

**Features :**

- \* Low-power consumption.
  - active: 30mA at 120ns.
  - stand by :
    - 20  $\mu$ A (CMOS input / output)
    - 5  $\mu$ A (CMOS input / output, SL)
- \* Single +2.3 to 2.7V power supply.
- \* Equal access and cycle time.
- \* 85/120 ns access time.
- \* 1.0V data retention mode.
- \* TTL compatible, tri-state input/output.
- \* Automatic power-down when deselected.
- \* Industrial grade (-40°C ~ 85°C) available.
- \* Package available: sTSOP and SOP.

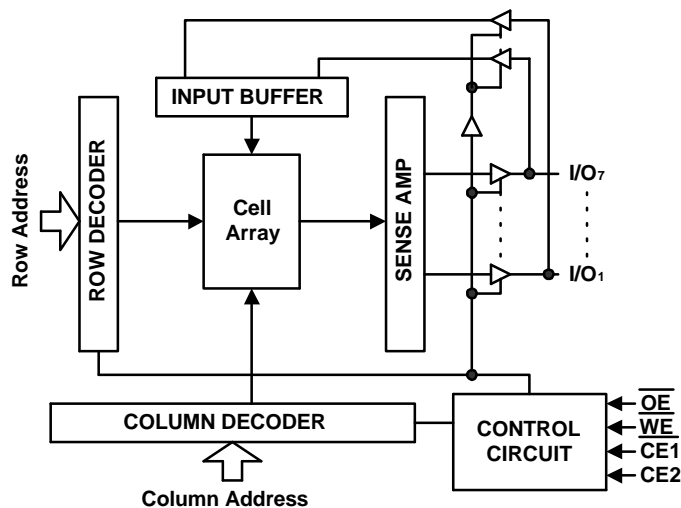
**Description :**

The GLT6400M08 is a low power CMOS Static RAM organized as 524,288 x 8 bits. Easy memory expansion is provided by an active LOW  $\overline{\text{CE1}}$  an active LOW  $\overline{\text{OE}}$ , and Tri-state I/O's. This device has an automatic power-down mode feature when deselected.

Writing to the device is accomplished by taking chip Enable 1 ( $\overline{\text{CE1}}$ ) with Write Enable ( $\overline{\text{WE}}$ ) LOW. Reading from the device is performed by taking Chip Enable 1 ( $\overline{\text{CE1}}$ ) with Output Enable ( $\overline{\text{OE}}$ ) LOW while Write Enable ( $\overline{\text{WE}}$ ) and Chip Enable 2 (CE2) is HIGH. The I/O pins are placed in a high-impedance state when the device is deselected : the outputs are disabled during a write cycle.

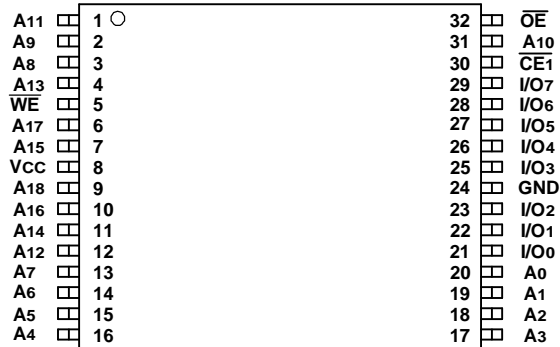
The GLT6400M08 comes with a 1V data retention feature and Lower Standby Power. The GLT6400M08 is available in a 32-pin sTSOP and SOP packages.

**Function Block Diagram :**

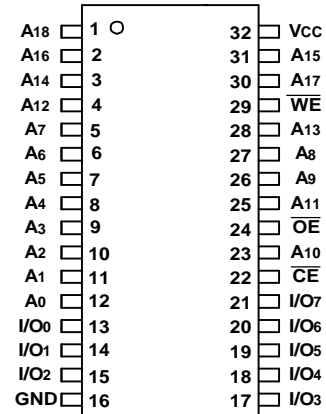


**Pin Configurations :**

**GLT6400M08**  
sTSOPI



**GLT6400M08**  
SOP



**Pin Descriptions:**

Name	Function
A <sub>0</sub> – A <sub>18</sub>	Address Inputs
CE <sub>1</sub>	Chip Enable Input
OE	Output Enable Input
WE	Write Enable Input
I/O <sub>0</sub> – I/O <sub>7</sub>	Data Input and Data Output
V <sub>CC</sub>	2.5V Power Supply
GND	Ground
NC	No Connection

