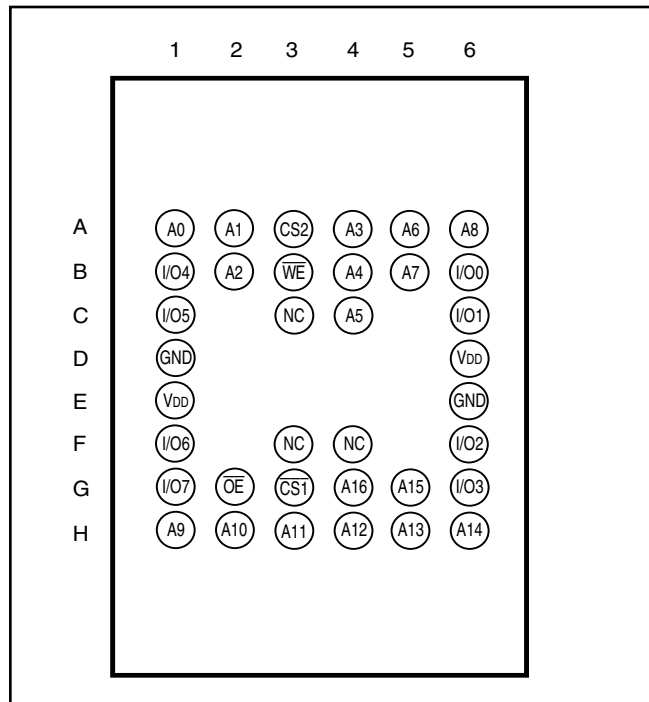


36-pin mini BGA (B) (6mm x 8mm)



A11	1	32	$\overline{OE}$
A9	2	31	A10
A8	3	30	$\overline{CS1}$
A13	4	29	I/O7
$\overline{WE}$	5	28	I/O6
CS2	6	27	I/O5
A15	7	26	I/O4
V _{DD}	8	25	I/O3
NC	9	24	GND
A16	10	23	I/O2
A14	11	22	I/O1
A12	12	21	I/O0
A7	13	20	A0
A6	14	19	A1
A5	15	18	A2
A4	16	17	A3

A0-A16	Address Inputs
$\overline{\text{CS}}1$	Chip Enable 1 Input
CS2	Chip Enable 2 Input
$\overline{\text{OE}}$	Output Enable Input
$\overline{\text{WE}}$	Write Enable Input
I/O0-I/O7	Input/Output
NC	No Connection
V _{DD}	Power
GND	Ground

Pin	Function
1	NC
2	A16
3	A14
4	A12
5	A7
6	A6
7	A5
8	A4
9	A3
10	A2
11	A1
12	A0
13	I/O0
14	I/O1
15	I/O2
16	GND
17	I/O3
18	I/O4
19	I/O5
20	I/O6
21	I/O7
22	$\overline{CS1}$
23	A10
24	$\overline{OE}$
25	A11
26	A9
27	A8
28	A13
29	$\overline{WE}$
30	CS2
31	A15
32	VDD

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}

ABSOLUTE MAXIMUM RATINGS⁽¹⁾

Symbol	Parameter	Value	Unit
V _{TERM}	Terminal Voltage with Respect to GND	−0.5 to V _{DD} + 0.5	V
V _{DD}	V _{DD} Relates to GND	−0.3 to 4.0	V
T _{STG}	Storage Temperature	−65 to +150	°C
P _T	Power Dissipation	1.0	W

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.

CAPACITANCE^(1,2)

Symbol	Parameter	Conditions	Max.	Unit
C _{IN}	Input Capacitance	V _{IN} = 0V	6	pF
C _{I/O}	Input/Output Capacitance	V _{OUT} = 0V	8	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} = 3.3V.

AC TEST CONDITIONS

Parameter	Unit (2.3V-3.6V)	Unit (3.3V ± 5%)	Unit (1.65V-2.2V)
Input Pulse Level	0.4V to V _{DD} - 0.3V	0.4V to V _{DD} - 0.3V	0.4V to V _{DD} - 0.3V
Input Rise and Fall Times	1V/ ns	1V/ ns	1V/ ns
Input and Output Timing and Reference Level (V _{Ref})	V _{DD} /2	$\frac{V_{DD}}{2} + 0.05$	0.9V
Output Load	See Figures 1 and 2	See Figures 1 and 2	See Figures 1 and 2
R1 (Ω)	317	317	13500
R2 (Ω)	351	351	10800
V _{TM} (V)	3.3V	3.3V	1.8V

AC TEST LOADS

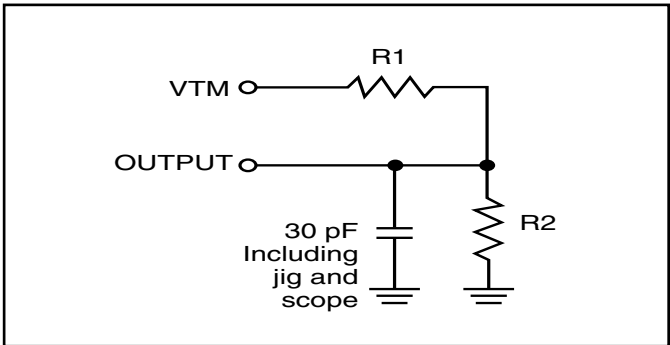


Figure 1.

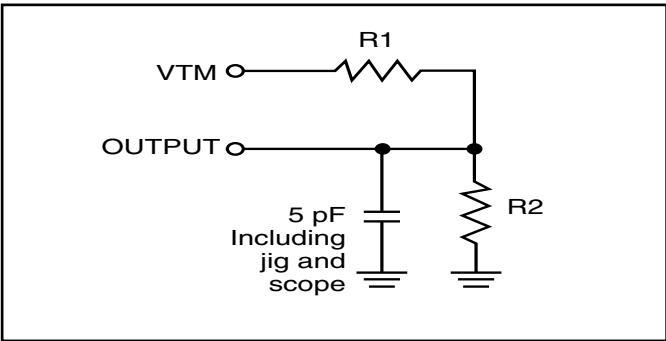


Figure 2.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 3.3V \pm 5\%$

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	$V_{DD} = \text{Min.}, I_{OH} = -1 \text{ mA}$	2.4	—	V
V_{OL}	Output LOW Voltage	$V_{DD} = \text{Min.}, I_{OL} = 2.1 \text{ mA}$	—	0.4	V
V_{IH}	Input HIGH Voltage		2	$V_{DD} + 0.3$	V
V_{IL}	Input LOW Voltage ⁽¹⁾		-0.3	0.8	V
I_{LI}	Input Leakage	$GND \leq V_{IN} \leq V_{DD}$	-1	1	μA
I_{LO}	Output Leakage	$GND \leq V_{OUT} \leq V_{DD}$, Outputs Disabled	-1	1	μA

