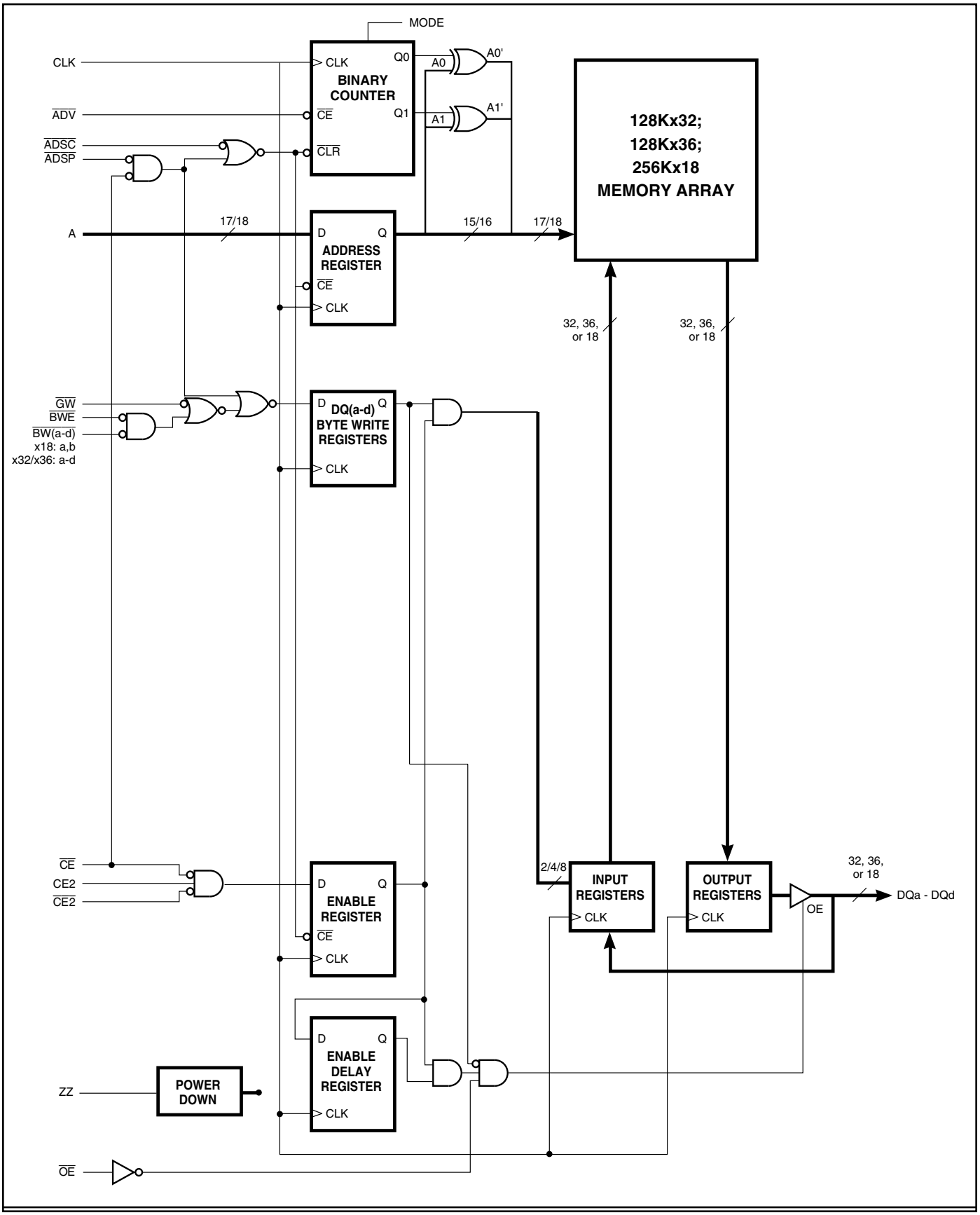
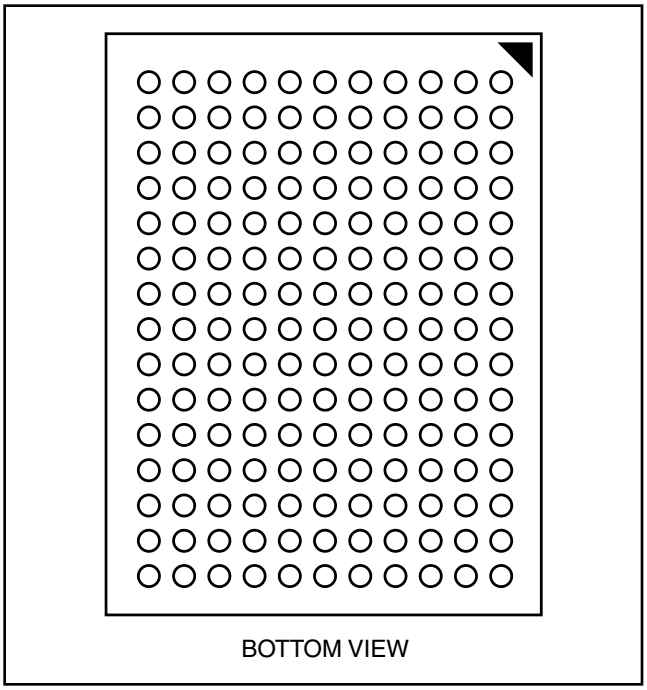
BLOCK DIAGRAM



165-PIN BGA

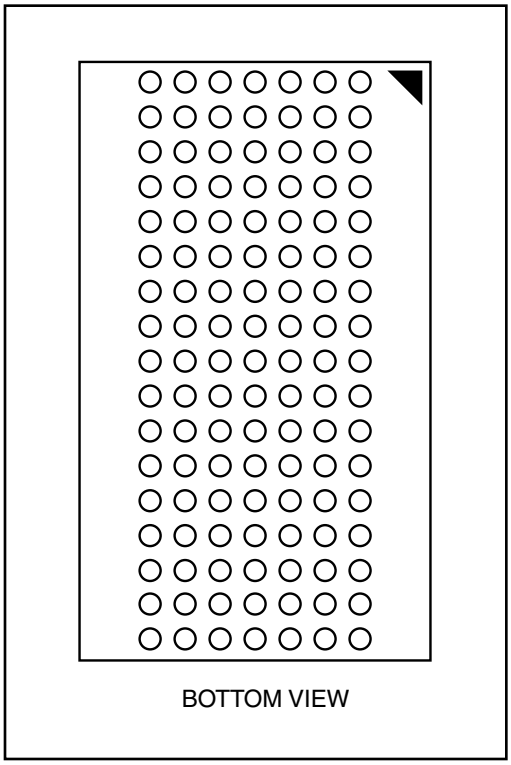
165-Ball, 13x15 mm BGA
1mm Ball Pitch, 11x15 Ball Array



BOTTOM VIEW

119-PIN BGA

119-Ball, 14x22 mm BGA
1mm Ball Pitch, 7x17 Ball Array



BOTTOM VIEW

119 BGA PACKAGE PIN CONFIGURATION

128K x 36 (TOP VIEW)

	1	2	3	4	5	6	7
A	V_{DDQ}	A	A	$\overline{ADSP}$	A	A	V_{DDQ}
B	NC	CE2	A	$\overline{ADSC}$	A	$\overline{CE2}$	NC
C	NC	A	A	V_{DD}	A	A	NC
D	DQc	DQPc	Vss	NC	Vss	DQPb	DQb
E	DQc	DQc	Vss	$\overline{CE}$	Vss	DQb	DQb
F	V_{DDQ}	DQc	Vss	$\overline{OE}$	Vss	DQb	V_{DDQ}
G	DQc	DQc	$\overline{BWc}$	$\overline{ADV}$	$\overline{BWb}$	DQb	DQb
H	DQc	DQc	Vss	$\overline{GW}$	Vss	DQb	DQb
J	V_{DDQ}	V_{DD}	NC	V_{DD}	NC	V_{DD}	V_{DDQ}
K	DQd	DQd	Vss	CLK	Vss	DQa	DQa
L	DQd	DQd	$\overline{BWd}$	NC	$\overline{BWa}$	DQa	DQa
M	V_{DDQ}	DQd	Vss	$\overline{BWE}$	Vss	DQa	V_{DDQ}
N	DQd	DQd	Vss	A_1*	Vss	DQa	DQa
P	DQd	DQPd	Vss	A_0*	Vss	DQPa	DQa
R	NC	A	MODE	V_{DD}	NC	A	NC
T	NC	NC	A	A	A	NC	ZZ
U	V_{DDQ}	NC	NC	NC	NC	NC	V_{DDQ}

Note: * A_0 and A_1 are the two least significant bits (LSB) of the address field and set the internal burst counter if burst is desired.

