
HB56A232D Series

2,097,152-word × 32-bit High Density Dynamic RAM Module

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ADE-203-300 (Z)

Description

The HB56A232D is a 2 M × 32 dynamic RAM Small Outline Dual In-line Memory Module (S.O.DIMM), mounted 4 pieces of 16-Mbit DRAM (HM5117800BTT) sealed in TSOP package. An outline of the HB56A232D is 72-pin Zig Zag Dual tabs socket type compact and thin package. Therefore, the HB56A232D makes high density mounting possible without surface mount technology. The HB56A232D provides common data inputs and outputs. Decoupling capacitors are mounted beside each TSOP on the module board.

Features

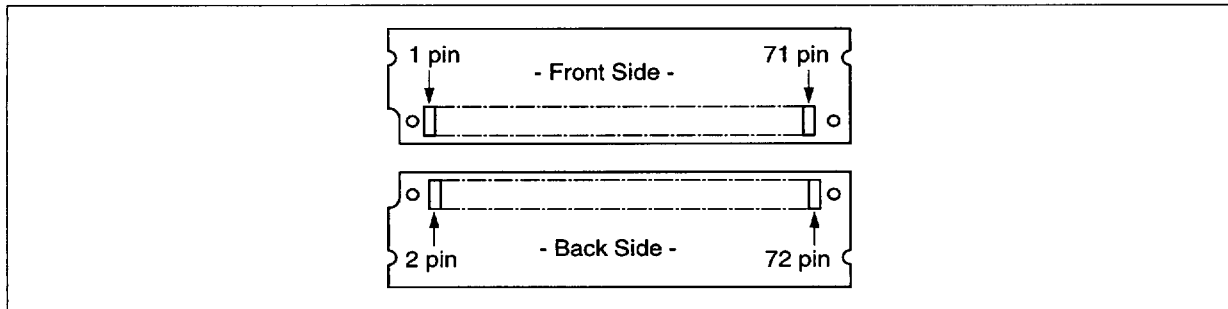
- 72-pin
 - Lead pitch: 1.27 mm
- Single 5 V (±5%) supply
- High speed
 - Access time: $t_{RAC} = 60/70/80$ ns (max)
- Low power dissipation
 - Active mode: 2.52/2.31/2.10 W (max)
 - Standby mode (TTL): 42 mW (max)
- Fast page mode capability
- 2,048 refresh cycles: 32 ms
- 3 variations of refresh
 - \overline{RAS} -only refresh
 - \overline{CAS} -before- \overline{RAS} refresh
 - Hidden refresh
- TTL compatible

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Ordering Information

Type No.	Access time	Package	Contact pad
HB56A232D-6B	60 ns	72-pin Small outline DIMM	gold
HB56A232D-7B	70 ns		
HB56A232D-8B	80 ns		

Pin Arrangement



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Pin Arrangement (cont)

Front Side				Back Side			
Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name	Pin No.	Pin Name
1	V _{SS}	37	DQ18	2	DQ0	38	DQ19
3	DQ1	39	V _{SS}	4	DQ2	40	$\overline{CE0}$
5	DQ3	41	$\overline{CE2}$	6	DQ4	42	$\overline{CE3}$
7	DQ5	43	$\overline{CE1}$	8	DQ6	44	$\overline{RE0}$
9	DQ7	45	NC	10	V _{CC}	46	NC
11	PD1	47	\overline{WE}	12	A0	48	NC
13	A1	49	DQ20	14	A2	50	DQ21
15	A3	51	DQ22	16	A4	52	DQ23
17	A5	53	DQ24	18	A6	54	DQ25
19	A10	55	NC	20	NC	56	DQ27
21	DQ9	57	DQ28	22	DQ10	58	DQ29
23	DQ11	59	DQ31	24	DQ12	60	DQ30
25	DQ13	61	V _{CC}	26	DQ14	62	DQ32
27	DQ15	63	DQ33	28	A7	64	DQ34
29	NC	65	NC	30	V _{CC}	66	PD2
31	A8	67	PD3	32	A9	68	PD4
33	NC	69	PD5	34	$\overline{RE2}$	70	PD6
35	DQ16	71	PD7	36	NC	72	V _{SS}

