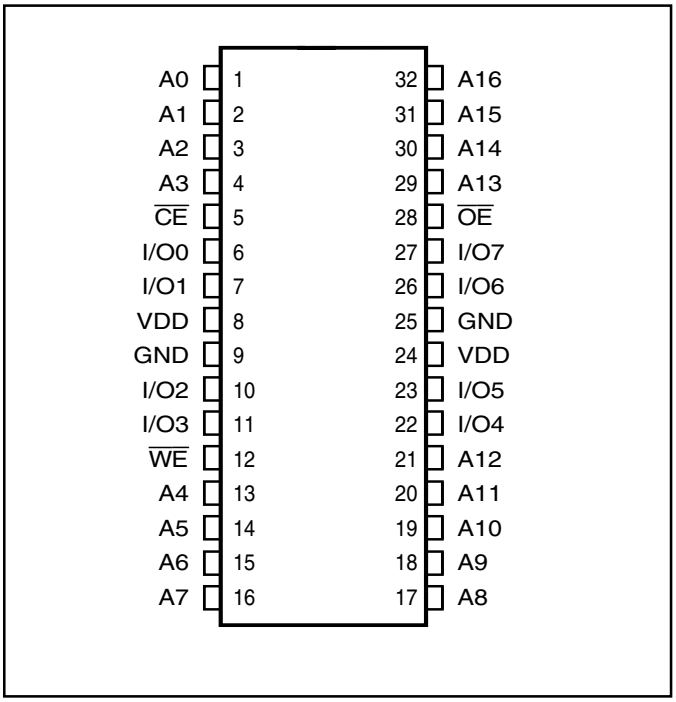
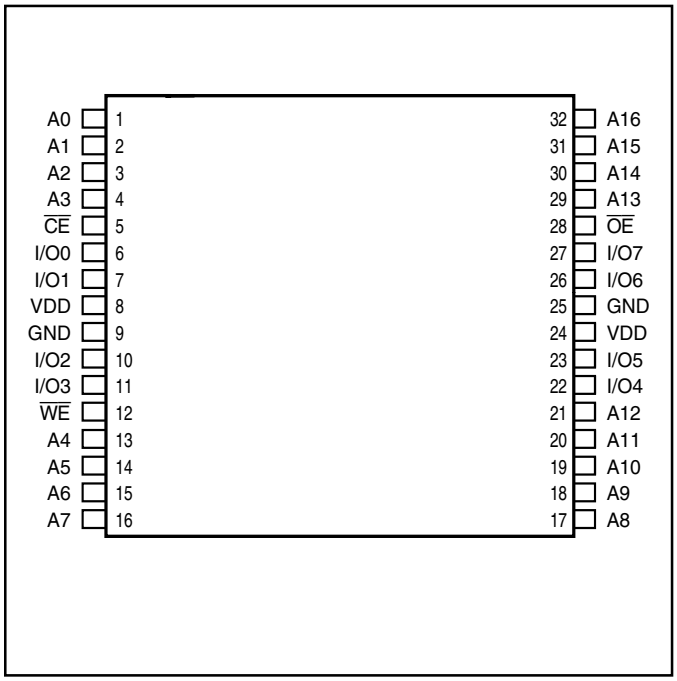
PIN CONFIGURATION
32-Pin SOJ



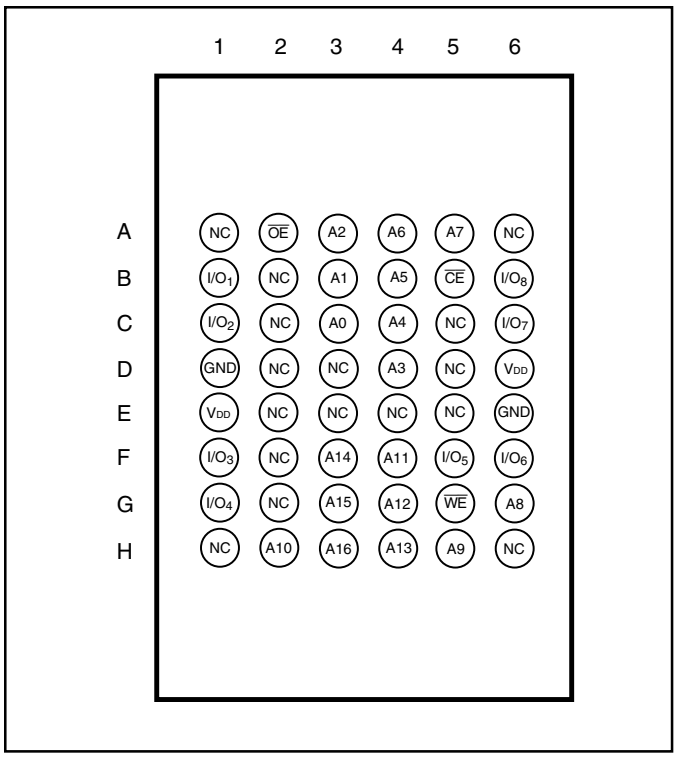
PIN CONFIGURATION
32-Pin TSOP (Type II) (T)
32-Pin sTSOP (Type I) (H)



PIN DESCRIPTIONS

A0-A16	Address Inputs
$\overline{CE}$	Chip Enable Input
$\overline{OE}$	Output Enable Input
$\overline{WE}$	Write Enable Input
I/O0-I/O7	Bidirectional Ports
V_{DD}	Power
GND	Ground

PIN CONFIGURATION
48-mini BGA (B) (6 mm x 8 mm)



TRUTH TABLE

Mode	$\overline{WE}$	$\overline{CE}$	$\overline{OE}$	I/O Operation	V_{DD} Current
Not Selected (Power-down)	X	H	X	High-Z	I_{SB1}, I_{SB2}
Output Disabled	H	L	H	High-Z	I_{CC1}, I_{CC2}
Read	H	L	L	D_{OUT}	I_{CC1}, I_{CC2}
Write	L	L	X	D_{IN}	I_{CC1}, I_{CC2}

ABSOLUTE MAXIMUM RATINGS(1)

Symbol	Parameter	Value	Unit
V_{TERM}	Terminal Voltage with Respect to GND	–0.5 to V_{DD}+0.5	V
T_{STG}	Storage Temperature	–65 to +150	°C
P_T	Power Dissipation	1.5	W
V_{DD}	V_{DD} Related to GND	-0.2 to +3.9	V

Note:
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.