PIN DESCRIPTIONS

Symbol	Pin Name
A	Address Inputs
A0, A1	Synchronous Burst Address Inputs
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{ADSP}$	Address Status Processor
$\overline{ADSC}$	Address Status Controller
$\overline{GW}$	Global Write Enable
CLK	Synchronous Clock
$\overline{CE}$, CE2, $\overline{CE2}$	Synchronous Chip Select
$\overline{BW}$x (x=a-d)	Synchronous Byte Write Controls
$\overline{BWE}$	Byte Write Enable

Symbol	Pin Name
$\overline{OE}$	Output Enable
ZZ	Power Sleep Mode
MODE	Burst Sequence Selection
NC	No Connect
DQa-DQd	Data Inputs/Outputs
DQPa-Pd	Output Power Supply
V_{DD}	Power Supply
V_{DDQ}	Output Power Supply
Vss	Ground

119 BGA PACKAGE PIN CONFIGURATION

256Kx18 (TOP VIEW)

	1	2	3	4	5	6	7
A	VDDQ	A	A	$\overline{ADSP}$	A	A	VDDQ
B	NC	CE2	A	$\overline{ADSC}$	A	$\overline{CE2}$	NC
C	NC	A	A	VDD	A	A	NC
D	DQb	NC	Vss	NC	Vss	DQPa	NC
E	NC	DQb	Vss	$\overline{CE}$	Vss	NC	DQa
F	VDDQ	NC	Vss	$\overline{OE}$	Vss	DQa	VDDQ
G	NC	DQb	$\overline{BWb}$	$\overline{ADV}$	Vss	NC	DQa
H	DQb	NC	Vss	$\overline{GW}$	Vss	DQa	NC
J	VDDQ	VDD	NC	VDD	NC	VDD	VDDQ
K	NC	DQb	Vss	CLK	Vss	NC	DQa
L	DQb	NC	Vss	NC	$\overline{BWa}$	DQa	NC
M	VDDQ	DQb	Vss	$\overline{BWE}$	Vss	NC	VDDQ
N	DQb	NC	Vss	A1*	Vss	DQa	NC
P	NC	DQPb	Vss	A0*	Vss	NC	DQa
R	NC	A	MODE	VDD	NC	A	NC
T	NC	A	A	NC	A	A	ZZ
U	VDDQ	NC	NC	NC	NC	NC	VDDQ

Note: * A_0 and A_1 are the two least significant bits (LSB) of the address field and set the internal burst counter if burst is desired.

PIN DESCRIPTIONS

Symbol	Pin Name
A	Address Inputs
A0, A1	Synchronous Burst Address Inputs
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{ADSP}$	Address Status Processor
$\overline{ADSC}$	Address Status Controller
$\overline{GW}$	Global Write Enable
CLK	Synchronous Clock
$\overline{CE}$, CE2, $\overline{CE2}$	Synchronous Chip Select
$\overline{BW}$x (x=a,b)	Synchronous Byte Write Controls
$\overline{BWE}$	Byte Write Enable

Symbol	Pin Name
$\overline{OE}$	Output Enable
ZZ	Power Sleep Mode
MODE	Burst Sequence Selection
NC	No Connect
DQa-DQb	Data Inputs/Outputs
DQPa-Pb	Output Power Supply
V_{DD}	Power Supply
V_{DDQ}	Output Power Supply
Vss	Ground

165 BGA PACKAGE PIN CONFIGURATION

128K x 36 (TOP VIEW)

	1	2	3	4	5	6	7	8	9	10	11
A	NC	A	$\overline{CE}$	$\overline{BWc}$	$\overline{BWb}$	$\overline{CE2}$	$\overline{BWE}$	$\overline{ADSC}$	$\overline{ADV}$	A	NC
B	NC	A	CE2	$\overline{BWd}$	$\overline{BWa}$	CLK	$\overline{GW}$	$\overline{OE}$	$\overline{ADSP}$	A	NC
C	DQPc	NC	V_{DDQ}	Vss	Vss	Vss	Vss	Vss	V_{DDQ}	NC	DQPb
D	DQc	DQc	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQb	DQb
E	DQc	DQc	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQb	DQb
F	DQc	DQc	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQb	DQb
G	DQc	DQc	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQb	DQb
H	NC	NC	NC	V_{DD}	Vss	Vss	Vss	V_{DD}	NC	NC	ZZ
J	DQd	DQd	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	DQa
K	DQd	DQd	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	DQa
L	DQd	DQd	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	DQa
M	DQd	DQd	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	DQa
N	DQPd	NC	V_{DDQ}	Vss	NC	NC	NC	Vss	V_{DDQ}	NC	DQPa
P	NC	NC	A	A	NC	A1*	NC	A	A	A	NC
R	MODE	NC	A	A	NC	A0*	NC	A	A	A	A

Note: * A_0 and A_1 are the two least significant bits (LSB) of the address field and set the internal burst counter if burst is desired.

PIN DESCRIPTIONS

Symbol	Pin Name
A	Address Inputs
A0, A1	Synchronous Burst Address Inputs
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{ADSP}$	Address Status Processor
$\overline{ADSC}$	Address Status Controller
$\overline{GW}$	Global Write Enable
CLK	Synchronous Clock
$\overline{CE}$, $\overline{CE2}$, CE2	Synchronous Chip Select
$\overline{BW}$x (x=a,b,c,d)	Synchronous Byte Write Controls

Symbol	Pin Name
$\overline{BWE}$	Byte Write Enable
$\overline{OE}$	Output Enable
ZZ	Power Sleep Mode
MODE	Burst Sequence Selection
NC	No Connect
DQx	Data Inputs/Outputs
DQPx	Data Inputs/Outputs
V_{DD}	3.3V/2.5V Power Supply
V_{DDQ}	Isolated Output Power Supply 3.3V/2.5V
Vss	Ground

165 BGA PACKAGE PIN CONFIGURATION

256K x 18 (TOP VIEW)

	1	2	3	4	5	6	7	8	9	10	11
A	NC	A	$\overline{CE}$	$\overline{BWb}$	NC	$\overline{CE2}$	$\overline{BWE}$	$\overline{ADSC}$	$\overline{ADV}$	A	A
B	NC	A	CE2	NC	$\overline{BWa}$	CLK	$\overline{GW}$	$\overline{OE}$	$\overline{ADSP}$	A	NC
C	NC	NC	V_{DDQ}	Vss	Vss	Vss	Vss	Vss	V_{DDQ}	NC	DQPa
D	NC	DQb	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	NC	DQa
E	NC	DQb	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	NC	DQa
F	NC	DQb	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	NC	DQa
G	NC	DQb	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	NC	DQa
H	NC	NC	NC	V_{DD}	Vss	Vss	Vss	V_{DD}	NC	NC	ZZ
J	DQb	NC	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	NC
K	DQb	NC	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	NC
L	DQb	NC	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	NC
M	DQb	NC	V_{DDQ}	V_{DD}	Vss	Vss	Vss	V_{DD}	V_{DDQ}	DQa	NC
N	DQPb	NC	V_{DDQ}	Vss	NC	NC	NC	Vss	V_{DDQ}	NC	NC
P	NC	NC	A	A	NC	A1*	NC	A	A	A	NC
R	MODE	NC	A	A	NC	A0*	NC	A	A	A	A

Note: * A_0 and A_1 are the two least significant bits (LSB) of the address field and set the internal burst counter if burst is desired.

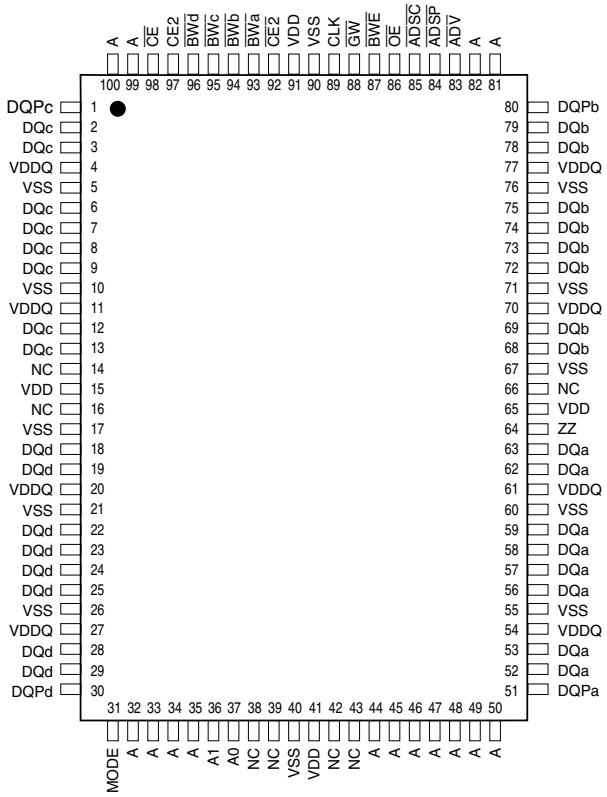
PIN DESCRIPTIONS

Symbol	Pin Name
A	Address Inputs
A0, A1	Synchronous Burst Address Inputs
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{ADSP}$	Address Status Processor
$\overline{ADSC}$	Address Status Controller
$\overline{GW}$	Global Write Enable
CLK	Synchronous Clock
$\overline{CE}$, $\overline{CE2}$, CE2	Synchronous Chip Select
$\overline{BW}$x (x=a,b)	Synchronous Byte Write Controls

