

16M X 64 Bits (128MB) SDRAM Unbuffered DIMM (PC100)

FEATURES

- PC100 compliant (see *Ordering Information*)
- Burst Mode Operation
- Auto and self refresh capability (4096 cycles/64ms refresh)
- LVTTTL compatible inputs and outputs
- +3.3V \pm 0.3V power supply
- MRS cycle with address key programs
 - Latency (access from column address)
 - Burst Length (1, 2, 4, 8, and full page)
 - Data scramble (sequential and interleave)
- All inputs are sampled at the positive going edge of the system clock
- Serial Presence Detect with EEPROM

GENERAL DESCRIPTION

The SimpleTech SL64U8E16M4G-A10xV is a 16M x 64 bits Synchronous Dynamic RAM (SDRAM) Dual In-line Memory Module (DIMM). This module consists of eight CMOS 4M x 8 bits x 4 banks SDRAMs in 54-pin 400-mil TSOP-II packages mounted on a 168-pin glass epoxy substrate. A serial EEPROM using the two pin I²C protocol is also mounted to provide for the Serial Presence Detects (SPD). Decoupling capacitors of 0.1 μ F and 0.33 μ F are mounted for the SDRAMs and the EEPROM. Damping resistors are added to all the data lines.

The module has gold edge connections and is intended for mounting into 168-pin DIMM edge connector sockets keyed for unbuffered signals and 3.3V power supply.

PIN CONFIGURATION

Pin Symbols

Pin	Symbol	Pin	Symbol	Pin	Symbol	Pin	Symbol	Pin	Symbol	Pin	Symbol	Pin	Symbol
1	VSS	25	NC	49	VDD	73	VDD	97	DQ41	121	A9	145	NC
2	DQ0	26	VDD	50	NC	74	DQ28	98	DQ42	122	BA0	146	VREF*
3	DQ1	27	\overline{WE}	51	NC	75	DQ29	99	DQ43	123	A11	147	NC
4	DQ2	28	DQMB0	52	CB2*	76	DQ30	100	DQ44	124	VDD	148	VSS
5	DQ3	29	DQMB1	53	CB3*	77	DQ31	101	DQ45	125	CLK1	149	DQ53
6	VDD	30	$\overline{S0}$	54	VSS	78	VSS	102	VDD	126	A12*	150	DQ54
7	DQ4	31	DU	55	DQ16	79	CLK2	103	DQ46	127	VSS	151	DQ55
8	DQ5	32	VSS	56	DQ17	80	NC	104	DQ47	128	CKE0	152	VSS
9	DQ6	33	A0	57	DQ18	81	NC	105	CB4*	129	$\overline{S3}$ *	153	DQ56
10	DQ7	34	A2	58	DQ19	82	SDA	106	CB5*	130	DQM6	154	DQ57
11	DQ8	35	A4	59	VDD	83	SCL	107	VSS	131	DQM7	155	DQ58
12	VSS	36	A6	60	DQ20	84	VDD	108	NC	132	A13*	156	DQ59
13	DQ9	37	A8	61	NC	85	VSS	109	NC	133	VDD	157	VDD
14	DQ10	38	A10/AP	62	VREF*	86	DQ32	110	VDD	134	NC	158	DQ60
15	DQ11	39	BA1	63	CKE1	87	DQ33	111	\overline{CAS}	135	NC	159	DQ61
16	DQ12	40	VDD	64	VSS	88	DQ34	112	DQMB4	136	CB6*	160	DQ62
17	DQ13	41	VDD	65	DQ21	89	DQ35	113	DQMB5	137	CB7*	161	DQ63
18	VDD	42	CLK0	66	DQ22	90	VDD	114	$\overline{S1}$ *	138	VSS	162	VSS
19	DQ14	43	VSS	67	DQ23	91	DQ36	115	\overline{RAS}	139	DQ48	163	CLK3
20	DQ15	44	DU	68	VSS	92	DQ37	116	VSS	140	DQ49	164	NC
21	CB0*	45	$\overline{S2}$	69	DQ24	93	DQ38	117	A1	141	DQ50	165	SA0
22	CB1*	46	DQMB2	70	DQ25	94	DQ39	118	A3	142	DQ51	166	SA1
23	VSS	47	DQMB3	71	DQ26	95	DQ40	119	A5	143	VDD	167	SA2
24	NC	48	DU	72	DQ27	96	VSS	120	A7	144	DQ52	168	VDD

*These pins are not used in this module.

