



128K X 8 BIT LOW POWER CMOS SRAM

FEATURES

- Access time :55ns
- Low power consumption:
 - Operating current:10 mA (TYP.)
 - Standby current: 1 μ A (TYP)
- Single 2.7V ~ 5.5V power supply
- Fully Compatible with all Competitors 5V product
- Fully Compatible with all Competitors 3.3V product

- Fully static operation
- Tri-state output
- Data retention voltage : 1.5V (MIN.)
- All products are ROHS Compliant
- Package : 32-pin 450 mil SOP
 - 32-pin 600 mil P-DIP
 - 32-pin 8mm x 20mm TSOP-I
 - 32-pin 8mm x 13.4mm sTSOP
 - 36-ball 6mm x 8mm TFBGA

GENERAL DESCRIPTION

The AS6C1008 is a 1,048,576-bit low power CMOS static random access memory organized as 131,072 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 AS6C1008 is well designed for very low power system applications, and particularly well suited for battery back-up non-volatile memory application.

The AS6C1008 operates from a single power supply of 2.7V ~ 5.5V.

FUNCTIONAL BLOCK DIAGRAM



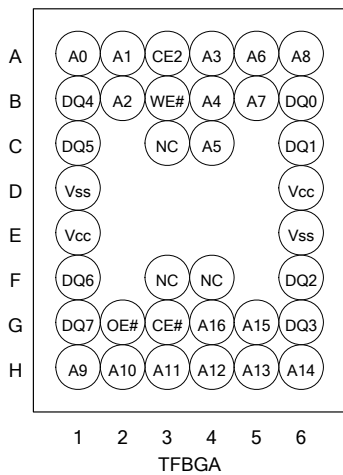
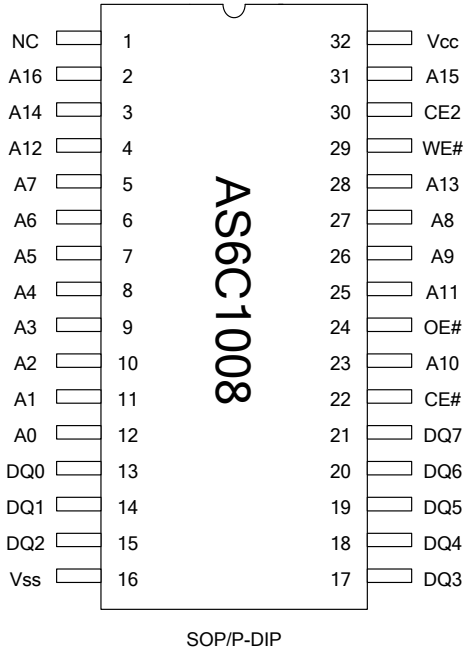
PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0 - A16	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
Terminal Voltage with Respect to V _{SS}	V _{TERM}	-0.5 to 7.0	V
Operating Temperature	T _A	0 to 70(C grade)	°C
		-40 to 85(I grade)	
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.

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	2.2	2.7	-	V
Output Low Voltage	V _{OL}	I _{OL} = 2mA	-	-	0.4	V
Average Operating Power supply Current	I _{CC}	Cycle time = Min. CE# = V _{IL} and CE2 = V _{IH} , I _{I/O} = 0mA	-55	10	60	mA
	I _{CC1}	Cycle time = 1μs CE# ≤ 0.2V and CE2 ≥ V _{CC} -0.2V, I _{I/O} = 0mA other pins at 0.2V or V _{CC} -0.2V	-	1	10	mA
Standby Power Supply Current	I _{SB1}	CE# ≥ V _{CC} -0.2V	C*	1	20	μA
		or CE2 ≤ 0.2V	I*	1	50	μA

*C=Commercial temperature/I= Industrial temperature



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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 $T_A = 25^\circ C$

CAPACITANCE ($T_A = 25^\circ C, f = 1.0MHz$)

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	$C_L = 30pF + 1TTL, I_{OH}/I_{OL} = -1mA/2mA$

AC ELECTRICAL CHARACTERISTICS

(1) READ CYCLE

PARAMETER	SYM.	AS6C1008-55		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

