



256K X 8 BIT LOW POWER CMOS SRAM

FEATURES

- Fast access time : 55ns
- Low power consumption:
Operating current : 20/18mA (TYP.)
Standby current : 2μA (TYP.)
- Single 2.7V ~ 5.5V power supply
- All outputs TTL compatible
- Fully static operation
- Tri-state output
- Data retention voltage : 2.0V (MIN.)
- **Lead free and green package available**
- Package : 32-pin 8mm x 20mm TSOP-I
32-pin 8mm x 13.4mm STSOP
32-pin 450 mil SOP
32-pin 600 mil P-DIP
36-ball 6mm x 8mm TFBGA

GENERAL DESCRIPTION

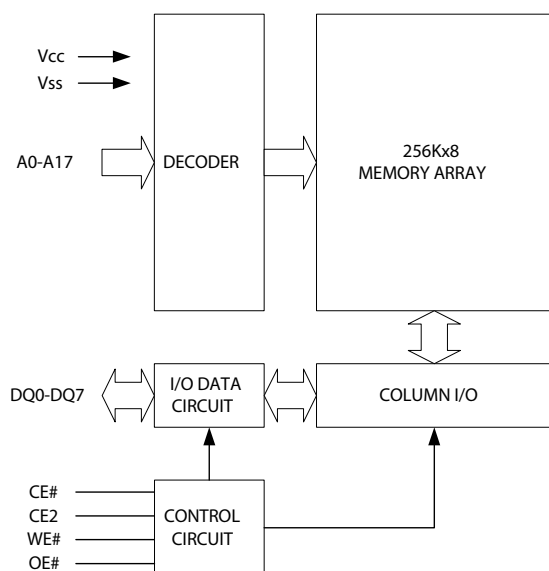
The AS6C2008A is a 2,097,152-bit low power CMOS static random access memory organized as 262,144 words by 8 bits. It is fabricated using very high performance, high reliability CMOS technology. Its standby current is stable within the range of operating temperature.

The AS6C2008A is well designed for very low power system applications, and particularly well suited for battery back-up nonvolatile memory application.

The AS6C2008A operates from a single power supply of 2.7V ~ 5.5V and all outputs are fully TTL compatible

PRODUCT FAMILY

Product Family	Operating Temperature	Vcc Range	Speed	Power Dissipation	
				Standby(I _{SB1} , TYP.)	Operating(I _{CC} , TYP.)
AS6C2008A(LLI)	-40 ~ 85°C	2.7 ~ 5.5V	55ns	2μA(LL)	20/18mA

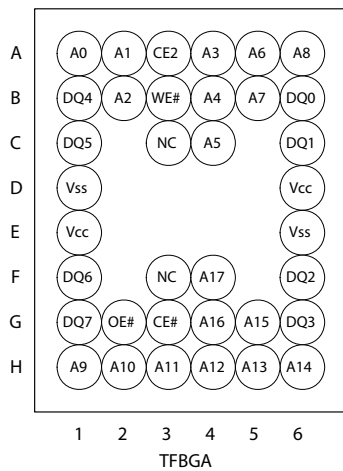
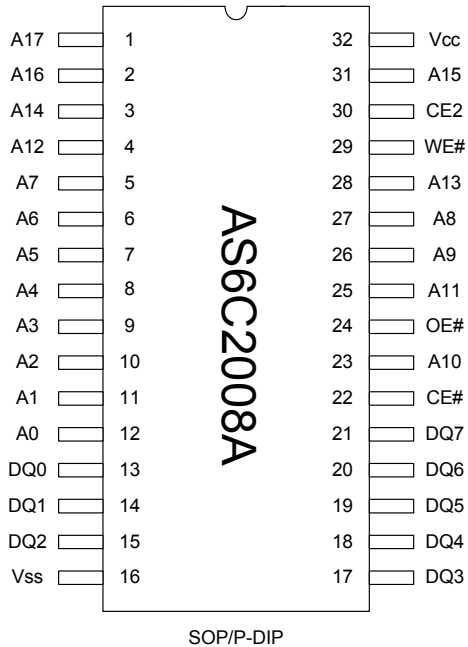
FUNCTIONAL BLOCK DIAGRAM**PIN DESCRIPTION**

SYMBOL	DESCRIPTION
A0 - A17	Address Inputs
DQ0 – DQ7	Data Inputs/Outputs
CE#, CE2	Chip Enable Inputs
WE#	Write Enable Input
OE#	Output Enable Input
Vcc	Power Supply
Vss	Ground
NC	No Connection



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PIN CONFIGURATION





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ABSOLUTE MAXIMUM RATINGS*

PARAMETER	SYMBOL	RATING	UNIT
Voltage on V _{CC} relative to V _{SS}	V _{T1}	-0.5 to 6.5	V
Voltage on any other pin relative to V _{SS}	V _{T2}	-0.5 to V _{CC} +0.5	V
Operating Temperature	T _A	-40 to 85(I grade)	°C
Storage Temperature	T _{STG}	-65 to 150	°C
Power Dissipation	P _D	1	W
DC Output Current	I _{OUT}	50	mA
Soldering Temperature (under 10 sec)	T _{SOLDER}	260	°C

*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 or any other conditions above those indicated in the operational sections of this specification is not implied. Exposure to the absolute maximum rating conditions for extended period may affect device reliability.