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Pin Description

Pin Name	Function
A0 to A10	Address Input : A0 to A10 Row Address : A0 to A10 Column Address : A0 to A9 Refresh Address : A0 to A10
DQ0 to DQ7 DQ9 to DQ16 DQ18 to DQ25 DQ27 to DQ34	Data-in/Data-out
$\overline{RE0}, \overline{RE2}$	Row Address Strobe (\overline{RAS})
$\overline{CE0}$ to $\overline{CE3}$	Column Address Strobe (\overline{CAS})
\overline{WE}	Read/Write Enable
V_{cc}	Power Supply
V_{ss}	Ground
PD1 to PD7	Presence Detect Pin
NC	Non Connection

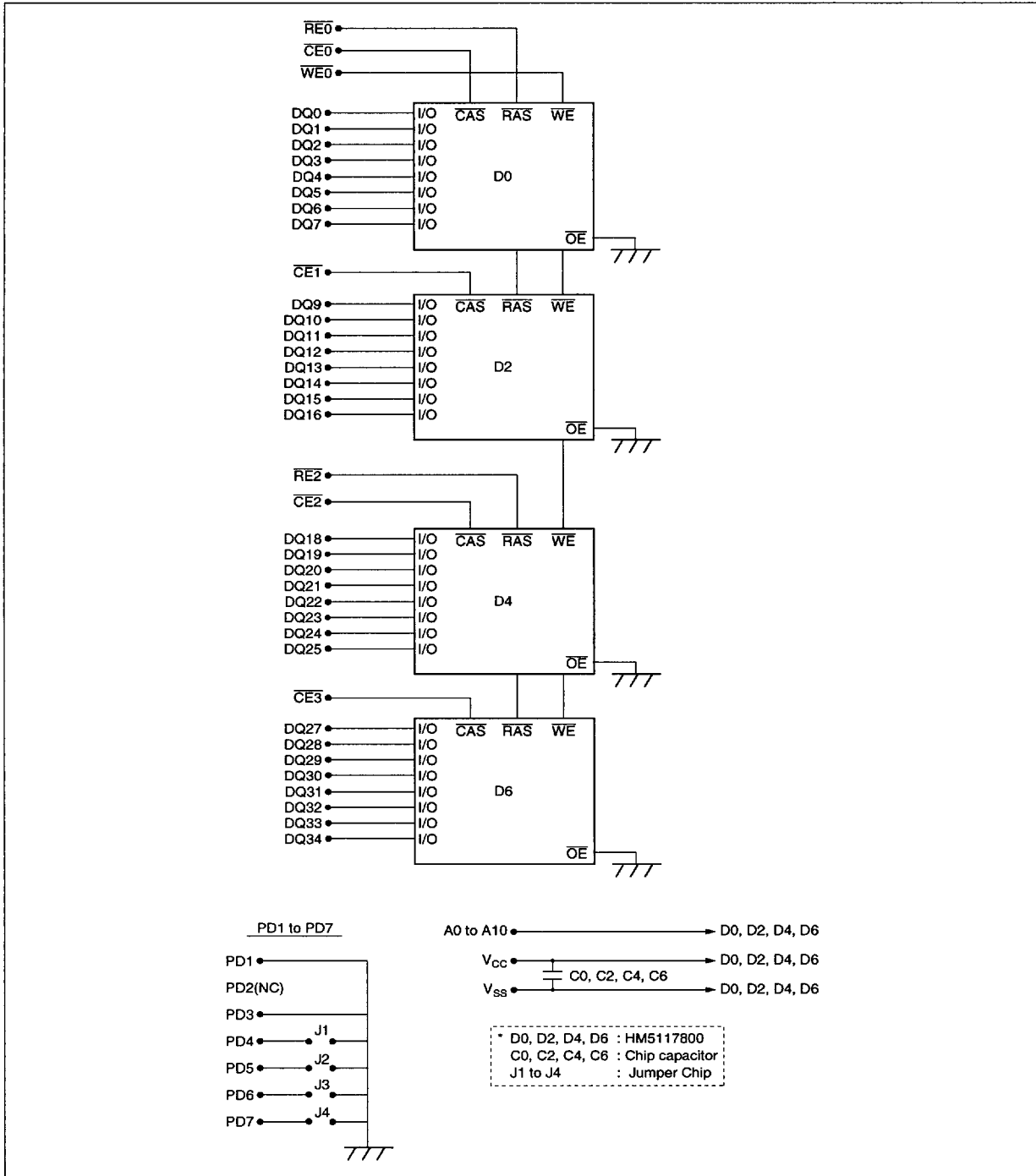
Presence Detect Pin Assignment

Pin No.	Pin Name	HB56A232D		
		60 ns	70 ns	80 ns
11	PD1	V_{ss}	V_{ss}	V_{ss}
66	PD2	NC	NC	NC
67	PD3	V_{ss}	V_{ss}	V_{ss}
68	PD4	NC	NC	NC
69	PD5	NC	V_{ss}	NC
70	PD6	NC	NC	V_{ss}
71	PD7	NC	NC	NC

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Block Diagram



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Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Voltage on any pin relative to V_{SS}	V_T	-1.0 to +7.0	V
Supply voltage relative to V_{SS}	V_{CC}	-1.0 to +7.0	V
Short circuit output current	I_{out}	50	mA
Power dissipation	Pt	4	W
Operating temperature	T_{opr}	0 to +70	°C
Storage temperature	T_{stg}	-55 to +125	°C

Recommended DC Operating Conditions ($T_a = 0$ to 70°C)

Parameter	Symbol	Min	Typ	Max	Unit	Note
Supply voltage	V_{SS}	0	0	0	V	
	V_{CC}	4.75	5.0	5.25	V	1
Input high voltage	V_{IH}	2.4	—	5.5	V	1
Input low voltage	V_{IL}	-0.5	—	0.8	V	1

Note: 1. All voltage referred to V_{SS} .

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DC Characteristics (Ta = 0 to 70°C, V_{CC} = 5 V ± 5%, V_{SS} = 0 V)

