DESCRIPTION

The HY638256 is a high-speed 32,768 x 8-bits CMOS static RAM fabricated using Hyundai's high performance twin tub CMOS process technology. This high reliability process coupled with high-speed circuit design techniques, yields maximum access time of 15ns. The HY638256 has a data retention mode that guarantees data to remain valid at a minimum power supply voltage of 2.0 volt. It is suitable for use in high-density high-speed system applications.

FEATURES

- Single 5V±10% Power Supply
- High speed - 15/20/25ns(max.)
- Low power consumption(Max.)

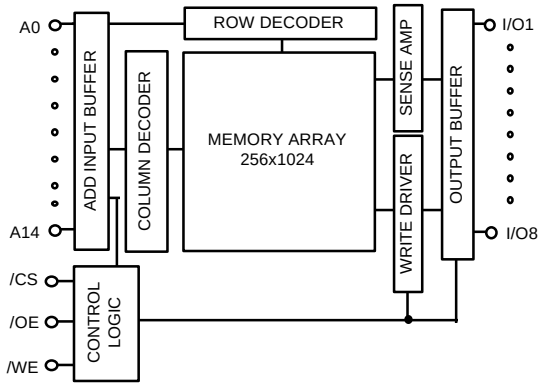
Mode	Conditions		Current	Units
Operating	15ns		100	mA
	20/25ns		90	mA
Standby	TTL		30	mA
	CMOS		2	mA
		L	100	uA

- Battery backup(L-part)
  - 2.0V(min) data retention
- Fully static operation and Tri-state outputs

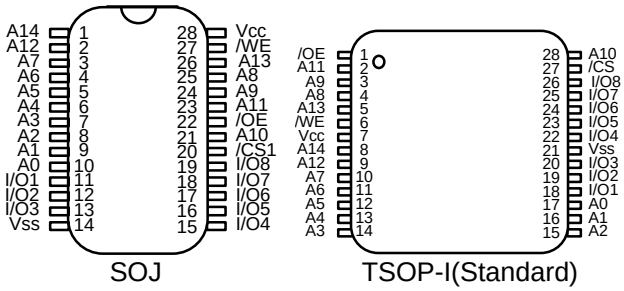
- No clock or refresh required

- TTL compatible inputs and outputs
- Standard pin configuration
  - 28pin 300mil SOJ
  - 28pin 8 x 13.4 mm TSOP-I

BLOCK DIAGRMM



PIN CONNECTION



SOJ TSOP-I(Standard)

PIN DESCRIPTION

Pin Name	Pin Function
/CS	Chip Select
/WE	Write Enable
/OE	Output Enable
A0~A14	Adderss Input
I/O1~I/O8	Data Input/Output
Vcc	Power(+5.0V)
Vss	Ground

ORDERING INFORMATION

Part No.	Speed	Power	Package
HY638256J	15/20/25		SOJ
HY638256LJ	15/20/25	L-part	SOJ
HY638256T1	15/20/25		TSOP-I Standard
HY638256LT1	15/20/25	L-part	TSOP-I Standard

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Parameter	Rating	Unit
Vcc, VIN, VOUT	Power Supply, Input/Output Voltage	-0.5 to 7.0	V
TA	Operating Temperature	0 to 70	°C
TSTG	Storage Temperature	-65 to 150	°C
PD	Power Dissipation	1.0	W
IOUT	Data Output Current	50	MA
TSOLDER	Lead Soldering Temperature & Time	260 • 10	°C • sec

Note
1. Stresses greater than those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the device. This is stress rating only and functional operation of the device at these or any other conditions above those indicated in the operational of this specification is not implied. Exposure to absolute maximum rating conditions for extended period may affect reliability.

RECOMMENDED DC OPERATING CONDITIONS

T_A=0°C to 70°C

Symbol	Parameter	Min.	Typ.	Max.	Unit
Vcc	Supply Voltage	4.5	5.0	5.5	V
Vss	Ground	0	0	0	V
VIH	Input High Voltage	2.2	-	Vcc+0.5	V
VIL	Input Low Voltage	-0.5(1)	-	0.8	V

Note
1. VIL = -3.0V for pulse width less than 10ns

TRUTH TABLE

/CS	/WE	/OE	Mode	I/O Operation
H	X	X	Standby	Hi-Z
L	H	H	Output Disabled	Hi-Z
L	H	L	Read	DOUT
L	L	X	Write	DIN

Note:
1. H=VIH, L=VIL, X=Don't care

DC ELECTRICAL CHARACTERISTICS

Vcc = 5.0V±10%, T_A = 0°C to 70°C, unless otherwise specified.

