



**Lyontek Inc.**

**LY62W5128B**

Rev. 1.2

**512K X 8 BIT LOW POWER CMOS SRAM**

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**REVISION HISTORY**

<b><u>Revision</u></b>	<b><u>Description</u></b>	<b><u>Issue Date</u></b>
Rev. 1.0	Initial Issue	Jun.21.2023
Rev. 1.1	Revised <b><u>ORDERING INFORMATION</u></b> in page 14 32 Pin(450mil) SOP Packing Type : Tube→Tray	Aug.24.2023
Rev. 1.2	Revised <b><u>DC ELECTRICAL CHARACTERISTICS</u></b> :ICC TEST CONDITION-- Page4	Mar.27.2024

### FEATURES

- Fast access time : 45/55ns
- Low power consumption:  
Operating current : 15/12mA (TYP.)  
Standby current : 2.2 $\mu$ A (TYP.)
- Single 2.7V ~ 5.5V power supply
- All outputs TTL compatible
- Fully static operation
- Tri-state output
- Data retention voltage : 1.5V (MIN.)
- **Green package available**
- Package : 32-pin 450mil SOP  
32-pin 8mm x 20mm TSOP I  
32-pin 8mm x 13.4mm sTSON  
36-ball 6mm x 8mm TFBGA

### GENERAL DESCRIPTION

The LY62W5128B is a 4,194,304-bit low power CMOS static random access memory organized as 524,288 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.

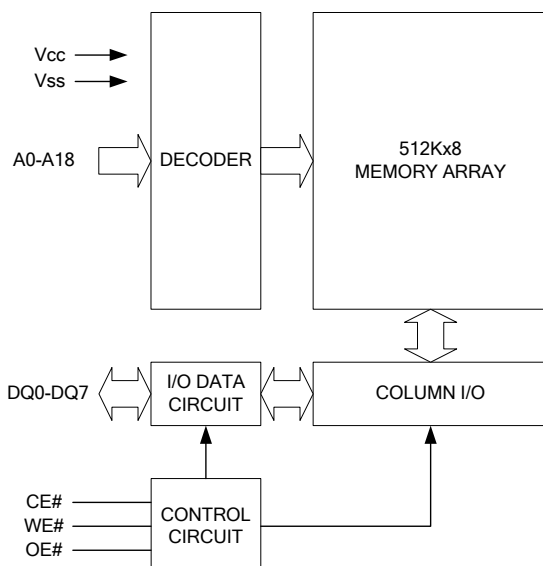
The LY62W5128B is well designed for very low power system applications, and particularly well suited for battery back-up nonvolatile memory application.

The LY62W5128B operates from a single power supply of 2.7V ~ 5.5V and all outputs are fully TTL compatible.

### PRODUCT FAMILY

Product Family	Operating Temperature	V <sub>CC</sub> Range	Speed	Power Dissipation	
				Standby(I <sub>SB1</sub> , TYP.)	Operating(I <sub>CC</sub> , TYP.)
LY62W5128B	0 ~ 70°C	2.7 ~ 5.5V	45/55ns	2.2 $\mu$ A	15/12mA
LY62W5128B(I)	-40 ~ 85°C	2.7 ~ 5.5V	45/55ns	2.2 $\mu$ A	15/12mA