OPERATING RANGE (V_{DD})

Range	Ambient Temperature	V_{DD} (15 ns)	V_{DD} (12 ns)
Commercial	0°C to +70°C	2.5V-3.6V	3.3V ± 10%
Industrial	–40°C to +85°C	2.5V-3.6V	3.3V ± 10%
Automotive	–40°C to +125°C	2.5V-3.6V	3.3V ± 10%

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

V_{DD} = 2.5V-3.6V

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{DD} = Min., I_{OH} = –1.0 mA	2.3	—	V
V_{OL}	Output LOW Voltage	V_{DD} = Min., I_{OL} = 1.0 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 ≤ V_{IN} ≤ V_{DD}	–2	2	µA
I_{LO}	Output Leakage	GND ≤ V_{OUT} ≤ V_{DD}, Outputs Disabled	–2	2	µA

Note:
1. 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} = 3.3V ± 10%

Symbol	Parameter	Test Conditions	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	V_{DD} = Min., I_{OH} = –4.0 mA	2.4	—	V
V_{OL}	Output LOW Voltage	V_{DD} = Min., I_{OL} = 8.0 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 ≤ V_{IN} ≤ V_{DD}	–2	2	µA
I_{LO}	Output Leakage	GND ≤ V_{OUT} ≤ V_{DD}, Outputs Disabled	–2	2	µA

Note:
1. 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.

POWER SUPPLY CHARACTERISTICS[1] (Over Operating Range)

Symbol	Parameter	Test Conditions	Options	-12 ns Min.	-12 ns Max.	-15 ns Min.	-15 ns Max.	Unit
I_{CC}	V_{DD} Dynamic Operating Supply Current	V_{DD} = Max., I_{OUT} = 0 mA, f = f_{MAX}	COM.	—	35	—	30	mA
			IND.	—	45	—	40	
			AUTO	—	60	—	50	
			typ.[2]	—	20	—	20	
I_{CC1}	Operating Supply Current	V_{DD} = Max., Iout = 0mA, f = 0	COM.	—	5	—	5	mA
			IND.	—	5	—	5	
			AUTO	—	5	—	5	
I_{SB1}	TTL Standby Current (TTL Inputs)	V_{DD} = Max., V_{IN} = V_{IH} or V_{IL} $\overline{CE} \geq V_{IH}$, f = 0	COM.	—	3	—	3	mA
			IND.	—	4	—	4	
			AUTO	—	4	—	4	
I_{SB2}	CMOS Standby Current (CMOS Inputs)	V_{DD} = Max., $\overline{CE} \geq V_{DD} - 0.2V$, $V_{IN} \geq V_{DD} - 0.2V$, or $V_{IN} \leq 0.2V$, f = 0	COM.	—	20	—	20	uA
			IND.	—	50	—	50	
			AUTO	—	75	—	75	
			typ.[2]	—	6	—	6	

Note:
1. At f = f_{MAX}, address and data inputs are cycling at the maximum frequency, f = 0 means no input lines change.
2. Typical values are measured at V_{DD}=2.5V, T_A=25°C. Not 100% tested.

CAPACITANCE[1]

Symbol	Parameter	Conditions	Max.	Unit
C_{IN}	Input Capacitance	V_{IN} = 0V	6	pF
C_{OUT}	Input/Output Capacitance	V_{OUT} = 0V	8	pF

Note:
1. Tested initially and after any design or process changes that may affect these parameters.

AC TEST CONDITIONS

Parameter	Unit (2.5V-3.6V)	Unit (3.3V ± 10%)
Input Pulse Level	0V to V_{DD} V	0V to V_{DD} V
Input Rise and Fall Times	1.5ns	1.5ns
Input and Output Timing and Reference Level (V_{Ref})	$V_{DD}/2$	$V_{DD}/2$ + 0.05
Output Load	See Figures 1a and 1b	See Figures 1a and 1b

AC TEST LOADS

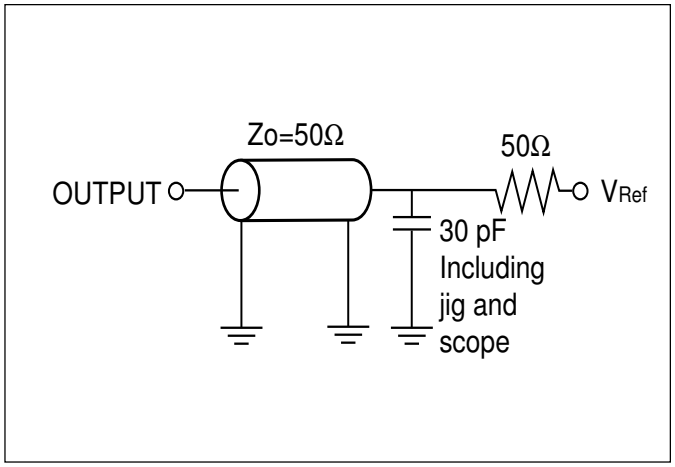


Figure 1a.

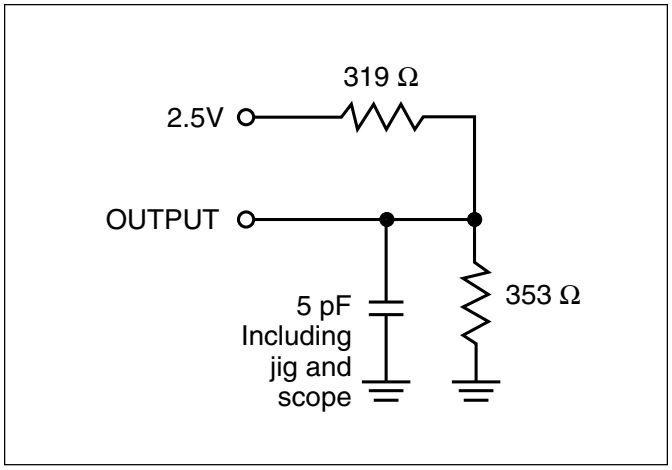


Figure 1b.

