Document Title

32K x8 bit 2.7~3.3V / 3.0~3.6V / 2.7~3.6V Low Power Slow SRAM

Revision History

Revision No	History	Draft Date	Remark
00	Initial Merged 3.0V/3.3V SPEC	Jan.20.2000	Final
01	Revised - Marking Information Change : SOP Type - Voh Limit Change : 2.4V => 2.2V @2.7~3.6V	Feb.21.2001	Final
02	Changed Logo - HYUNDAI -> hynix - Marking Information Change	Apr.30.2001	Final

DESCRIPTION

The HY62K(U,V)T08081E is a high-speed, low power and 32,786 X 8-bits CMOS Static Random Access Memory fabricated using Hynix's high performance CMOS process technology. It is suitable for use in low voltage operation and battery back-up application. This device has a data retention mode that guarantees data to remain valid at the minimum power supply voltage of 2.0 volt.

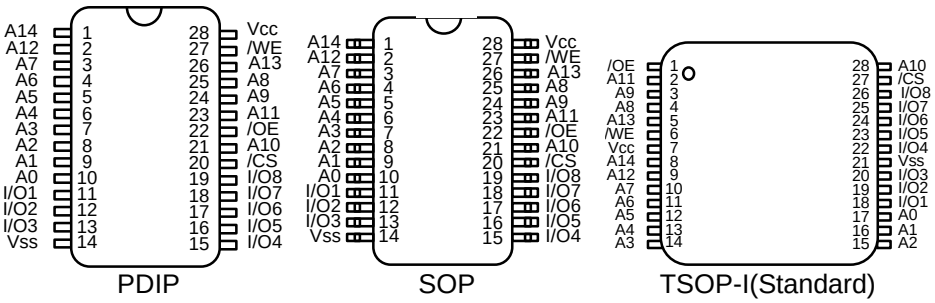
FEATURES

- Fully static operation and Tri-state output
- TTL compatible inputs and outputs
- Low power consumption
- Battery backup(L/LL-part)
  - 2.0V(min.) data retention
- Standard pin configuration
  - 28 pin 600mil PDIP
  - 28 pin 330mil SOP
  - 28 pin 8x13.4 mm TSOP-I (Standard)

Product No.	Voltage (V)	Speed (ns)	Operation Current(mA)	Standby Current(uA) LL-Part	Temperature (°C)
HY62KT08081E-C	2.7~3.6	70*/85/100	2	5	0~70(Normal)
HY62KT08081E-E				8	-25~85(Extended)
HY62KT08081E-I				8	-40~85(Extended)
HY62VT08081E-C	3.0~3.6	70/85/100	2	5	0~70(Normal)
HY62VT08081E-E				8	-25~85(Extended)
HY62VT08081E-I				8	-40~85(Extended)
HY62UT08081E-C	2.7~3.3	70*/85/100	2	5	0~70(Normal)
HY62UT08081E-E				8	-25~85(Extended)
HY62UT08081E-I				8	-40~85(Extended)

Note *. Measured at 30pF test load.

PIN CONNECTION

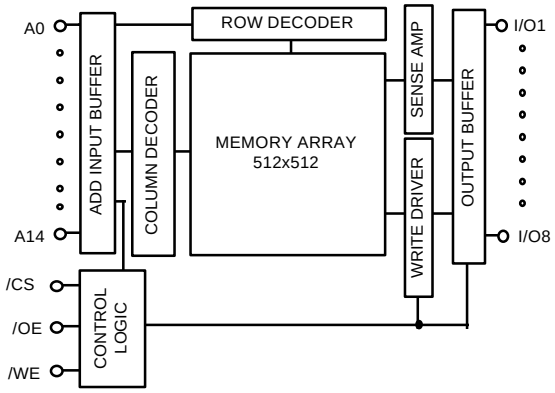


PDIP SOP TSOP-I(Standard)