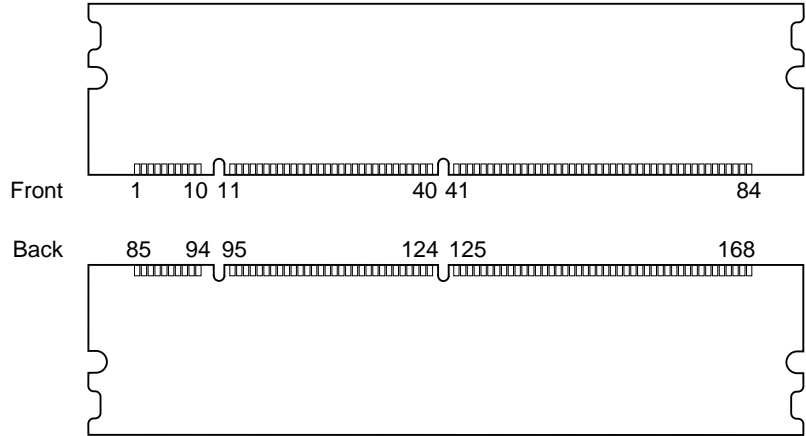
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PIN CONFIGURATION *(continued)*

Pin Functions

Pin Symbol	Pin Function
A0-A10/AP, A11	Address Inputs
BA0, BA1	Select Bank
DQ0-DQ63	Data In/Out
\overline{WE}	Write Enable
CLK0, CLK2	Clock Input
CKE0	Clock Enable Input
\overline{RAS}	Row Address Strobe
\overline{CAS}	Column Address Strobe
DQMB0-DQMB7	Data Input/Output Mask
S0, S2	Chip Select Input
SDA	Serial Data I/O
SCL	Serial Clock
SA0-SA2	Address in EEPROM
VDD	Power (+3.3V)
VSS	Ground
NC	No Connection
DU	Don't Use

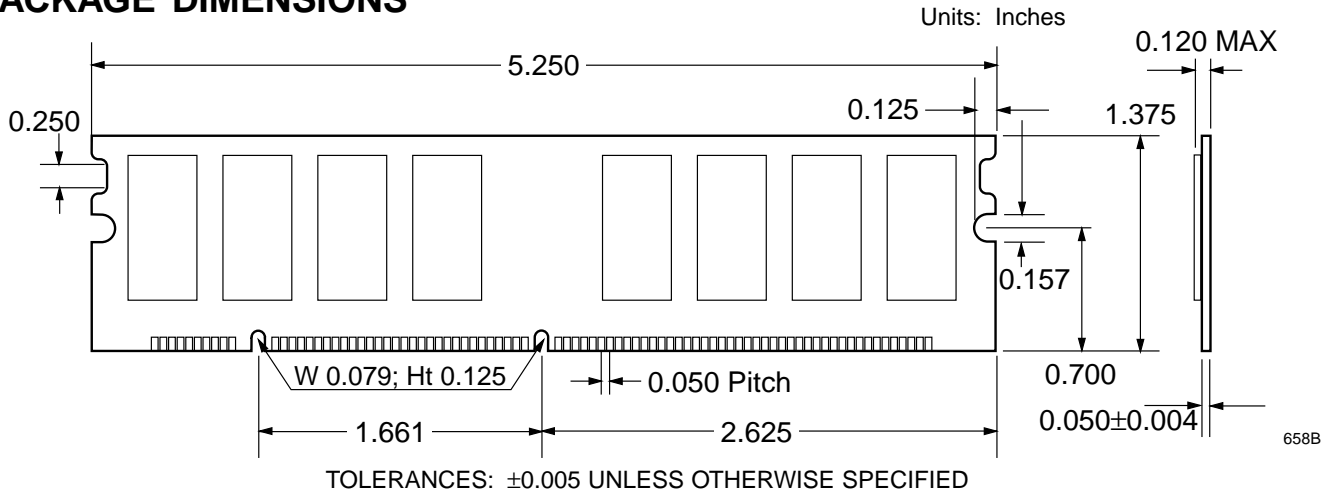
Pin Arrangement



ORDERING INFORMATION

Part Number	PC100 100MHz Parameters					
	CL	tRCD	tRP	tRC	Units	Comment
N.A	3	3	3	8	clks	slowest supported (option "A")
N.A	3	2	3	8	clks	2nd choice (option "B")
SL64U8E16M4G-A10CV	3	2	2	7	clks	target (option "C")
SL64U8E16M4G-A10DV	2	2	2	7	clks	goal (option "D")