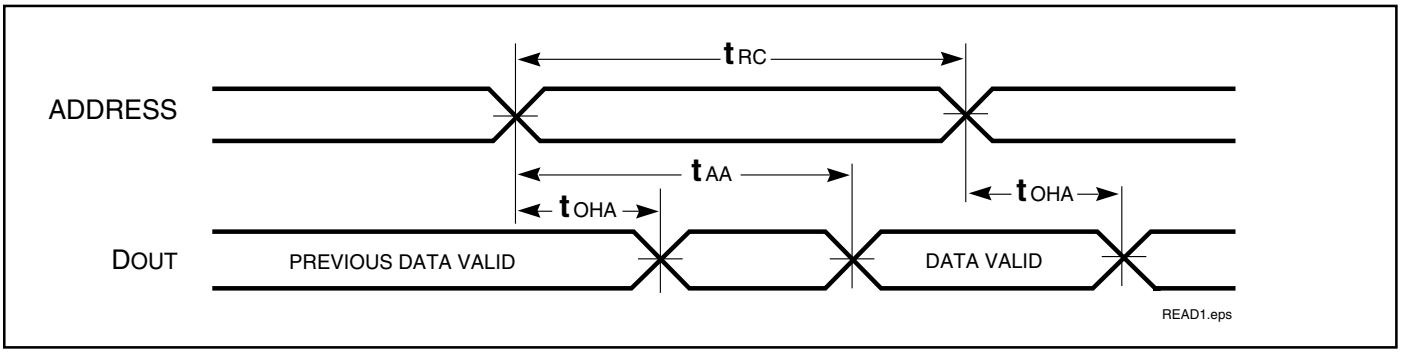
READ CYCLE SWITCHING CHARACTERISTICS[1] (Over Operating Range)

Symbol	Parameter	-12 ns Min.	-12 ns Max.	-15 ns Min.	-15 ns Max.	Unit
t_{RC}	Read Cycle Time	12	—	15	—	ns
t_{AA}	Address Access Time	—	12	—	15	ns
t_{OHA}	Output Hold Time	3	—	3	—	ns
t_{ACE}	$\overline{CE}$ Access Time	—	12	—	15	ns
t_{DOE}	$\overline{OE}$ Access Time	—	6	—	7	ns
t_{LZOE}[2]	$\overline{OE}$ to Low-Z Output	0	—	0	—	ns
t_{HZOE}[2]	$\overline{OE}$ to High-Z Output	0	6	0	6	ns
t_{LZCE}[2]	$\overline{CE}$ to Low-Z Output	3	—	3	—	ns
t_{HZCE}[2]	$\overline{CE}$ to High-Z Output	0	6	0	6	ns
t_{PU}	$\overline{CE}$ to Power Up Time	0	—	0	—	ns
t_{PD}	$\overline{CE}$ to Power Down Time	—	12	—	15	ns

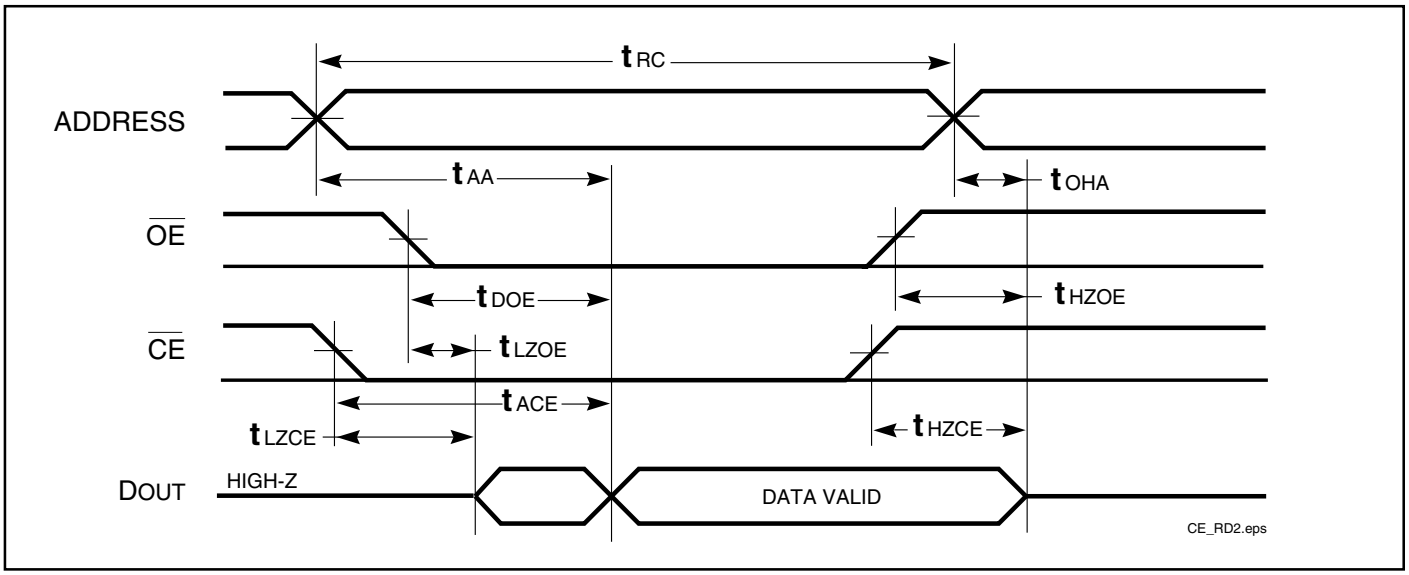
Notes:
1. Test conditions assume signal transition times of 3 ns or less, timing reference levels of 1.25V, input pulse levels of 0.4V to V_{DD}-0.3V and output loading specified in Figure 1.
2. Tested with the loading specified in Figure 1. Transition is measured ±500 mV from steady-state voltage. Not 100% tested.

AC WAVEFORMS

READ CYCLE NO. 1[1,2]



READ CYCLE NO. 2[1,3]



Notes:
1. $\overline{WE}$ is HIGH for a Read Cycle.
2. The device is continuously selected. $\overline{OE}$, $\overline{CE}$ = V_{IL}.
3. Address is valid prior to or coincident with $\overline{CE}$ LOW transitions.