### FUNCTIONAL BLOCK DIAGRAM

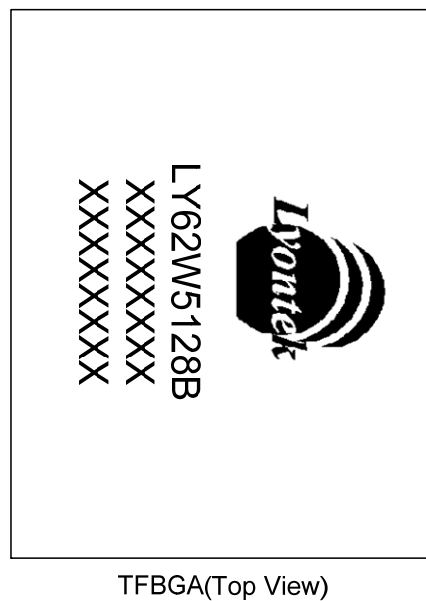
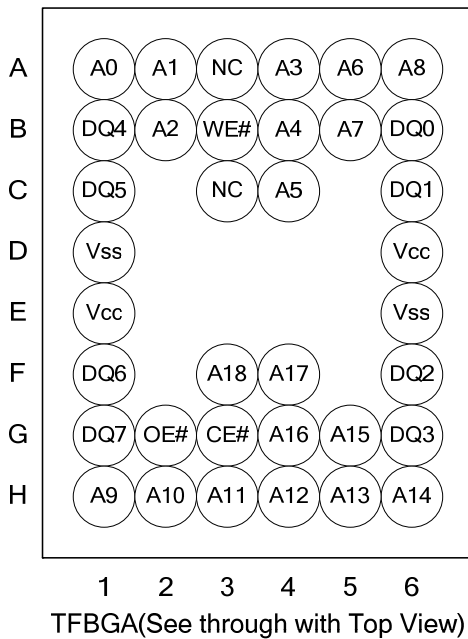
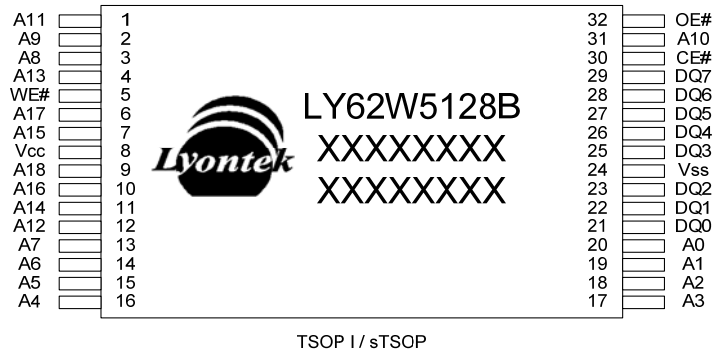
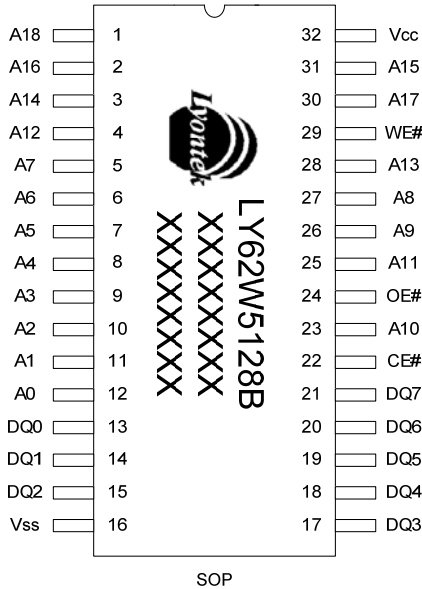


### PIN DESCRIPTION

SYMBOL	DESCRIPTION
A0 - A18	Address Inputs
DQ0 - DQ7	Data Inputs/Outputs
CE#	Chip Enable Inputs
WE#	Write Enable Input
OE#	Output Enable Input
V <sub>CC</sub>	Power Supply
V <sub>SS</sub>	Ground
NC	No Connection



**PIN CONFIGURATION**





#### ABSOLUTE MAXIMUM RATINGS\*

PARAMETER	SYMBOL	RATING	UNIT
Voltage on V <sub>CC</sub> relative to V <sub>SS</sub>	V <sub>T1</sub>	-0.5 to 6.5	V
Voltage on any other pin relative to V <sub>SS</sub>	V <sub>T2</sub>	-0.5 to V <sub>CC</sub> +0.5	V
Operating Temperature	T <sub>A</sub>	0 to 70(C grade)	°C
		-40 to 85(I grade)	
Storage Temperature	T <sub>STG</sub>	-65 to 150	°C
Power Dissipation	P <sub>D</sub>	1	W
DC Output Current	I <sub>OUT</sub>	50	mA

\*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#	OE#	WE#	I/O OPERATION	SUPPLY CURRENT
Standby	H	X	X	High-Z	I <sub>SB1</sub>
Output Disable	L	H	H	High-Z	I <sub>CC</sub> , I <sub>CC1</sub>
Read	L	L	H	D <sub>OUT</sub>	I <sub>CC</sub> , I <sub>CC1</sub>
Write	L	X	L	D <sub>IN</sub>	I <sub>CC</sub> , I <sub>CC1</sub>

Note: H = V<sub>IH</sub>, L = V<sub>IL</sub>, X = Don't care.



