WHITE ELECTRONIC DESIGNS

2x128Kx72, 3.3V Sync/Sync Burst SRAM SO-DIMM

*ADVANCED**

FEATURES

- 2x128Kx72 Synchronous, Synchronous Burst
- Access Speed(s): T_{KHQV} = 8.5, 9, 10, 12ns
- Flow-Through Architecture
- Linear Burst Mode
- Clock Controlled Registered Bank Enables (E_1\, E_2\)
- Clock Controlled Byte Write Mode Enable (BWE\)
- Clock Controlled Byte Write Enables (BW_1\ - BW_8\)
- Clock Controlled Registered Address
- Clock Controlled Registered Global Write (GW\)
- Aysnchronous Output Enable (G\)
- Internally self-timed Write
- Gold Lead Finish
- 3.3V ±10% Operation
- Common Data I/O
- High Capacitance (30pF) drive, at rated Access Speed
- Single total array Clock
- Multiple Vcc and Vss

The EDI2AG272128VxxD1 is a Synchronous/Synchronous Burst SRAM, 72 position DIMM (144 contacts) Module, organized as 2x128Kx72. The Module contains four (4) Synchronous Burst Ram Devices, packaged in the industry standard JEDEC 14mmx20mm TQFP placed on a Multilayer FR4 Substrate. The module architecture is defined as a Sync/Sync Burst, Flow-Through, with support for linear burst. This module provides High Performance, 2-1-1-1 accesses when used in Burst Mode, and used as a Synchronous Only Mode, provides a high performance cost advantage over BiCMOS aysnchronous device architectures.

Synchronous Only operations are performed via strapping ADSC\ Low, and ADSP\ / ADV\ High, which provides for Ultra Fast Accesses in Read Mode while providing for internally self-timed Early Writes.

Synchronous/Synchronous Burst operations are in relation to an externally supplied clock, Registered Address, Registered Global Write, Registered Enables as well as an Asynchronous Output enable. This Module has been defined with full flexibility, which allows individual control of each of the eight bytes, as well as Quad Words in both Read and Write Operations.

* *This data sheet describes a product that may or may not be under development and is subject to change or cancellation without notice.*