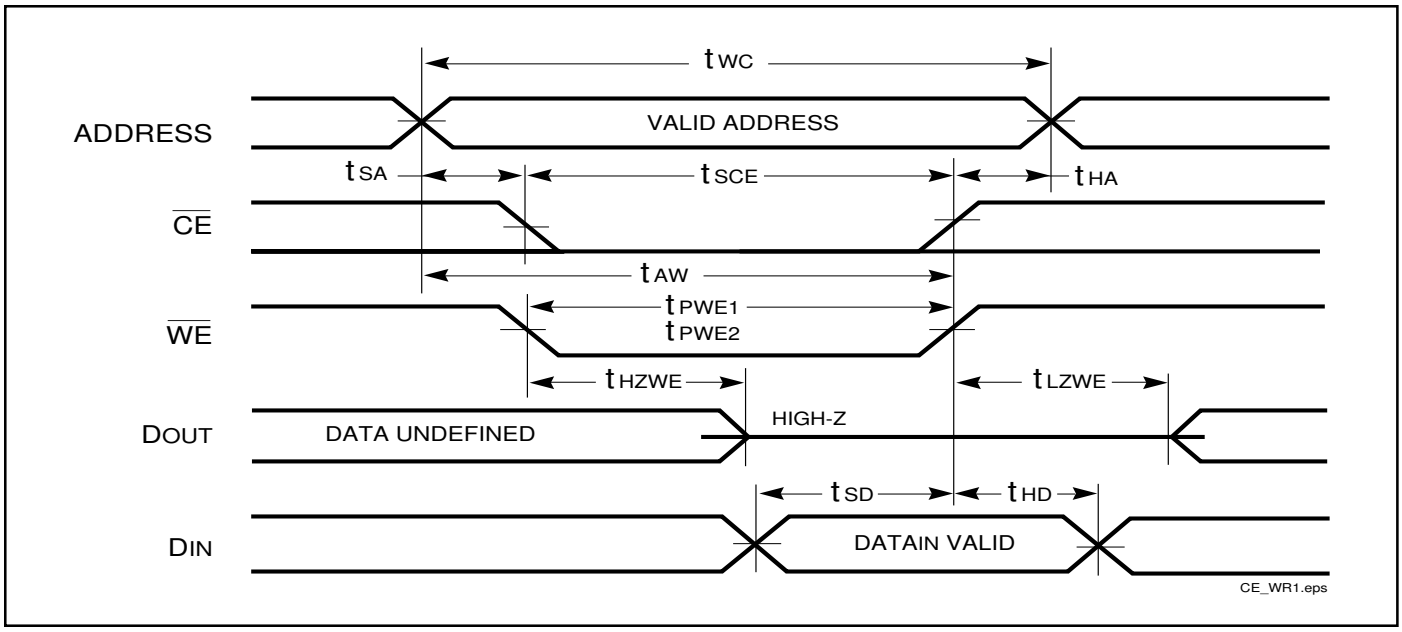
WRITE CYCLE SWITCHING CHARACTERISTICS[1,3] (Over Operating Range)

Symbol	Parameter	-12 ns Min.	-12 ns Max.	-15 ns Min.	-15 ns Max.	Unit
t_{WC}	Write Cycle Time	12	—	15	—	ns
t_{SCE}	$\overline{CE}$ to Write End	9	—	10	—	ns
t_{AW}	Address Setup Time to Write End	9	—	10	—	ns
t_{HA}	Address Hold from Write End	0	—	0	—	ns
t_{SA}	Address Setup Time	0	—	0	—	ns
t_{PWE_1}[1]	$\overline{WE}$ Pulse Width ($\overline{OE}$ High)	9	—	10	—	ns
t_{PWE_2}[2]	$\overline{WE}$ Pulse Width ($\overline{OE}$ Low)	11	—	12	—	ns
t_{SD}	Data Setup to Write End	9	—	9	—	ns
t_{HD}	Data Hold from Write End	0	—	0	—	ns
t_{HZWE}[2]	$\overline{WE}$ LOW to High-Z Output	—	6	—	7	ns
t_{LZWE}[2]	$\overline{WE}$ HIGH to Low-Z Output	3	—	3	—	ns

Notes:
1. Test conditions assume signal transition times of 3ns or less, timing reference levels of 1.25V, input pulse levels of 0.4V to V_{DD}-0.3V and output loading specified in Figure 1a.
2. Tested with the loading specified in Figure 1b. Transition is measured ±500 mV from steady-state voltage. Not 100% tested.
3. The internal write time is defined by the overlap of $\overline{CE}$ LOW 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.

