LH534000B

CMOS 4M (512K × 8 / 256K × 16)
Mask-Programmable ROM

FEATURES

- Memory organization selection:
  524,288 × 8 bit (byte mode)
  262,144 × 16 bit (word mode)
- $\overline{\text{BYTE}}$ input pin selects bit configuration
- Access time: 200 ns (MAX.)
- Low-power consumption:
  Operating: 275 mW (MAX.)
  Standby: 550 μW (MAX.)
- Static operation (Internal sync. system)
- TTL compatible I/O
- Three-state outputs
- Single +5 V power supply
- Packages:
  40-pin, 600-mil DIP
  40-pin, 525-mil SOP
  48-pin, 12 × 18 mm^2 TSOP (Type I)
  44-pin, 14 × 14 mm^2 QFP
  44-pin, 10 × 10 mm^2 QFP
- X16 word-wide pinout

DESCRIPTION

The LH534000B is a 4M bit mask-programmable ROM with two programmable memory organizations of byte and word modes. It is fabricated using silicon-gate CMOS process technology.

PIN CONNECTIONS

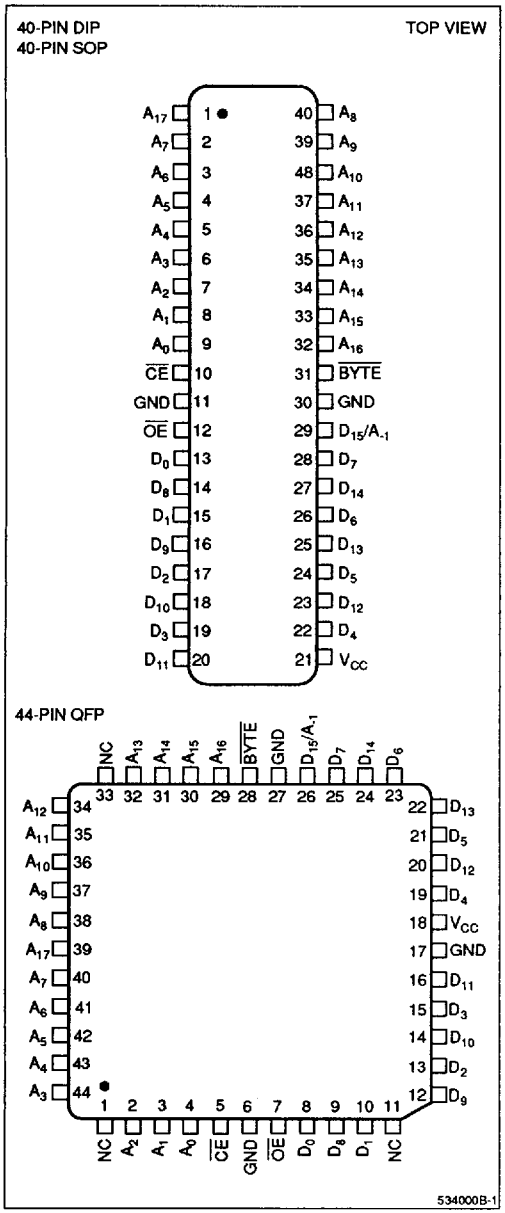


Figure 1. Pin Connections for DIP, SOP, and QFP Packages

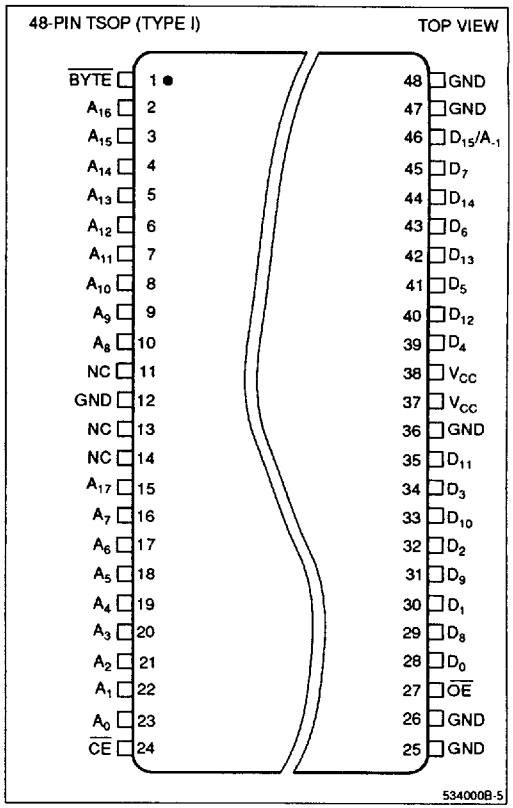


Figure 2. Pin Connections for TSOP Package

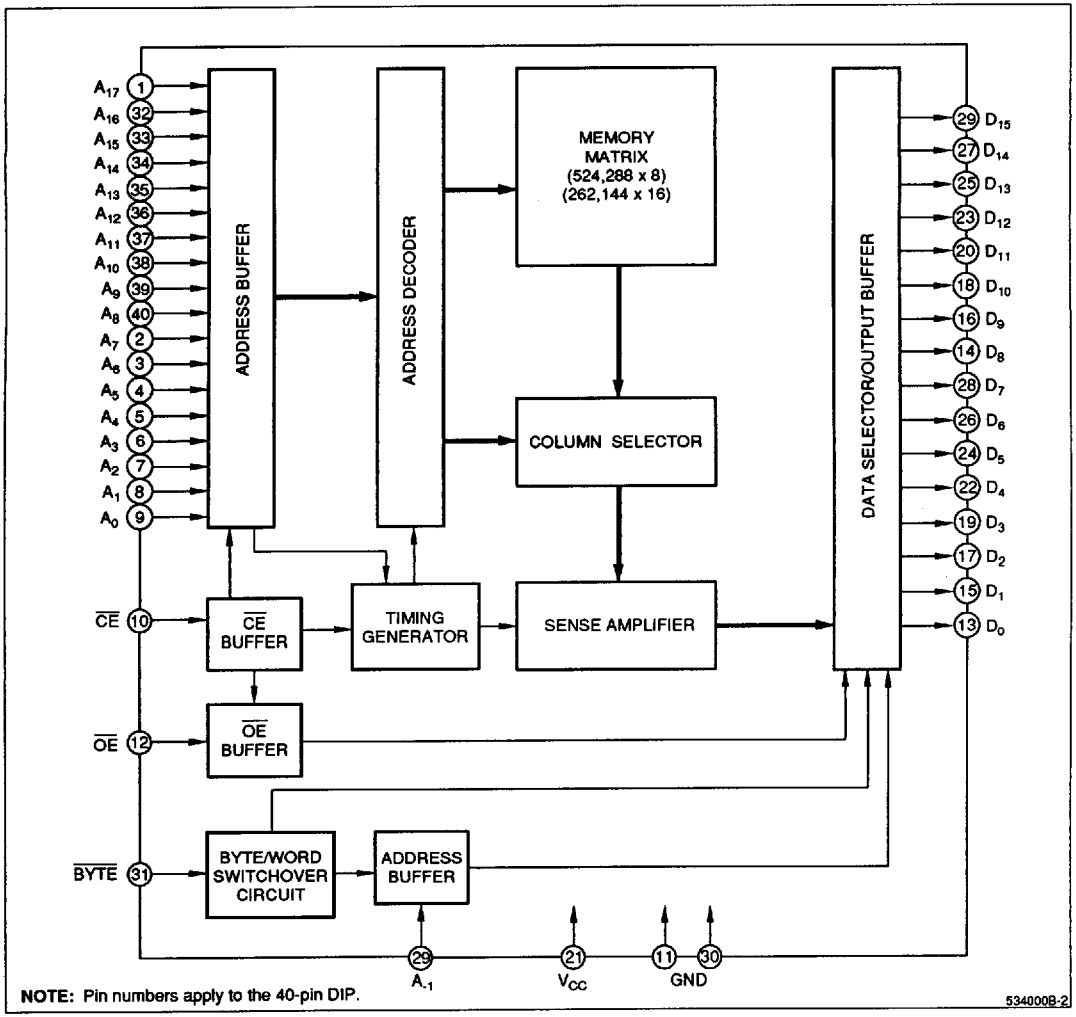


Figure 3. LH534000B Block Diagram

PIN DESCRIPTION

SIGNAL	PIN NAME	NOTE
A_{-1}	Address input (BYTE mode)	1
A_0 - A_{17}	Address input	
D_0 - D_{15}	Data output	
$\overline{CE}$	Chip enable input	

SIGNAL	PIN NAME	NOTE
$\overline{OE}$	Chip enable input	
$\overline{BYTE}$	Byte/word mode switch	
V_{CC}	Power supply (+5 V)	
GND	Ground	

NOTE:
1. D_{15}/A_{-1} pin becomes LSB address input (A_{-1}) when the bit configuration is set in byte mode, and data output (D_{15}) when in word mode. $\overline{BYTE}$ input pin selects bit configuration.