### DC ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.*4	MAX.	UNIT		
Supply Voltage	V <sub>CC</sub>		2.7	3.0	5.5	V		
Input High Voltage	V <sub>IH</sub> *1	V <sub>CC</sub> =4~5.5V	2.4	-	V <sub>CC</sub> +0.3	V		
		V <sub>CC</sub> =2.7~4V	2.2					
Input Low Voltage	V <sub>IL</sub> *2	V <sub>CC</sub> =4~5.5V	- 0.2	-	0.8	V		
		V <sub>CC</sub> =2.7~4V			0.6			
Input Leakage Current	I <sub>LI</sub>	V <sub>CC</sub> ≥ V <sub>IN</sub> ≥ V <sub>SS</sub>	- 1	-	1	μA		
Output Leakage Current	I <sub>LO</sub>	V <sub>CC</sub> ≥ V <sub>OUT</sub> ≥ V <sub>SS</sub> , Output Disabled	- 1	-	1	μA		
Output High Voltage	V <sub>OH</sub>	I <sub>OH</sub> = -1mA	2.4	2.7	-	V		
Output Low Voltage	V <sub>OL</sub>	I <sub>OL</sub> = 2mA	-	-	0.4	V		
Average Operating Power supply Current	I <sub>CC</sub>	Cycle time = MIN. CE# ≤ 0.2V, I <sub>I/O</sub> = 0mA Other pins at 0.2V or V <sub>CC</sub> -0.2V	- 45	-	15	25	mA	
			- 55	-	12	20	mA	
	I <sub>CC1</sub>	Cycle time = 1μs CE# ≤ 0.2V, I <sub>I/O</sub> = 0mA Other pins at 0.2V or V <sub>CC</sub> -0.2V	-	-	3	5	mA	
Standby Power Supply Current	I <sub>SB1</sub>	CE# ≥ V <sub>CC</sub> -0.2V Others at 0.2V or V <sub>CC</sub> - 0.2V	SL*5	25°C	-	2.2	5	μA
			SLI*5	40°C	-	3	6	μA
			SL		-	2.2	12	μA
			SLI		-	2.2	20	μA

Notes:

- V<sub>IH</sub>(max) = V<sub>CC</sub> + 3.0V for pulse width less than 10ns.
- V<sub>IL</sub>(min) = V<sub>SS</sub> - 3.0V for pulse width less than 10ns.
- Over/Undershoot specifications are characterized, not 100% tested.
- Typical values are included for reference only and are not guaranteed or tested.  
Typical values are measured at V<sub>CC</sub> = V<sub>CC</sub>(TYP.) and T<sub>A</sub> = 25°C
- This parameter is measured at V<sub>CC</sub> = 3.0V

### CAPACITANCE (T<sub>A</sub> = 25°C, f = 1.0MHz)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Input Capacitance	C <sub>IN</sub>	-	6	pF
Input/Output Capacitance	C <sub>I/O</sub>	-	8	pF

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

### AC TEST CONDITIONS

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

Lyontek Inc. reserves the rights to change the specifications and products without notice.

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### AC ELECTRICAL CHARACTERISTICS

#### (1) READ CYCLE

PARAMETER	SYM.	LY62W5128B-45		LY62W5128B-55		UNIT
		MIN.	MAX.	MIN.	MAX.	
Read Cycle Time	t <sub>RC</sub>	55	-	55	-	ns
Address Access Time	t <sub>AA</sub>	-	45	-	55	ns
Chip Enable Access Time	t <sub>ACE</sub>	-	45	-	55	ns
Output Enable Access Time	t <sub>OE</sub>	-	25	-	30	ns
Chip Enable to Output in Low-Z	t <sub>CLZ</sub> *	10	-	10	-	ns
Output Enable to Output in Low-Z	t <sub>OLZ</sub> *	5	-	5	-	ns
Chip Disable to Output in High-Z	t <sub>CHZ</sub> *	-	20	-	20	ns
Output Disable to Output in High-Z	t <sub>OHZ</sub> *	-	20	-	20	ns
Output Hold from Address Change	t <sub>OH</sub>	10	-	10	-	ns

#### (2) WRITE CYCLE

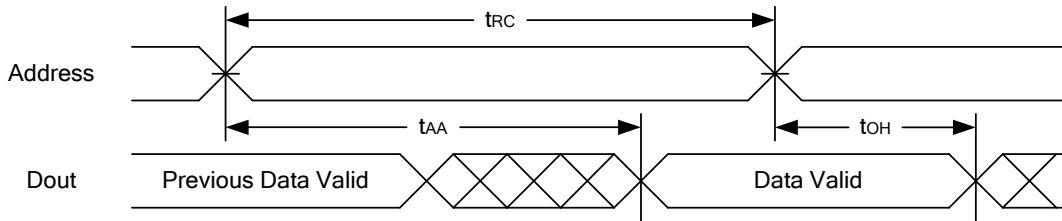
PARAMETER	SYM.	LY62W5128B-45		LY62W5128B-55		UNIT
		MIN.	MAX.	MIN.	MAX.	
Write Cycle Time	t <sub>WC</sub>	45	-	55	-	ns
Address Valid to End of Write	t <sub>AW</sub>	40	-	50	-	ns
Chip Enable to End of Write	t <sub>CW</sub>	40	-	50	-	ns
Address Set-up Time	t <sub>AS</sub>	0	-	0	-	ns
Write Pulse Width	t <sub>WP</sub>	35	-	45	-	ns
Write Recovery Time	t <sub>WR</sub>	0	-	0	-	ns
Data to Write Time Overlap	t <sub>DW</sub>	20	-	25	-	ns
Data Hold from End of Write Time	t <sub>DH</sub>	0	-	0	-	ns
Output Active from End of Write	t <sub>OW</sub> *	5	-	5	-	ns
Write to Output in High-Z	t <sub>WHZ</sub> *	-	20	-	20	ns

