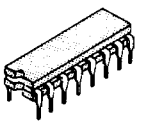
HM2504, HM2504-1

256-word × 1-bit Fully Decoded Random Access Memory

The HM2504 Series item is a TTL compatible, 256-word x 1-bit, read/write random access memory developed for application to buffer memories, control memories, high-speed main memories, etc. This is a fully decoded, read/write random access memory perfectly compatible with the standard DTL and TTL logic family, designed as an open collector output type for simplicity of expansion.

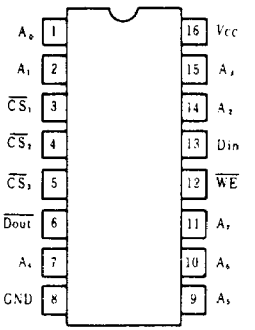
- Level ..... TTL compatible
- Construction ..... 256-word x 1 bit
- Read access time ..... HM2504: 55ns (max)
  HM2504-1: 45ns (max.)
- Chip select access time ..... 30ns (max.)
- Power consumption ..... 1.8mW/bit (typ)
- Output ..... Open collector

TTL



(DG-16)

■ PIN ARRANGEMENT



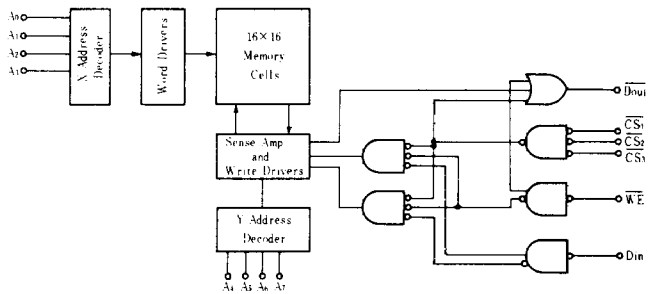
(Top View)

■ TRUTH TABLE

Inputs			Output Open Collector	Mode
$\overline{CS}$	$\overline{WE}$	Din		
any one H	×	×	H	Not Selected
all L	L	L	H	Write "0"
all L	L	H	H	Write "1"
all L	H	×	$\overline{Dout}$*	Read

Notes) × : Don't care
* : Read out inverted

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	HM2504, HM2504-1	Unit
Supply Voltage	V_{CC}	−0.5 to +7.0	V
Input Voltage	V_{in}	−0.5 to +5.5	V
Input Current	I_{in}	−12 to +5.0	mA
Output Voltage (Output High)	V_{out}	−0.5 to +5.5	V
Output Voltage (DC Output Low)	I_{out}	+20	mA
Storage Temperature	T_{stg}	−65 to +150	°C
Storage Temperature	T_{stg} (Bias)*	−55 to +125	°C

* Under Bias

■ELECTRICAL CHARACTERISTICS

●DC CHARACTERISTICS (V_{CC}=5.0V ±5%, Ta=0 to +75°C, air flow exceeding 2m/sec)

Item	Symbol	Test Condition		HM2504 Series			Unit
				min	typ	max	
Output Voltage	V_{OL}	V_{CC}=4.75V, I_{OL}=16mA		—	0.3	0.45	V
Input Voltage	V_{IH}	Guaranteed Input Voltage High		2.0	1.6	—	V
	V_{IL}	Guaranteed Input Voltage Low		—	1.5	0.85	V
Input Current	I_{IH}	V_{CC}=5.25V, V_{in}=4.5V		—	0	20	μA
	I_{IL}	V_{CC}=5.25V, V_{in}=0		—	−530	−800	μA
Output Leakage Current	I_{CEX}	V_{CC}=5.25V, V_{out}=4.5V		—	0	50	μA
Input Clamp Voltage	V_I	V_{CC}=5.25V, I_{in}=−10mA		—	−1.0	−1.5	V
Supply Current	I_{CC}	V_{CC}=5.25V All input GND	0< Ta <25°C	—	—	135	mA
			Ta ≧25°C	—	—	130	mA

●AC CHARACTERISTICS

(V_{CC}=5.0V ±5%, Ta=0 to +75°C, air flow exceeding 2m/s, see test circuit and waveforms)

1. READ MODE

Item	Symbol	Test Condition	HM2504			HM2504-1			Unit
			min	typ	max	min	typ	max	
Chip Select Access Time	t_{ACS}		—	12	30	—	12	30	ns
Chip Select Recovery Time	t_{RCS}		—	18	25	—	18	25	ns
Address Access Time	t_{AA}		—	35	55	—	30	45	ns

2. WRITE MODE

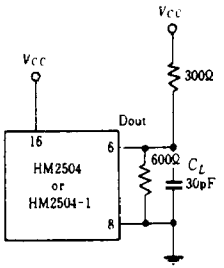
Item	Symbol	Test Condition	HM2504			HM2504-1			Unit
			min	typ	max	min	typ	max	
Write Pulse Width	t_W	t_{WSA}=0ns	30	8	—	30	8	—	ns
Data Setup Time	t_{WSD}		0	0	—	0	0	—	ns
Data Hold Time	t_{WHD}		5	0	—	5	0	—	ns
Address Setup Time	t_{WSA}	t_W=30ns	0	0	—	0	0	—	ns
Address Hold Time	t_{WHA}		5	0	—	5	0	—	ns
Chip Select Setup Time	t_{WSCS}		0	0	—	0	0	—	ns
Chip Select Hold Time	t_{WHCS}		5	0	—	5	0	—	ns
Write Disable Time	t_{WS}		—	14	35	—	14	35	ns
Write Recovery Time	t_{WR}		—	12	40	—	12	40	ns