TRUTH TABLE

$\overline{CE}$	$\overline{OE}$	$\overline{BYTE}$	A_{-1}	MODE	D_0 - D_7	D_8 - D_{15}	SUPPLY CURRENT
H	X	X	X	Non selected	High-Z		Standby (I_{SB})
L	H	X	X	Non selected	High-Z		Operating (I_{CC})
L	L	H	Inhibit	Word	D_0 - D_7	D_8 - D_{15}	Operating (I_{CC})
L	L	L	L	Byte	D_0 - D_7	High-Z	Operating (I_{CC})
L	L	L	H	Byte	D_8 - D_{15}	High-Z	Operating (I_{CC})

NOTES:
1. X = H or L
2. The input state of $\overline{BYTE}$ must not be changed during operation. The $\overline{BYTE}$ pin must be set to either HIGH or LOW.

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT	NOTE
Supply voltage	V_{CC}	-0.3 to +7.0	V	1
Input voltage	V_{IN}	-0.3 to V_{CC} +0.3	V	
Output voltage	V_{OUT}	-0.3 to V_{CC} +0.3	V	
Operating temperature	Topr	0 to +70	°C	
Storage temperature	Tstg	-55 to +150	°C	

NOTE:
1. The maximum applicable voltage on any pin with respect to GND.

RECOMMENDED OPERATING CONDITIONS (T_A = 0 to +70°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage	V_{CC}	4.5	5.0	5.5	V

DC CHARACTERISTICS (V_{CC} = 5 V ± 10%, T_A = 0 to +70°C)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT	NOTE
Input 'Low' voltage	V_{IL}		-0.3		0.8	V	
Input 'High' voltage	V_{IH}		2.2		V_{CC} +0.3	V	
Output 'Low' voltage	V_{OL}	I_{OL} = 2.0 mA			0.4	V	
Output 'High' voltage	V_{OH}	I_{OH} = -400 µA	2.4			V	
Input leakage current	$\lvert I_{LI} \rvert$	V_{IN} = 0 V to V_{CC}			10	µA	
Output leakage current	$\lvert I_{LO} \rvert$	V_{OUT} = 0 V to V_{CC}			10	µA	1
Operating current	I_{CC1}	t_{RC} = 200 ns			50	mA	2
	I_{CC2}	t_{RC} = 1 µs			45		
	I_{CC3}	t_{RC} = 200 ns			45	mA	3
	I_{CC4}	t_{RC} = 1 µs			40		
Standby current	I_{SB1}	$\overline{CE}$ = V_{IH}			3	mA	
	I_{SB2}	$\overline{CE}$ = V_{CC} - 0.2 V			100	µA	

NOTES:
1. OE = V_{IL}, $\overline{CE}$ = V_{IH}
2. V_{IN} = V_{IH}/V_{IL}, $\overline{CE}$ = V_{IL}, outputs open
3. V_{IN} = (V_{CC} - 0.2 V) or 0.2 V, $\overline{CE}$ = 0.2 V, outputs open

CAUTION

To stabilize the power supply, it is recommended that a high-frequency bypass capacitor be connected between the V_{CC} pin and the GND pin.

AC CHARACTERISTICS (V_{CC} = 5 V ± 10%, T_A = 0 to +70°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Read cycle time	t_{RC}	200			ns	
Address access time	t_{AA}			200	ns	
Chip enable access time	t_{ACE}			200	ns	
Output enable delay time	t_{OE}			80	ns	
Output hold time	t_{OH}	10			ns	
CE to output in High-Z	t_{CHZ}			80	ns	1
OE to output in High-Z	t_{OHZ}			80	ns	

