HM100504 Series — Preliminary

65,536-Words x 4-Bit Random Access Memory

■ DESCRIPTION

The Hitachi HM100504 is ECL 100k compatible, 65,536 words by 4 bits read/write random access memory developed for high speed systems such as cache and control/buffer storage.

■ FEATURES

- 65,536-words x 4 bit organization
- Fully compatible with 100k ECL level
- 0.8 µm Hi-BiCMOS process
- Address access time: 10/12 ns (max.)
- Write pulse width: 7/9 ns (min.)
- Low power dissipation: 500 mW (typ.)
- Output obtainable by wired-OR (open emitter)

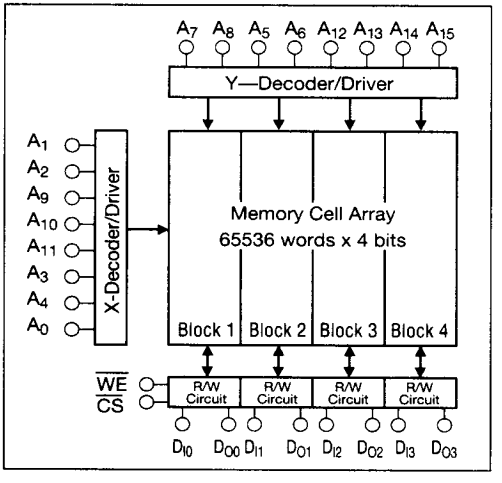
■ ORDERING INFORMATION

Type No.	Access Time	Package
HM100504F-10 HM100504F-12	10 ns 12 ns	28 pin Ceramic Flat (30 mil Lead Pitch) FG-28DA

■ PIN DESCRIPTION

Pin Name	Function
A_0–A_{15}	Address Input
D_{I0}–D_{I3}	Data Input
D_{O0}–D_{O3}	Data Output
$\overline{WE}$	Write Enable
$\overline{CS}$	Chip Select
V_{CC}	Ground
V_{EE}	Supply Voltage

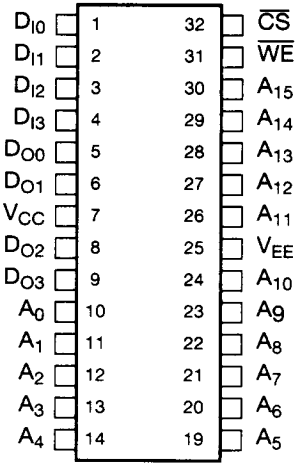
■ BLOCK DIAGRAM



FG-28DA

■ PIN ARRANGEMENT

HM100504 Series



(Top View)

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■ FUNCTION TABLE

Input			Output	Mode
$\overline{CS}$	$\overline{WE}$	D_{in}		
H	X[1]	X[1]	L	Not Selected
L	L	L	L	Write "0"
L	L	H	L	Write "1"
L	H	X[1]	D_{out}[2]	Read

Notes: 1. Irrelevant
2. Read Out Noninvert

■ ABSOLUTE MAXIMUM RATING (T_a = 25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V_{EE} to V_{CC}	+0.5 to −7.0	V
Input Voltage	V_{in}	+0.5 to V_{EE}	V
Output Current	I_{out}	−30	mA
Storage Temperature	T_{stg}	−65 to +150	°C
Storage Temperature	T_{stg} (bias)[1]	−55 to +125	°C

Note: 1. Under bias (V_{EE} = 6.0V min.)

■ ELECTRICAL CHARACTERISTICS

• DC Characteristics (V_{EE} = −4.5V, R_L = 50Ω to −2.0V, T_C = 0 to +85°C)

Item	Symbol	Min (B)	Typ	Max (A)	Unit	Test Condition
Output Voltage	V_{OH}	−1025	−955	−880	mV	V_{in} = V_{IHA} or V_{ILB}
	V_{OL}	−1810	−1715	−1620	mV	
Output Threshold Voltage	V_{OHC}	−1035	—	—	mV	V_{in} = V_{IHB} or V_{ILA}
	V_{OLC}	—	—	−1610	mV	
Input Voltage	V_{IH}	−1165	—	−880	mV	Guaranteed Input Voltage High/Low for All Inputs
	V_{IL}	−1810	—	−1475	mV	
Input Current	I_{IH}	—	—	220	µA	V_{in} = V_{IHA}
	I_{IL}	0.5	—	170	µA	V_{in} = V_{ILB} ($\overline{CS}$)
		−50	—	—	µA	V_{in} = V_{ILB} (Others)
Supply Current	I_{EE}	−180	—	—	mA	All Inputs and Outputs Open

■ AC CHARACTERISTICS (V_{EE} = −4.5V ± 5%, T_c = 0 to +85°C)

• Read Mode

Item	Symbol	HM100504-10			HM100504-12			Unit	Test Condition
		Min	Typ	Max	Min	Typ	Max		
Chip Select Access Time	tACS	—	—	6	—	—	7	ns	
Chip Select Recovery Time	tRCS	—	—	6	—	—	7	ns	
Address Access Time	tAA	—	—	10	—	—	12	ns	

• Write Mode

Item	Symbol	HM100504-10			HM100504-12			Unit	Test Condition
		Min	Typ	Max	Min	Typ	Max		
Write Pulse Width	tW	7	—	—	9	—	—	ns	tWSA = tWSA min
Data Setup Time	tWSD	1	—	—	1	—	—	ns	
Data Hold Time	tWHD	1	—	—	1	—	—	ns	
Address Setup Time	tWSA	1	—	—	1	—	—	ns	tW = tW min
Address Hold Time	tWHA	2	—	—	2	—	—	ns	
Chip Select Setup Time	tWSCS	1	—	—	1	—	—	ns	
Chip Select Hold Time	tWHCS	1	—	—	1	—	—	ns	
Write Disable Time	tWS	—	—	6	—	—	6	ns	
Write Recovery Time	tWR	—	—	12	—	—	14	ns	

• Rise/Fall Time

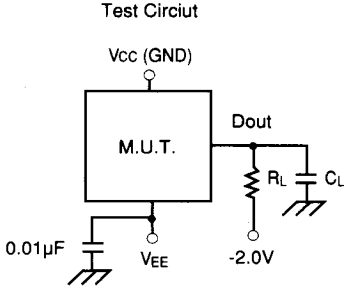
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output Rise Time	t_r	—	2	—	ns	
Output Fall Time	t_f	—	2	—	ns	

• Capacitance

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Input Capacitance	C_{in}	3	pF			
Output Capacitance	C_{OUT}	5	pF			

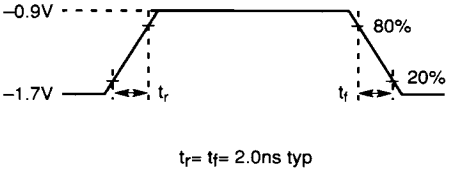
■ TEST CIRCUIT AND WAVEFORMS

1. Loading Condition



R_L = 50Ω
C_L = 30pF
(Includes probe and jig capacitance)

2. Input Pulse



t_r = t_f = 2.0ns typ

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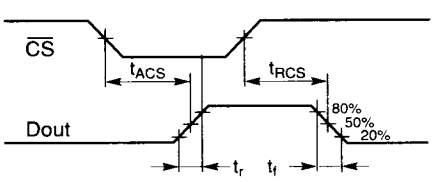
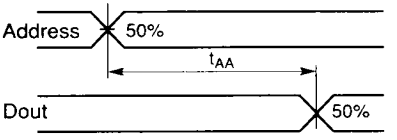
■ TIMING WAVEFORM

3. Read Mode





4. Write Mode