

MICRON

MT5C1009 883C  
128K x 8 SRAM

T-4623-14

MILITARY  
SRAM128K x 8 SRAM  
WITH SINGLE CHIP ENABLE

FAST SRAM

AVAILABLE AS MILITARY  
SPECIFICATIONS

- SMD 5962-89598, Class M
- JAN 5962-89598, Class B
- MIL-STD-883, Class B
- Radiation tolerant (consult factory)

## FEATURES

- High speed: 20, 25, 35 and 45ns
- Battery Backup: 2V data retention
- Low power standby
- Power down (gated inputs)
- High-performance, low-power CMOS process
- Single +5V ( $\pm 10\%$ ) power supply
- Easy memory expansion with  $\overline{CE}$  and  $\overline{OE}$  options
- All inputs and outputs are TTL compatible

## OPTIONS

- Timing
 

20ns access	-20
25ns access	-25
35ns access	-35
45ns access	-45
55ns access	-55*
70ns access	-70*
- Packages
 

Ceramic DIP (400 mil)	C
Ceramic DIP (600 mil)	CW
Ceramic LCC	EC
Ceramic Flat Pack	F
Ceramic SOJ	DCJ
- 2V data retention, low power standby L
- Power down (gated inputs) P

\*Electrical characteristics identical to those provided for the 45ns access devices.

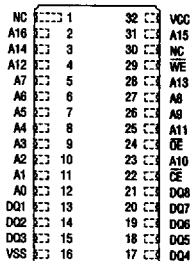
## GENERAL DESCRIPTION

The Micron SRAM family employs high-speed, low-power CMOS designs using a four-transistor memory cell. Micron SRAMs are fabricated using double-layer metal, double-layer polysilicon technology. Micron SRAMs are manufactured and quality controlled in the USA at our modern Boise, Idaho, facility.

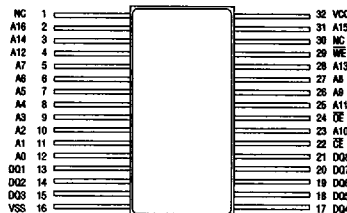
For flexibility in high-speed memory applications, Micron offers chip enable ( $\overline{CE}$ ) and output enable ( $\overline{OE}$ ) capability. These enhancements can place the outputs in High-Z for

## PIN ASSIGNMENT (Top View)

## 32-Pin DIP

32-Pin LCC  
32-Pin SOJ

## 32-Pin Flat Pack



additional flexibility in system design.

Writing to these devices is accomplished when write enable ( $\overline{WE}$ ) and  $\overline{CE}$  inputs are both LOW. Reading is accomplished when  $\overline{WE}$  remains HIGH while  $\overline{CE}$  and  $\overline{OE}$  go LOW. The devices offer a reduced power standby mode when disabled. This allows system designs to achieve low standby power requirements.

The "L" version provides an approximate 50 percent reduction in CMOS standby current ( $I_{sbc2}$ ) over the standard version. The "P" version provides an approximate 80 percent reduction in TTL standby current ( $I_{sbt1}$ ). This is achieved by including gated inputs on the  $\overline{WE}$ ,  $\overline{OE}$  and address lines. The gated inputs also facilitate the design of battery-backed systems where the designer needs to protect against inadvertent battery-current drain during power-down, when inputs may be at undefined levels.

All devices operate from a single +5V power supply and all inputs and outputs are fully TTL compatible.

