internal SRAM, Single-cycle Access at System Speed
 - High Bandwidth 32-bit Multi-port Dynamic RAM Controller supporting 512 Mbyte 8 bank DDR2/LPDDR/LPDDR2 with datapath scrambling
 - Independent Static Memory Controller with datapath scrambling and SLC/MLC NAND Support with up to 24-bit Error Correcting Code (PMECC)
- System running up to 166 MHz
 - Reset Controller, Shut Down Controller, Periodic Interval Timer, Watchdog Timer and Real-time Clock
 - Boot Mode Select Option, Remap Command
 - Internal Low-power 32 kHz RC Oscillator and Fast 12 MHz RC Oscillator
 - Selectable 32768 Hz Low-power Oscillator and 12 MHz Oscillator
 - One 400 to 1000 MHz PLL for the System and one PLL at 480 MHz optimized for USB High Speed
 - 39 DMA Channels including two 8-channel 64-bit Central DMA Controllers
 - 64-bit Advanced Interrupt Controller
 - Three Programmable External Clock Signals
 - Programmable Fuse Box with 256 fuse bits, 192 of them available for Customer
- Low Power Management
 - Shut Down Controller
 - Battery Backup Registers
 - Clock Generator and Power Management Controller
 - Very Slow Clock Operating Mode, Software Programmable Power Optimization Capabilities
- Peripherals
 - LCD TFT Controller with Overlay, Alpha-blending, Rotation, Scaling and Color Space Conversion
 - ITU-R BT. 601/656 Image Sensor Interface
 - Three HS/FS/LS USB Ports with On-Chip Transceivers
 - One Device Controller
 - One Host Controller with Integrated Root Hub (3 Downstream Ports)
 - One 10/100/1000 Mbps Gigabit Ethernet MAC Controller (GMAC) with IEEE1588 support
 - One 10/100 Mbps Ethernet MAC Controller (EMAC)
 - Two CAN Controllers with 8 Mailboxes, fully Compliant with CAN 2.0 Part A and 2.0 Part B
 - Softmodem Interface
 - Three High Speed Memory Card Hosts (eMMC 4.3 and SD 2.0)
 - Two Master/Slave Serial Peripheral Interfaces
 - Two Synchronous Serial Controllers
 - Three Two-wire Interface up to 400 Kbit/s supporting I2C Protocol and SMBUS
 - Four USARTs, two UARTs, one DBGU
 - Two Three-channel 32-bit Timer/Counters
 - One 4-channel 16-bit PWM Controller

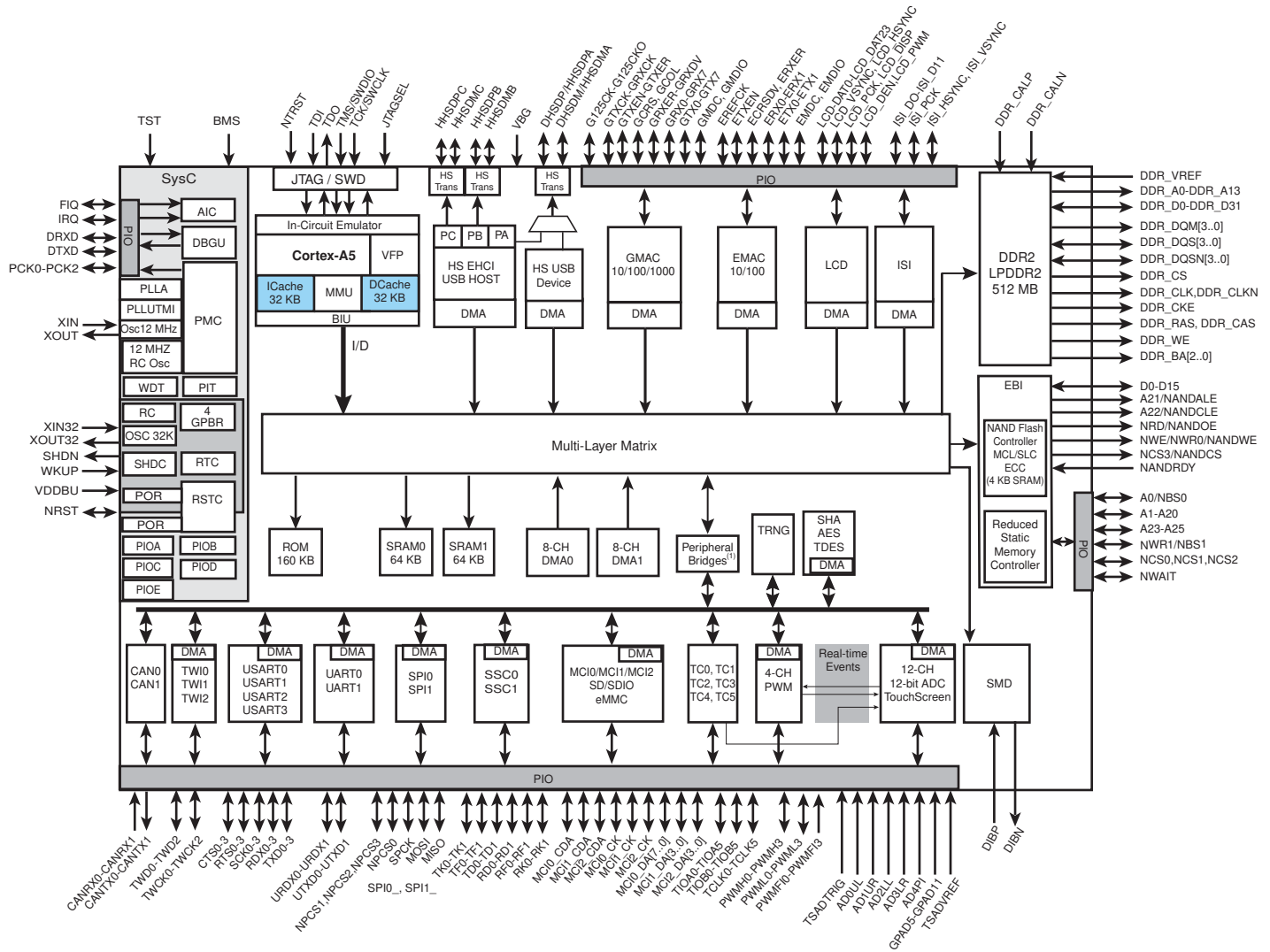
- One 12-channel 12-bit Analog-to-Digital Converter with Resistive Touch-Screen function
- Safety
 - Power-on Reset Cells
 - Independent Watchdog
 - Main Crystal Clock Failure Detection
 - Write Protection Registers
 - SHA: Supports Secure Hash Algorithm (SHA1, SHA224, SHA256, SHA384, SHA512)
 - Memory Management Unit
- Security
 - TRNG: True Random Number Generator
 - Encryption Engine
 - AES: 256-bit, 192-bit, 128-bit Key Algorithm, Compliant with FIPS PUB 197 Specifications
 - TDES: Two-key or Three-key Algorithms, Compliant with FIPS PUB 46-3 Specifications
 - Atmel® Secure Boot Solution
- I/O
 - Five 32-bit Parallel Input/Output Controllers
 - 160 I/Os
 - Input Change Interrupt Capability on Each I/O Line, Selectable Schmitt Trigger Input
 - Individually Programmable Open-drain, Pull-up and Pull-down Resistor, Synchronous Output, Filtering
 - Slew Rate Control on High Speed I/Os
 - Impedance Control on DDR I/Os
- Package
 - 324-ball LFBGA, 15 x 15 x 1.4 mm, pitch 0.8 mm
 - 324-ball TFBGA, 12 x 12 x 1.2 mm, pitch 0.5 mm

Table 1-1. SAMA5D3 Device Differences

Peripherals	SAMA5D31	SAMA5D33	SAMA5D34	SAMA5D35	SAMA5D36
CAN0, CAN1	—	—	X	X	X
EMAC	X	—	—	X	X
GMAC	—	X	X	X	X
HSMCI2	X	—	X	X	X
LCDC	X	X	X	—	X
TC1	—	—	—	X	X
UART0, UART1	X	—	—	X	X

2. Block Diagram

Figure 2-1. SAMA5D3 Block Diagram



Note: 1. Peripheral Bridge 0 (APB0) connects HSMCI0, SPI0, USART0, USART1, TWI0, TWI1, UART0, SSC0, SMD. Peripheral Bridge 1 (APB1) connects HSMCI1, HSMCI2, ADC, SSC1, UART1, USART2, USART3, TWI2, DBGU, SPI1, SHA, AES, TDES.

3. Signal Description

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

Table 3-1. Signal Description List

Signal Name	Function	Type	Active Level
Clocks, Oscillators and PLLs			
XIN	Main Oscillator Input	Input	—
XOUT	Main Oscillator Output	Output	—
XIN32	Slow Clock Oscillator Input	Input	—
XOUT32	Slow Clock Oscillator Output	Output	—
VBG	Bias Voltage Reference for USB	Analog	—
PCK0–PCK2	Programmable Clock Output	Output	—
Shutdown, Wake-up Logic			
SHDN	Shut-Down Control	Output	—
WKUP	Wake-Up Input	Input	—
ICE and JTAG			
TCK/SWCLK	Test Clock/Serial Wire Clock	Input	—
TDI	Test Data In	Input	—
TDO	Test Data Out	Output	—
TMS/SWDIO	Test Mode Select/Serial Wire Input/Output	I/O	—
JTAGSEL	JTAG Selection	Input	—
Reset/Test			
NRST	Microcontroller Reset	I/O	Low
TST	Test Mode Select	Input	—
NTRST	Test Reset Signal	Input	—
BMS	Boot Mode Select	Input	—
Debug Unit - DBGU			
DRXD	Debug Receive Data	Input	—
DTXD	Debug Transmit Data	Output	—
Advanced Interrupt Controller - AIC			
IRQ	External Interrupt Input	Input	—
FIQ	Fast Interrupt Input	Input	—
PIO Controller - PIOA - PIOB - PIOC - PIOD - PIOE			
PA0–PAxx	Parallel IO Controller A	I/O	—
PB0–PBxx	Parallel IO Controller B	I/O	—
PC0–PCxx	Parallel IO Controller C	I/O	—
PD0–PDxx	Parallel IO Controller D	I/O	—
PE0–PExx	Parallel IO Controller E	I/O	—
External Bus Interface - EBI			

Table 3-1. Signal Description List (Continued)

Signal Name	Function	Type	Active Level
D0–D15	Data Bus	I/O	—
A0–A25	Address Bus	Output	—
NWAIT	External Wait Signal	Input	Low
Static Memory Controller - HSMC			
NCS0–NCS3	Chip Select Lines	Output	Low
NWR0–NWR1	Write Signal	Output	Low
NRD	Read Signal	Output	Low
NWE	Write Enable	Output	Low
NBS0–NBS1	Byte Mask Signal	Output	Low
NANDOE	NAND Flash Output Enable	Output	Low
NANDWE	NAND Flash Write Enable	Output	Low
DDR2/LPDDR Controller			
DDR_VREF	Reference Voltage	Input	—
DDR_CALP	Positive Calibration Reference	Input	—
DDR_CALN	Negative Calibration Reference	Input	—
DDR_CK, DDR_CKN	DDR2 differential clock	Output	—
DDR_CKE	DDR2 Clock Enable	Output	High
DDR_CS	DDR2 Controller Chip Select	Output	Low
DDR_BA[2..0]	Bank Select	Output	Low
DDR_WE	DDR2 Write Enable	Output	Low
DDR_RAS, DDR_CAS	Row and Column Signal	Output	Low
DDR_A[13..0]	DDR2 Address Bus	Output	—
DDR_D[31..0]	DDR2 Data Bus	I/O	—
DQS[3..0]	Differential Data Strobe	I/O	—
DQSN[3..0]	DQSN must be connected to DDR_VREF for DDR2 memories	I/O	—
DQM[3..0]	Write Data Mask	Output	—
High Speed Multimedia Card Interface - HSMCI0–2			
MCI0_CK, MCI1_CK, MCI2_CK	Multimedia Card Clock	I/O	—
MCI0_CDA, MCI1_CDA, MCI2_CDA	Multimedia Card Command	I/O	—
MCI0_DA[7..0]	Multimedia Card 0 Data	I/O	—
MCI1_DA[3..0]	Multimedia Card 1 Data	I/O	—
MCI2_DA[3..0]	Multimedia Card 2 Data	I/O	—