Symbol	Parameter	Test Conditions		Min	Type	Max	Unit
I_{LI}	Input Leakage Current	$V_{SS} \le V_{IN} \le V_{CC}$		-2	-	2	uA
I_{LO}	Output Leakage Current	$V_{SS} \le V_{OUT} \le V_{CC}$, /CS = V_{IH} or /OE = V_{IH} or /WE = V_{IL}		-2	-	2	uA
I_{CC1}	Average Operating Current	/CS = V_{IL}, $I_{I/O}$ = 0mA, Min. Duty Cycle = 100%	15ns	-	-	100	mA
			20/25ns	-	-	90	mA
I_{SB}	TTL Standby Current (TTL Inputs)	/CS = V_{IH}, V_{IN}=V_{IH} or V_{IL}, Min. Cycle		-	-	30	mA
I_{SB1}	CMOS Standby Current (CMOS Inputs)	/CS ≥ V_{CC}-0.2V, V_{IN} ≥ V_{CC}-0.2V or V_{IN} ≤ 0.2V		-	-	2	mA
			L	-	20	100	uA
V_{OL}	Output Low Voltage	I_{OL} = 8.0mA		-	-	0.4	V
V_{OH}	Output High Voltage	I_{OH} = -4.0mA		2.4	-	-	V

Note : Typical values are at Vcc = 5.0V, T_A = 25°C

AC CHARACTERISTICS

Vcc = 5.0V±10%, T_A = 0°C to 70°C, unless otherwise specified.

#	Symbol	Parameter	-15		-20		-25		Unit
			Min	Max	Min	Max	Min	Max	
	READ CYCLE								
1	tRC	Read Cycle Time	15	-	20	-	25	-	ns
2	tAA	Address Access Time	-	15	-	20	-	25	ns
3	tACS	Chip Select Access Time	-	15	-	20	-	25	ns
4	tOE	Output Enable to Output Valid	-	8	-	10	-	12	ns
5	tCLZ	Chip Select to Output in Low Z	3	-	3	-	3	-	ns
6	tOLZ	Output Enable to Output in Low Z	3	-	3	-	3	-	ns
7	tCHZ	Chip Deselecting to Output in High Z	0	8	0	10	0	10	ns
8	tOHZ	Out Disable to Output in High Z	0	8	0	8	0	8	ns
9	tOH	Output Hold from Address Change	3	-	3	-	3	-	ns
	WRITE CYCLE								
10	tWC	Write Cycle Time	15	-	20	-	25	-	ns
11	tCW	Chip Select to End of Write	12	-	13	-	15	-	ns
12	tAW	Address Valid to End of Write	12	-	13	-	15	-	ns
13	tAS	Address Set-up Time	0	-	0	-	0	-	ns
14	tWP	Write Pulse Width	12	-	13	-	15	-	ns
15	tWR	Write Recovery Time	0	-	0	-	-	-	ns
16	tWHZ	Write to Output in High Z	0	7	0	9	0	10	ns
17	tDW	Data to Write Time Overlap	8	-	9	-	10	-	ns
18	tDH	Data Hold from Write Time	0	-	0	-	0	-	ns
19	tOW	Output Active from End of Write	3	-	3	-	3	-	ns

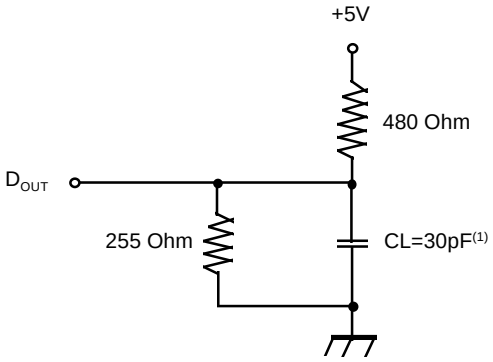
AC TEST CONDITIONS

Vcc = 5.0V±10%, T_A = 0°C to 70°C, unless otherwise specified.