**Truth Table:**

CE <sub>1</sub>	WE	OE	Data	Mode
H	X	X	High-Z	Standby
L	H	L	Data Out	Active, Read
L	H	H	High-Z	Active, Output Disable
L	L	X	Data Out	Active, Write

\*Key : X = Don't Care, L = Low, H = High

**Absolute Maximum Ratings\***

Parameter	Symbol	Minimum	Maximum	Unit
Voltage on Any Pin Relative to Gnd	Vt	-0.5	V <sub>CC</sub> +0.3	V
Power Dissipation	P <sub>T</sub>	-	1.0	W
Storage Temperature (Plastic)	Tstg	-55	+150	°C
Temperature Under Bias	Tbias	-40	+85	°C

\*Note : Stresses greater than those listed above 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 conditions outside those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**Recommended Operating Conditions ( T<sub>A</sub> = -25°C to + 85°C)**

Parameter	Symbol	Min	Typ	Max	Unit
Supply Voltage	V <sub>CC</sub>	2.3	2.5	2.7	V
	Gnd	0.0	0.0	0.0	V
Input Voltage	V <sub>IH</sub>	2.0	-	V <sub>CC</sub> +0.2	V
	V <sub>IL</sub>	-0.5*	-	0.6	V

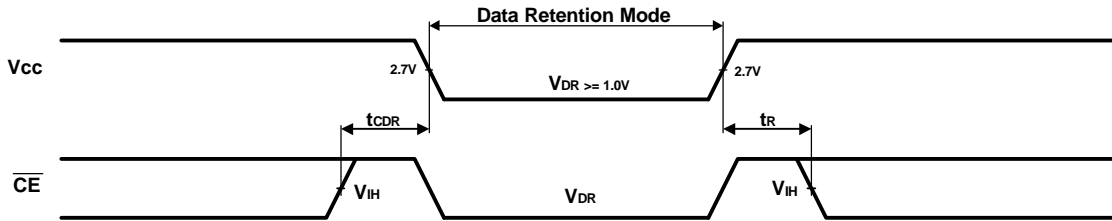
\* V<sub>IL</sub> min = -1.0V for pulse width less than t<sub>RC</sub>/2.

**DC Operating Characteristics (  $V_{CC}=2.3V$  to  $2.7V$ ,  $T_A=-25^{\circ}C$  to  $+85^{\circ}C$ )**

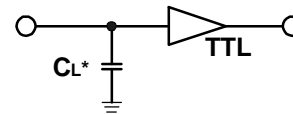
Parameter	Sym.	Test Conditions	85		120		Unit
			Min	Max	Min	Max	
Input Leakage Current	$ I_{LI} $	$V_{CC} = \text{Max}$ , $V_{IN} = \text{Gnd to } V_{CC}$		1		1	$\mu A$
Output Leakage Current	$ I_{LOI} $	$\overline{CE}_1 = V_{IH}$ $V_{CC} = \text{Max}$ , $V_{OUT} = \text{Gnd to } V_{CC}$		1		1	$\mu A$
Operating Power Supply Current	$I_{CC}$	$\overline{CE}_1 = V_{IL}$ , $V_{IN}=V_{IH}$ or $V_{IL}$ , $I_{OUT}=0mA$		5		5	mA
Average Operating Current	$I_{CC1}$	$\overline{CE}_1 = V_{IL}$ , $I_{OUT} = 0mA$ , Min Cycle, 100% Duty		45		30	mA
	$I_{CC2}$	$\overline{CE}_1 = 0.2V$ $I_{OUT} = 0mA$ , Cycle Time= $1\mu s$ , 100% Duty		5		5	mA
Standby Power Supply Current(TTL Level)	$I_{SB}$	$\overline{CE}_1 = V_{IH}$		0.3		0.3	mA
Standby Power Supply Current (CMOS Level)	$I_{SB1}$	$\overline{CE}_1 \geq V_{CC}-0.2V$ or $f=0$ $V_{IN} \leq 0.2V$ or $V_{IN} \geq V_{CC}-0.2V$	GLT6400M08 LL	20		20	$\mu A$
			GLT6400M08 SL	5		5	$\mu A$
Output Low Voltage	$V_{OL}$	$I_{OL} = 2 \text{ mA}$		0.4		0.4	V
Output High Voltage	$V_{OH}$	$I_{OH} = -1 \text{ mA}$	2.4		2.0		V