PIN DESCRIPTION

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

BLOCK DIAGRAM



ORDERING INFORMATION

Part No.	Vcc	Speed	Power	Temp	Package
HY62KT08081E-DPC	2.7~3.6V	70*/85/100ns	LL-part	0 to 70¡ É	PDIP
HY62KT08081E-DPE				-25 to 85¡ É	
HY62KT08081E-DPI				-40 to 85¡ É	
HY62KT08081E-DGC				0 to 70¡ É	SOP
HY62KT08081E-DGE				-25 to 85¡ É	
HY62KT08081E-DGI				-40 to 85¡ É	
HY62KT08081E-DTC				0 to 70¡ É	TSOP-I Standard
HY62KT08081E-DTE				-25 to 85¡ É	
HY62KT08081E-DTI				-40 to 85¡ É	
HY62VT08081E-DPC	3.0~3.6V	70/85/100ns	LL-part	0 to 70¡ É	PDIP
HY62VT08081E-DPE				-25 to 85¡ É	
HY62VT08081E-DPI				-40 to 85¡ É	
HY62VT08081E-DGC				0 to 70¡ É	SOP
HY62VT08081E-DGE				-25 to 85¡ É	
HY62VT08081E-DGI				-40 to 85¡ É	
HY62VT08081E-DTC				0 to 70¡ É	TSOP-I Standard
HY62VT08081E-DTE				-25 to 85¡ É	
HY62VT08081E-DTI				-40 to 85¡ É	
HY62UT08081E-DPC	2.7~3.3V	70*/85/100ns	LL-part	0 to 70¡ É	PDIP
HY62UT08081E-DPE				-25 to 85¡ É	
HY62UT08081E-DPI				-40 to 85¡ É	
HY62UT08081E-DGC				0 to 70¡ É	SOP
HY62UT08081E-DGE				-25 to 85¡ É	
HY62UT08081E-DGI				-40 to 85¡ É	
HY62UT08081E-DTC				0 to 70¡ É	TSOP-I Standard
HY62UT08081E-DTE				-25 to 85¡ É	
HY62UT08081E-DTI				-40 to 85¡ É	

Note *. Measured at 30pF test load.

ABSOLUTE MAXIMUM RATING (1)

Symbol	Parameter		Rating	Unit
Vcc, VIN, VOUT	Power Supply, Input/Output Voltage		-0.3 to 4.6	V
TA	Operating Temperature	HY62K(U,V)T08081E-C	0 to 70	°C
		HY62K(U,V)T08081E-E	-25 to 85	°C
		HY62K(U,V)T08081E-I	-40 to 85	°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 the functional operation of the device under these or any other conditions above those indicated in the operation of this specification is not implied. Exposure to the absolute maximum rating conditions for extended period may affect reliability.

RECOMMENDED DC OPERATING CONDITIONS

Symbol	Parameter		Min.	Typ.	Max.	Unit
Vcc	Power Supply Voltage	HY62KT08081E	2.7	3.0/3.3	3.6	V
		HY62VT08081E	3.0	3.3	3.6	V
		HY62UT08081E	2.7	3.0	3.3	V
Vss	Ground		0	0	0	V
V_{IH}	Input High Voltage		2.2	-	Vcc+0.3	V
V_{IL}	Input Low Voltage		-0.3(1)	-	0.4	V

Note
1. V_{IL} = -1.5V for pulse width less than 50ns

TRUTH TABLE

/CS	/WE	/OE	Mode	I/O Operation
H	X	X	Standby	High-Z
L	H	H	Output Disabled	High-Z
L	H	L	Read	Data Out
L	L	X	Write	Data In

Note
1. H=V_{IH}, L=V_{IL}, X=Don't Care

DC CHARACTERISTICS

Vcc = 2.7~3.6V, T_A = 0¡ Ëto 70°C (Normal)/-25°C to 85°C (Extended) /-40°C to 85°C (Industrial), unless otherwise specified.

