

SILICON GATE CMOS

65,536 WORD x 16 BIT CMOS STATIC RAM

Description

The TC551664AJ is a 1,048,576 bits high speed static random access memory organized as 65,536 words by 16 bits using CMOS technology, and operated from a single 5-volt supply. Toshiba's CMOS technology and advanced circuit form provide high speed feature.

The TC551664AJ has low power feature with device control using Chip Enable ($\overline{CE}$), and has Output Enable input ($\overline{OE}$) for fast memory access. Also, it allows that lower and upper byte access by Data Byte Control ($\overline{LB}$, $\overline{UB}$). The TC551664AJ is suitable for use in high speed applications such as cache memory and high speed storage. All inputs and outputs are TTL compatible.

The TC551664AJ is packaged in a 44-pin SOJ with 400mil width for high density surface assembly.

Features

- Fast access time
 - TC551664AJ -15 15ns (max.)
 - TC551664AJ -20 20ns (max.)
- Low power dissipation

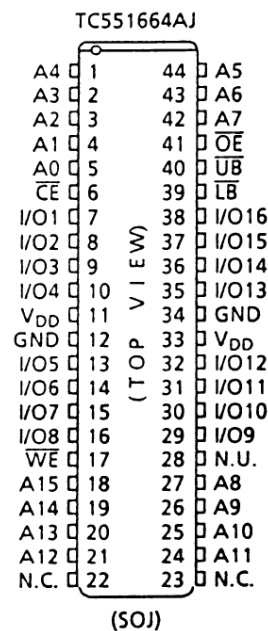
Cycle Time	15	20	25	30	50	ns
Operation (max.)	260	220	200	180	150	mA

- Standby: 1mA (max.)
- 5V single power supply: $5V \pm 10\%$
- Fully static operation
- Inputs and outputs TTL compatible
- Output buffer control: $\overline{OE}$
- Data byte controls: $\overline{LB}$ (I/O1 ~ I/O8), $\overline{UB}$ (I/O9 ~ I/O16)
- Package: SOJ44-P-400

Pin Names

A0 ~ A15	Address Inputs
I/O1 ~ I/O16	Data Inputs/Outputs
$\overline{CE}$	Chip Enable Input
$\overline{WE}$	Write Enable Input
$\overline{OE}$	Output Enable Input
$\overline{LB}$, $\overline{UB}$	Data Byte Control Input
V_{DD}	Power (+5V)
GND	Ground
N.C.	No Connection
N.U.	Not Usable Input

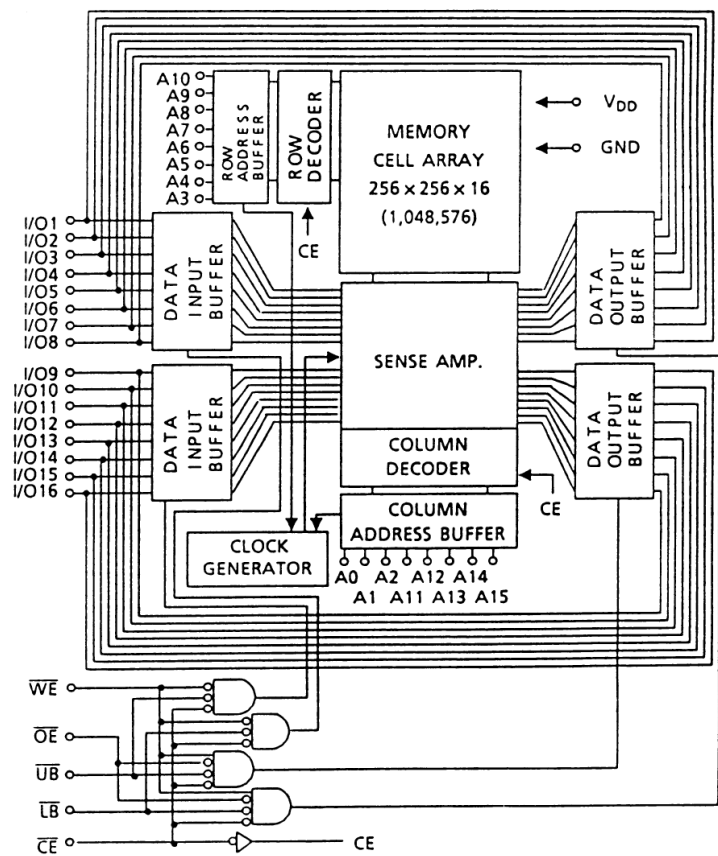
Pin Connection (Top View)



