



2 Megabyte Sync/Sync Burst, Small Outline DIMM

FEATURES

- 2x128Kx72 Synchronous, Synchronous Burst
- Flow-Through Architecture
- Linear Burst Mode
- Clock Controlled Registered Bank Enables (E1#, E2#)
- Clock Controlled Byte Write Mode Enable (BWE#)
- Clock Controlled Byte Write Enables (BW1# - BW8#)
- Clock Controlled Registered Address
- Clock Controlled Registered Global Write (GW#)
- Asynchronous Output Enable (G#)
- Internally self-timed Write
- Gold Lead Finish
- 3.3V $\pm$ 10% Operation
- Access Speed(s): TKHQV=8.5, 9, 10, 12ns
- Common Data I/O
- High Capacitance (30pf) drive, at rated Access Speed
- Single total array Clock
- Multiple Vcc and Gnd

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 asynchronous 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 product is under development, is not qualified or characterized and is subject to change or cancellation without notice.

**PIN CONFIGURATION**

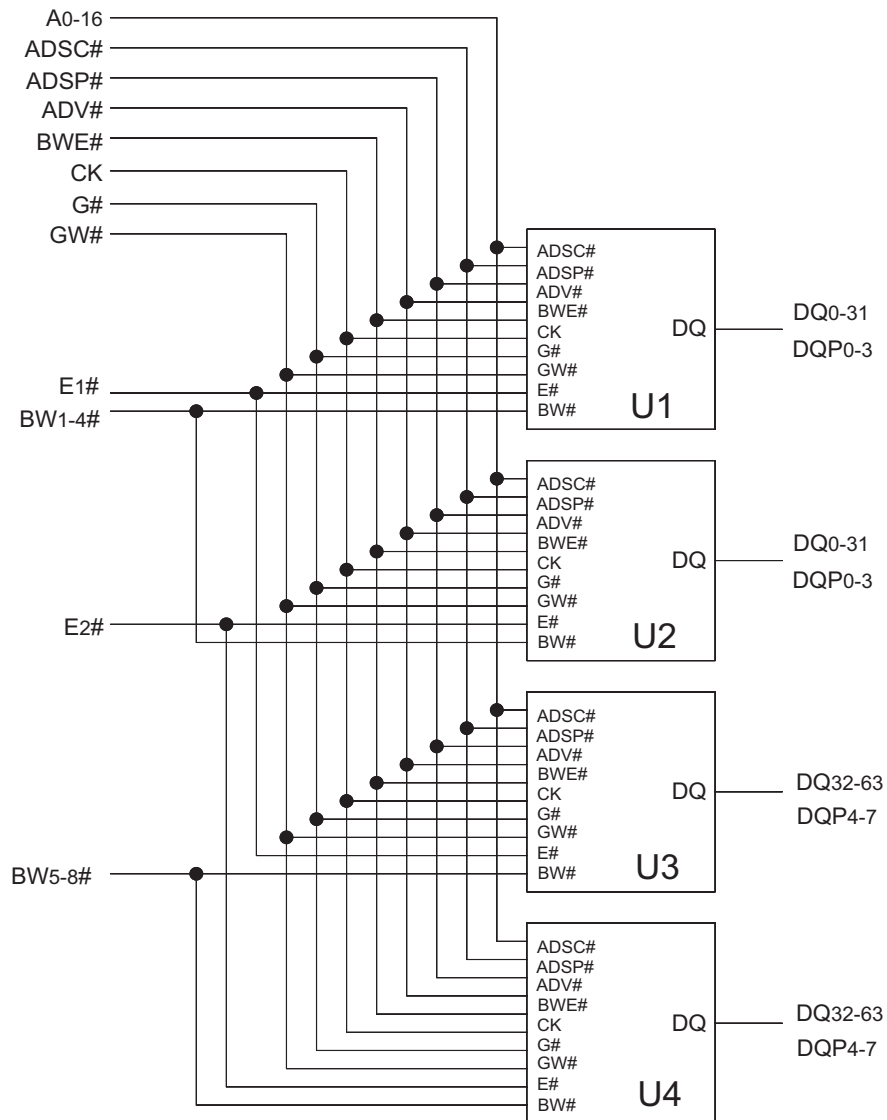
PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION	PIN	FUNCTION
1	V _{SS}	37	DQ0	73	V _{SS}	109	DQ41
2	V _{SS}	38	DQ7	74	V _{SS}	110	DQ46
3	A0	39	DQ1	75	BW4#	111	DQ42
4	RFU	40	DQ6	76	DQP3	112	DQ45
5	A16	41	DQ2	77	V _{CC}	113	DQ43
6	A1	42	DQ5	78	V _{CC}	114	DQ44
7	A2	43	DQ3	79	DQ24	115	V _{SS}
8	A15	44	DQ4	80	DQ31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