TRUTH TABLE

MODE	CE#	CE2	OE#	WE#	I/O OPERATION	SUPPLY CURRENT
Standby	H	X	X	X	High-Z	I _{SB1}
	X	L	X	X	High-Z	I _{SB1}
Output Disable	L	H	H	H	High-Z	I _{CC} , I _{CC1}
Read	L	H	L	H	D _{OUT}	I _{CC} , I _{CC1}
Write	L	H	X	L	D _{IN}	I _{CC} , I _{CC1}

Note: H = V_{IH}, L = V_{IL}, X = Don't care.



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DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP. ⁴	MAX.	UNIT
Supply Voltage	V _{CC}		2.7	3.0	5.5	V
Input High Voltage	V _{IH} ¹		0.7* V _{CC}	-	V _{CC} +0.3	V
Input Low Voltage	V _{IL} ²		- 0.2	-	0.6	V
Input Leakage Current	I _{LI}	V _{CC} ≥ V _{IN} ≥ V _{SS}	- 1	-	1	μA
Output Leakage Current	I _{LO}	V _{CC} ≥ V _{OUT} ≥ V _{SS} , Output Disabled	- 1	-	1	μA
Output High Voltage	V _{OH}	I _{OH} = -1mA	2.4	2.7	-	V
Output Low Voltage	V _{OL}	I _{OL} = 2mA	-	-	0.4	V
Average Operating Power supply Current	I _{CC}	Cycle time = Min., I _{I/O} = 0mA CE# = 0.2V and CE2 = V _{CC} -0.2V other pins at 0.2V or V _{CC} -0.2V	- 55	20	60	mA
			- 70	18	50	mA
	I _{CC1}	Cycle time = 1μs, I _{I/O} = 0mA CE# ≤ 0.2V and CE2 ≥ V _{CC} -0.2V, other pins at 0.2V or V _{CC} -0.2V	-	4	10	mA
Standby Power Supply Current	I _{SB1}	CE# ≥ V _{CC} -0.2V or CE2 ≤ 0.2V other pins at 0.2V or V _{CC} -0.2V	-	2	50	μA

Notes:

1. V_{IH}(max) = V_{CC} + 3.0V for pulse width less than 10ns.
2. V_{IL}(min) = V_{SS} - 3.0V for pulse width less than 10ns.
3. Over/Undershoot specifications are characterized, not 100% tested.
4. Typical values are included for reference only and are not guaranteed or tested.
Typical values are measured at V_{CC} = V_{CC}(TYP.) and T_A = 25°C

CAPACITANCE (T_A = 25°C f = 1.0MHz)

PARAMETER	SYMBOL	MIN.	MAX	UNIT
Input Capacitance	C _{IN}	-	6	pF
Input/Output Capacitance	C _{I/O}	-	8	pF

Note : These parameters are guaranteed by device characterization, but not production tested.

AC TEST CONDITIONS

Input Pulse Levels	0.2V to V _{CC} - 0.2V
Input Rise and Fall Times	3ns
Input and Output Timing Reference Levels	1.5V
Output Load	C _L = 30pF + 1TTL, I _{OH} /I _{OL} = -2mA/4mA



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AC ELECTRICAL CHARACTERISTICS**(1) READ CYCLE**

PARAMETER	SYM.	AS6C2008A-55		UNIT
		MIN.	MAX.	
Read Cycle Time	t _{RC}	55	-	ns
Address Access Time	t _{AA}	-	55	ns
Chip Enable Access Time	t _{ACE}	-	55	ns
Output Enable Access Time	t _{OE}	-	30	ns
Chip Enable to Output in Low-Z	t _{CLZ} *	10	-	ns
Output Enable to Output in Low-Z	t _{OLZ} *	5	-	ns
Chip Disable to Output in High-Z	t _{CHZ} *	-	20	ns
Output Disable to Output in High-Z	t _{OHZ} *	-	20	ns
Output Hold from Address Change	t _{OH}	10	-	ns

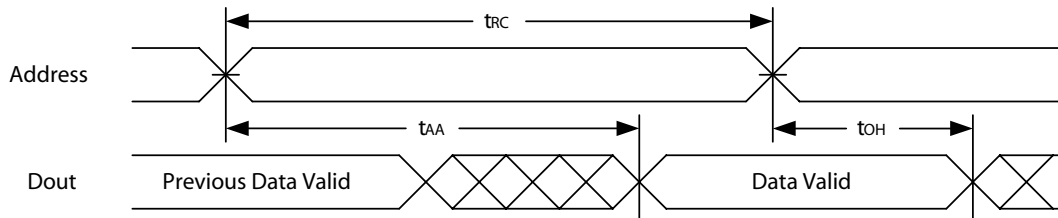
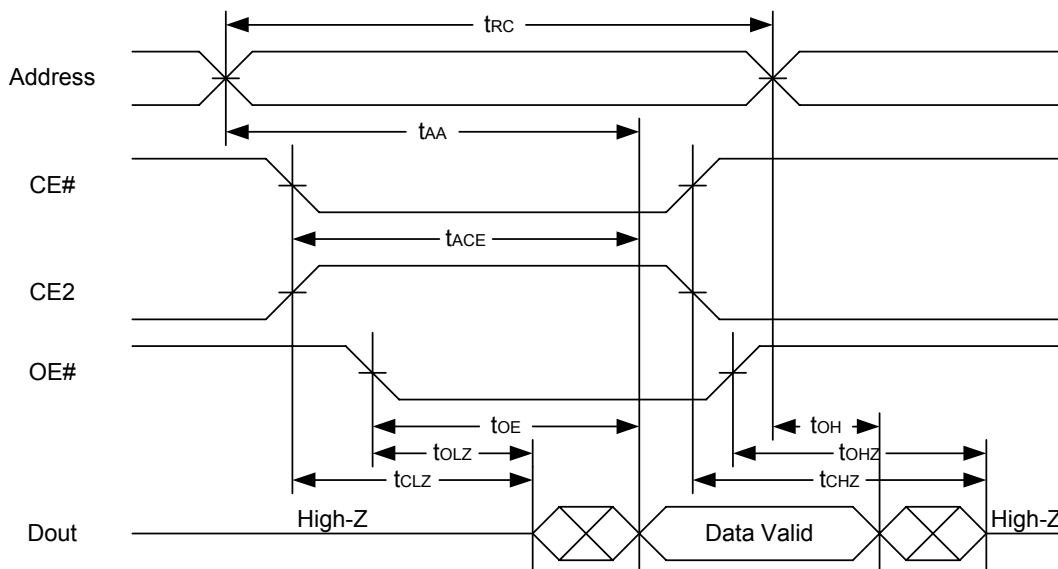
(2) WRITE CYCLE