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Block Diagram



Operating Mode

OPERATING MODE	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$	$\overline{LB}$	$\overline{UB}$	I/O1 ~ I/O8	I/O9 ~ I/O16	POWER
Read	L	L	H	L	L	Output	Output	I_{DDO}
				H	L	High Impedance	Output	I_{DDO}
				L	H	Output	High Impedance	I_{DDO}
Write	L	*	L	L	L	Input	Input	I_{DDO}
				H	L	High Impedance	Input	I_{DDO}
				L	H	Input	High Impedance	I_{DDO}
Output Disable	L	H	H	*	*	High Impedance	High Impedance	I_{DDO}
	L	*	*	H	H			I_{DDO}
Standby	H	*	*	*	*	High Impedance	High Impedance	I_{DDS}

*H or L Note: N.U. pin must be kept open elctrically or pulled down to GND level or less than 0.8V.
Applying a voltage more than 0.8V to N.U. pin is prohibited.

Maximum Ratings

SYMBOL	ITEM	RATING	UNIT
V_{DD}	Power Supply Voltage	-0.5 ~ 7.0	V
V_{IN}	Input Terminal Voltage	-2.0* ~ 7.0	V
V_{IO}	Input/Output Terminal Voltage	-0.5* ~ $V_{DD} + 0.5$	V
P_D	Power Dissipation	1.5	W
T_{SOLDER}	Soldering Temperature (10s)	260	°C
T_{STRG}	Storage Temperature	-65 ~ 150	°C
T_{OPR}	Operating Temperature	-10 ~ 85	°C

*-3V with a pulse width of 10ns

DC Recommended Operating Conditions

SYMBOL	PARAMETER	MIN.	TYP.	MAX.	UNIT
V_{DD}	Power Supply Voltage	4.5	5.0	5.5	V
V_{IH}	Input High Voltage	2.2	—	$V_{DD} + 0.5$	V
V_{IL}	Input Low Voltage	-0.5*	—	0.8	V

* -3V with a pulse width of 10ns

DC and Operating Characteristics (Ta = 0 ~ 70°C, V_{DD} = 5V±10%)

SYMBOL	PARAMETER	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
I _{LI}	Input Leakage Current (Except N.U. pin)	V _{IN} = 0 ~ V _{DD}		—	—	±10	μA
I _{LO}	Output Leakage Current	$\overline{CE} = V_{IH}$ or $\overline{WE} = V_{IL}$ or $\overline{OE} = V_{IH}$ V _{OUT} = 0 ~ V _{DD}		—	—	±10	μA
I _{I (N.U.)}	Input Current (N.U. pin)	V _{IN} = 0 ~ 0.8V		-1	—	20	μA
I _{OH}	Output High Current	V _{OH} = 2.4V		-4	—	—	mA
I _{OL}	Output Low Current	V _{OL} = 0.4V		8	—	—	mA
I _{DDO}	Operating Current	$\overline{CE} = V_{IL}$, I _{OUT} = 0mA, Other Inputs = V _{IH} /V _{IL}	t _{cycle} = 15ns	—	—	260	mA
			t _{cycle} = 20ns	—	—	220	
			t _{cycle} = 25ns	—	—	200	
			t _{cycle} = 30ns	—	—	180	
			t _{cycle} = 50ns	—	—	150	
I _{DD1}	Standby Current	$\overline{CE} = V_{IH}$, Other Inputs = V _{IH} /V _{IL}		—	—	30	mA
I _{DD2}		$\overline{CE} = V_{DD} - 0.2V$, Other Inputs = V _{DD} - 0.2V or 0.2V		—	—	1	

Capacitance (Ta = 25°C, f = 1.0MHz)

SYMBOL	PARAMETER	TEST CONDITION	MAX.	UNIT
C_{IN}	Input Capacitance	$V_{IN} = GND$	6	pF
C_{IO}	Input/Output Capacitance	$V_{IO} = GND$	8	pF

Note: This parameter is periodically sampled and is not 100% tested.