PACKAGE DIMENSIONS



SERIAL PRESENCE DETECT INFORMATION

Serial PD Interface Protocol: I²C; Current sink capability of SDA driver - 3mA; Maximum clock frequency: 100 KHz

Byte #	Function Described	Function Supported				Hex Value			
		A	B	C	D	A	B	C	D
0	# of bytes written into serial memory at module manufacturer	128 bytes				80h			
1	Total # of bytes of SPD memory device	256Bytes (2K-bit)				08h			
2	Fundamental memory type	SDRAM				04h			
3	# of row addresses on this assembly	12				0Ch			
4	# of column addresses on this assembly	10				0Ah			
5	# of module banks on this assembly	1 bank				01h			
6	Data width of this assembly	64 bits				40h			
7	...Data width of this assembly (continued)	—				00h			
8	Voltage interface standard of this assembly	LVTTL				01h			
9	SDRAM cycle time at CL=3 (tCYC)	—	—	10ns	10ns	—	—	A0h	A0h
10	SDRAM access time from clock at CL=3 (tAC)	—	—	6ns	6ns	—	—	60h	60h
11	DIMM configuration type	None				00h			
12	Refresh rate/type	15.625 μ s, Self-refresh				80h			
13	SDRAM width	8 bits				08h			
14	Error Checking DRAM data width	None				00h			
15	Min. CLK delay for back-to-back rand. col. addr.	tCCD=1 CLK				01h			
16	SDRAM device attributes: burst lengths supported	1,2,4,8, and full page				8Fh			
17	SDRAM device attributes: # of banks on SDRAM device	4 banks				04h			
18	SDRAM device attributes: CAS latency	CAS latency = 2,3				06h			
19	SDRAM device attributes: CS latency	CS latency = 0				01h			
20	SDRAM device attributes: Write latency	Write Latency = 0				01h			
21	SDRAM module attributes	non-PLL, non-buff., non-reg.				00h			
22	SDRAM device attributes: general	VCC10%, B/R, S/W, P/A, A/P				0Eh			
23	Minimum clock cycle time at CL=2 (tCYC)	—	—	15ns	10ns	—	—	F0h	A0h
24	Max. data access time form clock at CL=2 (tAC)	—	—	8ns	6ns	—	—	80h	60h
25	Minimum clock cycle time at CL=1 (tCYC)	—	—	—	—	—	—	00h	00h
26	Max. data access time from clock at CL=1 (tAC)	—	—	—	—	—	—	00h	00h
27	Minimum row precharge time (tRP)	—	—	20ns	20ns	—	—	14h	14h
28	Minimum row active to row active delay (tRRD)	—	—	20ns	20ns	—	—	14h	14h
29	Mininum RAS to CAS (tRCD)	—	—	20ns	20ns	—	—	14h	14h
30	Mininum RAS pulse width (tRAS)	—	—	50ns	50ns	—	—	32h	32h
31	Module bank density	128MB				20h			
32	Min. command and address signal setup time (tAS)	2ns				20h			
33	Min. command and address signal hold time (tAH)	1ns				10h			
34	Min. data signal input setup time (tDS)	2ns				20h			

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Byte #	Function Described	Function Supported				Hex Value			
		A	B	C	D	A	B	C	D
35	Min. data signal input hold time (t _{DH})	1ns				10h			
36-61	Superset information (may be used in future)	—				00h			
62	SPD revision	—	—	1.2	1.2	—	—	12h	12h
63	Checksum for bytes 0-62	JEDEC calculation				xxh			
64	Manufacturer's JEDEC ID code per JEP-106E	Continuation code				7Fh			
65	Man. JEDEC ID code (continued)	SimpleTech's ID				A8h			
66-71						FFh			
72	Manufacturing location	SimpleTech USA				01h			
73-90	Manufacturer's part number					xxh			
91	Revision code of PCB	Eng(00),RevA(01),RevB(02)				01h			
92						FFh			
93	Manufacturing date	Year (BCD)				yy			
94		Calender Week (BCD)				ww			
95	Assembly serial number	Tester number				ss			
96		Serial number (bits 7-0)				ss			
97		Serial number (bits 15-8)				ss			
98		Serial number (bits 23-16)				ss			
99-125	Manufacturer's specific data					xxh			
126	Intel specification frequency	100MHz				64h			
127	Intel specification details	Detailed 100MHz Info				—	—	AFh	AFh

FUNCTIONAL BLOCK DIAGRAM