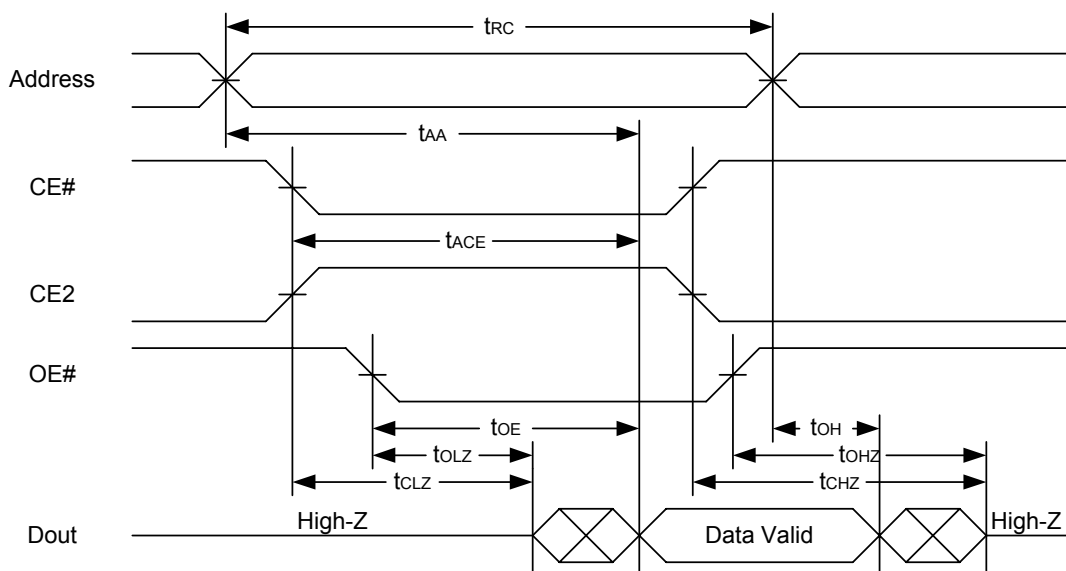
(2) WRITE CYCLE

PARAMETER	SYM.	AS6C1008-55		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)**

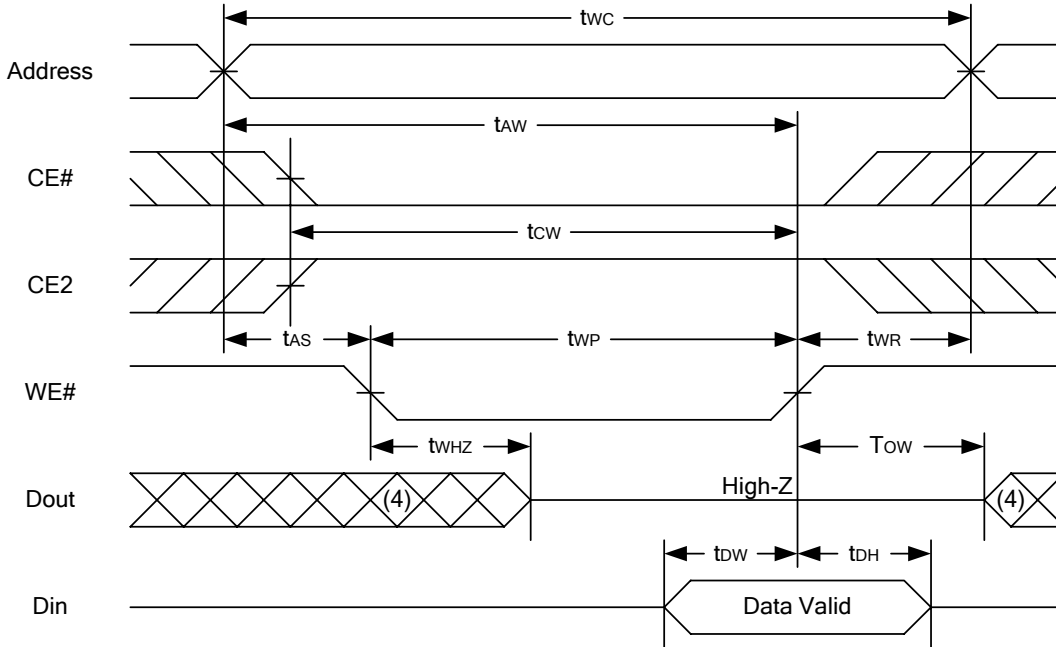
Notes :

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} .