PARAMETER	SYM.	AS6C2008A-55		UNIT
		MIN.	MAX.	
Write Cycle Time	t _{WC}	55	-	ns
Address Valid to End of Write	t _{AW}	50	-	ns
Chip Enable to End of Write	t _{CW}	50	-	ns
Address Set-up Time	t _{AS}	0	-	ns
Write Pulse Width	t _{WP}	45	-	ns
Write Recovery Time	t _{WR}	0	-	ns
Data to Write Time Overlap	t _{DW}	25	-	ns
Data Hold from End of Write Time	t _{DH}	0	-	ns
Output Active from End of Write	t _{OW} *	5	-	ns
Write to Output in High-Z	t _{WHZ} *	-	20	ns

*These parameters are guaranteed by device characterization, but not production tested.



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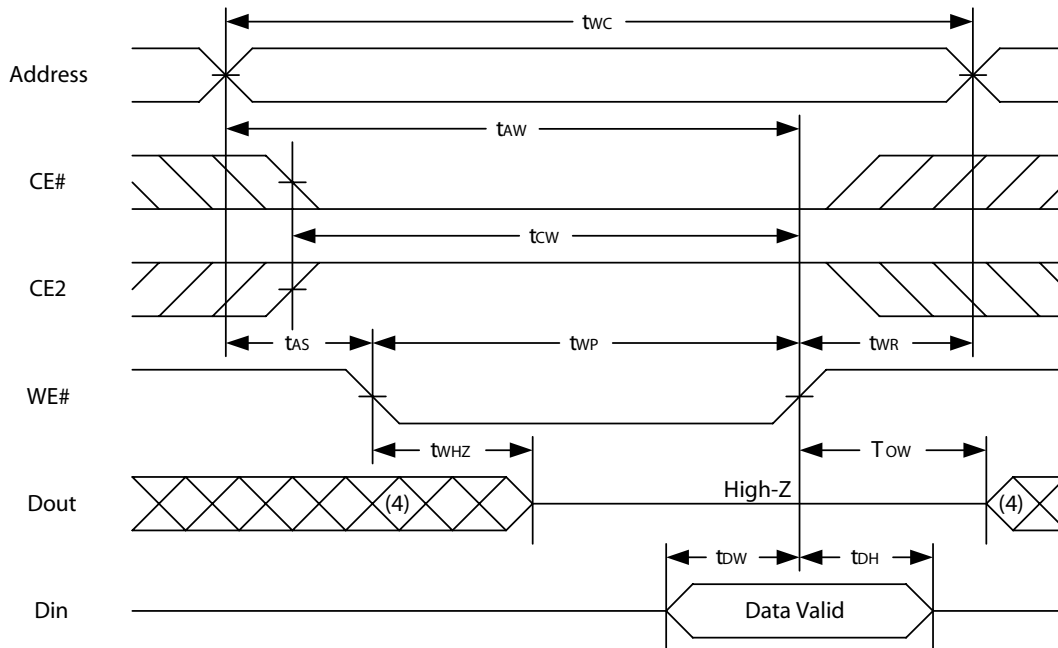
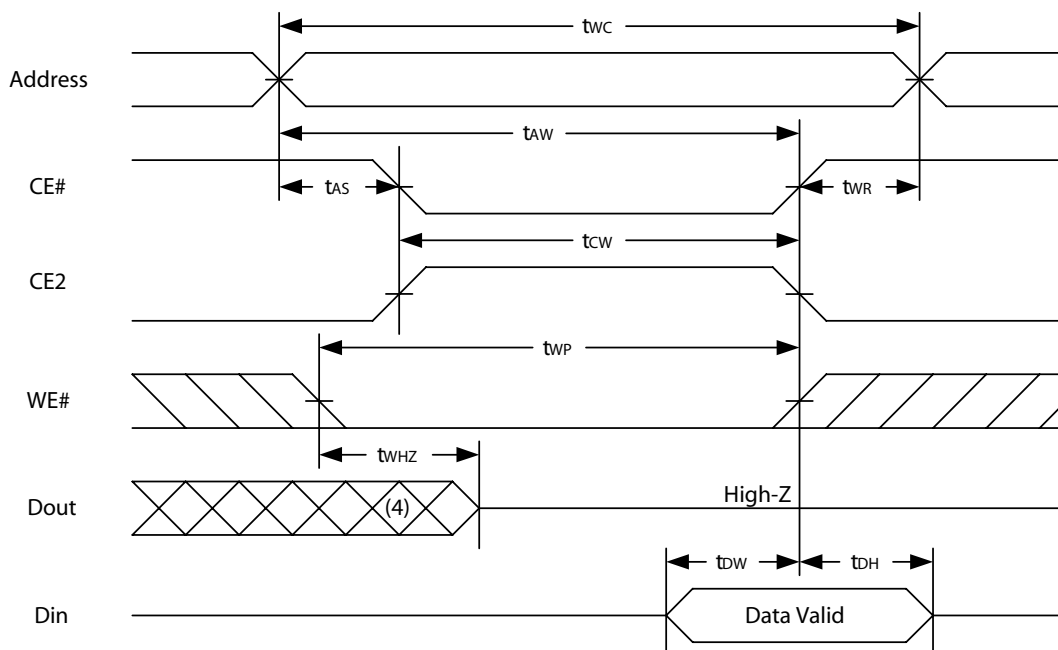
TIMING WAVEFORMS**READ CYCLE 1 (Address Controlled) (1,2)****READ CYCLE 2 (CE# and CE2 and OE# Controlled) (1,3,4,5)**

