36Mb Sync. Pipelined Burst SRAM Specification

100TQFP with Pb only

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Document Title

1Mx36 & 2Mx18-Bit Synchronous Pipelined Burst SRAM

Revision History

Rev. No.	History	Draft Date	Remark
0.0	1. Initial draft	May. 10. 2001	Advance
0.1	1. Add 165FBGA package	Aug. 29. 2001	Preliminary
0.2	1. Update JTAG scan order 2. Speed bin merge. From K7A3236(18)09M to K7A3236(18)00M. 3. AC parameter change. tOH(min)/tHZC(min) from 0.8 to 1.5 at -25 tOH(min)/tHZC(min) from 1.0 to 1.5 at -22 tOH(min)/tHZC(min) from 1.0 to 1.5 at -20	Dec. 31. 2001	Preliminary
0.3	1. Change pin out for 165FBGA - x18/x36 ; 11B => from A to NC , 2R ==> from NC to A .	Feb. 14. 2002	Preliminary
0.4	1. Insert pin at JTAG scan order of 165FBGA in connection with pin out change - x18/x36 ; insert Pin ID of 2R to BIT number of 69	Apr. 20. 2002	Preliminary
0.5	1. Add Icc, Isb,Isb1 and Isb2 values	May.10. 2002	Preliminary
1.0	1. Correct the pin name of 100TQFP.	Oct. 15. 2002	Final
1.1	1. Add the Industrial temperature range.	Mar. 19. 2003	Final
1.2	1. Change the Stand-by current (Isb) Before After Isb - 25 : 120 170 - 22 : 110 160 - 20 : 100 150 - 16 : 90 140 - 15 : 90 140 - 14 : 90 140 Isb1 : 90 110 Isb2 : 80 100	Oct. 17. 2003	Final
2.0	1. Delete the 119BGA and 165FBGA package. 2. Delete the 225MHz, 167MHz and 150MHz speed bin	Nov. 18. 2003	Final
3.0	1. Add the overshoot timing	Feb. 16. 2006	Final

36Mb SB/SPB SRAM Ordering Information

Org.	Part Number	Mode	VDD	Speed SB ; Access Time(ns) SPB ; Cycle Time(MHz)	PKG	Temp
2Mx18	K7B321825M-QC65/75	SB	3.3	6.5/7.5ns	Q: 100TQFP	C ; Commercial Temp.Range I ; Industrial Temp.Range
	K7A321800M-QC(I)25/20/14	SPB(2E1D)	3.3	250/200/138MHz		
1Mx36	K7B323625M-Q)C65/75	SB	3.3	6.5/7.5ns		
	K7A323600M-QC(I)25/20/14	SPB(2E1D)	3.3	250/200/138MHz		

1Mx36 & 2Mx18-Bit Synchronous Pipelined Burst SRAM

FEATURES

- Synchronous Operation.
- 2 Stage Pipelined operation with 4 Burst.
- On-Chip Address Counter.
- Self-Timed Write Cycle.
- On-Chip Address and Control Registers.
- V_{DD}= 3.3V +0.165V/-0.165V Power Supply.
- I/O Supply Voltage 3.3V +0.165V/-0.165V for 3.3V I/O or 2.5V+0.4V/-0.125V for 2.5V I/O.
- 5V Tolerant Inputs Except I/O Pins.
- Byte Writable Function.
- Global Write Enable Controls a full bus-width write.
- Power Down State via ZZ Signal.
- LBO Pin allows a choice of either a interleaved burst or a linear burst.
- Three Chip Enables for simple depth expansion with No Data Contention only for TQFP ; 2cycle Enable, 1cycle Disable.
- Asynchronous Output Enable Control.
- ADSP, ADSC, ADV Burst Control Pins.
- TTL-Level Three-State Output.
- 100-TQFP-1420A Package
- Operating in commeical and industrial temperature range.

FAST ACCESS TIMES

PARAMETER	Symbol	-25	-20	-14	Unit
Cycle Time	tCYC	4.0	5.0	7.2	ns
Clock Access Time	tCD	2.6	3.1	4.0	ns
Output Enable Access Time	tOE	2.6	3.1	4.0	ns

GENERAL DESCRIPTION

The K7A323600M and K7A321800M are 37,748,736-bit Synchronous Static Random Access Memory designed for high performance second level cache of Pentium and Power PC based System.

It is organized as 1M(2M) words of 36(18) bits and integrates address and control registers, a 2-bit burst address counter and added some new functions for high performance cache RAM applications; GW, BW, LBO, ZZ. Write cycles are internally self-timed and synchronous.

Full bus-width write is done by GW, and each byte write is performed by the combination of WEx and BW when GW is high. And with CS_1 high, ADSP is blocked to control signals.

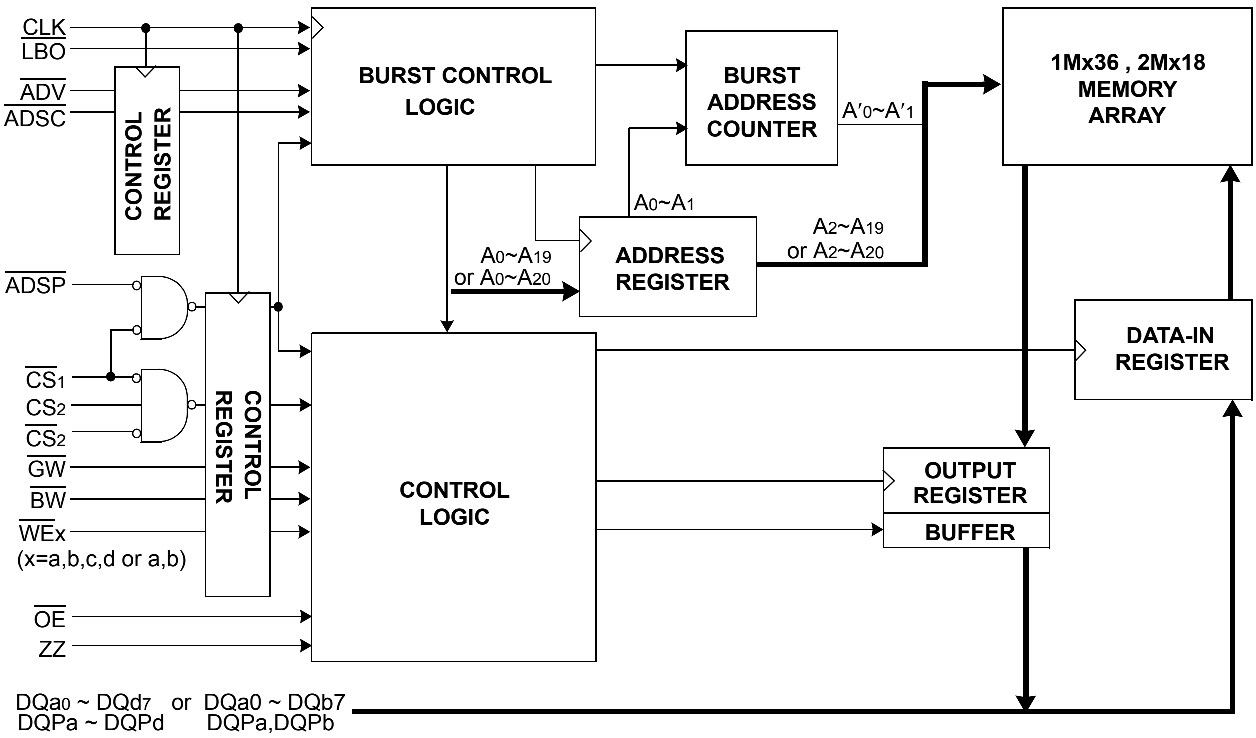
Burst cycle can be initiated with either the address status processor(ADSP) or address status cache controller(ADSC) inputs. Subsequent burst addresses are generated internally in the system's burst sequence and are controlled by the burst address advance(ADV) input.

LBO pin is DC operated and determines burst sequence(linear or interleaved).

ZZ pin controls Power Down State and reduces Stand-by current regardless of CLK.

The K7A323600M and K7A321800M are fabricated using SAMSUNG's high performance CMOS technology and is available in a 100pin TQFP package. Multiple power and ground pins are utilized to minimize ground bounce.

