

**131,072-WORD BY 8-BIT CMOS STATIC RAM**

**DESCRIPTION**

The TC558128AJ is a 1,048,576-bit high-speed static random access memory (SRAM) organized as 131,072 words by 8 bits. Fabricated using CMOS technology and advanced circuit techniques to provide high speed, it operates from a single 5 V power supply. There are two control inputs. Chip enable ( $\overline{CE}$ ) can be used to place the device in a low-power mode, and output enable ( $\overline{OE}$ ) provides fast memory access. This device is well suited to cache memory applications where high-speed access and high-speed storage are required. All inputs and outputs are directly TTL compatible. The TC558128AJ is available in a plastic 32-pin SOJ package (400 mil width) for high density surface assembly.

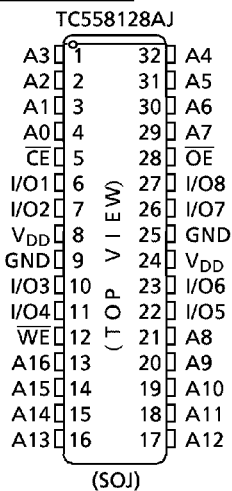
**FEATURES**

- Fast access time (the following are maximum values)
  - TC558128AJ-15: 15 ns
  - TC558128AJ-20: 20 ns
- Low-power dissipation (the following are maximum values)
- Single power supply voltage of 5 V  $\pm$  10%.
- Fully static operation
- All inputs and outputs are TTL compatible
- Output buffer control using  $\overline{OE}$
- Package: SOJ32-P-400-1.27A (Weight: 1.22 g typ)

Cycle Time	15	20	25	30	50	ns
Operation (max)	170	140	130	120	100	mA

Standby: 1 mA (both devices)

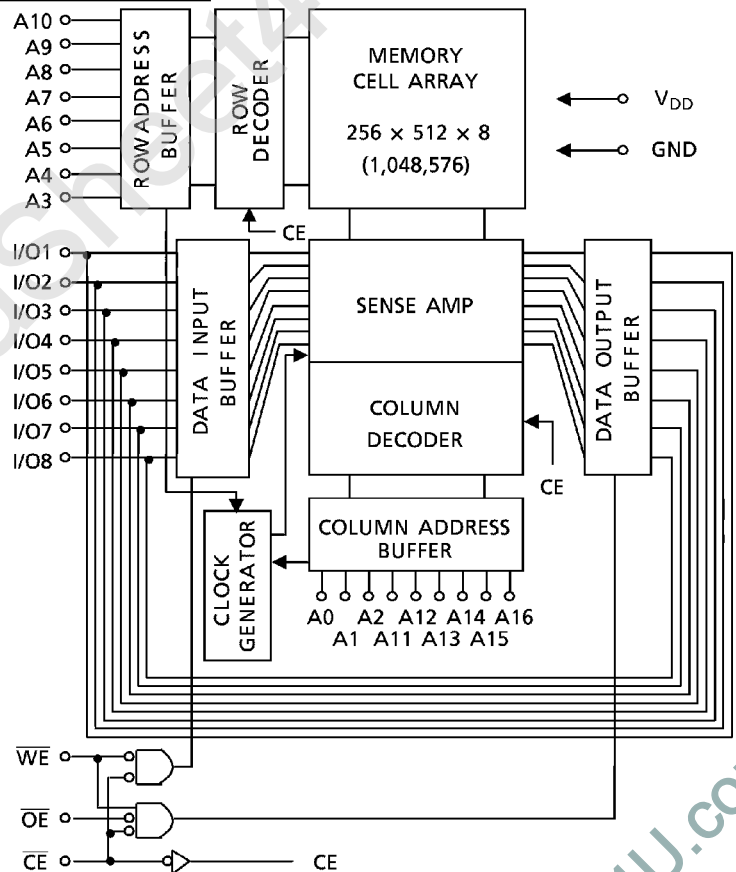
**PIN ASSIGNMENT**



**PIN NAMES**

A0 to A16	Address Inputs
I/O1 to I/O8	Data Inputs/Outputs
$\overline{CE}$	Chip Enable
WE	Write Enable Input
$\overline{OE}$	Output Enable
$V_{DD}$	Power (+ 5 V)
GND	Ground