PIN NAMES

DQ0-DQ63	Input/Output Bus
DQP0-DQP7	Parity Bits
A0-A16	Address Bus
E1#, E2#	Synchronous Bank Enables
BWE#	Byte Write Mode Enable
BW1#-BW8#	Byte Write Enables
CK	Array Clock
GW#	Synchronous Global write Enable
G#	Asynchronous Output Enable
V _{CC}	3.3V Power Supply
V _{SS}	Gnd



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	A0-A16	Input Synchronous	Addresses: These inputs are registered and must meet the setup and hold times around the rising edge of CK. The burst counter generates internal addresses associated with A0 and A1, during burst and wait cycle.
	33, 47, 61, 75, 89, 103, 117, 131	BW1#, BW2#, BW3#, BW4#, BW5#, BW6#, BW7#, BW8#	Input Synchronous	Byte Write: A byte write is LOW for a WRITE cycle and HIGH for a READ cycle. BW0# controls DQ0-7 and DQP0, BW1# controls DQ8-15 and DQP1. BW2# controls DQ16-23 and DQP2. BW3# controls DQ24-31 and DQP3. BW4# controls DQ32-39 and DQP4. BW5# controls DQ40-47 and DQP5. BW6# controls DQ48-55 and DQP6. BW7# controls DQ56-64 and DQP7.
	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 CK.
	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 CK.
	30	CK	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	E1#, E2#	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 de-selected or selected along with new external address to be registered. A READ or WRITE cycle is initiated depending upon write control inputs.
	Various	DQ0-63	Input/Output	Data Inputs/Outputs: First byte is DQ0-7, second byte is DQ8-15, third byte is DQ16-23, fourth byte is DQ24-31, fifth byte is DQ32-39, sixth byte is DQ40-47, seventh byte is DQ48-55 and the eighth byte is DQ56-64.
	34, 48, 62, 76, 90, 104, 118, 132	DQP0-7	Input/Output	Parity Inputs/Outputs: DQP0 is parity bit for DQ0-7. DQP1 is parity bit for DQ8-15. DQP2 is parity bit for DQ16-23. DQP3 is parity bit for DQ24-31. DQP4# is parity bit for DQ32-39. DQP5 is parity bit for DQ40-47. DQP6# is parity bit for DQ48-55. DQP7 is parity bit for DQ56-64 and DQP7. In order to use the device configured as a parity bit parity bit 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#	CK	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	CK	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 V _{CC} Relative to V _{SS}	-0.5V to +4.6V
V _{IN}	-0.5V to V _{CC} +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}	1.1	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

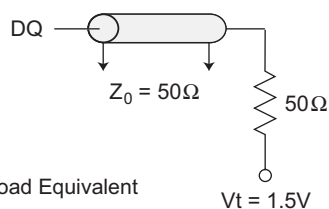
DC ELECTRICAL CHARACTERISTICS - READ CYCLE

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

AC TEST CONDITIONS

Input Pulse Levels	V _{SS} to 3.0V
Input and Output Timing Ref.	1.25V
Output Test equivalencies	

AC TEST LOAD





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=GND)

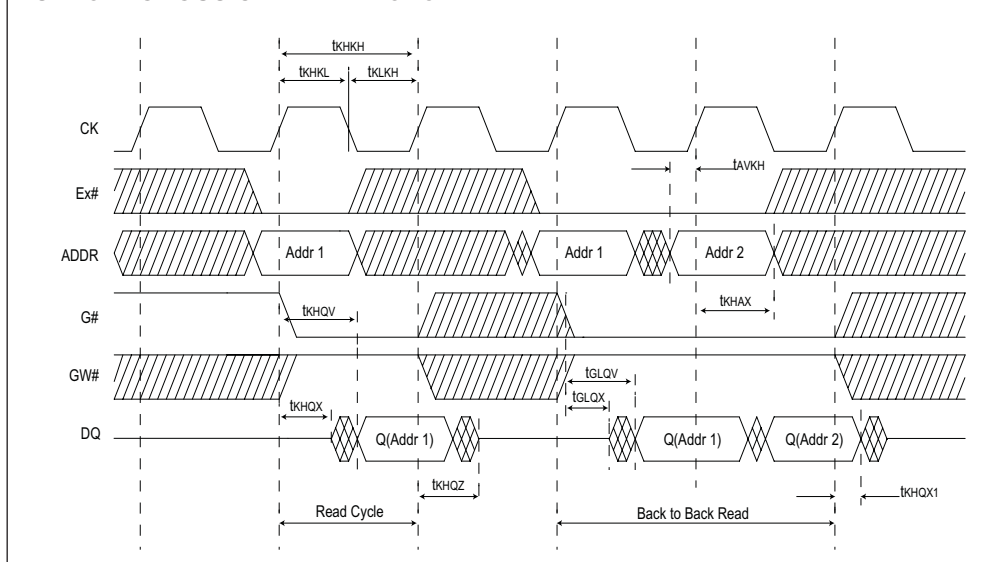
First Address (external)	Second Address (internal)	Third Address (internal)	Fourth Address (internal)
A-A00	A-A01	A-A10	A-A11
A-A01	A-A10	A-A11	A-A00
A-A10	A-A11	A-A00	A-A01
A-A11	A-A00	A-A01	A-A10