Symbol	Pin Name
$\overline{BWE}$	Byte Write Enable
$\overline{OE}$	Output Enable
ZZ	Power Sleep Mode
MODE	Burst Sequence Selection
NC	No Connect
DQx	Data Inputs/Outputs
DQPx	Data Inputs/Outputs
V_{DD}	3.3V/2.5V Power Supply
V_{DDQ}	Isolated Output Power Supply 3.3V/2.5V
Vss	Ground

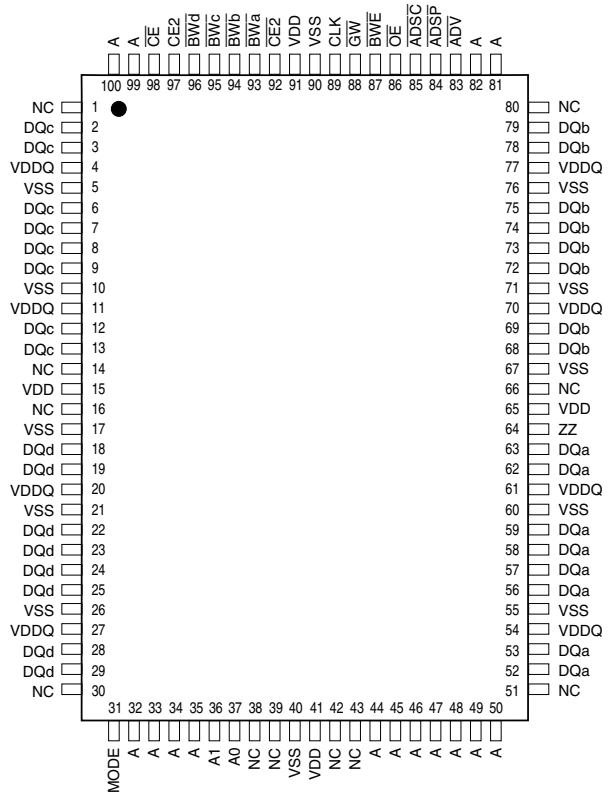
PIN CONFIGURATION

100-PIN QFP (128K X 36)



(3 Chip-Enable option)

100-PIN QFP (128K X 32)



(3 Chip-Enable option)

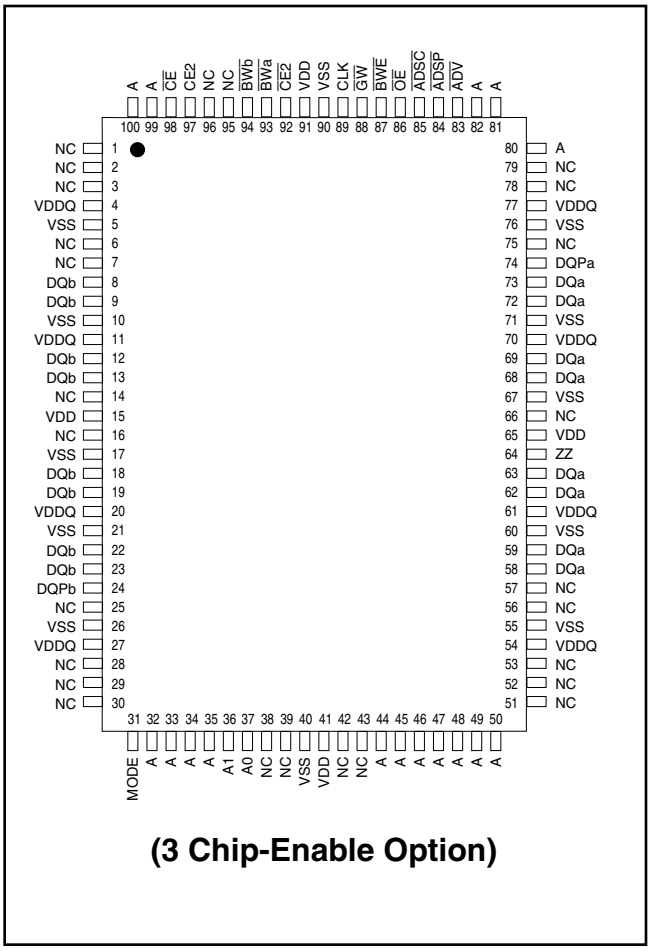
PIN DESCRIPTIONS

A0, A1	Synchronous Address Inputs. These pins must tied to the two LSBs of the address bus.
A	Synchronous Address Inputs
$\overline{ADSC}$	Synchronous Controller Address Status
$\overline{ADSP}$	Synchronous Processor Address Status
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{BWa}$-$\overline{BWd}$	Synchronous Byte Write Enable
$\overline{BWE}$	Synchronous Byte Write Enable
$\overline{CE}$, $\overline{CE2}$, CE2	Synchronous Chip Enable
CLK	Synchronous Clock

DQa-DQd	Synchronous Data Input/Output
DQPa-DQPd	Parity Data Input/Output
$\overline{GW}$	Synchronous Global Write Enable
MODE	Burst Sequence Mode Selection
$\overline{OE}$	Output Enable
V_{DD}	3.3V/2.5V Power Supply
V_{DDQ}	Isolated Output Buffer Supply: 3.3V/2.5V
Vss	Ground
ZZ	Snooze Enable

PIN CONFIGURATION

100-PIN QFP (256K X 18)



(3 Chip-Enable Option)

PIN DESCRIPTIONS

A0, A1	Synchronous Address Inputs. These pins must tied to the two LSBs of the address bus.
A	Synchronous Address Inputs
$\overline{ADSC}$	Synchronous Controller Address Status
$\overline{ADSP}$	Synchronous Processor Address Status
$\overline{ADV}$	Synchronous Burst Address Advance
$\overline{BWa}$-$\overline{BWb}$	Synchronous Byte Write Enable
$\overline{BWE}$	Synchronous Byte Write Enable
$\overline{CE}$, CE2, $\overline{CE2}$	Synchronous Chip Enable
CLK	Synchronous Clock
DQa-DQb	Synchronous Data Input/Output

DQPa-DQPb	Parity Data I/O; DQPa is parity for DQa1-8; DQPb is parity for DQb1-8
$\overline{GW}$	Synchronous Global Write Enable
MODE	Burst Sequence Mode Selection
$\overline{OE}$	Output Enable
V_{DD}	3.3V/2.5V Power Supply
V_{DDQ}	Isolated Output Buffer Supply: 3.3V/2.5V
Vss	Ground
ZZ	Snooze Enable

TRUTH TABLE[1-8]

OPERATION	ADDRESS	$\overline{CE}$	$\overline{CE2}$	CE2	ZZ	$\overline{ADSP}$	$\overline{ADSC}$	$\overline{ADV}$	$\overline{WRITE}$	$\overline{OE}$	CLK	DQ
Deselect Cycle, Power-Down	None	H	X	X	L	X	L	X	X	X	L-H	High-Z
Deselect Cycle, Power-Down	None	L	X	L	L	L	X	X	X	X	L-H	High-Z
Deselect Cycle, Power-Down	None	L	H	X	L	L	X	X	X	X	L-H	High-Z
Deselect Cycle, Power-Down	None	L	X	L	L	H	L	X	X	X	L-H	High-Z
Deselect Cycle, Power-Down	None	L	H	X	L	H	L	X	X	X	L-H	High-Z
Snooze Mode, Power-Down	None	X	X	X	H	X	X	X	X	X	X	High-Z
Read Cycle, Begin Burst	External	L	L	H	L	L	X	X	X	L	L-H	Q
Read Cycle, Begin Burst	External	L	L	H	L	L	X	X	X	H	L-H	High-Z
Write Cycle, Begin Burst	External	L	L	H	L	H	L	X	L	X	L-H	D
Read Cycle, Begin Burst	External	L	L	H	L	H	L	X	H	L	L-H	Q
Read Cycle, Begin Burst	External	L	L	H	L	H	L	X	H	H	L-H	High-Z
Read Cycle, Continue Burst	Next	X	X	X	L	H	H	L	H	L	L-H	Q
Read Cycle, Continue Burst	Next	X	X	X	L	H	H	L	H	H	L-H	High-Z
Read Cycle, Continue Burst	Next	H	X	X	L	X	H	L	H	L	L-H	Q
Read Cycle, Continue Burst	Next	H	X	X	L	X	H	L	H	H	L-H	High-Z
Write Cycle, Continue Burst	Next	X	X	X	L	H	H	L	L	X	L-H	D
Write Cycle, Continue Burst	Next	H	X	X	L	X	H	L	L	X	L-H	D
Read Cycle, Suspend Burst	Current	X	X	X	L	H	H	H	H	L	L-H	Q
Read Cycle, Suspend Burst	Current	X	X	X	L	H	H	H	H	H	L-H	High-Z
Read Cycle, Suspend Burst	Current	H	X	X	L	X	H	H	H	L	L-H	Q
Read Cycle, Suspend Burst	Current	H	X	X	L	X	H	H	H	H	L-H	High-Z
Write Cycle, Suspend Burst	Current	X	X	X	L	H	H	H	L	X	L-H	D
Write Cycle, Suspend Burst	Current	H	X	X	L	X	H	H	L	X	L-H	D