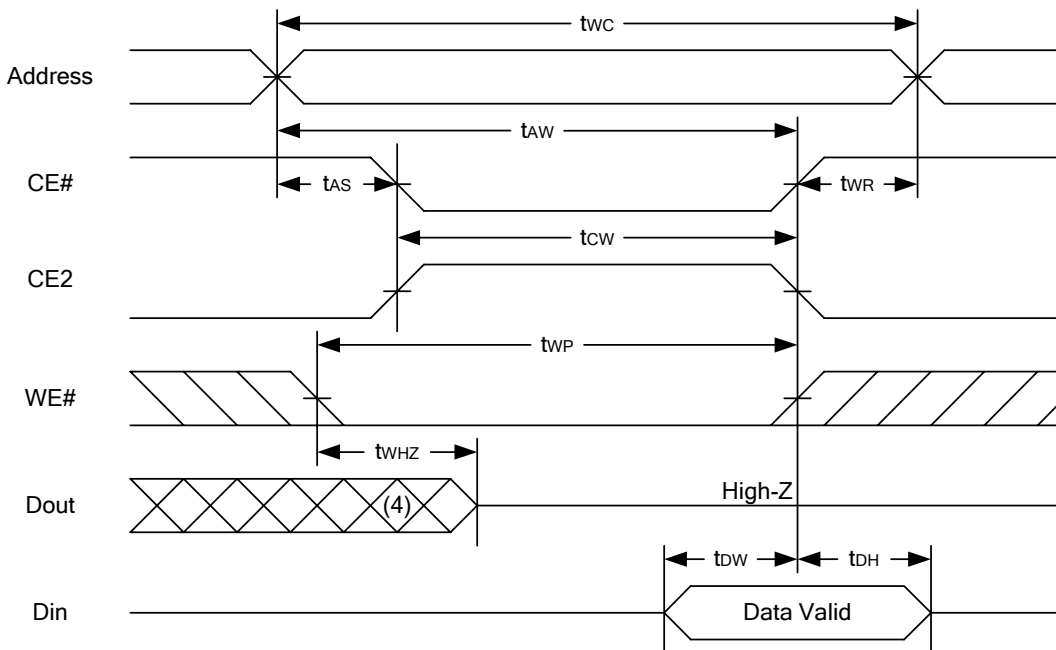


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WRITE CYCLE 1 (WE# Controlled) (1,2,3,5,6)



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 CL = 5pF. Transition is measured ±500mV from steady state.

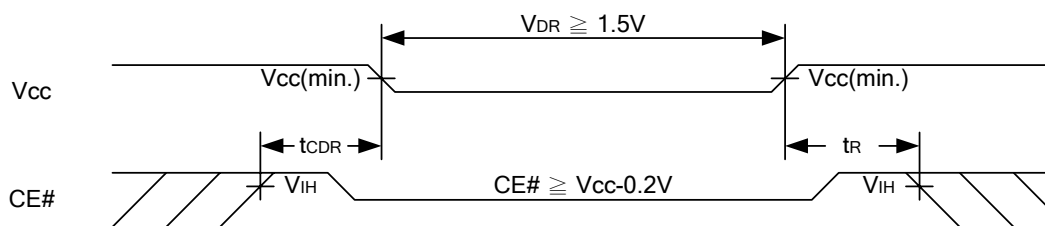
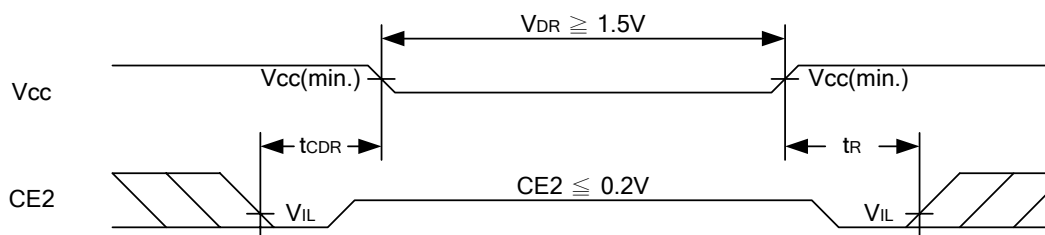