PIN CONFIGURATION

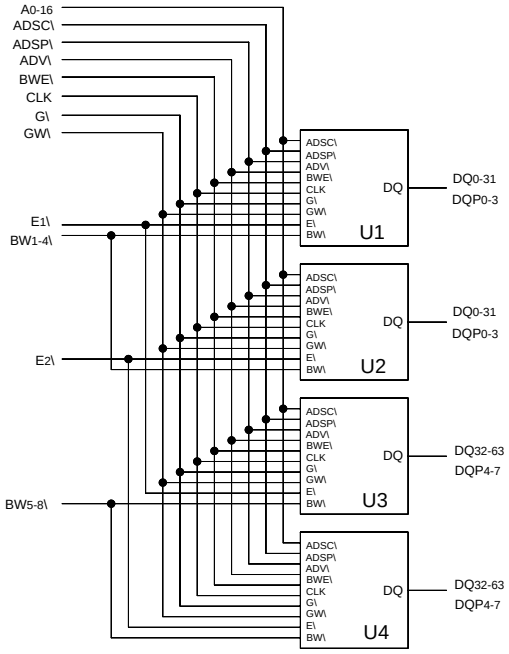
PIN SYMBOLS

PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
1	VSS	37	DQ0	73	VSS	109	DQ41
2	VSS	38	DQ7	74	VSS	110	DQ46
3	A0	39	DQ1	75	BW4\	111	DQ42
4	RFU	40	DQ6	76	DQP3	112	DQ45
5	A16	41	DQ2	77	VCC	113	DQ43
6	A1	42	DQ5	78	VCC	114	DQ44
7	A2	43	DQ3	79	DQ24	115	VSS
8	A15	44	DQ4	80	DQ31	116	VSS
9	A14	45	VSS	81	DQ25	117	BW7\
10	A3	46	VSS	82	DQ30	118	DQP6
11	A4	47	BW2\	83	DQ26	119	VCC
12	A13	48	DQP1	84	DQ29	120	VCC
13	A12	49	VCC	85	DQ27	121	DQ48
14	A5	50	VCC	86	DQ28	122	DQ55
15	A6	51	DQ8	87	VSS	123	DQ49
16	A11	52	DQ15	88	VSS	124	DQ54
17	A10	53	DQ9	89	BW5\	125	DQ50
18	A7	54	DQ14	90	DQP4	126	DQ53
19	A8	55	DQ10	91	VCC	127	DQ51
20	A9	56	DQ13	92	VCC	128	DQ52
21	VCC	57	DQ11	93	DQ32	129	VSS
22	VCC	58	DQ12	94	DQ39	130	VSS
23	G\	59	VSS	95	DQ33	131	BW8\
24	RFU	60	VSS	96	DQ38	132	DQP7
25	GW\	61	BW3\	97	DQ34	133	VCC
26	ADV\	62	DQP2	98	DQ37	134	VCC
27	ADSP\	63	VCC	99	DQ35	135	DQ56
28	ADSC\	64	VCC	100	DQ36	136	DQ63
29	E1\	65	DQ16	101	VSS	137	DQ57
30	CLK	66	DQ23	102	VSS	138	DQ62
31	E2\	67	DQ17	103	BW6\	139	DQ58
32	BWE\	68	DQ22	104	DQP5	140	DQ61
33	BW1\	69	DQ18	105	VCC	141	DQ59
34	DQP0	70	DQ21	106	VCC	142	DQ60
35	VCC	71	DQ19	107	DQ40	143	VSS
36	VCC	72	DQ20	108	DQ47	144	VSS

PIN NAMES

DQ0-63	Input/Output Bus
DQP0-7	Parity Bits
A0-16	Address Bus
E1\, E2\	Synchronous Bank Enables
BWE\	Byte Write Mode Enable
BW1-8\	Byte Write Enables
CLK	Array Clock
GW\	Synchronous Global Write Enable
G\	Asynchronous Output Enable
Vcc	3.3V Power Supply
Vss	Ground
NC	No Connect

FUNCTIONAL BLOCK DIAGRAM



PIN DESCRIPTIONS

DIMM Pins	Symbol	Type	Description
3, 6, 7, 10, 11, 14 15, 18, 19, 20, 17 16, 13, 12, 9, 8, 5	A_{0-16}	Input Synchronous	Addresses: These inputs are registered and must meet the setup and hold times around the rising edge of CLK. The burst counter generates internal addresses associated with A_0 and A_1, during burst and wait cycle.
33, 47, 61, 75, 89, 103, 117, 131	BW_1\, BW_2\, BW_3\, BW_4\, BW_5\, BW_6\, BW_7\, BW_8\	Input Synchronous	Byte Write: A byte write is LOW for a WRITE cycle and HIGH for a READ cycle. BW_0/ controls DQ_{0-7} and DQP_0, BW_1\ controls DQ_{8-15} and DQP_1. BW_2\ controls DQ16-23 and DQP_2. BW3\ controls DQ_{24-31} and DQP_3. BW_4\ controls DQ_{32-39} and DQP_4. BW_5\ controls DQ_{40-47} and DQP_5. BW_6\ controls DQ_{48-55} and DQP_6. BW_7\ controls DQ_{56-64} and DQP_7.
32	BWE\	Input Synchronous	Write Enable: This active LOW input gates byte write operations and must meet the setup and hold times around the rising edge of CLK.
25	GW\	Input Synchronous	Global Write: This active LOW input allows a full 72-bit WRITE to occur independent of the BWE\ and BWx\ lines and must meet the setup and hold times around the rising edge of CLK.
30	CLK	Input Synchronous	Clock: This signal registers the addresses, data, chip enables, write control and burst control inputs on its rising edge. All synchronous inputs must meet setup and hold times around the clock's rising edge.
29, 31	E_1\, E_2\	Input Synchronous	Bank Enables: These active LOW inputs are used to enable each individual bank and to gate ADSP\.
23	G\	Input	Output Enable: This active LOW asynchronous input enables the data output drivers.
26	ADV\	Input Synchronous	Address Status Processor: This active LOW input is used to control the internal burst counter. A HIGH on this pin generates wait cycle (no address advance).
27	ADSP\	Input Synchronous	Address Status Processor: This active LOW input, along with EL\ and EH\ being LOW, causes a new external address to be registered and a READ cycle is initiated using the new address.
28	ADSC\	Input Synchronous	Address Status Controller: This active LOW input causes device to be deselected or selected along with new external address to be registered. A READ or WRITE cycle is initiated depending upon write control inputs.
Various	DQ_{0-63}	Input/Output	Data Inputs/Outputs: First byte is DQ_{0-7}, second byte is DQ_{8-15}, third byte is DQ_{16-23}, fourth byte is DQ_{24-31}, fifth byte is DQ_{32-39}, sixth byte is DQ_{40-47}, seventh byte is DQ_{48-55} and the eight byte is DQ_{56-64}.
34, 48, 62, 76, 90, 104, 118, 132	DQP_{0-7}	Input/Output	Parity Inputs/Outputs: DQP_0 is parity bit for DQ_{0-7}. DQP_1 is parity bit for DQ_{8-15}. DQP_2 is parity bit for DQ_{16-23}. DQP_3 is parity bit for DQ_{24-31}. DQP_4\ is parity bit for DQ_{32-39}. DQP_5 is parity bit for DQ_{40-47}. DQP_6\ is parity bit for DQ_{48-55}. DQP_7 is parity bit for DQ_{56-64} and DQP_7. In order to use the device configured as a 128K x 64, the parity bits need to be tied to Vss through a 10K ohm resistor.
Various	Vcc	Supply	Core power supply: +3.3V -5%/+10%
Various	Vss	Ground	Ground