NOTE:

1. X means "Don't Care." H means logic HIGH. L means logic LOW.
2. For $\overline{WRITE}$, L means one or more byte write enable signals ($\overline{BWa\text{-}d}$) and $\overline{BWE}$ are LOW or $\overline{GW}$ is LOW. $\overline{WRITE}$ = H for all $\overline{BWx}$, $\overline{BWE}$, $\overline{GW}$ HIGH.
3. $\overline{BWa}$ enables WRITEs to DQa's and DQPa. $\overline{BWb}$ enables WRITEs to DQb's and DQPb. $\overline{BWc}$ enables WRITEs to DQc's and DQPc. $\overline{BWd}$ enables WRITEs to DQd's and DQPd. DQPa and DQPb are available on the x18 version. DQPa-DQPd are available on the x36 version.
4. All inputs except $\overline{OE}$ and ZZ must meet setup and hold times around the rising edge (LOW to HIGH) of CLK.
5. Wait states are inserted by suspending burst.
6. For a WRITE operation following a READ operation, $\overline{OE}$ must be HIGH before the input data setup time and held HIGH during the input data hold time.
7. This device contains circuitry that will ensure the outputs will be in High-Z during power-up.
8. $\overline{ADSP}$ LOW always initiates an internal READ at the L-H edge of CLK. A WRITE is performed by setting one or more byte write enable signals and $\overline{BWE}$ LOW or $\overline{GW}$ LOW for the subsequent L-H edge of CLK. See WRITE timing diagram for clarification.

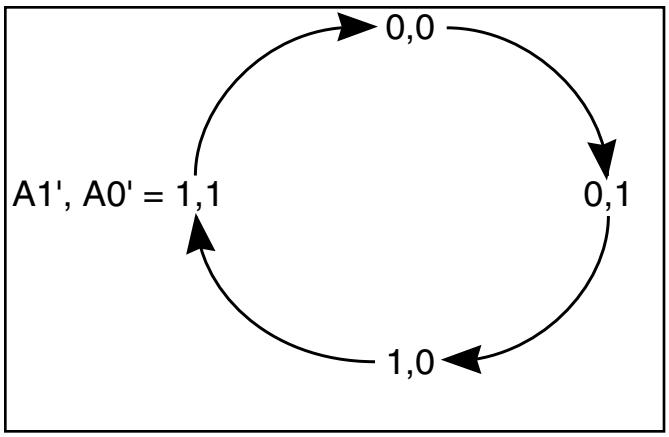
PARTIAL TRUTH TABLE

Function	$\overline{GW}$	$\overline{BWE}$	$\overline{BWa}$	$\overline{BWb}$	$\overline{BWc}$	$\overline{BWd}$
Read	H	H	X	X	X	X
Read	H	L	H	H	H	H
Write Byte 1	H	L	L	H	H	H
Write All Bytes	H	L	L	L	L	L
Write All Bytes	L	X	X	X	X	X

INTERLEAVED BURST ADDRESS TABLE (MODE = V_{DD} or No Connect)

External Address A1 A0	1st Burst Address A1 A0	2nd Burst Address A1 A0	3rd Burst Address A1 A0
00	01	10	11
01	00	11	10
10	11	00	01
11	10	01	00

LINEAR BURST ADDRESS TABLE (MODE = VSS)



ABSOLUTE MAXIMUM RATINGS[1]

Symbol	Parameter	Value	Unit
T_{STG}	Storage Temperature	–55 to +150	°C
P_D	Power Dissipation	1.6	W
I_{OUT}	Output Current (per I/O)	100	mA
V_{IN}, V_{OUT}	Voltage Relative to Vss for I/O Pins	–0.5 to V_{DDQ} + 0.5	V
V_{IN}	Voltage Relative to Vss for for Address and Control Inputs	–0.5 to V_{DD} + 0.5	V
V_{DD}	Voltage on V_{DD} Supply Relative to Vss	–0.5 to 4.6	V

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.
2. This device contains circuity to protect the inputs against damage due to high static voltages or electric fields; however, precautions may be taken to avoid application of any voltage higher than maximum rated voltages to this high-impedance circuit.
3. This device contains circuitry that will ensure the output devices are in High-Z at power up.

OPERATING RANGE (IS61/64LPSXXXXX)

Range	Ambient Temperature	V_{DD}	V_{DDQ}
Commercial	0°C to +70°C	3.3V ± 5%	3.3V / 2.5V ± 5%
Industrial	–40°C to +85°C	3.3V ± 5%	3.3V / 2.5V ± 5%
Automotive	–40°C to +125°C	3.3V ± 5%	3.3V / 2.5V ± 5%

OPERATING RANGE (IS61/64VPSXXXXX)

Range	Ambient Temperature	V_{DD}	V_{DDQ}
Commercial	0°C to +70°C	2.5V ± 5%	2.5V ± 5%
Industrial	–40°C to +85°C	2.5V ± 5%	2.5V ± 5%
Automotive	–40°C to +125°C	2.5V ± 5%	2.5V ± 5%

DC ELECTRICAL CHARACTERISTICS (Over Operating Range)

			3.3V		2.5V		
Symbol	Parameter	Test Conditions	Min.	Max.	Min.	Max.	Unit
V_{OH}	Output HIGH Voltage	I_{OH} = –4.0 mA (3.3V) I_{OH} = –1.0 mA (2.5V)	2.4	—	2.0	—	V
V_{OL}	Output LOW Voltage	I_{OL} = 8.0 mA (3.3V) I_{OL} = 1.0 mA (2.5V)	—	0.4	—	0.4	V
V_{IH}	Input HIGH Voltage		2.0	V_{DD} + 0.3	1.7	V_{DD} + 0.3	V
V_{IL}	Input LOW Voltage		-0.3	0.8	-0.3	0.7	V
I_{LI}	Input Leakage Current	$V_{SS} \le V_{IN} \le V_{DD}$(1)	-5	5	-5	5	µA
I_{LO}	Output Leakage Current	$V_{SS} \le V_{OUT} \le V_{DDQ}$, $\overline{OE} = V_{IH}$	-5	5	-5	5	µA

POWER SUPPLY CHARACTERISTICS[1] (Over Operating Range)

Symbol	Parameter	Test Conditions	Temp. range	-250 MAX x18	-250 MAX x32/x36	-200 MAX x18	-200 MAX x32/x36	Unit
I_{CC}	AC Operating Supply Current	Device Selected, $\overline{OE}$ = V_{IH}, ZZ ≤ V_{IL}, All Inputs ≤ 0.2V or ≥ V_{DD} – 0.2V, Cycle Time ≥ t_{KC} min.	Com.	225	225	200	200	mA
			Ind.	250	250	210	210	
			Auto.	275	275	225	225	
I_{SB}	Standby Current TTL Input	Device Deselected, V_{DD} = Max., All Inputs ≤ V_{IL} or ≥ V_{IH}, ZZ ≤ V_{IL}, f = Max.	Com.	90	90	90	90	mA
			Ind.	100	100	100	100	
			Auto.	120	120	120	120	
I_{SBI}	Standby Current CMOS Input	Device Deselected, V_{DD} = Max., V_{IN} ≤ V_{SS} + 0.2V or ≥V_{DD} – 0.2V f = 0	Com.	70	70	70	70	mA
			Ind.	75	75	75	75	
			Auto.	90	90	90	90	
			typ.[2]	40		40		

Note:
1. MODE pin has an internal pullup and should be tied to V_{DD} or V_{SS}. It exhibits ±100µA maximum leakage current when tied to ≤ V_{SS} + 0.2V or ≥ V_{DD} – 0.2V.
2. Typical values are measured at V_{DD} = 3.3V, T_A = 25°C and not 100% tested.