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DATA RETENTION CHARACTERISTICS

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	1.5	-	5.5	V	
Data Retention Current	I _{DR}	V _{CC} = 1.5V CE# \geq V _{CC} - 0.2V or CE2 \leq 0.2V	C**	-	0.5	12	μ A
			I**		0	30	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 C=Commercial temp/I = Industrial temp**

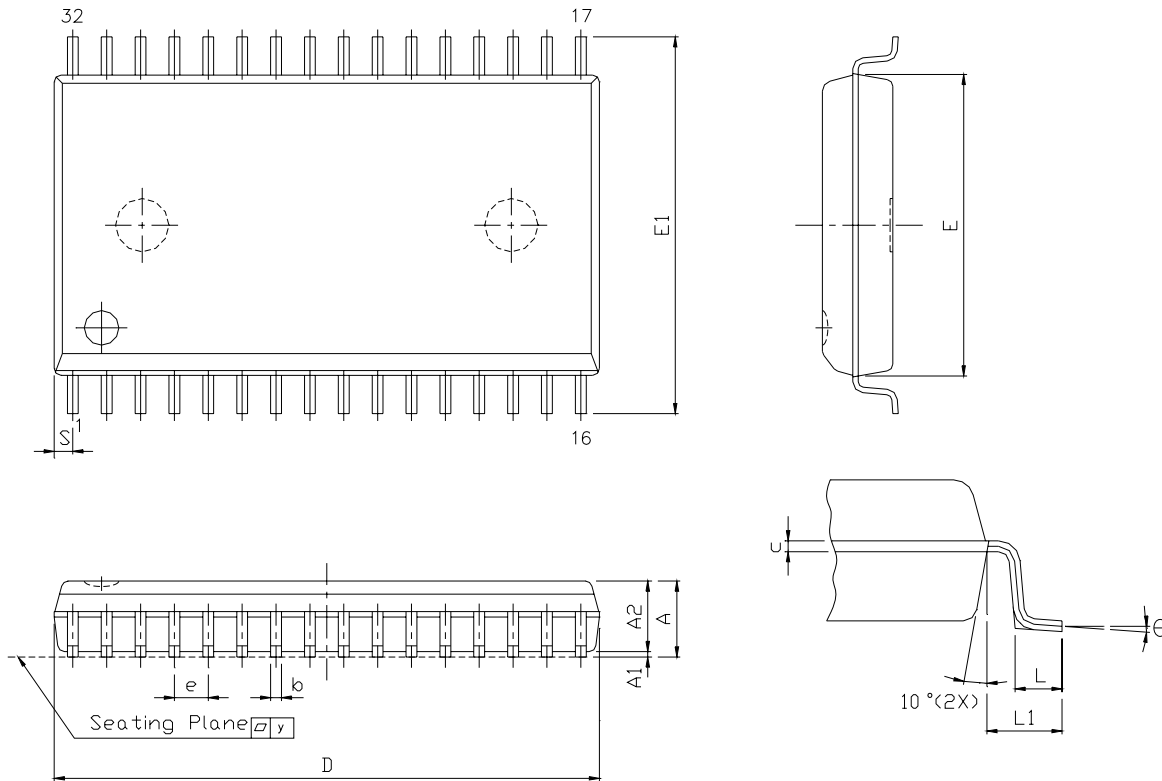
DATA RETENTION WAVEFORM**Low V_{CC} Data Retention Waveform (1) (CE# controlled)****Low V_{CC} Data Retention Waveform (2) (CE2 controlled)**