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

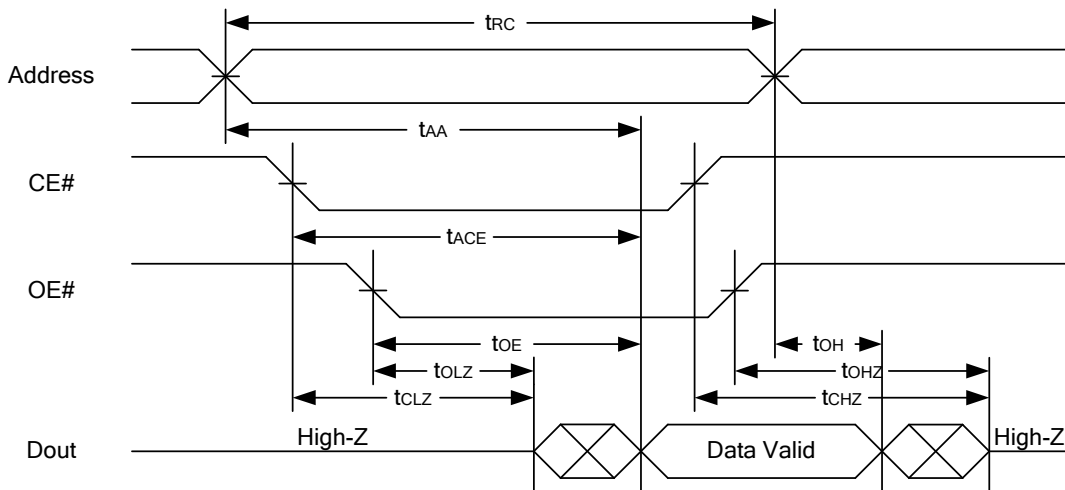


### TIMING WAVEFORMS

#### READ CYCLE 1 (Address Controlled) (1,2)



#### READ CYCLE 2 (CE# and OE# Controlled) (1,3,4,5)



#### Notes :

1.  $WE\#$  is high for read cycle.
2. Device is continuously selected  $OE\# = \text{low}$ ,  $CE\# = \text{low}$ .
3. Address must be valid prior to or coincident with  $CE\# = \text{low}$ ; 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 a given temperature and voltage condition,  $t_{CHZ}$  is less than  $t_{CLZ}$ ,  $t_{OHZ}$  is less than  $t_{OLZ}$ .





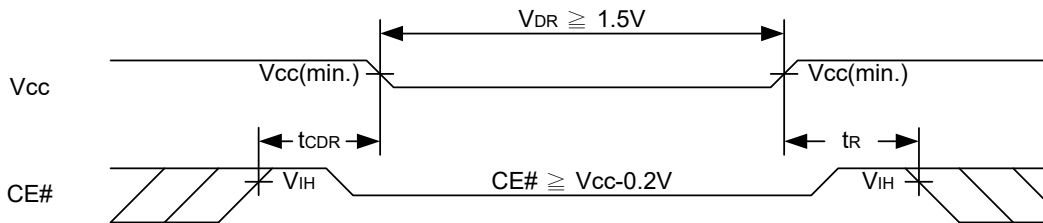


**DATA RETENTION CHARACTERISTICS**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT		
V <sub>CC</sub> for Data Retention	V <sub>DR</sub>	CE# ≥ V <sub>CC</sub> - 0.2V	1.5	-	5.5	V		
Data Retention Current	I <sub>DR</sub>	V <sub>CC</sub> = 1.5V CE# ≥ V <sub>CC</sub> - 0.2V Other pins at 0.2V or V <sub>CC</sub> -0.2V	SL	25°C	-	2.2	5	μA
			SLI	40°C	-	3	6	μA
			SL		-	2.2	12	μA
			SLI		-	2.2	20	μA
Chip Disable to Data Retention Time	t <sub>CDR</sub>	See Data Retention Waveforms (below)	0	-	-	ns		
Recovery Time	t <sub>R</sub>		t <sub>RC</sub> *	-	-	ns		