		HB56A232D								
		60 ns		70 ns		80 ns				
Parameter	Symbol	Min	Max	Min	Max	Min	Max	Unit	Test Conditions	Notes
Operating current	I _{CC1}	—	480	—	440	—	400	mA	t _{RC} = min	1, 2
Standby current	I _{CC2}	—	8	—	8	—	8	mA	TTL interface RAS, CAS = V _{IH} Dout = High-Z	
		—	4	—	4	—	4	mA	CMOS interface RAS, CAS ≥ V _{CC} - 0.2 V Dout = High-Z	
RAS-only refresh current	I _{CC3}	—	480	—	440	—	400	mA	t _{RC} = min	2
Standby current	I _{CC5}	—	20	—	20	—	20	mA	RAS = V _{IH} , CAS = V _{IL} Dout = enable	1
CAS-before-RAS refresh current	I _{CC6}	—	480	—	440	—	400	mA	t _{RC} = min	
Fast page mode current	I _{CC7}	—	400	—	360	—	340	mA	t _{PC} = min	1, 3
Input leakage current	I _{LI}	-10	10	-10	10	-10	10	μA	0 V ≤ Vin ≤ 6 V	
Output leakage current	I _{LO}	-10	10	-10	10	-10	10	μA	0 V ≤ Vout ≤ 6 V Dout = disable	
Output high voltage	V _{OH}	2.4	V _{CC}	2.4	V _{CC}	2.4	V _{CC}	V	High Iout = -5 mA	
Output low voltage	V _{OL}	0	0.4	0	0.4	0	0.4	V	Low Iout = 4.2 mA	

- Notes: 1. I_{CC} depends on output load condition when the device is selected, I_{CC} max is specified at the output open condition.
 2. Address can be changed once or less while RAS = V_{IL}.
 3. Address can be changed once or less while CAS = V_{IH}.

Capacitance (Ta = 25°C, V_{CC} = 5 V ± 5%)

Parameter	Symbol	Typ	Max	Unit	Notes
Input capacitance (Address)	C _{I1}	—	40	pF	1
Input capacitance (WE)	C _{I2}	—	48	pF	1
Input capacitance (RE)	C _{I3}	—	30	pF	1
Input capacitance (CE)	C _{I4}	—	23	pF	1
I/O capacitance (DQ)	C _{I/O}	—	23	pF	1, 2

- Notes: 1. Capacitance measured with Boonton Meter or effective capacitance measuring method.
 2. CE = V_{IH} to disable Dout.

