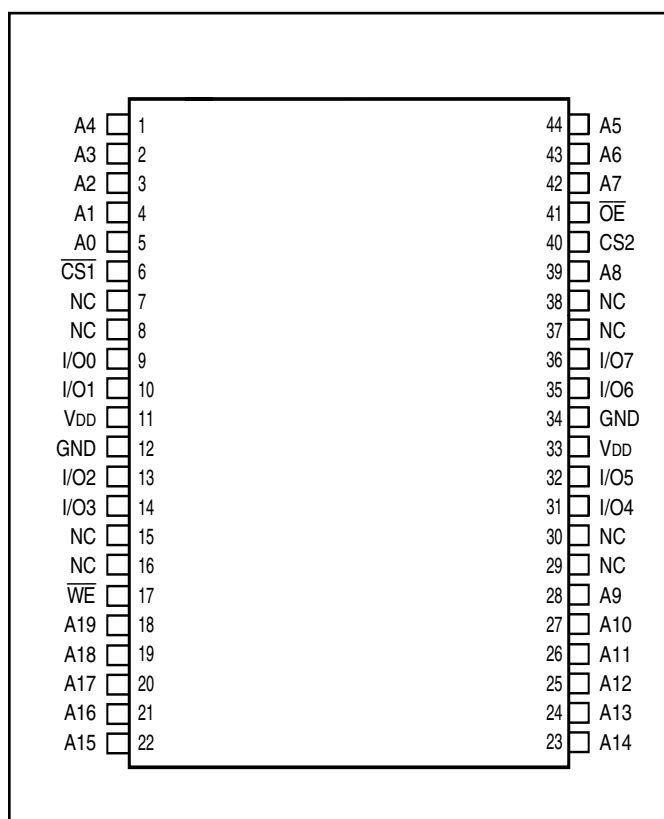
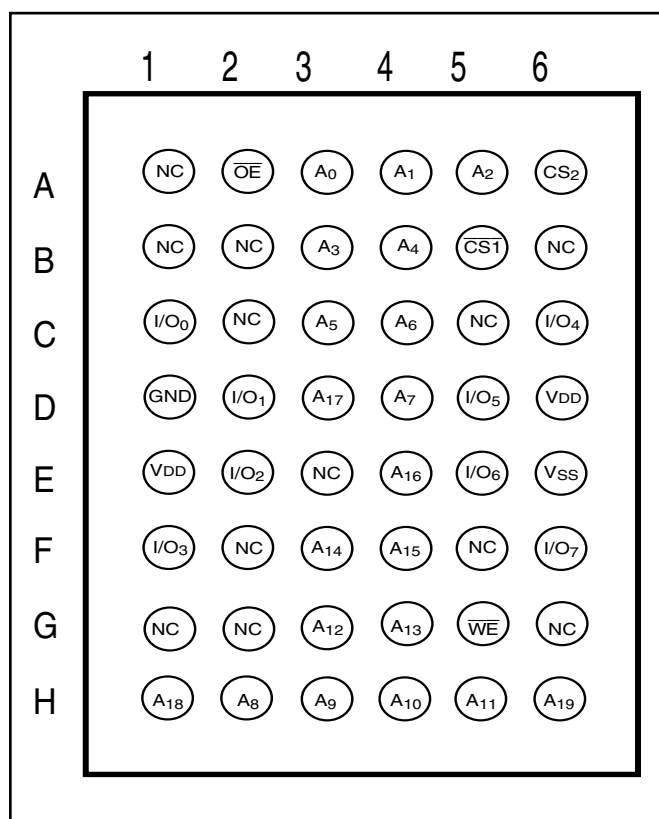


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PIN CONFIGURATION (1M x 8 Low Power)

48-pin mini BGA (B) (9mm x 11mm)

44-pin TSOP (Type II)



PIN DESCRIPTIONS

A0-A19	Address Inputs
CS1	Chip Enable 1 Input
CS2	Chip Enable 2 Input
OE	Output Enable Input
WE	Write Enable Input
I/O0-I/O7	Input/Output
NC	No Connection
VDD	Power
GND	Ground

TRUTH TABLE

Mode	$\overline{WE}$	$\overline{CS1}$	CS2	$\overline{OE}$	I/O Operation	V _{DD} Current
Not Selected	X	H	X	X	High-Z	I _{SB1} , I _{SB2}
(Power-down)	X	X	L	X	High-Z	I _{SB1} , I _{SB2}
Output Disabled	H	L	H	H	High-Z	I _{CC}
Read	H	L	H	L	D _{OUT}	I _{CC}
Write	L	L	H	X	D _{IN}	I _{CC}

OPERATING RANGE (V_{DD})

Range	Ambient Temperature	V _{DD}	Speed
Commercial	0°C to +70°C	4.5V - 5.5V	45ns
Industrial	-40°C to +85°C	4.5V - 5.5V	55ns
Automotive	-40°C to +125°C	4.5V - 5.5V	55ns

CAPACITANCE^(1,2)

Symbol	Parameter	Conditions	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	5	pF
C _{OUT}	Output Capacitance	V _{OUT} = 0V	7	pF

Notes:

1. Tested initially and after any design or process changes that may affect these parameters.
2. Test conditions: T_A = 25°C, f = 1 MHz, V_{DD} = 5.0V.