SYNCHRONOUS BURST - TRUTH TABLE

Operation	E1\	E2\	ADSP\	ADSC\	ADV\	GW\	G\	CLK	DQ	Addr. Used
Deselected Cycle, Power Down; Bank 1	H	X	X	L	X	X	X	L-H	High-Z	None
Deselected Cycle, Power Down; Bank 2	X	H	X	L	X	X	X	L-H	High-Z	None
Read Cycle, Begin Burst; Bank 1	L	H	L	X	X	X	L	L-H	Q	External
Read Cycle, Begin Burst; Bank 1	L	H	L	X	X	X	H	L-H	High-Z	External
Read Cycle, Begin Burst; Bank 2	H	L	L	X	X	X	L	L-H	Q	External
Read Cycle, Begin Burst; Bank 2	H	L	L	X	X	X	H	L-H	High-Z	External
Write Cycle, Begin Burst; Bank 1	L	H	H	L	X	L	X	L-H	D	External
Write Cycle, Begin Burst; Bank 2	H	L	H	L	X	L	X	L-H	D	External
Read Cycle, Begin Burst; Bank 1	L	H	H	L	X	H	L	L-H	Q	External
Read Cycle, Begin Burst; Bank 1	L	H	H	L	X	H	H	L-H	High-Z	External
Read Cycle, Begin Burst; Bank 2	H	L	H	L	X	H	L	L-H	Q	External
Read Cycle, Begin Burst; Bank 2	H	L	H	L	X	H	H	L-H	High-Z	External
Read Cycle, Continue Burst; Bank 1	X	H	X	H	L	H	L	L-H	Q	Next
Read Cycle, Continue Burst; Bank 1	X	H	X	H	L	H	H	L-H	High-Z	Next
Read Cycle, Continue Burst; Bank 2	H	X	X	H	L	H	L	L-H	Q	Next
Read Cycle, Continue Burst; Bank 2	H	X	X	H	L	H	H	L-H	High-Z	Next
Read Cycle, Continue Burst; Bank 1	H	H	X	H	L	H	L	L-H	Q	Next
Read Cycle, Continue Burst; Bank 1	H	H	X	H	L	H	H	L-H	High-Z	Next
Read Cycle, Continue Burst; Bank 2	H	H	X	H	L	H	L	L-H	Q	Next
Read Cycle, Continue Burst; Bank 2	H	H	X	H	L	H	H	L-H	High-Z	Next
Write Cycle, Continue Burst; Bank 1	X	H	H	H	L	L	X	L-H	D	Next
Write Cycle, Continue Burst; Bank 1	H	H	X	H	L	L	X	L-H	D	Next
Write Cycle, Continue Burst; Bank 2	H	X	H	H	L	L	X	L-H	D	Next
Write Cycle, Continue Burst; Bank 2	H	H	X	H	L	L	X	L-H	D	Next
Read Cycle, Suspend Burst; Bank 1	X	H	H	H	H	H	L	L-H	Q	Current
Read Cycle, Suspend Burst; Bank 1	X	H	H	H	H	H	H	L-H	High-Z	Current
Read Cycle, Suspend Burst; Bank 2	H	X	H	H	H	H	L	L-H	Q	Current
Read Cycle, Suspend Burst; Bank 2	H	X	H	H	H	H	H	L-H	High-Z	Current
Read Cycle, Suspend Burst; Bank 1	H	H	X	H	H	H	L	L-H	Q	Current
Read Cycle, Suspend Burst; Bank 1	H	H	X	H	H	H	H	L-H	High-Z	Current
Read Cycle, Suspend Burst; Bank 2	H	H	X	H	H	H	L	L-H	Q	Current
Read Cycle, Suspend Burst; Bank 2	H	H	X	H	H	H	H	L-H	High-Z	Current
Write Cycle, Suspend Burst; Bank 1	X	H	H	H	H	L	X	L-H	D	Current
Write Cycle, Suspend Burst; Bank 1	H	H	X	H	H	L	X	L-H	D	Current
Write Cycle, Suspend Burst; Bank 2	H	X	H	H	H	L	X	L-H	D	Current
Write Cycle, Suspend Burst; Bank 2	H	H	X	H	H	L	X	L-H	D	Current