t<sub>RC</sub>\* = Read Cycle Time

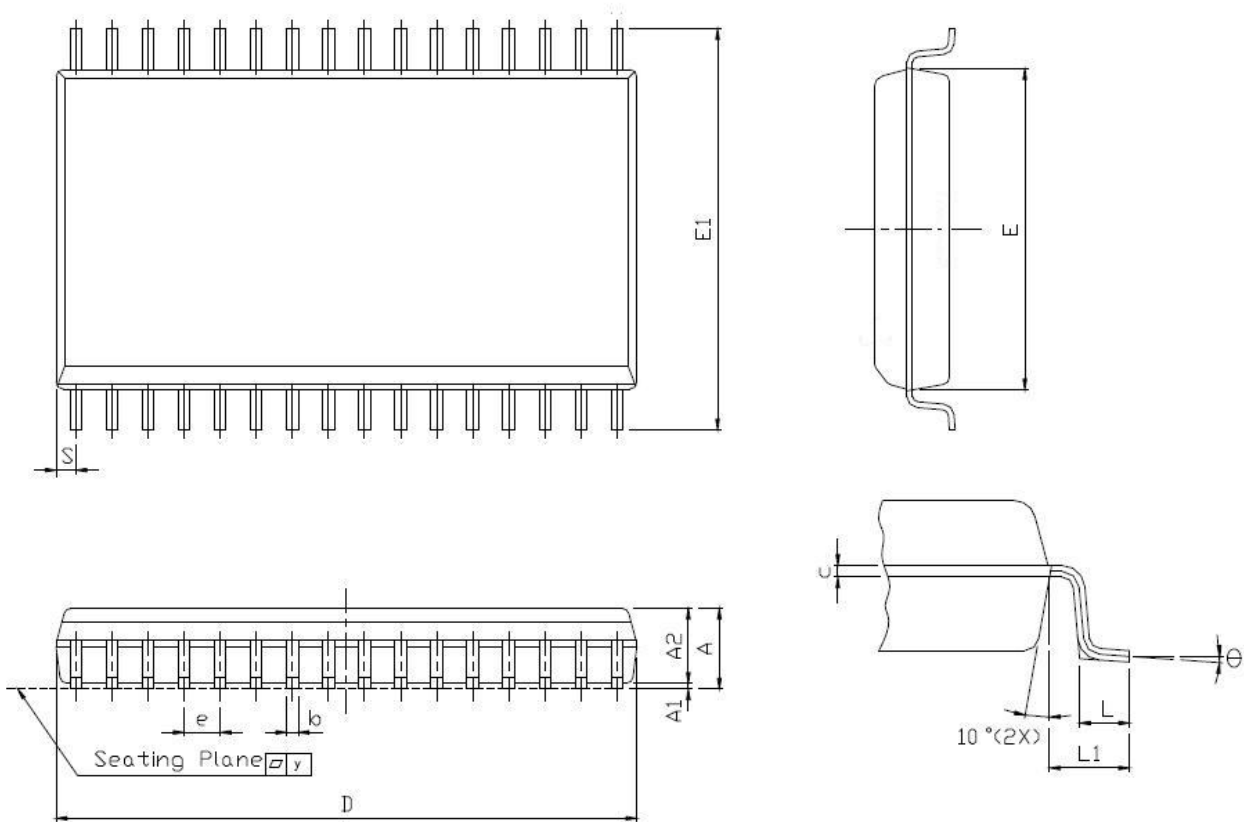
**DATA RETENTION WAVEFORM**





**PACKAGE OUTLINE DIMENSION**

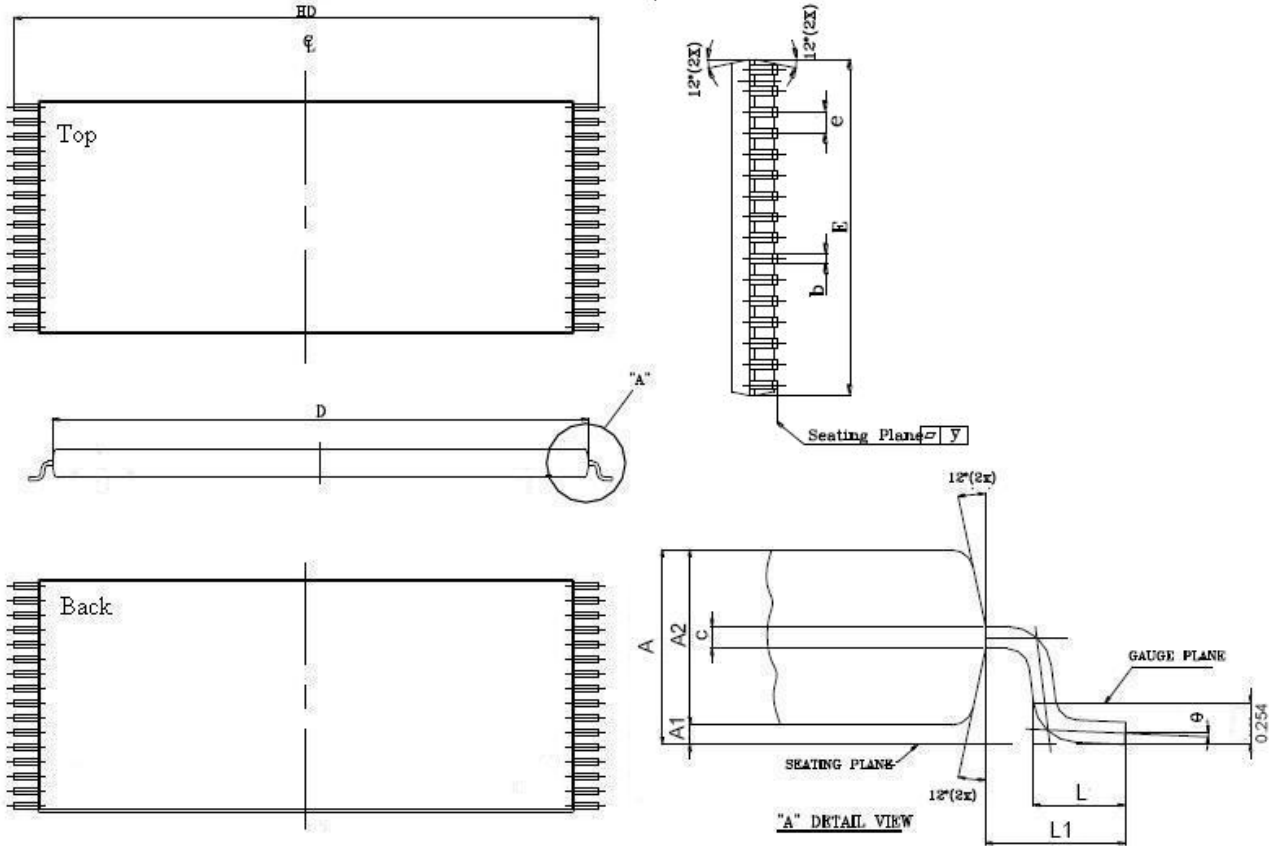
**32-pin 450 mil SOP Package Outline Dimension**



SYM.	UNIT	
	INCH.(BASE)	MM(REF)
A	0.120(MAX)	3.048(MAX)
A1	0.004(MIN)	0.102(MIN)