Note:

- V_{IL} (min.) = -0.3V DC; V_{IL} (min.) = -2.0V AC (pulse width < 10 ns). Not 100% tested.
 V_{IH} (max.) = $V_{DD} + 0.3V$ DC; V_{IH} (max.) = $V_{DD} + 2.0V$ AC (pulse width < 10 ns). Not 100% tested.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 2.3V-3.6V$

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	$V_{DD} = \text{Min.}, I_{OH} = -1.0 \text{ mA}$	1.8	—	V
V_{OL}	Output LOW Voltage	$V_{DD} = \text{Min.}, I_{OL} = 2.1 \text{ mA}$	—	0.4	V
V_{IH}	Input HIGH Voltage		2.0	$V_{DD} + 0.3$	V
V_{IL}	Input LOW Voltage ⁽¹⁾		-0.3	0.8	V
I_{LI}	Input Leakage	$GND \leq V_{IN} \leq V_{DD}$	-1	1	μA
I_{LO}	Output Leakage	$GND \leq V_{OUT} \leq V_{DD}$, Outputs Disabled	-1	1	μA

Note:

- V_{IL} (min.) = -0.3V DC; V_{IL} (min.) = -2.0V AC (pulse width < 10 ns). Not 100% tested.
 V_{IH} (max.) = $V_{DD} + 0.3V$ DC; V_{IH} (max.) = $V_{DD} + 2.0V$ AC (pulse width < 10 ns). Not 100% tested.

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

$V_{DD} = 1.65V-2.2V$

Symbol	Parameter	Test Conditions	V_{DD}	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	$I_{OH} = -0.1 \text{ mA}$	1.65-2.2V	1.4	—	V
V_{OL}	Output LOW Voltage	$I_{OL} = 0.1 \text{ mA}$	1.65-2.2V	—	0.2	V
V_{IH}	Input HIGH Voltage		1.65-2.2V	1.4	$V_{DD} + 0.2$	V
$V_{IL}^{(1)}$	Input LOW Voltage		1.65-2.2V	-0.2	0.4	V
I_{LI}	Input Leakage	$GND \leq V_{IN} \leq V_{DD}$		-1	1	μA
I_{LO}	Output Leakage	$GND \leq V_{OUT} \leq V_{DD}$, Outputs Disabled		-1	1	μA

Note:

- V_{IL} (min.) = -0.3V DC; V_{IL} (min.) = -2.0V AC (pulse width < 10 ns). Not 100% tested.
 V_{IH} (max.) = $V_{DD} + 0.3V$ DC; V_{IH} (max.) = $V_{DD} + 2.0V$ AC (pulse width < 10 ns). Not 100% tested.

OPERATING RANGE (V_{DD})

Range	Ambient Temperature	V _{DD}	Speed
Commercial	0°C to +70°C	1.65V-2.2V	45ns
Industrial	-40°C to +85°C	1.65V-2.2V	55ns
Automotive	-40°C to +125°C	1.65V-2.2V	55ns

OPERATING RANGE (V_{DD})

Range	Ambient Temperature	V _{DD} (45 ns)	V _{DD} (35 ns)
Commercial	0°C to +70°C	2.3V-3.6V	3.3V±5%
Industrial	-40°C to +85°C	2.3V-3.6V	3.3V±5%

OPERATING RANGE (V_{DD})

Range	Ambient Temperature	V _{DD} (45 ns)
Automotive	-40°C to +125°C	2.3V-3.6V

POWER SUPPLY CHARACTERISTICS⁽¹⁾ (Over Operating Range)

Symbol	Parameter	Test Conditions		-35		-45		-55		Unit
				Min.	Max.	Min.	Max.	Min.	Max.	
I _{CC}	V _{DD} Dynamic Operating Supply Current	V _{DD} = Max.,	Com.	—	8	—	6	—	5	mA
		I _{OUT} = 0 mA, f = f _{MAX}	Ind.	—	12	—	8	—	7	
		$\overline{CS1} = V_{IL}$	Auto.	—	15	—	12	—	12	
		V _{IN} ≥ V _{DD} - 0.3V, or V _{IN} ≤ 0.4V	typ. ⁽²⁾		4					
I _{CC1}	Operating Supply Current	V _{DD} = Max.,	Com.	—	2.5	—	2.5	—	2.5	mA
		I _{OUT} = 0 mA, f = 0	Ind.	—	2.5	—	2.5	—	2.5	
		$\overline{CS1} = V_{IL}$	Auto.	—	3	—	3	—	3	
		V _{IN} ≥ V _{DD} - 0.3V, or V _{IN} ≤ 0.4V								
I _{SB2}	CMOS Standby Current (CMOS Inputs)	V _{DD} = Max.,	Com.	—	2	—	2	—	2	μA
		$\overline{CS1} \geq V_{DD} - 0.2V$,	Ind.	—	4	—	4	—	4	
		V _{IN} ≥ V _{DD} - 0.2V, or	Auto.	—	18	—	18	—	18	
		V _{IN} ≤ 0.2V, f = 0	typ. ⁽²⁾		0.6					

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_{DD} = 3.0V, T_A = 25°C and not 100% tested.