Symbol	Parameter	Test Condition		Min.	Typ.	Max.	Unit
I_{LI}	Input Leakage Current	Vss ≤ V_{IN} ≤ Vcc		-1	-	1	uA
I_{LO}	Output Leakage Current	Vss ≤ V_{OUT} ≤ Vcc, /CS = V_{IH} or /OE = V_{IH} or /WE = V_{IL}		-1	-	1	uA
Icc	Operating Power Supply Current	/CS = V_{IL}, V_{IN} = V_{IH} or V_{IL}, $I_{I/O}$ = 0mA		-	-	2	mA
I_{CC1}	Average Operating Current	/CS = V_{IL}, V_{IN} = V_{IH} or V_{IL}, Min. Duty Cycle = 100%, $I_{I/O}$ = 0mA		-	-	30	mA
I_{CC2}	Average Operating Current	/CS = V_{IL}, V_{IN} = V_{IH} or V_{IL} Cycle = 1us , $I_{I/O}$ = 0mA		-	-	5	mA
I_{SB}	TTL Standby Current (TTL Inputs)	/CS= V_{IH}, V_{IN} = V_{IH} or V_{IL}		-	-	0.3	mA
I_{SB1}	CMOS Standby Current (CMOS Inputs)	/CS ≥ Vcc - 0.2V,	0~70 °C	-	-	5	uA
		V_{IN} ≥ Vcc - 0.2V or V_{IN} ≤ Vss + 0.2V	-25~85 °C or -40~85 °C	-	-	8	uA
V_{OL}	Output Low Voltage	I_{OL} = 2.1mA		-	-	0.4	V
V_{OH}	Output High Voltage	I_{OH} = -1.0mA		2.2	-	-	V

Note : Typical values are at Vcc =3.0/3.3V, T_A = 25°C

AC CHARACTERISTICS

Vcc = 2.7~3.6V , TA = 0¡ Ëto 70¡ È(Normal)/-25°C to 85°C (Extended) /-40°C to 85°C (Industrial), unless otherwise specified.

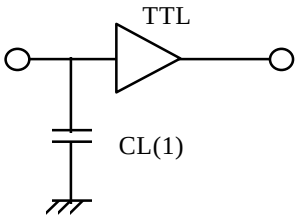
#	Symbol	Parameter	-70		-85		-10		Unit
			Min.	Max.	Min.	Max.	Min	Max.	
	READ CYCLE								
1	tRC	Read Cycle Time	70	-	85	-	100	-	ns
2	tAA	Address Access Time	-	70	-	85	-	100	ns
3	tACS	Chip Select Access Time	-	70	-	85	-	100	ns
4	tOE	Output Enable to Output Valid	-	35	-	40	-	50	ns
5	tCLZ	Chip Select to Output in Low Z	10	-	10	-	10	-	ns
6	tOLZ	Output Enable to Output in Low Z	5	-	5	-	5	-	ns
7	tCHZ	Chip Deselection to Output in High Z	0	30	0	30	0	30	ns
8	tOHZ	Out Disable to Output in High Z	0	30	0	30	0	30	ns
9	tOH	Output Hold from Address Change	10	-	10	-	15	-	ns
	WRITE CYCLE								
10	tWC	Write Cycle Time	70	-	85	-	100	-	ns
11	tCW	Chip Selection to End of Write	60	-	70	-	80	-	ns
12	tAW	Address Valid to End of Write	60	-	70	-	80	-	ns
13	tAS	Address Set-up Time	0	-	0	-	0	-	ns
14	tWP	Write Pulse Width	50	-	60	-	70	-	ns
15	tWR	Write Recovery Time	0	-	0	-	0	-	ns
16	tWHZ	Write to Output in High Z	0	25	0	30	0	35	ns
17	tDW	Data to Write Time Overlap	30	-	40	-	40	-	ns
18	tDH	Data Hold from Write Time	0	-	0	-	0	-	ns
19	tOW	Output Active from End of Write	5	-	5	-	10	-	ns

AC TEST CONDITIONS

Vcc = 2.7~3.6V, T_A = 0¡ Éto 70¡ É(Normal)/-25°C to 85°C (Extended) /-40°C to 85°C (Industrial), unless otherwise specified.

Parameter		Value
Input Pulse Level		0.4V to 2.2V
Input Rise and Fall Time		5ns
Input and Output Timing Reference Level		1.5V
Output Load	tCLZ,tOLZ,tCHZ,tOHZ,tWHZ,tOW	CL = 5pF + 1TTL Load
	Others	CL = 100pF + 1TTL Load
		CL* = 30pF + 1TTL Load