**Data Retention**

Parameter	Sym.	Test Conditions	Min.	Max.	Unit
$V_{CC}$ for Data retention	$V_{DR}$	$\overline{CE}_1 \geq V_{CC} - 0.2V$ or $V_{IN} \geq V_{CC} - 0.2V$ or $V_{IN} \leq 0.2V$	1.0	-	V
Data Retention Current	$I_{CCDR}$		-	4	$\mu A$
Chip Deselect to Data Retention Time	$t_{CDR}$		0	-	ns
Operating Recovery Time <sup>(2)</sup>	$t_R$		$t_{RC}$	-	ns

**Data Retention Waveform (TA = -25°C to + 85°C)**

**AC Test Conditions**

Input Pulse Levels	0.4V to 2.2V
Input Rise and Fall Time	5 ns
Input and Output Timing Reference Level	1.1V

**AC Test Loads and Waveforms**


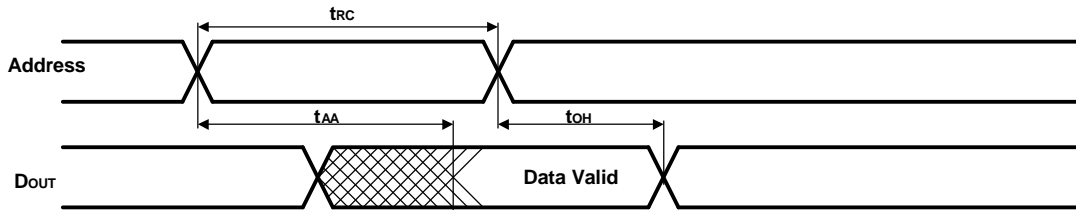
Output Load Condition  
 $C_L = 30\text{pf} + 1\text{TTL Load}$

\*Including Scope and Jig Capacitance

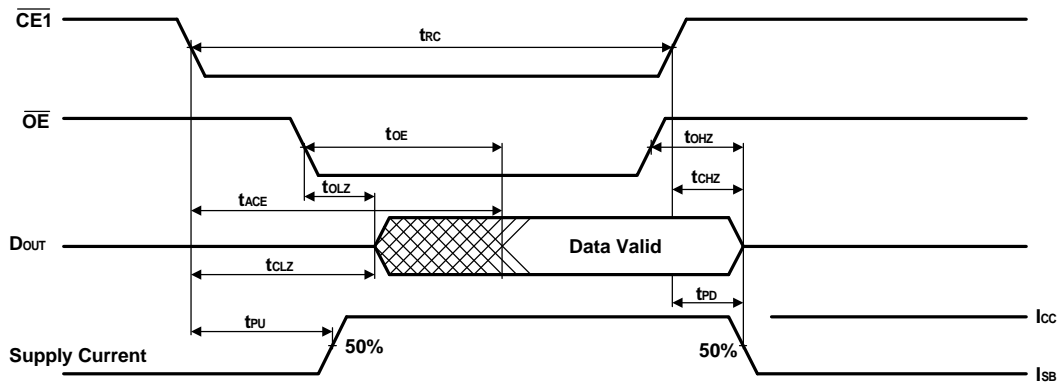
**Read Cycle<sup>(3,9)</sup> (Vcc=2.3V to 2.7V, TA = -25°C to + 85°C)**