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

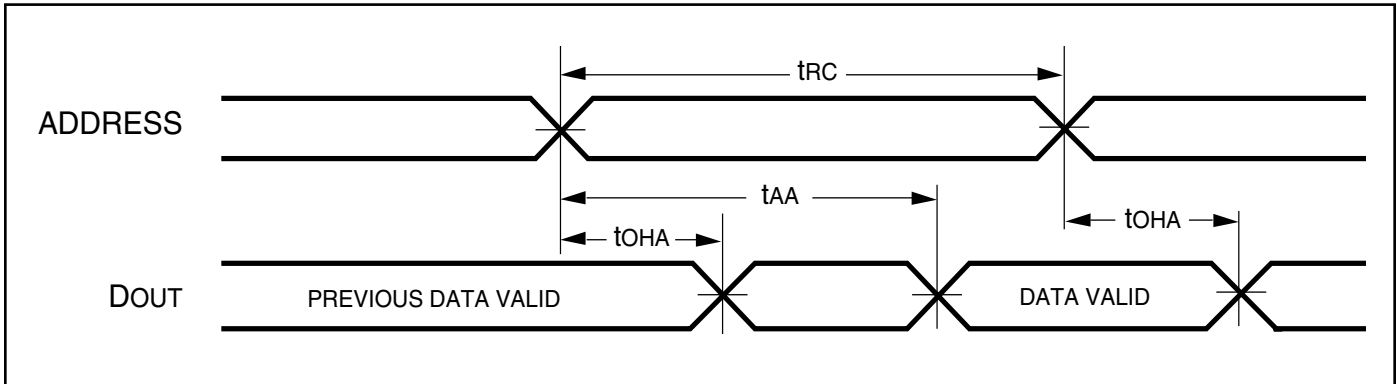
Symbol	Parameter	35 ns		45 ns		55 ns		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
t _{RC}	Read Cycle Time	35	—	45	—	55	—	ns
t _{AA}	Address Access Time	—	35	—	45	—	55	ns
t _{OHA}	Output Hold Time	10	—	10	—	10	—	ns
t _{ACS1} /t _{ACS2}	$\overline{\text{CS1}}$ /CS2 Access Time	—	35	—	45	—	55	ns
t _{DOE}	$\overline{\text{OE}}$ Access Time	—	10	—	20	—	25	ns
t _{HZOE} ⁽²⁾	$\overline{\text{OE}}$ to High-Z Output	—	10	—	15	—	20	ns
t _{LZOE} ⁽²⁾	$\overline{\text{OE}}$ to Low-Z Output	3	—	5	—	5	—	ns
t _{HZCS1} /t _{HZCS2} ⁽²⁾	$\overline{\text{CS1}}$ /CS2 to High-Z Output	0	10	0	15	0	20	ns
t _{LZCS1} /t _{LZCS2} ⁽²⁾	$\overline{\text{CS1}}$ /CS2 to Low-Z Output	5	—	10	—	10	—	ns

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 0.9V/1.5V, input pulse levels of 0.4 to V_{DD}-0.2V/V_{DD}-0.3V 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.

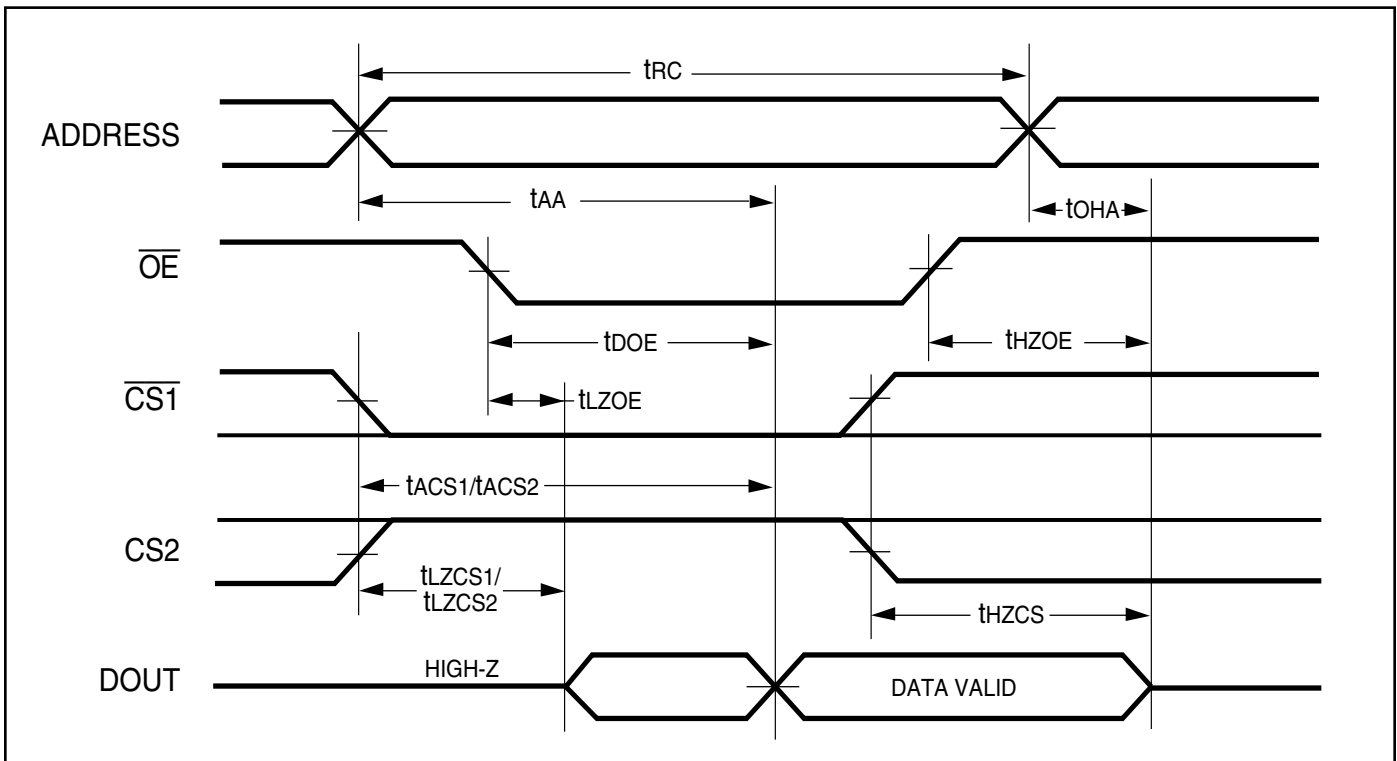
AC WAVEFORMS

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) ($\overline{CS1}$, $CS2$, $\overline{OE}$ 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)