AC TEST LOADS



Note : Including jig and scope capacitance

CAPACITANCE

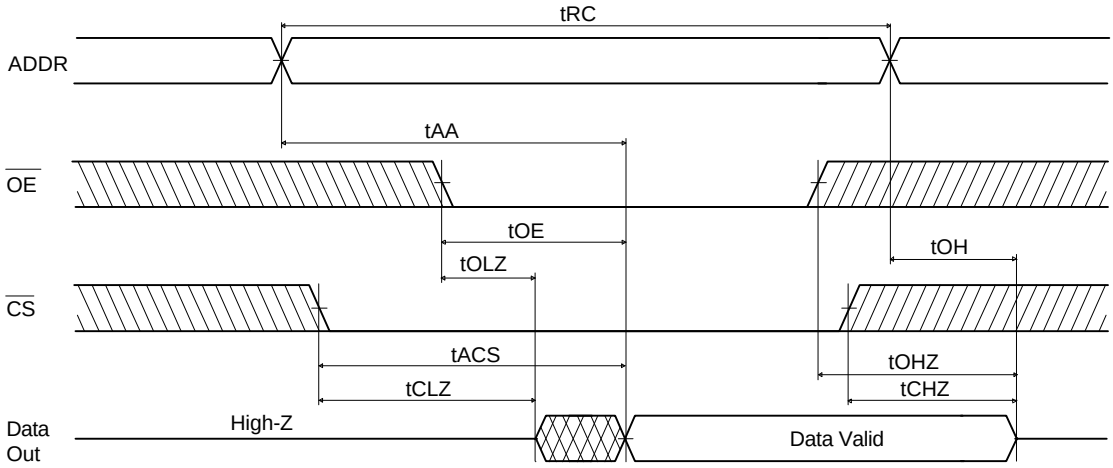
T_A = 25°C, f = 1.0MHz

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 : These parameters are sampled and not 100% tested

TIMING DIAGRAM

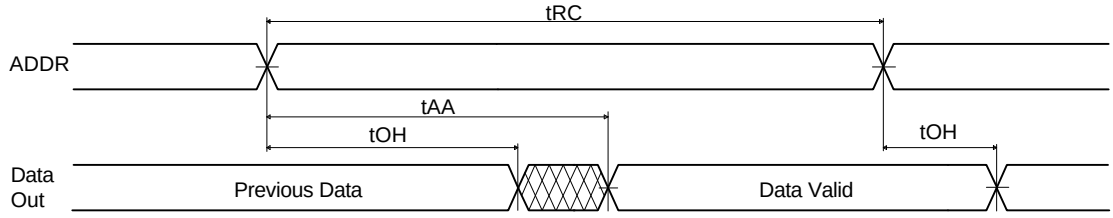
READ CYCLE 1



Note(READ CYCLE):

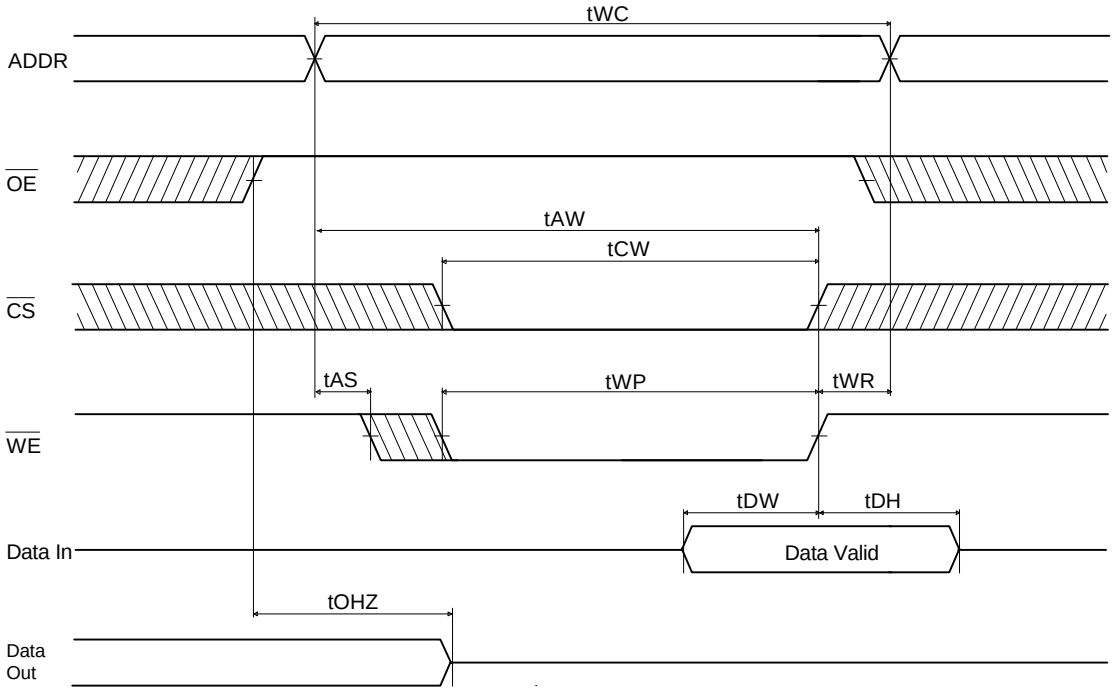
1. t_{CHZ} and t_{OHZ} are defined as the time at which the outputs achieve the open circuit conditions and arenot referenced to output voltage levels.
2. At any given temperature and voltage condition, t_{CHZ} max. is less than t_{CLZ} min. both for a given device and from device to device.
3. /WE is high for the read cycle.

