

Description

The GM23C16000 high performance read only memory is organized either as 2,097,152×8 bit (Byte Mode) or as 1,048,576×16 bit (Word Mode) followed by BHE mode select. The GM23C16000 offers automatic power down controlled by the mask programmed CE or $\overline{CE}$ input. The low power feature allows the battery operation. The large size of 16M bit memory density is ideal for character generator, data or program memory in micro-processor application.

Features

- Switchable organization
 - Byte mode: 2M×8 bit
 - Word mode: 1M×16 bit
- Single +5V Supply
- TTL compatible
- Access Time: 120ns/150ns/200ns (Max)
- Programmable chip enable and output enable
- Low power consumption
 - Operating: 50mA (Max)
 - Standby: 50μA (Max)
- Byte or Word switchable by BHE pin (BHE can be switched on the fly or a DC signal)
- Package: 42-pin plastic DIP, 44-pin plastic SOP, 64-pin plastic QFP

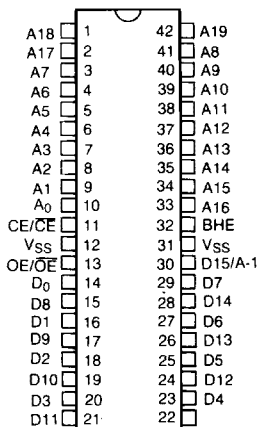
Pin Description

Pin	Function
A0 ~ A19	Address Input
D0 ~ D14	Data Output
D15/A-1	Output Data 15 (Word Mode)/ LSB Address (Byte Mode)
BHE	WORD/BYTE Selection
CE/ $\overline{CE}$ *	Chip Enable
OE/ $\overline{OE}$ *	Output Enable
V _{CC}	Power (+5V)
V _{SS}	GND
N.C.	No Connection

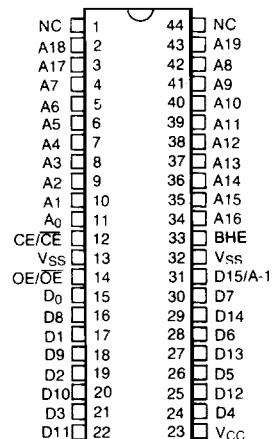
*User Selectable Polarity

Pin Configuration

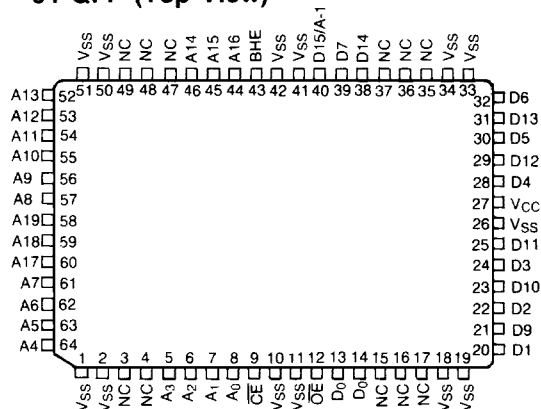
42 DIP (Top View)



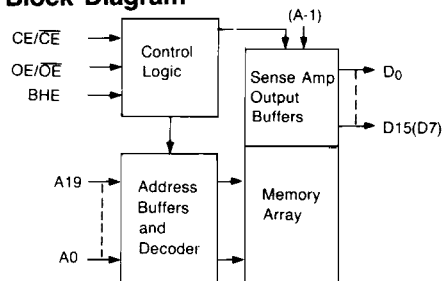
44 SOP (Top View)



64 QFP (Top View)



Block Diagram



Absolute Maximum Ratings*

Symbol	Parameter	Rating	Unit
T _A	Operating Temperature	-10 ~ +80	°C
T _{STG}	Storage Temperature	-65 ~ +150	°C
V _{CC}	Supply Voltage to Ground Potential	-0.5V ~ V _{CC} +0.5	V
V _{OUT}	Output Voltage	-0.5 ~ V _{CC} +0.5	V
V _{IN}	Input Voltage	-0.5 ~ V _{CC} +0.5	V
P _D	Power Dissipation	400	mW

*Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only. Function operating of this device at these or any other conditions above those indicated in the operational sections of this specification is not implied and exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Recommended Operating Condition (V_{CC} = 5.0V ± 10%, T_A = 0° ~ 70°C)

Symbol	Parameter	Min	Typ	Max	Unit
V _{CC}	Supply Voltage	4.5	5.0	5.5	V
V _{SS}	Supply Voltage	0	0	0	V
V _{IH}	Input High Voltage	2.2	—	V _{CC} +0.3	V
V _{IL}	Input Low Voltage	-0.3	—	0.8	V