LOGIC BLOCK DIAGRAM



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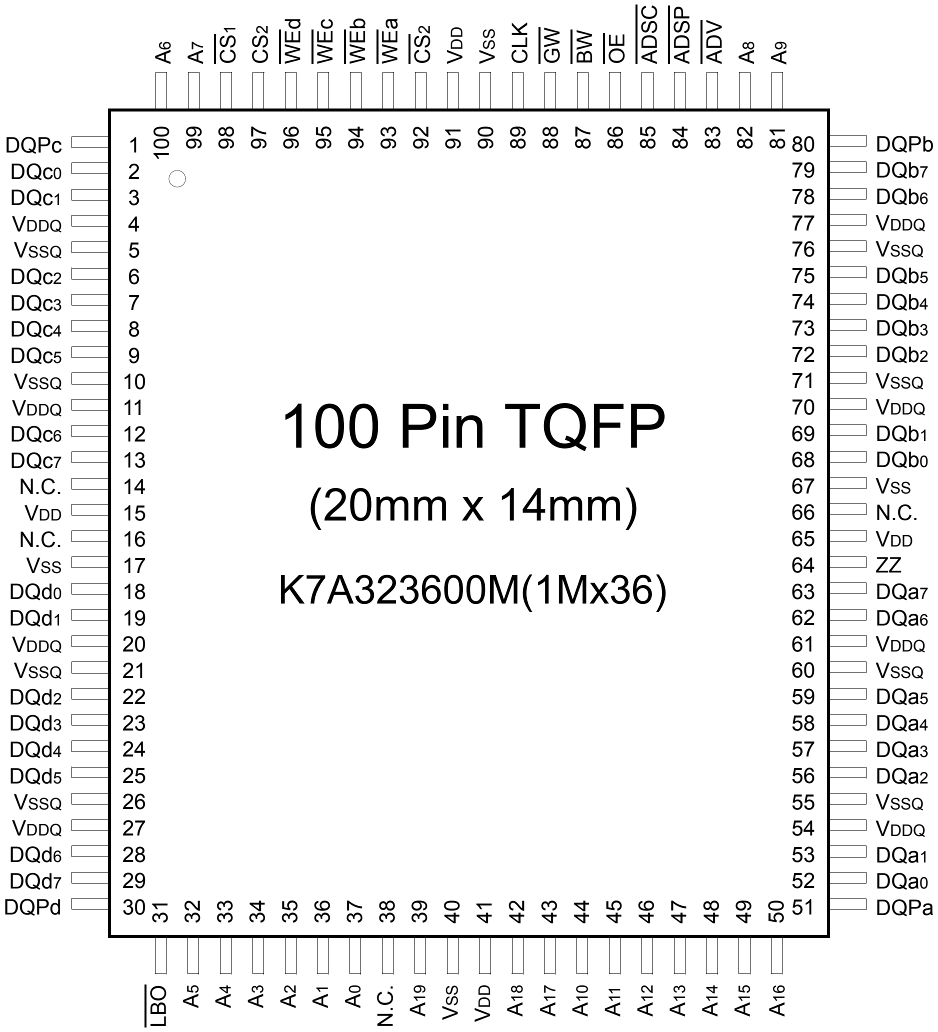
PIN CONFIGURATION(TOP VIEW)



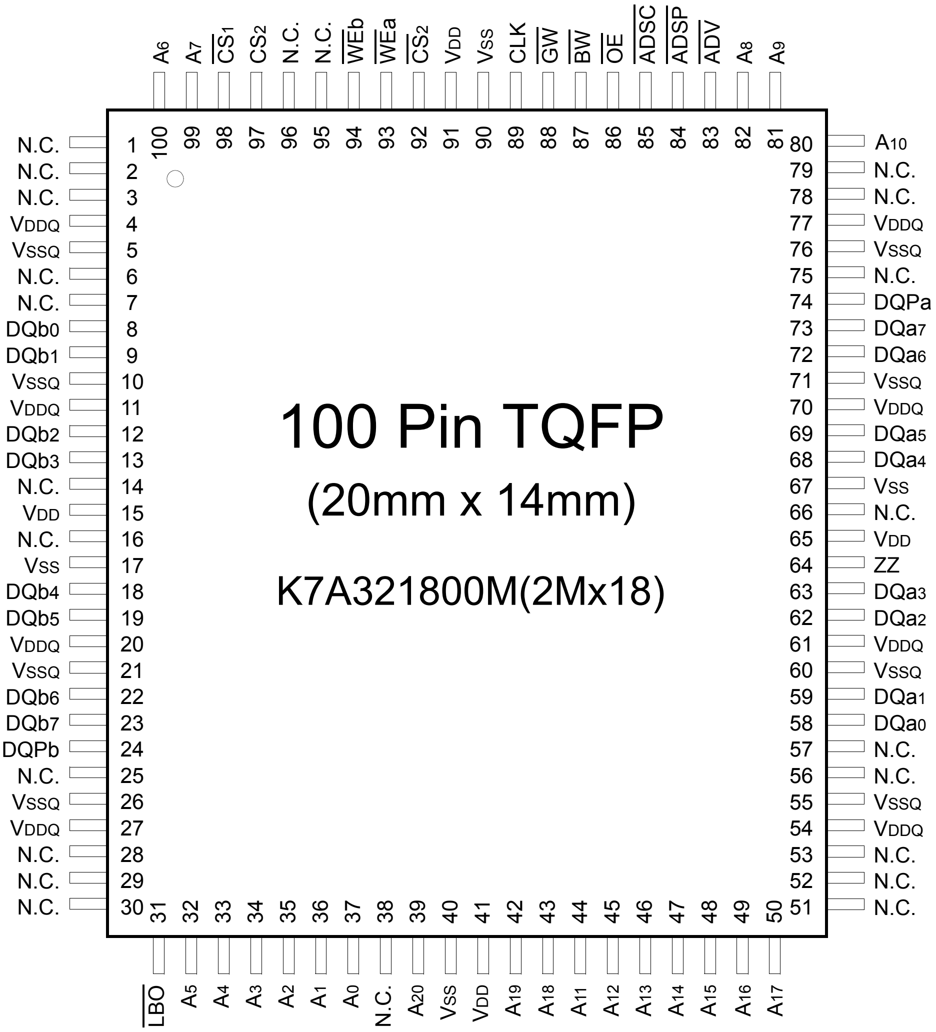
PIN NAME

SYMBOL	PIN NAME	TQFP PIN NO.	SYMBOL	PIN NAME	TQFP PIN NO.
A_0 - A_{19}	Address Inputs	32,33,34,35,36,37,39 42,43,44,45,46,47,48, 49,50,81,82,99,100	V_{DD} V_{SS}	Power Supply(+3.3V) Ground	15,41,65,91 17,40,67,90
ADV	Burst Address Advance	83	N.C.	No Connect	14,16,38,66
ADSP	Address Status Processor	84			
ADSC	Address Status Controller	85	DQa_0~a_7	Data Inputs/Outputs	52,53,56,57,58,59,62,63
CLK	Clock	89	DQb_0~b_7		68,69,72,73,74,75,78,79
CS_1	Chip Select	98	DQc_0~c_7		2,3,6,7,8,9,12,13
CS_2	Chip Select	97	DQd_0~d_7		18,19,22,23,24,25,28,29
CS_2	Chip Select	92	$DQPa$~P_d		51,80,1,30
WEx(x=a,b,c,d)	Byte Write Inputs	93,94,95,96			
OE	Output Enable	86	V_{DDQ}	Output Power Supply (3.3V or 2.5V)	4,11,20,27,54,61,70,77
GW	Global Write Enable	88			
BW	Byte Write Enable	87	V_{SSQ}	Output Ground	5,10,21,26,55,60,71,76
ZZ	Power Down Input	64			
LBO	Burst Mode Control	31			

Note : 1. A0 and A1 are the two least significant bits(LSB) of the address field and set the internal burst counter if burst is desired.

SAMSUNG ELECTRONICS

PIN CONFIGURATION(TOP VIEW)



PIN NAME

SYMBOL	PIN NAME	TQFP PIN NO.	SYMBOL	PIN NAME	TQFP PIN NO.
A_0 - A_{20}	Address Inputs	32,33,34,35,36,37,39 42,43,44,45,46,47,48, 49,50 80,81,82,99,100	V_{DD} V_{SS}	Power Supply(+3.3V) Ground	15,41,65,91 17,40,67,90
$\overline{ADV}$	Burst Address Advance	83	N.C.	No Connect	1,2,3,6,7,14,16,25,28,29 30,38,51,52,53,56,57 66,75,78,79,95,96
$\overline{ADSP}$	Address Status Processor	84			
$\overline{ADSC}$	Address Status Controller	85			
CLK	Clock	89			
$\overline{CS_1}$	Chip Select	98	DQa_0 ~ a_7 DQb_0 ~ b_7 DQPa, Pb	Data Inputs/Outputs	58,59,62,63,68,69,72,73 8,9,12,13,18,19,22,23 74,24
CS_2	Chip Select	97			
$\overline{CS_2}$	Chip Select	92			
$\overline{WEx}$(x=a,b)	Byte Write Inputs	93,94			
$\overline{OE}$	Output Enable	86	V_{DDQ}	Output Power Supply (3.3V or 2.5V)	4,11,20,27,54,61,70,77
$\overline{GW}$	Global Write Enable	88			
$\overline{BW}$	Byte Write Enable	87	V_{SSQ}	Output Ground	5,10,21,26,55,60,71,76
ZZ	Power Down Input	64			
$\overline{LBO}$	Burst Mode Control	31			

Note : 1. A_0 and A_1 are the two least significant bits(LSB) of the address field and set the internal burst counter if burst is desired.