READ CYCLE 2

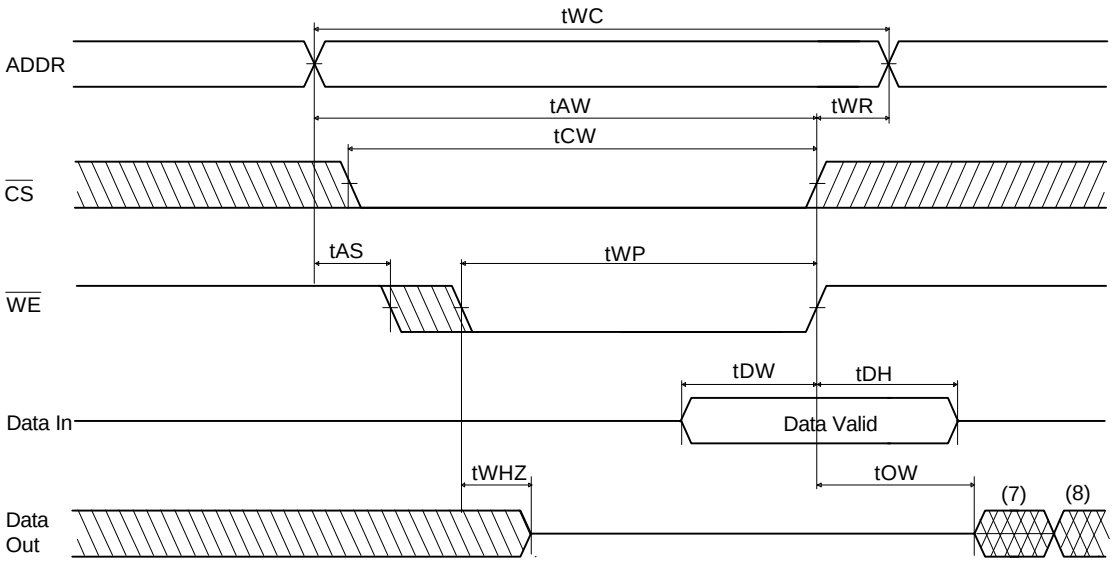


Note(READ CYCLE):
1. /WE is high for the read cycle.
2. Device is continuously selected /CS= V_{IL}.
3. /OE =V_{IL}.

WRITE CYCLE 1(/OE Clocked)



WRITE CYCLE 2 (/OE Low Fixed)



Notes(WRITE CYCLE):
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. t_{WP} is measured from the beginning of write to the end of write.
2. t_{CW} is measured from the later of /CS going low to the end of write .
3. t_{AS} is measured from the address valid to the beginning of write.
4. t_{WR} is measured from the end of write to the address change. t_{WR} is 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, and the I/O pins are in the output low-Z state, input 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. D_{OUT} is the same phase of the latest written data in this write cycle.
8. D_{OUT} is the read data of the new address.