CAPACITANCE[1,2]

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

3.3V I/O AC TEST CONDITIONS

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

AC TEST LOADS

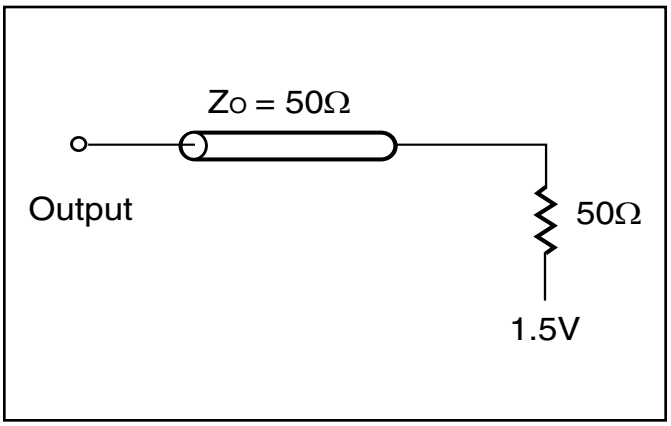


Figure 1

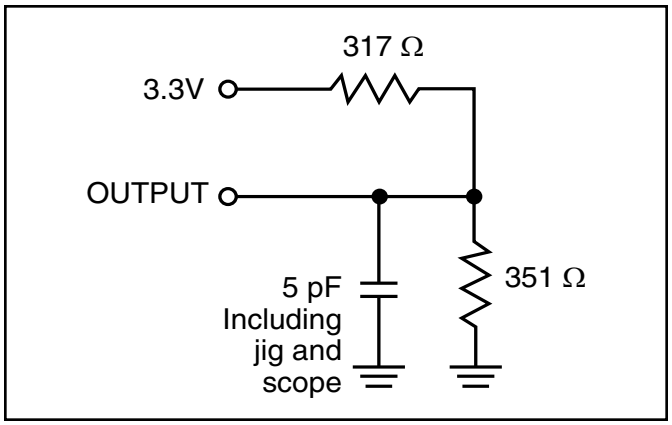


Figure 2

2.5V I/O AC TEST CONDITIONS

Parameter	Unit
Input Pulse Level	0V to 2.5V
Input Rise and Fall Times	1.5 ns
Input and Output Timing and Reference Level	1.25V
Output Load	See Figures 3 and 4

2.5 I/O OUTPUT LOAD EQUIVALENT

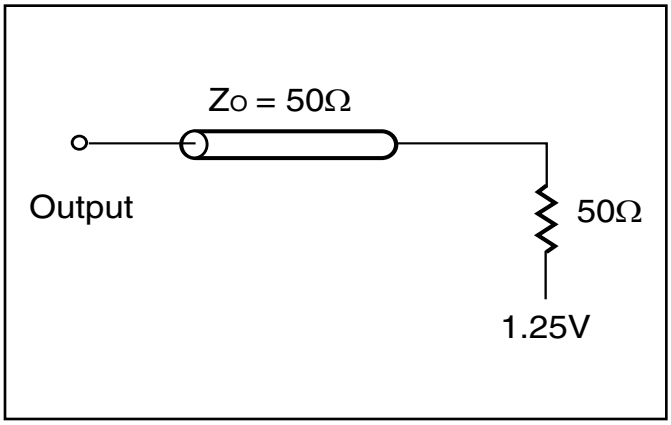


Figure 3

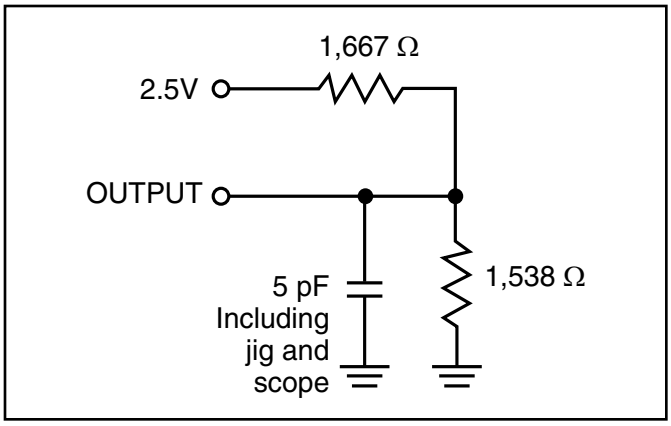


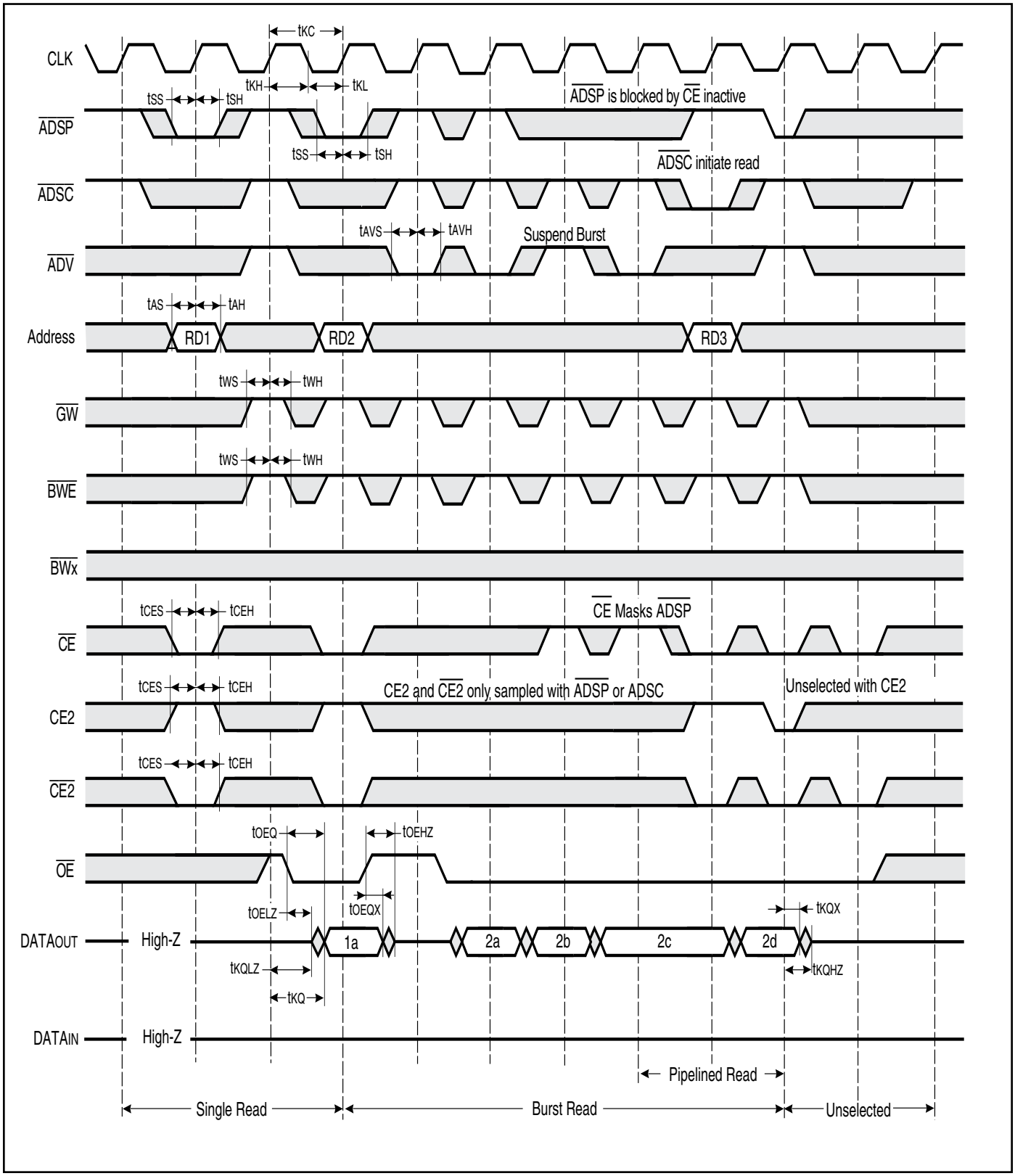
Figure 4

READ/WRITE CYCLE SWITCHING CHARACTERISTICS (Over Operating Range)