FUNCTION DESCRIPTION

The K7A323600M and K7A321800M are synchronous SRAM designed to support the burst address accessing sequence of the Power PC based microprocessor. All inputs (with the exception of OE, LBO and ZZ) are sampled on rising clock edges. The start and duration of the burst access is controlled by ADSC, ADSP and ADV and chip select pins.
The accesses are enabled with the chip select signals and output enabled signals. Wait states are inserted into the access with ADV.
When ZZ is pulled high, the SRAM will enter a Power Down State. At this time, internal state of the SRAM is preserved. When ZZ returns to low, the SRAM normally operates after 2cycles of wake up time. ZZ pin is pulled down internally.
Read cycles are initiated with ADSP(regardless of WEx and ADSC)using the new external address clocked into the on-chip address register whenever ADSP is sampled low, the chip selects are sampled active, and the output buffer is enabled with OE. In read operation the data of cell array accessed by the current address, registered in the Data-out registers by the positive edge of CLK, are carried to the Data-out buffer by the next positive edge of CLK. The data, registered in the Data-out buffer, are projected to the output pins. ADV is ignored on the clock edge that samples ADSP asserted, but is sampled on the subsequent clock edges. The address increases internally for the next access of the burst when WEx are sampled High and ADV is sampled low. And ADSP is blocked to control signals by disabling CS1.
All byte write is done by GW(regaedless of BW and WEx.), and each byte write is performed by the combination of BW and WEx when GW is high.
Write cycles are performed by disabling the output buffers with OE and asserting WEx. WEx are ignored on the clock edge that samples ADSP low, but are sampled on the subsequent clock edges. The output buffers are disabled when WEx are sampled Low(regaedless of OE). Data is clocked into the data input register when WEx sampled Low. The address increases internally to the next address of burst, if both WEx and ADV are sampled Low. Individual byte write cycles are performed by any one or more byte write enable signals(WEa, WEb, WEc or WEd) sampled low. The WEa control DQa0 ~ DQa7 and DQPa, WEb controls DQb0 ~ DQb7 and DQPb, WEc controls DQc0 ~ DQc7 and DQPc, and WEd control DQd0 ~ DQd7 and DQPd. Read or write cycle may also be initiated with ADSC, instead of ADSP. The differences between cycles initiated with ADSC and ADSP as are follows;

ADSP must be sampled high when ADSC is sampled low to initiate a cycle with ADSC.
WEx are sampled on the same clock edge that sampled ADSC low(and ADSP high).

Addresses are generated for the burst access as shown below, The starting point of the burst sequence is provided by the external address. The burst address counter wraps around to its initial state upon completion. The burst sequence is determined by the state of the LBO pin. When this pin is Low, linear burst sequence is selected. When this pin is High, Interleaved burst sequence is selected.

BURST SEQUENCE TABLE

(Interleaved Burst)

LBO PIN	HIGH	Case 1		Case 2		Case 3		Case 4	
		A1	A0	A1	A0	A1	A0	A1	A0
First Address		0	0	0	1	1	0	1	1
↓		0	1	0	0	1	1	1	0
		1	0	1	1	0	0	0	1
Fourth Address		1	1	1	0	0	1	0	0

(Linear Burst)

LBO PIN	LOW	Case 1		Case 2		Case 3		Case 4	
		A1	A0	A1	A0	A1	A0	A1	A0
First Address		0	0	0	1	1	0	1	1
↓		0	1	1	0	1	1	0	0
		1	0	1	1	0	0	0	1
Fourth Address		1	1	0	0	0	1	1	0

Note : 1. LBO pin must be tied to High or Low, and Floating State must not be allowed.

ASYNCHRONOUS TRUTH TABLE

Operation	ZZ	OE	I/O STATUS
Sleep Mode	H	X	High-Z
Read	L	L	DQ
	L	H	High-Z
Write	L	X	Din, High-Z
Deselected	L	X	High-Z

Notes

1. X means "Don′t Care".
2. ZZ pin is pulled down internally
3. For write cycles that following read cycles, the output buffers must be disabled with OE, otherwise data bus contention will occur.
4. Sleep Mode means power down state of which stand-by current does not depend on cycle time.
5. Deselected means power down state of which stand-by current depends on cycle time.

TRUTH TABLES

SYNCHRONOUS TRUTH TABLE

$\overline{CS_1}$	CS_2	$\overline{CS_2}$	$\overline{ADSP}$	$\overline{ADSC}$	$\overline{ADV}$	$\overline{WRITE}$	CLK	ADDRESS ACCESSED	OPERATION
H	X	X	X	L	X	X	↑	N/A	Not Selected
L	L	X	L	X	X	X	↑	N/A	Not Selected
L	X	H	L	X	X	X	↑	N/A	Not Selected
L	L	X	X	L	X	X	↑	N/A	Not Selected
L	X	H	X	L	X	X	↑	N/A	Not Selected
L	H	L	L	X	X	X	↑	External Address	Begin Burst Read Cycle
L	H	L	H	L	X	L	↑	External Address	Begin Burst Write Cycle
L	H	L	H	L	X	H	↑	External Address	Begin Burst Read Cycle
X	X	X	H	H	L	H	↑	Next Address	Continue Burst Read Cycle
H	X	X	X	H	L	H	↑	Next Address	Continue Burst Read Cycle
X	X	X	H	H	L	L	↑	Next Address	Continue Burst Write Cycle
H	X	X	X	H	L	L	↑	Next Address	Continue Burst Write Cycle
X	X	X	H	H	H	H	↑	Current Address	Suspend Burst Read Cycle
H	X	X	X	H	H	H	↑	Current Address	Suspend Burst Read Cycle
X	X	X	H	H	H	L	↑	Current Address	Suspend Burst Write Cycle
H	X	X	X	H	H	L	↑	Current Address	Suspend Burst Write Cycle

Notes : 1. X means "Don't Care". 2. The rising edge of clock is symbolized by ↑.
3. $\overline{WRITE}$ = L means Write operation in WRITE TRUTH TABLE.
$\overline{WRITE}$ = H means Read operation in WRITE TRUTH TABLE.
4. Operation finally depends on status of asynchronous input pins(ZZ and $\overline{OE}$).

WRITE TRUTH TABLE(x36)

$\overline{GW}$	$\overline{BW}$	$\overline{WEa}$	$\overline{WEb}$	$\overline{WEc}$	$\overline{WEd}$	OPERATION
H	H	X	X	X	X	READ
H	L	H	H	H	H	READ
H	L	L	H	H	H	WRITE BYTE a
H	L	H	L	H	H	WRITE BYTE b
H	L	H	H	L	L	WRITE BYTE c and d
H	L	L	L	L	L	WRITE ALL BYTEs
L	X	X	X	X	X	WRITE ALL BYTEs

Notes : 1. X means "Don't Care".
2. All inputs in this table must meet setup and hold time around the rising edge of CLK(↑).

WRITE TRUTH TABLE(x18)

$\overline{GW}$	$\overline{BW}$	$\overline{WEa}$	$\overline{WEb}$	OPERATION
H	H	X	X	READ
H	L	H	H	READ
H	L	L	H	WRITE BYTE a
H	L	H	L	WRITE BYTE b
H	L	L	L	WRITE ALL BYTEs
L	X	X	X	WRITE ALL BYTEs

Notes : 1. X means "Don't Care".
2. All inputs in this table must meet setup and hold time around the rising edge of CLK(↑).

ABSOLUTE MAXIMUM RATINGS*

PARAMETER		SYMBOL	RATING	UNIT
Voltage on VDD Supply Relative to VSS		VDD	-0.3 to 4.6	V
Voltage on VDDQ Supply Relative to VSS		VDDQ	VDD	V
Voltage on Input Pin Relative to VSS		VIN	-0.3 to VDD+0.3	V
Voltage on I/O Pin Relative to VSS		VIO	-0.3 to VDDQ+0.3	V
Power Dissipation		PD	1.6	W
Storage Temperature		TSTG	-65 to 150	°C
Operating Temperature	Commercial	TOPR	0 to 70	°C
	Industrial	TOPR	-40 to 85	°C
Storage Temperature Range Under Bias		TBIAS	-10 to 85	°C

***Note :** Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operating sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

OPERATING CONDITIONS at 3.3V I/O(0°C ≤ TA ≤ 70°C)

PARAMETER	SYMBOL	MIN	Typ.	MAX	UNIT
Supply Voltage	VDD	3.135	3.3	3.465	V
	VDDQ	3.135	3.3	3.465	V
Ground	VSS	0	0	0	V

OPERATING CONDITIONS at 2.5V I/O(0°C ≤ TA ≤ 70°C)

PARAMETER	SYMBOL	MIN	Typ.	MAX	UNIT
Supply Voltage	VDD	3.135	3.3	3.465	V
	VDDQ	2.375	2.5	2.9	V
Ground	VSS	0	0	0	V

CAPACITANCE*(TA=25°C, f=1MHz)

PARAMETER	SYMBOL	TEST CONDITION	MIN	MAX	UNIT
Input Capacitance	CIN	VIN=0V	-	5	pF
Output Capacitance	COUT	VOUT=0V	-	7	pF

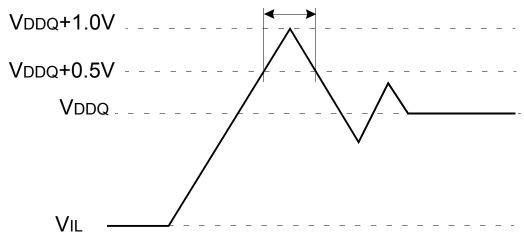
***Note :** Sampled not 100% tested.