SYNCHRONOUS ONLY - TRUTH TABLE

Operation	E1\	E2\	GW\	G\	ZZ	CLK	DQ
Synchronous Write-Bank 1	L	H	L	H	L	↑	High-Z
Synchronous Read-Bank 1	L	H	H	L	L	↑	
Synchronous Write-Bank 2	H	L	L	H	L	↑	High-Z
Synchronous Read-Bank 2	H	L	H	L	L	↑	

ABSOLUTE MAXIMUM RATINGS*

Voltage on Vcc Relative to Vss	-0.5V to +4.6V
Vin	-0.5V to Vcc +0.5V
Storage Temperature	-55°C to +125°C
Operating Temperature (Commercial)	0°C to +70°C
Operating Temperature (Industrial)	-40°C to +85°C
Short Circuit Output Current	10 mA

*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 greater than those indicated in operational sections of this specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

RECOMMENDED DC OPERATING CONDITIONS

Parameter	Sym	Min	Typ	Max	Units
Supply Voltage	V_{CC}	3.14	3.3	3.6	V
Supply Voltage	V_{SS}	0.0	0.0	0.0	V
Input High	V_{IH}	2.2	3.0	V_{CC} +0.3	V
Input Low	V_{IL}	-0.3	0.0	0.3	V
Input Leakage	I_{LI}	-2	1	2	µA
Output Leakage	I_{LO}	-2	1	2	µA

DC ELECTRICAL CHARACTERISTICS - READ CYCLE

Description	Symbol	Typ	Max 8.5	Max 9	Max 10	Max 12	Units
Power Supply Current	I_{CC1}	1.6	2.2	2.1	2.1	2.0	A
Power Supply Current Device Selected,No Operation	Icc	750	1.5	1.5	1.0	1.0	A
CMOS Standby	I_{CC3}	500	300	300	300	300	mA
Clock Running-Deselect	I_{CCK}	600	1000	1000	750	750	mA

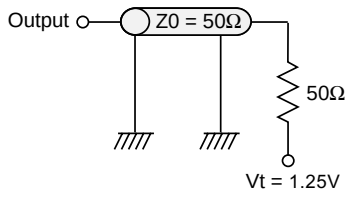
BURST ADDRESS TABLE (MODE = NC/Vcc)

First Address (external)	Second Address (internal)	Third Address (internal)	Fourth Address (internal)
A..A00	A..A01	A..A10	A..A11
A..A01	A..A00	A..A11	A..A10
A..A10	A..A11	A..A00	A..A01
A..A11	A..A10	A..A01	A..A00

BURST ADDRESS TABLE (MODE = Vss)

First Address (external)	Second Address (internal)	Third Address (internal)	Fourth Address (internal)
A..A00	A..A01	A..A10	A..A11
A..A01	A..A10	A..A11	A..A00
A..A10	A..A11	A..A00	A..A01
A..A11	A..A00	A..A01	A..A10