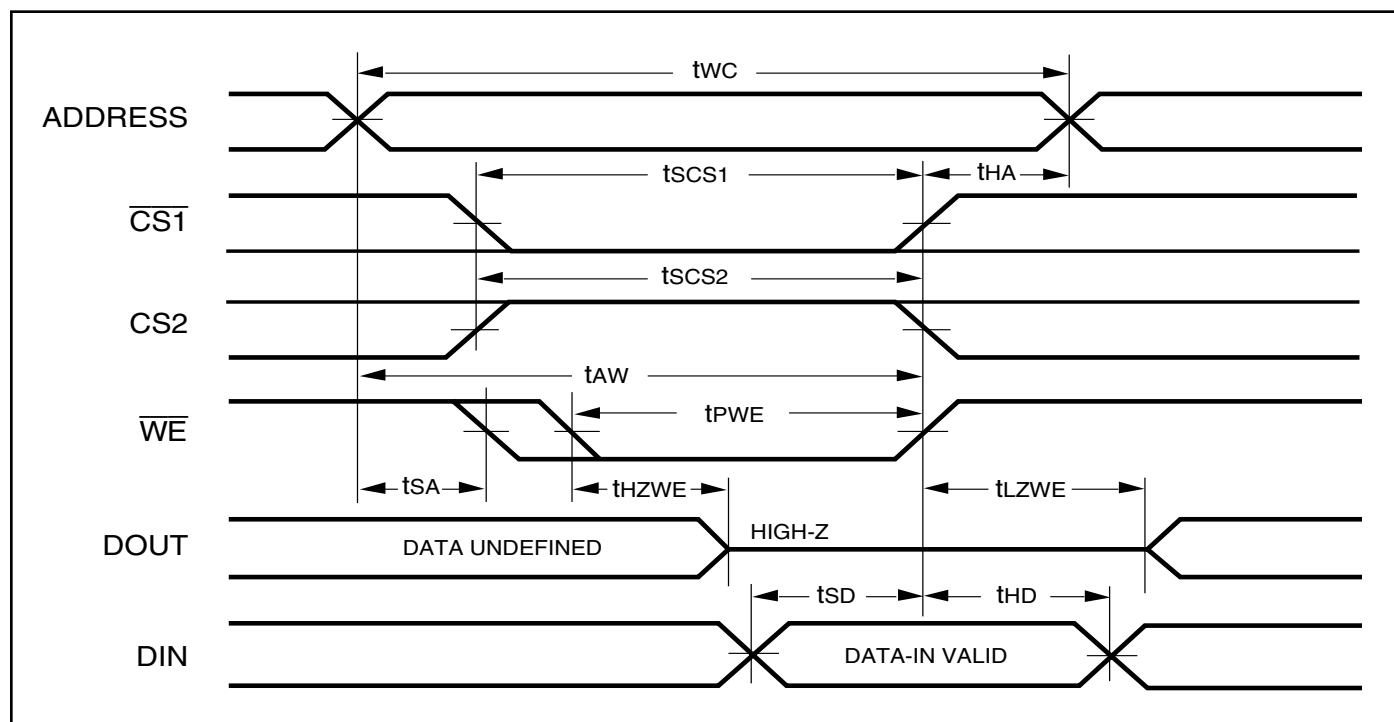
Symbol	Parameter	35ns		45ns		55 ns		Unit
		Min.	Max.	Min.	Max.	Min.	Max.	
t _{WC}	Write Cycle Time	35	—	45	—	55	—	ns
t _{SCS1} /t _{SCS2}	$\overline{CS1}/\overline{CS2}$ to Write End	25	—	35	—	45	—	ns
t _{AW}	Address Setup Time to Write End	25	—	35	—	45	—	ns
t _{HA}	Address Hold from Write End	0	—	0	—	0	—	ns
t _{SA}	Address Setup Time	0	—	0	—	0	—	ns
t _{PWE}	$\overline{WE}$ Pulse Width	25	—	35	—	40	—	ns
t _{SD}	Data Setup to Write End	20	—	20	—	25	—	ns
t _{HD}	Data Hold from Write End	0	—	0	—	0	—	ns
t _{HZWE} ⁽³⁾	$\overline{WE}$ LOW to High-Z Output	—	10	—	20	—	20	ns
t _{LZWE} ⁽³⁾	$\overline{WE}$ HIGH to Low-Z Output	3	—	5	—	5	—	ns

Notes:

1. Test conditions assume signal transition times of 5 ns or less, timing reference levels of 0.9V/1.5V, input pulse levels of 0.4V to V_{DD}-0.2V/V_{DD}-0.3V and output loading specified in Figure 1.
2. The internal write time is defined by the overlap of $\overline{CS1}$ LOW, $\overline{CS2}$ HIGH and $\overline{UB}$ or $\overline{LB}$, 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.