Parameter	Symbol	85		120		Unit	Note
		Min	Max	Min	Max		
Read Cycle Time	t <sub>RC</sub>	85		120		ns	
Address Access Time	t <sub>AA</sub>		85		120	ns	
Chip Enable Access Time	t <sub>ACE</sub>		85		120	ns	
Output Enable Access Time	t <sub>OE</sub>		40		60	ns	
Output Hold from address Change	t <sub>OH</sub>	10		15		ns	
Chip Enable to Output in Low-Z	t <sub>CLZ</sub>	10		10		ns	4,5
Chip Disable to Output in High-Z	t <sub>CHZ</sub>		35	0	35	ns	4,5
Output Enable to Output in Low-Z	t <sub>OLZ</sub>	5		5		ns	4,5
Output Disable to Output in High-Z	t <sub>OHZ</sub>		30	0	35	ns	4,5
Power-Up Time	t <sub>PU</sub>	0		0		ns	5
Power-Down Time	t <sub>PD</sub>		85		120	ns	5

### Timing Waveform of Read Cycle 1 <sup>(3,6,7,9)</sup> (Address Controlled)



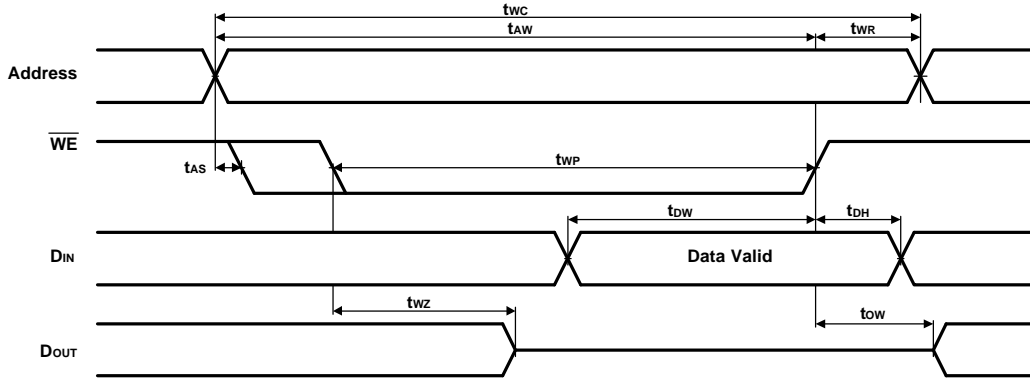
### Timing Waveform of Read Cycle 2 <sup>(5,6,8,9)</sup> ( $\overline{CE1}$ Controlled)



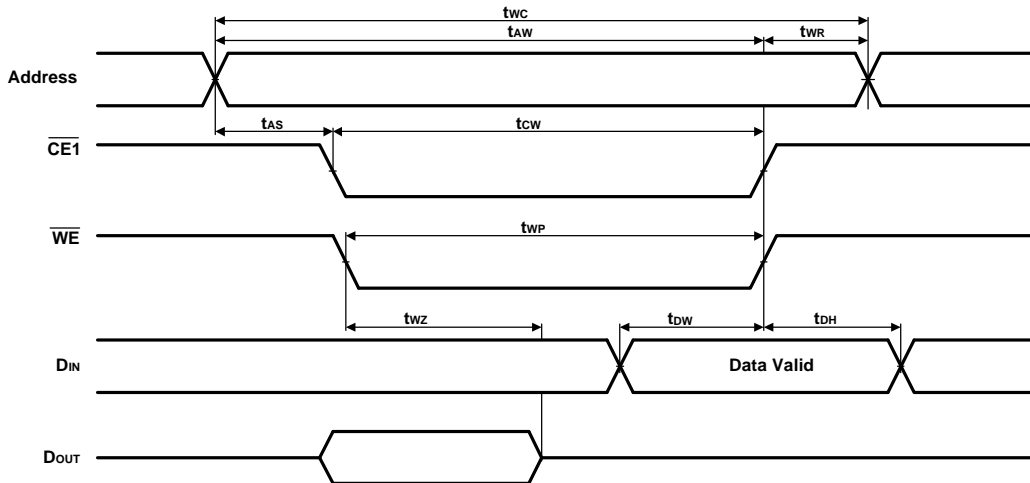
### Write Cycle <sup>(3,11)</sup> ( $V_{CC}=2.3V$ to $2.7V$ , $T_A = -25^{\circ}C$ to $+85^{\circ}C$ )