Table 3-1. Signal Description List (Continued)

Signal Name	Function	Type	Active Level
Universal Synchronous Asynchronous Receiver Transmitter - USART0-3			
SCKx	USARTx Serial Clock	I/O	—
TXDx	USARTx Transmit Data	Output	—
RXDx	USARTx Receive Data	Input	—
RTSx	USARTx Request To Send	Output	—
CTSx	USARTx Clear To Send	Input	—
Universal Asynchronous Receiver Transmitter - UARTx [1..0]			
UTXDx	UARTx Transmit Data	Output	—
URXDx	UARTx Receive Data	Input	—
Synchronous Serial Controller - SSCx [1..0]			
TDx	SSC Transmit Data	Output	—
RDx	SSC Receive Data	Input	—
TKx	SSC Transmit Clock	I/O	—
RKx	SSC Receive Clock	I/O	—
TFx	SSC Transmit Frame Sync	I/O	—
RFx	SSC Receive Frame Sync	I/O	—
Timer/Counter - TCx [5..0]			
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	—
Serial Peripheral Interface - SPIx [1..0]			
SPIx_MISO	Master In Slave Out	I/O	—
SPIx_MOSI	Master Out Slave In	I/O	—
SPIx_SPCK	SPI Serial Clock	I/O	—
SPIx_NPCS0	SPI Peripheral Chip Select 0	I/O	Low
SPIx_NPCS[3..1]	SPI Peripheral Chip Select	Output	Low
Two-Wire Interface - TWIx [2..0]			
TWDx	Two-wire Serial Data	I/O	—
TWCKx	Two-wire Serial Clock	I/O	—
CAN controller - CANx			
CANRXx	CAN input	Input	—
CANTXx	CAN output	Output	—
Soft Modem - SMD			
DIBN	Soft Modem Signal	I/O	—
DIBP	Soft Modem Signal	I/O	—
Pulse Width Modulation Controller - PWMC			
PWMH[3..0]	PWM Waveform Output High	Output	—

Table 3-1. Signal Description List (Continued)

Signal Name	Function	Type	Active Level
PWML[3..0]	PWM Waveform Output Low	Output	—
PWMLFx	PWM Fault Input	Input	—
USB Host High Speed Port - UHPHS			
HHSDPA	USB Host Port A High Speed Data +	Analog	—
HHSDMA	USB Host Port A High Speed Data -	Analog	—
HHSDPB	USB Host Port B High Speed Data +	Analog	—
HHSDMB	USB Host Port B High Speed Data -	Analog	—
HHSDPC	USB Host Port C High Speed Data +	Analog	—
HHSDMC	USB Host Port C High Speed Data -	Analog	—
USB Device High Speed Port - UDPHS			
DHSDP	USB Device High Speed Data +	Analog	—
DHSDM	USB Device High Speed Data -	Analog	—
Gigabit Ethernet 10/100/1000 - GMAC			
GTXCK	Transmit Clock or Reference Clock	Input	—
G125CK	125 MHz input Clock	Input	—
G125CKO	125 MHz output Clock	Output	—
GTXEN	Transmit Enable	Output	—
GTX[7..0]	Transmit Data	Output	—
GTXER	Transmit Coding Error	Output	—
GRXCK	Receive Clock	Input	—
GRXDV	Receive Data Valid	Input	—
GRX[7..0]	Receive Data	Input	—
GRXER	Receive Error	Input	—
GCRS	Carrier Sense and Data Valid	Input	—
GCOL	Collision Detect	Input	—
GMDC	Management Data Clock	Output	—
GMDIO	Management Data Input/Output	I/O	—
RMII Ethernet 10/100 - EMAC			
EREFCK	Transmit Clock or Reference Clock	Input	—
ETXEN	Transmit Enable	Output	—
ETX[1..0]	Transmit Data	Output	—
ECRSDV	Carrier Sense/Data Valid	Input	—
ERX[1..0]	Receive Data	Input	—
ERXER	Receive Error	Input	—
EMDC	Management Data Clock	Output	—
EMDIO	Management Data Input/Output	I/O	—
LCD Controller - LCDC			

Table 3-1. Signal Description List (Continued)

Signal Name	Function	Type	Active Level
LCDDAT[23..0]	LCD Data Bus	Output	—
LCDVSYNC	LCD Vertical Synchronization	Output	—
LCDHSYNC	LCD Horizontal Synchronization	Output	—
LCDPCK	LCD pixel Clock	Output	—
LCDDEN	LCD Data Enable	Output	—
LCDPWM	LCDPWM for Contrast Control	Output	—
LCDDISP	LCD Display ON/OFF	Output	—
Image Sensor Interface - ISI			
ISI_D[11..0]	Image Sensor Data	Input	—
ISI_HSYNC	Image Sensor Horizontal Synchro	input	—
ISI_VSYNC	Image Sensor Vertical Synchro	input	—
ISI_PCK	Image Sensor Data clock	input	—
Touch Screen Analog-to-Digital Converter - ADC			
AD0 _{UL}	Upper Left Touch Panel	Analog	—
AD1 _{UR}	Upper Right Touch Panel	Analog	—
AD2 _{LL}	Lower Left Touch Panel	Analog	—
AD3 _{LR}	Lower Right Touch Panel	Analog	—
AD4 _{PI}	Panel Input	Analog	—
AD5–AD11	7 Analog Inputs	Analog	—
ADTRG	ADC Trigger	Input	—
ADVREF	ADC Reference	Analog	—

4. Package and Pinout

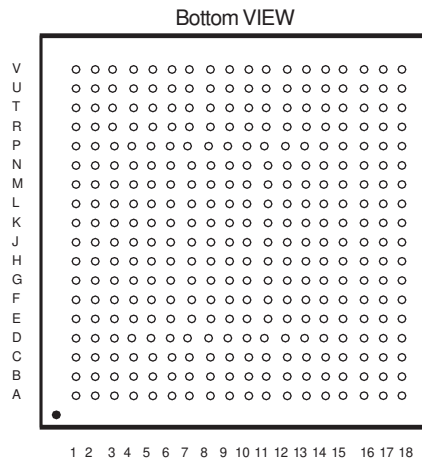
The SAMA5D3 product is available in two packages:

- 324-ball LFBGA (15 x 15 x 1.4 mm, pitch 0.8 mm)
- 324-ball TFBGA (12 x 12 x 1.2 mm, pitch 0.5 mm)

4.1 324-ball LFBGA Package (15 x 15 x 1.4 mm, pitch 0.8 mm)

Figure 4-1 shows the ball map of the 324-ball LFBGA package.

Figure 4-1. 324-ball LFBGA Ball Map



4.2 324-ball LFBGA Package Pinout

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
E3	VDDIOP0	GPIO	PA0	I/O	—	—	LCDDAT0	O	—	—	—	—	PIO, I, PU, ST
F5	VDDIOP0	GPIO	PA1	I/O	—	—	LCDDAT1	O	—	—	—	—	PIO, I, PU, ST
D2	VDDIOP0	GPIO	PA2	I/O	—	—	LCDDAT2	O	—	—	—	—	PIO, I, PU, ST
F4	VDDIOP0	GPIO	PA3	I/O	—	—	LCDDAT3	O	—	—	—	—	PIO, I, PU, ST
D1	VDDIOP0	GPIO	PA4	I/O	—	—	LCDDAT4	O	—	—	—	—	PIO, I, PU, ST
J10	VDDIOP0	GPIO	PA5	I/O	—	—	LCDDAT5	O	—	—	—	—	PIO, I, PU, ST
G4	VDDIOP0	GPIO	PA6	I/O	—	—	LCDDAT6	O	—	—	—	—	PIO, I, PU, ST
J9	VDDIOP0	GPIO	PA7	I/O	—	—	LCDDAT7	O	—	—	—	—	PIO, I, PU, ST
F3	VDDIOP0	GPIO	PA8	I/O	—	—	LCDDAT8	O	—	—	—	—	PIO, I, PU, ST
J8	VDDIOP0	GPIO	PA9	I/O	—	—	LCDDAT9	O	—	—	—	—	PIO, I, PU, ST
E2	VDDIOP0	GPIO	PA10	I/O	—	—	LCDDAT10	O	—	—	—	—	PIO, I, PU, ST
K8	VDDIOP0	GPIO	PA11	I/O	—	—	LCDDAT11	O	—	—	—	—	PIO, I, PU, ST
F2	VDDIOP0	GPIO	PA12	I/O	—	—	LCDDAT12	O	—	—	—	—	PIO, I, PU, ST
G6	VDDIOP0	GPIO	PA13	I/O	—	—	LCDDAT13	O	—	—	—	—	PIO, I, PU, ST
E1	VDDIOP0	GPIO	PA14	I/O	—	—	LCDDAT14	O	—	—	—	—	PIO, I, PU, ST
H5	VDDIOP0	GPIO	PA15	I/O	—	—	LCDDAT15	O	—	—	—	—	PIO, I, PU, ST
H3	VDDIOP0	GPIO	PA16	I/O	—	—	LCDDAT16	O	—	—	ISL_D0	I	PIO, I, PU, ST
H6	VDDIOP0	GPIO	PA17	I/O	—	—	LCDDAT17	O	—	—	ISL_D1	I	PIO, I, PU, ST
H4	VDDIOP0	GPIO	PA18	I/O	—	—	LCDDAT18	O	TWD2	I/O	ISL_D2	I	PIO, I, PU, ST
H7	VDDIOP0	GPIO	PA19	I/O	—	—	LCDDAT19	O	TWCK2	O	ISL_D3	I	PIO, I, PU, ST
H2	VDDIOP0	GPIO	PA20	I/O	—	—	LCDDAT20	O	PWMH0	O	ISL_D4	I	PIO, I, PU, ST
J6	VDDIOP0	GPIO	PA21	I/O	—	—	LCDDAT21	O	PWML0	O	ISL_D5	I	PIO, I, PU, ST
G2	VDDIOP0	GPIO	PA22	I/O	—	—	LCDDAT22	O	PWMH1	O	ISL_D6	I	PIO, I, PU, ST
J5	VDDIOP0	GPIO	PA23	I/O	—	—	LCDDAT23	O	PWML1	O	ISL_D7	I	PIO, I, PU, ST
F1	VDDIOP0	GPIO	PA24	I/O	—	—	LCDPWM	O	—	—	—	—	PIO, I, PU, ST
J4	VDDIOP0	GPIO	PA25	I/O	—	—	LCDDISP	O	—	—	—	—	PIO, I, PU, ST
G3	VDDIOP0	GPIO	PA26	I/O	—	—	LCDVSYNC	O	—	—	—	—	PIO, I, PU, ST
J3	VDDIOP0	GPIO	PA27	I/O	—	—	LCDHSYNC	O	—	—	—	—	PIO, I, PU, ST
G1	VDDIOP0	GPIO_CLK2	PA28	I/O	—	—	LCDPCK	O	—	—	—	—	PIO, I, PU, ST
K4	VDDIOP0	GPIO	PA29	I/O	—	—	LCDDEN	O	—	—	—	—	PIO, I, PU, ST
H1	VDDIOP0	GPIO	PA30	I/O	—	—	TWD0	I/O	URXD1	I	ISL_VSYNC	I	PIO, I, PU, ST
K3	VDDIOP0	GPIO	PA31	I/O	—	—	TWCK0	O	UTXD1	O	ISL_HSYNC	I	PIO, I, PU, ST
T2	VDDIOP1	GMAC	PB0	I/O	—	—	GTX0	O	PWMH0	O	—	—	PIO, I, PU, ST
N7	VDDIOP1	GMAC	PB1	I/O	—	—	GTX1	O	PWML0	O	—	—	PIO, I, PU, ST
T3	VDDIOP1	GMAC	PB2	I/O	—	—	GTX2	O	TK1	I/O	—	—	PIO, I, PU, ST
N6	VDDIOP1	GMAC	PB3	I/O	—	—	GTX3	O	TF1	I/O	—	—	PIO, I, PU, ST
P5	VDDIOP1	GMAC	PB4	I/O	—	—	GRX0	I	PWMH1	O	—	—	PIO, I, PU, ST
T4	VDDIOP1	GMAC	PB5	I/O	—	—	GRX1	I	PWML1	O	—	—	PIO, I, PU, ST
R4	VDDIOP1	GMAC	PB6	I/O	—	—	GRX2	I	TD1	O	—	—	PIO, I, PU, ST
U1	VDDIOP1	GMAC	PB7	I/O	—	—	GRX3	I	RK1	I	—	—	PIO, I, PU, ST
R5	VDDIOP1	GMAC	PB8	I/O	—	—	GTXCK	I	PWMH2	O	—	—	PIO, I, PU, ST
P3	VDDIOP1	GMAC	PB9	I/O	—	—	GTXEN	O	PWML2	O	—	—	PIO, I, PU, ST