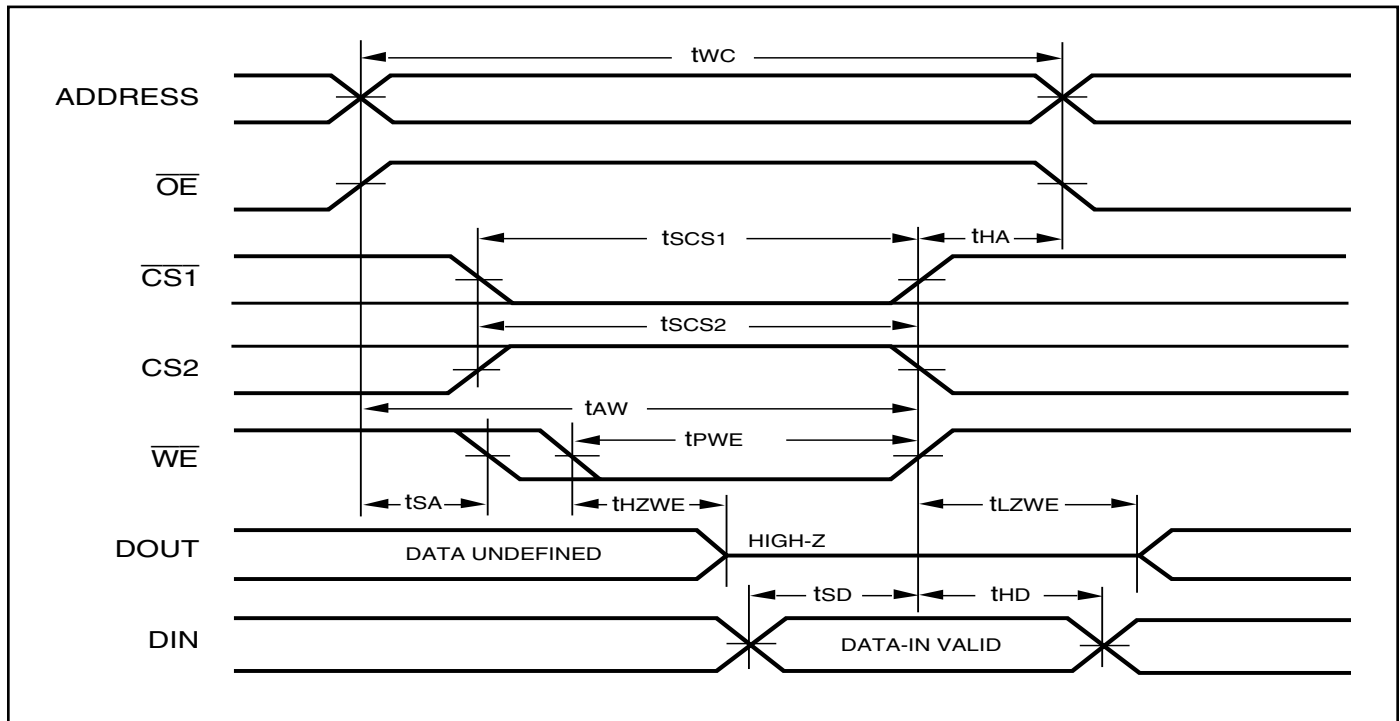
AC WAVEFORMS

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

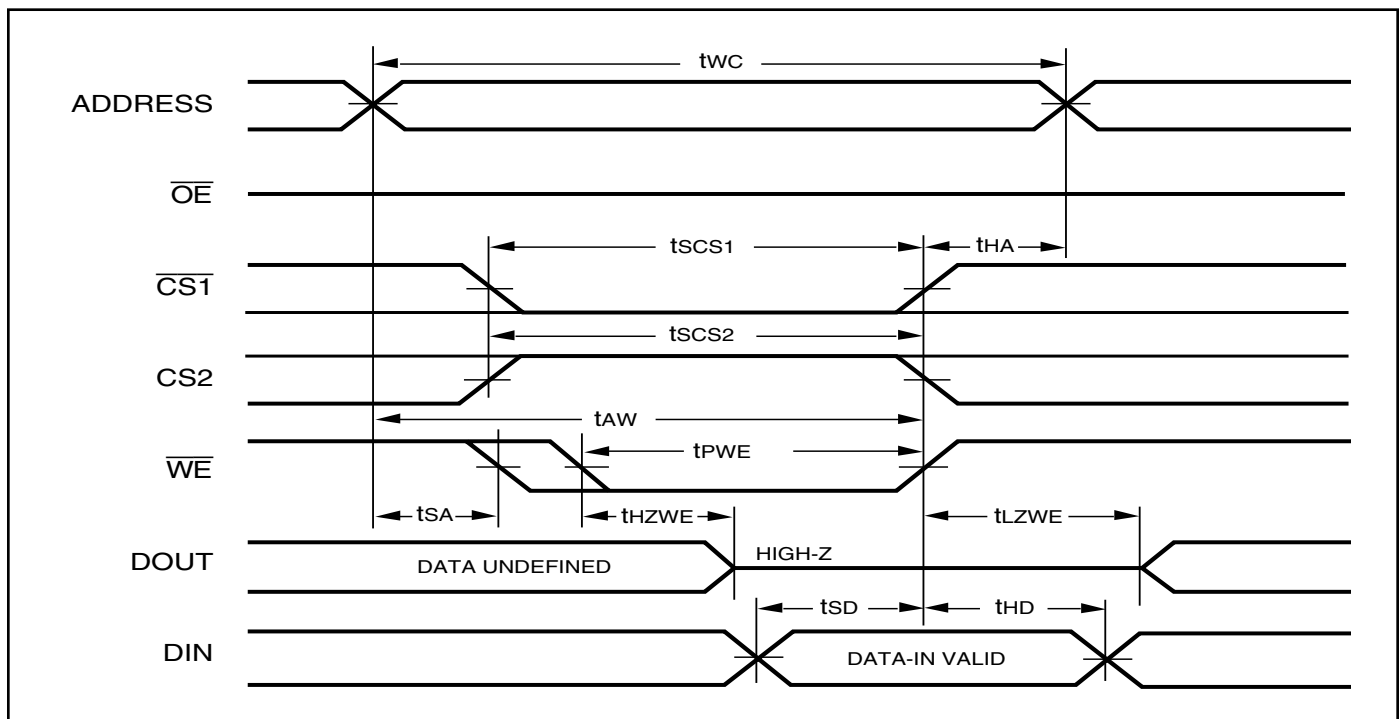


AC WAVEFORMS

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)