DC ELECTRICAL CHARACTERISTICS(V_{DD}=3.3V+0.165V/-0.165V, T_A=0°C to +70°C)

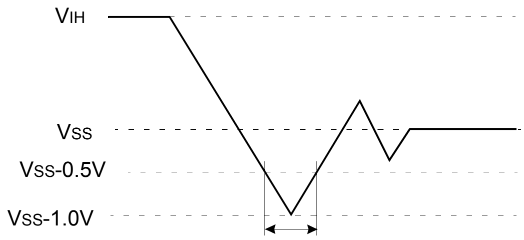
PARAMETER	SYMBOL	TEST CONDITIONS		MIN	MAX	UNIT	NOTES
Input Leakage Current(except ZZ)	I_{IL}	V_{DD} = Max ; V_{IN}=V_{SS} to V_{DD}		-2	+2	µA	
Output Leakage Current	I_{OL}	Output Disabled, V_{OUT}=V_{SS} to V_{DDQ}		-2	+2	µA	
Operating Current	I_{CC}	Device Selected, I_{OUT}=0mA, ZZ≤V_{IL} , Cycle Time ≥ t_{CYC} Min	-25	-	460	mA	1,2
			-20	-	410		
			-14	-	310		
Standby Current	I_{SB}	Device deselected, I_{OUT}=0mA, ZZ≤V_{IL}, f=Max, All Inputs≤0.2V or ≥ V_{DD}-0.2V	-25	-	170	mA	
			-20	-	150		
			-14	-	140		
	I_{SB1}	Device deselected, I_{OUT}=0mA, ZZ≤0.2V, f = 0, All Inputs=fixed (V_{DD}-0.2V or 0.2V)		-	110	mA	
	I_{SB2}	Device deselected, I_{OUT}=0mA, ZZ≥V_{DD}-0.2V, f=Max, All Inputs≤V_{IL} or ≥V_{IH}		-	100	mA	
Output Low Voltage(3.3V I/O)	V_{OL}	I_{OL}=8.0mA		-	0.4	V	
Output High Voltage(3.3V I/O)	V_{OH}	I_{OH}=-4.0mA		2.4	-	V	
Output Low Voltage(2.5V I/O)	V_{OL}	I_{OL}=1.0mA		-	0.4	V	
Output High Voltage(2.5V I/O)	V_{OH}	I_{OH}=-1.0mA		2.0	-	V	
Input Low Voltage(3.3V I/O)	V_{IL}			-0.3*	0.8	V	
nput High Voltage(3.3V I/O)	V_{IH}			2.0	V_{DD}+0.3**	V	3
Input Low Voltage(2.5V I/O)	V_{IL}			-0.3*	0.7	V	
Input High Voltage(2.5V I/O)	V_{IH}			1.7	V_{DD}+0.3**	V	3

Notes : 1. Reference AC Operating Conditions and Characteristics for input and timing.
2. Data states are all zero.
3. In Case of I/O Pins, the Max. V_{IH}=V_{DDQ}+0.3V.

Overshoot Timing



Undershoot Timing

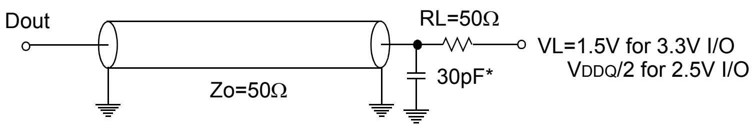


TEST CONDITIONS

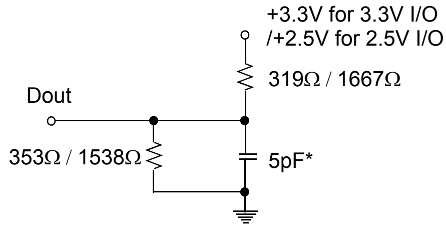
(V_{DD}=3.3V+0.165V/-0.165V,V_{DDQ}=3.3V+0.165/-0.165V or V_{DD}=3.3V+0.165V/-0.165V,V_{DDQ}=2.5V+0.4V/-0.125V, T_A=0to70°C)

PARAMETER	VALUE
Input Pulse Level(for 3.3V I/O)	0 to 3.0V
Input Pulse Level(for 2.5V I/O)	0 to 2.5V
Input Rise and Fall Time(Measured at 20% to 80% for 3.3V I/O)	1.0V/ns
Input Rise and Fall Time(Measured at 20% to 80% for 2.5V I/O)	1.0V/ns
Input and Output Timing Reference Levels for 3.3V I/O	1.5V
Input and Output Timing Reference Levels for 2.5V I/O	V_{DDQ}/2
Output Load	See Fig. 1

Output Load(A)



Output Load(B),
(for t_{LZC}, t_{LZOE}, t_{HZOE} & t_{HZC})



* Including Scope and Jig Capacitance

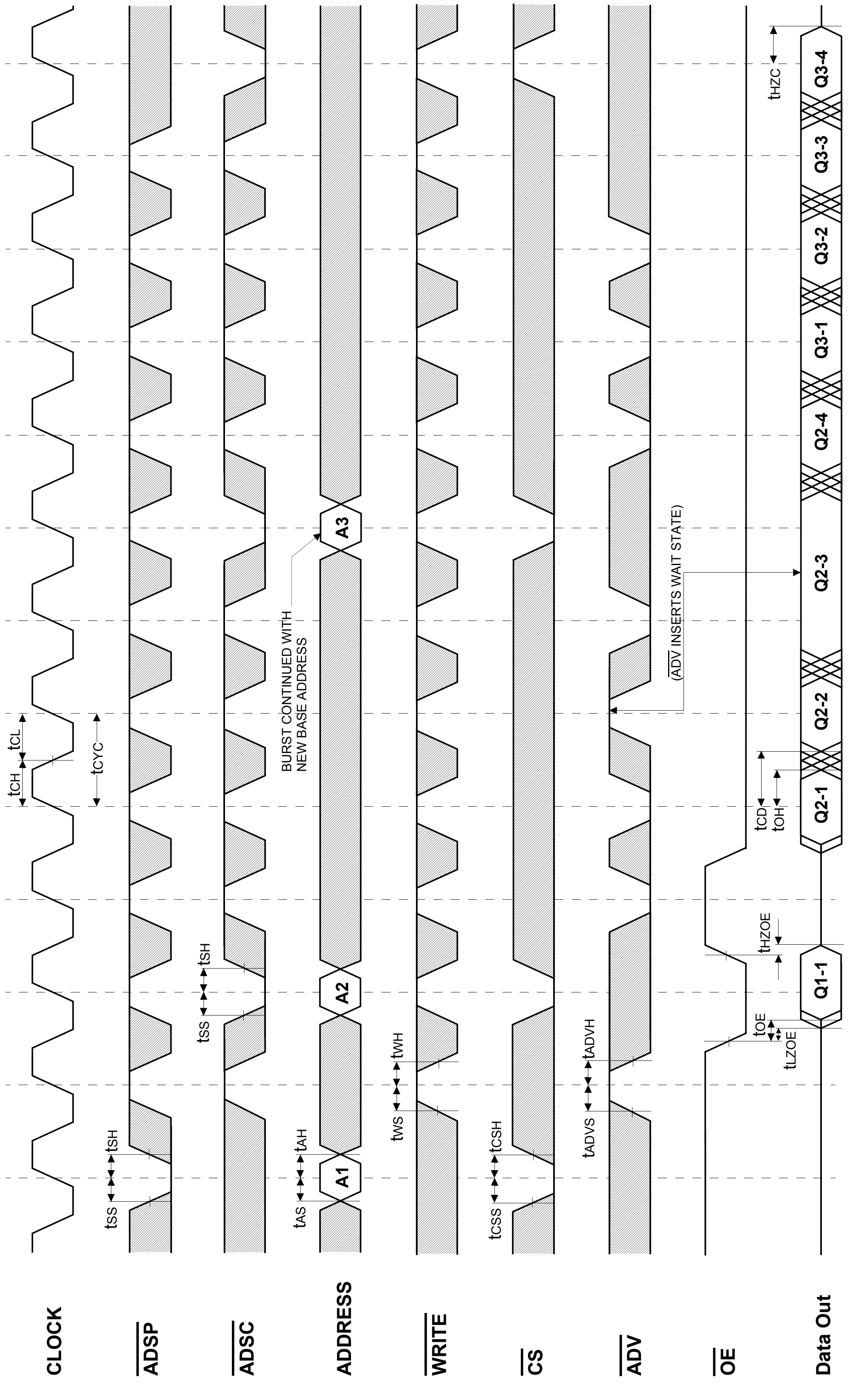
Fig. 1

AC TIMING CHARACTERISTICS(V_{DD}=3.3V+0.165V/-0.165V, T_A=0°C to +70°C)

