■ Features

- CMOS SRAM organized as 131,072 X 8bits
- Single+5.0v(±10%) Power Supply
- High Speed Access time : 15/17/20/25ns
- Operating Temperature : -40°C to 85°C
- Low power operation

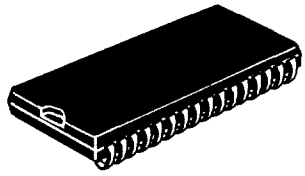
  Active : 185mA (max.)

  Standby : 55mA (max.)

- Packages

  -32pin Plastic SOJ(300mil)

  -32pin Plastic SOJ(400mil)



32pin Plastic SOJ(300mil/ 400mil)

■ Description

The N541024 is a high performance CMOS static RAM organized as 131,072 X 8bits.

Writing to this device is accomplished when the $\overline{WE}$ and the chip enable ($\overline{CE1}$) inputs are both Low and CE2 is high .

Reading is accomplished when $\overline{WE}$ and CE2 is High and $\overline{CE1}$ and the $\overline{OE}$ are both Low .

The N541024 operates from a single +5.0V power supply and all inputs and outputs are fully TTL compatible.

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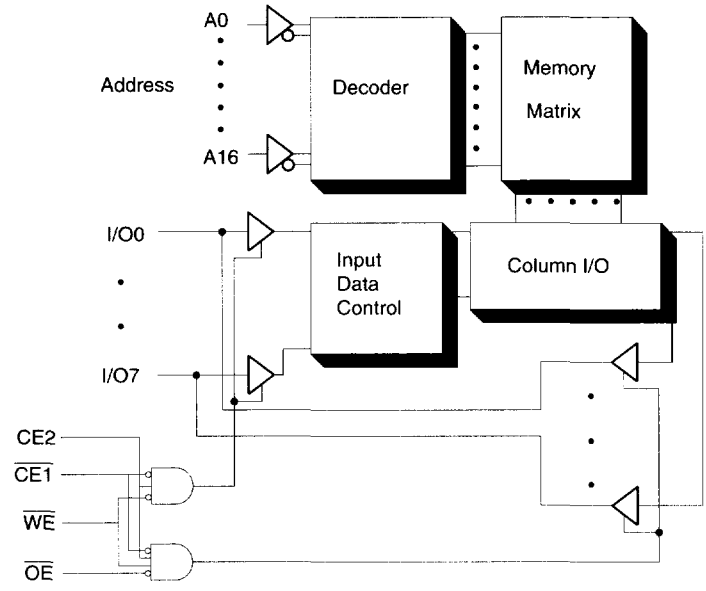
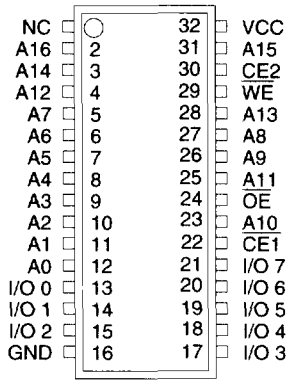
■ Functional Block Diagram



■ Pin Configuration

32 pin Plastic SOJ



■ Pin Description

SYMBOL	PIN NAME
A0-A16	Address input
I/O0-I/O7	Data input/output
$\overline{CE1}$	Chip Enable input
CE2	Chip Enable input
$\overline{OE}$	Output Enable input
$\overline{WE}$	Write Enable input
VCC	Power Supply Pin(+5V)
GND	Ground Pin

■ Mode Selection Table

$\overline{OE}$	$\overline{WE}$	$\overline{CE1}$	CE2	I/O	MODE
X	X	High	X	High impedance	Standby
X	X	X	Low	High impedance	Standby
Low	High	Low	High	Data out	Read
X	Low	Low	High	Data in	Write
High	High	Low	High	High impedance	Output disable

Note : X means don't care

■ Absolute Maximum Ratings

Symbol	Rating	Value	Unit
VTERM	Terminal Voltage with Respect to GND	-0.5 to 7.0	V
TA	Operating Temperature	-40 to 85	°C
TBIAS	Temperature Under Bias	-55 to 125	°C
TSTG	Storage Temperature	-55 to 125	°C
PT	Power Dissipation	1.0	W
IOUT	DC Output Current	50	mA