**BLOCK DIAGRAM**



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**MAXIMUM RATINGS**

SYMBOL	RATING	VALUE	UNIT
V <sub>DD</sub>	Power Supply Voltage	- 0.5 to 7.0	V
V <sub>IN</sub>	Input Terminal Voltage	- 2.0 * to 7.0	V
V <sub>I/O</sub>	Input/Output Terminal Voltage	- 0.5 * to V <sub>DD</sub> + 0.5	V
P <sub>D</sub>	Power Dissipation	1.1	W
T <sub>solder</sub>	Soldering Temperature (10 s)	260	°C
T <sub>strg</sub>	Storage Temperature	- 65 to 150	°C
T <sub>opr</sub>	Operating Temperature	- 10 to 85	°C

\*: - 3 V with a pulse width of 10 ns

**DC RECOMMENDED OPERATING CONDITIONS (Ta = 0° to 70°C)**

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
V <sub>DD</sub>	Power Supply Voltage	4.5	5.0	5.5	V
V <sub>IH</sub>	Input High Voltage	2.2	-	V <sub>DD</sub> + 0.5	V
V <sub>IL</sub>	Input Low Voltage	- 0.5 *	-	0.8	V

\*: - 3 V with a pulse width of 10 ns

**DC CHARACTERISTICS (Ta = 0° to 70°C, V<sub>DD</sub> = 5 V ± 10%)**

SYMBOL	PARAMETER	TEST CONDITION	MIN	TYP	MAX	UNIT	
I <sub>IL</sub>	Input Leakage Current	V <sub>IN</sub> = 0 V to V <sub>DD</sub>	-	-	± 10	μA	
I <sub>LO</sub>	Output Leakage Current	$\overline{CE} = V_{IH}$ or $\overline{WE} = V_{IL}$ or $\overline{OE} = V_{IH}$ V <sub>OUT</sub> = 0 V to V <sub>DD</sub>	-	-	± 10	μA	
I <sub>OH</sub>	Output High Current	V <sub>OH</sub> = 2.4 V	- 4	-	-	mA	
I <sub>OL</sub>	Output Low Current	V <sub>OL</sub> = 0.4 V	8	-	-	mA	
I <sub>DDO</sub>	Operating Current	$\overline{CE} = V_{IL}$ , I <sub>out</sub> = 0 mA Other Inputs = V <sub>IH</sub> or V <sub>IL</sub>	t <sub>cycle</sub> = 15 ns	-	-	170	mA
			t <sub>cycle</sub> = 20 ns	-	-	140	
			t <sub>cycle</sub> = 25 ns	-	-	130	
			t <sub>cycle</sub> = 30 ns	-	-	120	
			t <sub>cycle</sub> = 50 ns	-	-	100	
I <sub>DDS1</sub>	Standby Current	$\overline{CE} = V_{IH}$ , Other Inputs = V <sub>IH</sub> or V <sub>IL</sub>	-	-	30	mA	
I <sub>DDS2</sub>		$\overline{CE} = V_{DD} - 0.2 V$ Other Inputs = V <sub>DD</sub> - 0.2 V or 0.2 V	-	-	1		

**CAPACITANCE** ( $T_a = 25^\circ\text{C}$ ,  $f = 1.0\text{ MHz}$ )

SYMBOL	PARAMETER	TEST CONDITION	MAX	UNIT
$C_{IN}$	Input Capacitance	$V_{IN} = \text{GND}$	6	pF
$C_{I/O}$	Input/Output Capacitance	$V_{I/O} = \text{GND}$	8	pF

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

**OPERATING MODE**

MODE	$\overline{\text{CE}}$	$\overline{\text{OE}}$	$\overline{\text{WE}}$	I/O1 to I/O8	POWER
Read	L	L	H	Output	$I_{DDO}$
Write	L	x	L	Input	$I_{DDO}$
Outputs Disable	L	H	H	High Impedance	$I_{DDO}$
Standby	H	x	x	High Impedance	$I_{DDs}$