AC Characteristics (Ta = 0 ~ 70°C⁽¹⁾, VDD = 5V±10%)

Read Cycle

SYMBOL	PARAMETER	TC551664AJ -15		TC551664AJ -20		UNIT
		MIN.	MAX.	MIN.	MAX.	
t _{RC}	Read Cycle Time	15	–	20	–	ns
t _{ACC}	Address Access Time	–	15	–	20	
t _{CO}	$\overline{\text{CE}}$ Access Time	–	15	–	20	
t _{OE}	$\overline{\text{OE}}$ Access Time	–	8	–	10	
t _{BA}	$\overline{\text{UB}}$, $\overline{\text{LB}}$ Access Time	–	8	–	10	
t _{OH}	Output Data Hold Time from Address Change	5	–	5	–	
t _{COE}	Output Enable Time from $\overline{\text{CE}}$	5	–	5	–	
t _{OEE}	Output Enable Time from $\overline{\text{OE}}$	1	–	1	–	
t _{BE}	Output Enable Time from $\overline{\text{UB}}$, $\overline{\text{LB}}$	1	–	1	–	
t _{COD}	Output Disable Time from $\overline{\text{CE}}$	–	8	–	8	
t _{ODO}	Output Disable Time from $\overline{\text{OE}}$	–	8	–	8	
t _{BD}	Output Disable Time from $\overline{\text{UB}}$, $\overline{\text{LB}}$	–	8	–	8	

Write Cycle

SYMBOL	PARAMETER	TC551664AJ -15		TC551664AJ -20		UNIT
		MIN.	MAX.	MIN.	MAX.	
t _{WC}	Write Cycle Time	15	–	20	–	ns
t _{WP}	Write Pulse Width	9	–	10	–	
t _{CW}	Chip Enable to End of Write	12	–	13	–	
t _{BW}	$\overline{\text{UB}}$, $\overline{\text{LB}}$ Enable to End of Write	12	–	12	–	
t _{AW}	Address Valid to End of Write	12	–	12	–	
t _{AS}	Address Setup Time	0	–	0	–	
t _{WR}	Write Recovery Time	0	–	0	–	
t _{DS}	Data Setup Time	8	–	10	–	
t _{DH}	Data Hold Time	0	–	0	–	
t _{OEW}	Output Enable Time from $\overline{\text{WE}}$	1	–	1	–	
t _{ODW}	Output Disable Time from $\overline{\text{WE}}$	–	8	–	8	

AC Test Conditions

Input Pulse Levels	3.0V/0.0V
Input Pulse Rise and Fall Time	3ns
Input Timing Measurement Reference Level	1.5V
Output Timing Measurement Reference Level	1.5V
Output Load	Fig. 1

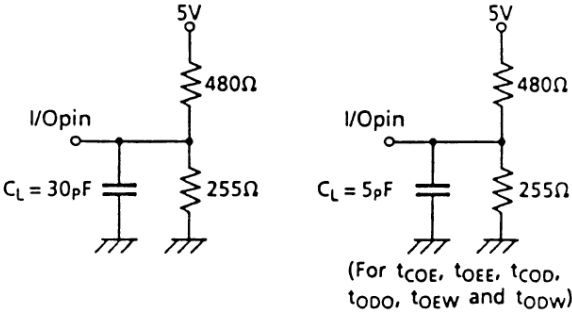
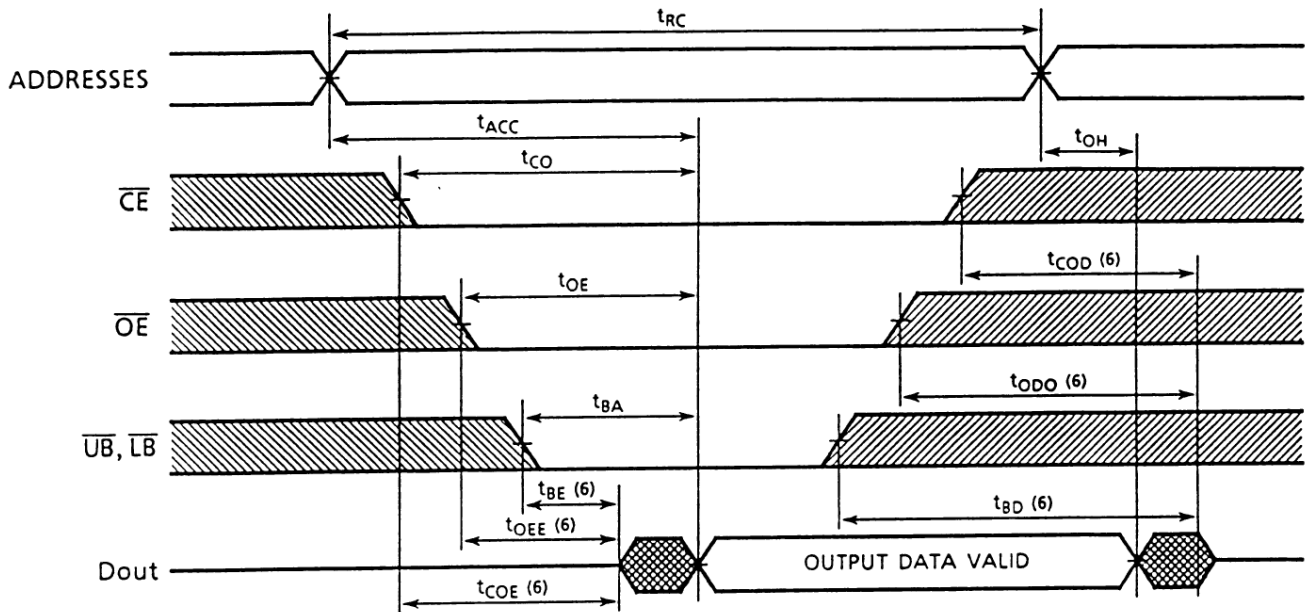