A2	0.116(MAX)	2.946(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±0.006	11.303±0.152
E1	0.555±0.025	14.097±0.635
e	0.050(TYP)	1.270(TYP)
L	0.033±0.017	0.838±0.432
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°



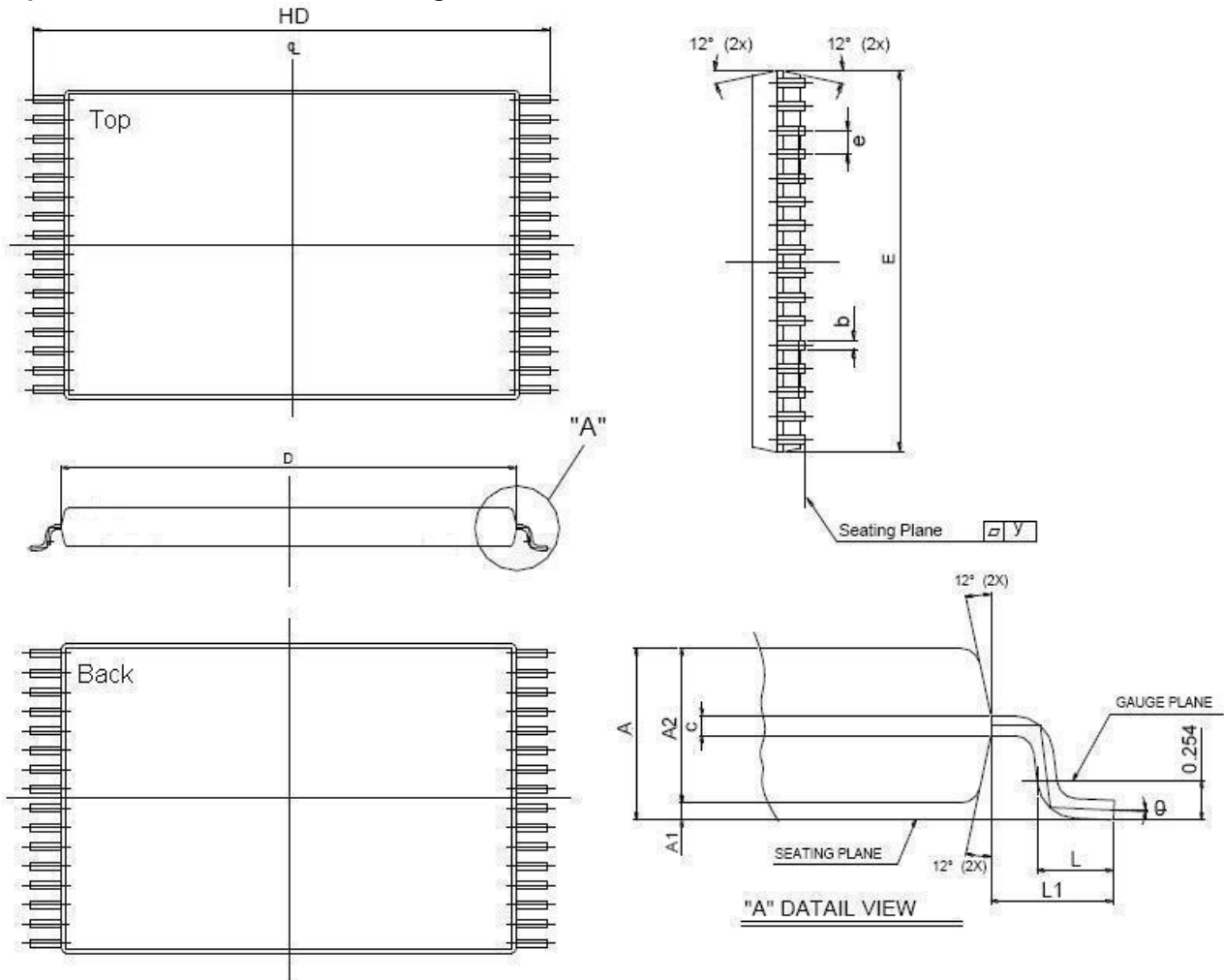
**32-pin 8mm x 20mm TSOP I Package Outline Dimension**