Notes :

1. WE# is high for read cycle.
2. Device is continuously selected OE# = low, CE# = low, CE2 = high.
3. Address must be valid prior to or coincident with CE# = low, CE2 = high; otherwise t_{AA} is the limiting parameter.
4. t_{CLZ} , t_{OLZ} , t_{CHZ} and t_{OHZ} are specified with $C_L = 5\text{pF}$. Transition is measured $\pm 500\text{mV}$ from steady state.
5. At any given temperature and voltage condition, t_{CHZ} is less than t_{CLZ} , t_{OHZ} is less than t_{OLZ} .



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WRITE CYCLE 1 (WE# Controlled) (1,2,3,5,6)**WRITE CYCLE 2 (CE# and CE2 Controlled) (1,2,5,6)****Notes :**

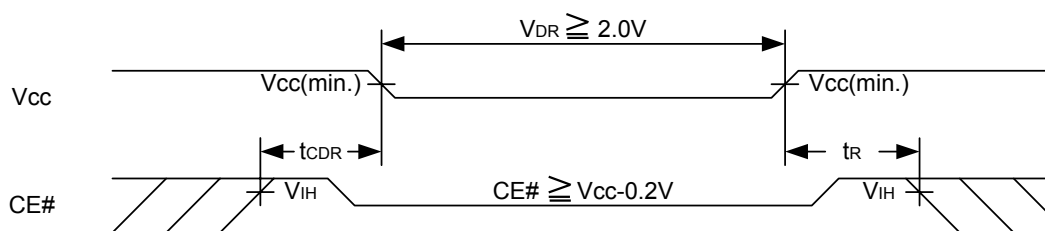
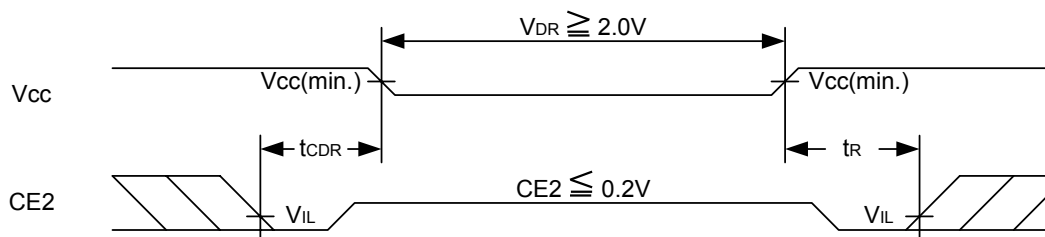
1. WE#, CE# must be high or CE2 must be low during all address transitions.
2. A write occurs during the overlap of a low CE#, high CE2, low WE#.
3. During a WE#-controlled write cycle with OE# low, tWP must be greater than tWHZ + tDW to allow the drivers to turn off and data to be placed on the bus.
4. During this period, I/O pins are in the output state, and input signals must not be applied.
5. If the CE#low transition and CE2 high transition occurs simultaneously with or after WE# low transition, the outputs remain in a high impedance state.
6. tOW and tWHZ are specified with $C_L = 5pF$. Transition is measured $\pm 500mV$ from steady state.