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AC Characteristics

- Refer to the HM5117800B Series data sheet.
- The HB56A232D Series writes data only in early write cycle ($t_{wCS} \geq t_{wCS}(\text{min})$).
Delayed write cycle is not available (\overline{OE} pin is fixed to V_{SS}).

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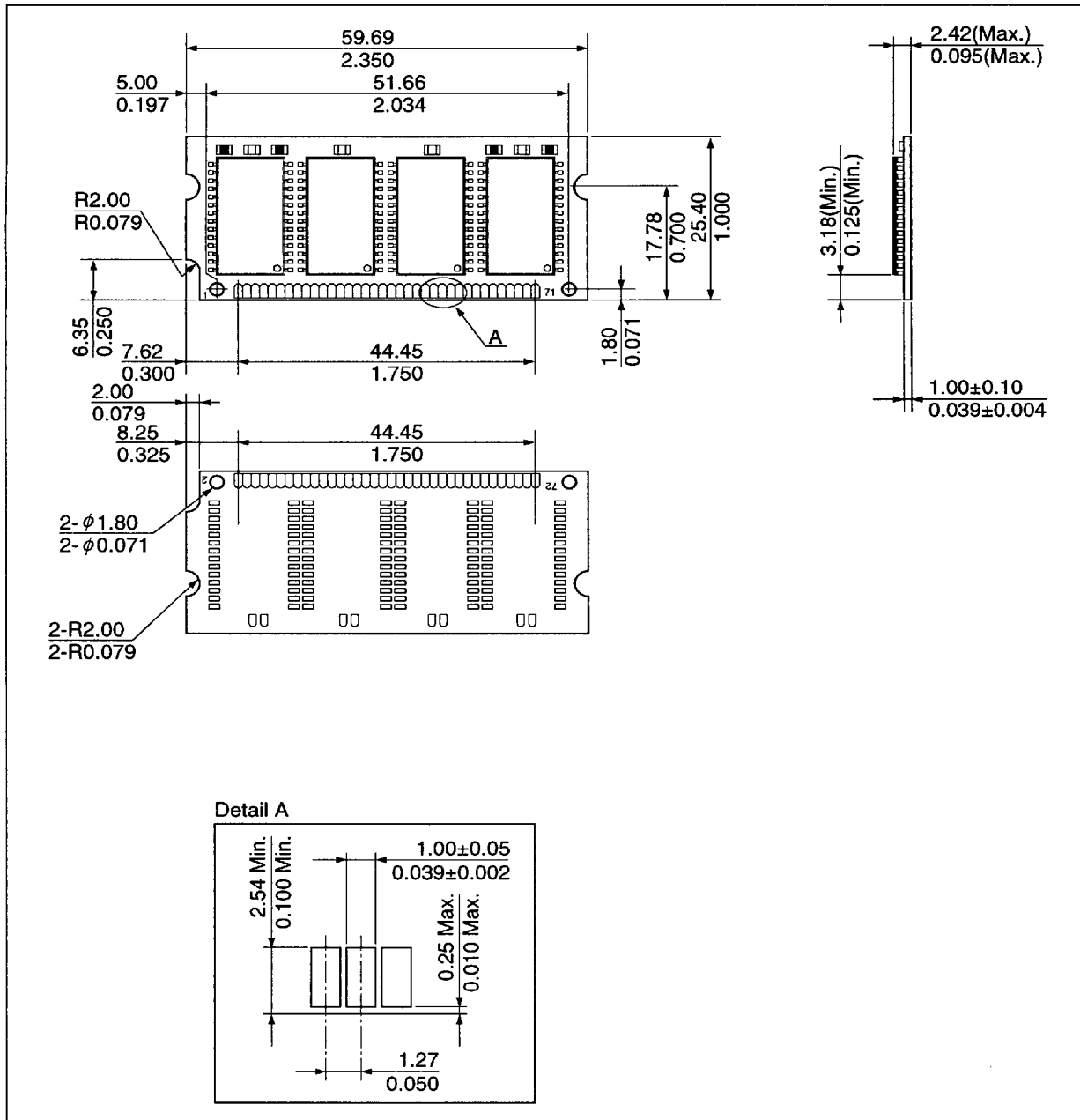
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Physical Outline

Unit: mm/inch



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