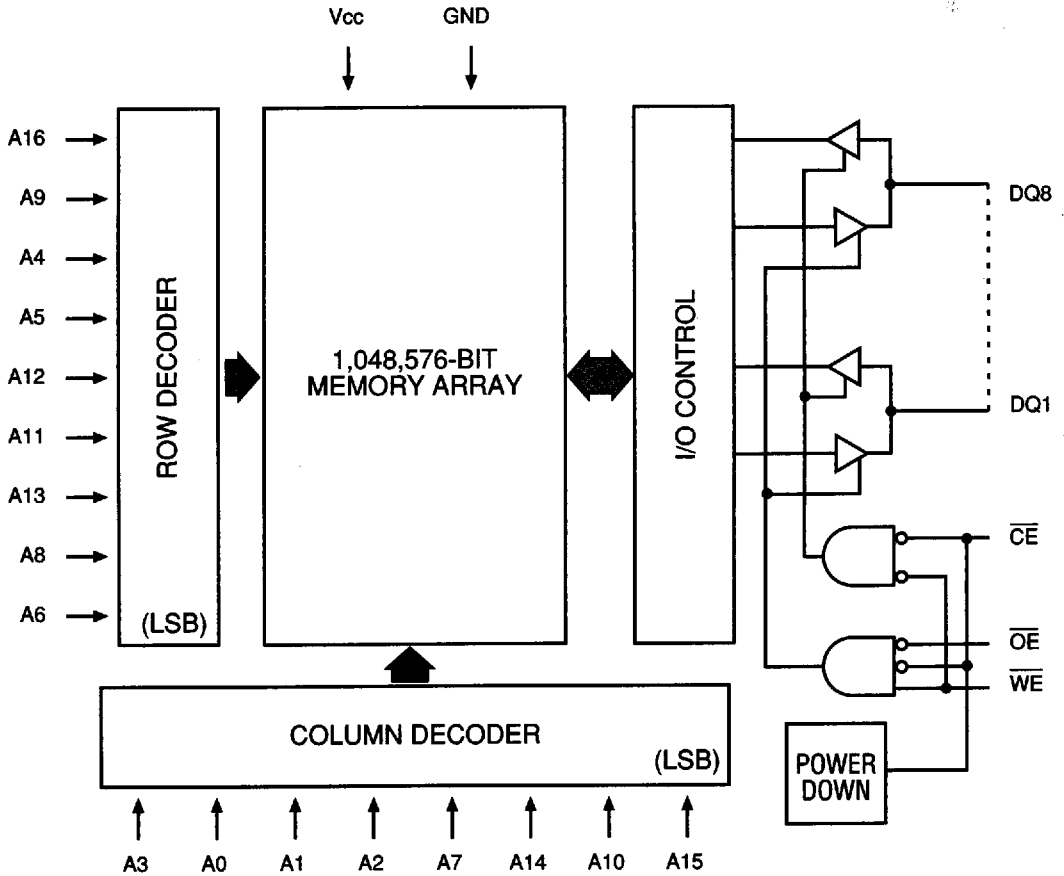
**MICRON**

**MT5C1009 883C**  
**128K x 8 SRAM**

**FUNCTIONAL BLOCK DIAGRAM**

T-46-23-14

**FAST SRAM**



**NOTE:** The two least significant row address bits (A8 and A6) are encoded using gray code.

**TRUTH TABLE**

MODE	$\overline{OE}$	$\overline{CE}$	$\overline{WE}$	DQ	POWER
STANDBY	X	H	X	HIGH-Z	STANDBY
READ	L	L	H	Q	ACTIVE
READ	H	L	H	HIGH-Z	ACTIVE
WRITE	X	L	L	D	ACTIVE

**MICRON****MT5C1009 883C**  
**128K x 8 SRAM****T-46-23-14****ABSOLUTE MAXIMUM RATINGS\***

Voltage on Any Input or DQ Relative to V <sub>SS</sub> ....	-2V to +7V
Voltage on V <sub>CC</sub> Supply Relative to V <sub>SS</sub> .....	-1V to +7V
Storage Temperature .....	-65°C to +150°C
Power Dissipation .....	1W
Short Circuit Output Current .....	50mA
Load Temperature (soldering temperature) .....	+260°C
Junction Temperature .....	+175°C

\*Stresses 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 above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