AC TEST CIRCUIT



AC Output Load Equivalent

AC TEST CONDITIONS

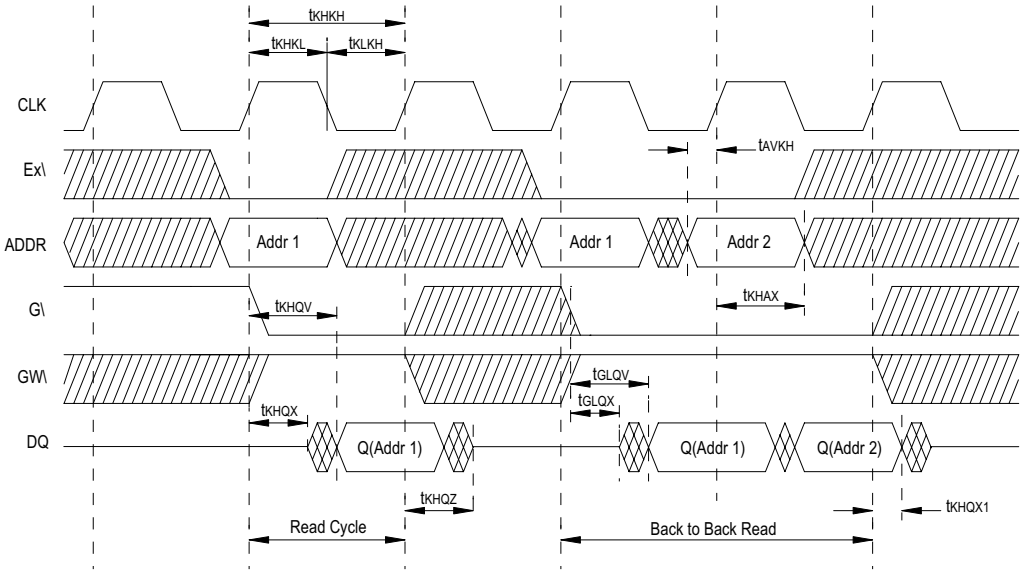
Parameter	I/O	Unit
Input Pulse Levels	Vss to 3.0	V
Input and Output Timing Levels	1.25	V
Output Test Equivalencies	See figure, at left	