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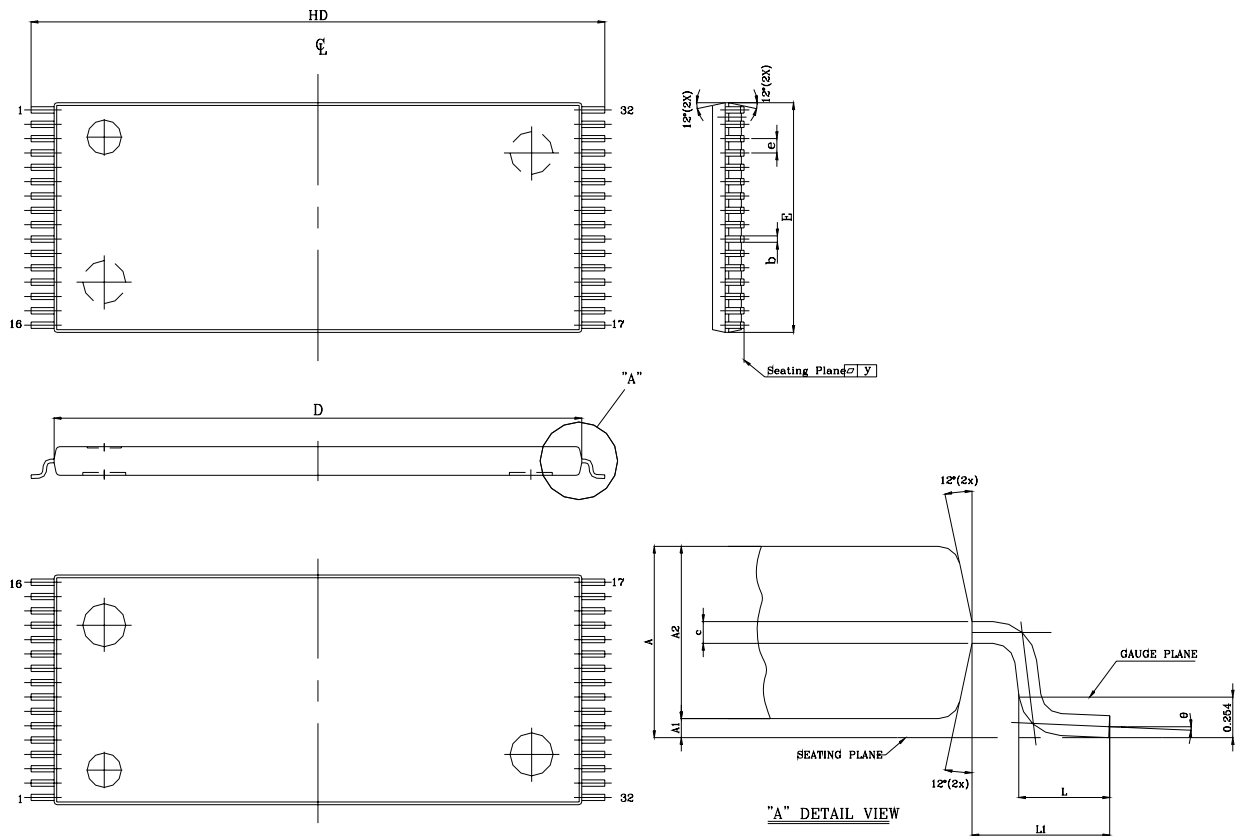
DATA RETENTION CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
V _{CC} for Data Retention	V _{DR}	CE# $\geq$ V _{CC} - 0.2V or CE2 $\leq$ 0.2V	2.0	-	5.5	V
Data Retention Current	I _{DR}	V _{CC} = 2.0V CE# $\geq$ V _{CC} - 0.2V or CE2 $\leq$ 0.2V other pins at 0.2V or V _{CC} -0.2V	-	0.5	20	μ A
Chip Disable to Data Retention Time	t _{CDR}	See Data Retention Waveforms (below)	0	-	-	ns
Recovery Time	t _R		t _{RC*}	-	-	ns

t_{RC*} = Read Cycle Time**DATA RETENTION WAVEFORM****Low V_{CC} Data Retention Waveform (1)** (CE# controlled)**Low V_{CC} Data Retention Waveform (2)** (CE2 controlled)



256K X 8 BIT LOW POWER CMOS SRAM

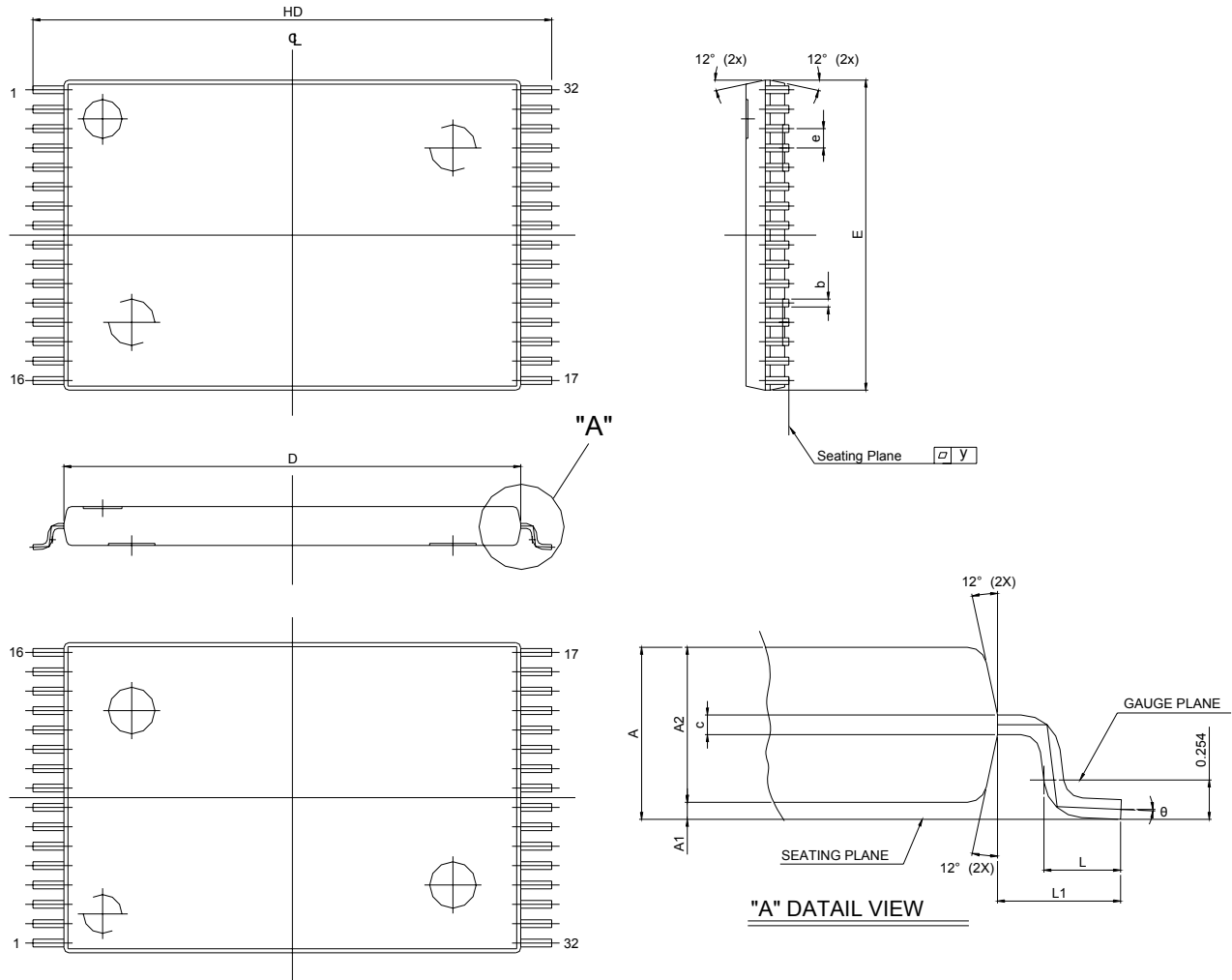
PACKAGE OUTLINE DIMENSION**32 pin 8mm x 20mm TSOP-I Package Outline Dimension**