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
R6	VDDIOP1	GMAC	PB10	I/O	—	—	GTXER	O	RF1	I/O	—	—	PIO, I, PU, ST
V3	VDDIOP1	GMAC	PB11	I/O	—	—	GRXCK	I	RD1	I	—	—	PIO, I, PU, ST
P6	VDDIOP1	GMAC	PB12	I/O	—	—	GRXDV	I	PWMH3	O	—	—	PIO, I, PU, ST
V1	VDDIOP1	GMAC	PB13	I/O	—	—	GRXER	I	PWML3	O	—	—	PIO, I, PU, ST
R7	VDDIOP1	GMAC	PB14	I/O	—	—	GCRS	I	CANRX1	I	—	—	PIO, I, PU, ST
U3	VDDIOP1	GMAC	PB15	I/O	—	—	GCOL	I	CANTX1	O	—	—	PIO, I, PU, ST
P7	VDDIOP1	GMAC	PB16	I/O	—	—	GMDC	O	—	—	—	—	PIO, I, PU, ST
V2	VDDIOP1	GMAC	PB17	I/O	—	—	GMDIO	I/O	—	—	—	—	PIO, I, PU, ST
V5	VDDIOP1	GMAC	PB18	I/O	—	—	G125CK	I	—	—	—	—	PIO, I, PU, ST
T6	VDDIOP1	GMAC	PB19	I/O	—	—	MCI1_CDA	I/O	GTX4	O	—	—	PIO, I, PU, ST
N8	VDDIOP1	GMAC	PB20	I/O	—	—	MCI1_DA0	I/O	GTX5	O	—	—	PIO, I, PU, ST
U4	VDDIOP1	GMAC	PB21	I/O	—	—	MCI1_DA1	I/O	GTX6	O	—	—	PIO, I, PU, ST
M7	VDDIOP1	GMAC	PB22	I/O	—	—	MCI1_DA2	I/O	GTX7	O	—	—	PIO, I, PU, ST
U5	VDDIOP1	GMAC	PB23	I/O	—	—	MCI1_DA3	I/O	GRX4	I	—	—	PIO, I, PU, ST
M8	VDDIOP1	GMAC	PB24	I/O	—	—	MCI1_CK	I/O	GRX5	I	—	—	PIO, I, PU, ST
T5	VDDIOP1	GMAC	PB25	I/O	—	—	SCK1	I/O	GRX6	I	—	—	PIO, I, PU, ST
N9	VDDIOP1	GMAC	PB26	I/O	—	—	CTS1	I	GRX7	I	—	—	PIO, I, PU, ST
V4	VDDIOP1	GPIO	PB27	I/O	—	—	RTS1	O	G125CKO	O	—	—	PIO, I, PU, ST
M9	VDDIOP1	GPIO	PB28	I/O	—	—	RXD1	I	—	—	—	—	PIO, I, PU, ST
P8	VDDIOP1	GPIO	PB29	I/O	—	—	TXD1	O	—	—	—	—	PIO, I, PU, ST
M10	VDDIOP0	GPIO	PB30	I/O	—	—	DRXD	I	—	—	—	—	PIO, I, PU, ST
R9	VDDIOP0	GPIO	PB31	I/O	—	—	DTXD	O	—	—	—	—	PIO, I, PU, ST
D8	VDDIOP0	GPIO	PC0	I/O	—	—	ETX0	O	TIOA3	I/O	—	—	PIO, I, PU, ST
A4	VDDIOP0	GPIO	PC1	I/O	—	—	ETX1	O	TIOB3	I/O	—	—	PIO, I, PU, ST
E8	VDDIOP0	GPIO	PC2	I/O	—	—	ERX0	I	TCLK3	I	—	—	PIO, I, PU, ST
A3	VDDIOP0	GPIO	PC3	I/O	—	—	ERX1	I	TIOA4	I/O	—	—	PIO, I, PU, ST
A2	VDDIOP0	GPIO	PC4	I/O	—	—	ETXEN	O	TIOB4	I/O	—	—	PIO, I, PU, ST
F8	VDDIOP0	GPIO	PC5	I/O	—	—	ECRSVDV	I	TCLK4	I	—	—	PIO, I, PU, ST
B3	VDDIOP0	GPIO	PC6	I/O	—	—	ERXER	I	TIOA5	I/O	—	—	PIO, I, PU, ST
G8	VDDIOP0	GPIO	PC7	I/O	—	—	EREFCK	I	TIOB5	I/O	—	—	PIO, I, PU, ST
B4	VDDIOP0	GPIO	PC8	I/O	—	—	EMDC	O	TCLK5	I	—	—	PIO, I, PU, ST
F7	VDDIOP0	GPIO	PC9	I/O	—	—	EMDIO	I/O	—	—	—	—	PIO, I, PU, ST
A1	VDDIOP0	GPIO	PC10	I/O	—	—	MCI2_CDA	I/O	—	—	LCDDAT20	O	PIO, I, PU, ST
D7	VDDIOP0	GPIO	PC11	I/O	—	—	MCI2_DA0	I/O	—	—	LCDDAT19	O	PIO, I, PU, ST
C6	VDDIOP0	GPIO	PC12	I/O	—	—	MCI2_DA1	I/O	TIOA1	I/O	LCDDAT18	O	PIO, I, PU, ST
E7	VDDIOP0	GPIO	PC13	I/O	—	—	MCI2_DA2	I/O	TIOB1	I/O	LCDDAT17	O	PIO, I, PU, ST
B2	VDDIOP0	GPIO	PC14	I/O	—	—	MCI2_DA3	I/O	TCLK1	I	LCDDAT16	O	PIO, I, PU, ST
F6	VDDIOP0	MCL_CLK	PC15	I/O	—	—	MCI2_CK	I/O	PCK2	O	LCDDAT21	O	PIO, I, PU, ST
B1	VDDIOP0	GPIO	PC16	I/O	—	—	TK0	I/O	—	—	—	—	PIO, I, PU, ST
E6	VDDIOP0	GPIO	PC17	I/O	—	—	TF0	I/O	—	—	—	—	PIO, I, PU, ST
C3	VDDIOP0	GPIO	PC18	I/O	—	—	TD0	O	—	—	—	—	PIO, I, PU, ST
D6	VDDIOP0	GPIO	PC19	I/O	—	—	RK0	I/O	—	—	—	—	PIO, I, PU, ST
C4	VDDIOP0	GPIO	PC20	I/O	—	—	RF0	I/O	—	—	—	—	PIO, I, PU, ST

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
D5	VDDIOP0	GPIO	PC21	I/O	—	—	RD0	I	—	—	—	—	PIO, I, PU, ST
C2	VDDIOP0	GPIO	PC22	I/O	—	—	SPI1_MISO	I/O	—	—	—	—	PIO, I, PU, ST
G9	VDDIOP0	GPIO	PC23	I/O	—	—	SPI1_MOSI	I/O	—	—	—	—	PIO, I, PU, ST
C1	VDDIOP0	GPIO_CLK	PC24	I/O	—	—	SPI1_SPCK	I/O	—	—	—	—	PIO, I, PU, ST
H10	VDDIOP0	GPIO	PC25	I/O	—	—	SPI1_NPCS0	I/O	—	—	—	—	PIO, I, PU, ST
H9	VDDIOP0	GPIO	PC26	I/O	—	—	SPI1_NPCS1	O	TWD1	I/O	ISI_D11	I	PIO, I, PU, ST
D4	VDDIOP0	GPIO	PC27	I/O	—	—	SPI1_NPCS2	O	TWCK1	O	ISI_D10	I	PIO, I, PU, ST
H8	VDDIOP0	GPIO	PC28	I/O	—	—	SPI1_NPCS3	O	PWMF10	I	ISI_D9	I	PIO, I, PU, ST
G5	VDDIOP0	GPIO	PC29	I/O	—	—	URXD0	I	PWMF12	I	ISI_D8	I	PIO, I, PU, ST
D3	VDDIOP0	GPIO	PC30	I/O	—	—	UTXD0	O	—	—	ISI_PCK	O	PIO, I, PU, ST
E4	VDDIOP0	GPIO	PC31	I/O	—	—	FIQ	I	PWMF11	I	—	—	PIO, I, PU, ST
K5	VDDIOP1	GPIO	PD0	I/O	—	—	MCI0_CDA	I/O	—	—	—	—	PIO, I, PU, ST
P1	VDDIOP1	GPIO	PD1	I/O	—	—	MCI0_DA0	I/O	—	—	—	—	PIO, I, PU, ST
K6	VDDIOP1	GPIO	PD2	I/O	—	—	MCI0_DA1	I/O	—	—	—	—	PIO, I, PU, ST
R1	VDDIOP1	GPIO	PD3	I/O	—	—	MCI0_DA2	I/O	—	—	—	—	PIO, I, PU, ST
L7	VDDIOP1	GPIO	PD4	I/O	—	—	MCI0_DA3	I/O	—	—	—	—	PIO, I, PU, ST
P2	VDDIOP1	GPIO	PD5	I/O	—	—	MCI0_DA4	I/O	TIOA0	I/O	PWMH2	O	PIO, I, PU, ST
L8	VDDIOP1	GPIO	PD6	I/O	—	—	MCI0_DA5	I/O	TIOB0	I/O	PWML2	O	PIO, I, PU, ST
R2	VDDIOP1	GPIO	PD7	I/O	—	—	MCI0_DA6	I/O	TCLK0	I	PWMH3	O	PIO, I, PU, ST
K7	VDDIOP1	GPIO	PD8	I/O	—	—	MCI0_DA7	I/O	—	—	PWML3	O	PIO, I, PU, ST
U2	VDDIOP1	MCI_CLK	PD9	I/O	—	—	MCI0_CK	I/O	—	—	—	—	PIO, I, PU, ST
K9	VDDIOP1	GPIO	PD10	I/O	—	—	SPI0_MISO	I/O	—	—	—	—	PIO, I, PU, ST
M5	VDDIOP1	GPIO	PD11	I/O	—	—	SPI0_MOSI	I/O	—	—	—	—	PIO, I, PU, ST
K10	VDDIOP1	GPIO_CLK	PD12	I/O	—	—	SPI0_SPCK	I/O	—	—	—	—	PIO, I, PU, ST
N4	VDDIOP1	GPIO	PD13	I/O	—	—	SPI0_NPCS0	I/O	—	—	—	—	PIO, I, PU, ST
L9	VDDIOP1	GPIO	PD14	I/O	—	—	SCK0	I/O	SPI0_NPCS1	O	CANRX0	I	PIO, I, PU, ST
N3	VDDIOP1	GPIO	PD15	I/O	—	—	CTS0	I	SPI0_NPCS2	O	CANTX0	O	PIO, I, PU, ST
L10	VDDIOP1	GPIO	PD16	I/O	—	—	RTS0	O	SPI0_NPCS3	O	PWMF13	I	PIO, I, PU, ST
N5	VDDIOP1	GPIO	PD17	I/O	—	—	RXD0	I	—	—	—	—	PIO, I, PU, ST
M6	VDDIOP1	GPIO	PD18	I/O	—	—	TXD0	O	—	—	—	—	PIO, I, PU, ST
T1	VDDIOP1	GPIO	PD19	I/O	—	—	ADTRG	I	—	—	—	—	PIO, I, PU, ST
N2	VDDANA	GPIO_ANA	PD20	I/O	—	—	AD0	I	—	—	—	—	PIO, I, PU, ST
M3	VDDANA	GPIO_ANA	PD21	I/O	—	—	AD1	I	—	—	—	—	PIO, I, PU, ST
M2	VDDANA	GPIO_ANA	PD22	I/O	—	—	AD2	I	—	—	—	—	PIO, I, PU, ST
L3	VDDANA	GPIO_ANA	PD23	I/O	—	—	AD3	I	—	—	—	—	PIO, I, PU, ST
M1	VDDANA	GPIO_ANA	PD24	I/O	—	—	AD4	I	—	—	—	—	PIO, I, PU, ST
N1	VDDANA	GPIO_ANA	PD25	I/O	—	—	AD5	I	—	—	—	—	PIO, I, PU, ST
L1	VDDANA	GPIO_ANA	PD26	I/O	—	—	AD6	I	—	—	—	—	PIO, I, PU, ST
L2	VDDANA	GPIO_ANA	PD27	I/O	—	—	AD7	I	—	—	—	—	PIO, I, PU, ST
K1	VDDANA	GPIO_ANA	PD28	I/O	—	—	AD8	I	—	—	—	—	PIO, I, PU, ST
K2	VDDANA	GPIO_ANA	PD29	I/O	—	—	AD9	I	—	—	—	—	PIO, I, PU, ST
J1	VDDANA	GPIO_ANA	PD30	I/O	—	—	AD10	I	PCK0	O	—	—	PIO, I, PU, ST
J2	VDDANA	GPIO_ANA	PD31	I/O	—	—	AD11	I	PCK1	O	—	—	PIO, I, PU, ST