x: Don't care

**AC CHARACTERISTICS** ( $T_a = 0^\circ$  to  $70^\circ\text{C}$  (Note 1),  $V_{DD} = 5\text{ V} \pm 10\%$ )

**READ CYCLE**

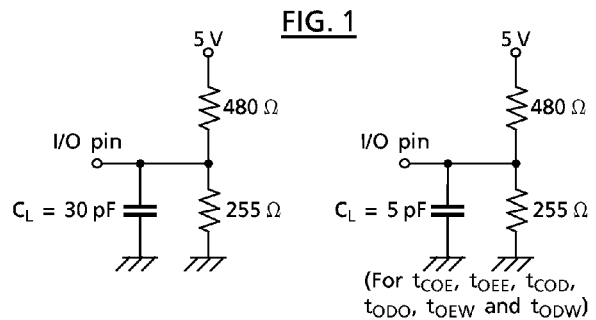
SYMBOL	PARAMETER	TC558128AJ-15		TC558128AJ-20		UNIT
		MIN	MAX	MIN	MAX	
$t_{RC}$	Read Cycle Time	15	–	20	–	ns
$t_{ACC}$	Address Access Time	–	15	–	20	
$t_{CO}$	Chip Enable Access Time	–	15	–	20	
$t_{OE}$	Output Enable Access Time	–	8	–	10	
$t_{OH}$	Output Data Hold Time from Address Change	5	–	5	–	
$t_{COE}$	Output Enable Time from Chip Enable	5	–	5	–	
$t_{OEE}$	Output Enable Time from Output Enable	1	–	1	–	
$t_{COD}$	Output Disable Time from Chip Enable	–	8	–	8	
$t_{ODO}$	Output Disable Time from Output Enable	–	8	–	8	

**WRITE CYCLE**

SYMBOL	PARAMETER	TC558128AJ-15		TC558128AJ-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	–	
$t_{AW}$	Address Valid to End of Write	12	–	13	–	
$t_{AS}$	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 Write Enable	1	–	1	–	
$t_{ODW}$	Output Disable Time from Write Enable	–	8	–	8	