SYM.	UNIT	INCH(BASE)	MM(REF)
A		0.047 (MAX)	1.20 (MAX)
A1		0.004 $\pm$ 0.002	0.10 $\pm$ 0.05
A2		0.039 $\pm$ 0.002	1.00 $\pm$ 0.05
b		0.008 + 0.002 - 0.001	0.20 + 0.05 -0.03
c		0.005 (TYP)	0.127 (TYP)
D		0.724 $\pm$ 0.004	18.40 $\pm$ 0.10
E		0.315 $\pm$ 0.004	8.00 $\pm$ 0.10
e		0.020 (TYP)	0.50 (TYP)
HD		0.787 $\pm$ 0.008	20.00 $\pm$ 0.20
L		0.0197 $\pm$ 0.004	0.50 $\pm$ 0.10
L1		0.0315 $\pm$ 0.004	0.08 $\pm$ 0.10
y		0.003 (MAX)	0.076 (MAX)
θ		0° ~ 5°	0° ~ 5°



256K X 8 BIT LOW POWER CMOS SRAM

32 pin 8mm x 13.4mm STSOP Package Outline Dimension

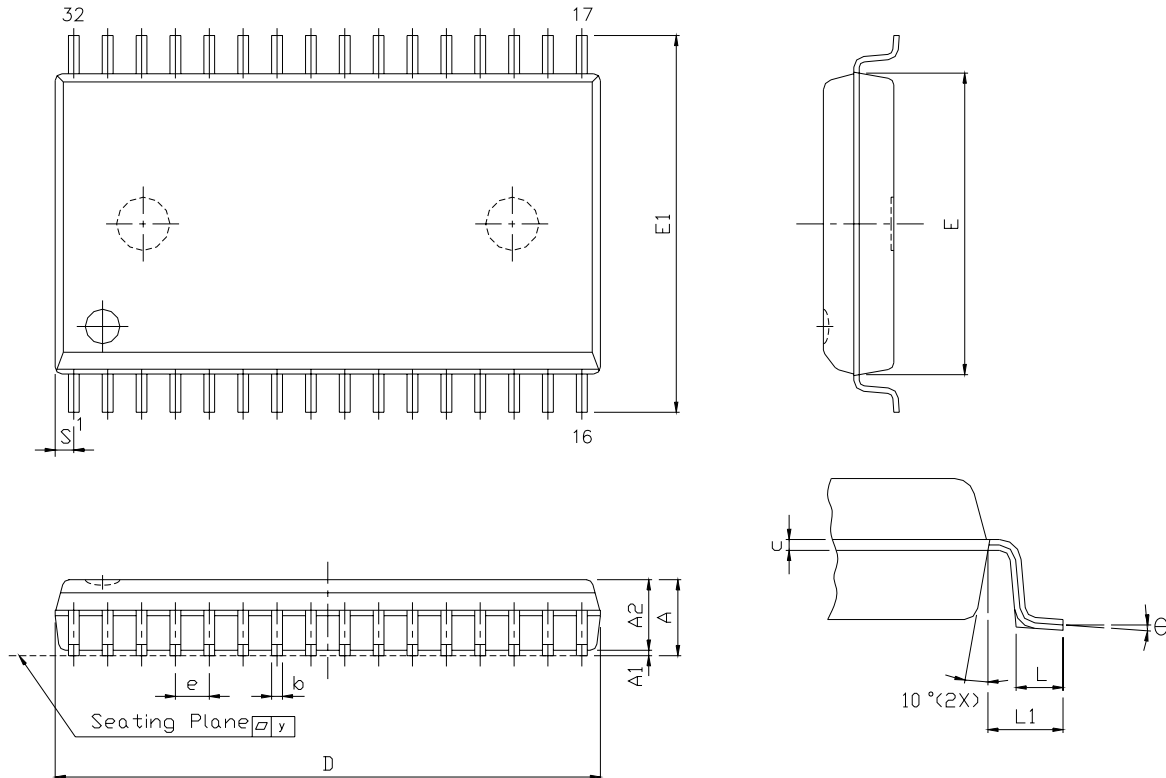


SYM. \ UNIT	INCH(BASE)	MM(REF)
A	0.049 (MAX)	1.25 (MAX)
A1	0.005 ± 0.002	0.130 ± 0.05
A2	0.039 ± 0.002	1.00 ± 0.05
b	0.008 ± 0.01	0.20 ± 0.025
c	0.005 (TYP)	0.127 (TYP)
D	0.465 ± 0.004	11.80 ± 0.10
E	0.315 ± 0.004	8.00 ± 0.10