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
P13	VDDIOM	EBI	PE0	I/O	—	—	A0/NBS0	O	—	—	—	—	A,I, PD, ST
R14	VDDIOM	EBI	PE1	I/O	—	—	A1	O	—	—	—	—	A,I, PD, ST
R13	VDDIOM	EBI	PE2	I/O	—	—	A2	O	—	—	—	—	A,I, PD, ST
V18	VDDIOM	EBI	PE3	I/O	—	—	A3	O	—	—	—	—	A,I, PD, ST
P14	VDDIOM	EBI	PE4	I/O	—	—	A4	O	—	—	—	—	A,I, PD, ST
U18	VDDIOM	EBI	PE5	I/O	—	—	A5	O	—	—	—	—	A,I, PD, ST
T18	VDDIOM	EBI	PE6	I/O	—	—	A6	O	—	—	—	—	A,I, PD, ST
R15	VDDIOM	EBI	PE7	I/O	—	—	A7	O	—	—	—	—	A,I, PD, ST
P17	VDDIOM	EBI	PE8	I/O	—	—	A8	O	—	—	—	—	A,I, PD, ST
P15	VDDIOM	EBI	PE9	I/O	—	—	A9	O	—	—	—	—	A,I, PD, ST
P18	VDDIOM	EBI	PE10	I/O	—	—	A10	O	—	—	—	—	A,I, PD, ST
R16	VDDIOM	EBI	PE11	I/O	—	—	A11	O	—	—	—	—	A,I, PD, ST
N16	VDDIOM	EBI	PE12	I/O	—	—	A12	O	—	—	—	—	A,I, PD, ST
R17	VDDIOM	EBI	PE13	I/O	—	—	A13	O	—	—	—	—	A,I, PD, ST
N17	VDDIOM	EBI	PE14	I/O	—	—	A14	O	—	—	—	—	A,I, PD, ST
R18	VDDIOM	EBI	PE15	I/O	—	—	A15	O	SCK3	I/O	—	—	A,I, PD, ST
N18	VDDIOM	EBI	PE16	I/O	—	—	A16	O	CTS3	I	—	—	A,I, PD, ST
P16	VDDIOM	EBI	PE17	I/O	—	—	A17	O	RTS3	O	—	—	A,I, PD, ST
M18	VDDIOM	EBI	PE18	I/O	—	—	A18	O	RXD3	I	—	—	A,I, PD, ST
N15	VDDIOM	EBI	PE19	I/O	—	—	A19	O	TXD3	O	—	—	A,I, PD, ST
M15	VDDIOM	EBI	PE20	I/O	—	—	A20	O	SCK2	I/O	—	—	A,I, PD, ST
N14	VDDIOM	EBI	PE21	I/O	—	—	A21/NANDALE	O	—	—	—	—	A,I, PD, ST
M17	VDDIOM	EBI	PE22	I/O	—	—	A22/NANDCLE	O	—	—	—	—	A,I, PD, ST
M13	VDDIOM	EBI	PE23	I/O	—	—	A23	O	CTS2	I	—	—	A,I, PD, ST
M16	VDDIOM	EBI	PE24	I/O	—	—	A24	O	RTS2	O	—	—	A,I, PD, ST
N12	VDDIOM	EBI	PE25	I/O	—	—	A25	O	RXD2	I	—	—	A,I, PD, ST
M14	VDDIOM	EBI	PE26	I/O	—	—	NCS0	O	TXD2	O	—	—	A,I, PD, ST
M12	VDDIOM	EBI	PE27	I/O	—	—	NCS1	O	TIOA2	I/O	LCDDAT22	O	PIO,I, PD, ST
L13	VDDIOM	EBI	PE28	I/O	—	—	NCS2	O	TIOB2	I/O	LCDDAT23	O	PIO, I, PD, ST
L15	VDDIOM	EBI	PE29	I/O	—	—	NWR1/NBS1	O	TCLK2	I	—	—	PIO, I, PD, ST
L14	VDDIOM	EBI	PE30	I/O	—	—	NWAIT	I	—	—	—	—	PIO, I, PD, ST
L16	VDDIOM	EBI	PE31	I/O	—	—	IRQ	I	PWML1	O	—	—	PIO,I, PD, ST
U15	VDDBU	SYSC	TST	I	—	—	—	—	—	—	—	—	I, PD,
U9	VDDIOP0	SYSC	BMS	I	—	—	—	—	—	—	—	—	I
U8	VDDIOP0	CLOCK	XIN	I	—	—	—	—	—	—	—	—	I
V8	VDDIOP0	CLOCK	XOUT	O	—	—	—	—	—	—	—	—	O
U16	VDDBU	CLOCK	XIN32	I	—	—	—	—	—	—	—	—	I
V16	VDDBU	CLOCK	XOUT32	O	—	—	—	—	—	—	—	—	O
T12	VDDBU	SYSC	SHDN	O	—	—	—	—	—	—	—	—	O
T10	VDDBU	SYSC	WKUP	I	—	—	—	—	—	—	—	—	I, ST
V9	VDDIOP0	RSTJTAG	NRST	I/O	—	—	—	—	—	—	—	—	I, PU, ST
P11	VDDIOP0	RSTJTAG	NTRST	I	—	—	—	—	—	—	—	—	I, PU, ST
R8	VDDIOP0	RSTJTAG	TDI	I	—	—	—	—	—	—	—	—	I, ST

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
M11	VDDIOP0	RSTJTAG	TDO	O	—	—	—	—	—	—	—	—	O
N10	VDDIOP0	RSTJTAG	TMS	I	SWDIO	I/O	—	—	—	—	—	—	I, ST
P9	VDDIOP0	RSTJTAG	TCK	I	SWCLK	I	—	—	—	—	—	—	I, ST
T9	VDDBU	SYSC	JTAGSEL	I	—	—	—	—	—	—	—	—	I, PD
V6	VDDIOP0	DIB	DIBP	O	—	—	—	—	—	—	—	—	O, PU
U6	VDDIOP0	DIB	DIBN	O	—	—	—	—	—	—	—	—	O, PU
K12	VDDIOM	EBI	D0	I/O	—	—	—	—	—	—	—	—	I, PD
K15	VDDIOM	EBI	D1	I/O	—	—	—	—	—	—	—	—	I, PD
K14	VDDIOM	EBI	D2	I/O	—	—	—	—	—	—	—	—	I, PD
K16	VDDIOM	EBI	D3	I/O	—	—	—	—	—	—	—	—	I, PD
K13	VDDIOM	EBI	D4	I/O	—	—	—	—	—	—	—	—	I, PD
K17	VDDIOM	EBI	D5	I/O	—	—	—	—	—	—	—	—	I, PD
J12	VDDIOM	EBI	D6	I/O	—	—	—	—	—	—	—	—	I, PD
K18	VDDIOM	EBI	D7	I/O	—	—	—	—	—	—	—	—	I, PD
J14	VDDIOM	EBI	D8	I/O	—	—	—	—	—	—	—	—	I, PD
J16	VDDIOM	EBI	D9	I/O	—	—	—	—	—	—	—	—	I, PD
J13	VDDIOM	EBI	D10	I/O	—	—	—	—	—	—	—	—	I, PD
J17	VDDIOM	EBI	D11	I/O	—	—	—	—	—	—	—	—	I, PD
J15	VDDIOM	EBI	D12	I/O	—	—	—	—	—	—	—	—	I, PD
J18	VDDIOM	EBI	D13	I/O	—	—	—	—	—	—	—	—	I, PD
H16	VDDIOM	EBI	D14	I/O	—	—	—	—	—	—	—	—	I, PD
H18	VDDIOM	EBI	D15	I/O	—	—	—	—	—	—	—	—	I, PD
L12	VDDIOM	EBI	NCS3/NANDCS	O	—	—	—	—	—	—	—	—	O, PU
L18	VDDIOM	EBI	NANDRDY	I	—	—	—	—	—	—	—	—	I, PU
L17	VDDIOM	EBI	NRD/NANDOE	O	—	—	—	—	—	—	—	—	O, PU
K11	VDDIOM	EBI	NWE/NANDWE	O	—	—	—	—	—	—	—	—	O, PU
C13	VDDIODDR	Reference voltage	DDR_VREF	I	—	—	—	—	—	—	—	—	I
B10	VDDIODDR	DDR_IO	DDR_A0	O	—	—	—	—	—	—	—	—	O
C11	VDDIODDR	DDR_IO	DDR_A1	O	—	—	—	—	—	—	—	—	O
A9	VDDIODDR	DDR_IO	DDR_A2	O	—	—	—	—	—	—	—	—	O
D11	VDDIODDR	DDR_IO	DDR_A3	O	—	—	—	—	—	—	—	—	O
B9	VDDIODDR	DDR_IO	DDR_A4	O	—	—	—	—	—	—	—	—	O
E10	VDDIODDR	DDR_IO	DDR_A5	O	—	—	—	—	—	—	—	—	O
D10	VDDIODDR	DDR_IO	DDR_A6	O	—	—	—	—	—	—	—	—	O
A8	VDDIODDR	DDR_IO	DDR_A7	O	—	—	—	—	—	—	—	—	O
C10	VDDIODDR	DDR_IO	DDR_A8	O	—	—	—	—	—	—	—	—	O
B8	VDDIODDR	DDR_IO	DDR_A9	O	—	—	—	—	—	—	—	—	O
F11	VDDIODDR	DDR_IO	DDR_A10	O	—	—	—	—	—	—	—	—	O
A7	VDDIODDR	DDR_IO	DDR_A11	O	—	—	—	—	—	—	—	—	O
D9	VDDIODDR	DDR_IO	DDR_A12	O	—	—	—	—	—	—	—	—	O
A6	VDDIODDR	DDR_IO	DDR_A13	O	—	—	—	—	—	—	—	—	O
H12	VDDIODDR	DDR_IO	DDR_D0	I/O	—	—	—	—	—	—	—	—	HiZ
H17	VDDIODDR	DDR_IO	DDR_D1	I/O	—	—	—	—	—	—	—	—	HiZ

