Asynchronous SRAM, 3.3V, 512Kx24

FEATURES

- 512Kx24 bit CMOS Static
- Random Access Memory Array
  - Fast Access Times: 10, 12, and 15ns
  - Master Output Enable and Write Control
  - TTL Compatible Inputs and Outputs
  - Fully Static, No Clocks
- Surface Mount Package
  - 119 Lead BGA (JEDEC MO-163), No. 391
  - Small Footprint, 14mmx22mm
  - Multiple Ground Pins for Maximum Noise Immunity
- Single +3.3V (±5%) Supply Operation
- DSP Memory Solution
  - Motorola DSP5630x
  - Analog Devices SHARC™

DESCRIPTION

The WED8L24513VxxBC is a 3.3V, twelve megabit SRAM constructed with three 512Kx8 die mounted on a multi-layer laminate substrate. With 10 to 15ns access times, x24 width and a 3.3V operating voltage, the WED8L24513V is ideal for creating a single chip memory solution for the Motorola DSP5630x (Figure 7) or a two chip solution for the Analog Devices SHARC™ DSP (Figure 8).

The single or dual chip memory solutions offer improved system performance by reducing the length of board traces and the number of board connections compared to using multiple monolithic devices.

The JEDEC Standard 119 lead BGA provides a 61% space savings over using three 512Kx8, 400 mil wide SOJs and the BGA package has a maximum height of 110 mils compared to 148 mils for the SOJ packages.

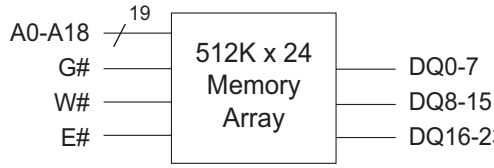
PIN CONFIGURATION

	1	2	3	4	5	6	7
A	NC	AO	A1	A2	A3	A4	NC
B	NC	A5	A6	E#	A7	A8	NC
C	I/012	NC	NC	NC	NC	NC	I/00
D	I/013	V_{CC}	GND	GND	GND	V_{CC}	I/01
E	I/014	GND	V_{CC}	GND	V_{CC}	GND	I/02
F	I/015	V_{CC}	GND	GND	GND	V_{CC}	I/03
G	I/016	GND	V_{CC}	GND	V_{CC}	GND	I/04
H	I/017	V_{CC}	GND	GND	GND	V_{CC}	I/05
J	NC	GND	V_{CC}	GND	V_{CC}	GND	NC
K	I/018	V_{CC}	GND	GND	GND	V_{CC}	I/06
L	I/019	GND	V_{CC}	GND	V_{CC}	GND	I/07
M	I/020	V_{CC}	GND	GND	GND	V_{CC}	I/08
N	I/021	GND	V_{CC}	GND	V_{CC}	GND	I/09
P	I/022	V_{CC}	GND	GND	GND	V_{CC}	I/010
R	I/023	A18	NC	NC	NC	A17	I/011
T	NC	A9	A10	W#	A11	A12	NC
U	NC	A13	A14	G#	A15	A16	NC

PIN NAMES

A0-18	Address Inputs
E#	Chip Enable
W#	Master Write Enable
G#	Master Output Enable
DQ0-23	Common Data Input/Output
V_{CC}	Power (3.3V ±5%)
GND	Ground
NC	No Connection

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Voltage on any pin relative to VSS	-0.5V to 4.6V
Operating Temperature TA (Ambient) Commercial Industrial	 0°C to + 70°C -40°C to +85°C
Storage Temperature	-55°C to +125°C
Power Dissipation	1.5 Watts
Output Current.	50 mA

*Stress greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions greater than those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

AC TEST CONDITIONS

Input Pulse Levels	V_{SS} to 3.0V
Input Rise and Fall Times	5ns
Input and Output Timing Levels	1.5V
Output Load	Figure 1

NOTE: For t_{EHQZ}, t_{GHQZ} and t_{WLQZ}, Figure 2

RECOMMENDED DC OPERATING CONDITIONS

Parameter	Sym	Min	Typ	Max	Units
Supply Voltage	V_{CC}	3.135	3.3	3.465	V
Supply Voltage	V_{SS}	0	0	0	V
Input High Voltage	V_{IH}	2.2	--	V_{CC}+0.3	V
Input Low Voltage	V_{IL}	-0.3	--	0.8	V

FIG. 1

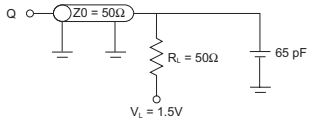
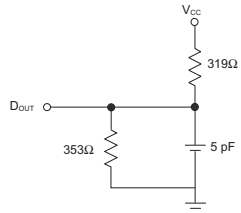