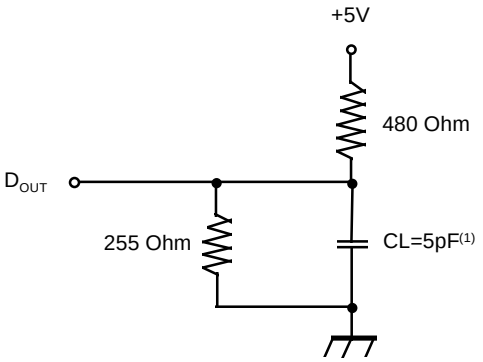
Parameter	Value
Input Pulse Level	0V to 3V
Input Rise and Fall Time	3ns
Input and Output Timing Reference Level	1.5V
Output Load	See below

AC TEST LOADS

Output Load (A)



Output Load (B)
(for tCHZ, tCLZ, tOHZ, tOLZ, tWHZ & tOW)



Note : Including jig and scope capacitance

CAPACITANCE

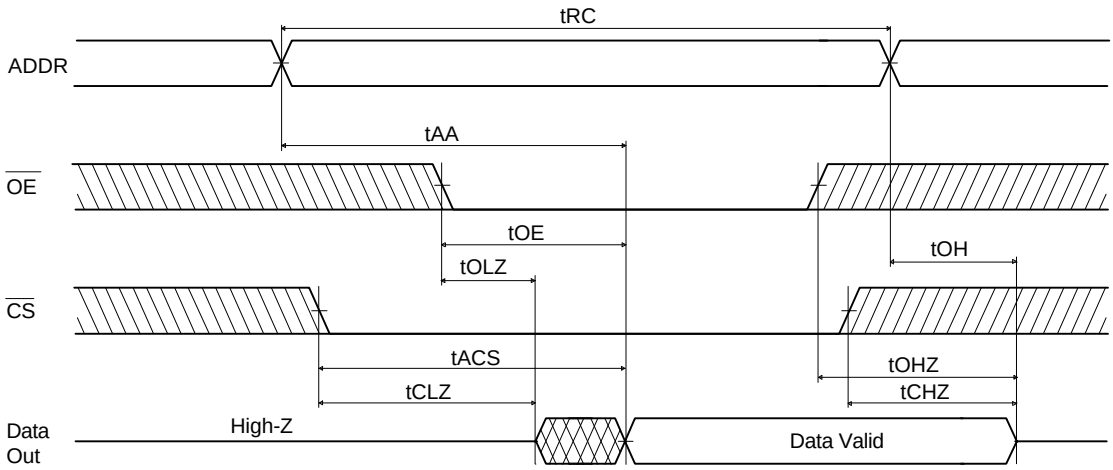
(T_A = 25°C, f= 1.0MHz)

Symbol	Parameter	Condition	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	6	pF
$C_{I/O}$	Input/Output Capacitance	$V_{I/O}$ = 0V	8	pF