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
H13	VDDIODDR	DDR_IO	DDR_D2	I/O	—	—	—	—	—	—	—	—	HiZ
G17	VDDIODDR	DDR_IO	DDR_D3	I/O	—	—	—	—	—	—	—	—	HiZ
G16	VDDIODDR	DDR_IO	DDR_D4	I/O	—	—	—	—	—	—	—	—	HiZ
H15	VDDIODDR	DDR_IO	DDR_D5	I/O	—	—	—	—	—	—	—	—	HiZ
F17	VDDIODDR	DDR_IO	DDR_D6	I/O	—	—	—	—	—	—	—	—	HiZ
G15	VDDIODDR	DDR_IO	DDR_D7	I/O	—	—	—	—	—	—	—	—	HiZ
F16	VDDIODDR	DDR_IO	DDR_D8	I/O	—	—	—	—	—	—	—	—	HiZ
E17	VDDIODDR	DDR_IO	DDR_D9	I/O	—	—	—	—	—	—	—	—	HiZ
G14	VDDIODDR	DDR_IO	DDR_D10	I/O	—	—	—	—	—	—	—	—	HiZ
E16	VDDIODDR	DDR_IO	DDR_D11	I/O	—	—	—	—	—	—	—	—	HiZ
D17	VDDIODDR	DDR_IO	DDR_D12	I/O	—	—	—	—	—	—	—	—	HiZ
C18	VDDIODDR	DDR_IO	DDR_D13	I/O	—	—	—	—	—	—	—	—	HiZ
D16	VDDIODDR	DDR_IO	DDR_D14	I/O	—	—	—	—	—	—	—	—	HiZ
C17	VDDIODDR	DDR_IO	DDR_D15	I/O	—	—	—	—	—	—	—	—	HiZ
B16	VDDIODDR	DDR_IO	DDR_D16	I/O	—	—	—	—	—	—	—	—	HiZ
B18	VDDIODDR	DDR_IO	DDR_D17	I/O	—	—	—	—	—	—	—	—	HiZ
C15	VDDIODDR	DDR_IO	DDR_D18	I/O	—	—	—	—	—	—	—	—	HiZ
A18	VDDIODDR	DDR_IO	DDR_D19	I/O	—	—	—	—	—	—	—	—	HiZ
C16	VDDIODDR	DDR_IO	DDR_D20	I/O	—	—	—	—	—	—	—	—	HiZ
C14	VDDIODDR	DDR_IO	DDR_D21	I/O	—	—	—	—	—	—	—	—	HiZ
D15	VDDIODDR	DDR_IO	DDR_D22	I/O	—	—	—	—	—	—	—	—	HiZ
B14	VDDIODDR	DDR_IO	DDR_D23	I/O	—	—	—	—	—	—	—	—	HiZ
A15	VDDIODDR	DDR_IO	DDR_D24	I/O	—	—	—	—	—	—	—	—	HiZ
A14	VDDIODDR	DDR_IO	DDR_D25	I/O	—	—	—	—	—	—	—	—	HiZ
E12	VDDIODDR	DDR_IO	DDR_D26	I/O	—	—	—	—	—	—	—	—	HiZ
A11	VDDIODDR	DDR_IO	DDR_D27	I/O	—	—	—	—	—	—	—	—	HiZ
B11	VDDIODDR	DDR_IO	DDR_D28	I/O	—	—	—	—	—	—	—	—	HiZ
F12	VDDIODDR	DDR_IO	DDR_D29	I/O	—	—	—	—	—	—	—	—	HiZ
A10	VDDIODDR	DDR_IO	DDR_D30	I/O	—	—	—	—	—	—	—	—	HiZ
E11	VDDIODDR	DDR_IO	DDR_D31	I/O	—	—	—	—	—	—	—	—	HiZ
G12	VDDIODDR	DDR_IO	DDR_DQM0	O	—	—	—	—	—	—	—	—	O
E15	VDDIODDR	DDR_IO	DDR_DQM1	O	—	—	—	—	—	—	—	—	O
B15	VDDIODDR	DDR_IO	DDR_DQM2	O	—	—	—	—	—	—	—	—	O
D12	VDDIODDR	DDR_IO	DDR_DQM3	O	—	—	—	—	—	—	—	—	O
E18	VDDIODDR	DDR_IO	DDR_DQS0	I/O	—	—	—	—	—	—	—	—	I, PD
G18	VDDIODDR	DDR_IO	DDR_DQS1	I/O	—	—	—	—	—	—	—	—	I, PD
B17	VDDIODDR	DDR_IO	DDR_DQS2	I/O	—	—	—	—	—	—	—	—	I, PD
B13	VDDIODDR	DDR_IO	DDR_DQS3	I/O	—	—	—	—	—	—	—	—	I, PD
D18	VDDIODDR	DDR_IO	DDR_DQSN0	I/O	—	—	—	—	—	—	—	—	I, PU
F18	VDDIODDR	DDR_IO	DDR_DQSN1	I/O	—	—	—	—	—	—	—	—	I, PU
A17	VDDIODDR	DDR_IO	DDR_DQSN2	I/O	—	—	—	—	—	—	—	—	I, PU
A13	VDDIODDR	DDR_IO	DDR_DQSN3	I/O	—	—	—	—	—	—	—	—	I, PU
C8	VDDIODDR	DDR_IO	DDR_CS	O	—	—	—	—	—	—	—	—	O

Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
B12	VDDIODDR	DDR_IO	DDR_CLK	O	—	—	—	—	—	—	—	—	O
A12	VDDIODDR	DDR_IO	DDR_CLKN	O	—	—	—	—	—	—	—	—	O
B7	VDDIODDR	DDR_IO	DDR_CKE	O	—	—	—	—	—	—	—	—	O
C12	VDDIODDR	DDR_IO	DDR_CALN	I	—	—	—	—	—	—	—	—	O
E13	VDDIODDR	DDR_IO	DDR_CALP	I	—	—	—	—	—	—	—	—	O
G11	VDDIODDR	DDR_IO	DDR_RAS	O	—	—	—	—	—	—	—	—	O
A5	VDDIODDR	DDR_IO	DDR_CAS	O	—	—	—	—	—	—	—	—	O
B5	VDDIODDR	DDR_IO	DDR_WE	O	—	—	—	—	—	—	—	—	O
E9	VDDIODDR	DDR_IO	DDR_BA0	O	—	—	—	—	—	—	—	—	O
B6	VDDIODDR	DDR_IO	DDR_BA1	O	—	—	—	—	—	—	—	—	O
F9	VDDIODDR	DDR_IO	DDR_BA2	O	—	—	—	—	—	—	—	—	O
R11	VBG	VBG	VBG	I	—	—	—	—	—	—	—	—	I
U14	VDDUTMII	USBHS	HHSDPC	I/O	—	—	—	—	—	—	—	—	O, PD
V14	VDDUTMII	USBHS	HHSDMC	I/O	—	—	—	—	—	—	—	—	O, PD
U12	VDDUTMII	USBHS	HHSDPB	I/O	—	—	—	—	—	—	—	—	O, PD
V12	VDDUTMII	USBHS	HHSDMB	I/O	—	—	—	—	—	—	—	—	O, PD
U10	VDDUTMII	USBHS	HHSDPA	I/O	DHSDP	—	—	—	—	—	—	—	O, PD
V10	VDDUTMII	USBHS	HHSDMA	I/O	DHSDM	—	—	—	—	—	—	—	O, PD
V15	VDDBU	power supply	VDDBU	I	—	—	—	—	—	—	—	—	I
T13	GNDBU	ground	GNDBU	I	—	—	—	—	—	—	—	—	I
C5, C7, D14, T15, T7, U17, V7	VDDCORE	power supply	VDDCORE	I	—	—	—	—	—	—	—	—	I
A16, C9, N13, T14, T8, V17	GNDCORE	ground	GNDCORE	I	—	—	—	—	—	—	—	—	I
D13, F14, G10, G13, H11	VDDIODDR	power supply	VDDIODDR	I	—	—	—	—	—	—	—	—	I
E14, F10, F13, F15, H14	GNDIODDR	ground	GNDIODDR	I	—	—	—	—	—	—	—	—	I
P12, T16	VDDIOM	power supply	VDDIOM	I	—	—	—	—	—	—	—	—	I
J11, T17	GNDIOM	ground	GNDIOM	I	—	—	—	—	—	—	—	—	I
G7, V11	VDDIOP0	power supply	VDDIOP0	I	—	—	—	—	—	—	—	—	I
L11, M4	VDDIOP1	power supply	VDDIOP1	I	—	—	—	—	—	—	—	—	I
E5, J7, N11, U7	GNDIOP	Ground	GNDIOP	I	—	—	—	—	—	—	—	—	I
V13	VDDUTMIC	Power supply	VDDUTMIC	I	—	—	—	—	—	—	—	—	I

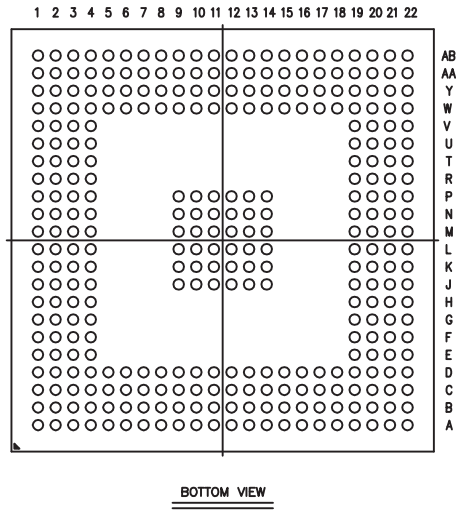
Table 4-1. SAMA5D3 Pinout for 324-ball LFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
U13	VDDUTMII	Power supply	VDDUTMII	I	—	—	—	—	—	—	—	—	I
R12	GNDUTMI	Ground	GNDUTMI	I	—	—	—	—	—	—	—	—	I
R10	VDDPLLA	Power supply	VDDPLLA	I	—	—	—	—	—	—	—	—	I
P10	GNDPLL	Ground	GNDPLL	I	—	—	—	—	—	—	—	—	I
U11	VDDOSC	Power supply	VDDOSC	I	—	—	—	—	—	—	—	—	I
T11	GNDOSC	Ground	GNDOSC	I	—	—	—	—	—	—	—	—	I
L6	VDDANA	Power supply	VDDANA	I	—	—	—	—	—	—	—	—	I
L4	GNDANA	Ground	GNDANA	I	—	—	—	—	—	—	—	—	I
L5	VDDANA	Power supply	ADVREF	I	—	—	—	—	—	—	—	—	I
R3	VDDFUSE	Power supply	VDDFUSE	I	—	—	—	—	—	—	—	—	I
P4	GNDFUSE	Ground	GNDFUSE	I	—	—	—	—	—	—	—	—	I

4.3 324-ball TFBGA Package (12 x 12 x 1.2 mm, pitch 0.5 mm)

Figure 4-2 shows the ball map of the 324-ball TFBGA package.