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PACKAGE OUTLINE DIMENSION

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 ±0.005	11.303 ±0.127
E1		0.555 ±0.012	14.097 ±0.305
e		0.050(TYP)	1.270(TYP)
L		0.0347 ±0.008	0.881 ±0.203
L1		0.055 ±0.008	1.397 ±0.203
S		0.026(MAX)	0.660 (MAX)
y		0.004(MAX)	0.101(MAX)
θ		0° -10°	0° -10°



128K X 8 BIT LOW POWER CMOS SRAM

32 pin 600 mil P-DIP Package Outline Dimension



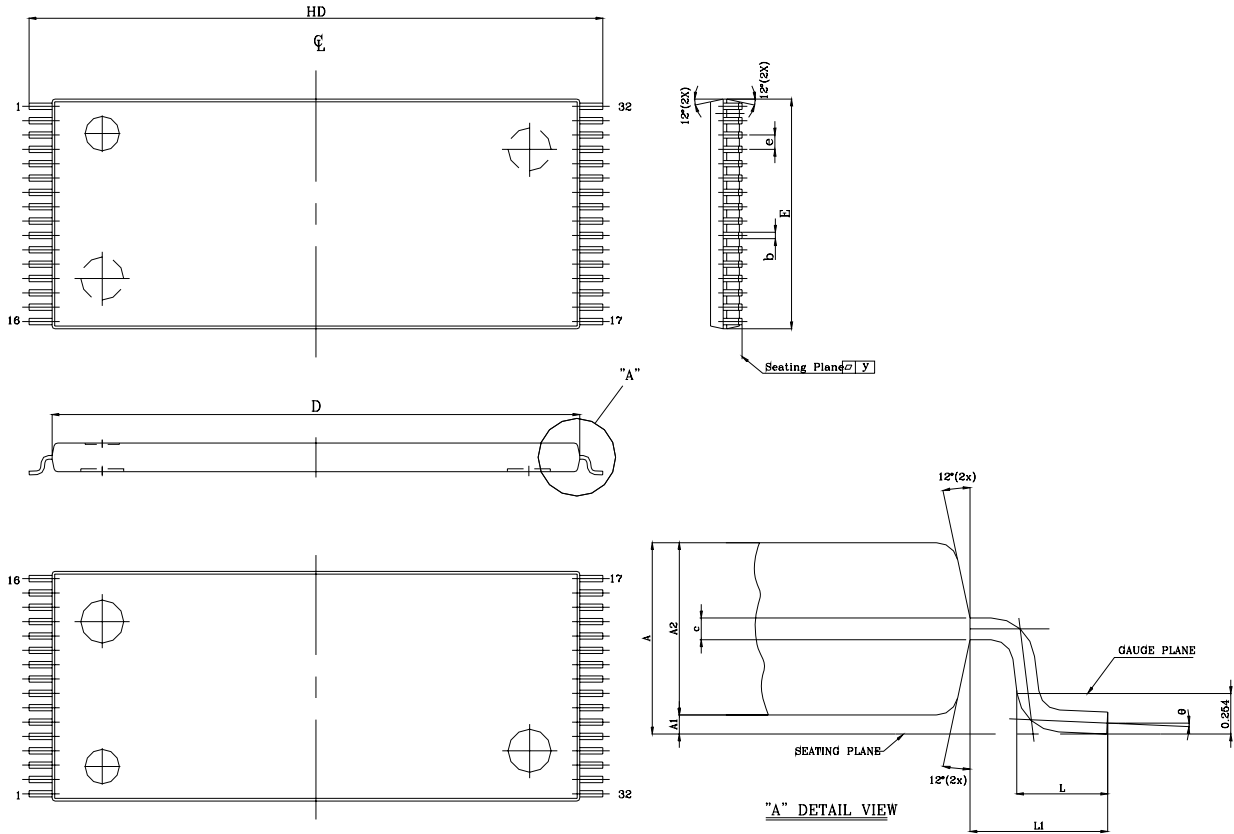
SYM. \ UNIT	INCH(BASE)	MM(REF)
A1	0.001 (MIN)	0.254 (MIN)
A2	0.150 ± 0.005	3.810 ± 0.127
B	0.018 ± 0.005	0.457 ± 0.127
D	1.650 ± 0.005	41.910 ± 0.127
E	0.600 ± 0.010	15.240 ± 0.254
E1	0.544 ± 0.004	13.818 ± 0.102
e	0.100 (TYP)	2.540 (TYP)
eB	0.640 ± 0.020	16.256 ± 0.508.
L	0.130 ± 0.010	3.302 ± 0.254
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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32 pin 8mm x 20mm TSOP-I Package Outline Dimension