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		0.009 ±0.002	0.22 ±0.05
c		0.006 ±0.002	0.155 ±0.055
D		0.724 ±0.008	18.40 ±0.20
E		0.315 ±0.008	8.00 ±0.20
e		0.020 (TYP)	0.50 (TYP)
HD		0.787 ±0.008	20.00 ±0.20
L		0.024 ±0.004	0.60 ±0.10
L1		0.0315 ±0.004	0.08 ±0.10
y		0.003 (MAX)	0.08 (MAX)
ϑ		0°~5°	0°~5°

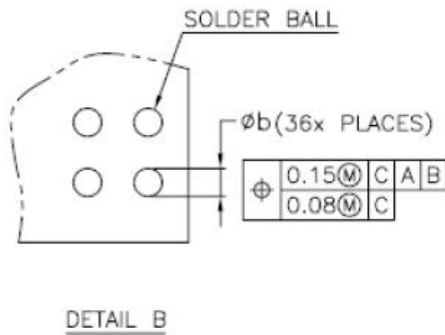
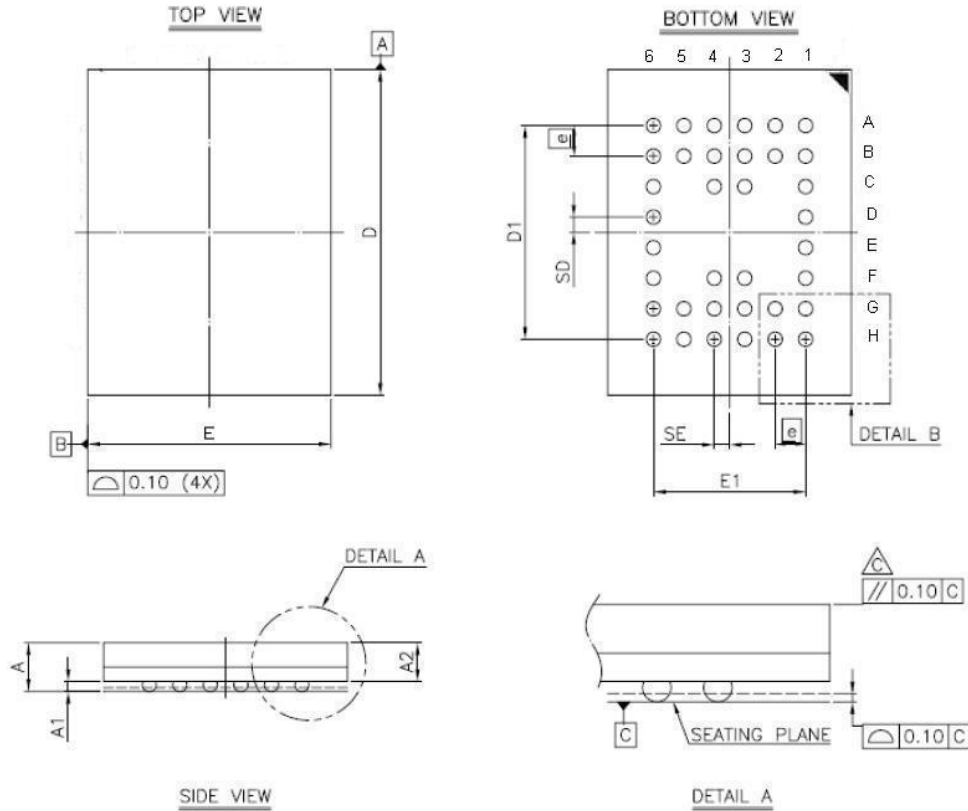