READ CYCLE TIMING PARAMETERS

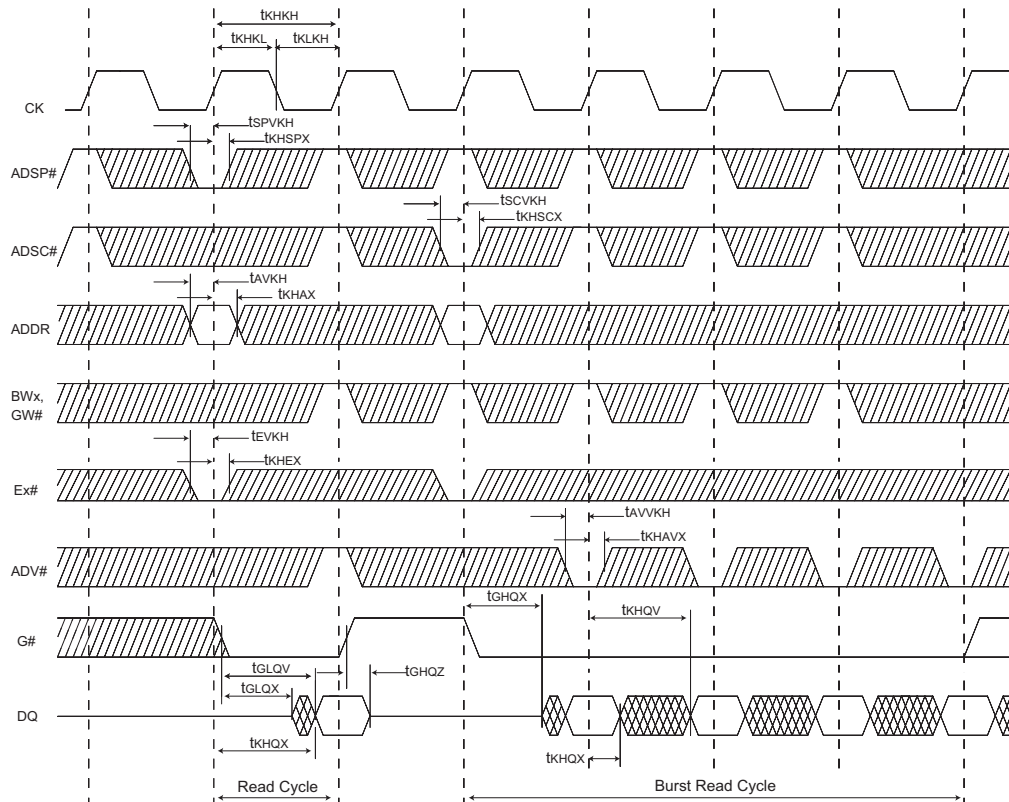
Description	Sym	8.5ns		9ns		10ns		12ns		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Clock Cycle Time	t _{KHKH}	*	*	10		12		15		ns
Clock High Time	t _{KHKL}	*	*	4		5		5		ns
Clock Low Time	t _{KLKH}	*	*	4		5		5		ns
Clock to Output Valid	t _{KHqV}	*	*		9		10		12	ns
Clock to Output Invalid	t _{KHqX1}	*	*	3		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