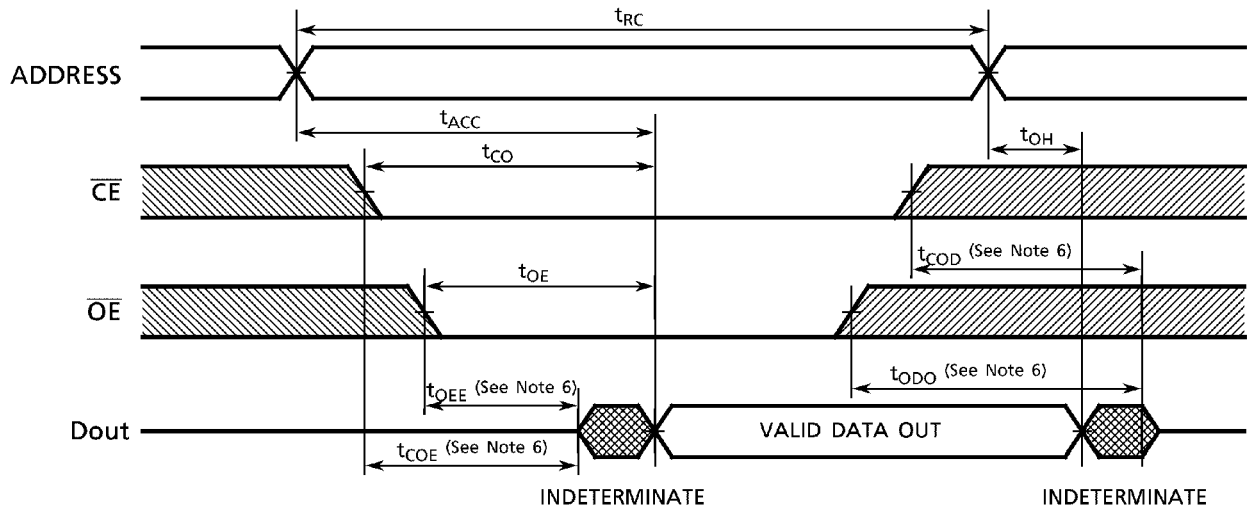
**AC TEST CONDITIONS**

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

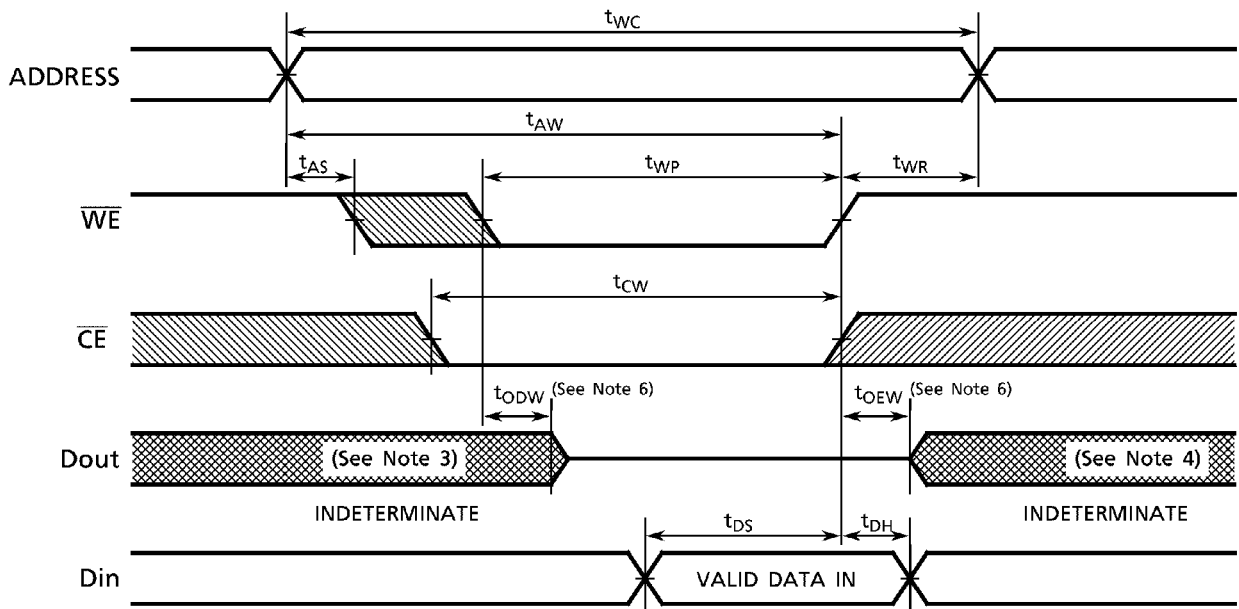


**TIMING DIAGRAMS**

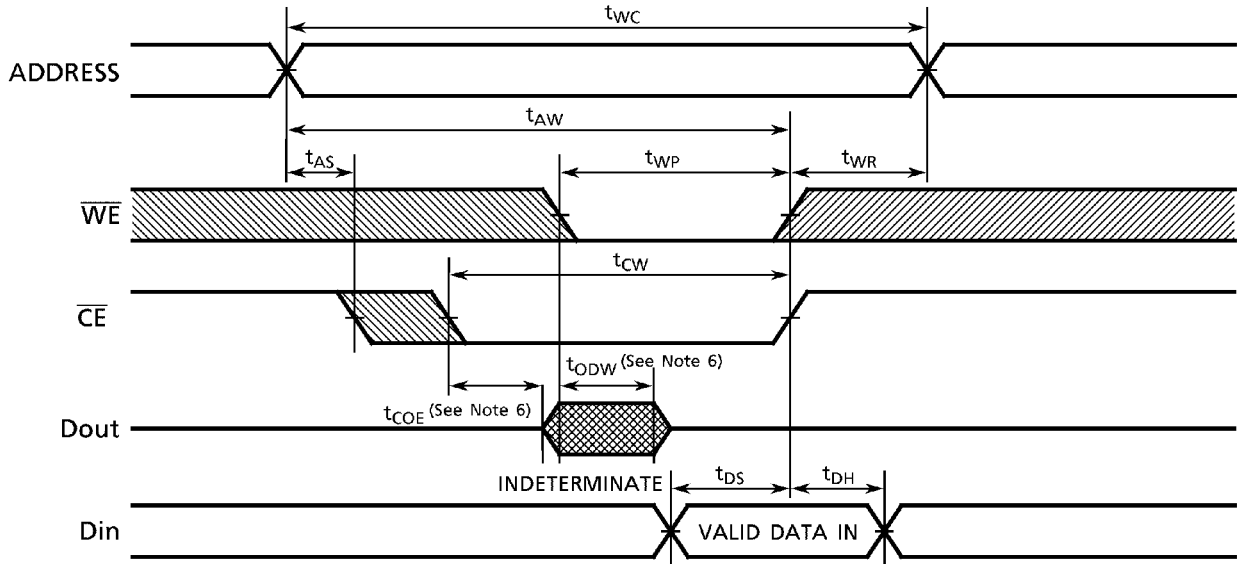
**READ CYCLE (See Note 2)**



**WRITE CYCLE 1 ( $\overline{WE}$  CONTROLLED) (See Note 5)**

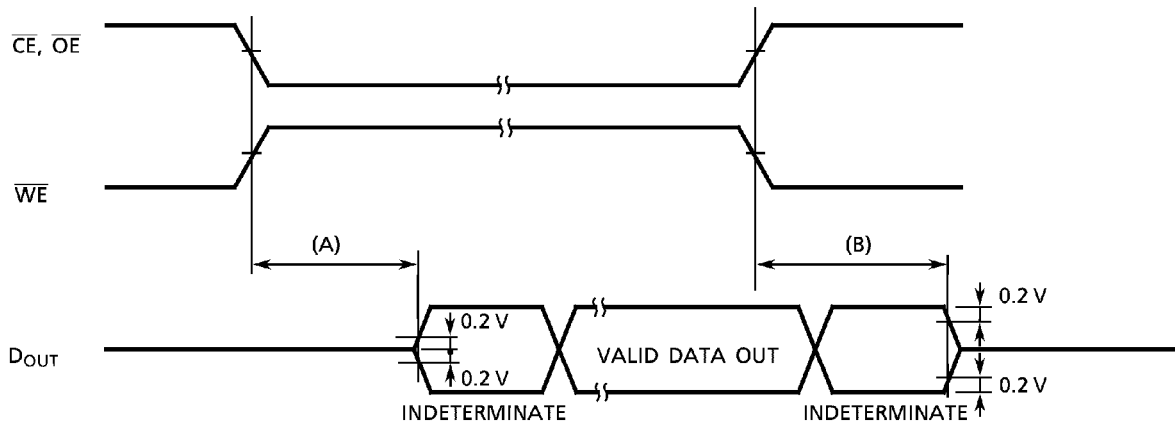


WRITE CYCLE 2 ( $\overline{CE}$  CONTROLLED) (See Note 5)



Note: (1) Operating temperature ( $T_a$ ) is guaranteed for transverse air flow exceeding 400 linear feet per minute.

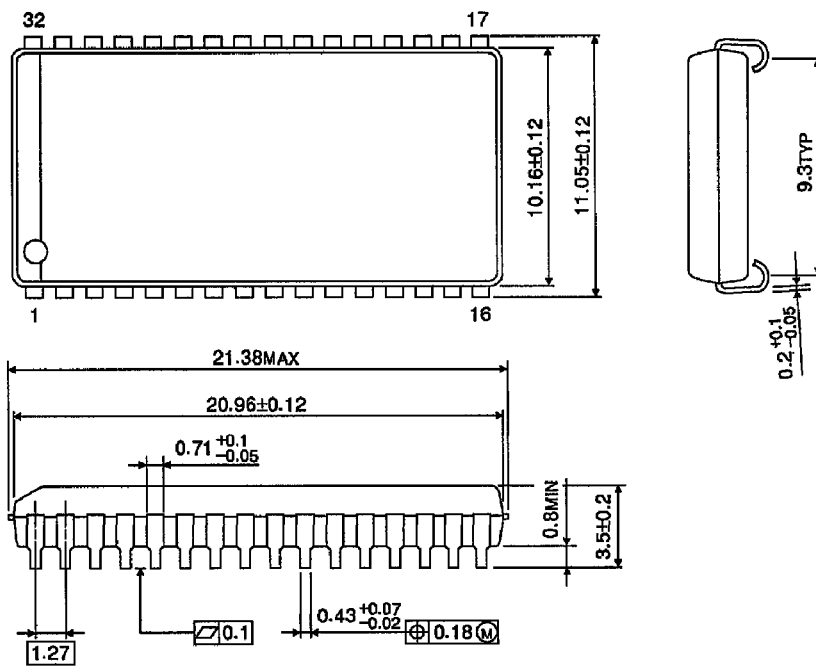
- (2)  $\overline{WE}$  remains HIGH for the Read Cycle.
- (3) If  $\overline{CE}$  goes LOW coincident with or after  $\overline{WE}$  goes LOW, the outputs will remain at high impedance.
- (4) If  $\overline{CE}$  goes HIGH coincident with or before  $\overline{WE}$  goes HIGH, the outputs will remain at high impedance.
- (5) If  $\overline{OE}$  is HIGH during the write cycle, the outputs will remain at high impedance.
- (6) The parameters specified below are measured using the load shown in Fig. 1.
  - (A)  $t_{COE}, t_{OEE}, t_{OE\overline{W}}$  Output ..... Enable Time
  - (B)  $t_{COD}, t_{ODO}, t_{OD\overline{W}}$  Output ..... Disable Time



PACKAGE DIMENSIONS

Plastic SOJ (SOJ32-P-400-1.27A)

Units in mm



Weight: 1.22 g (typ)