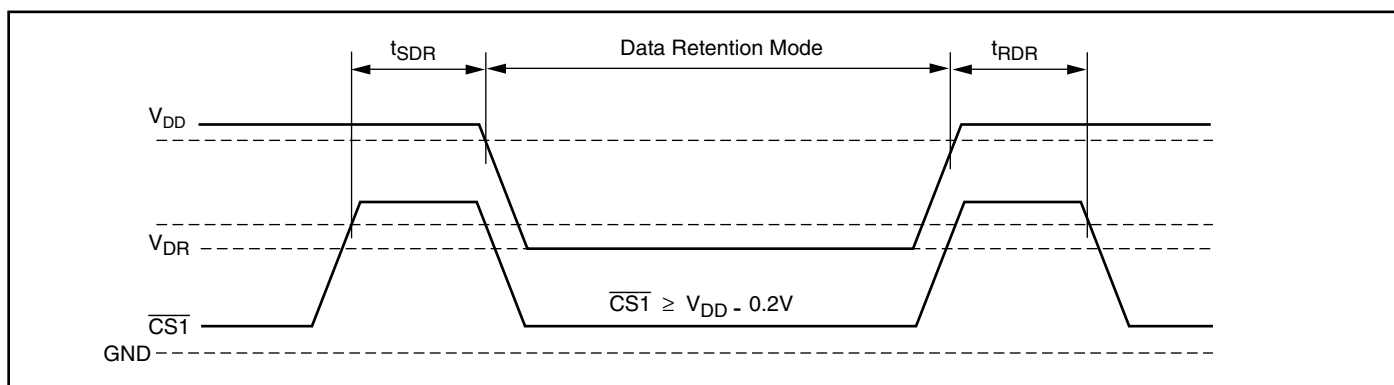


DATA RETENTION SWITCHING CHARACTERISTICS

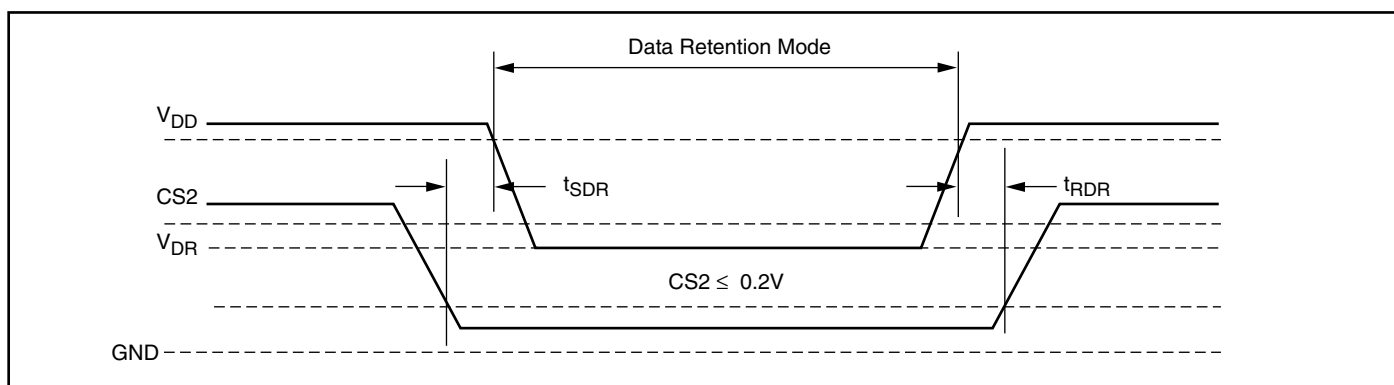
Symbol	Parameter	Test Condition	Min.	typ. ⁽¹⁾	Max.	Unit
V _{DR}	V _{DD} for Data Retention	See Data Retention Waveform	1.2		3.6	V
I _{DR}	Data Retention Current	V _{DD} = 1.2V, CS1 ≥ V _{DD} - 0.2V	—	0.5	2 4 18	μA Com. Ind. Auto.
t _{SDR}	Data Retention Setup Time	See Data Retention Waveform	0		—	ns
t _{RDR}	Recovery Time	See Data Retention Waveform	t _{RC}		—	ns

Note: 1. Typical values are measured at V_{DD} = 3.0V, T_A = 25°C and not 100% tested.

DATA RETENTION WAVEFORM (CS1 Controlled)



DATA RETENTION WAVEFORM (CS2 Controlled)



ORDERING INFORMATION

IS62WV1288DALL (1.65V - 2.2V)

Industrial Range: -40°C to +85°C

Speed (ns)	Order Part No.	Package
55	IS62WV1288DALL-55TLI	TSOP-I, Lead-free (8mmx20mm)
	IS62WV1288DALL-55HLI	sTSOP-I, Lead-free (8mmx13.4mm)
	IS62WV1288DALL-55BI	mini BGA (6mm x 8mm)
	IS62WV1288DALL-55BLI	mini BGA (6mm x 8mm), Lead-free

ORDERING INFORMATION

IS62WV1288DBLL (2.3V - 3.6V)

Industrial Range: -40°C to +85°C¹

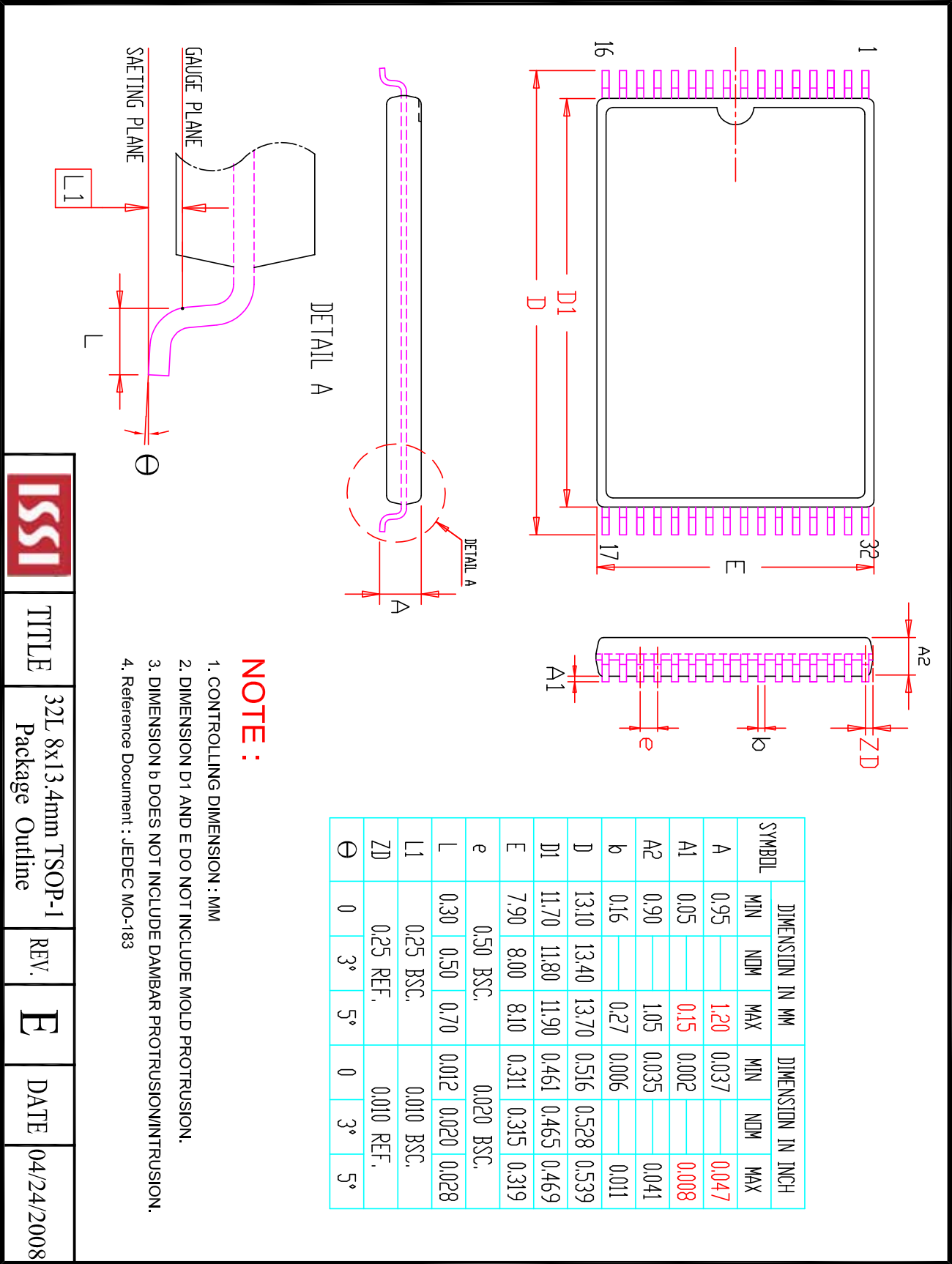
Speed (ns)	Order Part No.	Package
45	IS62WV1288DBLL-45TLI	TSOP-I, Lead-free (8mmx20mm)
	IS62WV1288DBLL-45HLI	sTSOP-I, Lead-free (8mmx13.4mm)
	IS62WV1288DBLL-45QLI	SOP, Lead-free
	IS62WV1288DBLL-45BI	mini BGA (6mm x 8mm)
	IS62WV1288DBLL-45BLI	mini BGA (6mm x 8mm), Lead-free