Parameter	Symbol	-25		-20		-14		Unit
		Min	MAX	MIN	MAX	Min	Max	
Cycle Time	t_{CYC}	4.0	-	5.0	-	7.2	-	ns
Clock Access Time	t_{CD}	-	2.6	-	3.1	-	4.0	ns
Output Enable to Data Valid	t_{OE}	-	2.6	-	3.1	-	4.0	ns
Clock High to Output Low-Z	t_{LZC}	0	-	0	-	0	-	ns
Output Hold from Clock High	t_{OH}	1.5	-	1.5	-	1.5	-	ns
Output Enable Low to Output Low-Z	t_{LZOE}	0	-	0	-	0	-	ns
Output Enable High to Output High-Z	t_{HZOE}	-	2.6	-	3.0	-	3.5	ns
Clock High to Output High-Z	t_{HZC}	1.5	2.6	1.5	3.0	1.5	3.5	ns
Clock High Pulse Width	t_{CH}	1.7	-	2.0	-	2.5	-	ns
Clock Low Pulse Width	t_{CL}	1.7	-	2.0	-	2.5	-	ns
Address Setup to Clock High	t_{AS}	1.2	-	1.4	-	1.5	-	ns
Address Status Setup to Clock High	t_{SS}	1.2	-	1.4	-	1.5	-	ns
Data Setup to Clock High	t_{DS}	1.2	-	1.4	-	1.5	-	ns
Write Setup to Clock High ($\overline{GW}$, $\overline{BW}$, $\overline{WE}$x)	t_{WS}	1.2	-	1.4	-	1.5	-	ns
Address Advance Setup to Clock High	t_{ADVS}	1.2	-	1.4	-	1.5	-	ns
Chip Select Setup to Clock High	t_{CSS}	1.2	-	1.4	-	1.5	-	ns
Address Hold from Clock High	t_{AH}	0.3	-	0.4	-	0.5	-	ns
Address Status Hold from Clock High	t_{SH}	0.3	-	0.4	-	0.5	-	ns
Data Hold from Clock High	t_{DH}	0.3	-	0.4	-	0.5	-	ns
Write Hold from Clock High ($\overline{GW}$, $\overline{BW}$,	t_{WH}	0.3	-	0.4	-	0.5	-	ns
Address Advance Hold from Clock High	t_{ADVH}	0.3	-	0.4	-	0.5	-	ns
Chip Select Hold from Clock High	t_{CSH}	0.3	-	0.4	-	0.5	-	ns
ZZ High to Power Down	t_{PDS}	2	-	2	-	2	-	cycle
ZZ Low to Power Up	t_{PUS}	2	-	2	-	2	-	cycle

Notes : 1. All address inputs must meet the specified setup and hold times for all rising clock edges whenever $\overline{ADSC}$ and/or $\overline{ADSP}$ is sampled low and $\overline{CS}$ is sampled low. All other synchronous inputs must meet the specified setup and hold times whenever this device is chip selected.
2. Both chip selects must be active whenever $\overline{ADSC}$ or $\overline{ADSP}$ is sampled low in order for the this device to remain enabled.
3. $\overline{ADSC}$ or $\overline{ADSP}$ must not be asserted for at least 2 Clock after leaving ZZ state.

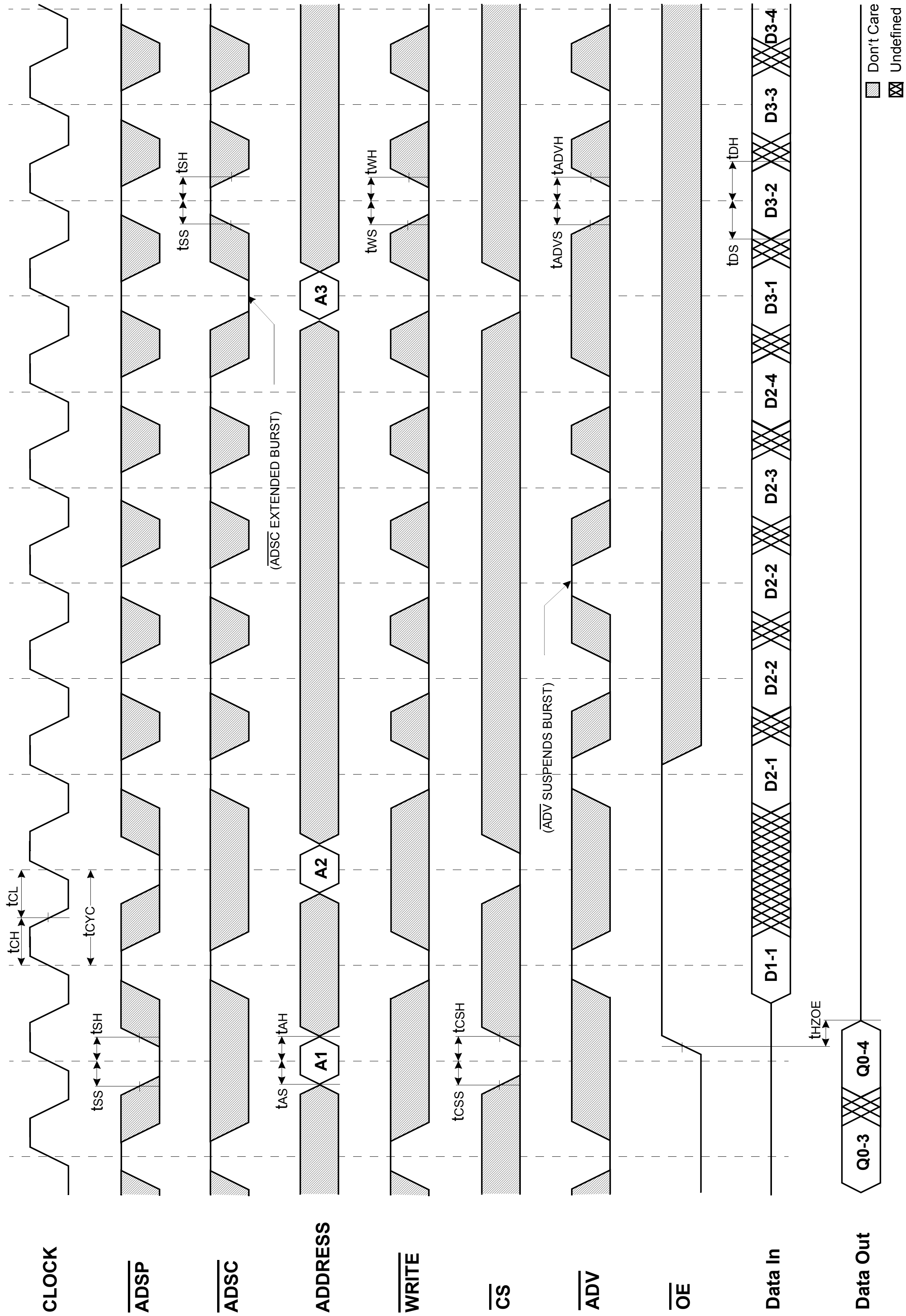
TIMING WAVEFORM OF READ CYCLE



Don't Care
Undefined

NOTES : $\overline{WRITE}$ = L means $\overline{GW}$ = L, or $\overline{GW}$ = H, $\overline{BW}$ = L, $\overline{WEx}$ = L
$\overline{CS}$ = L means $\overline{CS_1}$ = L, CS_2 = H and $\overline{CS_2}$ = L
$\overline{CS}$ = H means $\overline{CS_1}$ = H, or CS_1 = L and $\overline{CS_2}$ = H, or $\overline{CS_1}$ = L, and CS_2 = L