e	0.020 (TYP)	0.50 (TYP)
HD	0.528 ± 0.008	13.40 ± 0.20
L	0.0197 ± 0.004	0.50 ± 0.10
L1	0.0315 ± 0.004	0.8 ± 0.10
y	0.003 (MAX)	0.076 (MAX)
θ	0° ~ 5°	0° ~ 5°



256K X 8 BIT LOW POWER CMOS SRAM

32 pin 450 mil SOP Package Outline Dimension

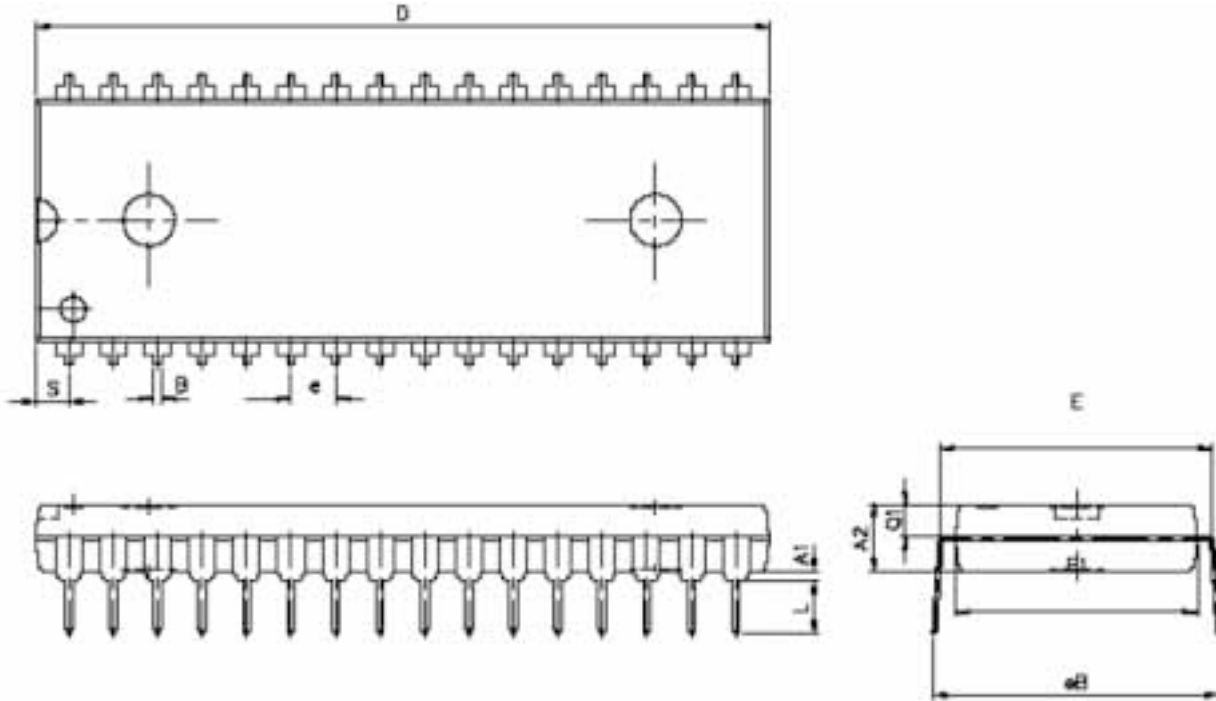


SYM.	UNIT	INCH.(BASE)	MM(REF)
A		0.118 (MAX)	2.997 (MAX)
A1		0.004(MIN)	0.102(MIN)
A2		0.111(MAX)	2.82(MAX)
b		0.016(TYP)	0.406(TYP)
c		0.008(TYP)	0.203(TYP)
D		0.817(MAX)	20.75(MAX)
E		0.445 $\pm$ 0.005	11.303 $\pm$ 0.127
E1		0.555 $\pm$ 0.012	14.097 $\pm$ 0.305
e		0.050(TYP)	1.270(TYP)
L		0.0347 $\pm$ 0.008	0.881 $\pm$ 0.203
L1		0.055 $\pm$ 0.008	1.397 $\pm$ 0.203
S		0.026(MAX)	0.660 (MAX)
y		0.004(MAX)	0.101(MAX)
θ		0° -10°	0° -10°



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32 pin 600 mil P-DIP Package Outline Dimension