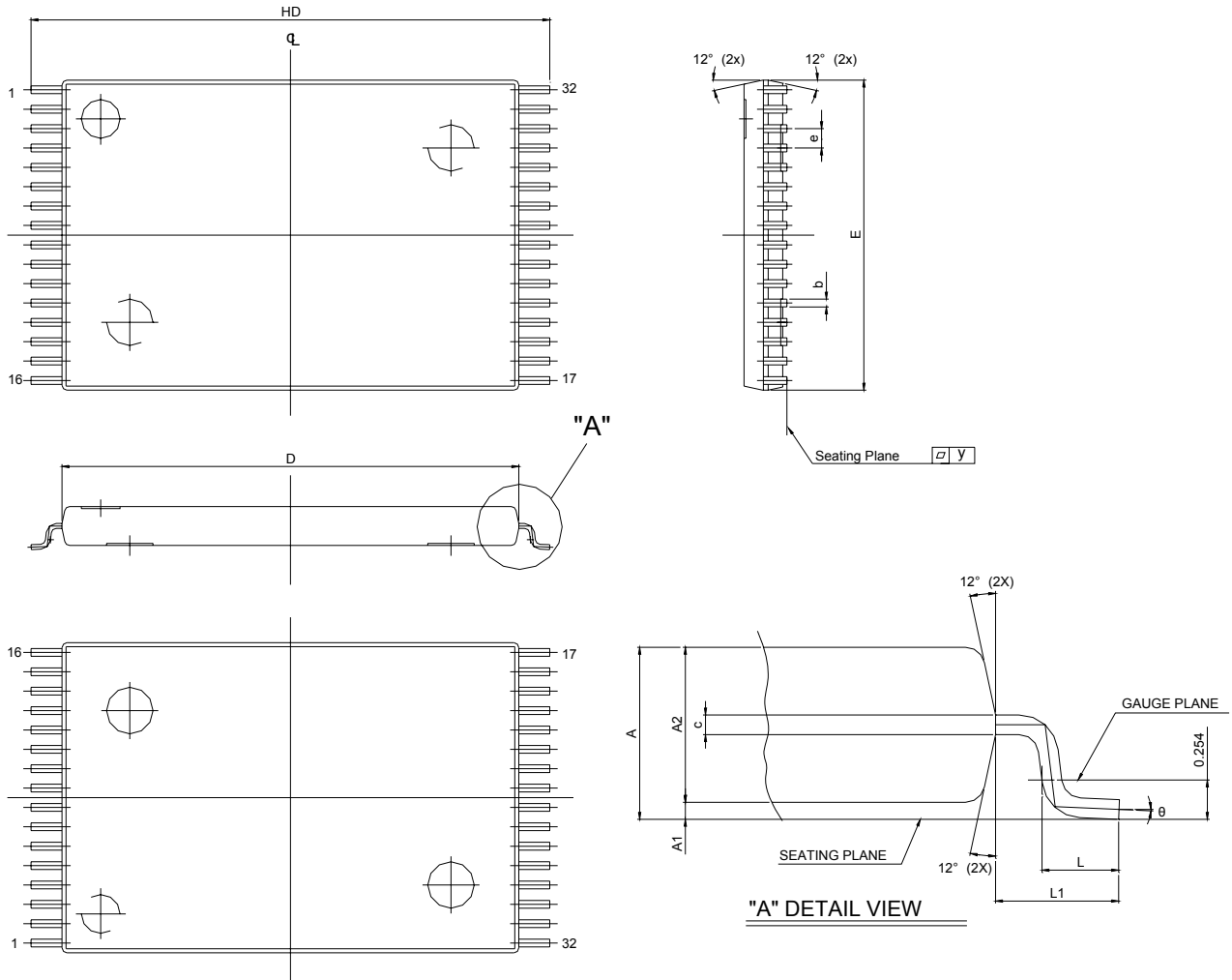


SYM.	UNIT	INCH(BASE)	MM(REF)
A		0.047 (MAX)	1.20 (MAX)
A1		0.004 ±0.002	0.10 ±0.05
A2		0.039 ±0.002	1.00 ±0.05
b		0.008 + 0.002 - 0.001	0.20 + 0.05 - 0.03
c		0.005 (TYP)	0.127 (TYP)
D		0.724 ±0.004	18.40 ±0.10
E		0.315 ±0.004	8.00 ±0.10
e		0.020 (TYP)	0.50 (TYP)
HD		0.787 ±0.008	20.00 ±0.20
L		0.0197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



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32 pin 8mm x 13.4mm sTSSOP Package Outline Dimension

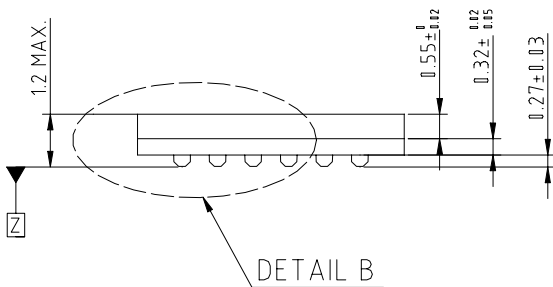


SYM.	UNIT	INCH(BASE)	MM(REF)
A		0.049 (MAX)	1.25 (MAX)
A1		0.005 ±0.002	0.130 ±0.05
A2		0.039 ±0.002	1.00 ±0.05
b		0.008 ±0.01	0.20±0.025
c		0.005 (TYP)	0.127 (TYP)
D		0.465 ±0.004	11.80 ±0.10
E		0.315 ±0.004	8.00 ±0.10
e		0.020 (TYP)	0.50 (TYP)
HD		0.528±0.008	13.40 ±0.20.
L		0.0197 ±0.004	0.50 ±0.10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



128K X 8 BIT LOW POWER CMOS SRAM

36 ball 6mm x 8mm TFBGA Package Outline Dimension



SIDE VIEW