Figure 4-2. 324-ball TFBGA Ball Map



4.4 324-ball TFBGA Package Pinout

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
D2	VDDIOP0	GPIO	PA0	I/O	—	—	LCDDAT0	O	—	—	—	—	PIO, I, PU, ST
G4	VDDIOP0	GPIO	PA1	I/O	—	—	LCDDAT1	O	—	—	—	—	PIO, I, PU, ST
C2	VDDIOP0	GPIO	PA2	I/O	—	—	LCDDAT2	O	—	—	—	—	PIO, I, PU, ST
F3	VDDIOP0	GPIO	PA3	I/O	—	—	LCDDAT3	O	—	—	—	—	PIO, I, PU, ST
F2	VDDIOP0	GPIO	PA4	I/O	—	—	LCDDAT4	O	—	—	—	—	PIO, I, PU, ST
G3	VDDIOP0	GPIO	PA5	I/O	—	—	LCDDAT5	O	—	—	—	—	PIO, I, PU, ST
B1	VDDIOP0	GPIO	PA6	I/O	—	—	LCDDAT6	O	—	—	—	—	PIO, I, PU, ST
G2	VDDIOP0	GPIO	PA7	I/O	—	—	LCDDAT7	O	—	—	—	—	PIO, I, PU, ST
C1	VDDIOP0	GPIO	PA8	I/O	—	—	LCDDAT8	O	—	—	—	—	PIO, I, PU, ST
H3	VDDIOP0	GPIO	PA9	I/O	—	—	LCDDAT9	O	—	—	—	—	PIO, I, PU, ST
D1	VDDIOP0	GPIO	PA10	I/O	—	—	LCDDAT10	O	—	—	—	—	PIO, I, PU, ST
H4	VDDIOP0	GPIO	PA11	I/O	—	—	LCDDAT11	O	—	—	—	—	PIO, I, PU, ST
E2	VDDIOP0	GPIO	PA12	I/O	—	—	LCDDAT12	O	—	—	—	—	PIO, I, PU, ST
K9	VDDIOP0	GPIO	PA13	I/O	—	—	LCDDAT13	O	—	—	—	—	PIO, I, PU, ST
H2	VDDIOP0	GPIO	PA14	I/O	—	—	LCDDAT14	O	—	—	—	—	PIO, I, PU, ST
K4	VDDIOP0	GPIO	PA15	I/O	—	—	LCDDAT15	O	—	—	—	—	PIO, I, PU, ST
G1	VDDIOP0	GPIO	PA16	I/O	—	—	LCDDAT16	O	—	—	ISL_D0	I	PIO, I, PU, ST
K10	VDDIOP0	GPIO	PA17	I/O	—	—	LCDDAT17	O	—	—	ISL_D1	I	PIO, I, PU, ST
F1	VDDIOP0	GPIO	PA18	I/O	—	—	LCDDAT18	O	TWD2	I/O	ISL_D2	I	PIO, I, PU, ST
J4	VDDIOP0	GPIO	PA19	I/O	—	—	LCDDAT19	O	TWCK2	O	ISL_D3	I	PIO, I, PU, ST
J3	VDDIOP0	GPIO	PA20	I/O	—	—	LCDDAT20	O	PWMH0	O	ISL_D4	I	PIO, I, PU, ST
K2	VDDIOP0	GPIO	PA21	I/O	—	—	LCDDAT21	O	PWML0	O	ISL_D5	I	PIO, I, PU, ST
J2	VDDIOP0	GPIO	PA22	I/O	—	—	LCDDAT22	O	PWMH1	O	ISL_D6	I	PIO, I, PU, ST
L9	VDDIOP0	GPIO	PA23	I/O	—	—	LCDDAT23	O	PWML1	O	ISL_D7	I	PIO, I, PU, ST
H1	VDDIOP0	GPIO	PA24	I/O	—	—	LCDPWM	O	—	—	—	—	PIO, I, PU, ST
K3	VDDIOP0	GPIO	PA25	I/O	—	—	LCDDISP	O	—	—	—	—	PIO, I, PU, ST
J1	VDDIOP0	GPIO	PA26	I/O	—	—	LCDVSYNC	O	—	—	—	—	PIO, I, PU, ST
L10	VDDIOP0	GPIO	PA27	I/O	—	—	LCDHSYNC	O	—	—	—	—	PIO, I, PU, ST
K1	VDDIOP0	GPIO_CLK2	PA28	I/O	—	—	LCDPCK	O	—	—	—	—	PIO, I, PU, ST
L3	VDDIOP0	GPIO	PA29	I/O	—	—	LCDDEN	O	—	—	—	—	PIO, I, PU, ST
L2	VDDIOP0	GPIO	PA30	I/O	—	—	TWD0	I/O	URXD1	I	ISL_VSYNC	I	PIO, I, PU, ST
L4	VDDIOP0	GPIO	PA31	I/O	—	—	TWCK0	O	UTXD1	O	ISL_HSYNC	I	PIO, I, PU, ST
AA1	VDDIOP1	GMAC	PB0	I/O	—	—	GTX0	O	PWMH0	O	—	—	PIO, I, PU, ST
W3	VDDIOP1	GMAC	PB1	I/O	—	—	GTX1	O	PWML0	O	—	—	PIO, I, PU, ST
Y2	VDDIOP1	GMAC	PB2	I/O	—	—	GTX2	O	TK1	I/O	—	—	PIO, I, PU, ST
Y3	VDDIOP1	GMAC	PB3	I/O	—	—	GTX3	O	TF1	I/O	—	—	PIO, I, PU, ST
AA2	VDDIOP1	GMAC	PB4	I/O	—	—	GRX0	I	PWMH1	O	—	—	PIO, I, PU, ST
W5	VDDIOP1	GMAC	PB5	I/O	—	—	GRX1	I	PWML1	O	—	—	PIO, I, PU, ST
W7	VDDIOP1	GMAC	PB6	I/O	—	—	GRX2	I	TD1	O	—	—	PIO, I, PU, ST
AB2	VDDIOP1	GMAC	PB7	I/O	—	—	GRX3	I	RK1	I	—	—	PIO, I, PU, ST
AB1	VDDIOP1	GMAC	PB8	I/O	—	—	GTXCK	I	PWMH2	O	—	—	PIO, I, PU, ST
AA3	VDDIOP1	GMAC	PB9	I/O	—	—	GTXEN	O	PWML2	O	—	—	PIO, I, PU, ST

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
W6	VDDIOP1	GMAC	PB10	I/O	—	—	GTXER	O	RF1	I/O	—	—	PIO, I, PU, ST
AB3	VDDIOP1	GMAC	PB11	I/O	—	—	GRXCK	I	RD1	I	—	—	PIO, I, PU, ST
Y5	VDDIOP1	GMAC	PB12	I/O	—	—	GRXDV	I	PWMH3	O	—	—	PIO, I, PU, ST
Y4	VDDIOP1	GMAC	PB13	I/O	—	—	GRXER	I	PWML3	O	—	—	PIO, I, PU, ST
W8	VDDIOP1	GMAC	PB14	I/O	—	—	GCRS	I	CANRX1	I	—	—	PIO, I, PU, ST
AA5	VDDIOP1	GMAC	PB15	I/O	—	—	GCOL	I	CANTX1	O	—	—	PIO, I, PU, ST
AA4	VDDIOP1	GMAC	PB16	I/O	—	—	GMDC	O	—	—	—	—	PIO, I, PU, ST
Y7	VDDIOP1	GMAC	PB17	I/O	—	—	GMDIO	I/O	—	—	—	—	PIO, I, PU, ST
AB4	VDDIOP1	GMAC	PB18	I/O	—	—	G125CK	I	—	—	—	—	PIO, I, PU, ST
Y6	VDDIOP1	GMAC	PB19	I/O	—	—	MCI1_CDA	I/O	GTX4	O	—	—	PIO, I, PU, ST
Y8	VDDIOP1	GMAC	PB20	I/O	—	—	MCI1_DA0	I/O	GTX5	O	—	—	PIO, I, PU, ST
AA6	VDDIOP1	GMAC	PB21	I/O	—	—	MCI1_DA1	I/O	GTX6	O	—	—	PIO, I, PU, ST
W9	VDDIOP1	GMAC	PB22	I/O	—	—	MCI1_DA2	I/O	GTX7	O	—	—	PIO, I, PU, ST
AB6	VDDIOP1	GMAC	PB23	I/O	—	—	MCI1_DA3	I/O	GRX4	I	—	—	PIO, I, PU, ST
AB5	VDDIOP1	GMAC	PB24	I/O	—	—	MCI1_CK	I/O	GRX5	I	—	—	PIO, I, PU, ST
AB7	VDDIOP1	GMAC	PB25	I/O	—	—	SCK1	I/O	GRX6	I	—	—	PIO, I, PU, ST
AA7	VDDIOP1	GMAC	PB26	I/O	—	—	CTS1	I	GRX7	I	—	—	PIO, I, PU, ST
AB8	VDDIOP1	GPIO	PB27	I/O	—	—	RTS1	O	G125CKO	O	—	—	PIO, I, PU, ST
AA8	VDDIOP1	GPIO	PB28	I/O	—	—	RXD1	I	—	—	—	—	PIO, I, PU, ST
Y9	VDDIOP1	GPIO	PB29	I/O	—	—	TXD1	O	—	—	—	—	PIO, I, PU, ST
W10	VDDIOP0	GPIO	PB30	I/O	—	—	DRXD	I	—	—	—	—	PIO, I, PU, ST
Y12	VDDIOP0	GPIO	PB31	I/O	—	—	DTXD	O	—	—	—	—	PIO, I, PU, ST
D10	VDDIOP0	GPIO	PC0	I/O	—	—	ETX0	O	TIOA3	I/O	—	—	PIO, I, PU, ST
B8	VDDIOP0	GPIO	PC1	I/O	—	—	ETX1	O	TIOB3	I/O	—	—	PIO, I, PU, ST
D9	VDDIOP0	GPIO	PC2	I/O	—	—	ERX0	I	TCLK3	I	—	—	PIO, I, PU, ST
C8	VDDIOP0	GPIO	PC3	I/O	—	—	ERX1	I	TIOA4	I/O	—	—	PIO, I, PU, ST
B7	VDDIOP0	GPIO	PC4	I/O	—	—	ETXEN	O	TIOB4	I/O	—	—	PIO, I, PU, ST
D8	VDDIOP0	GPIO	PC5	I/O	—	—	ECRSV	I	TCLK4	I	—	—	PIO, I, PU, ST
A6	VDDIOP0	GPIO	PC6	I/O	—	—	ERXER	I	TIOA5	I/O	—	—	PIO, I, PU, ST
A7	VDDIOP0	GPIO	PC7	I/O	—	—	EREFCK	I	TIOB5	I/O	—	—	PIO, I, PU, ST
B6	VDDIOP0	GPIO	PC8	I/O	—	—	EMDC	O	TCLK5	I	—	—	PIO, I, PU, ST
D7	VDDIOP0	GPIO	PC9	I/O	—	—	EMDIO	I/O	—	—	—	—	PIO, I, PU, ST
A5	VDDIOP0	GPIO	PC10	I/O	—	—	MCI2_CDA	I/O	—	—	LCDDAT20	O	PIO, I, PU, ST
C7	VDDIOP0	GPIO	PC11	I/O	—	—	MCI2_DA0	I/O	—	—	LCDDAT19	O	PIO, I, PU, ST
B5	VDDIOP0	GPIO	PC12	I/O	—	—	MCI2_DA1	I/O	TIOA1	I/O	LCDDAT18	O	PIO, I, PU, ST
C6	VDDIOP0	GPIO	PC13	I/O	—	—	MCI2_DA2	I/O	TIOB1	I/O	LCDDAT17	O	PIO, I, PU, ST
B4	VDDIOP0	GPIO	PC14	I/O	—	—	MCI2_DA3	I/O	TCLK1	I	LCDDAT16	O	PIO, I, PU, ST
A4	VDDIOP0	MCL_CLK	PC15	I/O	—	—	MCI2_CK	I/O	PCK2	O	LCDDAT21	O	PIO, I, PU, ST
A3	VDDIOP0	GPIO	PC16	I/O	—	—	TK0	I/O	—	—	—	—	PIO, I, PU, ST
C5	VDDIOP0	GPIO	PC17	I/O	—	—	TF0	I/O	—	—	—	—	PIO, I, PU, ST
C4	VDDIOP0	GPIO	PC18	I/O	—	—	TD0	O	—	—	—	—	PIO, I, PU, ST
D6	VDDIOP0	GPIO	PC19	I/O	—	—	RK0	I/O	—	—	—	—	PIO, I, PU, ST
B3	VDDIOP0	GPIO	PC20	I/O	—	—	RF0	I/O	—	—	—	—	PIO, I, PU, ST