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Parameter	Value	Unit
V _{TERM}	Terminal Voltage with Respect to GND	−0.5 to +7.0	V
T _{STG}	Storage Temperature	−65 to +150	°C
P _T	Power Dissipation	1.5	W
I _{OUT}	DC Output Current (LOW)	20	mA

Notes:

1. 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.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

Symbol	Parameter	Test Conditions		Min.	Max.	Unit
V _{OH}	Output HIGH Voltage	V _{DD} = Min., I _{OH} = −1 mA		2.4	—	V
V _{OL}	Output LOW Voltage	V _{DD} = Min., I _{OL} = 2.1 mA		—	0.4	V
V _{IH}	Input HIGH Voltage			2.2	V _{DD} + 0.5	V
V _{IL}	Input LOW Voltage ⁽¹⁾			−0.3	0.8	V
I _{LI}	Input Leakage	GND ≤ V _{IN} ≤ V _{DD}	Com.	−1	1	μA
			Ind.	−2	2	
			Auto.	−5	5	
I _{LO}	Output Leakage	GND ≤ V _{OUT} ≤ V _{DD} Outputs Disabled	Com.	−1	1	μA
			Ind.	−2	2	
			Auto.	−5	5	

Note:

1. V_{IL} (min) = −0.3V DC; V_{IL} (min) = −2.0V AC (pulse width −2.0 ns). Not 100% tested.
V_{IH} (max) = V_{DD} + 0.3V DC; V_{IH} (max) = V_{DD} + 2.0V AC (pulse width −2.0 ns). Not 100% tested.

AC TEST CONDITIONS

Parameter	Unit
Input Pulse Level	0V to 3.0V
Input Rise and Fall Times	5 ns
Input and Output Timing and Reference Level	1.5V
Output Load	See Figures 1 and 2

AC TEST LOADS

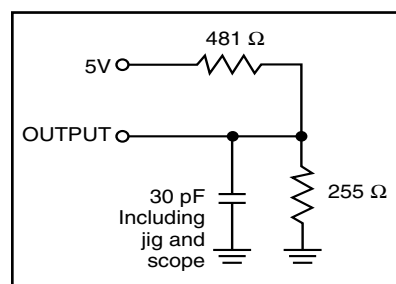


Figure 1

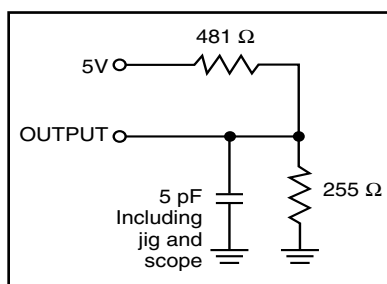


Figure 2

POWER SUPPLY CHARACTERISTICS⁽¹⁾ (Over Operating Range)

Symbol	Parameter	Test Conditions		-45 ns		-55 ns		Unit
				Min.	Max.	Min.	Max.	
I _{CC}	V _{DD} Dynamic Operating	V _{DD} = Max., $\overline{CS1} = V_{IL}$, CS2 = V _{IH}	Com.	—	25			mA
	Supply Current	I _{OUT} = 0 mA	Ind.			—	25	
		V _{IN} = V _{IH} or V _{IL}	Auto.			—	40	
		f = f _{MAX}	typ ⁽²⁾	13		12		
I _{CC1}	Average operating Current	$\overline{CS1} = V_{IL}$, CS2 = V _{IH}	Com.	—	10			mA
		I _{I/O} = 0 mA	Ind.			—	10	
		V _{IN} = V _{IH} or V _{IL}	Auto.			—	20	
I _{SB1}	TTL Standby Current (TTL Inputs)	V _{DD} = Max., $\overline{CS1} \geq V_{IH}$, CS2 ≤ V _{IL}	Com.	—	1			mA
		V _{IN} = V _{IH} or V _{IL}	Ind.			—	1.5	
		f = 0	Auto.			—	2	
I _{SB2}	CMOS Standby Current (CMOS Inputs)	V _{DD} = Max.,	Com.	—	40			μA
		$\overline{CS1} \geq V_{DD} - 0.2V$ and CS2 ≤ V _{SS} + 0.2V	Ind.			—	60	
		V _{IN} ≥ V _{DD} - 0.2V or V _{IN} ≤ V _{SS} + 0.2V	Auto.			—	180	
		f = 0	typ ⁽²⁾	15				

Note:

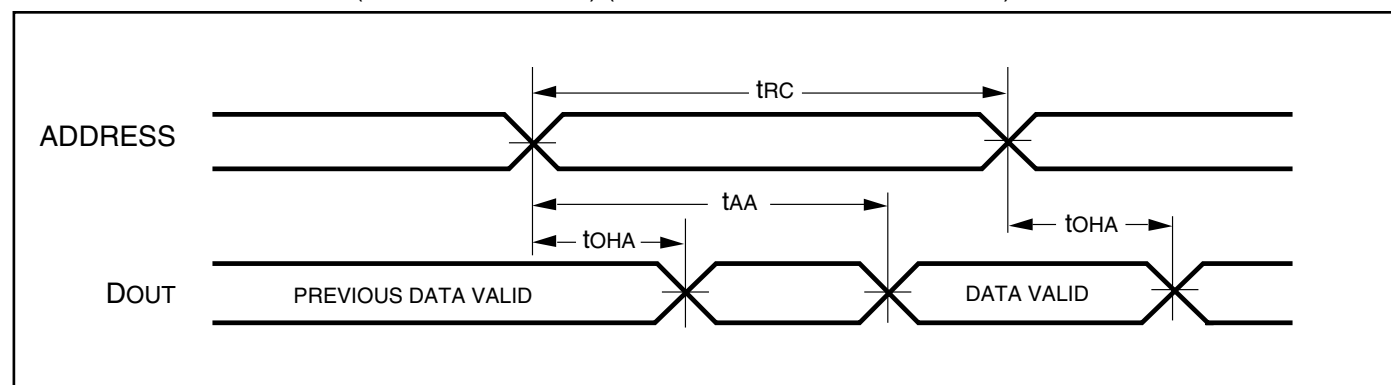
- At f = f_{MAX}, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.
- Typical Values are measured at V_{CC} = 5V, T_A = 25°C and not 100% tested.

READ CYCLE SWITCHING CHARACTERISTICS⁽¹⁾ (Over Operating Range)

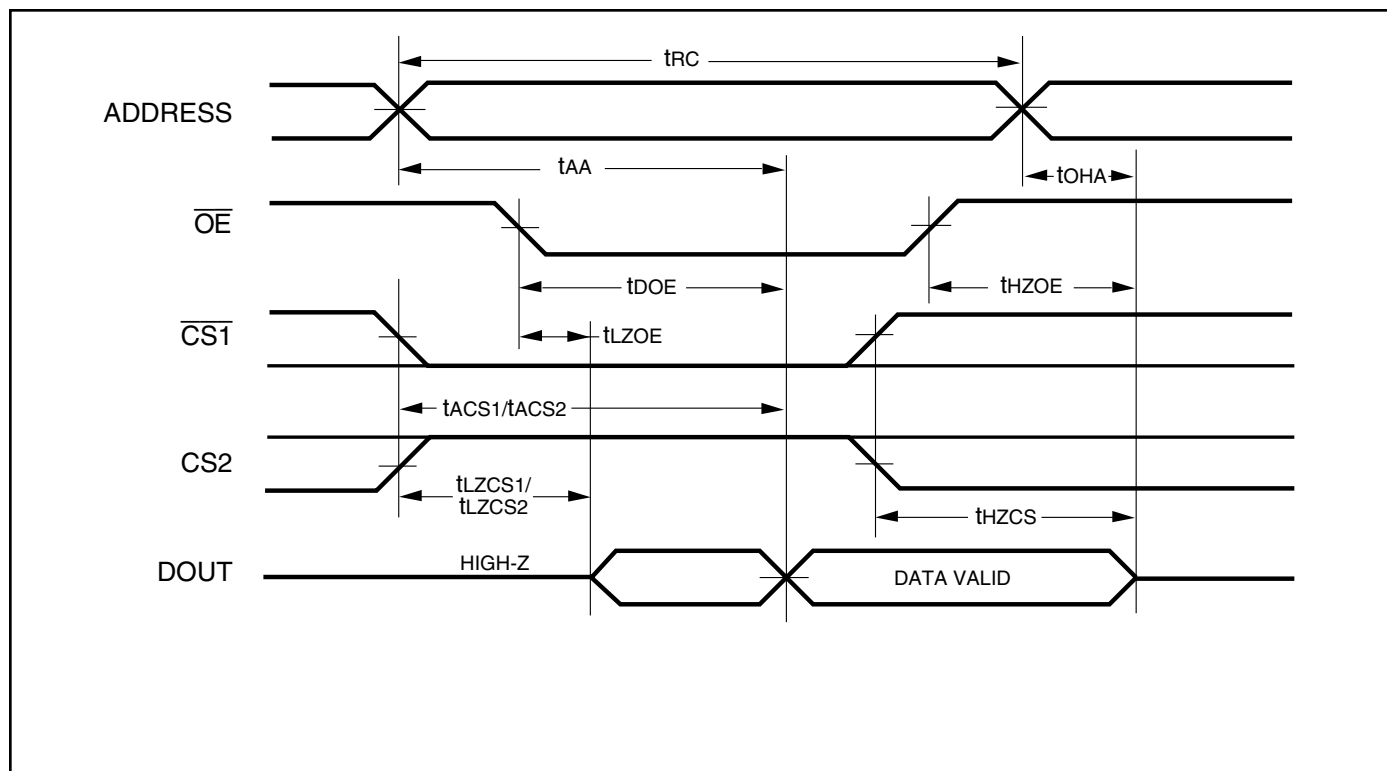
Symbol	Parameter	45 ns		55 ns		Unit
		Min.	Max.	Min.	Max.	
t_{RC}	Read Cycle Time	45	—	55	—	ns
t_{AA}	Address Access Time	—	45	—	55	ns
t_{OHA}	Output Hold Time	10	—	10	—	ns
t_{ACS1}/t_{ACS2}	$\overline{CS1}/CS2$ Access Time	—	45	—	55	ns
t_{DOE}	$\overline{OE}$ Access Time	—	20	—	25	ns
$t_{HZOE}^{(2)}$	$\overline{OE}$ to High-Z Output	—	15	—	20	ns
$t_{LZOE}^{(2)}$	$\overline{OE}$ to Low-Z Output	5	—	5	—	ns
$t_{HZCS1}/t_{HZCS2}^{(2)}$	$\overline{CS1}/CS2$ to High-Z Output	0	15	0	20	ns
$t_{LZCS1}/t_{LZCS2}^{(2)}$	$\overline{CS1}/CS2$ to Low-Z Output	10	—	10	—	ns