READ CYCLE TIMING PARAMETERS

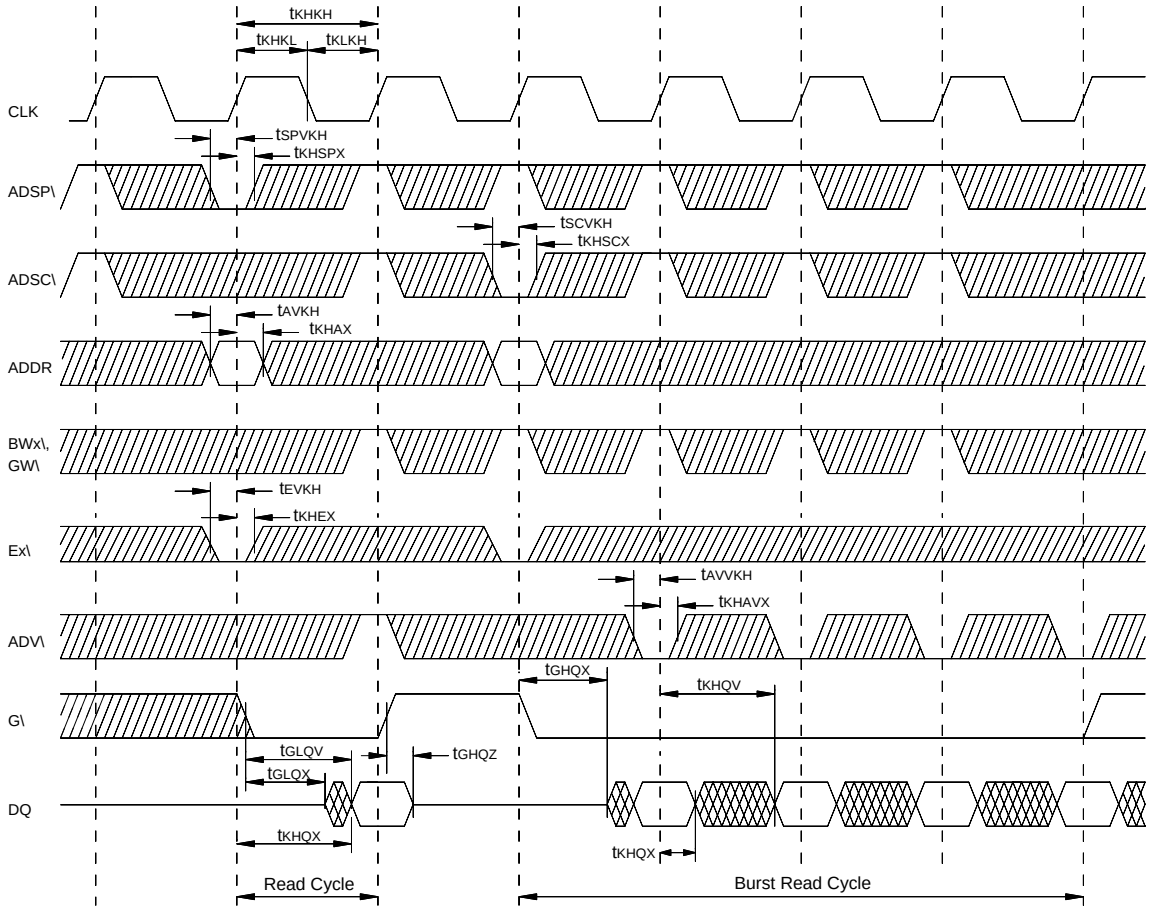
Description	Sym	8.5ns		9ns		10ns		12ns		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Clock Cycle Time	t_{KHKH}	*	*	10		12		15		ns
Clock High Time	t_{KHKL}	*	*	4		5		5		ns
Clock Low Time	t_{KLKH}	*	*	4		5		5		ns
Clock to Output Valid	t_{KHQV}	*	*		9		10		12	ns
Clock to Output Invalid	t_{KHQX1}	*	*	3		3		3		ns
Clock to Output Low-Z	t_{KHQX}	*	*	2		2		2		ns
Output Enable to Output Valid	t_{GLQV}	*	*		4		4		5	ns
Output Enable to Output Low-Z	t_{GLQX}	*	*	0		0		0		ns
Output Enable to Output High-Z	t_{GHQZ}	*	*		4		4		5	ns
Address Setup	t_{AVKH}	*	*	2.5		2.5		2.5		ns
Bank Enable Setup	t_{EVKH}	*	*	2.5		2.5		2.5		ns
Address Hold	t_{KHAX}	*	*	1.0		1.0		1.0		ns
Bank Enable Hold	t_{KHEX}	*	*	1.0		1.0		1.0		ns