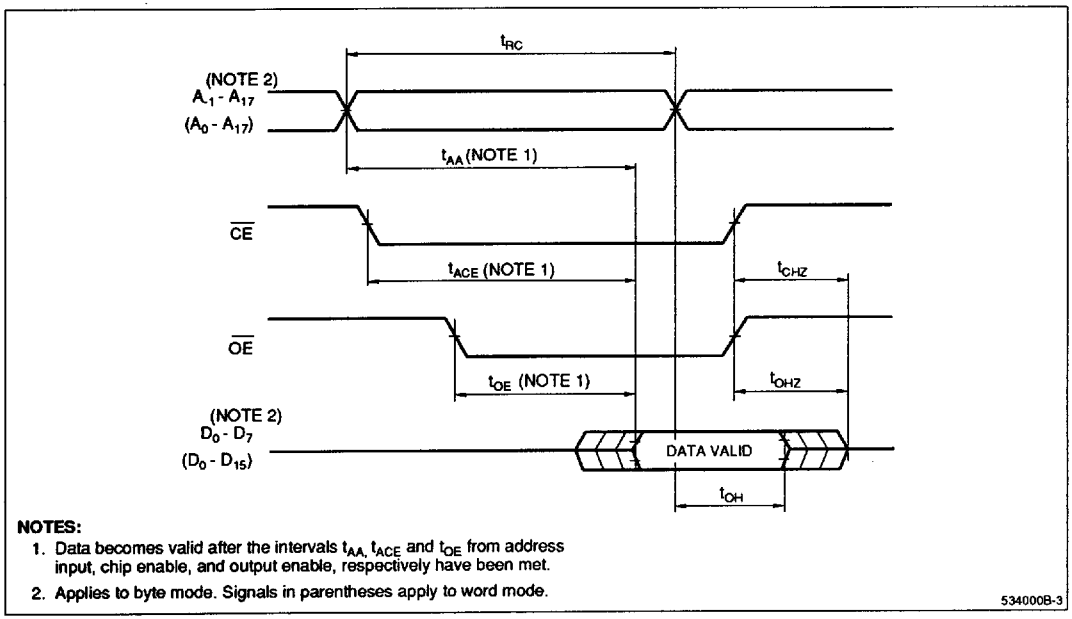
NOTE:
1. This is the time required for the outputs to become high-impedance.

AC TEST CONDITIONS

PARAMETER	RATING
Input voltage amplitude	0.6 V to 2.4 V
Input rise/fall time	10 ns
Input reference level	1.5 V
Output reference level	0.8 V and 2.2 V
Output load condition	1TTL +100 pF

CAPACITANCE (V_{CC} = 5 V ± 10%, f = 1 MHz, T_A = 25°C)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Input capacitance	C_{IN}			10	pF
Output capacitance	C_{OUT}			10	pF

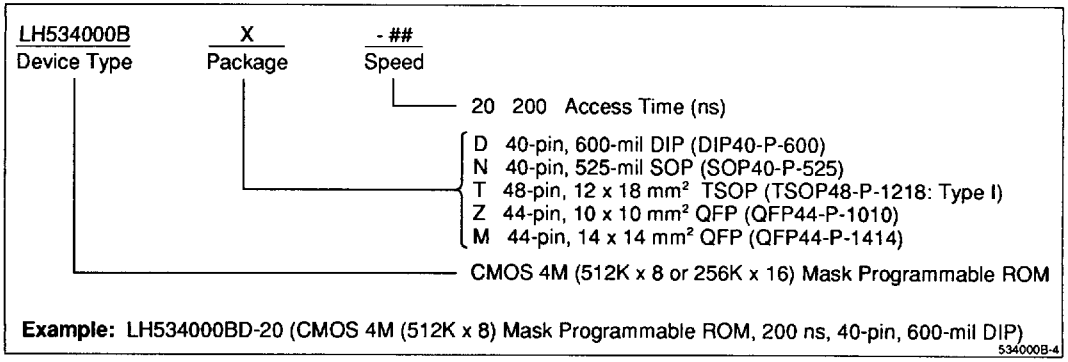


NOTES:
1. Data becomes valid after the intervals t_{AA}, t_{ACE} and t_{OE} from address input, chip enable, and output enable, respectively have been met.
2. Applies to byte mode. Signals in parentheses apply to word mode.

534000B-3

Figure 4. Timing Diagram

ORDERING INFORMATION



Example: LH534000BD-20 (CMOS 4M (512K x 8) Mask Programmable ROM, 200 ns, 40-pin, 600-mil DIP)