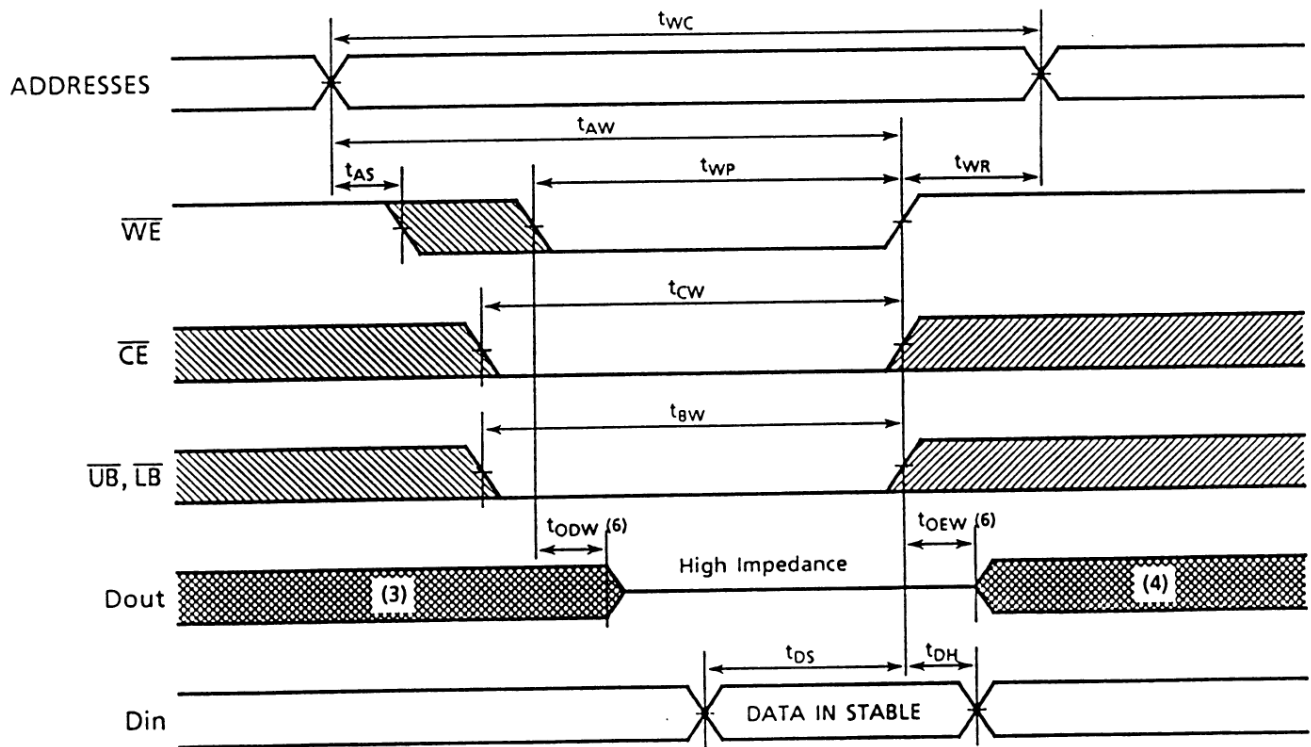
Figure 1.