SYNC-BURST READ CYCLE

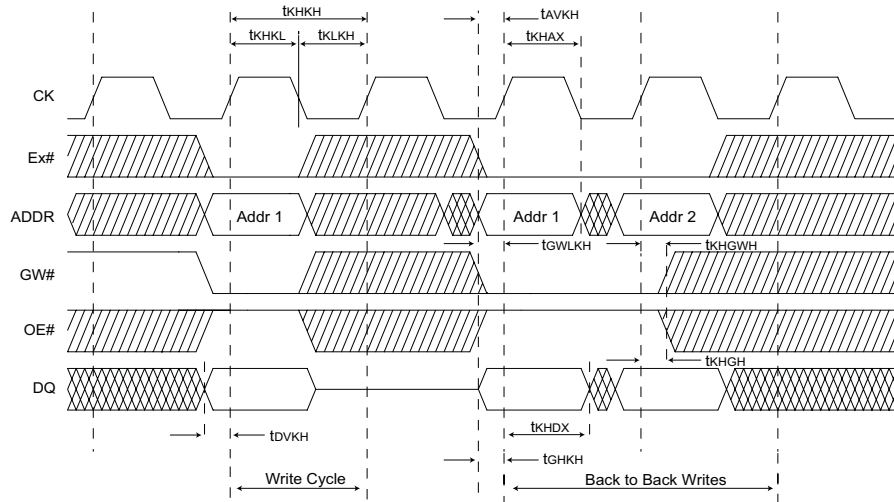


WRITE CYCLE TIMING PARAMETERS

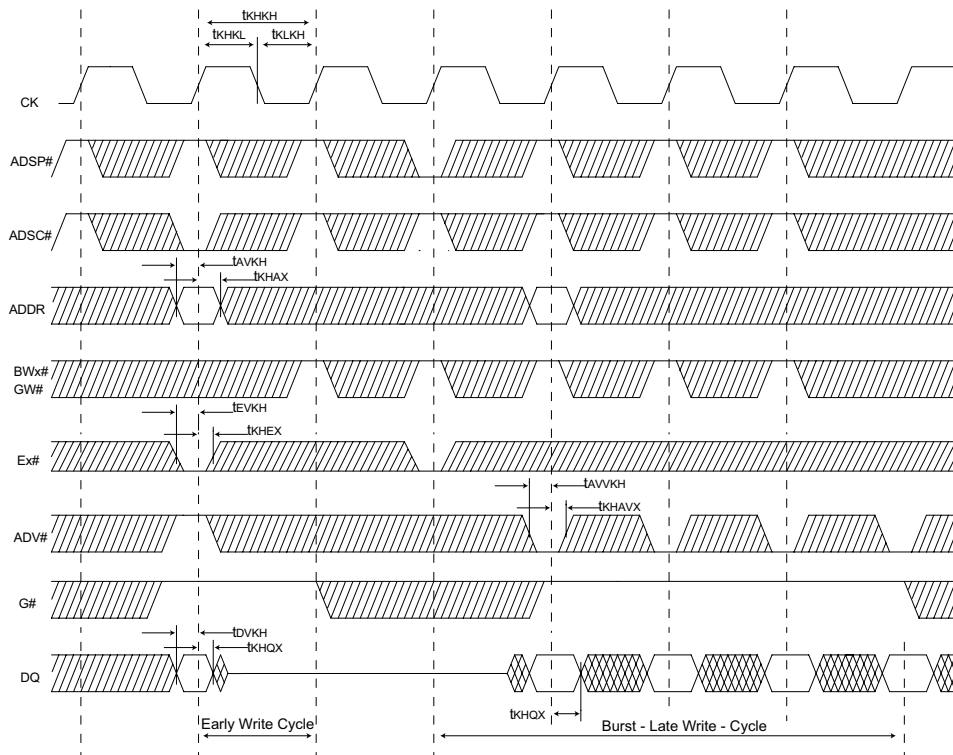
Description	Sym	8.5ns		9ns		10ns		12ns		Units
		Min	Max	Min	Max	Min	Max	Min	Max	
Clock Cycle Time	t _{KHKH}			10		12		15		ns
Clock High Time	t _{KHKL}			4		5		5		ns
Clock Low Time	t _{KLKH}			4		5		5		ns
Address Setup	t _{AVKH}			2.5		2.5		2.5		ns
Address Hold	t _{KHAX}			1.0		1.0		1.0		ns
Bank Enable 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