*TBD

SYNCHRONOUS ONLY READ CYCLE



SYNCHRONOUS-BURST READ CYCLE

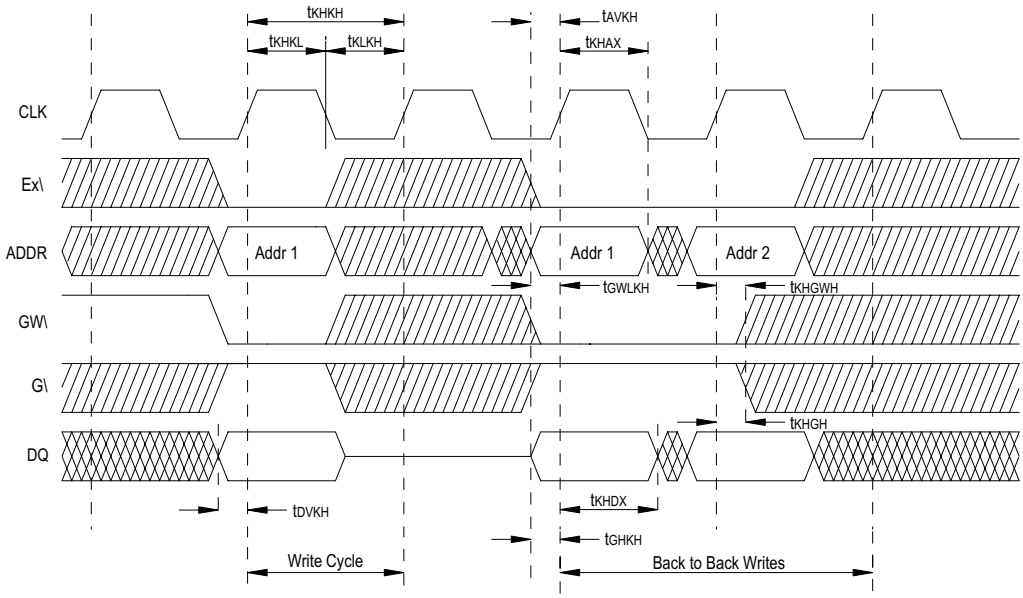


WRITE CYCLE TIMING PARAMETERS

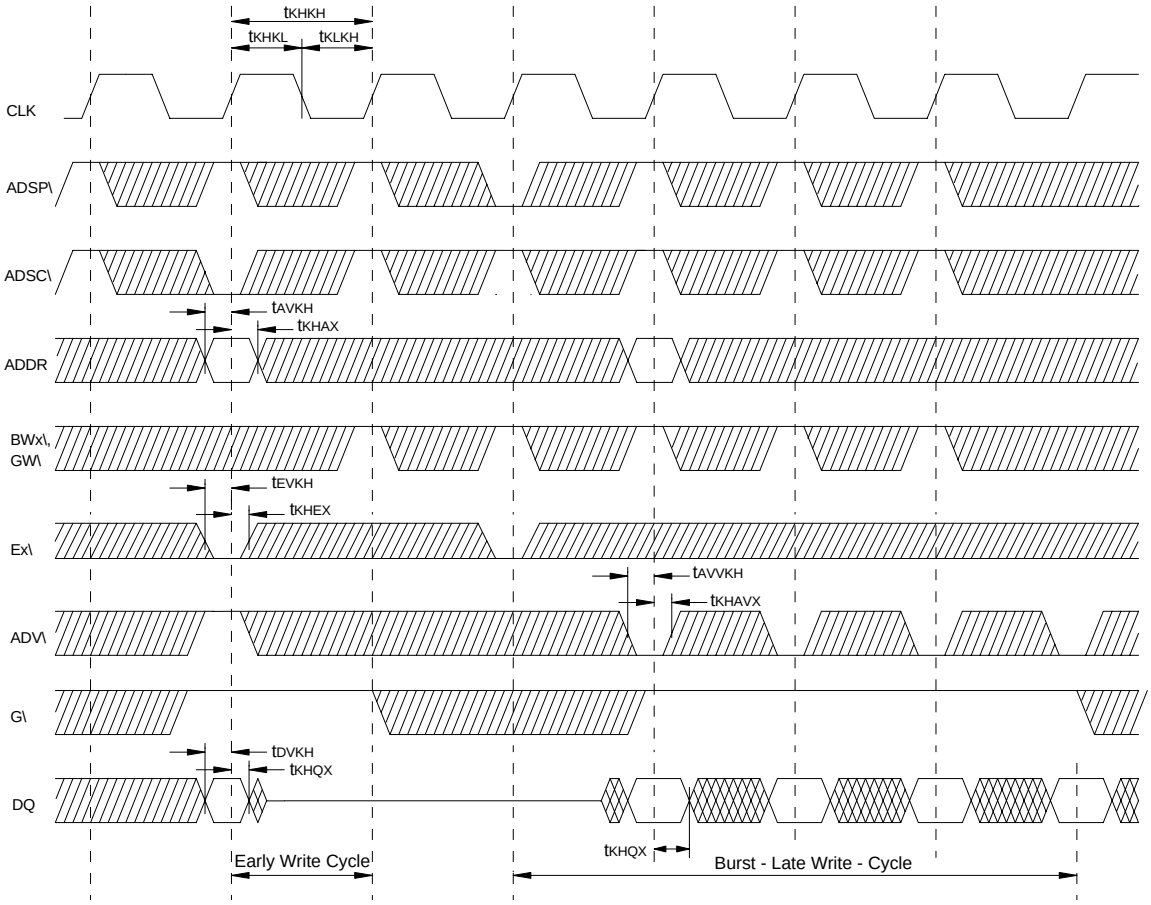
Description	Sym	8.5ns Min	8.5ns Max	9ns Min	9ns Max	10ns Min	10ns Max	12ns Min	12ns Max	Units
Clock Cycle Time	t_{KHKH}	*	*	10		12		15		ns
Clock High Time	t_{KHKL}	*	*	4		5		5		ns
Clock Low Time	t_{KLKH}	*	*	4		5		5		ns
Address Setup	t_{AVKH}	*	*	2.5		2.5		2.5		ns
Address Hold	t_{KHAX}	*	*	1.0		1.0		1.0		ns
Bank Enable Setup	t_{EVKH}	*	*	2.5		2.5		2.5		ns
Bank Enable Hold	t_{KHEX}	*	*	1.0		1.0		1.0		ns
Global Write Enable Setup	t_{WVKH}	*	*	2.5		2.5		2.5		ns
Global Write Enable Hold	t_{KHWX}	*	*	1.0		1.0		1.0		ns
Data Setup	t_{DVKH}	*	*	2.5		2.5		2.5		ns
Data Hold	t_{KHDX}	*	*	1.0		1.0		1.0		ns