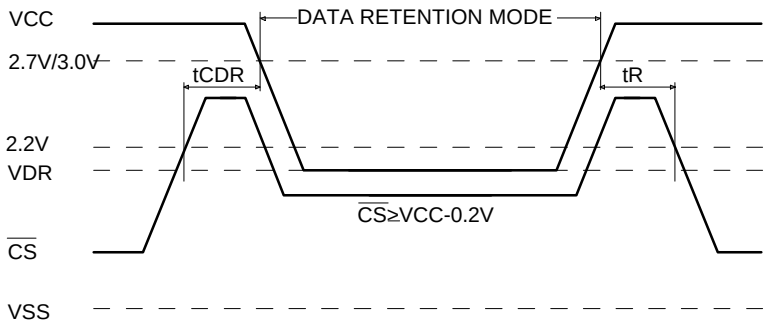
DATA RETENTION CHARACTERISTIC

Vcc = 2.7~3.6V, T_A = 0°C to 70°C (Normal)/-25°C to 85°C (Extended) /-40°C to 85°C (Industrial), unless otherwise specified.

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
V_{DR}	Vcc for Data Retention	CS≥Vcc-0.2V, V_{IN}≥Vcc-0.2V or V_{IN}≤Vss+0.2V		2.0	-	3.6	V
I_{CCDR}	Data Retention Current	Vcc=3.0V, /CS≥Vcc - 0.2V, V_{IN}≥Vcc - 0.2V or V_{IN}≤Vss + 0.2V	0~70°C	-	0.5	5	uA
			-25~85°C or -40~85°C	-	0.5	8	uA
tCDR	Chip Deselect to Data Retention Time	See Data Retention Timing Diagram		0	-	-	ns
tR	Operating Recovery Time			tRC(2)	-	-	ns

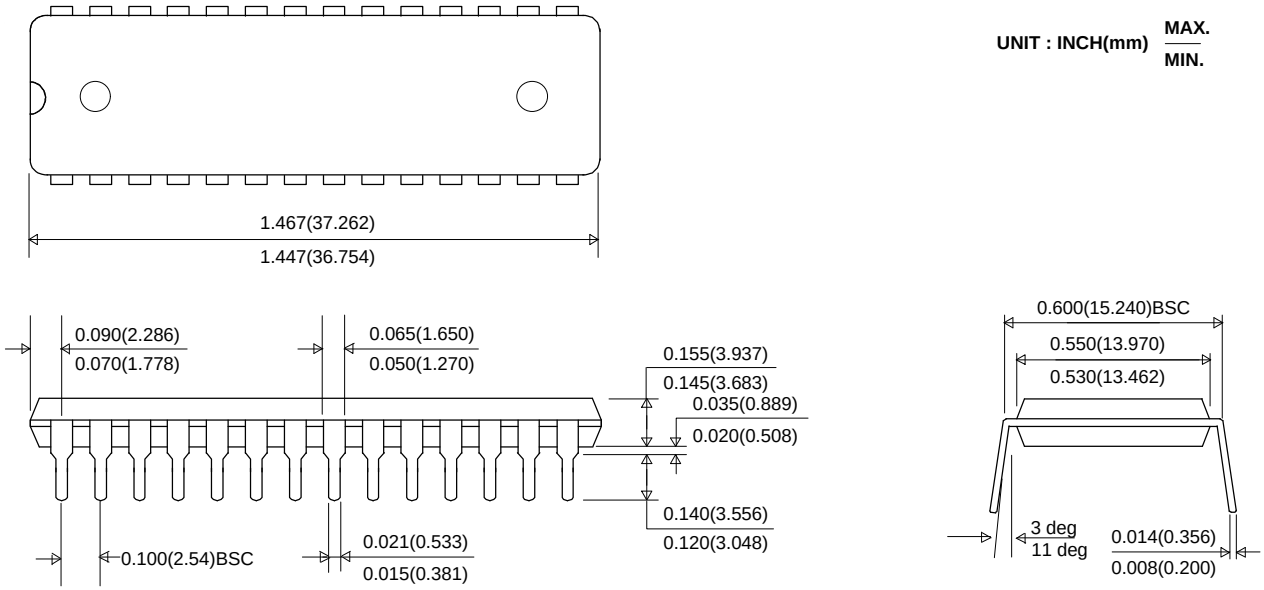
Notes
1. Typical values are under the condition of T_A = 25°C.
2. tRC is read cycle time.