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ORDERING INFORMATION

Ordering Codes

Alliance	Organization	VCC range	Package	Operating Temp	Speed ns
AS6C1008-55PCN	128K X 8	2.7-5.5V	32pin 600mil PDIP	Commercial ~ 0° C to 70° C	55
AS6C1008-55PIN	128K X 8	2.7-5.5V	32pin 600mil PDIP	Industrial ~ -40°C to 85° C	55
AS6C1008-55SIN	128K X 8	2.7-5.5V	32pin 450mil SOP	Industrial ~ -40°C to 85° C	55
AS6C1008-55TIN	128K X 8	2.7-5.5V	32pin TSOP-I (8 x 20 mm)	Industrial ~ -40°C to 85° C	55
AS6C1008-55STIN	128K X 8	2.7-5.5V	32pin sTSOP (8 x 13.4 mm)	Industrial ~ -40°C to 85° C	55
AS6C1008-55BIN	128K X 8	2.7-5.5V	36pin TFBGA (6mm x 8mm)	Industrial ~ -40°C to 85° C	55

Part numbering system

AS6C	1008	- 55	X	X	N
low power SRAM prefix	Device Number 10 = 1M 08 = by 8	Access Time	Package Options: P = 32 pin 600 mil P-DIP S = 32 pin 450 mil SOP T = 32 pin TSOP-I (8mm x 20 mm) ST = 32 pin sTSOP (8 x 13.4 mm) B = 36 ball 6 x 8mm TFBGA	Temperature Range: C = Commercial (0°C to +70° C) I = Industrial (-40° to +85° C)	N = Lead Free ROHS Compliant Part