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0V to 3.0V and output loading specified in Figure 1.
2. Tested with the load in Figure 2. Transition is measured ± 500 mV from steady-state voltage. Not 100% tested.

AC WAVEFORMS
READ CYCLE NO. 1^(1,2) (Address Controlled) ($\overline{CS1} = \overline{OE} = V_{IL}$, $CS2 = \overline{WE} = V_{IH}$)


AC WAVEFORMS

READ CYCLE NO. 2^(1,3) ($\overline{CS1}$, $CS2$, AND $\overline{OE}$ Controlled)**Notes:**

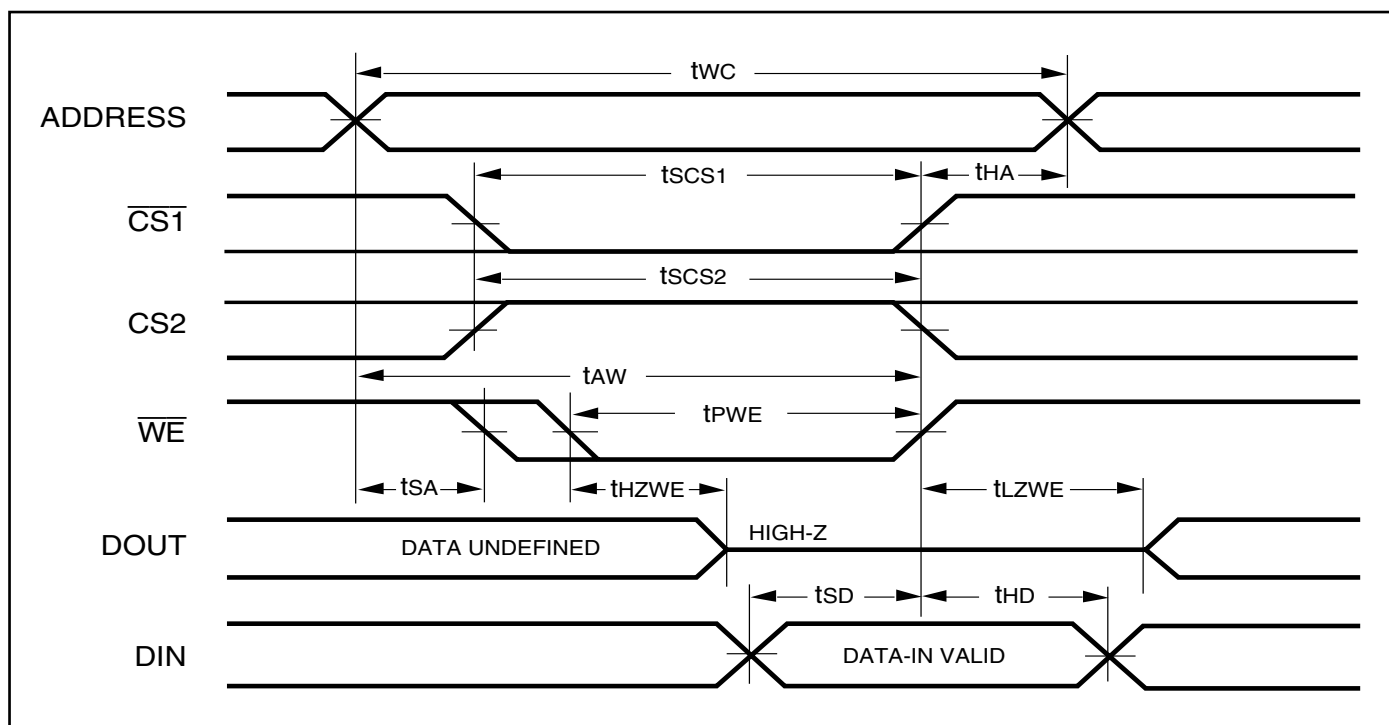
1. $\overline{WE}$ is HIGH for a Read Cycle.
2. The device is continuously selected. $\overline{OE}$, $\overline{CS1} = V_{IL}$. $CS2 = \overline{WE} = V_{IH}$.
3. Address is valid prior to or coincident with $\overline{CS1}$ LOW and $CS2$ HIGH transition.