Parameter	Symbol	85		120		Unit	Note
		Min	Max	Min	Max		
Write Cycle Time	$t_{WC}$	85		120		ns	
Chip Enable to Write End	$t_{CW}$	70		100		ns	
Address Setup to Write End	$t_{AW}$	70		100		ns	
Address Setup Time	$t_{AS}$	0		0		ns	
Write Pulse Width	$t_{WP}$	60		80		ns	
Write Recovering Time	$t_{WR}$	0		0		ns	
Data Valid to Write End	$t_{DW}$	35		50		ns	
Data Hold Time	$t_{DH}$	0		0		ns	
Write Enable to Output in High-Z	$t_{WZ}$		35	0	35	ns	4,5
Output Active from Write End	$t_{OW}$	5		5		ns	4,5

**Timing Waveform of Write Cycle 1** <sup>(10,11)</sup> ( $\overline{WE}$  Controlled)



**Timing Waveform of Write Cycle 2** <sup>(10,11)</sup> ( $\overline{CE1}$  Controlled)





Notes :

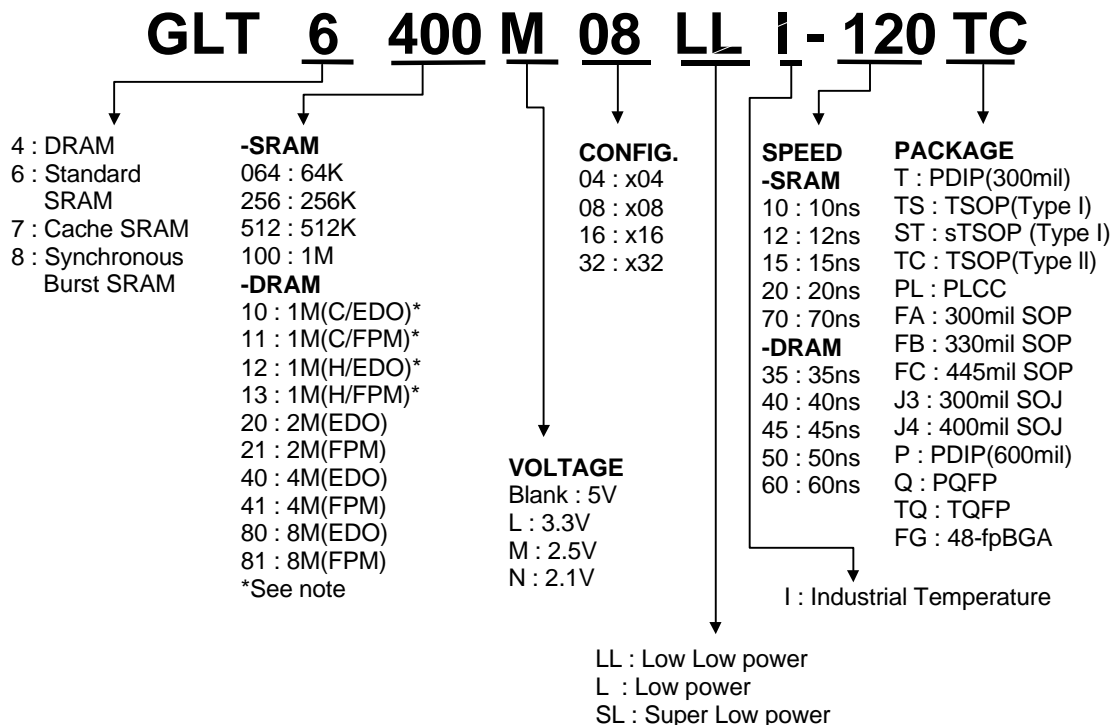
1. L-version includes this feature.
2. This Parameter is samples and not 100% tested.
3. For test conditions, see AC Test Condition.
4. This parameter is tested with CL = 5pF. Transition is measured  $\pm 500\text{mV}$  from steady – state voltage.
5. This parameter is guaranteed, but is not tested.
6.  $\overline{\text{WE}}$  is HIGH for read cycle.
7.  $\overline{\text{CE1}}$  and  $\overline{\text{OE}}$  are LOW and for read cycle.
8. Address valid prior to or coincident with  $\overline{\text{CE1}}$  transition LOW .
9. All read cycle timings are referenced from the last valid address to the first transition address.
10.  $\overline{\text{CE1}}$  or WE must be HIGH during address transition.
11. All write cycle timings are referenced from the last valid address to the first transition address.