NOTICE
Stress 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 at these or any other conditions above 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

Recommended Operating Temperature and Supply Voltage

Ambient Temperature	GND	VCC
-40°C to 85°C	0V	5.0V±10%

Recommended DC Operating Conditions

Symbol	Parameter	Min.	Typ.	Max.	Unit
VCC	Supply Voltage	4.5	5.0	5.5	V
GND	Supply Voltage	0	0	0	V
VIH	Input High Voltage	2.2	-	VCC + 0.5V	V
VIL	Input Low Voltage	-0.5	-	0.8	V

Note : VIL(min) = -3.0V for pulse width less than 20ns.

■ Capacitance

(TA = +25°C, f = 1.0MHz)

Symbol	Parameter	Condition	Max.	Unit
CIN	Input Capacitance	VIN=0V	8	pF
COUT	Output Capacitance	VOUT=0V	8	pF

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■ DC Electrical Characteristics

(Vcc = 5.0V±10%, TA = -40°C to +85°C, VLC ≤ 0.2V, VHC > VCC-0.2V)

Symbol	Parameter	N541024 -15	N541024 -17	N541024 -20	N541024 -25	unit
ICC	Dynamic Operating Current $\overline{CE1}$ ≤ VIL and CE2 ≥ VIH, VCC = max, f = fmax, IOUT = 0mA, VIN ≥ VIH or ≤ VIL	185	165	155	145	mA
ISB	Standby Power Supply Current (TTL level) $\overline{CE1}$ ≥ VIH and/or CE2 ≤ VIL, VCC = max, f = fmax, VIN ≥ VIH or ≤ VIL	55	50	45	40	mA
ISB1	Full Standby Power Supply Current (CMOS level) $\overline{CE1}$ ≥ VHC and/or CE2 ≤ VLC, VCC = max, f = 0, VIN ≥ VHC or ≤ VLC	10	10	10	10	mA

DC Electrical Characteristics(1)

(Vcc = 5.0V±10%)

Symbol	Parameter	Test condition	Standard type		Unit
			Min.	Max.	
ILI	Input Leakage current	VCC = max, VIN = GND to VCC	-5	5	μA
ILO	Output Leakage Current	VCC = max, $\overline{CE1}$ ≥ VIH and/or CE2 ≤ VIL, VOUT = GND to VCC	-5	5	μA
VOL	Output low voltage	IOL =8mA, VCC = min	-	0.4	V
		IOL =10mA, VCC = min	-	0.5	V
VOH	Output high voltage	IOH =-4mA, VCC = min	2.4	-	V

■ AC Test Conditions

Input pulse levels	GND to 3V
Input rise and fall times	5ns
Input timing reference levels	1.5V
Output timing reference levels	1.5V
Output load	See figure 1 and 2

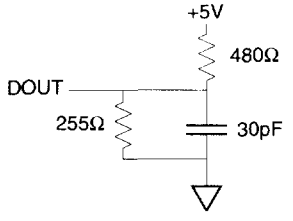

Figure 1. Output Load Equivalent

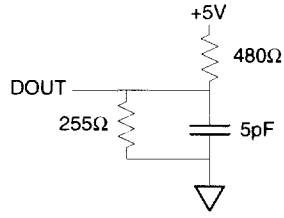

Figure 2. Output Load Equivalent
(for tLZCE, tHZCE, tLZWE, tHZWE, tLZOE, tHZOE)

■ AC Electrical Characteristics

(Vcc = 5.0V±10%, TA = -40°C to 85°C)

Description	Symbol	N541024-15		N541024-17		N541024-20		N541024-25		Unit
Read Cycle		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Read Cycle time	tRC	15		17		20		25		ns
Address access time	tAA		15		17		20		25	ns
Chip enable access time	tACE		15		17		20		25	ns
Output hold from address change	tOH	3		3		3		3		ns
Chip enable to output in low-Z	tLZCE	5		5		5		5		ns
Chip disable to output in high-Z	tHZCE		7		7		8		10	ns
Chip enable to power up time	tPU	0		0		0		0		ns
Chip disable to power down time	tPD		15		17		20		25	ns
Output enable access time	tAOE		6		6		6		8	ns
Output enable to output in low-Z	tLZOE	0		0		0		0		ns
Output disable to output in high-Z	tHZOE		6		6		6		8	ns