WRITE CYCLE SWITCHING CHARACTERISTICS^(1,2) (Over Operating Range)

Symbol	Parameter	45ns		55 ns		Unit
		Min.	Max.	Min.	Max.	
t _{WC}	Write Cycle Time	45	—	55	—	ns
t _{SCS1} /t _{SCS2}	CS1/CS2 to Write End	35	—	45	—	ns
t _{AW}	Address Setup Time to Write End	35	—	45	—	ns
t _{HA}	Address Hold from Write End	0	—	0	—	ns
t _{SA}	Address Setup Time	0	—	0	—	ns
t _{PWE} ⁽⁴⁾	$\overline{WE}$ Pulse Width	35	—	40	—	ns
t _{SD}	Data Setup to Write End	25	—	30	—	ns
t _{HD}	Data Hold from Write End	0	—	0	—	ns
t _{HZWE} ⁽³⁾	$\overline{WE}$ LOW to High-Z Output	—	20	—	20	ns
t _{LZWE} ⁽³⁾	$\overline{WE}$ HIGH to Low-Z Output	5	—	5	—	ns

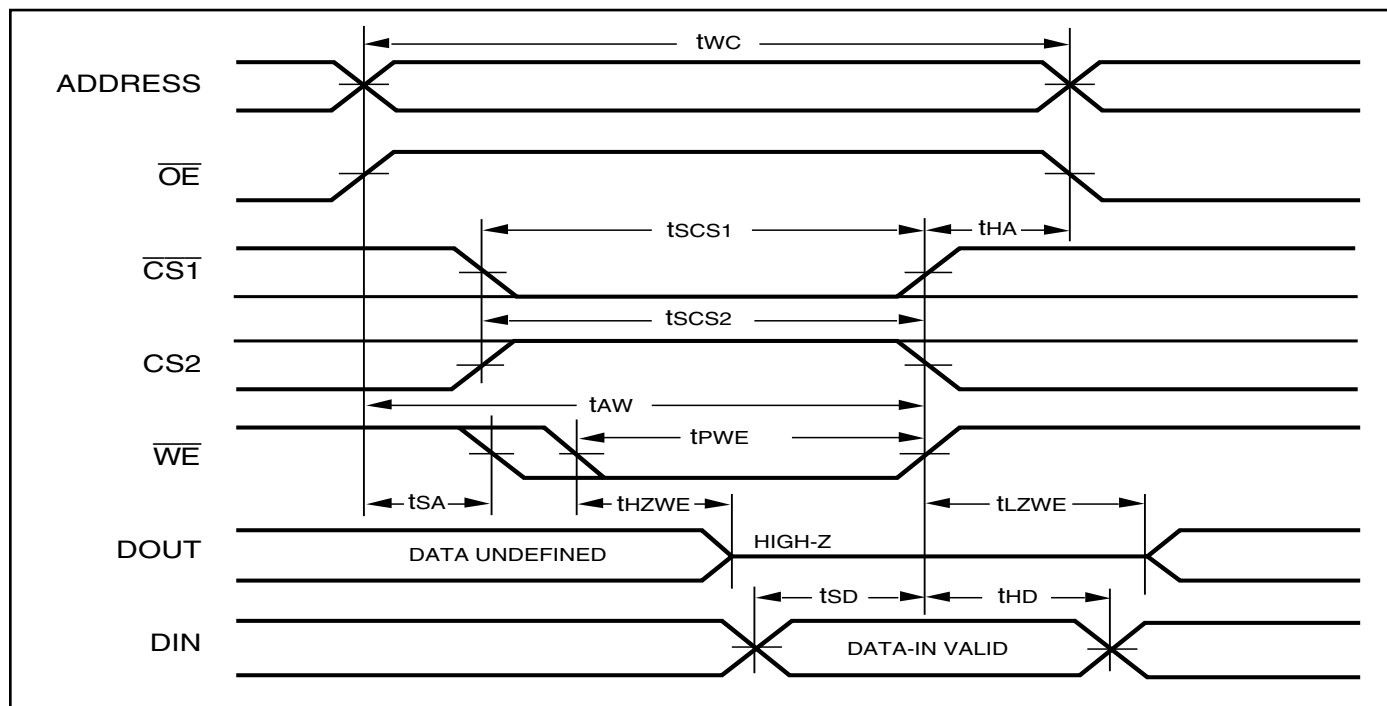
Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 1.5V, input pulse levels of 0V to 3.0V and output loading specified in Figure 1.
2. The internal write time is defined by the overlap of $\overline{CS1}$ LOW, CS2 HIGH, and $\overline{WE}$ LOW. All signals must be in valid states to initiate a Write, but any one can go inactive to terminate the Write. The Data Input Setup and Hold timing are referenced to the rising or falling edge of the signal that terminates the write.
3. Tested with the load in Figure 2. Transition is measured ± 500 mV from steady-state voltage. Not 100% tested.
4. t_{PWE} > t_{HZWE} + t_{SD} when $\overline{OE}$ is LOW.