Timing Waveforms

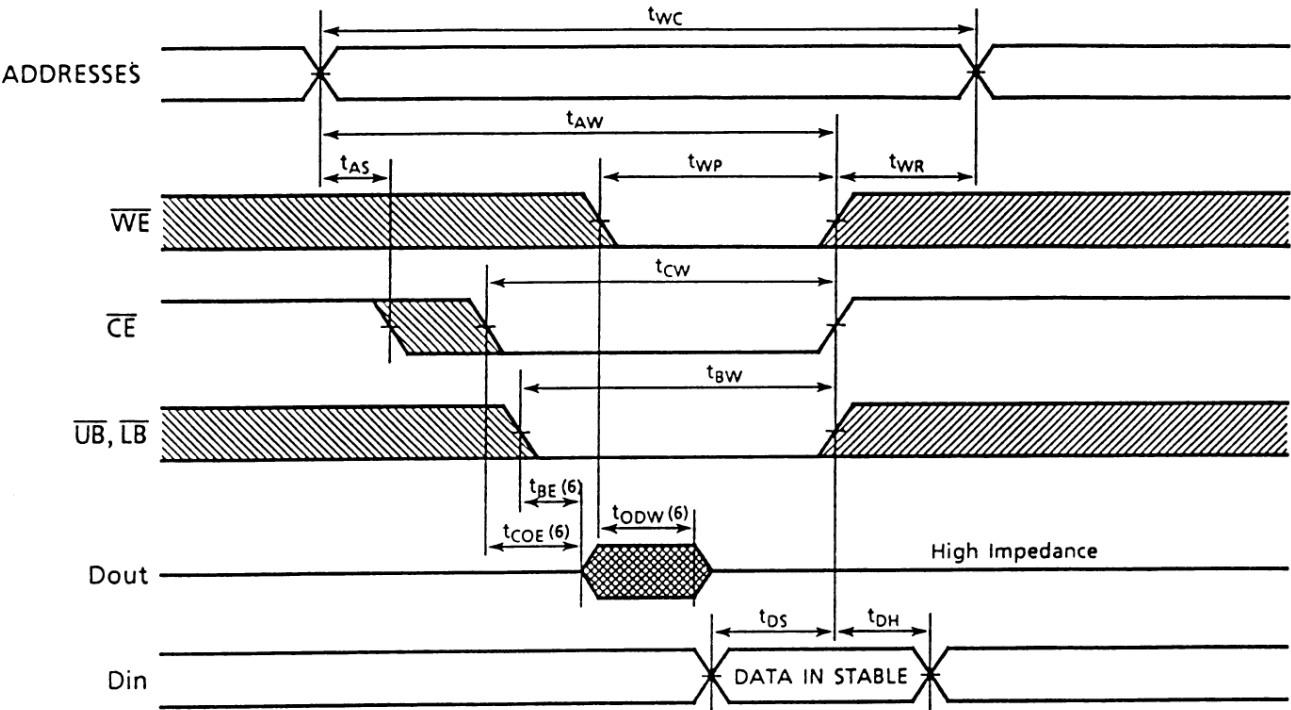
Read Cycle ⁽²⁾



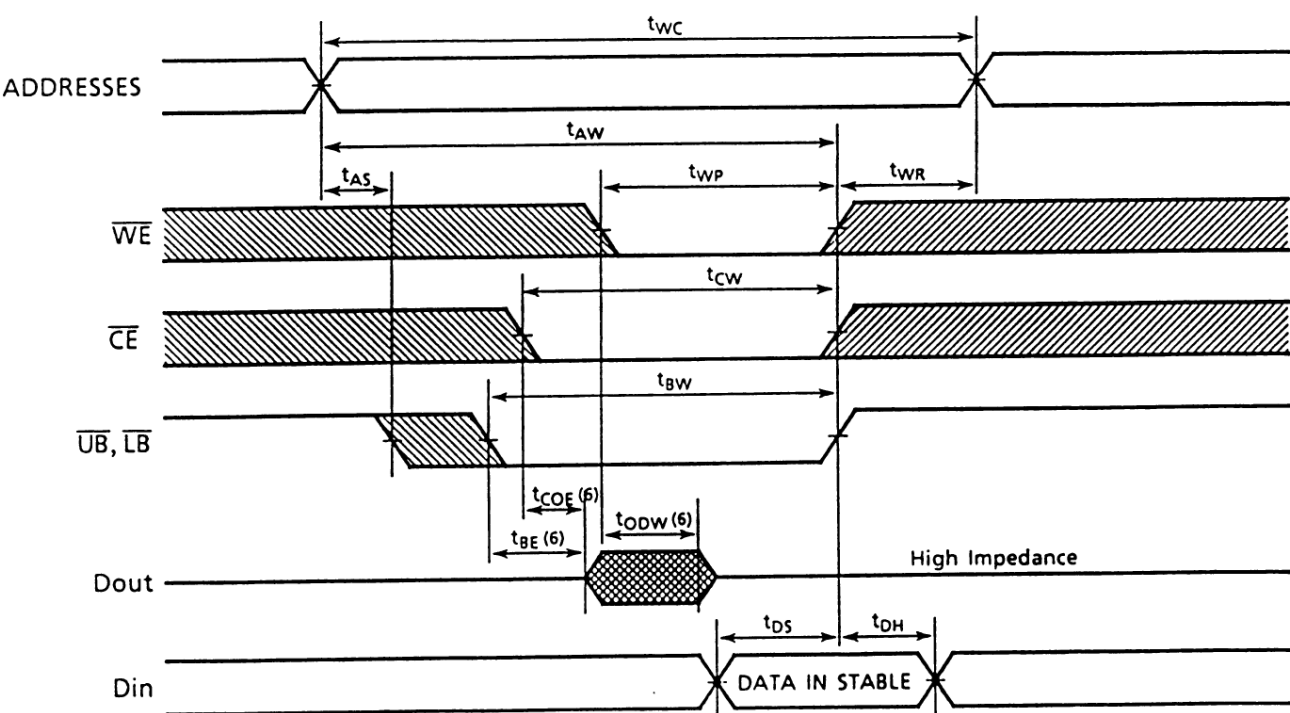
Write Cycle 1 ⁽⁵⁾ ($\overline{WE}$ Controlled)



Write Cycle 2 ⁽⁵⁾ ($\overline{\text{CE}}$ Controlled)