(Vcc = 5.0V±10%, TA = -40°C to 85°C)

Description	Symbol	N541024-15		N541024-17		N541024-20		N541024-25		Unit
Write Cycle		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
Write Cycle time	tWC	15		17		20		25		ns
Chip enable to end of write	tCW	11		12		13		15		ns
Address valid to end of write	tAW	11		12		13		15		ns
Address set-up time	tAS	0		0		0		0		ns
Address hold from end of write	tAH	0		0		0		0		ns
Write pulse width ($\overline{OE} \geq VIH$)	tWP1	11		12		13		15		ns
Write pulse width ($\overline{OE} \leq VIL$)	tWP2	12		13		14		15		ns
Data set-up time	tDS	7		8		8		10		ns
Data hold time	tDH	0		0		0		0		ns
Write disable to output in low-Z	tLZWE	0		0		0		0		ns
Write enable to output in high-Z	tHZWE		7		7		8		10	ns

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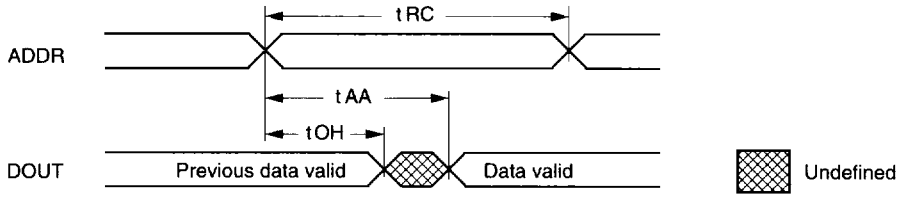
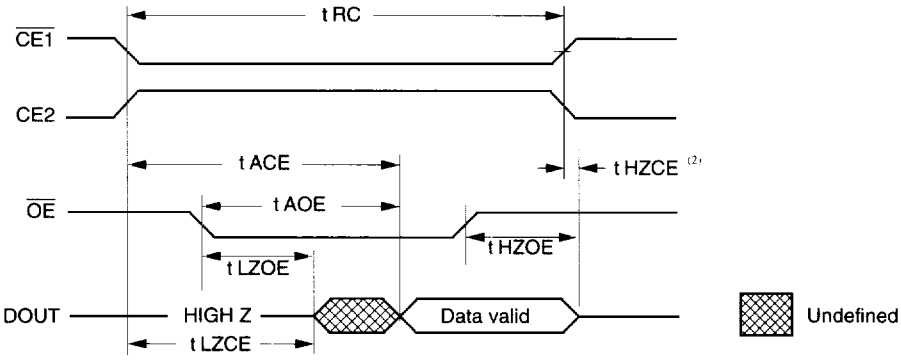
■ AC Timing Waveforms

Read Cycle No.1[1]



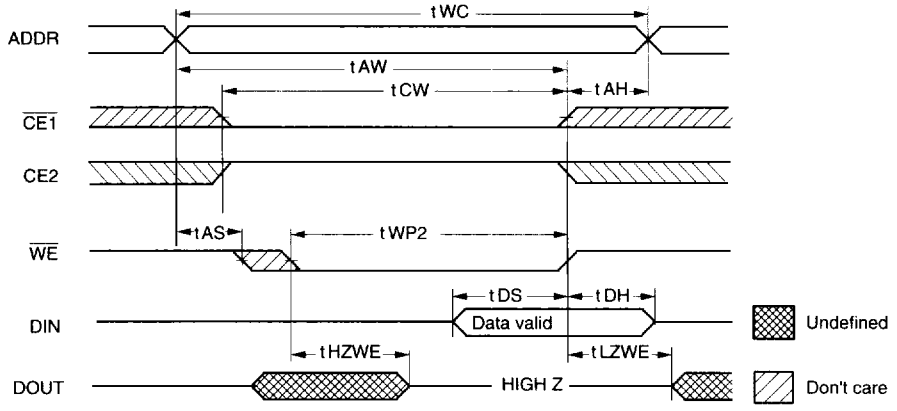
Read Cycle No.2 [1]