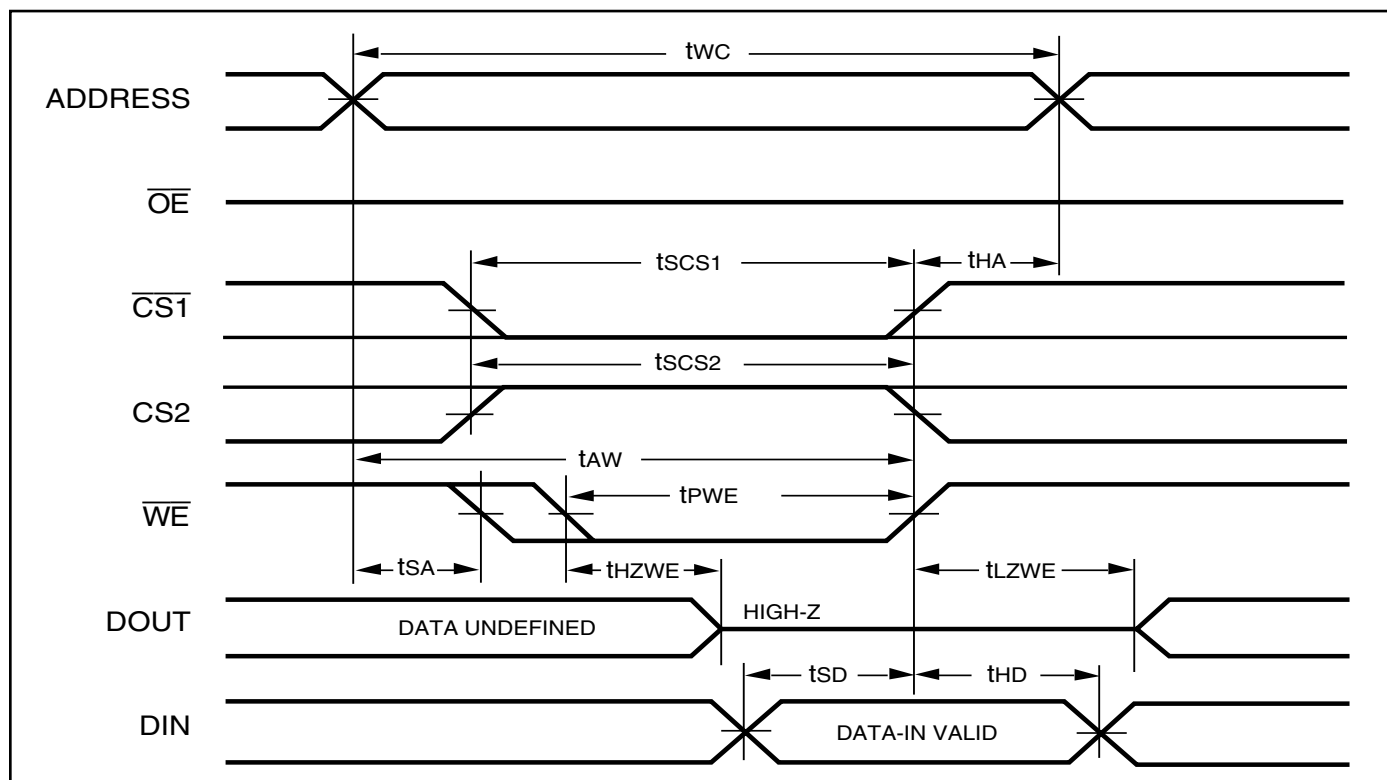
AC WAVEFORMS
WRITE CYCLE NO. 1 ($\overline{CS1}$ /CS2 Controlled, $\overline{OE}$ = HIGH or LOW)


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WRITE CYCLE NO. 2 ($\overline{WE}$ Controlled: $\overline{OE}$ is HIGH During Write Cycle)



WRITE CYCLE NO. 3 ($\overline{WE}$ Controlled: $\overline{OE}$ is LOW During Write Cycle)