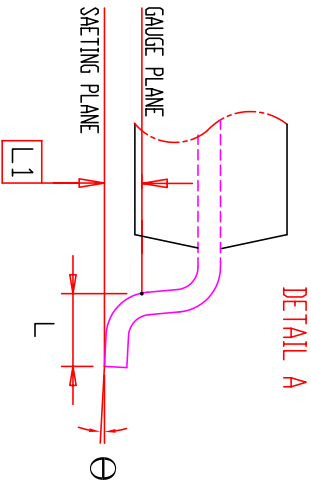
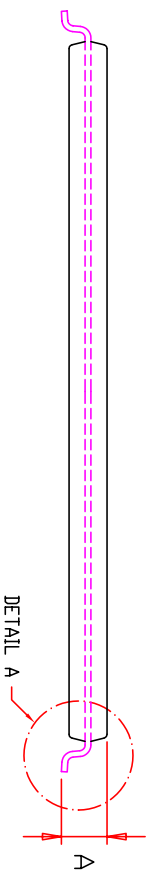
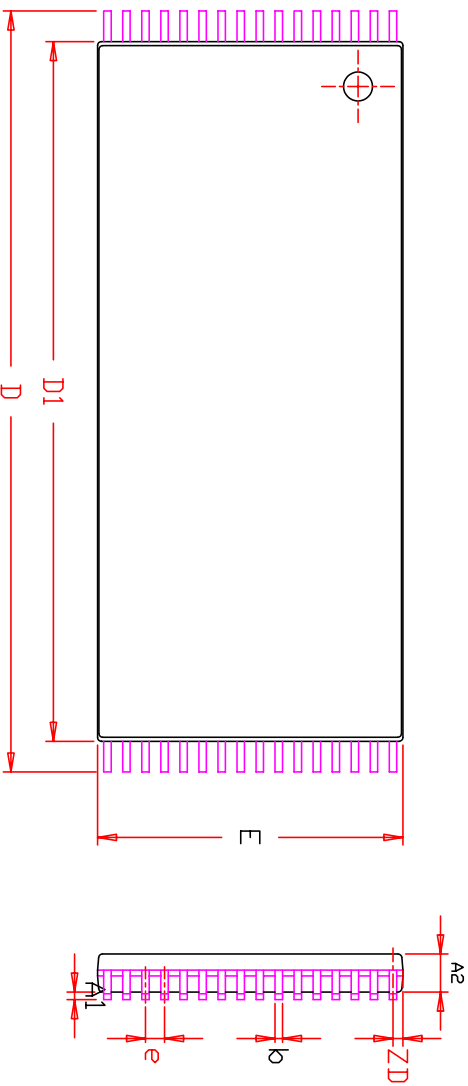
Automotive Range: -40°C to +125°C

Speed (ns)	Order Part No.	Package
45	IS65WV1288DBLL-45TLA3	TSOP-I, Lead-free (8mmx20mm)
	IS65WV1288DBLL-45HLA3	sTSOP-I, Lead-free (8mmx13.4mm)
	IS65WV1288DBLL-45QLA3	SOP, Lead-free

Notes:

1. Speed = 35ns for temperature range of 0°C to +70°C or for V_{DD} = 3.3V ± 5%.



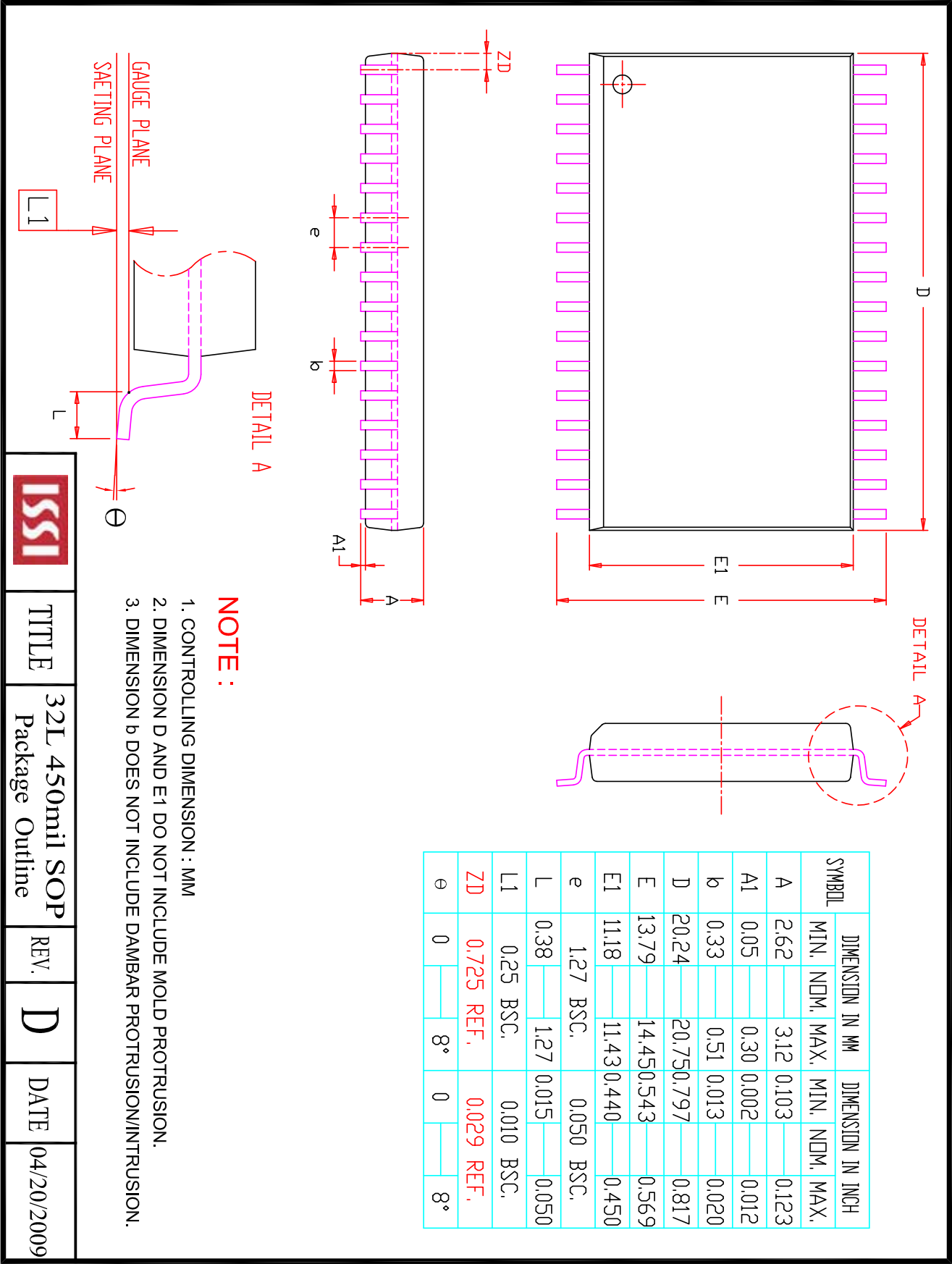


SYMBOL	DIMENSION IN MM		
	MIN	NDM	MAX
A	1.00		1.20
A1	0.05		0.20
A2	0.95	1.00	1.05
b	0.17		0.27
D	19.80	20.00	20.20
D1	18.30	18.40	18.50
E	7.80	8.00	8.20
e	0.50 BSC.		
L	0.40		0.70
L1		0.25 BSC.	
ZD		0.25 REF.	
Θ	0	5°	8°

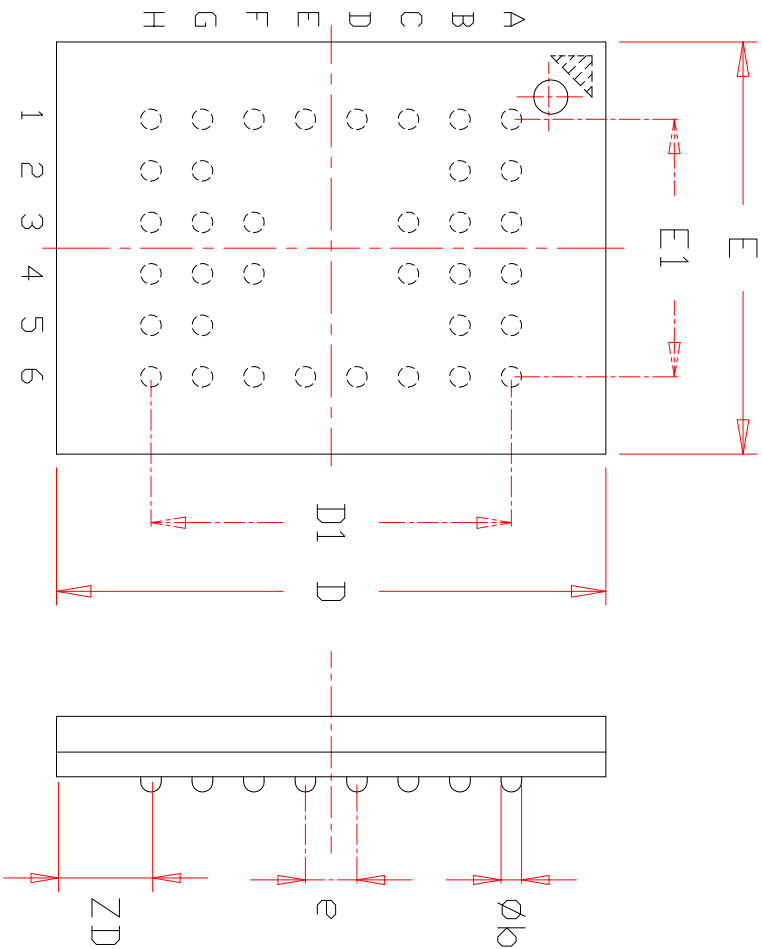
NOTE :

1. Controlling dimension : mm
2. Dimension D1 adn E do not include mold protrusion .
3. Dimension b does not include dambar protrusion/intrusion.
4. Formed leads shall be planar with respect to one another within 0.1mm at the seating plane after final test.

ISSI®	TITLE	REV.	E	DATE	
	32L 8x20mm TSOP-1 Package Outline			06/08/2006	



TOP VIEW



SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A			1.20			0.047
A1	0.20		0.30	0.008		0.012
øb	0.30	0.35	0.40	0.012	0.014	0.016
D	7.90	8.00	8.10	0.311	0.315	0.319
D1	5.25	BSC.		0.207	BSC.	
E	5.90	6.00	6.10	0.232	0.236	0.240
E1	3.75	BSC.		0.148	BSC.	
e	0.75	BSC.		0.030	BSC.	
ZD	1.375	REF.		0.054	REF.	
ZE	1.125	REF.		0.044	REF.	

NOTE :

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



TITLE

36/48L 6x8mm TF-BGA
Package Outline

REV.

E

DATE

08/12/2008