SYNC (NON-BURST) WRITE CYCLE

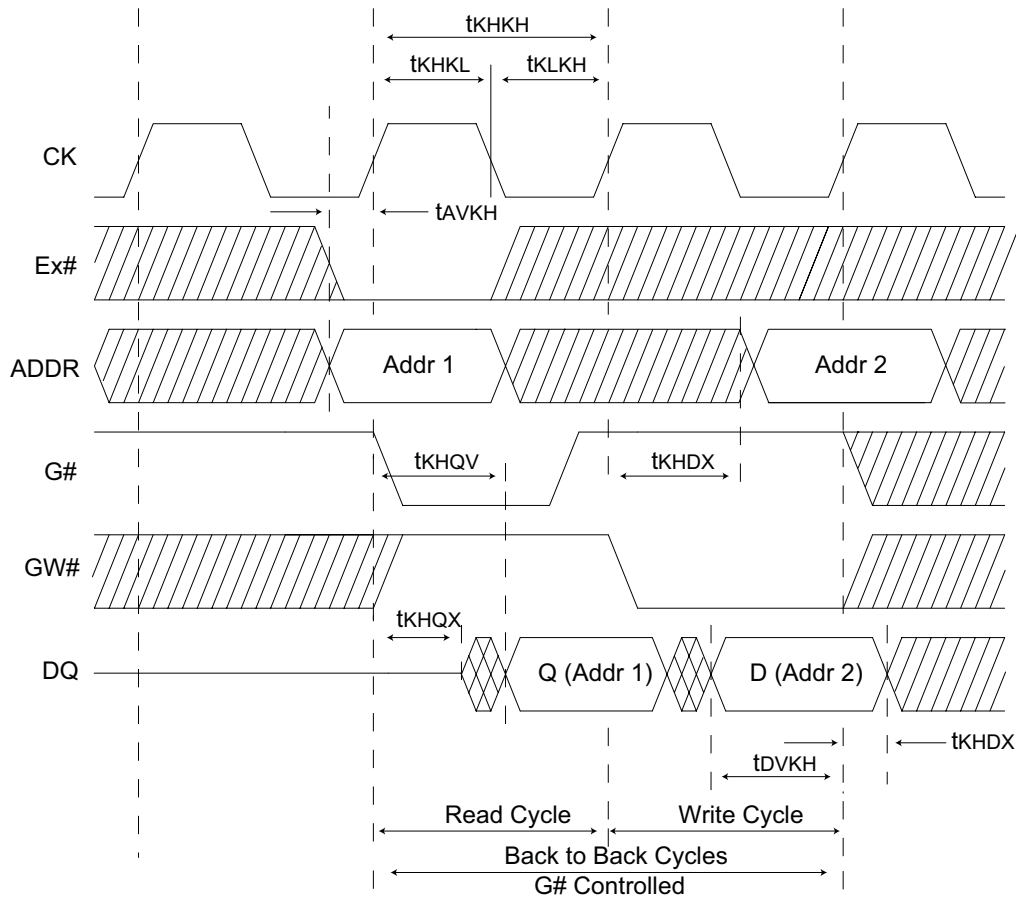


SYNCBURST WRITE CYCLE





SYNC (NON-BURST) READ/WRITE CYCLE



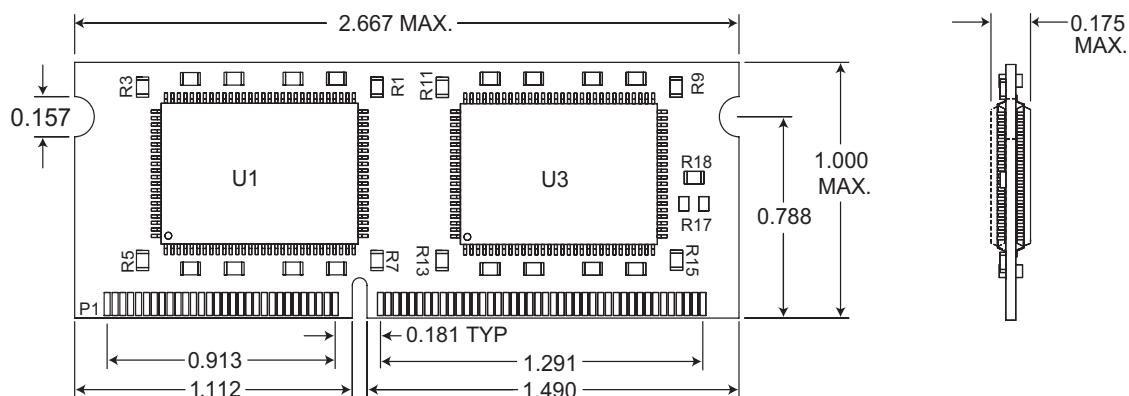


PACKAGE DESCRIPTION

Package No. 409

144 Lead

Small Outline DIMM



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