TIMING WAVEFORM OF WRTE CYCLE



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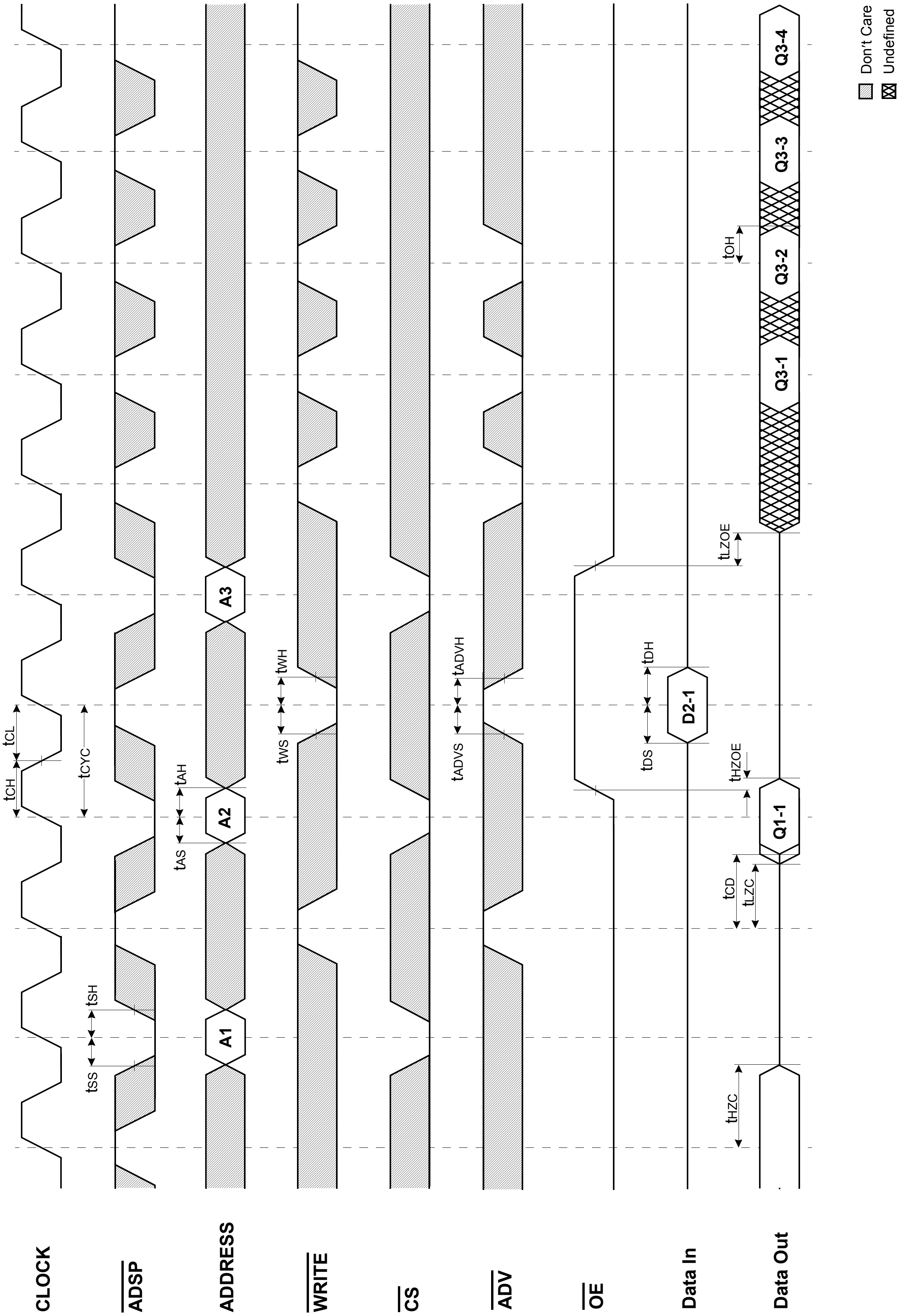
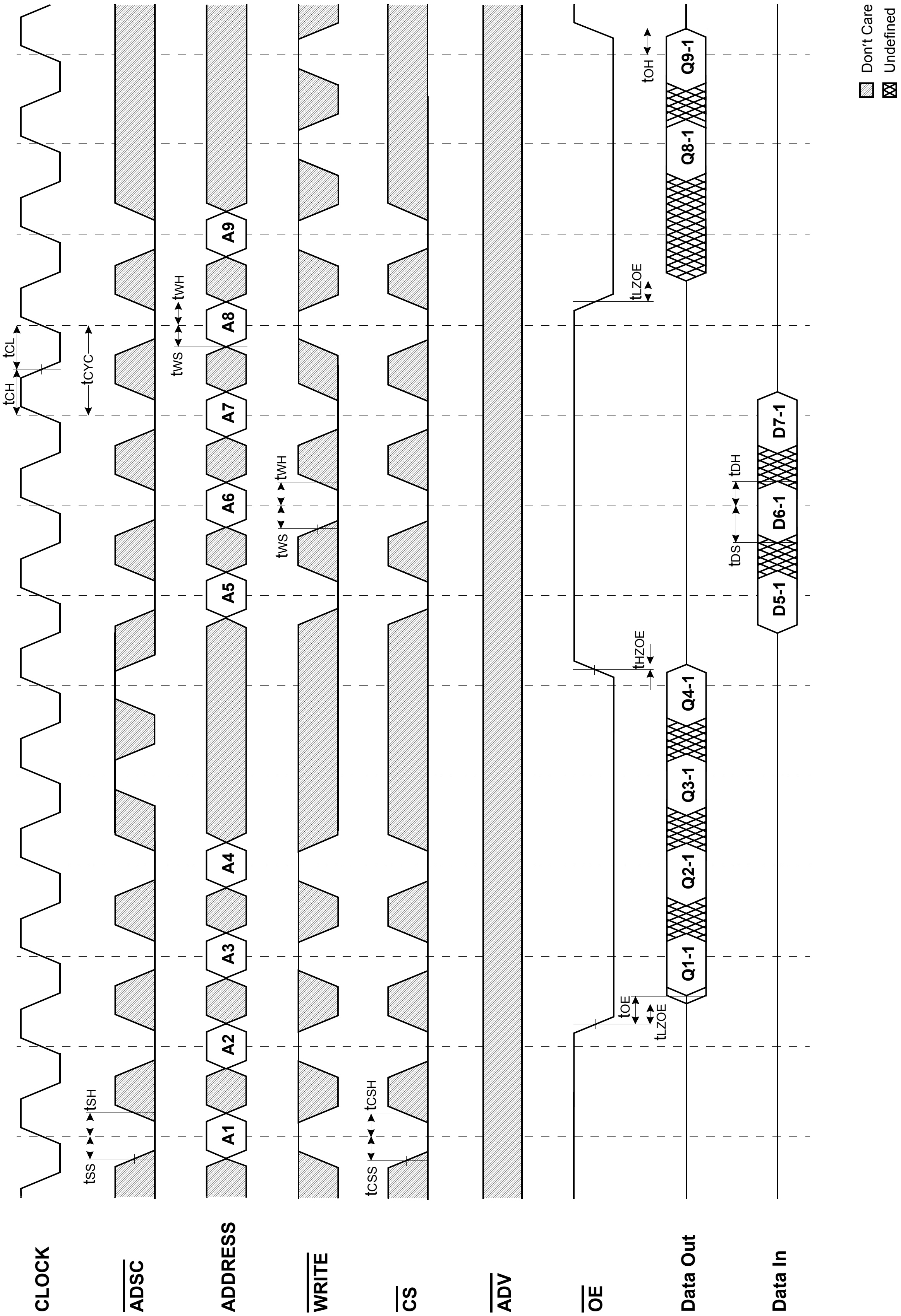
TIMING WAVEFORM OF COMBINATION READ/WRTE CYCLE(ADSP CONTROLLED , ADSC=HIGH)



SAMSUNG ELECTRONICS

TIMING WAVEFORM OF SINGLE READ/WRITE CYCLE($\overline{ADSC}$ CONTROLLED , $\overline{ADSP}$=HIGH)