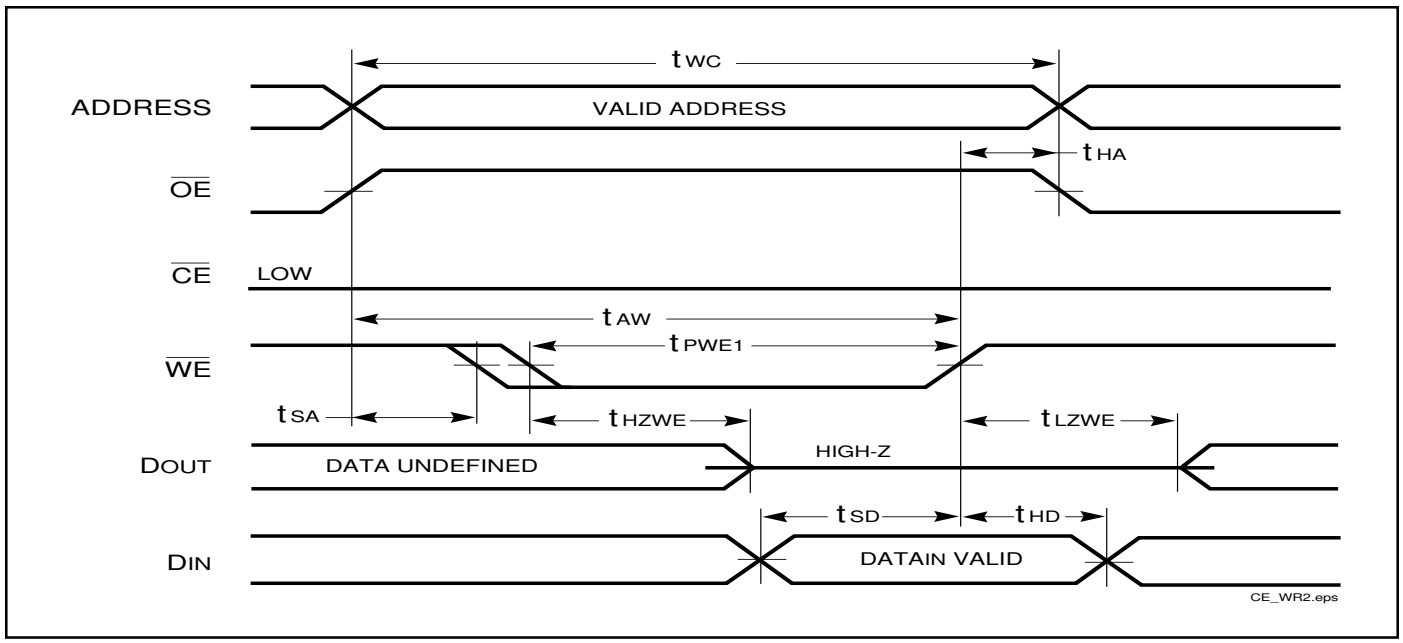
AC WAVEFORMS

WRITE CYCLE NO. 1[1,2] ($\overline{CE}$ Controlled, $\overline{OE}$ = HIGH or LOW)

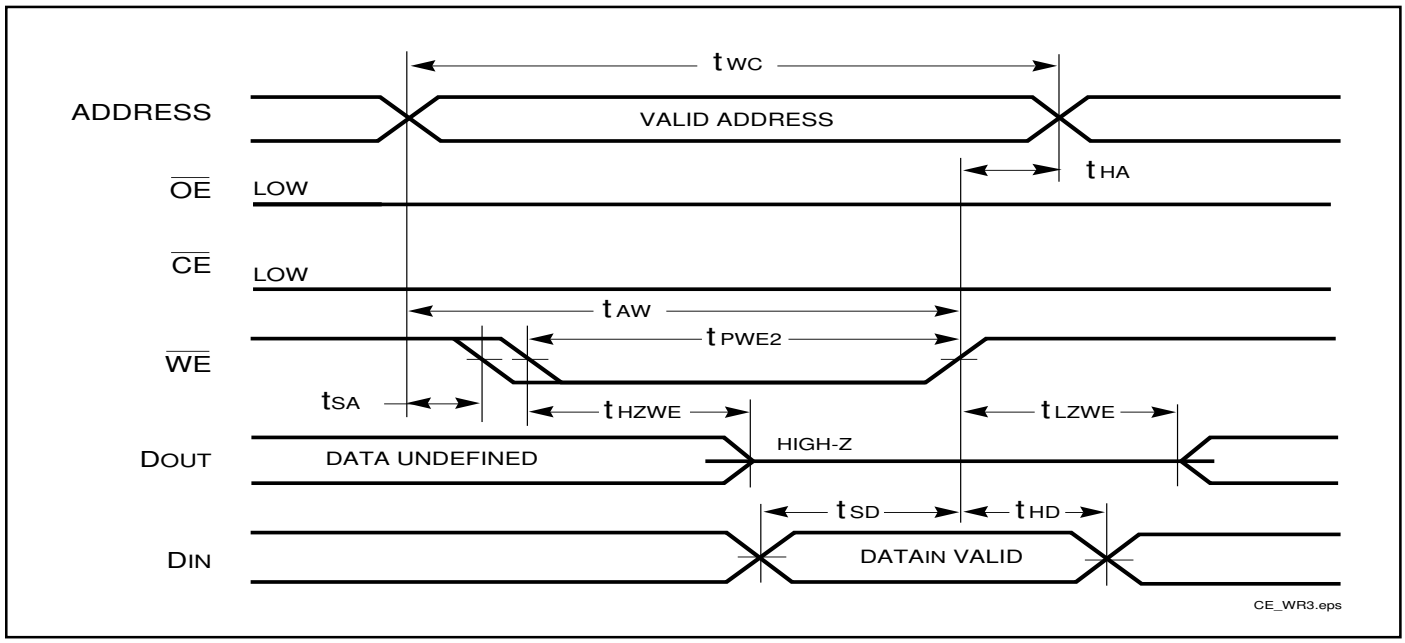


AC WAVEFORMS

WRITE CYCLE NO. 2[1] ($\overline{WE}$ Controlled, $\overline{OE}$ = HIGH during Write Cycle)



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



Notes:

1. The internal write time is defined by the overlap of $\overline{CE}$ LOW 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.
2. I/O will assume the High-Z state if $\overline{OE}$ > V_{IH}.

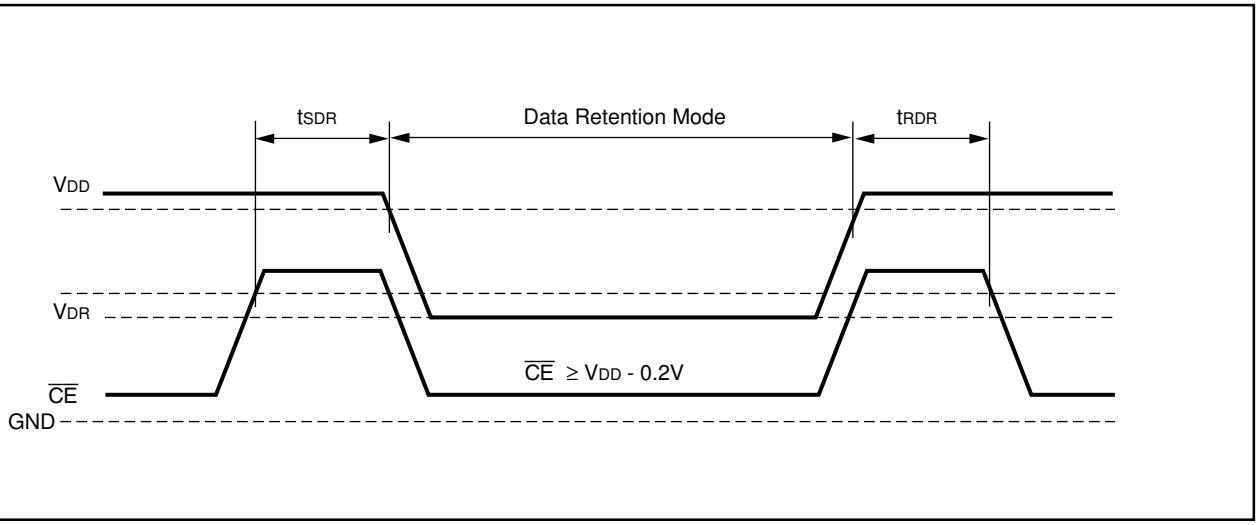
DATA RETENTION SWITCHING CHARACTERISTICS