Note : This parameter is sampled and not 100% tested

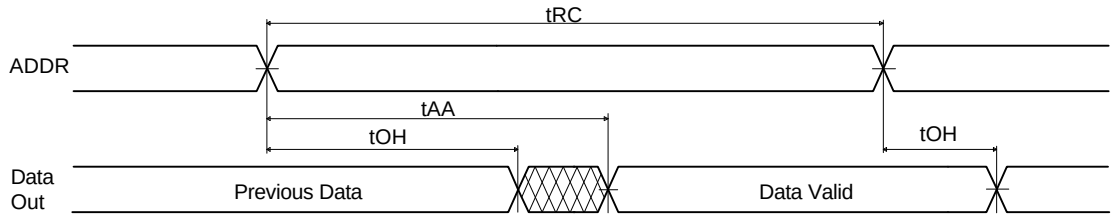
TIMING DIAGRAM

READ CYCLE 1



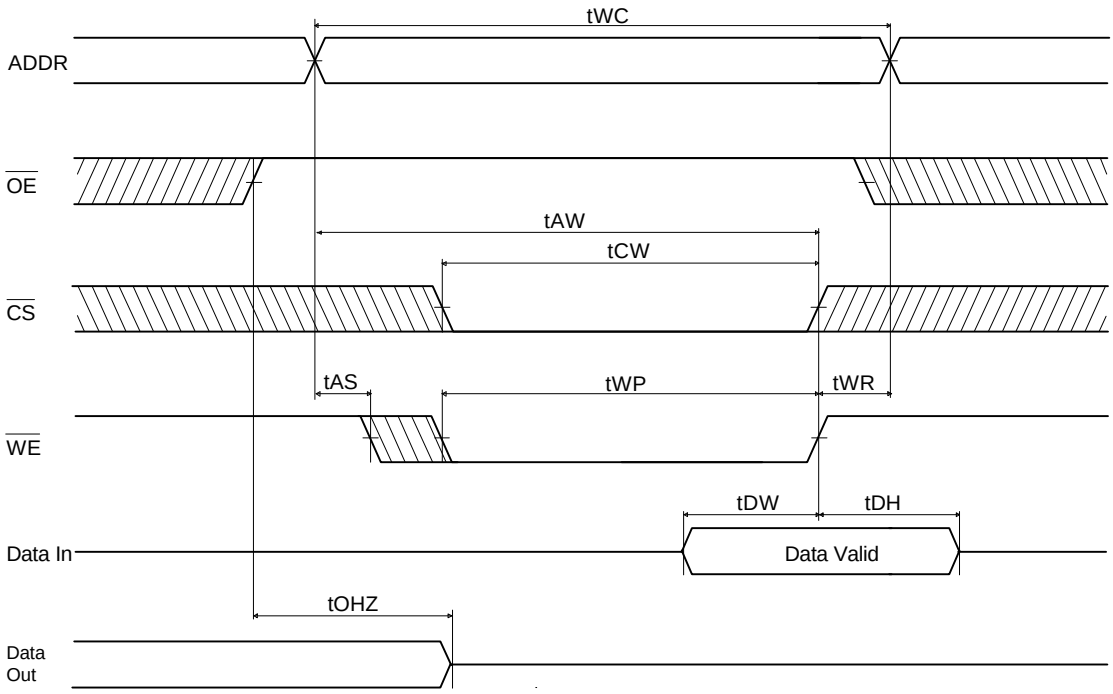
Note (Read Cycle)
1. tCHZ and tOHZ are defined as the time at which the outputs achieve the open circuit conditions and are not referenced to output voltage levels.
2. At any given temperature and voltage condition, tCHZ max. is less than tCLZ min. both for a given device and from device to device.
3. /WE is high for read cycle.

READ CYCLE 2

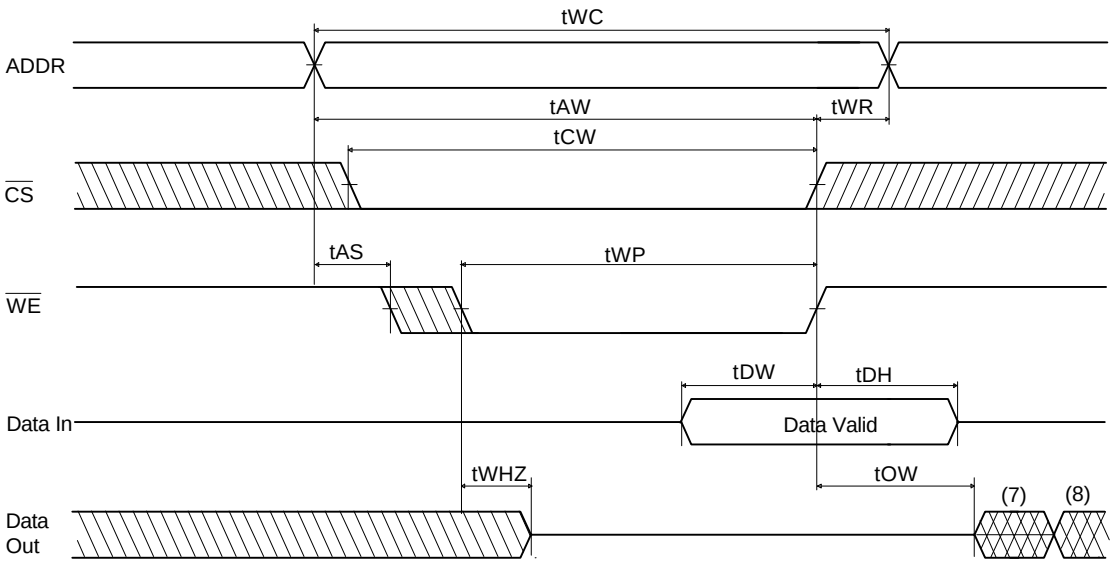


Note (Read Cycle)
1. /WE is high for read cycle.
2. Device is continuously selected /CS=V_{IL}.
3. /OE=V_{IL}.

WRITE CYCLE 1(/OE Low Clocked)



WRITE CYCLE 2(/OE Low Fixed)



Notes:
1. A write occurs during the overlap of a low /CS and a low /WE. A write begins at the latest transition among /CS going low, and /WE going low : A write ends at the earliest transition among /CS going high and /WE going high. tWP is measured from the beginning of write to the end of write.
2. tCW is measured from the later of /CS going low to end of write.
3. tAS is measured from the address valid to the beginning of write.
4. tWR is measured from the end of write to the address change. tWR applied in case a write ends as /CS or /WE going high.
5. If /OE and /WE are in the read mode during this period, the I/O pins are in the output low-Z state, inputs of opposite phase of the output must not be applied because bus contention can occur.
6. If /CS goes low simultaneously with /WE going low or after /WE going low, the outputs remain in high impedance state.
7. DOUT is the same phase of latest written data in the write cycle.
8. DOUT is the read data of the new address.