FIG. 2



DC ELECTRICAL CHARACTERISTICS

Parameter	Sym	Conditions	Min	Max		Units
				10ns	12-15ns	
Operating Power Supply Current	I_{CC1}	W# = V_{IL}, II/O = 0mA, Min Cycle		450	350	mA
Standby (TTL) Supply Current	I_{CC2}	E# > V_{IH}, V_{IN} < V_{IL} or V_{IN} > V_{IH}, f=ØMHz		150	150	mA
Full Standby CMOS Supply Current	I_{CC3}	E# > V_{CC}-0.2V V_{IN} > V_{CC}-0.2V or V_{IN} < 0.2V		90	90	mA
Input Leakage Current	I_{LI}	V_{IN} = 0V to V_{CC}		±10	±10	µA
Output Leakage Current	I_{LO}	V I/O = 0V to V_{CC}		±10	±10	µA
Output High Volltage	V_{OH}	I_{OH} = -4.0mA	2.4			V
Output Low Voltage	V_{OL}	I_{OL} = 4.0mA		0.4	0.4	V

TRUTH TABLE

G#	E#	W#	Mode	Output	Power
X	H	X	Standby	High Z	I_{CC2},I_{CC3}
H	L	H	Output Deselect	High Z	I_{CC1}
L	L	H	Read	D_{OUT}	I_{CC1}
X	L	L	Write	D_{IN}	I_{CC1}

CAPACITANCE

(f = 1.0MHz, V_{IN} = V_{CC} or V_{SS})

Parameter	Sym	Max	Unit
Address Lines	CA	8	pF
Data Lines	CD/Q	10	pF
Write & Output Enable Lines	W#, G#	8	pF
Chip Enable Lines	EØ# - E2#	8	pF

These parameters are sampled, not 100% tested.

AC CHARACTERISTICS READ CYCLE

Parameter	Symbol		10ns		12ns		15ns		Units
	JEDEC	Alt.	Min	Max	Min	Max	Min	Max	
Read Cycle Time	t_{AVAV}	t_{RC}	10		12		15		ns
Address Access Time	t_{AVQV}	t_{AA}		10		12		15	ns
Chip Enable Access Time	t_{ELQV}	t_{ACS}		10		12		15	ns
Chip Enable to Output in Low Z (1)	t_{ELQX}	t_{CLZ}	3		3		3		ns
Chip Disable to Output in High Z (1)	t_{EHQZ}	t_{CHZ}		5		6		7	ns
Output Hold from Address Change	t_{AVQX}	t_{OH}	3		3		3		ns
Output Enable to Output Valid	t_{GLQV}	t_{OE}		5		6		7	ns
Output Enable to Output in Low Z (1)	t_{GLQX}	t_{OLZ}	0		0		0		ns
Output Disable to Output in High Z(1)	t_{GHQZ}	t_{OHZ}		5		6		7	ns

NOTE 1: Parameter is guaranteed, but not tested.

FIG. 3 READ CYCLE 1 - W# HIGH, G#, E# LOW

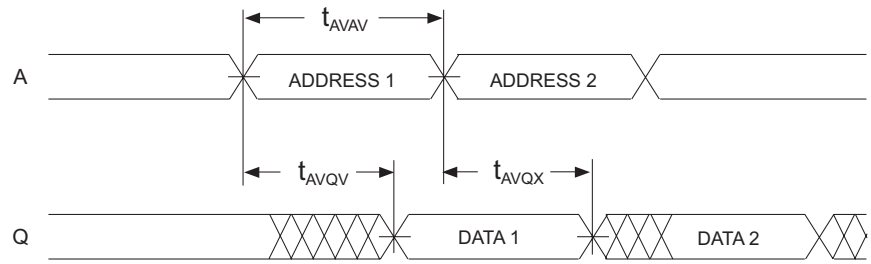
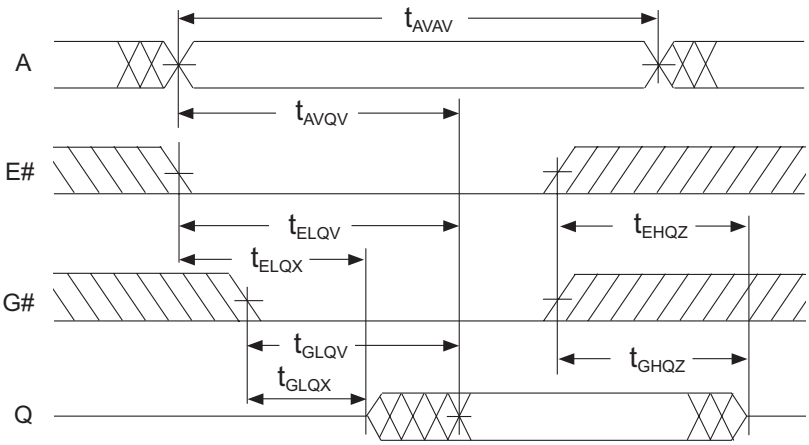