Symbol	Parameter	Test Condition	Operations	Min.	Typ.(1)	Max.	Unit
V_{DR}	V_{DD} for Data Retention	See Data Retention Waveform		1.8	—	3.6	V
I_{DR}	Data Retention Current	V_{DD} = 1.8V, $\overline{CE} \geq V_{DD} - 0.2V$	COM.	—	6	20	µA
			IND.	—	6	50	
			AUTO.	—	6	75	
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} = 2.5V, T_A = 25°C. Not 100% tested.

DATA RETENTION WAVEFORM ($\overline{CE}$ Controlled)



ORDERING INFORMATION

Industrial Range: –40°C to +85°C

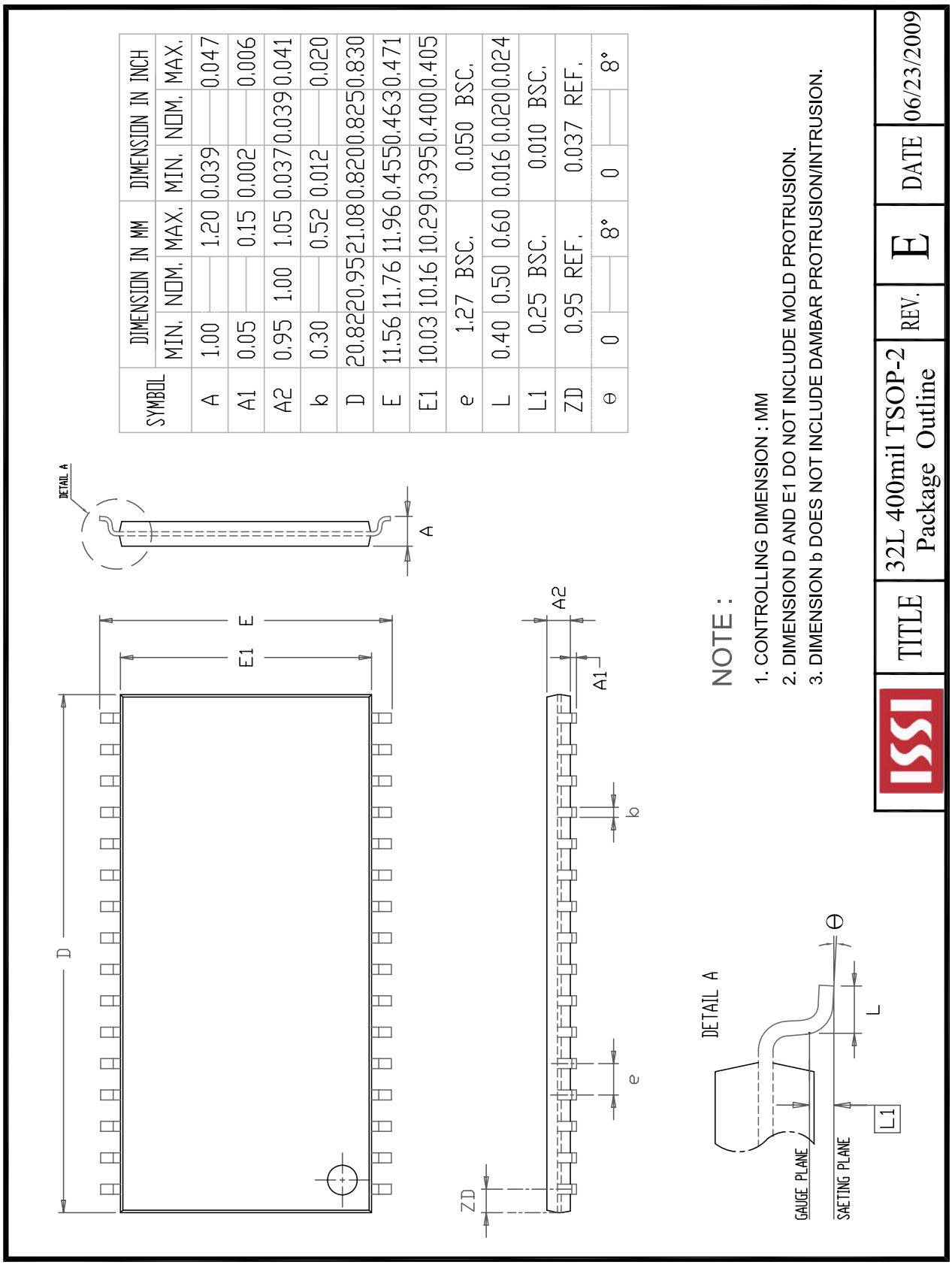
Speed (ns)	Order Part No.	Package
12	IS63WV1024BLL-12TI	32-pin TSOP (Type II)
	IS63WV1024BLL-12TLI	32-pin TSOP (Type II), Lead-free
	IS63WV1024BLL-12HI	sTSOP (Type I) (8mm x13.4mm)
	IS63WV1024BLL-12HLI	sTSOP (Type I) (8mm x13.4mm), Lead-free
	IS63WV1024BLL-12JLI	32-pin SOJ (300-mil), Lead-free
	IS63WV1024BLL-12BI	mBGA(6mmx8mm)
	IS63WV1024BLL-12BLI	mBGA(6mmx8mm), Lead-free