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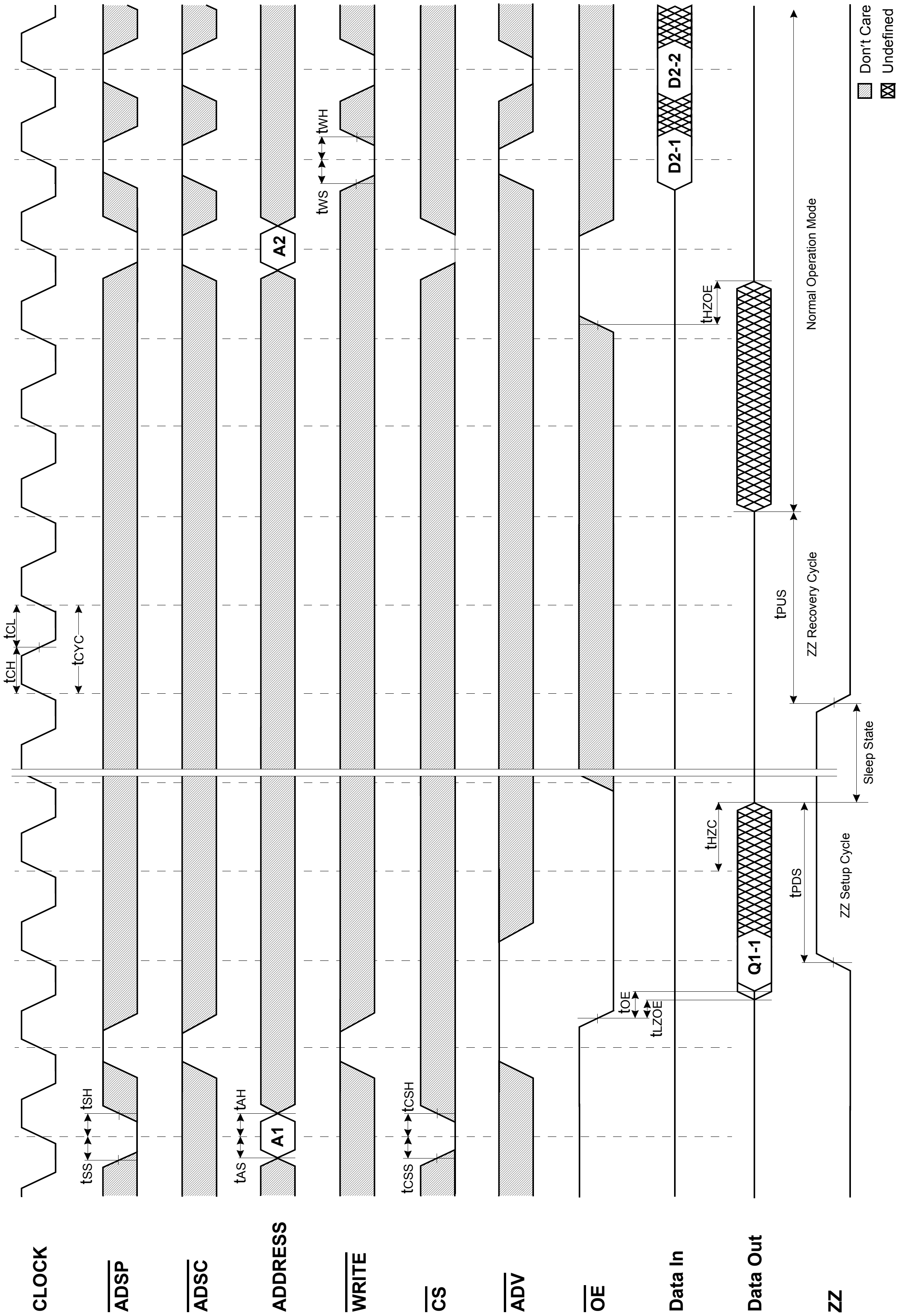
TIMING WAVEFORM OF POWER DOWN CYCLE

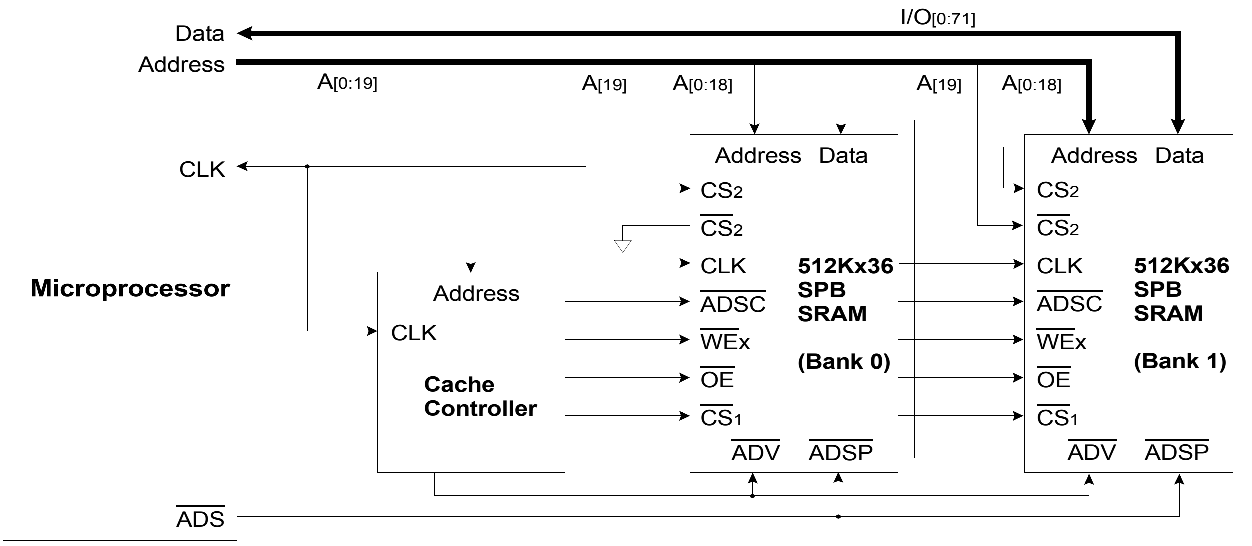


SAMSUNG ELECTRONICS

APPLICATION INFORMATION

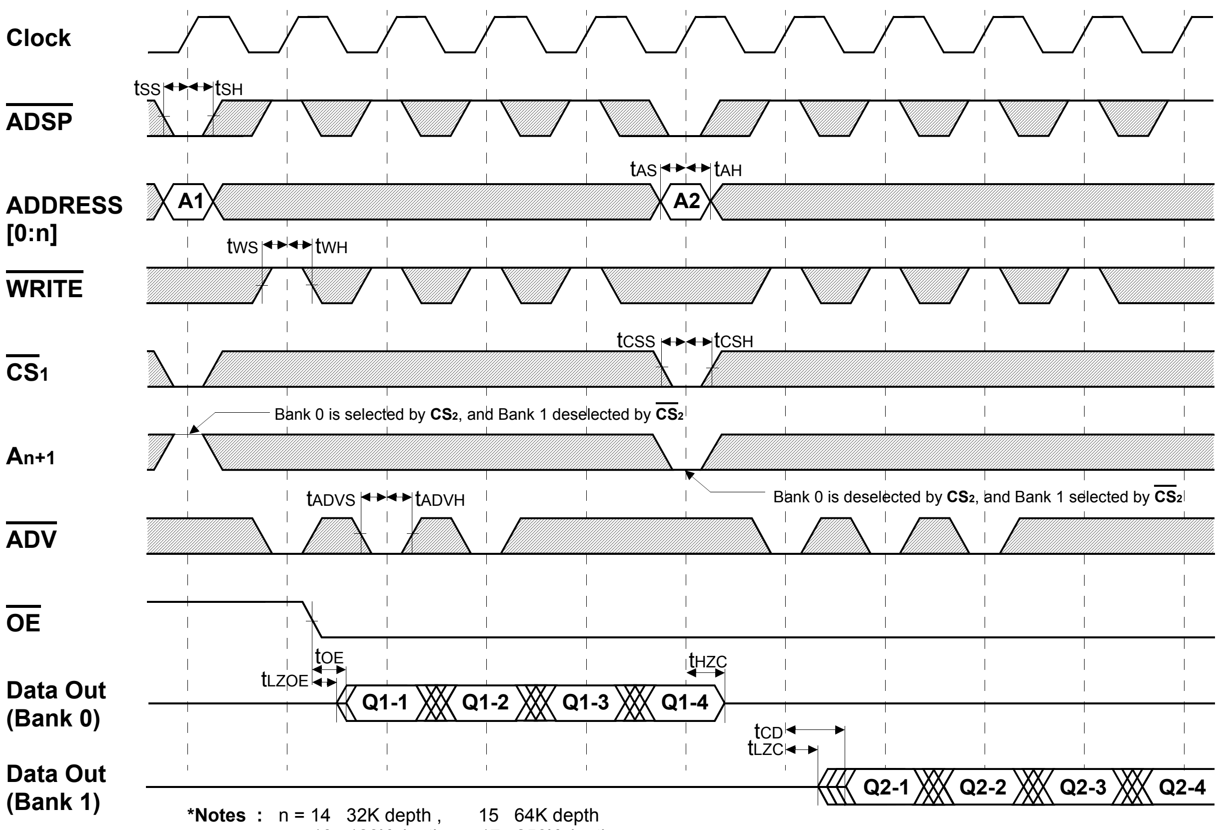
DEPTH EXPANSION

The Samsung 512Kx36 Synchronous Pipelined Burst SRAM has two additional chip selects for simple depth expansion.
This permits easy secondary cache upgrades from 512K depth to 1M depth without extra logic.