3. CAPACITANCE

Item	Symbol	Test Condition	HM2504			HM2504-1			Unit
			min	typ	max	min	typ	max	
Input Capacitance	C_{in}		—	3	5	—	3	5	pF
Output Capacitance	C_{out}		—	6	8	—	6	8	pF

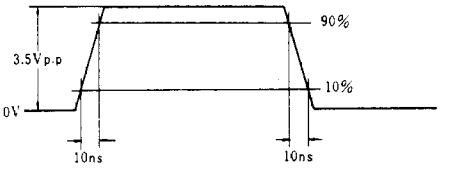
■ TEST CIRCUIT AND WAVEFORMS

1. LOADING CONDITION

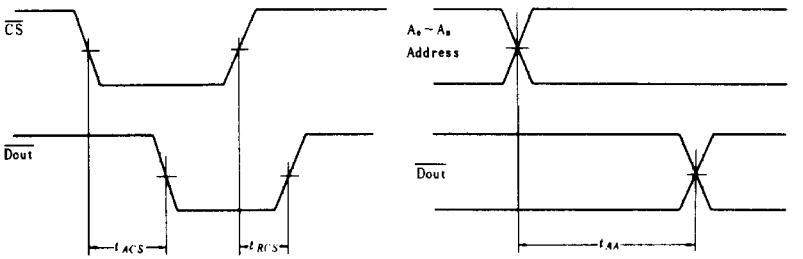


Note: C_L includes jig and stray capacitance

2. INPUT PULSE

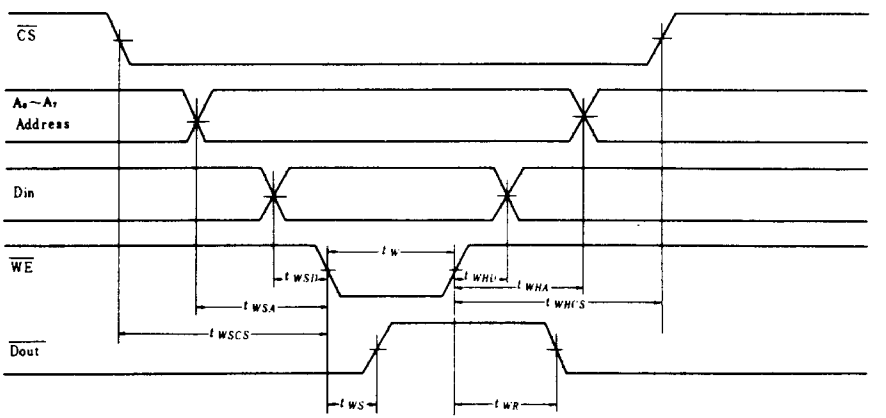


3. READ MODE



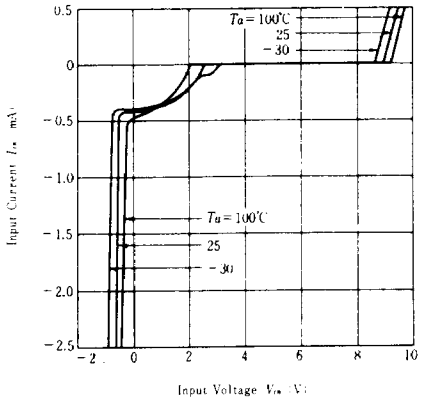
(All time measurements refer to 1.5V)

4. WRITE MODE

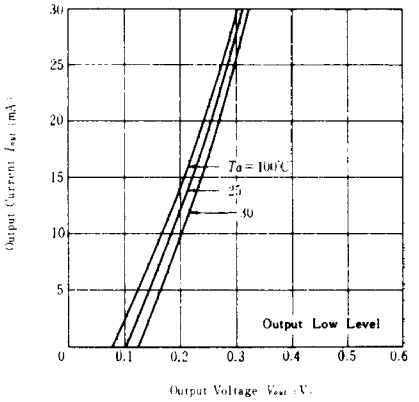


(All time measurements refer to 1.5V)

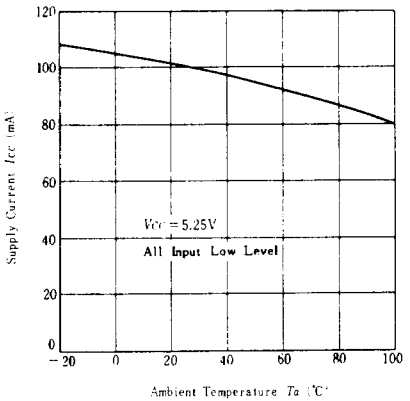
INPUT CHARACTERISTICS



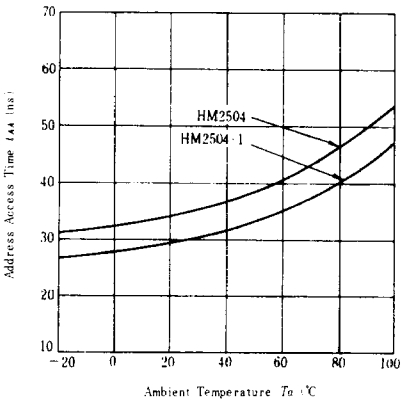
OUTPUT CHARACTERISTICS



SUPPLY CURRENT vs. AMBIENT TEMPERATURE



ADDRESS ACCESS TIME vs. AMBIENT TEMPERATURE



SUPPLY CURRENT vs. SUPPLY VOLTAGE