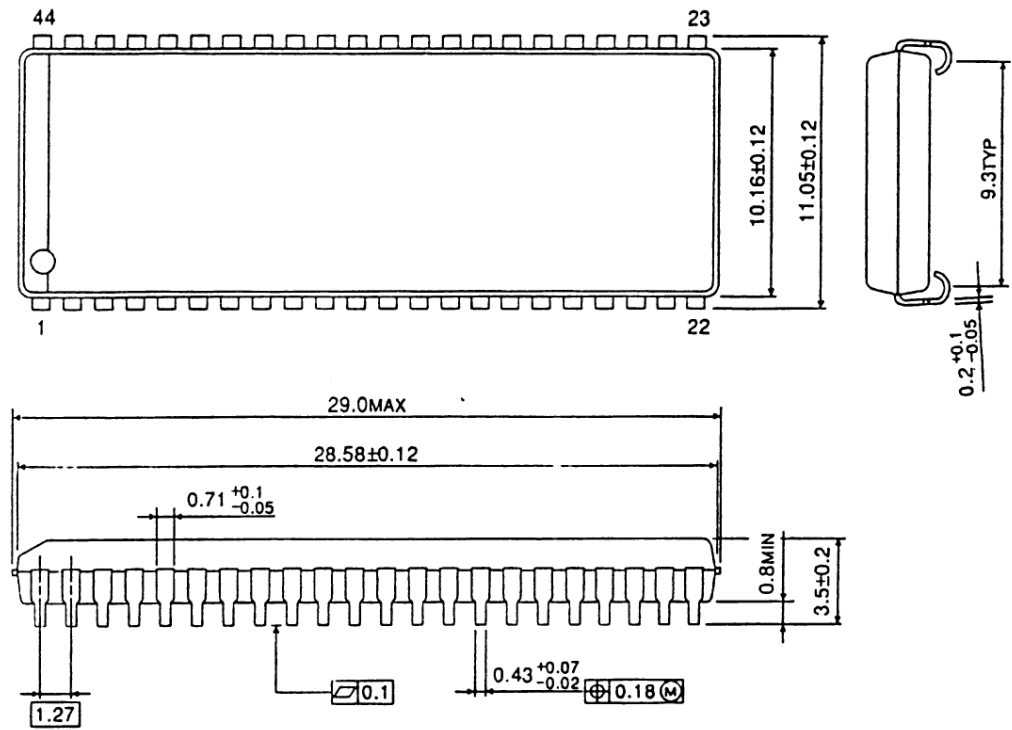
Write Cycle 3 ⁽⁵⁾ ($\overline{\text{UB}}, \overline{\text{LB}}$ Controlled)



Outline Drawings

Plastic SOJ (SOJ44-P-400)

Unit in mm



Weight : 1.64g (Typ.)