INTERLEAVE READ TIMING (Refer to non-interleave write timing for interleave write timing)

(ADSP CONTROLLED , ADSC=HIGH)



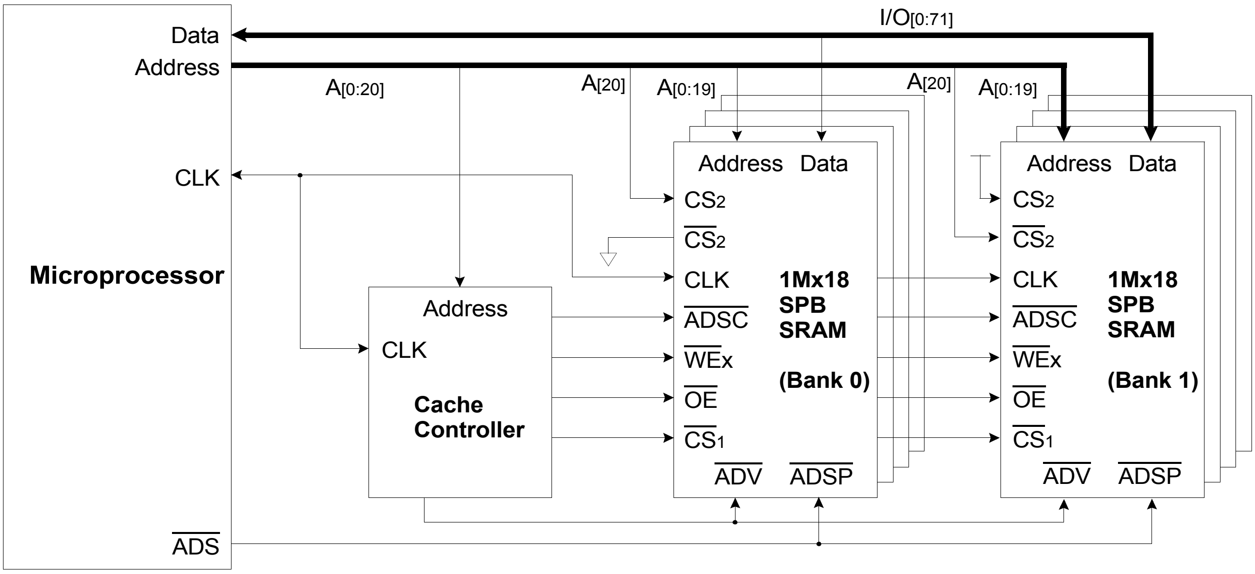
*Notes : n = 14 32K depth , 15 64K depth
16 128K depth , 17 256K depth
18 512K depth , 19 1M depth

SAMSUNG ELECTRONICS

APPLICATION INFORMATION

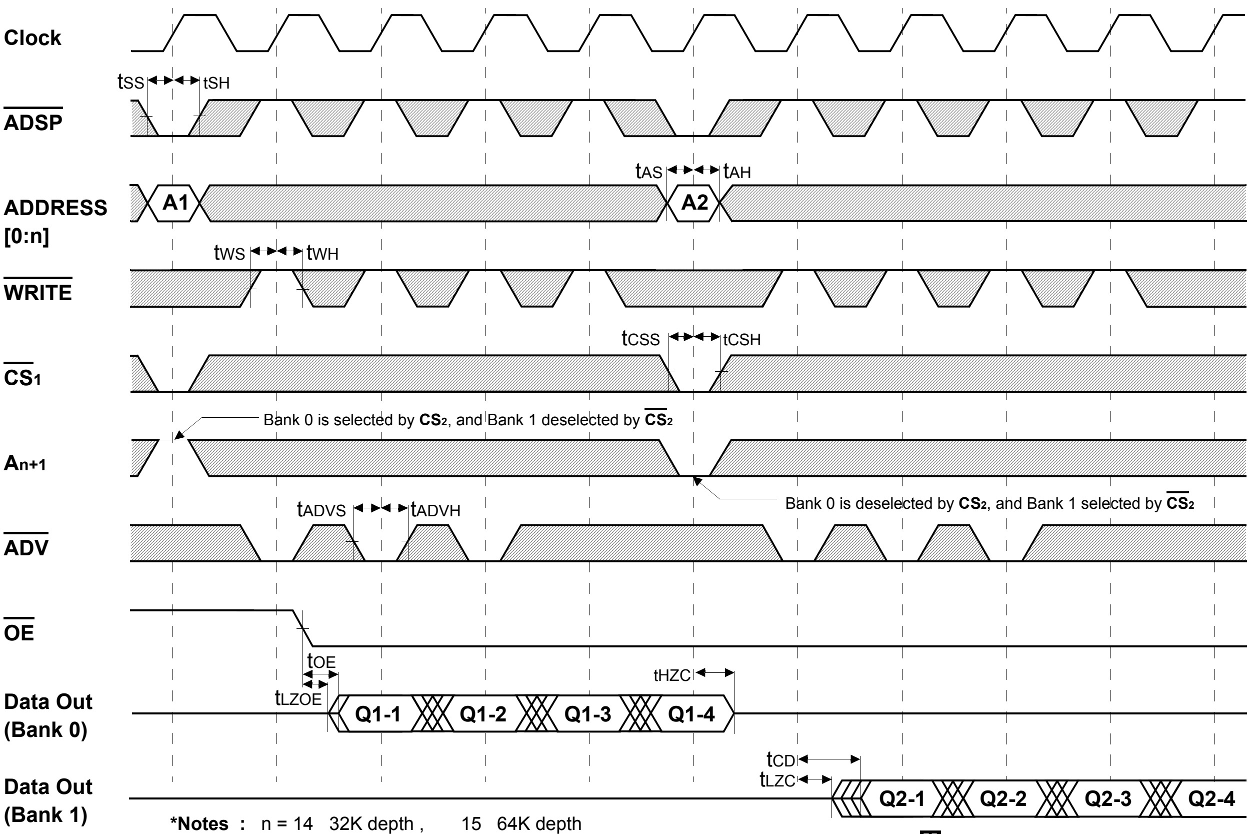
DEPTH EXPANSION

The Samsung 1Mx18 Synchronous Pipelined Burst SRAM has two additional chip selects for simple depth expansion.
This permits easy secondary cache upgrades from 1M depth to 2M depth without extra logic.



INTERLEAVE READ TIMING (Refer to non-interleave write timing for interleave write timing)

(ADSP CONTROLLED , ADSC=HIGH)



***Notes :** n = 14 32K depth , 15 64K depth
16 128K depth , 17 256K depth
18 512K depth , 19 1M depth
20 2M depth

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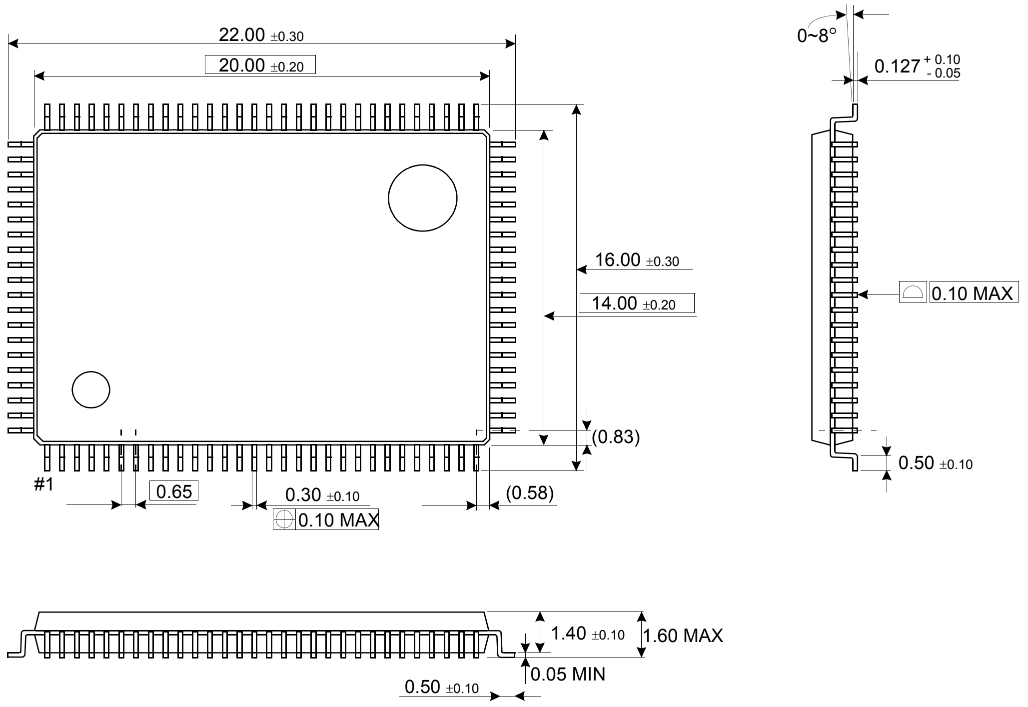
PACKAGE DIMENSIONS

100-TQFP-1420A

Units ; millimeters/Inches



SAMSUNG ELECTRONICS