DC Electrical Characteristics: (V_{CC} = 5.0V ± 10%, T_A = 0 ~ 70°C)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{OH}	Output High Voltage	I _{OH} = -400μA	2.4			V
V _{OL}	Output Low Voltage	I _{OL} = 2.1mA			0.4	V
I _{IL}	Input Leakage Current	V _{IN} = 0V to V _{CC}		±1		μA
I _{OL}	Output Leakage Current	V _{OUT} = 0V to V _{CC}		±5		μA
I _{CC}	Operating Supply Current	$\overline{CE}$ = V _{IL} , CE = V _{IH}			50	mA
I _{SB1}	Standby Current (TTL)	$\overline{CE}$ = V _{IH} , all Output Open			1	mA
I _{SB2}	Standby Current (CMOS)	$\overline{CE}$ = V _{CC} , all Output Open			50	μA

Capacitance (T_A = 25°C, f = 1.0 MHz)

Symbol	Parameter	Conditions	Min	Max	Unit
C _I	Input Capacitance	V _{IN} = 0V		10	pF
C _O	Output Capacitance	V _{OUT} = 0V		10	pF

Note: Capacitance is periodically sampled and not 100% tested.

Mode Selection

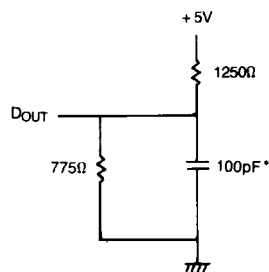
Mode	CE/ $\overline{\text{CE}}$	OE/ $\overline{\text{OE}}$	BHE	D0 D7	D8 D14	D15/A-1	Power
Standby	L/H	X	X	High Z		X	Standby
16 Bit Operating	H/L	H/L	H	Data Out			Active
8 Bit Operating			L	Data Out (Lower 8 Bit) Data Out (Upper 8 Bit)	High Z	L H	
Output Disable		L/H	X	High Z		X	

AC Operating Characteristics ($V_{CC}=5.0V \pm 10\%$, $T_A=0 \sim 70^\circ\text{C}$)

Symbol	Parameter	GM23C16000-12		GM23C16000-15		GM23C16000-20		Unit
		Min	Max	Min	Max	Min	Max	
t_{RC}	Read Cycle Time	120		150		200		ns
t_{ACE}	Chip Enable Access Time		120		150		200	ns
t_{AA}	Address Access Time		120		150		200	ns
t_{OE}	Output Enable Access Time		60		70		80	ns
t_{OHZ} t_{CHZ}	Output or Chip Disable to Output High-Z		50		60		70	ns
t_{OH}	Output Hold from Address Change	10		10		10		ns
t_{OLZ} t_{CLZ}	Output or Chip Enable to Output in Low-Z	10		10		10		ns
t_{BHE}	BHE Access Time		120		150		200	ns
t_{BHZ}	BHE Low to Output O8-O15 in High-Z		50		60		70	ns
t_{BLZ}	BHE High to Output O8-O15 in Low-Z	10		10			10	ns

AC Test Condition

Input Pulse Levels	0.4V to 2.4V
Input Rise and Fall Times	10ns
Timing Measurement	$V_{IL}=0.8V$ $V_{IH}=2.2V$
Reference Level	$V_{OL}=0.8V$ $V_{OH}=2.0V$
Output Load	See Fig. 1