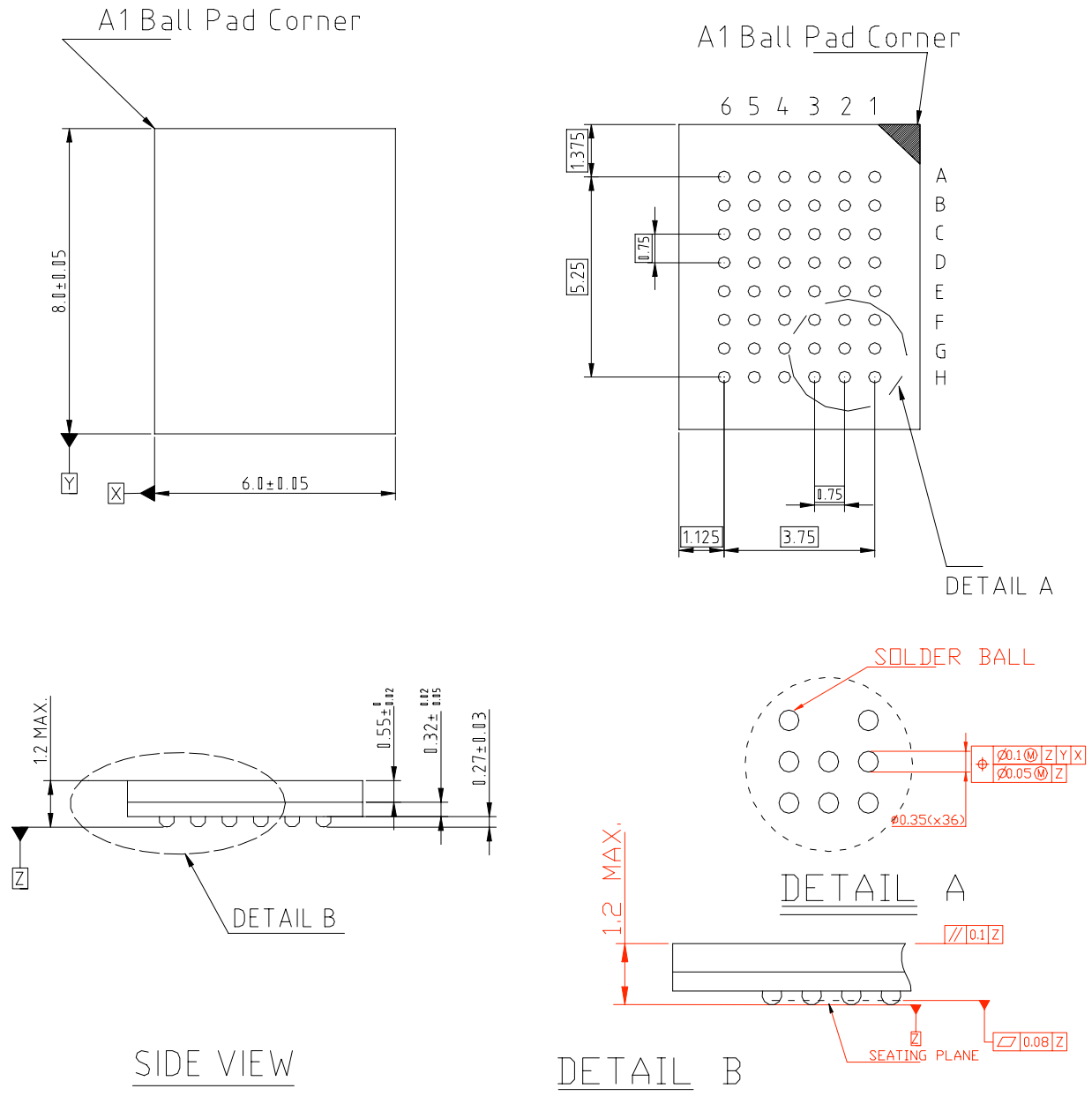
SYM.	UNIT	INCH(BASE)	MM(REF)
A1		0.001 (MIN)	0.254 (MIN)
A2		0.150 ± 0.005	3.810 ± 0.127
B		0.018 ± 0.005	0.457 ± 0.127
D		1.650 ± 0.005	41.910 ± 0.127
E		0.600 ± 0.010	15.240 ± 0.254
E1		0.544 ± 0.004	13.818 ± 0.102
e		0.100 (TYP)	2.540 (TYP)
eB		0.640 ± 0.020	16.256 ± 0.508.
L		0.130 ± 0.010	3.302 ± 0.254
S		0.075 ± 0.010	1.905 ± 0.254
Q1		0.070 ± 0.005	1.778 ± 0.127

Note : D/E1/S dimension do not include mold flash.



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36 ball 6mm x 8mm TFBGA Package Outline Dimension





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ORDERING INFORMATION

Alliance	Organization	VCC Range	Package	Operating Temp	Speed ns
AS6C2008A-55SIN	256K x 8	2.7 - 5.5V	32pin 450mil SOP	Industrial ~ -40 F - 85 F	55
AS6C2008A-55STIN	256K x 8	2.7 - 5.5V	32pin sTSOP(8 x 13.4mm)	Industrial ~ -40 F - 85 F	55
AS6C2008A-55TIN	256K x 8	2.7 - 5.5V	32pin TSOP- 1(8 x 20 mm)	Industrial ~ -40 F - 85 F	55
AS6C2008A-55BIN	256K x 8	2.7 - 5.5V	36ball TFBGA(6 x 8mm)	Industrial ~ -40 F - 85 F	55

PART NUMBERING SYSTEM

AS6C	2008	-55	X	X	N
low power SRAM prefix	Device Number 20 = 2M 08 = x8	Access Time	Package Option S = 32pin 450 mil SOP ST = 32pin sTSOP(8 x 13.4) T = 32pin TSOP - 1(8 x 20mm)	Temperature Range I = Industrial (-40 to + 85 C)	N = Lead Free RoHS compliant part

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