FIG. 4 READ CYCLE 2 - W# HIGH



AC CHARACTERISTICS WRITE CYCLE

Parameter	Symbol		10ns		12ns		15ns		Units
	JEDEC	Alt.	Min	Max	Min	Max	Min	Max	
Write Cycle Time	t_{AVAV}	t_{WC}	10		12		15		ns
Chip Enable to End of Write	t_{ELWH} t_{ELEH}	t_{CW} t_{CW}	8 8		9 9		9 9		ns ns
Address Setup Time	t_{AVWL} t_{AVEL}	t_{AS} t_{AS}	0 0		0 0		0 0		ns ns
Address Valid to End of Write	t_{AVWH} t_{AVEH}	t_{AW} t_{AW}	8 8		9 9		10 10		ns ns
Write Pulse Width	t_{WLWH} t_{WLEH}	t_{WP} t_{WP}	8 8		10 10		11 11		ns ns
Write Recovery Time	t_{WHAX} t_{EHAX}	t_{WR} t_{WR}	0 0		0 0		0 0		ns ns
Data Hold Time	t_{WHDX} t_{EHDX}	t_{DH} t_{DH}	0 0		0 0		0 0		ns ns
Write to Output in High Z (1)	t_{WLQZ}	t_{WHZ}	0	5	0	6	0	7	ns
Data to Write Time	t_{DVWH} t_{DVEH}	t_{DW} t_{DW}	6 6		6 6		7 7		ns ns
Output Active from End of Write (1)	t_{WHQX}	t_{WLZ}	3		3		3		ns

NOTE 1: Parameter is guaranteed, but not tested.

FIG. 5 WRITE CYCLE 1 - W# CONTROLLED

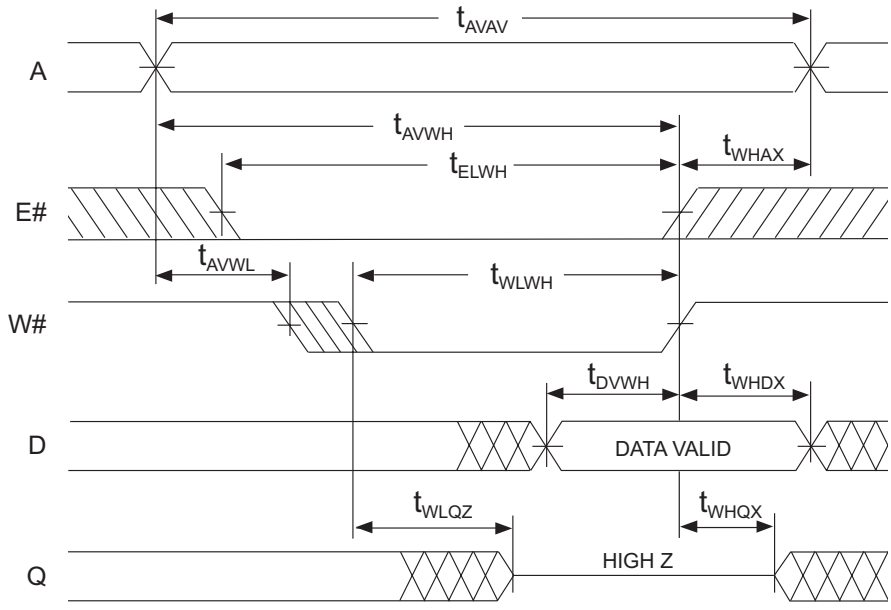
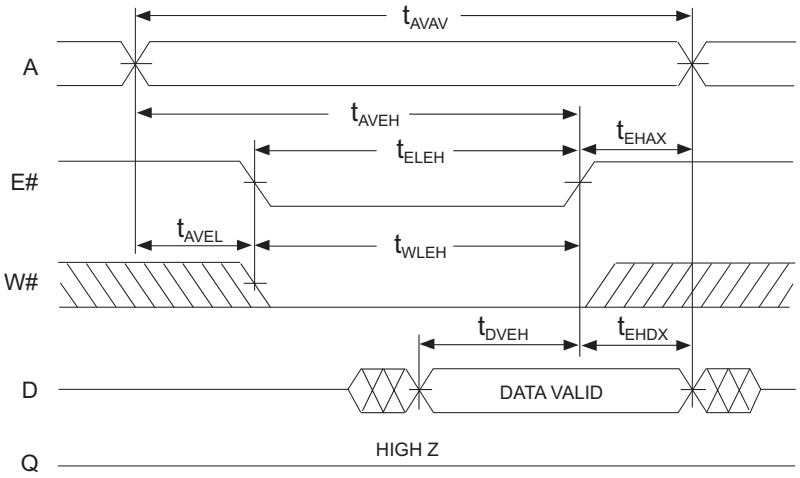