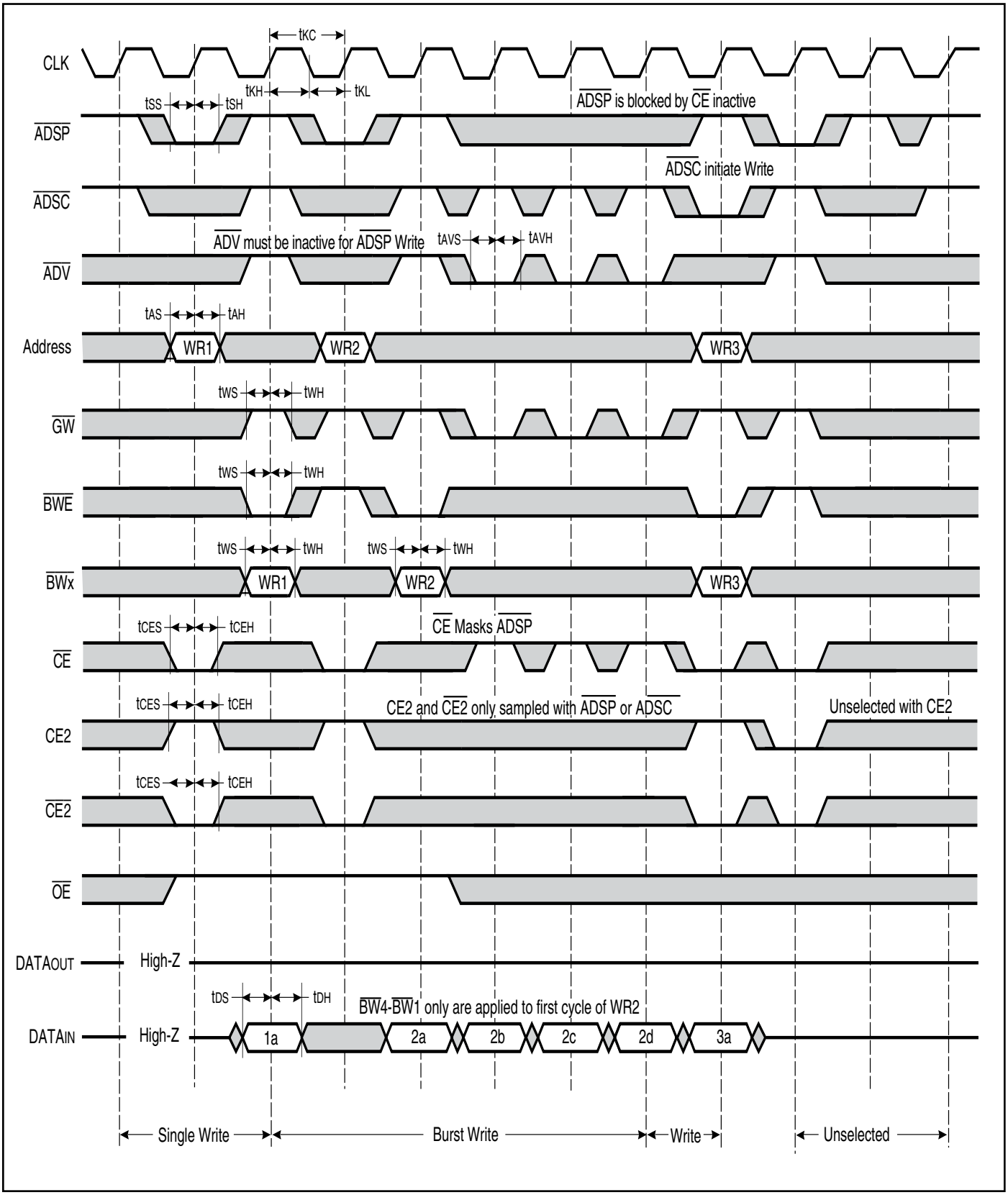
		-250		-200		
Symbol	**Parameter**	**Min.**	**Max.**	**Min.**	**Max.**	**Unit**
f_{MAX}	Clock Frequency	—	250	—	200	MHz
t_{KC}	Cycle Time	4.0	—	5	—	ns
t_{KH}	Clock High Time	1.7	—	2	—	ns
t_{KL}	Clock Low Time	1.7	—	2	—	ns
t_{KQ}	Clock Access Time	—	2.6	—	3.1	ns
t_{KQX}(2)	Clock High to Output Invalid	0.8	—	1.5	—	ns
t_{KQLZ}(2,3)	Clock High to Output Low-Z	0.8	—	1	—	ns
t_{KQHZ}(2,3)	Clock High to Output High-Z	—	2.6	—	3.0	ns
t_{OEQ}	Output Enable to Output Valid	—	2.8	—	3.1	ns
t_{OEQX}(2)	Output Disable to Output Invalid	0	—	0	—	ns
t_{OELZ}(2,3)	Output Enable to Output Low-Z	0	—	0	—	ns
t_{OEHZ}(2,3)	Output Disable to Output High-Z	—	2.6	—	3.0	ns
t_{AS}	Address Setup Time	1.2	—	1.4	—	ns
t_{SS}	Address Status Setup Time	1.2	—	1.4	—	ns
t_{WS}	Read/Write Setup Time	1.2	—	1.4	—	ns
t_{CES}	Chip Enable Setup Time	1.2	—	1.4	—	ns
t_{AVS}	Address Advance Setup Time	1.2	—	1.4	—	ns
t_{DS}	Data Setup Time	1.2	—	1.4	—	ns
t_{AH}	Address Hold Time	0.3	—	0.4	—	ns
t_{SH}	Address Status Hold Time	0.3	—	0.4	—	ns
t_{WH}	Write Hold Time	0.3	—	0.4	—	ns
t_{CEH}	Chip Enable Hold Time	0.3	—	0.4	—	ns
t_{AVH}	Address Advance Hold Time	0.3	—	0.4	—	ns
t_{DH}	Data Hold Time	0.3	—	0.4	—	ns

Note:
1. Configuration signal MODE is static and must not change during normal operation.
2. Guaranteed but not 100% tested. This parameter is periodically sampled.
3. Tested with load in Figure 2.

READ/WRITE CYCLE TIMING



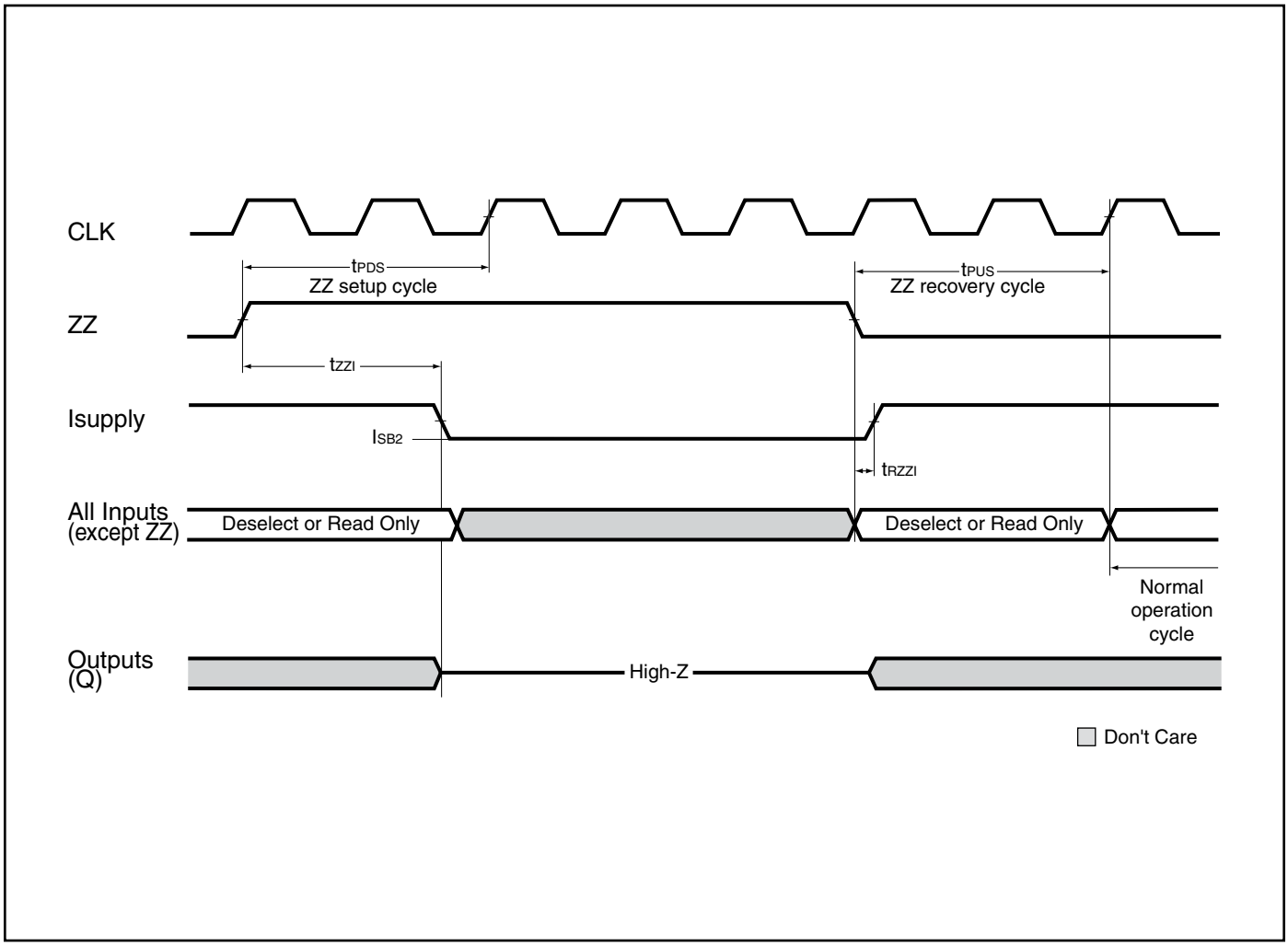
WRITE CYCLE TIMING



SNOOZE MODE ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Max.	Unit
I_{SB2}	Current during SNOOZE MODE	ZZ ≥ Vih	—	60	mA
t_{PDS}	ZZ active to input ignored		2	—	cycle
t_{PUS}	ZZ inactive to input sampled		2	—	cycle
t_{ZZI}	ZZ active to SNOOZE current		—	2	cycle
t_{RZZI}	ZZ inactive to exit SNOOZE current		0	—	ns