**FAST SRAM****ELECTRICAL CHARACTERISTICS AND RECOMMENDED DC OPERATING CONDITIONS**(-55°C ≤ T<sub>C</sub> ≤ 125°C; V<sub>CC</sub> = 5.0V ± 10%)

DESCRIPTION	CONDITIONS	SYMBOL	MIN	MAX	UNITS	NOTES
Input High (Logic 1) Voltage		V <sub>IH</sub>	2.2	V <sub>CC</sub> +1.0	V	1
Input Low (Logic 0) Voltage		V <sub>IL</sub>	-0.5	0.8	V	1, 2
Input Leakage Current	0V ≤ V <sub>IN</sub> ≤ V <sub>CC</sub>	I <sub>LI</sub>	-5	5	μA	
Output Leakage Current	Output Disabled 0V ≤ V <sub>OUT</sub> ≤ V <sub>CC</sub>	I <sub>LO</sub>	-5	5	μA	
Output High Voltage	I <sub>OH</sub> = -4.0mA	V <sub>OH</sub>	2.4		V	1
Output Low Voltage	I <sub>OL</sub> = 8.0mA	V <sub>OL</sub>		0.4	V	1

DESCRIPTION	CONDITIONS	SYMBOL	MAX				UNITS	NOTES
			-20	-25	-35	-45		
Power Supply Current: Operating	CE ≤ V <sub>IL</sub> ; V <sub>CC</sub> = MAX f = MAX = 1/τRC (MIN) Outputs Open	I <sub>CC</sub>	155	140	125	115	mA	3
Power Supply Current: Standby	CE ≥ V <sub>IH</sub> ; V <sub>CC</sub> = MAX f = MAX = 1/τRC (MIN) Outputs Open	I <sub>SBT1</sub>	40	35	32	30	mA	
	"P" Version Only	I <sub>SBT1</sub>	10	10	10	10	mA	
	CE ≥ V <sub>IH</sub> , All Other Inputs ≤ V <sub>IL</sub> or ≥ V <sub>IH</sub> , V <sub>CC</sub> = MAX f = 0 Hz	I <sub>SBT2</sub>	25	25	25	25	mA	
	"P" Version Only	I <sub>SBT2</sub>	10	10	10	10	mA	
	CE ≥ V <sub>CC</sub> - 0.2V; V <sub>CC</sub> = MAX V <sub>IL</sub> ≤ V <sub>SS</sub> + 0.2V V <sub>IH</sub> ≥ V <sub>CC</sub> - 0.2V; f = 0 Hz	I <sub>SBC2</sub>	10	10	10	10	mA	
	"L" Version Only	I <sub>SBC2</sub>	5	5	5	5	mA	

**CAPACITANCE**

DESCRIPTION	CONDITIONS	SYMBOL	MIN	MAX	UNITS	NOTES
Input Capacitance (OE, A2, A3, A10)	T <sub>A</sub> = 25°C, f = 1MHz V <sub>CC</sub> = 5V	C <sub>I</sub>		10	pF	4
Output Capacitance (DQ1-DQ8)		C <sub>O</sub>		8	pF	4
Input Capacitance (All Other Inputs)		C <sub>I</sub>		8	pF	4

**MICRON****MT5C1009 883C**  
**128K x 8 SRAM****T-46-23-14****ELECTRICAL CHARACTERISTICS AND RECOMMENDED AC OPERATING CONDITIONS**(Note 5)  $(-55^{\circ}\text{C} \leq T_C \leq 125^{\circ}\text{C}; V_{CC} = 5\text{V} \pm 10\%)$ **FAST SRAM**