**TBD*

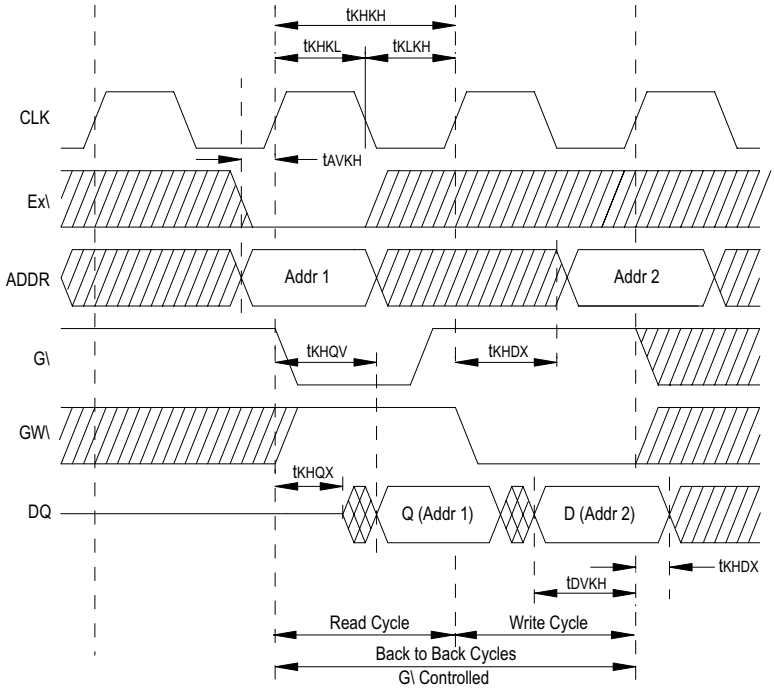
SYNCHRONOUS (NON-BURST) WRITE CYCLE



SYNCHRONOUS-BURST WRITE CYCLE

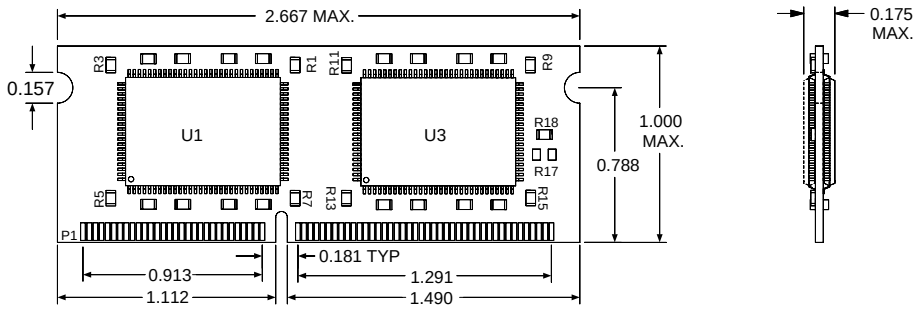


SYNCHRONOUS(NON-BURST) READ/WRITE CYCLE



PACKAGE DESCRIPTION: 144 LEAD SMALL OUTLINE DIMM

Package No. 409



ALL DIMENSIONS ARE IN INCHES

ORDERING INFORMATION

Part Number	Organization	Voltage	Speed (ns)	Package
EDI2AG272128V85D1*	4x256Kx72	3.3	8.5	144 Small Outline DIMM
EDI2AG272128V9D1*	4x256Kx72	3.3	9	144 Small Outline DIMM
EDI2AG272128V10D1	4x256Kx72	3.3	10	144 Small Outline DIMM
EDI2AG272128V12D1	4x256Kx72	3.3	12	144 Small Outline DIMM

**Consult Factory for Availability*