**32-pin 8mm x 13.4mm sTSP Package Outline Dimension**



SYM.	UNIT	INCH(BASE)	MM(REF)
A		0.049 (MAX)	1.25 (MAX)
A1		0.004 ±0.002	0.10 ±0.05
A2		0.039 ±0.002	1.00 ±0.05
b		0.009 ±0.002	0.22 ±0.05
c		0.006 ±0.002	0.155 ±0.055
D		0.465 ±0.008	11.80 ±0.20
E		0.315 ±0.008	8.00 ±0.20
e		0.020 (TYP)	0.50 (TYP)
HD		0.528±0.008	13.40 ±0.20.
L		0.02 ±0.008	0.50 ±0.20
L1		0.031 ±0.005	0.8 ±0.125
y		0.003 (MAX)	0.076 (MAX)
θ		0°~5°	0°~5°

#### 36-ball 6mm × 8mm TFBGA Package Outline Dimension



SYM.	DIMENSION (mm)			DIMENSION (inch)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.20	0.25	0.30	0.008	0.010	0.012
A2	—	—	0.94	—	—	0.037
b	0.30	0.35	0.40	0.012	0.014	0.016
D	7.95	8.00	8.05	0.313	0.315	0.317
D1	5.25 BSC			0.207 BSC		
E	5.95	6.00	6.05	0.234	0.236	0.238
E1	3.75 BSC			0.148 BSC		
SE	0.375 TYP			0.015 TYP		
SD	0.375 TYP			0.015 TYP		
B	0.75 BSC			0.030 BSC		

NOTE:  
 1. CONTROLLING DIMENSION : MILLIMETER.  
 2. REFERENCE DOCUMENT : JEDEC MO-207.



#### ORDERING INFORMATION

Package Type	Access Time (Speed)(ns)	Power Type	Temperature Range(°C)	Packing Type	Lyontek Item No.
32-pin (450mil) SOP	45	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BSL-45SL
				Tape Reel	LY62W5128BSL-45SLT
			-40°C~85°C	Tray	LY62W5128BSL-45SLI
				Tape Reel	LY62W5128BSL-45SLIT
	55	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BSL-55SL
				Tape Reel	LY62W5128BSL-55SLT
			-40°C~85°C	Tray	LY62W5128BSL-55SLI
				Tape Reel	LY62W5128BSL-55SLIT



#### ORDERING INFORMATION

Package Type	Access Time (Speed)(ns)	Power Type	Temperature Range(°C)	Packing Type	Lyontek Item No.
32-pin (8mm x 20mm) TSOP I	45	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BLL-45SL
				Tape Reel	LY62W5128BLL-45SLT
			-40°C~85°C	Tray	LY62W5128BLL-45SLI
				Tape Reel	LY62W5128BLL-45SLIT
	55	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BLL-55SL
				Tape Reel	LY62W5128BLL-55SLT
			-40°C~85°C	Tray	LY62W5128BLL-55SLI
				Tape Reel	LY62W5128BLL-55SLIT



#### ORDERING INFORMATION

Package Type	Access Time (Speed)(ns)	Power Type	Temperature Range(°C)	Packing Type	Lyontek Item No.
32-pin (8mm x 13.4mm) sTSOP	45	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BRL-45SL
				Tape Reel	LY62W5128BRL-45SLT
			-40°C~85°C	Tray	LY62W5128BRL-45SLI
				Tape Reel	LY62W5128BRL-45SLIT
	55	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BRL-55SL
				Tape Reel	LY62W5128BRL-55SLT
			-40°C~85°C	Tray	LY62W5128BRL-55SLI
				Tape Reel	LY62W5128BRL-55SLIT





#### ORDERING INFORMATION

Package Type	Access Time (Speed)(ns)	Power Type	Temperature Range(°C)	Packing Type	Lyontek Item No.
36-ball (6mm x 8mm) TFBGA	45	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BGL-45SL
				Tape Reel	LY62W5128BGL-45SLT
			-40°C~85°C	Tray	LY62W5128BGL-45SLI
				Tape Reel	LY62W5128BGL-45SLIT
	55	Special Ultra Low Power	0°C~70°C	Tray	LY62W5128BGL-55SL
				Tape Reel	LY62W5128BGL-55SLT
			-40°C~85°C	Tray	LY62W5128BGL-55SLI
				Tape Reel	LY62W5128BGL-55SLIT



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**LY62W5128B**

Rev. 1.2

**512K X 8 BIT LOW POWER CMOS SRAM**

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