FIG. 6 WRITE CYCLE 2 - E# CONTROLLED



ORDERING INFORMATION

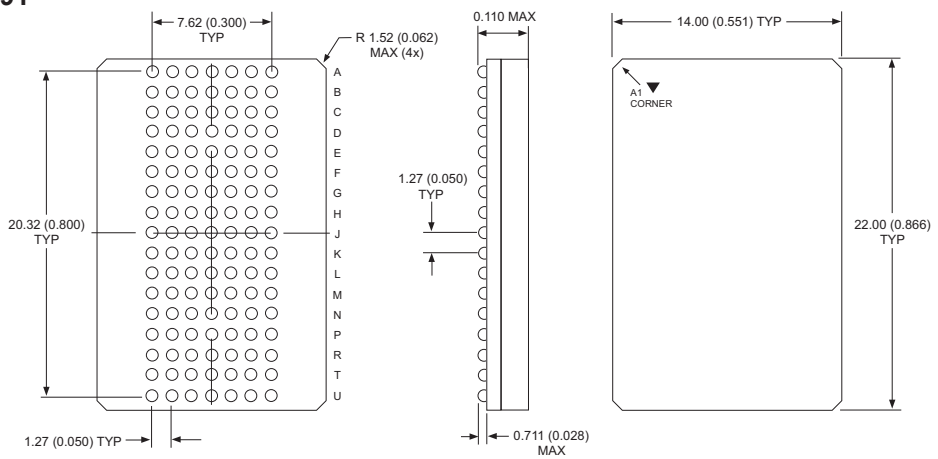
Commercial (0°C to +70)

Part Number	Speed (ns)	Package No.
WED8L24513V10BC	10	391
WED8L24513V12BC	12	391
WED8L24513V15BC	15	391

Industrial (-40°C to +85°C)

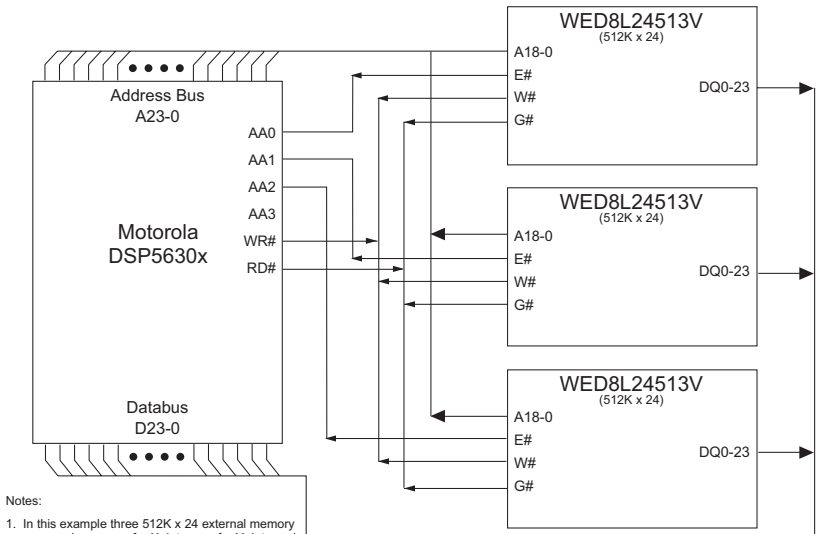
Part Number	Speed (ns)	Package No.
WED8L24513V12BI	12	391
WED8L24513V15BI	15	391

PACKAGE NO. 391
119 LEAD BGA
JEDEC MO-163



ALL LINEAR DIMENSIONS ARE IN MILLIMETERS AND PARENTHETICALLY IN INCHES

FIG. 7 INTERFACING THE MOTOROLA DSP5630x DSP FAMILY WITH THE WED8L24513V (512K x 24)



Notes:

1. In this example three 512K x 24 external memory arrays are shown, one for X data, one for Y data and one for Program. Specific applications may require one, two, or all three arrays.

2. Any combination of AA0-AA3 may be used as chip selects. However, each chip select may only be used to select one memory array.

FIG. 8 INTERFACING THE ANALOG DEVICES 2106XL DSP FAMILY WITH THE WED8L24513V (512K X 24)