



# GENERAL Single-PORT REGISTER FILE

## 512 WORDS X 32 BITS, MUX 2

### SMIC 0.11um LOGIC PROCESS

## Version 0.1.a

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## OVERVIEW

The Single-Port Register File(BW) is designed for SMIC's 0.11um CMOS Logic process. The memory is optimized for speed, power and area. It operates at a voltage range of 1.08V to 1.32V and a temperature range of -40°C to 125°C.

The write enable (WEN), bit write enable(BWEN[0:n]),chip enable (CEN), address (A) and data in (D) signals are latched on the rising-edge of the clock. When CEN is low and WEN is high, the memory will be in read operation. Data is read from the location specified by the address A[0:i], and is output on the output port Q[0:n].When CEN is low, WEN is low and BWEN[j] is high, the memory will be in read operation. Data D[j] is read from the location specified by the address A[0:i], and is output on the output port Q[j].When CEN is low, WEN is low and BWEN[j] is low the memory will be in write operation, the corresponding data on the data port D[j] will be written into the location specified by the address A[0:i] and the data will appear on the corresponding output port Q[j].

When CEN is high the memory is in standby mode. Meanwhile, the data stored in memory is retained but cannot be read or written.

## CONFIGURATION:

PARAMETER	VALUE
Mux	2
Words	512
Bits	32
Width	202.485um
Height	303.17um
Area	61387.377um <sup>2</sup>

## PIN DEFINITION:

PIN	DIRECTION	DEFINITION
A[8:0]	Input	Address Inputs
D[31:0]	Input	Data Inputs
BWEN[31:0]	Input	Bit Write Enable
WEN	Input	Write Enable
CEN	Input	Chip Enable
CLK	Input	Clock Input
Q[31:0]	Output	Data Outputs

## TIMING:

PARAMETER	DESCRIPTION	SS CORNER 1.08V, -40°C		SS CORNER 1.08V, 125°C		FF CORNER 1.32V, -40°C		FF CORNER 1.32V, 0°C		FF CORNER 1.32V, 125°C		TT CORNER 1.2V, 25°C	
(ns)		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
T <sub>cyc</sub>	Cycle Time	1.891		2.290		0.808		0.866		1.043		1.379	
T <sub>a</sub>	Access Time <sup>1</sup>		1.719		2.082	0.735		0.787		0.948			1.254
T <sub>as</sub>	Address Setup	0.585		0.600		0.340		0.359		0.408		0.417	
T <sub>ah</sub>	Address Hold	0.254		0.244		0.168		0.171		0.183		0.195	
T <sub>ds</sub>	Data Setup	0.374		0.352		0.240		0.252		0.277		0.267	
T <sub>dh</sub>	Data Hold	0.363		0.425		0.239		0.248		0.302		0.288	
T <sub>bws</sub>	Bit-write Enable Setup	0.374		0.352		0.240		0.252		0.277		0.267	
T <sub>bwh</sub>	Bit-write Enable Hold	0.363		0.425		0.239		0.248		0.301		0.288	
T <sub>ws</sub>	Write Enable Setup	0.493		0.471		0.287		0.301		0.333		0.340	
T <sub>wh</sub>	Write Enable Hold	0.242		0.222		0.156		0.158		0.162		0.179	
T <sub>cs</sub>	Chip Enable Setup	0.668		0.605		0.275		0.283		0.304		0.368	
T <sub>ch</sub>	Chip Enable Hold	0.000		0.000		0.000		0.000		0.000		0.000	
T <sub>ckh</sub>	Clock High	0.040		0.040		0.040		0.040		0.040		0.040	
T <sub>ckl</sub>	Clock Low	0.330		0.330		0.220		0.220		0.220		0.220	
T <sub>ckr</sub>	Clock Rise Skew		1.000		1.000		0.500		0.500		0.500		0.600

Timing simulation conditions:

1. Access time = best case for fast corner and worst case for slow/typical corners

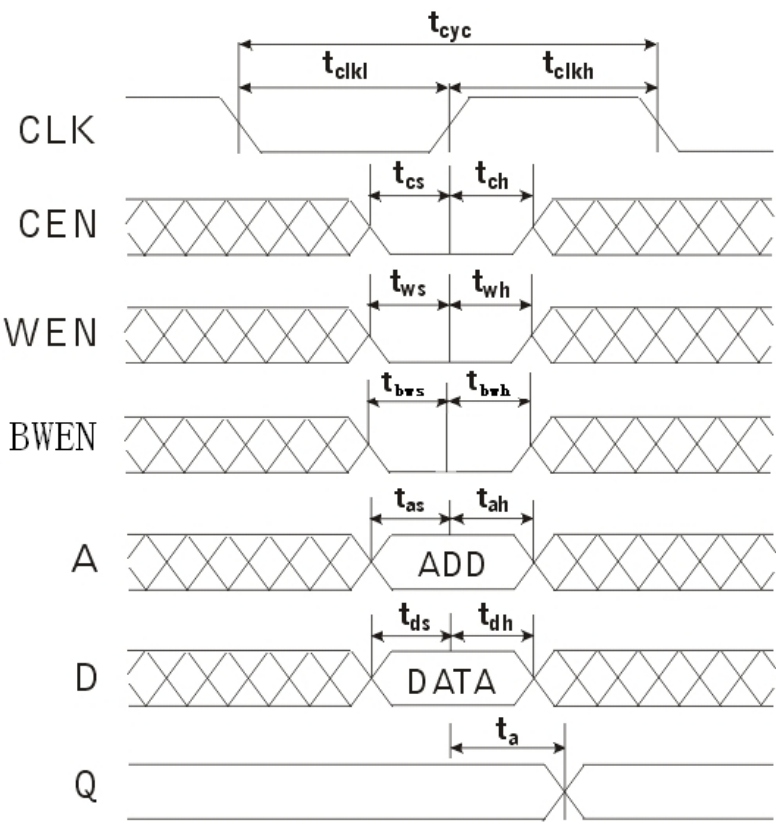
## POWER:(UNITS=uA/Mhz)

PARAMETER	SS CORNER 1.08V, -40C	SS CORNER 1.2V, 125C	FF CORNER 1.32V, -40C	FF CORNER 1.32V, 0°C	FF CORNER 1.32V, 125°C	TT CORNER 1.2V, 25°C
AC Current	13.114	13.563	17.483	17.616	18.597	15.315
Read AC Current	13.121	13.560	17.460	17.616	18.602	15.316
Write AC Current	13.108	13.566	17.507	17.616	18.592	15.313
Standby Power (mW)	0.001468	0.047146	0.012005	0.024921	0.816679	0.009942

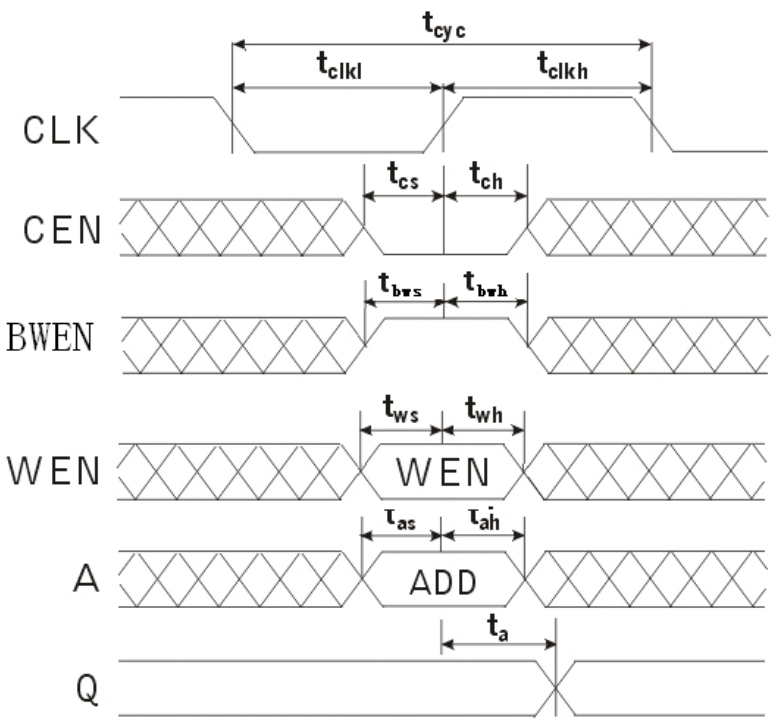
Power simulation conditions:

1. 50% read / 50% write operations, all addresses and 50% of input pins toggle at 1Mhz

**WRITE CYCLE TIMING:**



**READ CYCLE TIMING:**



## Datasheet Revision History

Date	Version	Changes
	0.1.a	

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