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
D5	VDDIOP0	GPIO	PC21	I/O	—	—	RD0	I	—	—	—	—	PIO, I, PU, ST
C3	VDDIOP0	GPIO	PC22	I/O	—	—	SPI1_MISO	I/O	—	—	—	—	PIO, I, PU, ST
B2	VDDIOP0	GPIO	PC23	I/O	—	—	SPI1_MOSI	I/O	—	—	—	—	PIO, I, PU, ST
A2	VDDIOP0	GPIO_CLK	PC24	I/O	—	—	SPI1_SPCK	I/O	—	—	—	—	PIO, I, PU, ST
A1	VDDIOP0	GPIO	PC25	I/O	—	—	SPI1_NPCS0	I/O	—	—	—	—	PIO, I, PU, ST
D3	VDDIOP0	GPIO	PC26	I/O	—	—	SPI1_NPCS1	O	TWD1	I/O	ISI_D11	I	PIO, I, PU, ST
D4	VDDIOP0	GPIO	PC27	I/O	—	—	SPI1_NPCS2	O	TWCK1	O	ISI_D10	I	PIO, I, PU, ST
E4	VDDIOP0	GPIO	PC28	I/O	—	—	SPI1_NPCS3	O	PWMF10	I	ISI_D9	I	PIO, I, PU, ST
E3	VDDIOP0	GPIO	PC29	I/O	—	—	URXD0	I	PWMF12	I	ISI_D8	I	PIO, I, PU, ST
E1	VDDIOP0	GPIO	PC30	I/O	—	—	UTXD0	O	—	—	ISI_PCK	O	PIO, I, PU, ST
F4	VDDIOP0	GPIO	PC31	I/O	—	—	FIQ	I	PWMF11	I	—	—	PIO, I, PU, ST
M10	VDDIOP1	GPIO	PD0	I/O	—	—	MCI0_CDA	I/O	—	—	—	—	PIO, I, PU, ST
T1	VDDIOP1	GPIO	PD1	I/O	—	—	MCI0_DA0	I/O	—	—	—	—	PIO, I, PU, ST
R4	VDDIOP1	GPIO	PD2	I/O	—	—	MCI0_DA1	I/O	—	—	—	—	PIO, I, PU, ST
U1	VDDIOP1	GPIO	PD3	I/O	—	—	MCI0_DA2	I/O	—	—	—	—	PIO, I, PU, ST
M9	VDDIOP1	GPIO	PD4	I/O	—	—	MCI0_DA3	I/O	—	—	—	—	PIO, I, PU, ST
V1	VDDIOP1	GPIO	PD5	I/O	—	—	MCI0_DA4	I/O	TIOA0	I/O	PWMH2	O	PIO, I, PU, ST
N10	VDDIOP1	GPIO	PD6	I/O	—	—	MCI0_DA5	I/O	TIOB0	I/O	PWML2	O	PIO, I, PU, ST
W1	VDDIOP1	GPIO	PD7	I/O	—	—	MCI0_DA6	I/O	TCLK0	I	PWMH3	O	PIO, I, PU, ST
R3	VDDIOP1	GPIO	PD8	I/O	—	—	MCI0_DA7	I/O	—	—	PWML3	O	PIO, I, PU, ST
Y1	VDDIOP1	MCI_CLK	PD9	I/O	—	—	MCI0_CK	I/O	—	—	—	—	PIO, I, PU, ST
T3	VDDIOP1	GPIO	PD10	I/O	—	—	SPI0_MISO	I/O	—	—	—	—	PIO, I, PU, ST
T2	VDDIOP1	GPIO	PD11	I/O	—	—	SPI0_MOSI	I/O	—	—	—	—	PIO, I, PU, ST
N9	VDDIOP1	GPIO_CLK	PD12	I/O	—	—	SPI0_SPCK	I/O	—	—	—	—	PIO, I, PU, ST
U2	VDDIOP1	GPIO	PD13	I/O	—	—	SPI0_NPCS0	I/O	—	—	—	—	PIO, I, PU, ST
T4	VDDIOP1	GPIO	PD14	I/O	—	—	SCK0	I/O	SPI0_NPCS1	O	CANRX0	I	PIO, I, PU, ST
V2	VDDIOP1	GPIO	PD15	I/O	—	—	CTS0	I	SPI0_NPCS2	O	CANTX0	O	PIO, I, PU, ST
U3	VDDIOP1	GPIO	PD16	I/O	—	—	RTS0	O	SPI0_NPCS3	O	PWMF13	I	PIO, I, PU, ST
V3	VDDIOP1	GPIO	PD17	I/O	—	—	RXD0	I	—	—	—	—	PIO, I, PU, ST
U4	VDDIOP1	GPIO	PD18	I/O	—	—	TXD0	O	—	—	—	—	PIO, I, PU, ST
W2	VDDIOP1	GPIO	PD19	I/O	—	—	ADTRG	I	—	—	—	—	PIO, I, PU, ST
P3	VDDANA	GPIO_ANA	PD20	I/O	—	—	AD0	I	—	—	—	—	PIO, I, PU, ST
R2	VDDANA	GPIO_ANA	PD21	I/O	—	—	AD1	I	—	—	—	—	PIO, I, PU, ST
P2	VDDANA	GPIO_ANA	PD22	I/O	—	—	AD2	I	—	—	—	—	PIO, I, PU, ST
R1	VDDANA	GPIO_ANA	PD23	I/O	—	—	AD3	I	—	—	—	—	PIO, I, PU, ST
P1	VDDANA	GPIO_ANA	PD24	I/O	—	—	AD4	I	—	—	—	—	PIO, I, PU, ST
N3	VDDANA	GPIO_ANA	PD25	I/O	—	—	AD5	I	—	—	—	—	PIO, I, PU, ST
N1	VDDANA	GPIO_ANA	PD26	I/O	—	—	AD6	I	—	—	—	—	PIO, I, PU, ST
N2	VDDANA	GPIO_ANA	PD27	I/O	—	—	AD7	I	—	—	—	—	PIO, I, PU, ST
M2	VDDANA	GPIO_ANA	PD28	I/O	—	—	AD8	I	—	—	—	—	PIO, I, PU, ST
M1	VDDANA	GPIO_ANA	PD29	I/O	—	—	AD9	I	—	—	—	—	PIO, I, PU, ST
M3	VDDANA	GPIO_ANA	PD30	I/O	—	—	AD10	I	PCK0	O	—	—	PIO, I, PU, ST
L1	VDDANA	GPIO_ANA	PD31	I/O	—	—	AD11	I	PCK1	O	—	—	PIO, I, PU, ST

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
W17	VDDIOM	EBI	PE0	I/O	—	—	A0/NBS0	O	—	—	—	—	A,I, PD, ST
Y18	VDDIOM	EBI	PE1	I/O	—	—	A1	O	—	—	—	—	A,I, PD, ST
W18	VDDIOM	EBI	PE2	I/O	—	—	A2	O	—	—	—	—	A,I, PD, ST
AA21	VDDIOM	EBI	PE3	I/O	—	—	A3	O	—	—	—	—	A,I, PD, ST
Y16	VDDIOM	EBI	PE4	I/O	—	—	A4	O	—	—	—	—	A,I, PD, ST
Y20	VDDIOM	EBI	PE5	I/O	—	—	A5	O	—	—	—	—	A,I, PD, ST
W19	VDDIOM	EBI	PE6	I/O	—	—	A6	O	—	—	—	—	A,I, PD, ST
Y22	VDDIOM	EBI	PE7	I/O	—	—	A7	O	—	—	—	—	A,I, PD, ST
Y21	VDDIOM	EBI	PE8	I/O	—	—	A8	O	—	—	—	—	A,I, PD, ST
W22	VDDIOM	EBI	PE9	I/O	—	—	A9	O	—	—	—	—	A,I, PD, ST
V19	VDDIOM	EBI	PE10	I/O	—	—	A10	O	—	—	—	—	A,I, PD, ST
W20	VDDIOM	EBI	PE11	I/O	—	—	A11	O	—	—	—	—	A,I, PD, ST
W21	VDDIOM	EBI	PE12	I/O	—	—	A12	O	—	—	—	—	A,I, PD, ST
T19	VDDIOM	EBI	PE13	I/O	—	—	A13	O	—	—	—	—	A,I, PD, ST
V22	VDDIOM	EBI	PE14	I/O	—	—	A14	O	—	—	—	—	A,I, PD, ST
V20	VDDIOM	EBI	PE15	I/O	—	—	A15	O	SCK3	I/O	—	—	A,I, PD, ST
V21	VDDIOM	EBI	PE16	I/O	—	—	A16	O	CTS3	I	—	—	A,I, PD, ST
T20	VDDIOM	EBI	PE17	I/O	—	—	A17	O	RTS3	O	—	—	A,I, PD, ST
U20	VDDIOM	EBI	PE18	I/O	—	—	A18	O	RXD3	I	—	—	A,I, PD, ST
U21	VDDIOM	EBI	PE19	I/O	—	—	A19	O	TXD3	O	—	—	A,I, PD, ST
U22	VDDIOM	EBI	PE20	I/O	—	—	A20	O	SCK2	I/O	—	—	A,I, PD, ST
R19	VDDIOM	EBI	PE21	I/O	—	—	A21/NANDALE	O	—	—	—	—	A,I, PD, ST
R20	VDDIOM	EBI	PE22	I/O	—	—	A22/NANDCLE	O	—	—	—	—	A,I, PD, ST
T21	VDDIOM	EBI	PE23	I/O	—	—	A23	O	CTS2	I	—	—	A,I, PD, ST
T22	VDDIOM	EBI	PE24	I/O	—	—	A24	O	RTS2	O	—	—	A,I, PD, ST
P19	VDDIOM	EBI	PE25	I/O	—	—	A25	O	RXD2	I	—	—	A,I, PD, ST
R22	VDDIOM	EBI	PE26	I/O	—	—	NCS0	O	TXD2	O	—	—	A,I, PD, ST
R21	VDDIOM	EBI	PE27	I/O	—	—	NCS1	O	TIOA2	I/O	LCDDAT22	O	PIO,I, PD, ST
P20	VDDIOM	EBI	PE28	I/O	—	—	NCS2	O	TIOB2	I/O	LCDDAT23	O	PIO, I, PD, ST
P21	VDDIOM	EBI	PE29	I/O	—	—	NWR1/NBS1	O	TCLK2	I	—	—	PIO, I, PD, ST
N19	VDDIOM	EBI	PE30	I/O	—	—	NWAIT	I	—	—	—	—	PIO, I, PD, ST
N21	VDDIOM	EBI	PE31	I/O	—	—	IRQ	I	PWML1	O	—	—	PIO,I, PD, ST
Y15	VDDBU	SYSC	TST	I	—	—	—	—	—	—	—	—	I, PD,
AB14	VDDIOP0	SYSC	BMS	I	—	—	—	—	—	—	—	—	I
AB11	VDDIOP0	CLOCK	XIN	I	—	—	—	—	—	—	—	—	I
AA11	VDDIOP0	CLOCK	XOUT	O	—	—	—	—	—	—	—	—	O
AB19	VDDBU	CLOCK	XIN32	I	—	—	—	—	—	—	—	—	I
AA19	VDDBU	CLOCK	XOUT32	O	—	—	—	—	—	—	—	—	O
W16	VDDBU	SYSC	SHDN	O	—	—	—	—	—	—	—	—	O
AB16	VDDBU	SYSC	WKUP	I	—	—	—	—	—	—	—	—	I, ST
Y13	VDDIOP0	RSTJTAG	NRST	I/O	—	—	—	—	—	—	—	—	I, PU, ST
AA14	VDDIOP0	RSTJTAG	NTRST	I	—	—	—	—	—	—	—	—	I, PU, ST
W13	VDDIOP0	RSTJTAG	TDI	I	—	—	—	—	—	—	—	—	I, ST