DESCRIPTION	SYM	-20		-25		-35		-45		UNITS	NOTES
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX		
<b>READ Cycle</b>											
READ cycle time	<sup>t</sup> RC	20		25		35		45		ns	
Address access time	<sup>t</sup> AA		20		25		35		45	ns	
Chip Enable access time	<sup>t</sup> ACE		20		25		35		45	ns	
Output hold from address change	<sup>t</sup> OH	3		3		3		3		ns	
Chip Enable to output in Low-Z	<sup>t</sup> LZOE	5		5		5		5		ns	7
Chip disable to output in High-Z	<sup>t</sup> HZOE		8		10		15		18	ns	6, 7
Chip Enable to power-up time	<sup>t</sup> PU	0		0		0		0		ns	
Chip disable to power-down time	<sup>t</sup> PD		20		25		35		45	ns	
Output Enable access time	<sup>t</sup> AOE		7		8		12		15	ns	
Output Enable to output in Low-Z	<sup>t</sup> LZOE	0		0		0		0		ns	
Output disable to output in High-Z	<sup>t</sup> HZOE		7		9		12		15	ns	6
<b>WRITE Cycle</b>											
WRITE cycle time	<sup>t</sup> WC	20		25		35		45		ns	
Chip Enable to end of write	<sup>t</sup> CW	15		16		20		25		ns	
Address valid to end of write	<sup>t</sup> AW	15		16		20		25		ns	
Address setup time	<sup>t</sup> AS	0		0		0		0		ns	
Address hold from end of write	<sup>t</sup> AH	0		0		0		0		ns	
WRITE pulse width	<sup>t</sup> WP	15		16		20		25		ns	
Data setup time	<sup>t</sup> DS	8		10		13		15		ns	
Data hold time	<sup>t</sup> DH	0		0		0		0		ns	
Write disable to output in Low-Z	<sup>t</sup> LZWE	4		4		4		4		ns	7
Write Enable to output in High-Z	<sup>t</sup> HZWE	0	9	0	10	0	13	0	15	ns	6, 7

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**T-46-23-14**

**AC TEST CONDITIONS**

Input pulse levels .....	V <sub>SS</sub> to 3V
Input rise and fall times .....	5ns
Input timing reference levels .....	1.5V
Output reference levels .....	1.5V
Output load .....	See Figures 1 and 2

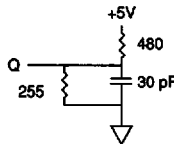


Fig. 1 OUTPUT LOAD EQUIVALENT

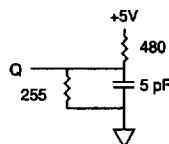


Fig. 2 OUTPUT LOAD EQUIVALENT

**FAST SRAM**

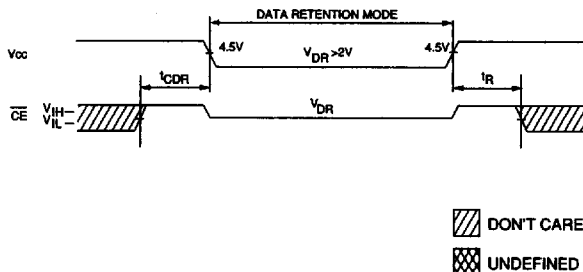
**NOTES**

- All voltages referenced to V<sub>SS</sub> (GND).
- 3V for pulse width < 20ns.
- I<sub>CC</sub> is dependent on output loading and cycle rates. The specified value applies with the outputs unloaded, and  $f = \frac{1}{t_{RC} (MIN)}$  Hz.
- This parameter is sampled.
- Test conditions as specified with the output loading as shown in Fig. 1 unless otherwise noted.
- t<sub>HZCE</sub>, t<sub>HZOE</sub> and t<sub>HZWE</sub> are specified with CL = 5 pF as in Fig. 2. Transition is measured ± 500mV typical from steady state voltage, allowing for actual tester RC time constant.
- At any given temperature and voltage condition, t<sub>HZCE</sub> is less than t<sub>LZCE</sub> and t<sub>HZWE</sub> is less than t<sub>LZWE</sub>.
- $\overline{WE}$  is HIGH for READ cycle.
- Device is continuously selected. Chip enable and output enable are held in their active state.
- Address valid prior to or coincident with latest occurring chip enable.
- t<sub>RC</sub> = READ cycle time.
- Chip enable ( $\overline{CE}$ ) and write enable ( $\overline{WE}$ ) can initiate and terminate a WRITE cycle.