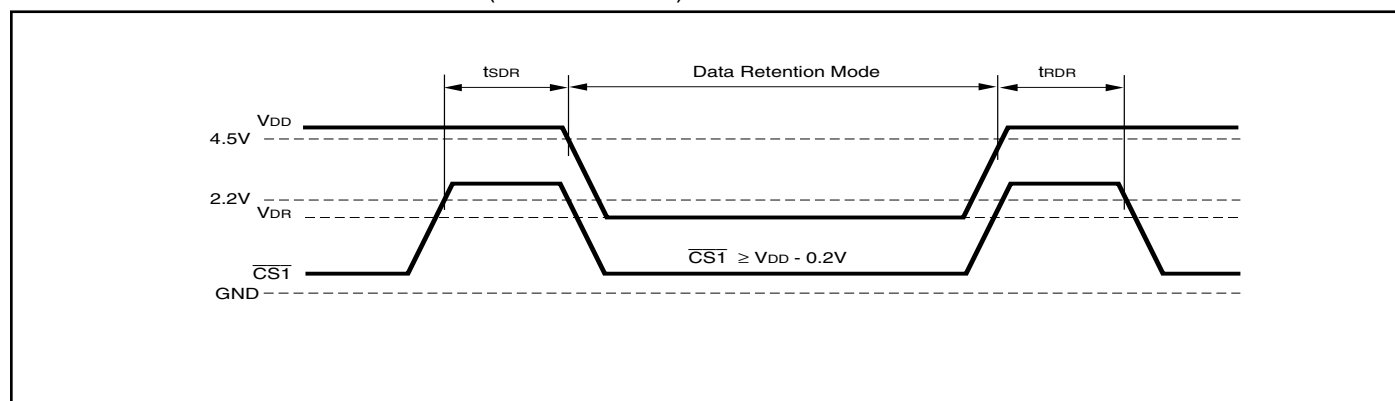
DATA RETENTION SWITCHING CHARACTERISTICS (4.5V - 5.5V)

Symbol	Parameter	Test Condition	Min.	Typ. ⁽¹⁾	Max.	Unit
V _{DR}	V _{DD} for Data Retention	See Data Retention Waveform	2.0		5.5	V
I _{DR}	Data Retention Current	V _{DD} = 2.0V and CS1 ≥ V _{DD} - 0.2V and (a) CS2 ≥ V _{DD} - 0.2V or (b) CS2 ≤ GND + 0.2V	—	15	20 40 60 180	μA
t _{SDR}	Data Retention Setup Time	See Data Retention Waveform	0		—	ns
t _{RDR}	Recovery Time	See Data Retention Waveform	t _{RC}		—	ns

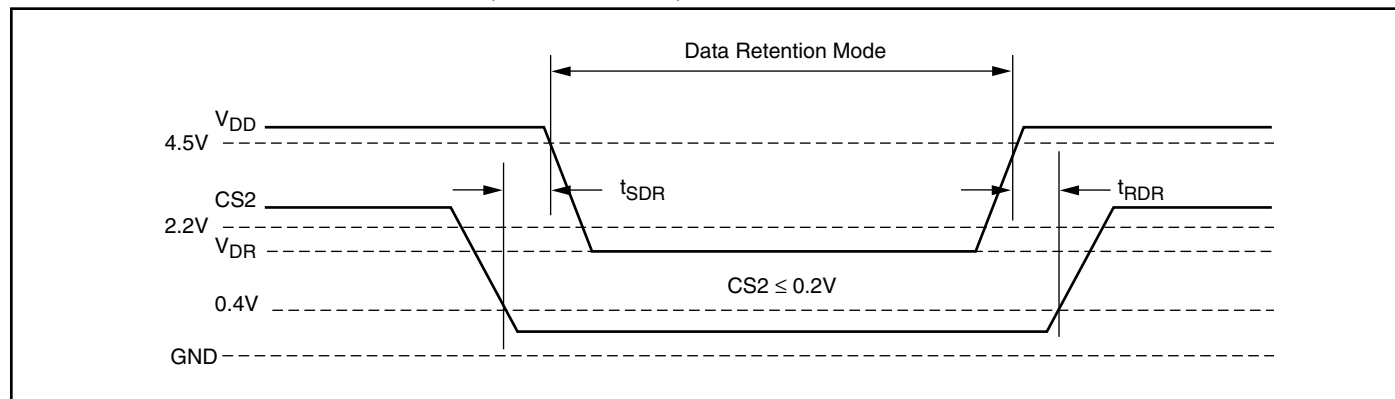
Note:

1. Typical Values are measured at V_{CC} = 5V, T_A = 25°C and not 100% tested.

DATA RETENTION WAVEFORM (CS1 Controlled)



DATA RETENTION WAVEFORM (CS2 Controlled)



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IS62C10248AL (4.5V - 5.5V)