DATA RETENTION TIMING DIAGRAM

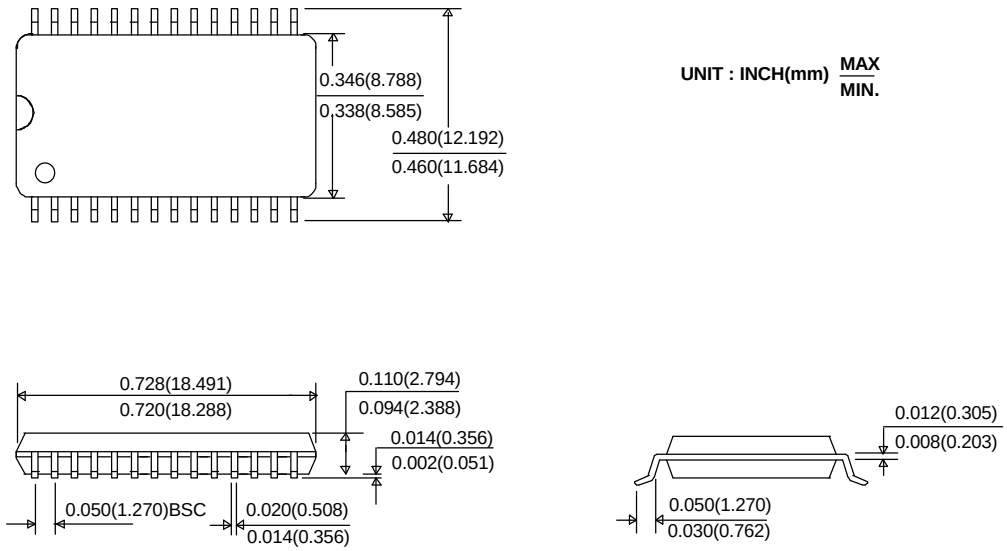


PACKAGE INFORMATION

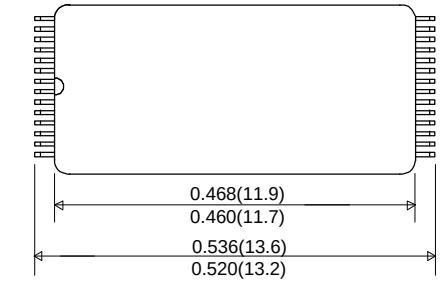
28pin 600mil Dual In-Line Package(Blank)



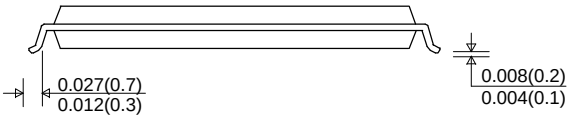
28pin 330mil Small Outline Package(FW)

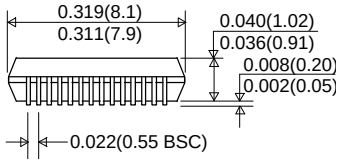


28pin 8x13.4mm Thin Small Outline Package Standard(T)



UNIT : INCH(mm) MAX. / MIN.





MARKING INFORMATION

Package	Marking Example
PDIP	hynix KOREA HY62vT08081E yywwp cPsst
SOP	hynix KOREA HY62vT08081E yywwp cGsst
TSOP-I	HY62vT0808 1E-cTsst yywwp KOR

Index

- **hynix** : hynix Logo
- **KOREA / KOR** : Origin Country
- **HY62vT08081E** : Part Name
  - HY62KT08081E : 2.7~3.6V
  - HY62VT08081E : 3.0~3.6V
  - HY62UT08081E : 2.7~3.3V
- **yy** : Year (ex : 00 = year 2000, 01 = year 2001)
- **ww** : Work Week (ex : 12 = ww12)
- **p** : Process Code
- **c** : Power Consumption
  - D : Low Low Power
- **P / G / T** : Package Type
  - P : PDIP
  - G : SOP
  - T : TSOP-I
- **ss** : Speed
  - 70 : 70ns
  - 85 : 85ns
  - 10 : 100ns
- **t** : Temperature
  - C : Commercial (0 ~ 70 °C)
  - E : Extended (-25 ~ 85 °C)
  - I : Industrial (-40 ~ 85 °C)

Note
- Capital Letter : Fixed Item
- Small Letter : Non-fixed Item (Except hynix)