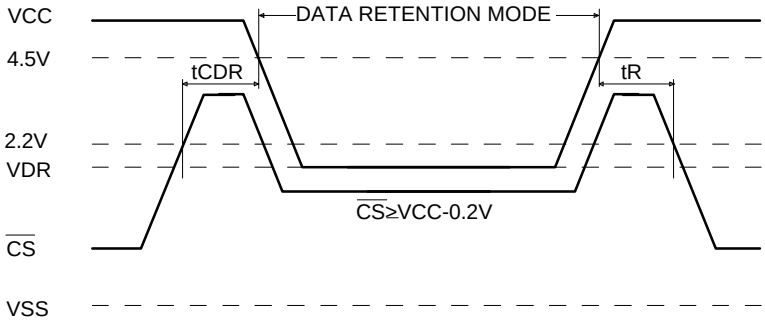
DATA RETENTION ELECTRIC CHARACTERISTIC(L Version)

T_A=0°C to 70°C

Symbol	Parameter	Test Condition	Power	Min	Typ	Max	Unit
V_{DR}	Vcc for Data Retention	/CS ≥ V_{CC} - 0.2V V_{SS} ≤ V_{IN} ≤ V_{CC}		2.0	-	-	V
I_{CCDR}	Data Retention Current	V_{CC} = 3V, /CS ≥ V_{CC}-0.2V Vin ≥ Vcc - 0.2V or ≤ 2.0V	L	-	2	50	uA
tCDR	Chip Deselect to Data Retention Time	See Data Retention Timing Diagram		0	-	-	ns
tR	Operating Recovery Time			tRC(2)	-	-	ns

Notes
1. Typical values are at the condition of T_A=25°C
2. tRC is read cycle time

DATA RETENTION WAVEFORM

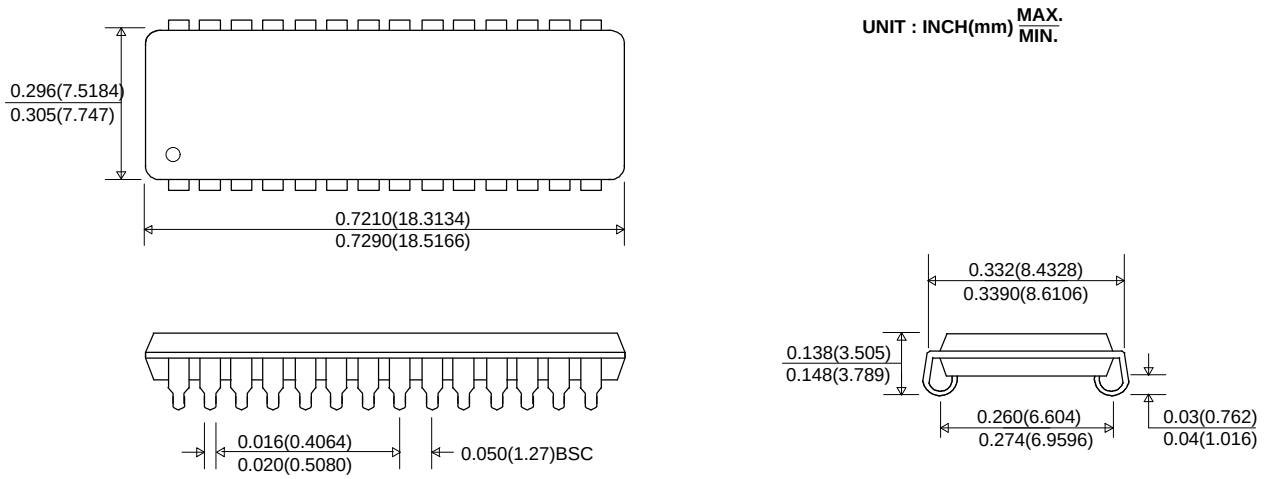


RELIABILITY SPEC.

TEST MODE		TEST SPEC.
ESD	HBM	≥ 2000V
	MM	≥ 250V
LATCH - UP		≤ -100mA
		≥ 100mA

PACKAGE INFORMATION

28pin 300mil Small Outline J-Form Package (J)



28pin 8x13.4mm Thin Small Outline Package Standard(T1)