Industrial Range: -40°C to +85°C

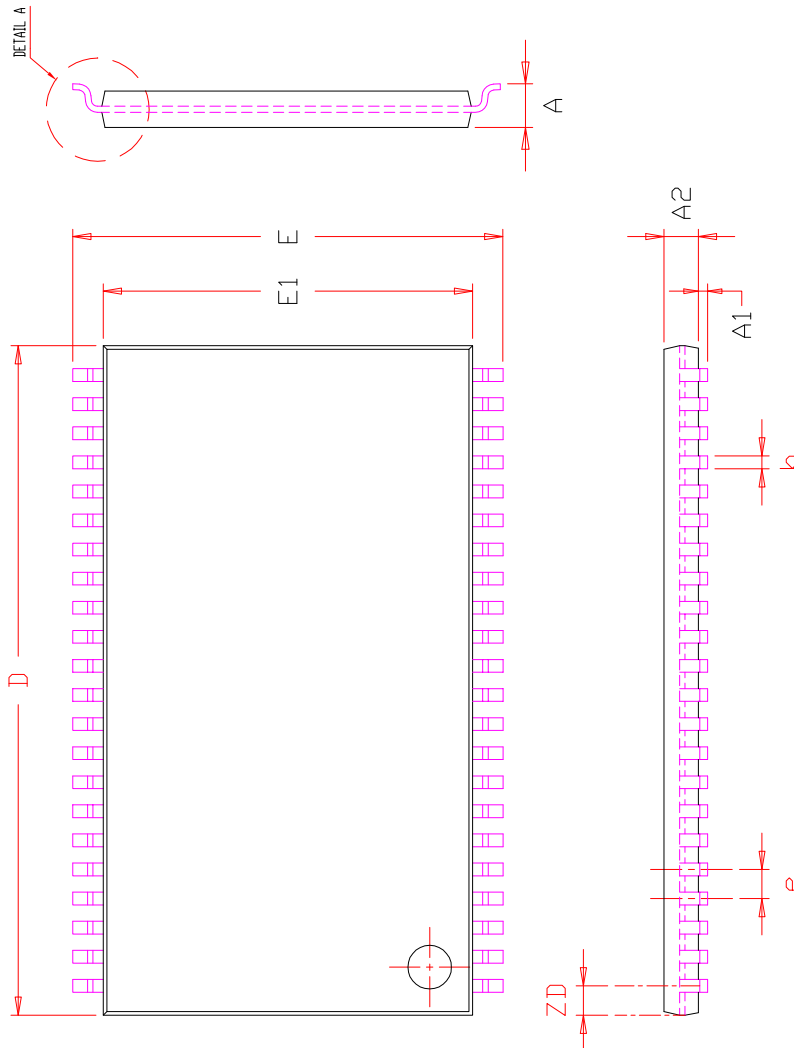
Speed (ns)	Order Part No.*	Package
55	IS62C10248AL-55TLI	TSOP-II, Lead-free
	IS62C10248AL-55MLI	mini BGA, Lead-free (9mmx11mm)

*Devices will meet 45ns when used in 0°C to +70°C temperature range.

IS65C10248AL (4.5V - 5.5V)

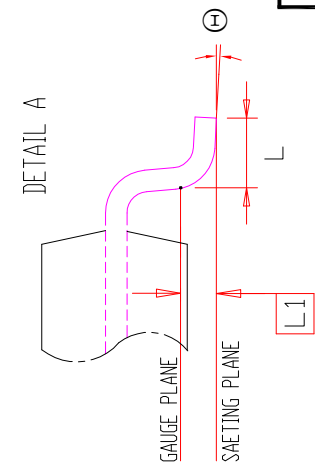
Industrial Range: -40°C to +125°C

Speed (ns)	Order Part No.	Package
55	IS65C10248AL-55CTLA3	TSOP-II, Lead-free, Copper Lead-frame
	IS65C10248AL-55MLA3	mini BGA, Lead-free (9mmx11mm)


NOTE :

1. CONTROLLING DIMENSION : MM
2. DIMENSION D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION.

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00		1.20	0.039		0.047
A1	0.05		0.15	0.002		0.006
A2	0.95	1.00	1.05	0.037	0.039	0.041
b	0.30		0.45	0.012		0.018
D	18.28	18.41	18.54	0.720	0.725	0.730
E	11.56	11.76	11.96	0.455	0.463	0.471
E1	10.03	10.16	10.29	0.395	0.400	0.405
e	0.80	BSC.		0.031	BSC.	
L	0.40		0.69	0.016		0.027
L1	0.25	BSC.		0.010	BSC.	
ZD	0.805	REF.		0.032	REF.	
⊖	0		8°	0		8°


TITLE
44L 400mil TSOP-2
Package Outline

REV.
F
DATE

06/04/2008



1. CONTROLLING DIMENSION : MM .
2. Reference document : JEDEC MO-207

SYM.	DIMENSION (mm)			DIMENSION (INCH)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.20	—	0.30	0.008	—	0.012
b	0.30	0.35	0.40	0.012	0.014	0.016
D	10.90	11.00	11.10	0.429	0.433	0.437
D1	5.25 BSC			0.207 BSC		
E	8.90	9.00	9.10	0.350	0.354	0.358
E1	3.75 BSC			0.148 BSC		
E	0.75 BSC			0.030 BSC		

	TITLE	48L 9x11mm TF-BGA Package Outline	REV.	B	DATE	08/21/2008
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