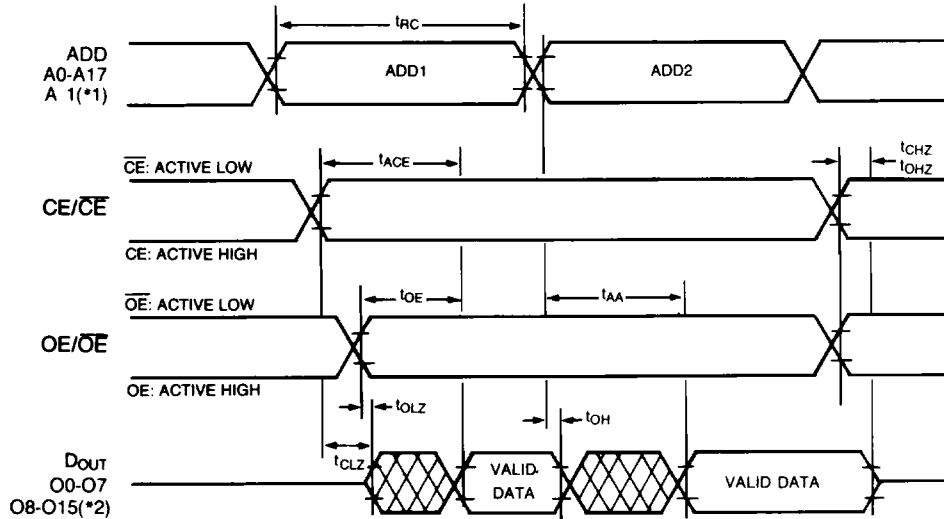


*Including scope and Jig

Fig. 1 Output Load Circuit

TIMING WAVEFORMS

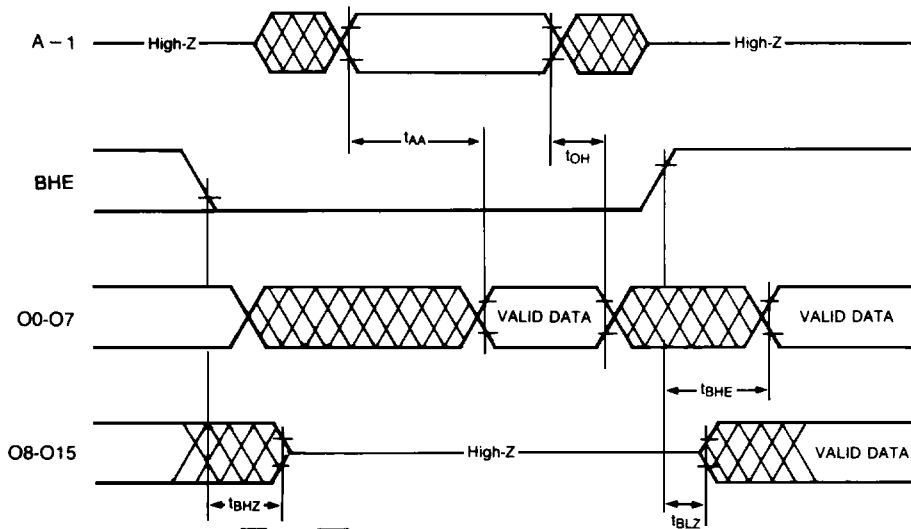
(1) Word Mode (BHE = V_{IH})/Byte Mode (BHE = V_{IL})



(*1) Byte Mode only. A-1 is Least Significant Bit Address. (BHE = V_{IL})

(*2) Word Mode only. (BHE = V_{IH})

(2) Word Mode, Byte Mode Switch



Notes: 1. CE/CE, OE/OE are enable A0-A17 are Valid.

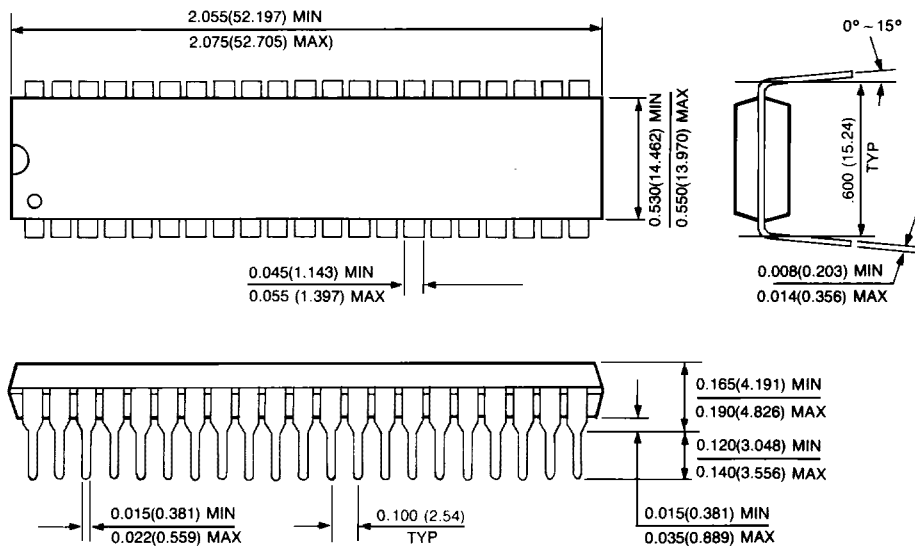
2. If BHE is high and CE, OE is enable O15/A-1 pin is in the output state.

3. Therefore, the input signals of opposite phase to the outputs must not be applied to them.

Package Dimension

Unit: Inches (mm)

42 DIP



44 SOP