### Ordering Information

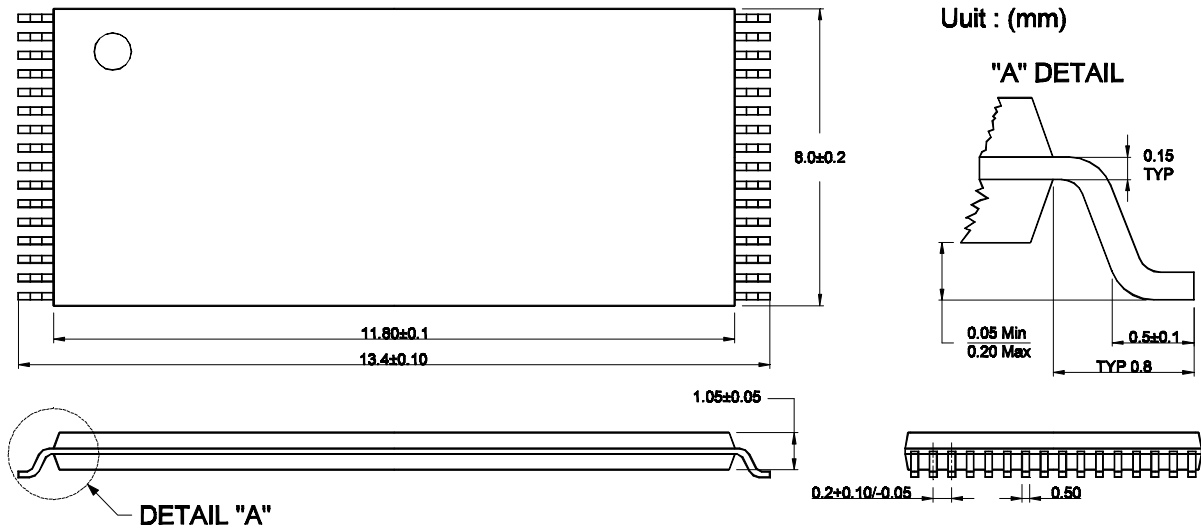
<b>Part Number</b>	<b>SPEED</b>	<b>POWER</b>	<b>PACKAGE</b>
GLT6400M08LL-85 ST	85ns	Normal	sTSOPI 32L
GLT6400M08SL-85 ST	85ns	Normal	sTSOPI 32L
GLT6400M08SLI-85 ST	85ns	Normal	sTSOPI 32L
GLT6400M08LLI-85 ST	85ns	Normal	sTSOPI 32L
GLT6400M08LL-120 ST	120ns	Normal	sTSOPI 32L
GLT6400M08SL-120 ST	120ns	Normal	sTSOPI 32L
GLT6400M08SLI-120 ST	120ns	Normal	sTSOPI 32L
GLT6400M08LLI-120 ST	120ns	Normal	sTSOPI 32L
GLT6400M08LL-85 FC	85ns	Normal	SOP 32L
GLT6400M08SL-85 FC	85ns	Normal	SOP 32L
GLT6400M08SLI-85 FC	85ns	Normal	SOP 32L
GLT6400M08LLI-85 FC	85ns	Normal	SOP 32L
GLT6400M08LL-120 FC	120ns	Normal	SOP 32L
GLT6400M08SL-120 FC	120ns	Normal	SOP 32L
GLT6400M08SLI-120 FC	120ns	Normal	SOP 32L
GLT6400M08LLI-120 FC	120ns	Normal	SOP 32L

### Parts Numbers (Top Mark) Definition :



### Package Information

32 pin 8x13.4mm Small Outline J-form Package (sTSSOP)



32 pin 445mil Small Outline J-form Package SOP