Automotive Range (A3): –40°C to +85°C

Speed (ns)	Order Part No.	Package
15 (12*)	IS64WV1024BLL-15TA3	32-pin TSOP (Type II)
	IS64WV1024BLL-15TLA3	32-pin TSOP (Type II), Lead-free
	IS64WV1024BLL-15HA3	sTSOP (Type I) (8mm x13.4mm)
	IS64WV1024BLL-15HLA3	sTSOP (Type I) (8mm x13.4mm), Lead-free
	IS64WV1024BLL-15BA3	mBGA(6mmx8mm)
	IS64WV1024BLL-15BLA3	mBGA(6mmx8mm), Lead-free

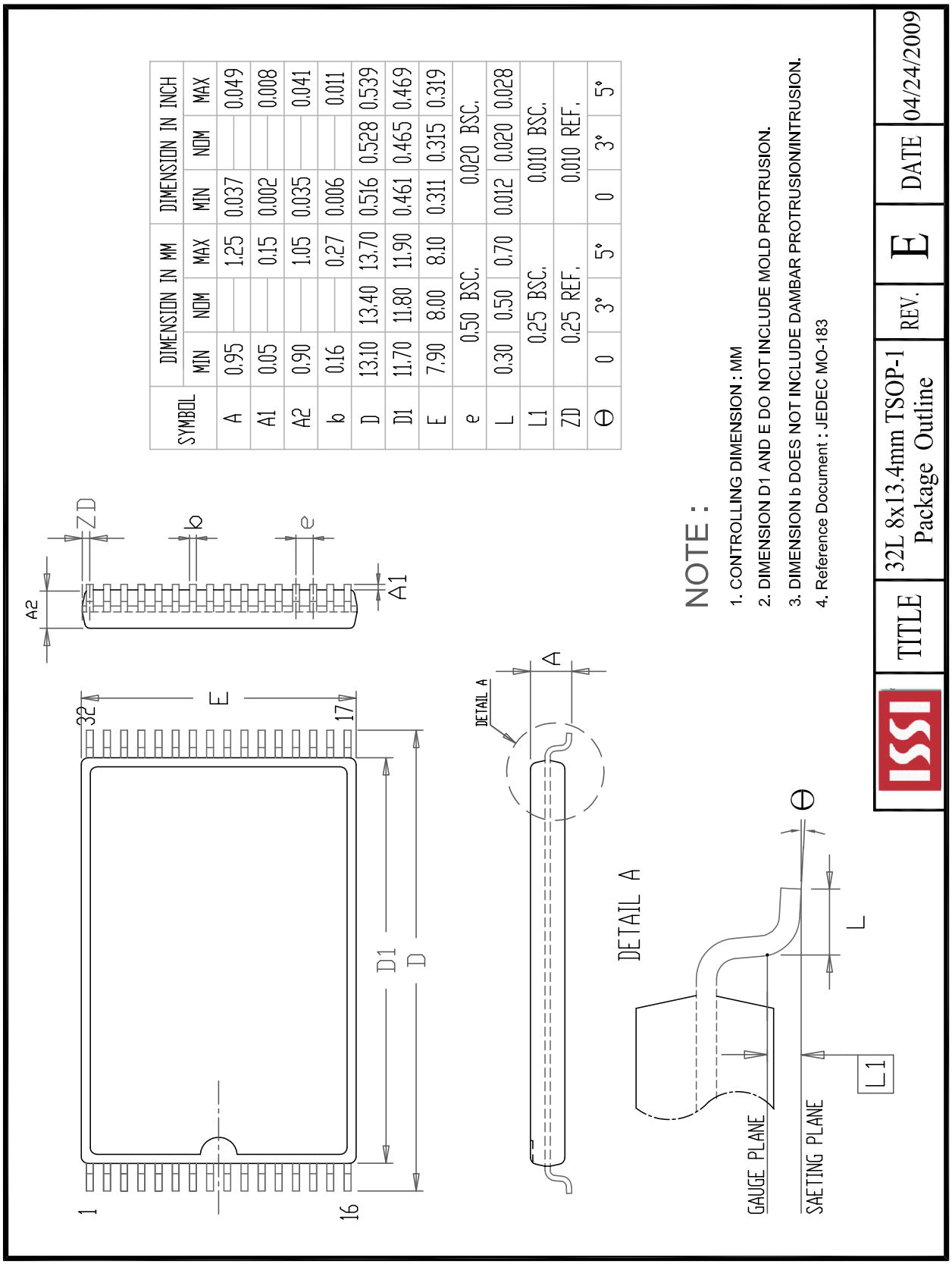
Note:
1. Speed = 12ns for V_{DD} = 3.3V $\pm$ 10%. Speed = 15ns for V_{DD} = 2.5V-3.6V.