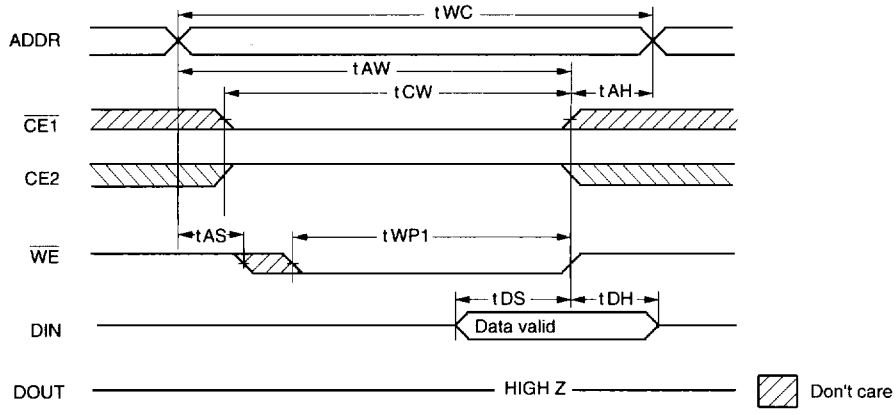
Note : (1) $\overline{WE}$ is High for READ cycle.

(2) At any given temperature and voltage condition, tHZCE is less than tLZCE.

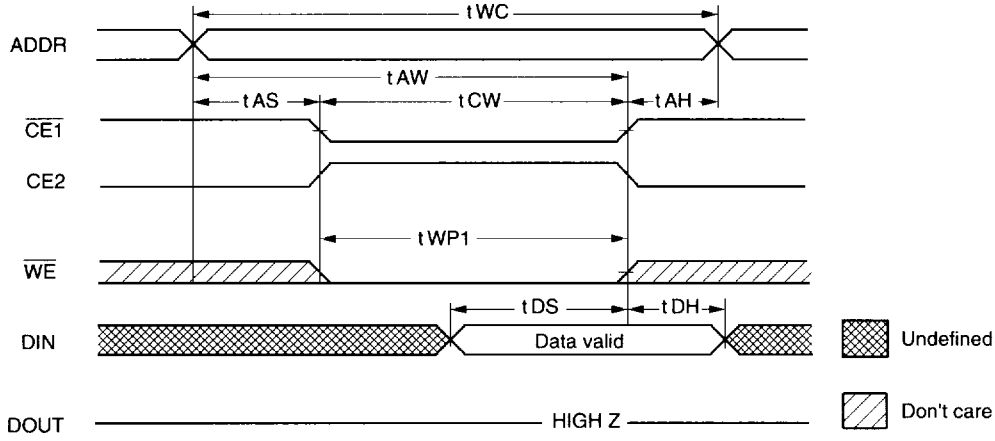
Write Cycle No.1(Write Enable Controlled)



Write Cycle No.2(Write Enable Controlled)[3]



Write Cycle No.3(Chip Enable Controlled)[3]



Note : (3) $\overline{OE}$ = High.