**DATA RETENTION ELECTRICAL CHARACTERISTICS (L Version Only)**

DESCRIPTION	CONDITIONS	SYMBOL	MIN	MAX	UNITS	NOTES
V <sub>CC</sub> for Retention Data		V <sub>DR</sub>	2	—	V	
Data Retention Current	$\overline{CE} \geq (V_{CC} - 0.2V)$ $V_{IN} \geq (V_{CC} - 0.2V)$ or $\leq 0.2V$	V <sub>CC</sub> = 2V		1.0	mA	
		V <sub>CC</sub> = 3V		1.5	mA	
Chip Deselect to Data Retention Time		t <sub>CDR</sub>	0	—	ns	4
Operation Recovery Time		t <sub>R</sub>	t <sub>RC</sub>		ns	4, 11

**LOW V<sub>CC</sub> DATA RETENTION WAVEFORM**



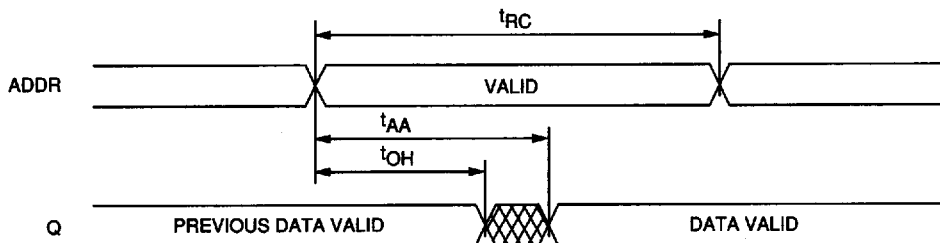
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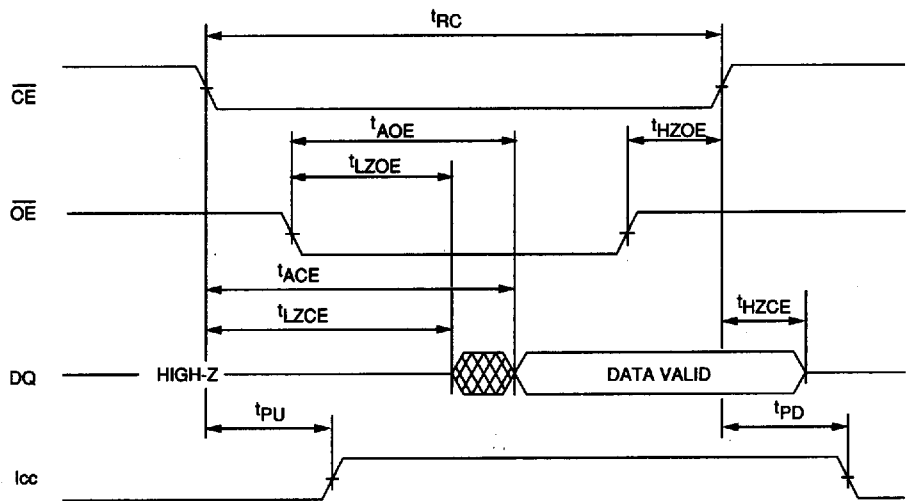
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T-46-23-14