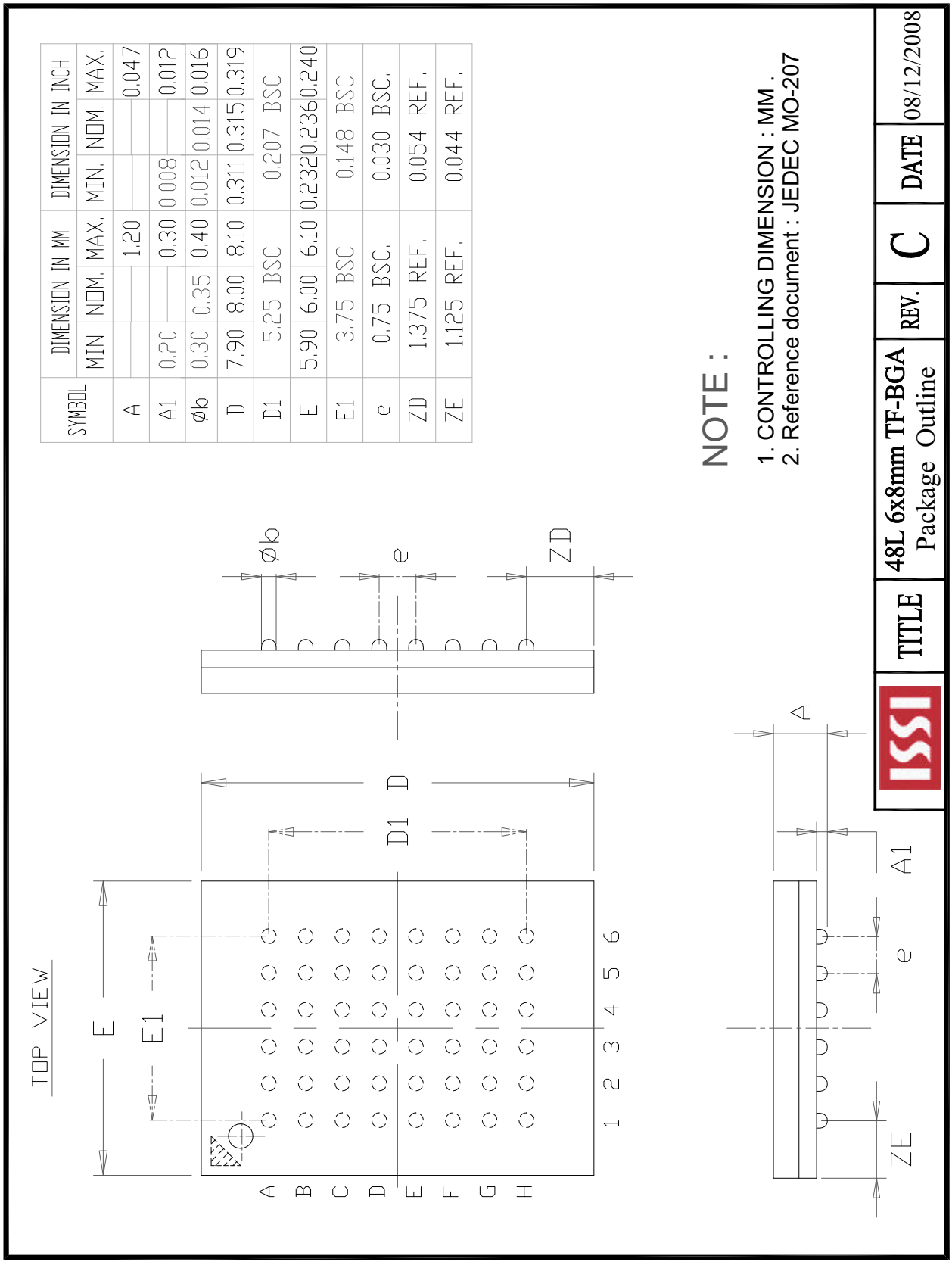
SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	—	1.20	0.039	—	0.047
A1	0.05	—	0.15	0.002	—	0.006
A2	0.95	1.00	1.05	0.037	0.039	0.041
b	0.30	—	0.52	0.012	—	0.020
D	20.82	20.95	21.08	0.820	0.825	0.830
E	11.56	11.76	11.96	0.455	0.463	0.471
E1	10.03	10.16	10.29	0.395	0.400	0.405
e	1.27 BSC.			0.050 BSC.		
L	0.40	0.50	0.60	0.016	0.020	0.024
L1	0.25 BSC.			0.010 BSC.		
ZD	0.95 REF.			0.037 REF.		
θ	0	—	8°	0	—	8°



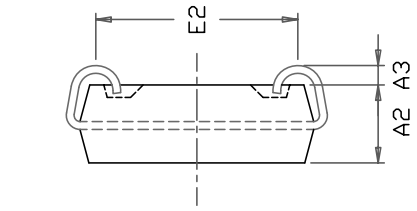
NOTE :
1. CONTROLLING DIMENSION : MM
2. DIMENSION D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION.

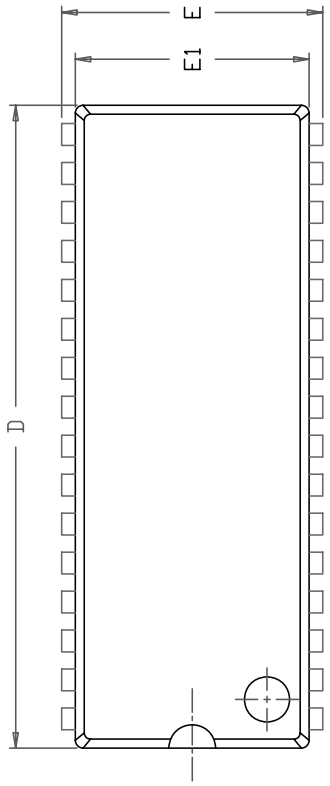
	TITLE	REV.		DATE
ISSI	32L 400mil TSOP-2 Package Outline		E	06/23/2009

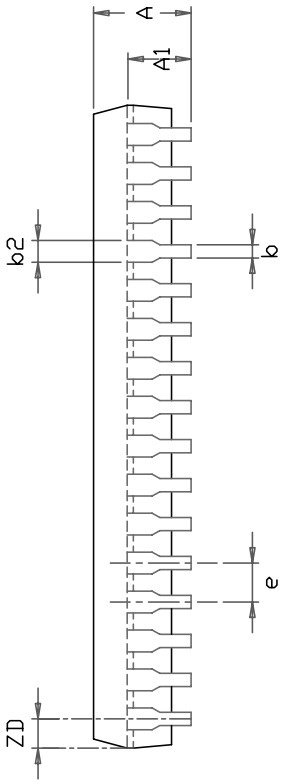




SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	3.05	—	3.76	0.120	—	0.148
A1	2.08	—	2.41	0.082	—	0.095
A2	2.41	2.54	2.67	0.095	0.100	0.105
A3	0.64	—	1.09	0.025	—	0.043
b	0.41	—	0.51	0.016	—	0.020
b2	0.66	—	0.81	0.026	—	0.032
D	20.82	—	21.09	0.820	—	0.830
E	8.38	8.51	8.64	0.330	0.335	0.340
E1	7.49	7.62	7.75	0.295	0.300	0.305
E2	6.48	—	6.99	0.255	—	0.275
e	1.27 BSC.			0.050 BSC.		
ZD	0.95 REF.			0.037 REF.		







NOTE :

1. CONTROLLING DIMENSION : MM
2. DIMENSION D AND E1 DO NOT INCLUDE MOLD PROTRUSION.
3. DIMENSION b2 DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION.

TITLE	32L 300mil SOJ Package Outline	REV.	C	DATE	08/14/2009