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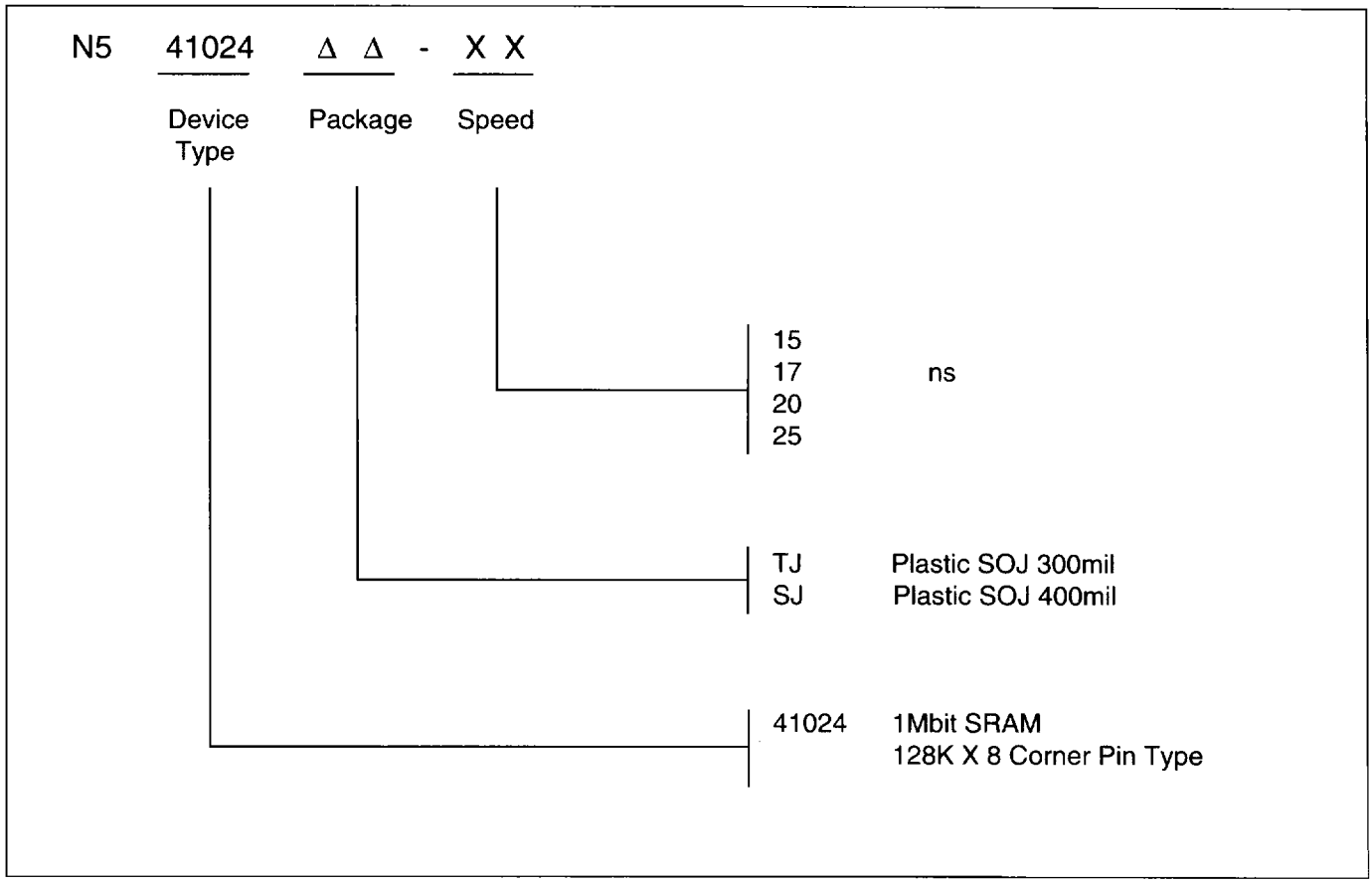
■ Ordering Information



PART NO.	Access Time (ns)	Operating Current (mA)	Power down Standby Current (mA)	Package
N541024TJ-15	15	185	55	32Pin Plastic SOJ (300mil)
N541024SJ-15	15	185	55	32Pin Plastic SOJ (400mil)
N541024TJ-17	17	165	50	32Pin Plastic SOJ (300mil)
N541024SJ-17	17	165	50	32Pin Plastic SOJ (400mil)
N541024TJ-20	20	155	45	32Pin Plastic SOJ (300mil)
N541024SJ-20	20	155	45	32Pin Plastic SOJ (400mil)
N541024TJ-25	25	145	40	32Pin Plastic SOJ (300mil)
N541024SJ-25	25	145	40	32Pin Plastic SOJ (400mil)