SNOOZE MODE TIMING



ORDERING INFORMATION (3.3V core/2.5V-3.3V I/O)

Commercial Range: 0°C to +70°C

Configuration	Frequency	Order Part Number	Package
128Kx32			
	250	IS61LPS12832A-250TQ	100 QFP
		IS61LPS12832A-250B2	119 BGA
		IS61LPS12832A-250B3	165 BGA
	200	IS61LPS12832A-200TQ	100 QFP
		IS61LPS12832A-200B2	119 BGA
		IS61LPS12832A-200B3	165 BGA
128Kx36			
	250	IS61LPS12836A-250TQ	100 QFP
		IS61LPS12836A-250TQL	100 QFP, Lead-free
		IS61LPS12836A-250B2	119 BGA
		IS61LPS12836A-250B3	165 BGA
	200	IS61LPS12836A-200TQ	100 QFP
		IS61LPS12836A-200B2	119 BGA
		IS61LPS12836A-200B3	165 BGA
256Kx18			
	250	IS61LPS25618A-250TQ	100 QFP
		IS61LPS25618A-250B2	119 BGA
		IS61LPS25618A-250B3	165 BGA
	200	IS61LPS25618A-200TQ	100 QFP
		IS61LPS25618A-200B2	119 BGA
		IS61LPS25618A-200B3	165 BGA

ORDERING INFORMATION (3.3V core/2.5V-3.3V I/O)

Industrial Range: -40°C to +85°C

Configuration	Frequency	Order Part Number	Package
128Kx32			
	250	IS61LPS12832A-250TQI	100 QFP
		IS61LPS12832A-250B2I	119 BGA
		IS61LPS12832A-250B3I	165 BGA
	200	IS61LPS12832A-200TQI	100 QFP
		IS61LPS12832A-200TQLI	100 QFP, Lead-free
		IS61LPS12832A-200B2I	119 BGA
		IS61LPS12832A-200B3I	165 BGA
128Kx36			
	250	IS61LPS12836A-250TQI	100 QFP
		IS61LPS12836A-250B2I	119 BGA
		IS61LPS12836A-250B3I	165 BGA
	200	IS61LPS12836A-200TQI	100 QFP
		IS61LPS12836A-200TQLI	100 QFP, Lead-free
		IS61LPS12836A-200B2I	119 BGA
		IS61LPS12836A-200B2LI	119 BGA, Lead-free
		IS61LPS12836A-200B3I	165 BGA
256Kx18			
	250	IS61LPS25618A-250TQI	100 QFP
		IS61LPS25618A-250B2I	119 BGA
		IS61LPS25618A-250B3I	165 BGA
	200	IS61LPS25618A-200TQI	100 QFP
		IS61LPS25618A-200TQLI	100 QFP, Lead-free
		IS61LPS25618A-200B2I	119 BGA
		IS61LPS25618A-200B3I	165 BGA

Automotive Range: -40°C to +125°C

Configuration	Frequency	Order Part Number	Package
128Kx32			
	200	IS64LPS12832A-200TQA3	100 QFP
		IS64LPS12832A-200TQLA3	100 QFP, Lead-free
128Kx36			
	200	IS64LPS12836A-200TQA3	100 QFP
256Kx18			
	200	IS64LPS25618A-200TQA3	100 QFP
		IS64LPS25618A-200TQLA3	100 QFP, Lead-free

ORDERING INFORMATION (2.5V core/2.5V I/O)

Commercial Range: 0°C to +70°C

Configuration	Frequency	Order Part Number	Package
128Kx36			
	250	IS61VPS12836A-250TQ	100 QFP
		IS61VPS12836A-250B2	119 BGA
		IS61VPS12836A-250B3	165 BGA
	200	IS61VPS12836A-200TQ	100 QFP
		IS61VPS12836A-200B2	119 BGA
		IS61VPS12836A-200B3	165 BGA
256Kx18			
	250	IS61VPS25618A-250TQ	100 QFP
		IS61VPS25618A-250B2	119 BGA
		IS61VPS25618A-250B3	165 BGA
	200	IS61VPS25618A-200TQ	100 QFP
		IS61VPS25618A-200B2	119 BGA
		IS61VPS25618A-200B3	165 BGA

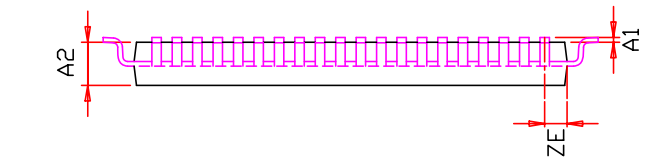
Industrial Range: -40°C to +85°C

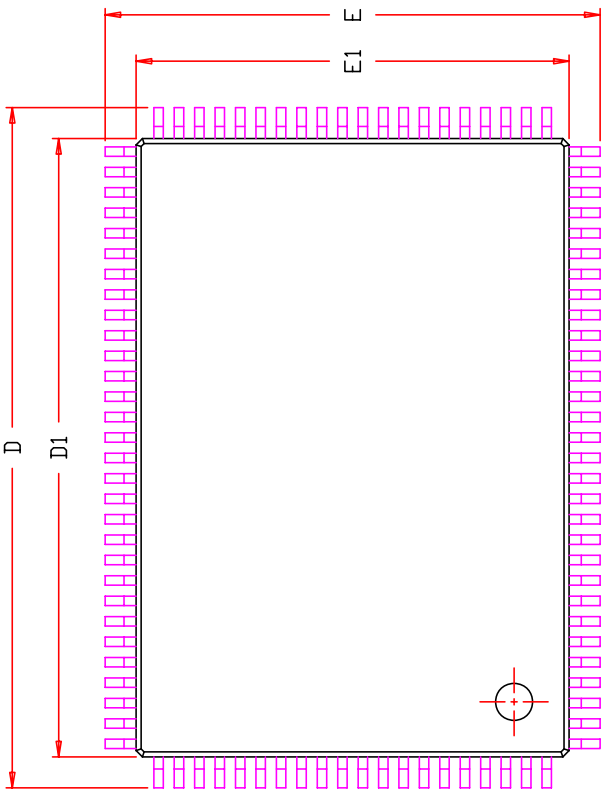
Configuration	Frequency	Order Part Number	Package
128Kx36			
	250	IS61VPS12836A-250TQI	100 QFP
		IS61VPS12836A-250B2I	119 BGA
		IS61VPS12836A-250B3I	165 BGA
	200	IS61VPS12836A-200TQI	100 QFP
		IS61VPS12836A-200B2I	119 BGA
		IS61VPS12836A-200B3I	165 BGA
256Kx18			
	250	IS61VPS25618A-250TQI	100 QFP
		IS61VPS25618A-250B2I	119 BGA
		IS61VPS25618A-250B3I	165 BGA
	200	IS61VPS25618A-200TQI	100 QFP
		IS61VPS25618A-200B2I	119 BGA
		IS61VPS25618A-200B3I	165 BGA

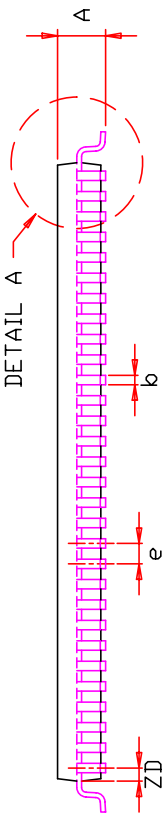
Automotive Range: -40°C to +125°C

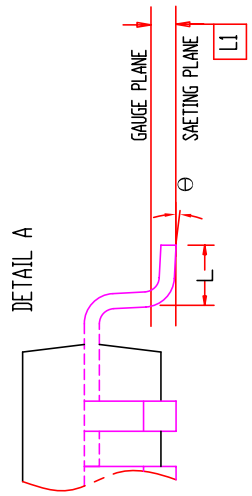
Configuration	Frequency	Order Part Number	Package
128Kx32			
	200	IS64VPS12832A-200TQA3	100 QFP
128Kx36			
	200	IS64VPS12836A-200TQA3	100 QFP
256Kx18			
	200	IS64VPS25618A-200TQA3	100 QFP