**READ CYCLE NO. 1<sup>8,9</sup>**



**READ CYCLE NO. 2<sup>7,8,10</sup>**



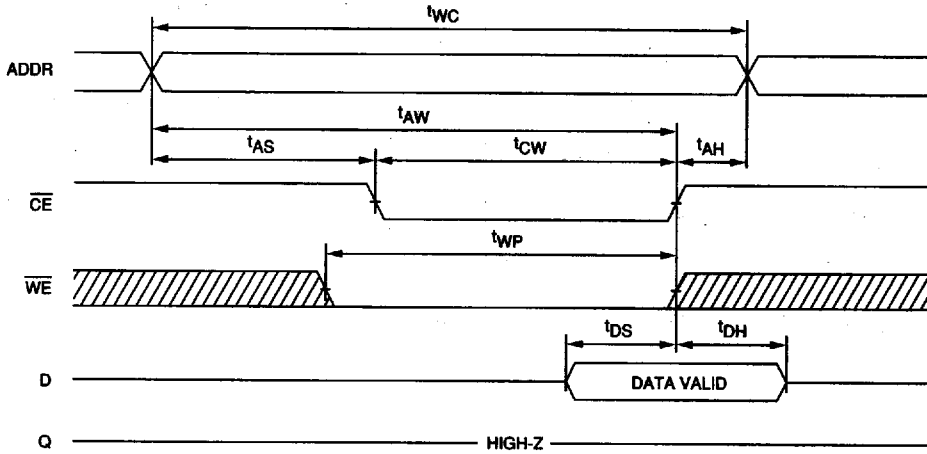
 DONT CARE  
 UNDEFINED

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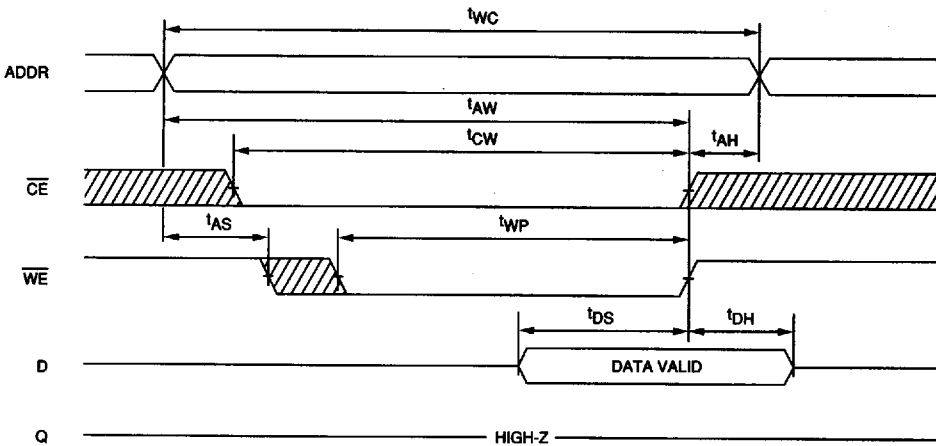
T-46-23-14

**WRITE CYCLE NO. 1<sup>12</sup>**  
(Chip Enable Controlled)



**FAST SRAM**

**WRITE CYCLE NO. 2<sup>7,12</sup>**  
(Write Enable Controlled)



 **DON'T CARE**  
 **UNDEFINED**

**NOTE:** Output enable ( $\overline{OE}$ ) is inactive (HIGH).

**MICRON**MT5C1009 883C  
128K x 8 SRAM**ELECTRICAL TEST REQUIREMENTS****T-46-23-14****FAST SRAM**

MIL-STD-883 TEST REQUIREMENTS	SUBGROUPS (per Method 5005, Table I)
INTERIM ELECTRICAL (PRE-BURN-IN) TEST PARAMETERS (Method 5004)	2, 8A, 10
FINAL ELECTRICAL TEST PARAMETERS (Method 5004)	1*, 2, 3, 7*, 8, 9, 10, 11
GROUP A TEST REQUIREMENTS (Method 5005)	1, 2, 3, 4**, 7, 8, 9, 10, 11
GROUP C AND D END-POINT ELECTRICAL PARAMETERS (Method 5005)	1, 2, 3, 7, 8, 9, 10, 11

\* PDA applies to subgroups 1 and 7.

\*\* Subgroup 4 shall be measured only for initial qualification and after process or design changes, which may affect input or output capacitance.