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
W11	VDDIOP0	RSTJTAG	TDO	O	—	—	—	—	—	—	—	—	O
W12	VDDIOP0	RSTJTAG	TMS	I	SWDIO	I/O	—	—	—	—	—	—	I, ST
Y14	VDDIOP0	RSTJTAG	TCK	I	SWCLK	I	—	—	—	—	—	—	I, ST
AA16	VDDBU	SYSC	JTAGSEL	I	—	—	—	—	—	—	—	—	I, PD
AA9	VDDIOP0	DIB	DIBP	O	—	—	—	—	—	—	—	—	O, PU
AB9	VDDIOP0	DIB	DIBN	O	—	—	—	—	—	—	—	—	O, PU
M19	VDDIOM	EBI	D0	I/O	—	—	—	—	—	—	—	—	I, PD
M22	VDDIOM	EBI	D1	I/O	—	—	—	—	—	—	—	—	I, PD
M20	VDDIOM	EBI	D2	I/O	—	—	—	—	—	—	—	—	I, PD
L22	VDDIOM	EBI	D3	I/O	—	—	—	—	—	—	—	—	I, PD
L20	VDDIOM	EBI	D4	I/O	—	—	—	—	—	—	—	—	I, PD
L21	VDDIOM	EBI	D5	I/O	—	—	—	—	—	—	—	—	I, PD
K21	VDDIOM	EBI	D6	I/O	—	—	—	—	—	—	—	—	I, PD
H22	VDDIOM	EBI	D7	I/O	—	—	—	—	—	—	—	—	I, PD
L19	VDDIOM	EBI	D8	I/O	—	—	—	—	—	—	—	—	I, PD
J22	VDDIOM	EBI	D9	I/O	—	—	—	—	—	—	—	—	I, PD
K19	VDDIOM	EBI	D10	I/O	—	—	—	—	—	—	—	—	I, PD
J21	VDDIOM	EBI	D11	I/O	—	—	—	—	—	—	—	—	I, PD
K22	VDDIOM	EBI	D12	I/O	—	—	—	—	—	—	—	—	I, PD
H20	VDDIOM	EBI	D13	I/O	—	—	—	—	—	—	—	—	I, PD
K20	VDDIOM	EBI	D14	I/O	—	—	—	—	—	—	—	—	I, PD
J20	VDDIOM	EBI	D15	I/O	—	—	—	—	—	—	—	—	I, PD
N20	VDDIOM	EBI	NCS3/NANDCS	O	—	—	—	—	—	—	—	—	O, PU
M21	VDDIOM	EBI	NANDRDY	I	—	—	—	—	—	—	—	—	I, PU
N22	VDDIOM	EBI	NRD/NANDOE	O	—	—	—	—	—	—	—	—	O, PU
P22	VDDIOM	EBI	NWE/NANDWE	O	—	—	—	—	—	—	—	—	O, PU
J13, J14	VDDIODDR	Reference voltage	DDR_VREF	I	—	—	—	—	—	—	—	—	I
B13	VDDIODDR	DDR_IO	DDR_A0	O	—	—	—	—	—	—	—	—	O
C14	VDDIODDR	DDR_IO	DDR_A1	O	—	—	—	—	—	—	—	—	O
B16	VDDIODDR	DDR_IO	DDR_A2	O	—	—	—	—	—	—	—	—	O
C13	VDDIODDR	DDR_IO	DDR_A3	O	—	—	—	—	—	—	—	—	O
A14	VDDIODDR	DDR_IO	DDR_A4	O	—	—	—	—	—	—	—	—	O
D13	VDDIODDR	DDR_IO	DDR_A5	O	—	—	—	—	—	—	—	—	O
C12	VDDIODDR	DDR_IO	DDR_A6	O	—	—	—	—	—	—	—	—	O
B12	VDDIODDR	DDR_IO	DDR_A7	O	—	—	—	—	—	—	—	—	O
D12	VDDIODDR	DDR_IO	DDR_A8	O	—	—	—	—	—	—	—	—	O
A13	VDDIODDR	DDR_IO	DDR_A9	O	—	—	—	—	—	—	—	—	O
C11	VDDIODDR	DDR_IO	DDR_A10	O	—	—	—	—	—	—	—	—	O
B11	VDDIODDR	DDR_IO	DDR_A11	O	—	—	—	—	—	—	—	—	O
A12	VDDIODDR	DDR_IO	DDR_A12	O	—	—	—	—	—	—	—	—	O
A11	VDDIODDR	DDR_IO	DDR_A13	O	—	—	—	—	—	—	—	—	O
J19	VDDIODDR	DDR_IO	DDR_D0	I/O	—	—	—	—	—	—	—	—	HiZ
H21	VDDIODDR	DDR_IO	DDR_D1	I/O	—	—	—	—	—	—	—	—	HiZ

Table 4-2. SAMA5D3 Pinout for 324-ball TFBGA Package (Continued)

Pin	Power Rail	I/O Type	Primary		Alternate		PIO Peripheral A		PIO Peripheral B		PIO Peripheral C		Reset State
			Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal	Dir	Signal, Dir, PU, PD, HiZ, ST
F20	VDDIODDR	DDR_IO	DDR_D2	I/O	—	—	—	—	—	—	—	—	HiZ
G20	VDDIODDR	DDR_IO	DDR_D3	I/O	—	—	—	—	—	—	—	—	HiZ
F21	VDDIODDR	DDR_IO	DDR_D4	I/O	—	—	—	—	—	—	—	—	HiZ
H19	VDDIODDR	DDR_IO	DDR_D5	I/O	—	—	—	—	—	—	—	—	HiZ
G21	VDDIODDR	DDR_IO	DDR_D6	I/O	—	—	—	—	—	—	—	—	HiZ
D21	VDDIODDR	DDR_IO	DDR_D7	I/O	—	—	—	—	—	—	—	—	HiZ
G19	VDDIODDR	DDR_IO	DDR_D8	I/O	—	—	—	—	—	—	—	—	HiZ
D20	VDDIODDR	DDR_IO	DDR_D9	I/O	—	—	—	—	—	—	—	—	HiZ
C22	VDDIODDR	DDR_IO	DDR_D10	I/O	—	—	—	—	—	—	—	—	HiZ
C20	VDDIODDR	DDR_IO	DDR_D11	I/O	—	—	—	—	—	—	—	—	HiZ
B21	VDDIODDR	DDR_IO	DDR_D12	I/O	—	—	—	—	—	—	—	—	HiZ
C21	VDDIODDR	DDR_IO	DDR_D13	I/O	—	—	—	—	—	—	—	—	HiZ
D19	VDDIODDR	DDR_IO	DDR_D14	I/O	—	—	—	—	—	—	—	—	HiZ
F19	VDDIODDR	DDR_IO	DDR_D15	I/O	—	—	—	—	—	—	—	—	HiZ
B20	VDDIODDR	DDR_IO	DDR_D16	I/O	—	—	—	—	—	—	—	—	HiZ
E21	VDDIODDR	DDR_IO	DDR_D17	I/O	—	—	—	—	—	—	—	—	HiZ
E19	VDDIODDR	DDR_IO	DDR_D18	I/O	—	—	—	—	—	—	—	—	HiZ
C17	VDDIODDR	DDR_IO	DDR_D19	I/O	—	—	—	—	—	—	—	—	HiZ
D18	VDDIODDR	DDR_IO	DDR_D20	I/O	—	—	—	—	—	—	—	—	HiZ
A18	VDDIODDR	DDR_IO	DDR_D21	I/O	—	—	—	—	—	—	—	—	HiZ
C19	VDDIODDR	DDR_IO	DDR_D22	I/O	—	—	—	—	—	—	—	—	HiZ
C18	VDDIODDR	DDR_IO	DDR_D23	I/O	—	—	—	—	—	—	—	—	HiZ
C16	VDDIODDR	DDR_IO	DDR_D24	I/O	—	—	—	—	—	—	—	—	HiZ
A21	VDDIODDR	DDR_IO	DDR_D25	I/O	—	—	—	—	—	—	—	—	HiZ
D15	VDDIODDR	DDR_IO	DDR_D26	I/O	—	—	—	—	—	—	—	—	HiZ
A20	VDDIODDR	DDR_IO	DDR_D27	I/O	—	—	—	—	—	—	—	—	HiZ
B14	VDDIODDR	DDR_IO	DDR_D28	I/O	—	—	—	—	—	—	—	—	HiZ
A22	VDDIODDR	DDR_IO	DDR_D29	I/O	—	—	—	—	—	—	—	—	HiZ
A16	VDDIODDR	DDR_IO	DDR_D30	I/O	—	—	—	—	—	—	—	—	HiZ
D14	VDDIODDR	DDR_IO	DDR_D31	I/O	—	—	—	—	—	—	—	—	HiZ
E20	VDDIODDR	DDR_IO	DDR_DQM0	O	—	—	—	—	—	—	—	—	O
B22	VDDIODDR	DDR_IO	DDR_DQM1	O	—	—	—	—	—	—	—	—	O
B18	VDDIODDR	DDR_IO	DDR_DQM2	O	—	—	—	—	—	—	—	—	O
C15	VDDIODDR	DDR_IO	DDR_DQM3	O	—	—	—	—	—	—	—	—	O
G22	VDDIODDR	DDR_IO	DDR_DQS0	I/O	—	—	—	—	—	—	—	—	I, PD
E22	VDDIODDR	DDR_IO	DDR_DQS1	I/O	—	—	—	—	—	—	—	—	I, PD
A19	VDDIODDR	DDR_IO	DDR_DQS2	I/O	—	—	—	—	—	—	—	—	I, PD
B17	VDDIODDR	DDR_IO	DDR_DQS3	I/O	—	—	—	—	—	—	—	—	I, PD
F22	VDDIODDR	DDR_IO	DDR_DQSN0	I/O	—	—	—	—	—	—	—	—	I, PU
D22	VDDIODDR	DDR_IO	DDR_DQSN1	I/O	—	—	—	—	—	—	—	—	I, PU
B19	VDDIODDR	DDR_IO	DDR_DQSN2	I/O	—	—	—	—	—	—	—	—	I, PU
A17	VDDIODDR	DDR_IO	DDR_DQSN3	I/O	—	—	—	—	—	—	—	—	I, PU
C9	VDDIODDR	DDR_IO	DDR_CS	O	—	—	—	—	—	—	—	—	O