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.40	—	1.60	0.055	—	0.063
A1	0.05	—	0.15	0.002	—	0.006
A2	1.35	1.40	1.45	0.053	0.055	0.057
b	0.22	0.30	0.38	0.009	0.012	0.015
D	21.90	22.00	22.10	0.862	0.866	0.870
D1	19.90	20.00	20.10	0.783	0.787	0.791
E	15.90	16.00	16.10	0.626	0.630	0.634
E1	13.90	14.00	14.10	0.547	0.551	0.555
e		0.65 BSC.			0.026 BSC.	
L	0.45	0.60	0.75	0.018	0.024	0.030
L1		0.25 BSC.			0.010 BSC.	
ZD		0.575 REF.			0.023 REF.	
ZE		0.825 REF.			0.032 REF.	
θ	0	3.5°	7°	0	3.5°	7°





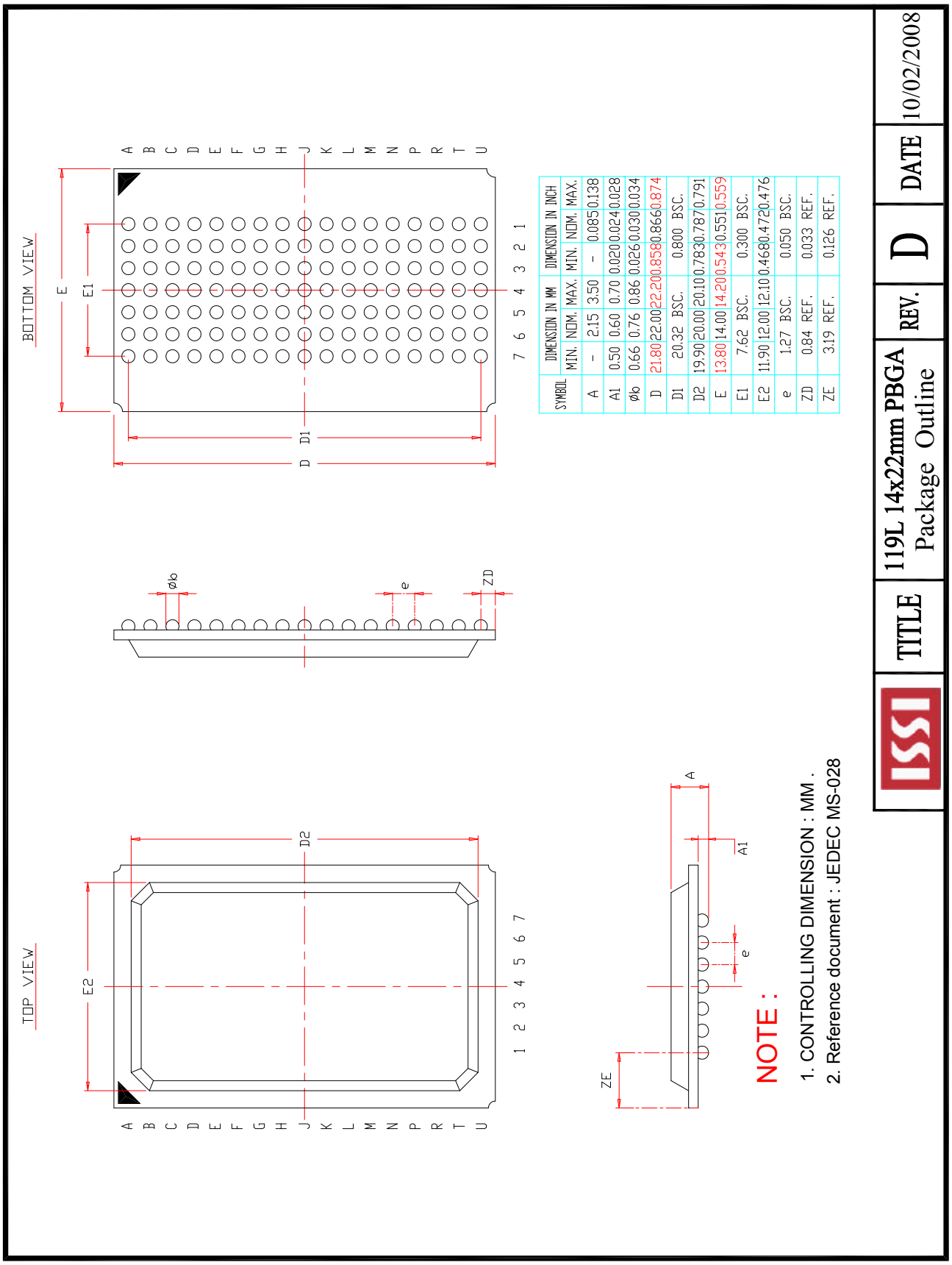




NOTE :
1. CONTROLLING DIMENSION : MM
2. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION.
3. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION/INTRUSION.

	TITLE	100L 14x20x1.4mm LQFP (Footprint : 2.0 mm) Package Outline	REV.	F	DATE	09/01/2009

280-600-011 REV. A



SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	–	2.15	3.50	–	0.085	0.138
A1	0.50	0.60	0.70	0.020	0.024	0.028
ØD	0.66	0.76	0.86	0.026	0.030	0.034
D	21.80	22.00	22.20	0.858	0.866	0.874
D1		20.32 BSC.			0.800 BSC.	
D2	19.90	20.00	20.10	0.783	0.787	0.791
E	13.80	14.00	14.20	0.543	0.551	0.559
E1		7.62 BSC.			0.300 BSC.	
E2	11.90	12.00	12.10	0.468	0.472	0.476
e		1.27 BSC.			0.050 BSC.	
ZD		0.84 REF.			0.033 REF.	
ZE		3.19 REF.			0.126 REF.	

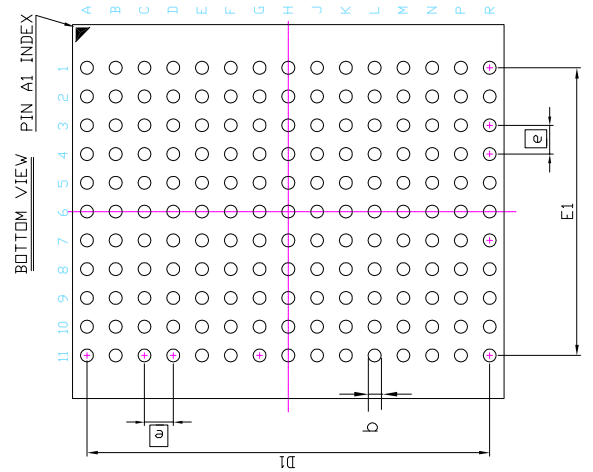
NOTE :
1. CONTROLLING DIMENSION : MM .
2. Reference document : JEDEC MS-028

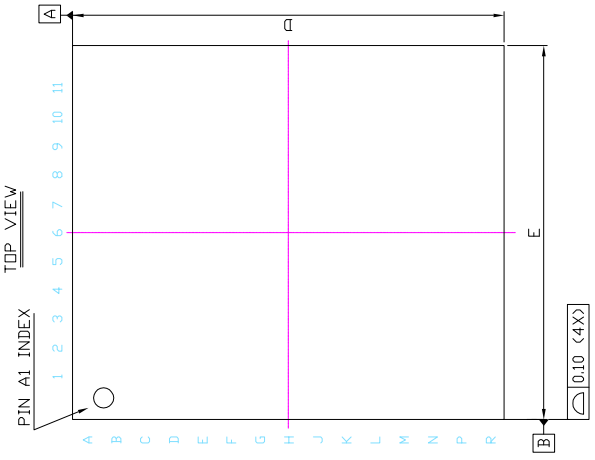
ISSI	TITLE	119L 14x22mm PBGA Package Outline	REV.	D	DATE	10/02/2008

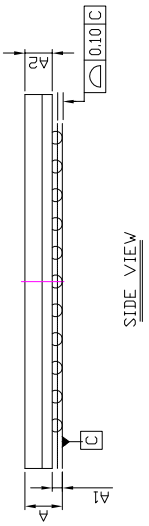
SYM.	DIMENSION (mm)			DIMENSION (inch)		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	—	—	1.20	—	—	0.047
A1	0.25	0.35	0.40	0.010	0.014	0.016
A2	—	0.79	—	—	0.031	—
b	0.40	0.45	0.50	0.016	0.018	0.020
D	14.90	15.00	15.10	0.587	0.591	0.594
D1	13.90	14.00	14.10	0.547	0.551	0.555
E	12.90	13.00	13.10	0.508	0.512	0.516
E1	9.90	10.00	10.10	0.390	0.394	0.398
e	1.00 BSC			0.039 BSC		

NOTE :

1. CONTROLLING DIMENSION : MM .







ISSI	TITLE	165L 13x15mm TF-BGA Package Outline	REV.	B	DATE	08/28/2008